TRANSFORMING URBAN ROADS IN INDIA

THE TENDER S.U.R.E. IMPACT

BENGALURU

Prepared by

Jana Urban Space Foundation

Jana Urban Space

Jana Urban Space works towards transforming the quality of life in urban India through the streams of urban planning and design, across both policy and practice. Placing community and environmental sustainability at the heart of design, Jana Urban Space works on policies on land titling, spatial reforms, and street design guidelines, as well as regional plans, masterplans, and neighbourhood-level plans. The organization also focuses on the improvement of road infrastructure (Tender S.U.R.E.), rejuvenation of public spaces (markets, bus stands, lakes, parks, heritage and community centres), and the architecture of affordable housing.

TENDER
S.U.R.E. | **S**pecifications for **U**rban **R**oads **E**xecution

THE TENDER S.U.R.E. IMPACT

BENGALURU

April 2025

Partners

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BACKGROUND

India's cities are expected to house an additional 404 million residents by 2050. However, the planning and design of cities and the services offered are unlikely to keep up with this pace of urbanisation.

In this scenario, urban roads are more than just motorised thoroughfares. They are a fundamental element of networked infrastructure in a city. However, traditional forms of urban development in the past couple of decades have centred on automobiles and private vehicles. Urban roads built around automobiles take away the opportunity for the equitable distribution of road space among all users.

Furthermore, the planning and maintenance of roads in India has traditionally been done in an ad-hoc, piecemeal manner. There is little to no coordination between the different agencies involved in constructing and maintaining roads and those in charge of laying down allied services. Urban roads are therefore subjected to frequent digging, especially around the monsoons. This leads to repetitive maintenance costs and inconveniences to all road users.

In 2011, to bridge these gaps, Jana Urban Space Foundation conceived and authored the first set of design and procurement guidelines for urban roads in India: Tender S.U.R.E.

Tender S.U.R.E. envisages the creation of a robust, safe, and comfortable movement corridor for people and goods across all modes of transport. The right-of-way is designed for all, not just vehicle users. Designated footpaths, safe cycle tracks and allocated areas for bus stops, parking, street furniture, and vending are also taken into consideration.

Another key principle of Tender S.U.R.E. is to provide ducted corridors for underground utilities. These include — but are not limited to — water supply, sewerage, stormwater drainage, gas, power, telecom, street lights, and surveillance, with regular inspection chambers and last-mile house connections contained within the footpath on both sides. This is done to prevent repeated digging and cyclic expenditure while improving the level of services and enhancing user experience.

Till date, 183kms of Tender S.U.R.E. roads have been built — or are in the process of being built — across the country.

Tender S.U.R.E. roads have been appreciated and recognized in different ways. In a bid to collect substantive data and evidence on the implementation and impact of Tender S.U.R.E. road design, a monitoring, evaluation, and learning exercise was conducted in Bengaluru in 2022. This report documents the framework and results of this work.

APPROACH

Twelve important features of Tender S.U.R.E. roads were identified as key to their intended impact, including wide footpaths, the development of landscaped strip dividers, cycle lanes, common utility access points, etc. These affected the intended impact in four broad ways:

1. **Improved walkability.**
2. **Improved drivability.**
3. **Improved road safety.**
4. **Improved road maintenance.**

Ten Tender S.U.R.E. roads and three control roads in Bengaluru's Central Business District were selected for monitoring and evaluation. Tender S.U.R.E. roads covered a variety of diversity from year of execution to length, road classification, zoning, etc. Control roads were selected to match this range of characteristics and an array of methods were employed to assess both sets of roads.

Monitoring: The 12 key features were reviewed across three dimensions: pre-Tender S.U.R.E., against the intended design, and against the implemented design. Data for the first two was available with Jana Urban Space while the implemented design was reviewed on the ground in July 2022. Overall monitoring scores were assigned to all Tender S.U.R.E. roads based on the implementation of the aforementioned features.

Evaluation: Objective surveys of walkability, lighting, and traffic volume and flow were some of the many methods employed to conduct evaluation. We also carried out a series of stakeholder perception surveys with pedestrians and vehicle (motorised and non-motorised) users of the roads, traffic police, and engineers.

MONITORING RESULTS

Amongst the 10 Tender S.U.R.E. roads that were studied, several strictly adhered to the intended design and the implementation of the 12 key features. For example, **97% of the key features have been implemented on St Mark's Road and, on Commissariat Road, this figure is 83%**. More than 50% of the key features have been implemented across all 10 roads. Where there were implementation gaps, one of the main differentiators stemmed from the year of execution:

- Roads that were completed in Phase 01 (2014–17) and Phase 02 (2016–18) of the project show a higher level of compliance with the intended design and the Tender S.U.R.E. guidelines.
- All selected Tender S.U.R.E. roads completed in the first two phases score high in walkability (footpath width) and traffic management (road width, and availability and design of bus stops).
- Issues in compliance observed in Phase 03 (2017–20) roads are primarily found in utilities being above ground, bins being omitted, etc.

EVALUATION RESULTS

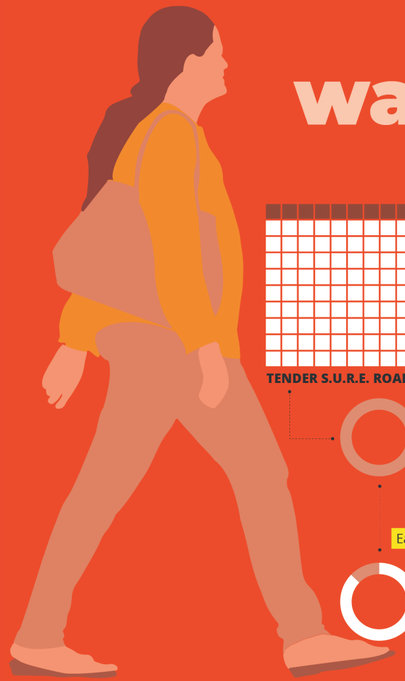
The following are the key findings from the evaluation:

- Pedestrians and vehicle users interviewed about Tender S.U.R.E. roads reported a significantly better experience than those interviewed about control roads. **90% people on Tender S.U.R.E roads find it easier to walk as compared to 27% on non Tender S.U.R.E roads and 74% vehicle users find it easier to drive on Tender S.U.R.E roads as compared to 20% on non Tender S.U.R.E roads**. In terms of safety from road traffic accidents, **53% of pedestrians and vehicle users felt safer on Tender S.U.R.E. roads** than on control roads.
- The perception surveys are supported by results from the objective walkability measure. **Tender S.U.R.E. roads are more walkable than control roads**, **with an average walkability score of 8.4 on 10, as compared to 7.6**.
- Objective street lighting measures show that **Tender S.U.R.E. roads are brighter** than control roads (**21 Lux compared with 16 Lux**), though all roads meet the minimum accepted bar for Lux levels.
- **Traffic police reports significantly easier traffic management on Tender S.U.R.E. roads (95% found it 'easy/very easy')** as compared with control roads (which only 67% found 'easy/very easy').
- Pedestrians, vehicle users, and traffic police highlighted several features of Tender S.U.R.E. roads which benefit walkability, drivability, safety from accidents and traffic management:
  - Wide/smooth footpath
  - Landscaped barrier between roads and footpaths
  - Design that leads to less flooding and roadwork blockages
  - Lack of potholes.
- Two engineers surveyed stated that Tender S.U.R.E. roads are well planned and executed, are built using good quality material, and require minimum wear-and-tear related maintenance. Additionally, repair and maintenance is made easier with convenient access to utilities through access chambers.
- While vehicular speed across all 13 roads falls significantly below recommendations, Tender S.U.R.E. roads, on average, show marginally higher speeds than control roads. Additionally, a relatively even speed is observed throughout the day, without much variation in peak and non-peak hour speeds. This suggests both a consistency of flow and an absence of serious congestion.
- Tender S.U.R.E. roads carry a higher volume of pedestrians as compared with control roads, with the former seeing **228% more pedestrians** than the latter.
- Tender S.U.R.E. roads carry a more diverse range of pedestrians. For instance, in one road set (St Mark's Road and Devanga Samaja Road – both collector roads), the Tender S.U.R.E. road **(St Mark's Road) carries 73% more adults, and 45% more elderly**.

WAY FORWARD

- While the degree of maintenance required by Tender S.U.R.E. roads is observed to be significantly lesser than other roads, it still does not completely alleviate the need for routine maintenance. To address the issue of poor urban road conditions in the long term, it may be necessary to **implement a comprehensive road maintenance and repair program** that improves their overall condition and reduces the likelihood of damage.

walkability



How walkable are the roads?
From a road safety perspective

90% find the roads **very walkable**

TENDER S.U.R.E. ROADS

27% find them **walkable**

CONTROL ROADS

0% find the roads **impossible to walk on**

20% find the roads **impossible to walk on**

Ease of two people walking alongside

87% find it **very easy to walk**

23% find it **very easy to walk**

8.4

TENDER S.U.R.E. ROADS

7.6

CONTROL ROADS

Walkability Monitoring Score
Objective monitoring to measure ease of walking on Tender S.U.R.E. roads

+228%

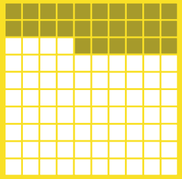
Higher count of pedestrians on Tender S.U.R.E. roads

+117%

Higher count of women on Tender S.U.R.E. roads

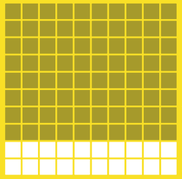
drivability

How drivable are the roads?
From a road safety perspective



74% find the roads **very drivable**

TENDER S.U.R.E. ROADS



20% find the roads **drivable**

CONTROL ROADS

28% find the roads **good/ very good to drive during peak hours**

0% find the roads **good/ very good to drive during peak hours**

Ease of driving during peak/ non-peak hours

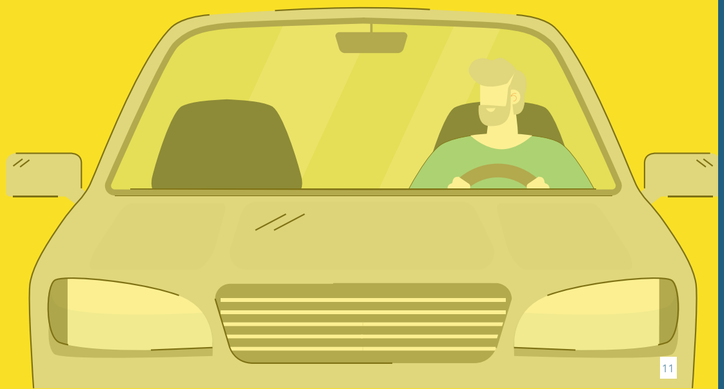
44% find the roads **very good to drive during non-peak hours**

7% find the roads **very good to drive during non-peak hours**

Ease of managing traffic

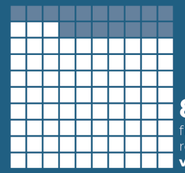
95% traffic police find it **easy/ very easy to manage traffic**

67% traffic police find it **easy/ very easy to manage traffic**



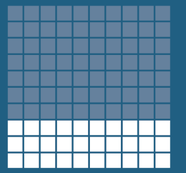
safety

How safe are the roads?
From accidents



83% find the roads **safe/ very safe**

TENDER S.U.R.E. ROADS



30% find the roads **safe/ very safe**

CONTROL ROADS

From daytime crime

99% find them **safe/ very safe**

80% find them **safe/ very safe**

From nightime crime

62% find them **safe/ very safe**

30% find them **safe/ very safe**

31%
higher than average Lux on Tender S.U.R.E. roads

+228 %
more pedestrians
on Tender
S.U.R.E. roads

Unfold for key findings

Rethinking Urban Mobility with Tender S.U.R.E.

INTRODUCTION

1.1 | ABOUT TENDER S.U.R.E. ROADS

India's cities are expected to house an additional 404 million residents by 2050[1]. Bengaluru, for example, which had a population of 9.7 million in 2014, will soon become a megacity of more than 10 million — if it isn't already. This number is expected to touch 14.8 million by 2030. However, this spurt in urbanisation is not evenly matched with the planning and design of cities or the quality of services offered.

This is most apparent on roads, wherein —

- Poorly designed and unplanned roads with lack of proper infrastructure make walking and cycling extremely unsafe and hazardous.
- Road congestion and ever-increasing private transport lead to an increase in pollution.
- Poorly built roads and infrastructure result in the formation of potholes, cracks, broken footpaths, and open drains that endanger the safety of users.
- Lack of enforcement allows two-wheeled vehicles to ride on footpaths and cycle tracks, while parked vehicles encroach pedestrian spaces, compromising non-vehicular user movement.

URBAN ROADS BUILT AROUND AUTOMOBILES TAKE AWAY THE OPPORTUNITY FOR THE EQUITABLE DISTRIBUTION OF ROAD SPACE AMONG ALL USERS.

In such a scenario, urban roads are more than just motorised thoroughfares. They are a fundamental element of networked infrastructure in a city — enabling the transportation of people, goods and services, and being conduits for piped infrastructure such as water supply, stormwater and sewage network, electrical lines, etc. Roads are also the first public space we encounter outside our homes. They allow for a range of activities: from localised movement and community interactions to thriving markets.

The role of roads in tackling the burgeoning health crises, especially that of non-communicable diseases, has been widely researched. A study done by the Public Health Foundation of India (PHFI) highlights the positive implications of walking and cycling on non-communicable diseases such as diabetes and hypertension. Lack of infrastructure leading to physical inactivity is shown to be responsible for 3.3% of deaths and 19 million Disability Adjusted Life Years (DALYs) worldwide[2].

However, traditional forms of urban development in the past couple of decades have centred on automobiles and private vehicles. Urban roads built around automobiles take away the opportunity for the equitable distribution of road space among all users. This is particularly evident in the case of India, where the number of private vehicles increases significantly every year and sprawling cities with limited public transport lead to a greater dependence and a further rise in their numbers.

Moreover, the planning and maintenance of roads in India has traditionally been done in an ad-hoc, piecemeal manner. There is little to no coordination between the different agencies involved in constructing and maintaining roads and those in charge of laying down allied services. Urban roads are therefore subjected to frequent digging, especially around the monsoons. This leads to inflated life cycle costs and inconveniences to all road users.

The Tender S.U.R.E. guidelines aim to bridge these gaps in urban road design and implementation. Conceived and authored by Jana Urban Space Foundation in 2011, **Tender S.U.R.E.** is a two-volume set of design, procurement, and implementation guidelines that are the first of its kind for urban roads in India.

TENDER S.U.R.E. ENVISAGES THE CREATION OF A ROBUST, SAFE, AND COMFORTABLE MOVEMENT CORRIDOR FOR PEOPLE AND GOODS ACROSS ALL MODES OF TRANSPORT.

1 UN Department of Social and Economic Affairs. (2014). World Urbanization Prospects - Highlights. New York: United Nations.

2 Solanki HK, Ahamed F, Gupta SK, Nongkynrih B. Road Transport in Urban India: Its Implications on Health. Indian J Community Med. 2016 Jan-Mar;41(1):16-22. doi: 10.4103/0970-0218.170959. PMID: 26917868; PMCID: PMC4746948.

Tender S.U.R.E. envisages the creation of a robust, safe, and comfortable movement corridor for people and goods across all modes of transport. It redefines road design to create vibrant public spaces that welcome all users. The right-of-way is designed for all, not just vehicle users. Designated footpaths, safe cycle tracks and allocated areas for bus stops, parking, street furniture, and vending are also taken into consideration.

Another key principle of Tender S.U.R.E. is to provide ducted corridors for underground utilities. These include — but are not limited to — water supply, sewerage, stormwater drainage, gas, power, telecom, street lights, and surveillance, with regular inspection chambers and last-mile house connections contained within the footpath on both sides. This is done to prevent repeated digging and cyclic expenditure while improving the level of services and enhancing user experience. A more detailed overview of the objectives of Tender S.U.R.E. are available in the following sections.

Till date, 183kms of Tender S.U.R.E. roads have been built — or are in the process of being built — across the country.

These roads have been appreciated and recognized in different ways[3]. In a bid to quantify their impact, a monitoring, evaluation, and learning exercise was conducted in Bengaluru in 2022. This report documents the framework and results of this work.

3 *2012 - Volvo Sustainable Mobility Award*
2017 - Tender S.U.R.E. included in NACTO, North America's global street design guidelines for best practices.
2017 - Tender S.U.R.E. roads in Bengaluru identified as best practice for walkability and bike-ability by C40 cities
2018 - HUDCO Award for best practices in improving the living environment

1.2 | OBJECTIVES AND FEATURES OF TENDER S.U.R.E. ROADS

Tender S.U.R.E. roads primarily focus on promoting equitable division of the right-of-way. They create a designated safe movement corridor for all user groups, including women, children, and the differently abled. They also promote financial sustainability by providing an organised corridor for underground utilities that reduces life cycle costs and improves the quality of services.

The Tender S.U.R.E. guidelines, therefore, seek to make urban roads in India:

1. More walkable
2. More drivable
3. Safer
4. Easier and more cost effective to maintain.

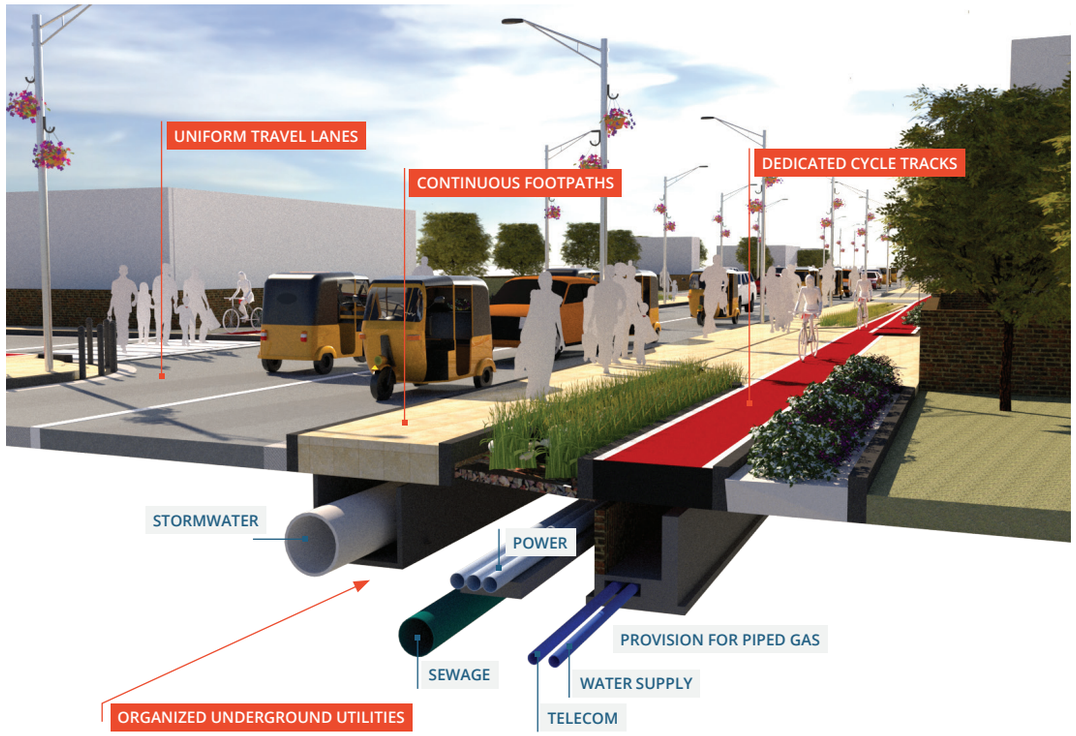


Figure 01. Objectives and features of Tender S.U.R.E. roads

Tender S.U.R.E. aims to achieve these objectives through 12 key design features listed in *Table 01*.

		Continuous wide footpath	Travel lanes of uniform width	Standardised specifications for material and construction	Integrated bus stop infrastructure	Optimum street lighting	Landscape inclusion	On street waste management	Regular access to underground utilities	Well-designed stormwater drainage	Dedicated cycle tracks	Dedicated vending spaces	Adequate short and long duration street parking
OBJECTIVES OF TENDER S.U.R.E.	1	●	○	●	●	●	●	○	●	●	●	●	○
	2		●	●	●	●	○		●	●	●		●
	3	●	●	●	○	●	●		○	●	●	○	●
	4			●				●	●	●			

Table 01. Design feature matrix for Tender S.U.R.E. roads

LEGEND
● Direct impact
○ Indirect impact

1.3 | GUIDELINES AND EXECUTION OF TENDER S.U.R.E. ROADS

The construction of a guidelines-compliant Tender S.U.R.E. road follows a 10-step process, from conception to implementation. It is designed to meet the objectives stated in *Section 1.2 | on page 20*, and is delineated in *Figure 02* below.

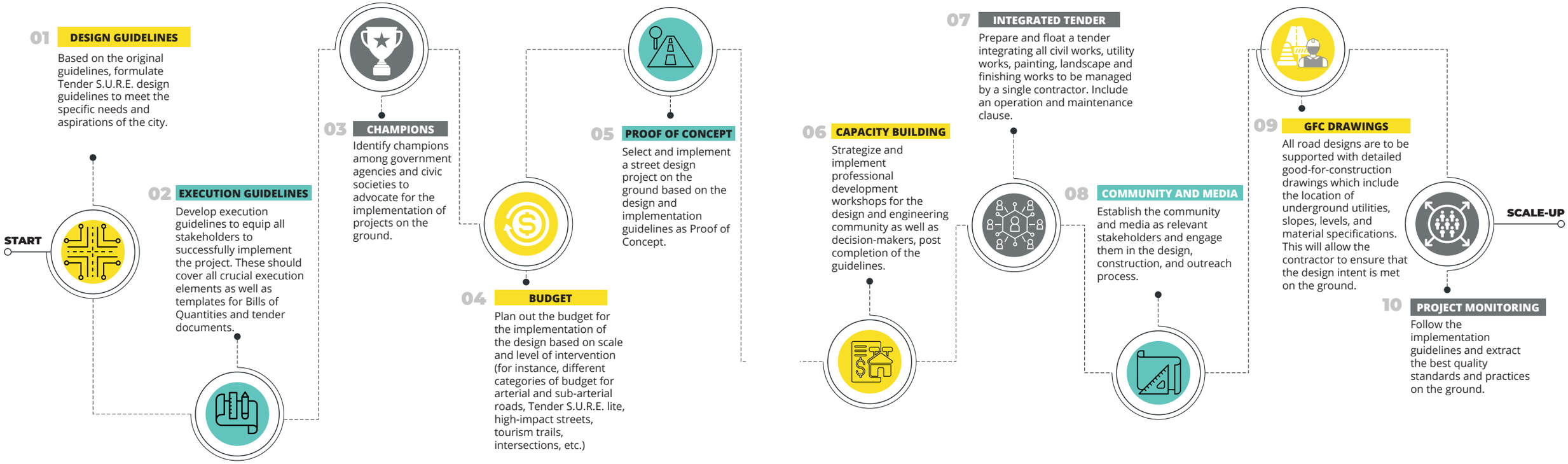
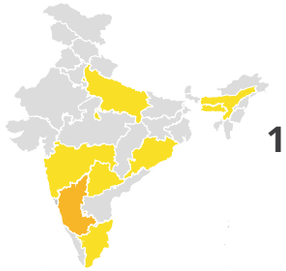
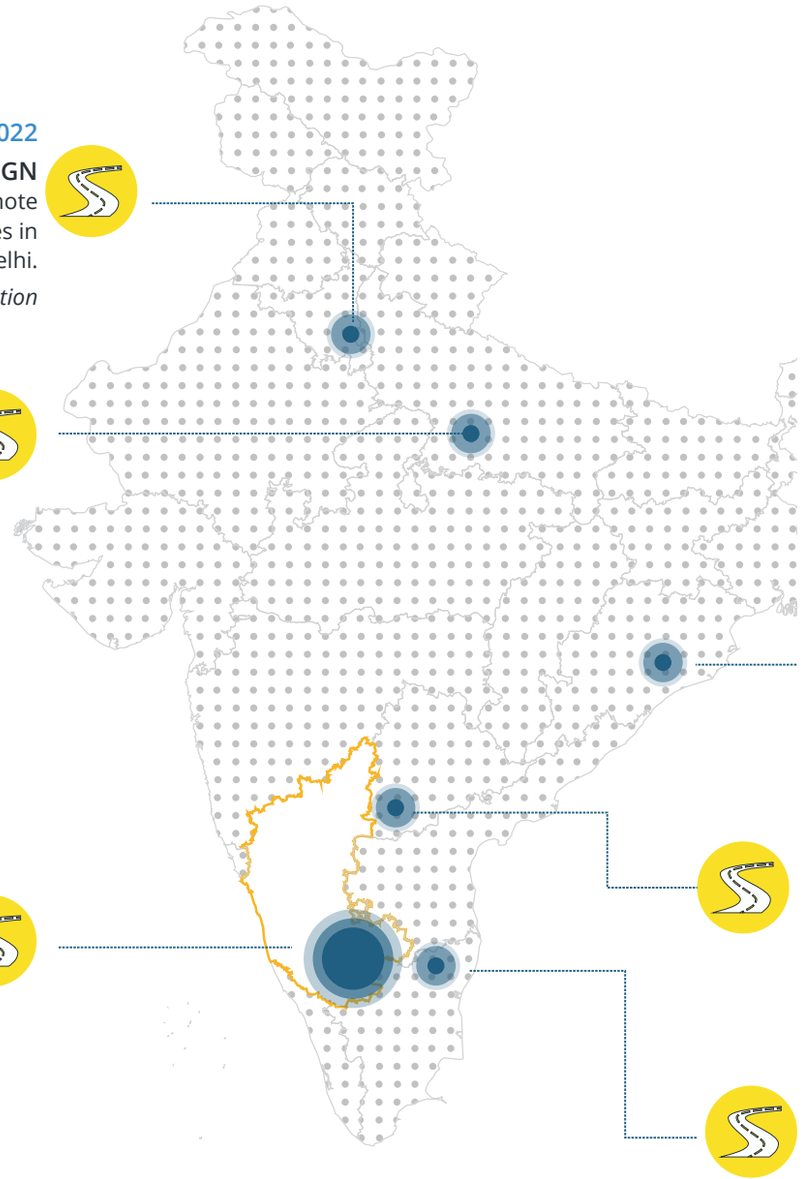


Figure 02. Steps to build a Tender S.U.R.E. road



1.4 | CURRENT REACH OF TENDER S.U.R.E. ROADS



2022
INTERSECTION REDESIGN
Tactical urbanism trials to promote road safety and reduce fatalities in 4 key junctions in Delhi.
In partnership with ***SaveLIFE Foundation***

2022
TENDER S.U.R.E. ROAD REDEVELOPMENT
18km of roads in Lucknow.
4km of roads in Gorakhpur.
16km of roads in Ayodhya.

2023
CM GRIDS
200 km across 17 ULBs.

2014
TENDER S.U.R.E. ROAD REDEVELOPMENT
60km of Tender S.U.R.E. roads in Bengaluru.
22.5km of Tender S.U.R.E. roads in Hubballi–Dharwad.

Tactical urbanism trials to promote road safety and reduce fatalities in 1 key junction.
In partnership with ***SaveLIFE Foundation***

2023
TENDER S.U.R.E. ROAD REDEVELOPMENT
18km and 15 intersections in Meghalaya.

2024
TENDER S.U.R.E. ROAD REDEVELOPMENT
3.5km of roads in Sivasagar, Assam

2021
ODISHA S.U.R.E.
65km of local road redevelopment in 10 ULBs.

SCALE-UP IN 3 ULBs
260km of footpaths.

2022
TENDER S.U.R.E. ROAD REDEVELOPMENT
1.2km model road in Nalgonda.
13 key intersections across 6 zones in Hyderabad.

2020
CHENNAI MEGA STREETS
15km of pedestrian priority complete streets.

2022
COIMBATORE STREETS
1.5km of roads.

>200KM
of Tender S.U.R.E. roads

>20
junction improvement projects

>268KM
of Tender S.U.R.E. footpaths

Figure 03. Map showing reach of Tender S.U.R.E. across India

Bengaluru is the epicentre of Tender S.U.R.E. roads in India, with a 60km network constructed over the last decade.

Tender S.U.R.E.'s pilot project was undertaken in the Central Business District area of Bengaluru, as it carries some of the heaviest traffic volumes in the city. Being a historic core, it has also inherited service networks that date back many decades. The first Tender S.U.R.E. road, St Mark's Road, was completed in 2015 while the most recent ones were completed in 2022 by the BBMP under the Smart Cities Mission.

Given the extensive network, and having been in place for nearly 10 years, the Monitoring, Evaluation, and Learning (MEL) study has been conducted on the completed Tender S.U.R.E. roads in Bengaluru.

2

METHODOLOGY

2.1 | OVERVIEW

The methodology section highlights how each stage of Monitoring, Evaluation, and Learning (MEL) was chosen and designed to assess the impact of constructed Tender S.U.R.E. roads.

The purpose of the monitoring exercise is to understand to what extent the key features of the Tender S.U.R.E. road design have transferred to the roads in practice. Factoring in these results, the evaluation aims to measure the extent to which the objectives and intended impact of the Tender S.U.R.E. design has been achieved. The learning exercise considers how design and implementation can be improved in the future for maximum impact.

While the framework developed in this section pertains to Tender S.U.R.E. roads in Bengaluru, it can be applied to Tender S.U.R.E. projects in other states as well.

2.2 | SELECTION OF ROADS

Out of the 60kms of completed Tender S.U.R.E. roads in Bengaluru, a set of 10 roads were selected for evaluation. All 10 sit within the city's Central Business District (CBD) area.

To ensure the comprehensiveness of the study, a diverse range of roads were selected based on the following parameters:

- Year of execution/development of the road into a Tender S.U.R.E. road
- Road classification (arterial, sub-arterial, collector or local)
- Zoning classification (public, semi-public [schools, institutions, government buildings, etc.], commercial, residential, parks and open spaces, defence, industrial, or unclassified)
- Length
- Number of lanes
- Traffic direction (one or two way).

Three non-Tender S.U.R.E. roads (also within the CBD) were selected as a control group for comparison. Care was taken to ensure that they matched the diversity of the selected Tender S.U.R.E. roads (refer *Table 02)*. Additionally, for specific comparisons such as traffic volume and flow, sets of road pairs (Tender S.U.R.E. versus control roads) were identified since overall comparisons would be of limited use when road zoning and other features heavily influence such parameters. These road pairs and their selection are also outlined in *Section 5.2 | on page 62*.

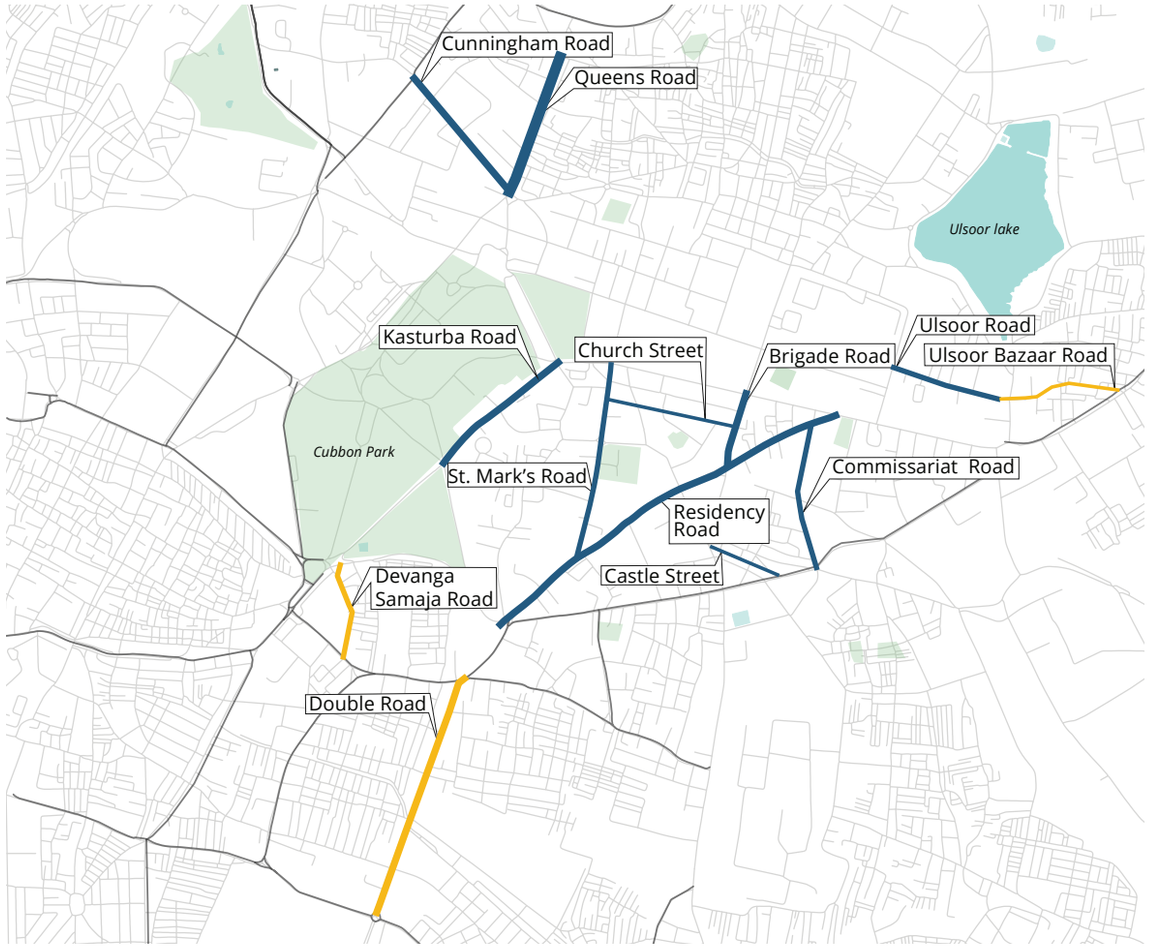


Figure 04. Map locating selected Tender S.U.R.E. roads for study

The Tender S.U.R.E. and control roads are shown spatially on the map in Figure 04. A detailed description of the categorizations and selections is given in Table 02.

Parameters for Road Selection

		Road name	Area	Year of execution	Classification	Zoning	Length (km)	No. of Lanes	Traffic direction
TENDER S.U.R.E. ROADS	1	Residency Road	CBD	2013-17	Sub-arterial		2	3/4	One-way
	2	St Mark's Road	CBD	2013-17	Collector		1.8	2/3	One-way
	3	Cunningham Road	CBD	2013-17	Sub-arterial		1.3	3	One-way
	4	Commissariat Road	CBD	2013-17	Collector		0.6	3	One-way
	5	Church Street	CBD	2016-18	Local		0.715	2	One-way
	6	Queens Road	CBD	2018-20	Arterial		1.37	3	One-way
	7	Ulsoor Road	CBD	2018-20	Collector		0.59	2+2	Two-way
	8	Castle Street	CBD	2018-20	Local		0.4	2	One-way
	9	Brigade Road	CBD	2018-20	Local + Sub-arterial		0.37	2	One-way
	10	Kasturba Road	CBD	2018-20	Sub-arterial		0.76	4+3	Two-way
TOTAL							**9.905**		
CONTROL ROADS	1	Double Road/KH Road	CBD		Sub-arterial		1.3	2+2	Two-way
	2	Ulsoor Bazaar Street	CBD		Local		0.55		One-way
	3	Devanga Samaja Road	CBD		Collector		0.45		One-way

Table 02. Selection of roads for study

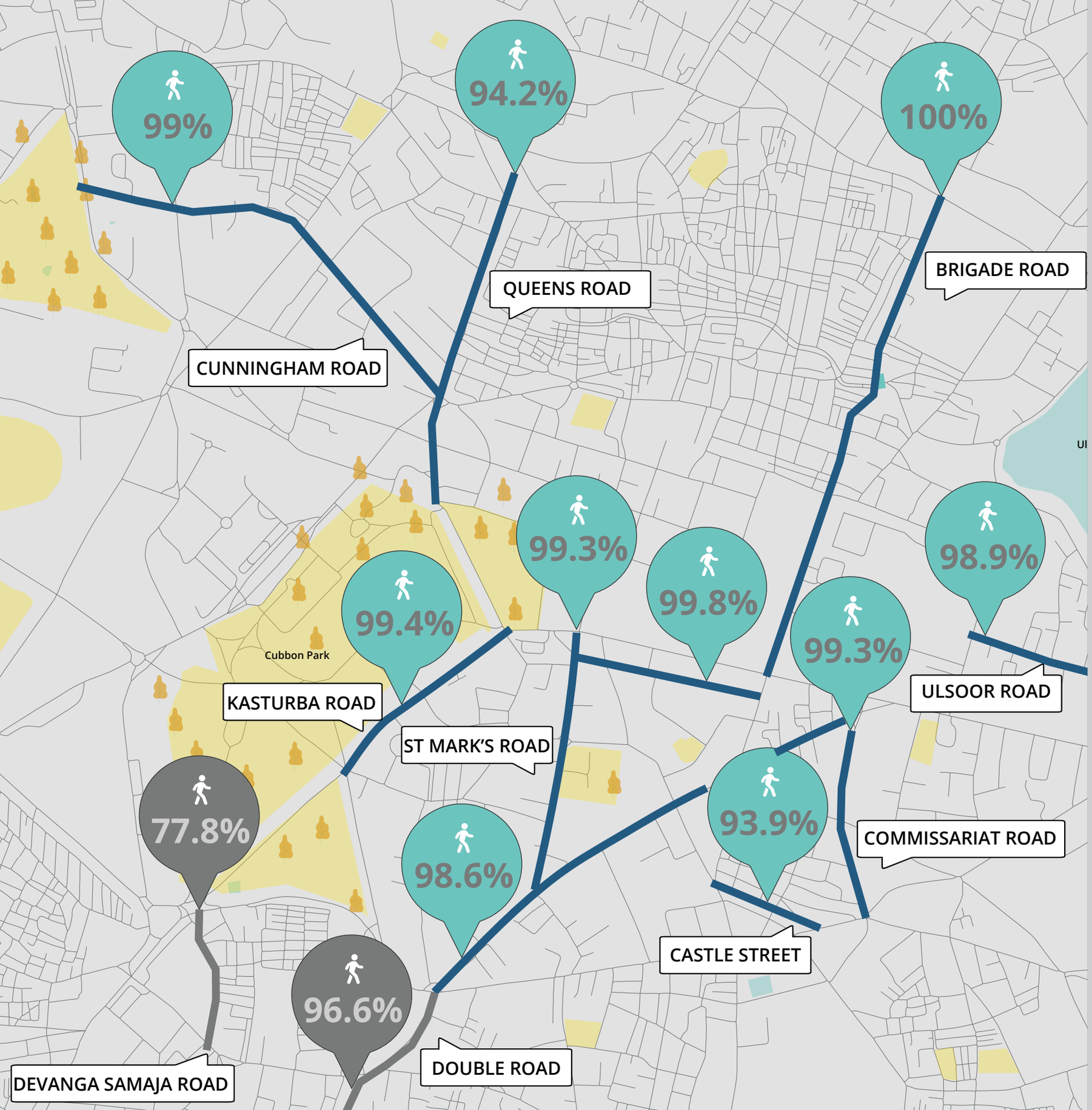
LEGEND
- PUBLIC/ SEMI-PUBLIC
- COMMERCIAL
- RESIDENTIAL
- GREEN/ OPEN SPACE

2.3 | DESIGN FRAMEWORK

The graphic below highlights how each stage of Monitoring, Evaluation, and Learning (MEL) has been considered and measured with regard to the impact of constructed Tender S.U.R.E. roads.

	WHAT	WHY	HOW	OUTCOME
MONITORING	Identify if the **key features** of Tender S.U.R.E. roads have been implemented on the ground.	To understand the relationship between road implementation and potential impact. If any key features are missing, this will have a bearing on impact.	1 Pre-design/ original state of the road (collected prior to road redevelopment) 2 The proposed Tender S.U.R.E. design (drawn from the Jana Urban Space archives) 3 Post-execution (collected on site at the relevant roads over a period of 2 weeks in July 2022 by trained urban planners	A feature implementation score for each road, indicative of implementation success of key features across roads with different topographies including zoning classification, direction of traffic, lane width, primary road usage, and year of upgradation to Tender S.U.R.E. road.
PROCESS EVALUATION	Observe and **review the process** of implementation of key features on Tender S.U.R.E. roads.	To understand the barriers, issues, challenges and unintended consequences to implementation.	*To be covered in a future study:* Focus on understanding the implementation gaps identified in the monitoring exercise as part of the current project. This would include interviews with the urban planners of the road, site engineers, civic agencies, and other relevant road-building stakeholders.	
IMPACT EVALUATION	Measure the impact of the Tender S.U.R.E. road design on **walkability, drivability, safety, and road maintenance.**	To understand if the key features of Tender S.U.R.E. roads deliver the intended impact in these areas.	The impact on each of the areas was measured on 10 Tender S.U.R.E. and 3 control roads 1 Perceptions from a cross-section of 65 pedestrians (5 per road), on walkability, safety and road maintenance. — *35% women, 65% men; 43% under 30 years of age, 57% over 30 years of age.* 2 Perceptions from a cross-section of 65 citizens (5 per road), who use motorised/non-motorised vehicles, on walkability, drivability, safety, and road maintenance. 3 Perceptions from 26 traffic police personnel (2 per road) responsible for the different roads, on walkability, drivability, safety, and road maintenance. — *12% women, 88% men; 50% under 30 years of age, 50% over 30 years of age; • 4 police sub-inspectors • 2 asst. sub-inspectors • 7 head constables • 13 police constables* 4 Perceptions from 2 engineers responsible for CBD roads on road maintenance — *32% women, 68% men; 55% two-wheelers, 20% four-wheelers, 13% bus users, 3% cyclists, 2% taxi users* 5 Objective traffic survey data on all roads at peak and non-peak hours covering: a) Pedestrian volume and types b) Traffic volume and types c) Traffic speed. 6 Objective survey of footpaths on all 13 roads including the existence of a path, lighting, width, encroachments, and accessibility.	
LEARNINGS	Align **findings** from monitoring and evaluation components to **generate learnings**.	To use data-driven evidence to review and enhance Tender S.U.R.E. road design and implementation to achieve its intended impact.	Review and analyse the monitoring outcomes with the impact outcomes to determine the relationship between the different key features of Tender S.U.R.E. roads and the intended impact.	Highlight the presence — and absence — of alignment and what needs to be considered going forward in the design and implementation of Tender S.U.R.E. roads.

Table 03. Framework for MEL exercise



3

KEY FINDINGS

3.1 | MONITORING RESULTS

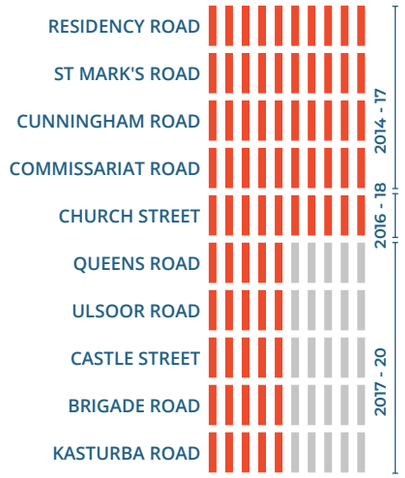


Figure 05. Extent to which Tender S.U.R.E. 10 steps are followed

The monitoring score establishes the extent to which the selected Tender S.U.R.E. roads comply with the Tender S.U.R.E. design guidelines.

Every road in the study has been reviewed against the 12 key design features of a Tender S.U.R.E. road (*refer Table 01 | on page 21).* Each of the 12 features is further subdivided into the physical components that impact the end result.

For example, Tender S.U.R.E. guidelines prescribe 'wide, continuous footpaths[1]. This includes 9 elements such as the width and height of the footpath, the presence of ramps and tactile pavers for universal access, the presence of bollards, etc.

Similarly, the feature of 'uniform travel lanes' is not just a function of the lanes. It also involves the provision of halting and parking bays wherever necessary to prevent haphazard stopping of vehicles and the obstruction of traffic flow.

A detailed framework of the monitoring study is provided in *Section 5.4 | on page 66.*

A scoring system was designed based on this framework. It measures the outcome of the monitoring study and accords a point for each particular design compliance (*refer Section 5.6 | on page 94). Figure 06* highlights the extent of compliance by the selected Tender S.U.R.E. roads. St Mark's Road shows the highest level of compliance with a score of 9.7.

The selected 10 Tender S.U.R.E. roads displayed significant differences in the intended and final outcomes of the key features. One of the main differentiators stems from the year of execution. All selected Tender S.U.R.E. roads completed in Phase 01 (2014–17) and Phase 02 (2016–18) display a higher level of compliance with the intended design [*refer Figure 05*]. They score high in walkability (footpath width), and traffic management (road width, availability and design of bus stops). The issues in compliance observed in Phase 03 (2017–20) roads are primarily with regard to utilities being above ground, bins being omitted, etc.

A detailed result of the monitoring study for all selected Tender S.U.R.E. roads can be found in *Section 5.5 | on page 74.*

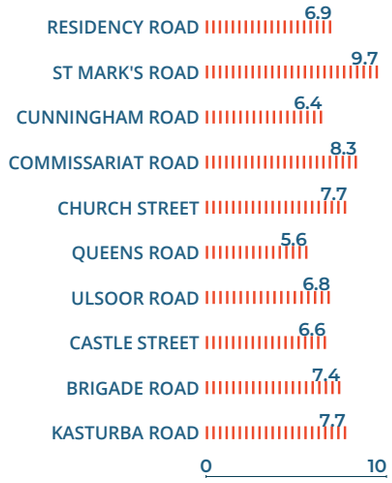


Figure 06. Monitoring scores

1 *Minimum width of 1.5m for all roads, except sub-local roads with 2m or 3m RoW*

Walkability monitoring

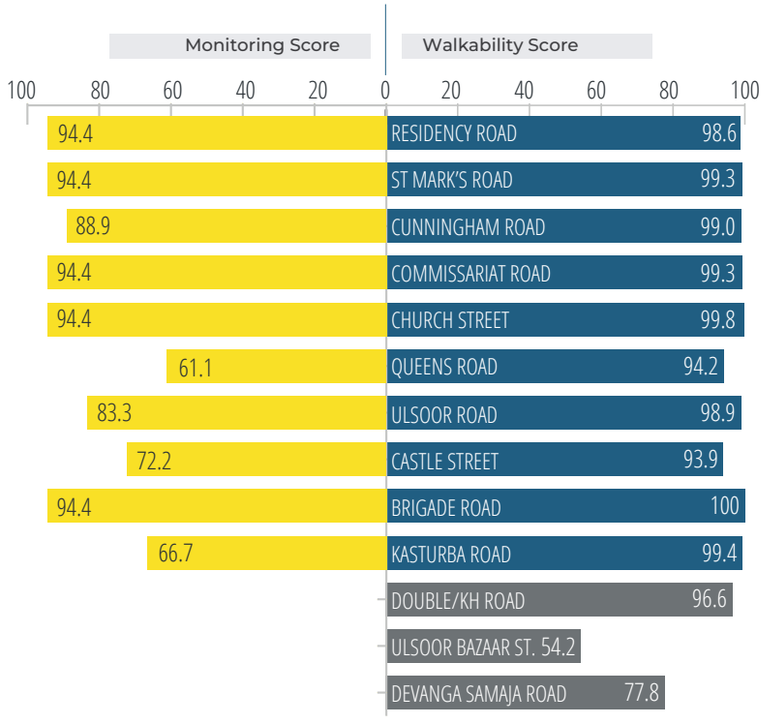


Figure 07. Walkability monitoring scores

Figure 07 shows a comparative score chart. The monitoring score for footpaths (availability of design features as shown in *Table A_02 | on page 66*) is on the left and the walkability score (which captures the extent to which the footpath is free from obstructions and blockages) is on the right. The chart highlights that roads with high monitoring scores (i.e. those that have closely followed the design guidelines) have higher walkability scores as well.

A detailed rationale for the walkability scores is available in *Section 5.7 | on page 100.*

Devanga Samaja Road

Uneven and broken footpath slabs

Vendors encroaching on footpaths

THE WALKABILITY SCORES MEASURE THE EXTENT TO WHICH A FOOTPATH IS FREE FROM OBSTRUCTIONS.

Double / Kh Road

Vehicles parked on footpath

Vehicles parked on footpath

Construction material dumped on footpath

Ulsoor Bazaar Street

Broken footpath; rubble dumped on footpath

Construction material dumped on footpath

No visible footpath

Figure 08. Obstructions on footpaths for control roads

3.2 | EVALUATION RESULTS

Walkability

+228 %

MORE PEDESTRIANS ON TENDER S.U.R.E. ROADS

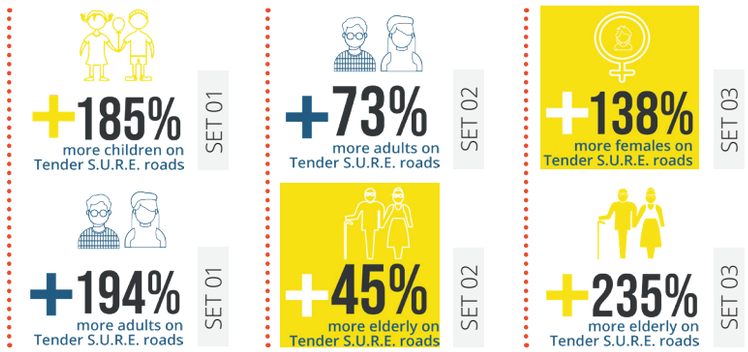
+117 %

MORE WOMEN ON TENDER S.U.R.E. ROADS

A survey of selected Tender S.U.R.E. and control roads reveals that typically, **Tender S.U.R.E. footpaths carry about 228% more pedestrians and 117% more women than the control roads.** Tender S.U.R.E. roads see 233% more pedestrians than the control road (Double Road) in the sub-arterial road category. In the collector road category, this figure is 555%. Brigade Road and Church Street reveal significantly high pedestrian volumes, which could also be attributed to the presence of a metro station nearby and the unique retail/ commercial typology of the roads themselves.

Pedestrian diversity

As illustrated in *Figure 09,* Tender S.U.R.E. footpaths display a higher diversity of pedestrians as compared to control roads. When comparing Residency Road and Double/KH Road, both sub-arterial roads with similar land use on either side, **Residency Road sees 194% more adults, 185% more children and 629% more elderly using the footpaths.**



Set 1: Residency Road and Double/ KH Road

Set 2: St Mark's Road and Devanga Samaja Road

Set 3: Church Street and Ulsoor Bazar Street

Figure 09. Pedestrian diversity on selected Tender S.U.R.E. roads

Perceptions on walkability

Pedestrian perception

Pedestrians interviewed on selected Tender S.U.R.E. roads have a better overall experience of its walkability, unlike pedestrians interviewed on control roads.

- 92% of respondents interviewed about Tender S.U.R.E. roads report that there is a footpath across all sections of the road, compared to only 20% of respondents on control roads.
- 87% of pedestrians interviewed about Tender S.U.R.E. roads perceive that it is very easy for them to walk alongside others (friends/family/ colleagues) on the footpath of the road. In comparison, only 23% of pedestrians interviewed on control roads find it very easy to walk alongside another person, while 38% find it impossible (*refer Figure 11)*.

However, from a road safety perspective, there is a stark difference in experience between Tender S.U.R.E. and control roads. While 70% of pedestrians interviewed on Tender S.U.R.E. roads perceive it to be very walkable, 0% of respondents on control roads find it very walkable, with 20% finding it very un-walkable (*refer Figure 10)*.

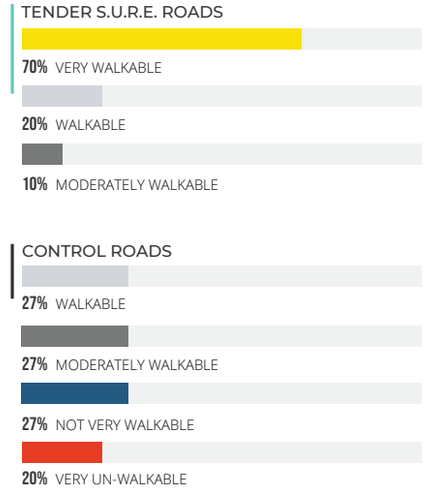


Figure 10. Pedestrian perceptions on walkability from a road safety perspective

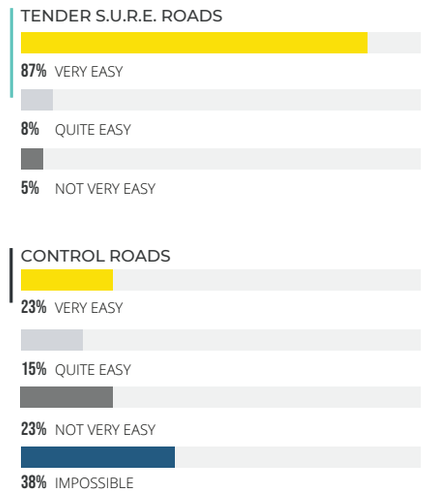


Figure 11. Pedestrian perceptions on ease of walkability for two people walking alongside each other

EVALUATION RESULTS
Drivability

Traffic police perception

Traffic police personnel interviewed on selected Tender S.U.R.E. roads perceive fewer impediments impacting walkability than those interviewed on control roads.

As per the respondents:

- The large width of Tender S.U.R.E. roads ensures that street vendors are not blocking the footpath and that pedestrians are able to walk free of obstacles. 10% of respondents interviewed about Tender S.U.R.E. roads report that there is encroachment by street vendors on the footpath, compared to 17% of respondents on control roads.
- Good design of the road, including the presence of bollards on the corners of the footpath, does not allow street vendors to pull their carts onto the footpath.

Of the pedestrians interviewed on walkability, 91% use the road once a day and 66% work in the vicinity. Of the traffic police respondents, 73% have been traffic cops in Bengaluru for more than five years.

Perceptions on drivability

74% of vehicle users interviewed on Tender S.U.R.E. roads find the roads very drivable compared to 20% on control roads. The key reasons users find Tender S.U.R.E. roads drivable are fewer obstructions and traffic violations.

- 58% of respondents find it convenient to park on the road for short and long breaks, as compared to 27% on control roads. Additionally, Tender S.U.R.E. roads are perceived to have organised street parking, as opposed to control roads where parking occurs along the travel lane.
- 28% of people interviewed on Tender S.U.R.E. roads found traffic flow during peak hours to be good/very good, as compared to 0% on control roads.

According to traffic police surveyed on control roads, impediments to traffic flow include heavy traffic, bottlenecks from certain types of buildings on the road (e.g., school, temple, museum), pedestrians walking on the road, bottlenecks from buses, vehicles parked on the road, and mismanaged traffic junctions.

Traffic police perceive better traffic flow on Tender S.U.R.E. roads during peak and non-peak hours, as compared to control roads. The key reasons attributed to this are smooth road surfaces, pedestrians using the foothpath and not walking on the road, and buses not causing obstructions.

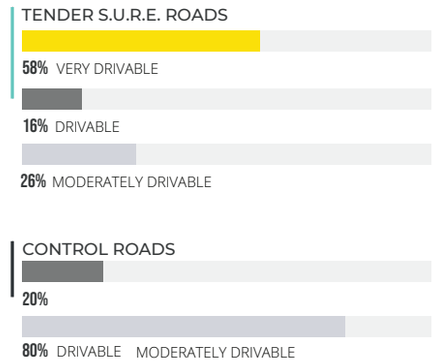


Figure 12. Drivability perception of vehicle users from a road safety perspective

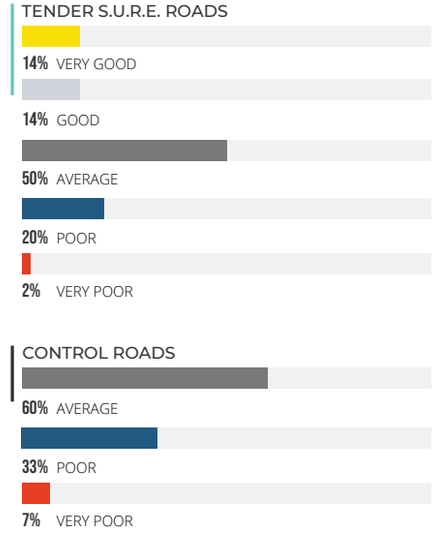


Figure 13. Vehicle users' perceptions of traffic flow during peak hours

Traffic management

Traffic police interviewed about Tender S.U.R.E. roads find traffic management easier compared to those interviewed about control roads.

› 95% of respondents interviewed about Tender S.U.R.E. roads report that it is easy/very easy to manage traffic, compared to 67% of respondents on control roads.

Traffic police highlight several features on Tender S.U.R.E. roads that facilitate easy traffic management, including well-built and wide roads and footpaths, and clearly visible zebra crossings.

Traffic volume

While traffic volumes are often linked to the type of road (arterial, collector, etc.), the study of roads in Bengaluru's CBD reveals that the volume of traffic is relatively similar across all roads. Additionally, they are all well over the capacity they are designed to carry, when compared against the Tentative Capacities of Urban Roads report by the Public Works Department, Government of Delhi (2014) (*refer Figure 14*).

However, traditionally, in organically developing cities, roads were not planned with traffic volume considerations. In the case of Bengaluru with its one-way roads, traffic volume is an indicator of routing rather than hierarchy.

The comparison of traffic volumes between sets of roads, therefore, does not reveal anything significant. However, it can serve as important tracking information over time.

Traffic speed

In combination with traffic volume, speed of movement can act as a good indicator of obstructions or congestion. The study reveals that while vehicular speed across all 13 roads falls significantly below the recommendations, Tender S.U.R.E. roads, on average, show marginally higher speeds than control roads (*refer Section 5.8 | on page 102)*.

A relatively more consistent speed is observed throughout the day on Tender S.U.R.E. roads, without much variation in peak and non-peak hour speeds. This is evidence of both, consistency of flow and an absence of serious congestion.

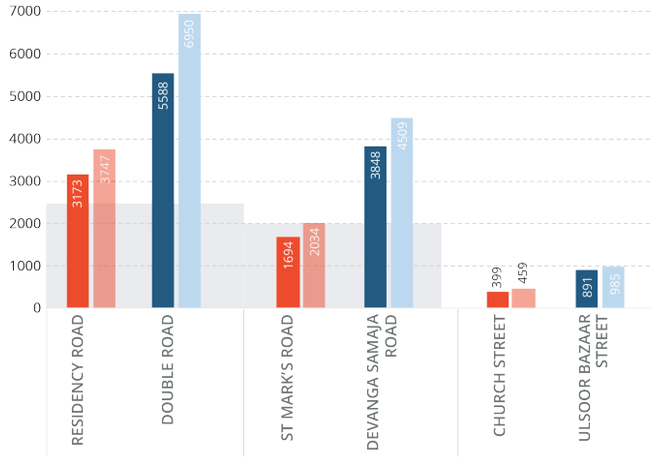


Figure 14. Traffic volume on selected sub-arterial, collector, and local roads

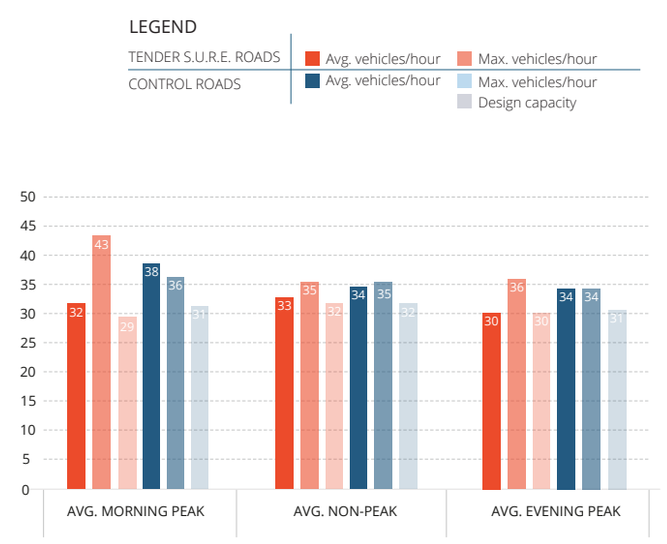


Figure 15. Traffic speed on selected sub-arterial, collector, and local roads

EVALUATION RESULTS
Safety

Perceptions on safety from crime

Pedestrians and vehicle users' perception

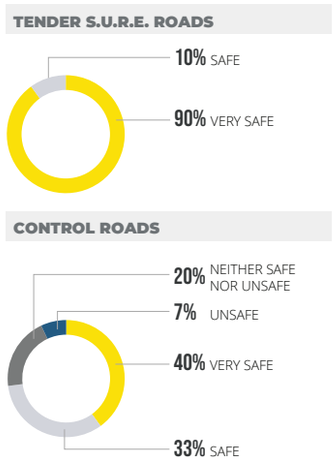


Figure 16. Pedestrians perceptions on safety from daytime crimes

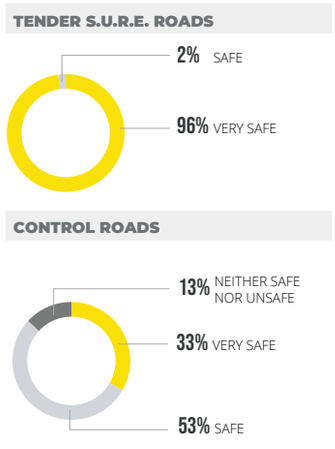


Figure 17. Vehicle users' perceptions on safety from daytime crimes

Pedestrians and vehicle users perceive a much higher level of safety while using Tender S.U.R.E. roads, both in the daytime and at night.

- 90% of pedestrians interviewed felt that Tender S.U.R.E. roads were very safe to use in the daytime, compared to 40% in the case of control roads.
- Although nearly half the respondents had not used the roads at night, 54% of pedestrians interviewed felt that Tender S.U.R.E. roads were very safe to use at night. In the case of control roads, this number was 0%. The reasons mentioned were adequate policing, having other people on the road, and the fact that the road is well-lit.
- 96% of vehicle users interviewed felt that Tender S.U.R.E. roads were very safe to drive on in the daytime, compared to 33% in the case of control roads.
- Again, although many of the vehicle users had not driven on the road at night, 64% of the respondents felt Tender S.U.R.E. roads would be very safe to drive on at night, as compared to 20% in the case of control roads.

Traffic police's perception

100% of traffic police personnel perceived all the roads in the study to be safe/very safe for both pedestrians and vehicle users. However, when asked about pedestrians using the roads at night, 85% of them perceived Tender S.U.R.E. roads to be safe/very safe, compared to 66% in the case of control roads.

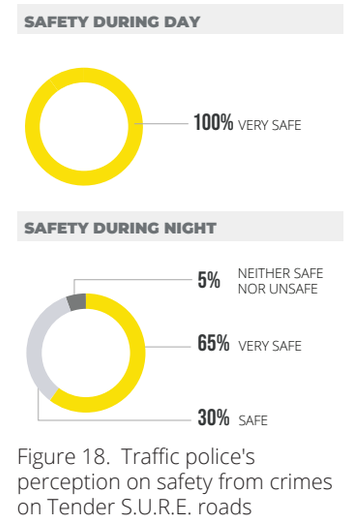


Figure 18. Traffic police's perception on safety from crimes on Tender S.U.R.E. roads

LIGHTING

While the Tender S.U.R.E. and control roads surveyed comply with the acceptable Lux standards for street lighting, Tender S.U.R.E. roads are generally better lit than control roads.

LUX SCORE	Tender S.U.R.E. Roads (10)	Control Roads (3)
Average Lux	**21**	16
Min. Lux	**12**	10
Max. Lux	**378**	128

31%
HIGHER AVERAGE LUX ON TENDER S.U.R.E. ROADS

Table 04. Lux levels on selected roads for study

Safety

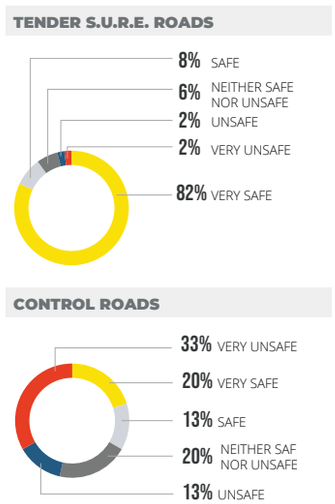


Figure 19. Pedestrian perceptions on safety from daytime accidents

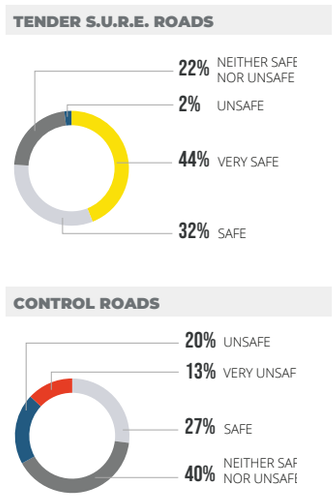


Figure 20. Vehicle users' perceptions on safety from daytime accidents

Perceptions on safety from accidents

Pedestrians and vehicle users interviewed about Tender S.U.R.E. roads perceive greater safety from road traffic accidents, as compared to those interviewed about control roads.

- 90% of pedestrians interviewed about Tender S.U.R.E. roads feel safe/very safe from motorised and/or non-motorised traffic on the road, compared to 33% of respondents on control roads.
- 76% of vehicle users interviewed about Tender S.U.R.E. roads feel safe/very safe from motorised and/or non motorised traffic on the road, compared to 27% of respondents on control roads.

Traffic police find both Tender S.U.R.E. and control roads to be safe from road accidents for pedestrians and vehicle users. However, their perception is slightly better ('very safe') for Tender S.U.R.E. roads. They highlight several features of Tender S.U.R.E. roads that facilitate greater road traffic safety, including features that encourage pedestrians to use the footpath (e.g., wide, well-maintained, and clean footpaths), bollards on the footpath that prevent vehicles from getting on them, well-maintained signals, and well-designed, wide, and good quality roads with no potholes.

EVALUATION RESULTS

Road Maintenance: Utilities

Two municipal engineers were interviewed about their experience of working with Phase 01 Tender S.U.R.E. roads. They found that the roads are well planned and executed, use good quality construction material, and minimise usage related wear-and-tear. With utilities (above ground and underground) placed in designated chambers, access for repair and maintenance is easy and does not require digging the road/ footpath.

Specifically, the engineers found that:

- It is very convenient to access stormwater manholes for maintenance on this road as it is well planned and executed.
- It is convenient to access sewerage chambers for maintenance on this road as it has suitable disposal points and levels of pipe installation. The quality of construction material used is also good.
- It is very convenient to access electrical panels for maintenance on this road. Tender S.U.R.E. road engineers are able to see the ducts inside which BESCOM has installed the cables, thereby making maintenance easy.
- It is convenient to access data and telephonic infrastructure for maintenance on this road. The chamber for such infrastructure was placed on the side of the road (instead of the centre) during construction, making it easily accessible.
- It is very convenient to access streetlights for maintenance on this road. Streetlights are installed on the side of the Tender S.U.R.E. road. The poles are set up every 20-25 metres with electric cables running next to the landscape strip. This makes access very easy.

- It is very convenient to access kerb gratings (drain inlets) for maintenance on this road. Tender S.U.R.E. roads are well built with enough space to access kerb gratings easily.
- There is never any digging, roadwork or disruption on this road and/or footpath to access utilities for their repair and maintenance. This is because Tender S.U.R.E. roads have chambers on both sides which can be used for cleaning and repair and maintenance.
- Overall quality in terms of the design and construction material used is excellent.
- There is very rarely digging, road works or disruption on this road for necessary road repair due to wear and tear. Tender S.U.R.E. roads are made of good quality materials and don't require repair for at least 5 years.
- This road does not suffer in the monsoon from flooding or poor drainage due to good road design and implementation.

Additional interviews are being carried out to substantiate the views of the two engineers interviewed.

4

WAY FORWARD

4.1 | LEARNINGS

The findings from the monitoring and evaluation exercise clearly show that there are considerable benefits to Tender S.U.R.E. roads. This despite the fact that not all key Tender S.U.R.E. design features are present on any one of the roads and an integrated network of roads is not clearly established. These benefits align distinctly with improved walkability, improved drivability, improved safety, and greater ease and lower cost of maintenance, albeit on isolated roads as of now. These have all been evidenced through multiple stakeholders and objective measures. The potential value of Tender S.U.R.E. road design in the larger context of urban development, therefore, is clear.

Nonetheless, there is a need to **better understand the implementation challenges on the ground**. With recent projects seeing fewer of the key features implemented, it is important to undertake a process review with different stakeholders and observational opportunities to understand the implementation barriers and constraints from different perspectives. This would include engaging with urban planners, engineers, builders, etc. with the aim of removing such barriers for future projects or upgradation works.

THE NET EFFECTS OF GOOD ROAD DESIGN AND IMPLEMENTATION FOR A CITY CAN ONLY ACHIEVE FRUITION WHEN CONSISTENT ACROSS GEOGRAPHY.

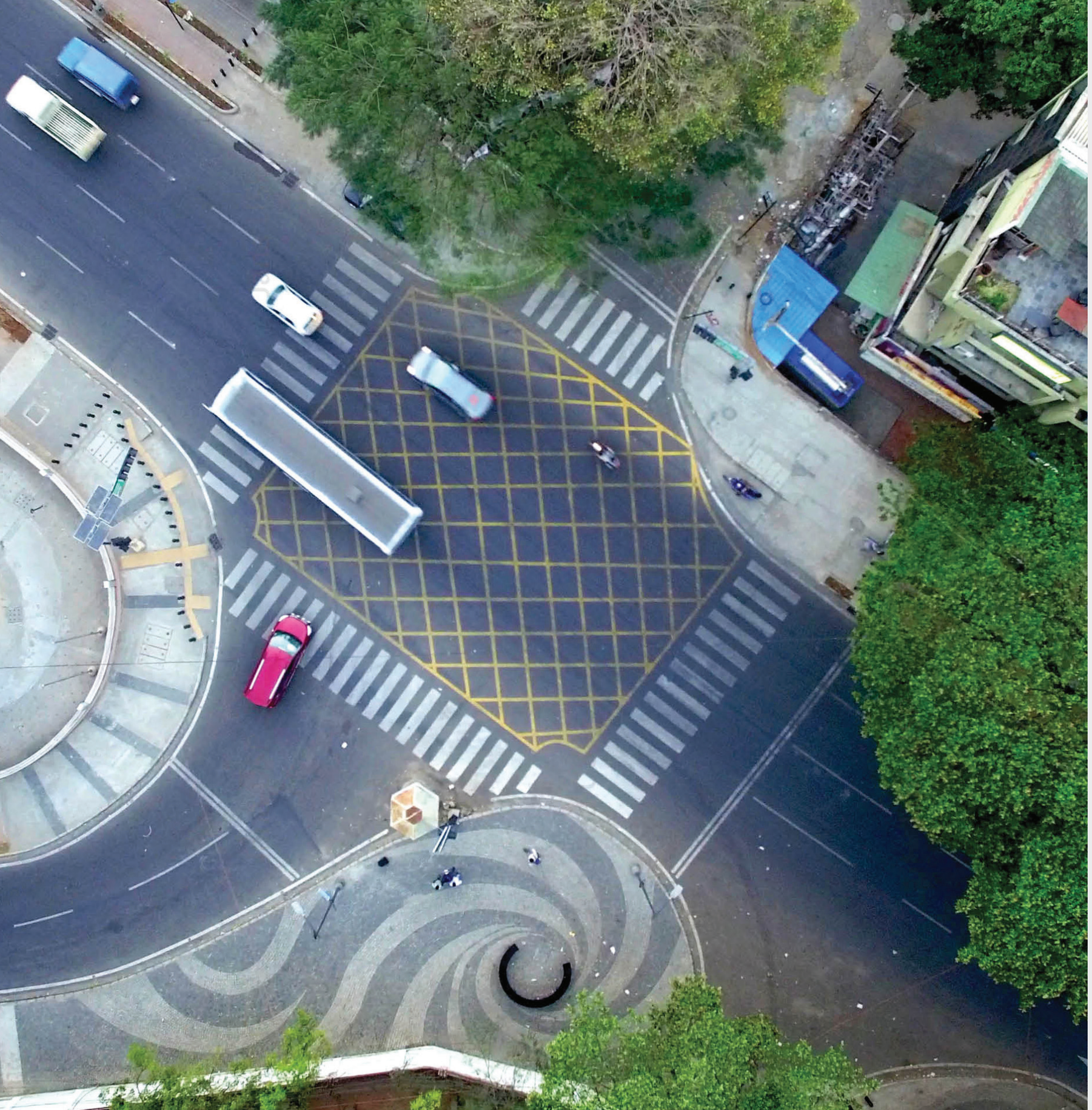
Additionally, **the integration of networks of Tender S.U.R.E. roads has not yet been achieved**. The net effects of good road design and implementation for a city can only achieve fruition when consistent across geography. Understanding process implementation barriers in this regard, and in the larger context of spatial planning in urban centres, will also be critical in successfully advocating for new integrated road upgradation works (to Tender S.U.R.E.).

While it has been observed that the degree of maintenance required in Tender S.U.R.E. roads is significantly lesser than that of other roads, it still does not completely alleviate the need for routine maintenance. Heavy traffic and increasing vehicular pressure on the roads, in addition to extreme weather events, have resulted in the development of alligator cracks and rutting in some Tender S.U.R.E. roads.

To address the issue of poor urban road conditions in the long term, it may be necessary to **implement a comprehensive road maintenance and repair program** that improves their overall condition and reduces the likelihood of damage. Effective maintenance of urban roads requires a combination of periodic inspections and repairs for different types of roads with various materials (such as asphalt, concrete, and paver blocks) at varying frequencies. A plan for addressing more significant issues that may arise is also needed.

TO ADDRESS THE ISSUE OF POOR URBAN ROAD CONDITIONS IN THE LONG TERM, IT MAY BE NECESSARY TO IMPLEMENT A COMPREHENSIVE ROAD MAINTENANCE AND REPAIR PROGRAM.

Lastly, it will be important to continue evaluating Tender S.U.R.E. roads over time and in different geographies to understand how their impact plays out in the longer term and in the larger context of urbanisation in India's cities.



5

ANNEXURES

5.1 | ANNEX 01

The Tender S.U.R.E. Journey

2011

Tender S.U.R.E. Guidelines Published

volume 1 outlines design principles for what is on, under, and above the right of way and detailed technical guidelines for each.

volume 2 outlines the template for the procurement and contracting of urban road works.

Launch of Tender S.U.R.E., 2011 by the then chief minister, Mr. Sadananda Gowda. The project enjoys bi-partisan political backing in Karnataka and has had the support of 4 chief ministers across political parties.

Impact of Tender S.U.R.E.

Residency Road

Before Tender S.U.R.E.

After Tender S.U.R.E.

Introduction of pedestrian crossing, uninterrupted footpath, and street elements to enhance the functioning of Residency Road.

2012 - 2017

Tender S.U.R.E. Phase 01

Jana Urban Space designs, monitors, manages and facilitates inter-agency coordination for 7 roads (10kms) in the Central Business District (CBD) of Bengaluru as **proof of concept. They are the first roads in the city with uniform travel lanes, continuous footpaths, designated cycle tracks, safe intersections, and organised underground utilities contained within the footpaths.**

Church Street, Bengaluru completed as a pedestrian-priority Tender S.U.R.E. Road, 2018.

2014 - 2018

Tender S.U.R.E. Phase 02

Following the success of Phase 01, another 20kms of Tender S.U.R.E. roads are completed in the CBD of Bengaluru. Tender S.U.R.E. footpath standards are adopted as the de facto standards across the city.

2016 - Present

Tender S.U.R.E. goes to Hubballi–Dharwad

Based on the success of the Tender S.U.R.E. roads in Bengaluru, 17kms of Tender S.U.R.E. roads are constructed Hubballi–Dharwad. The 2.1km Hubballi–Shirur Park Road is completed and the rest are under construction as part of the Smart Cities initiative.

Shirur Park Road, Hubballi's first Tender S.U.R.E. road, completed in 2018.

2017 - Present

Tender S.U.R.E. Phase 03

30kms of Tender S.U.R.E. roads included in the Bengaluru Smart Cities proposal and currently under construction.

Once complete, the Tender S.U.R.E. network will span more than 60kms across the city and will connect to public transit, educational institutions, and landmarks. The roads will also have continuous pedestrian paths, cycle tracks, safe intersections, on-street parking, and organised utilities, making it one of the most walkable, cycle-able city centres in India.

2020 - Present

S.U.R.E. road at Berhampur, Odisha

Odisha S.U.R.E.

Jana Urban Space is designing 65kms of local road redevelopment in 10 ULBs across the state. The project is currently in the construction phase and is envisioned to scale-up to cover 300km of footpaths and 50 intersections across 3 ULBs

2022

Chennai Mega Streets

With the vision of creating a transit-oriented centre, Jana Urban Space is designing 15kms of roads based on Tender S.U.R.E. principles in the heart of Chennai. Construction will commence shortly.

5.2 | ANNEX 02

Selection of Roads for Comparative Study

As described in the main report, while there are features that are similar across different roads, the characteristics of each depend on various factors like land use, traffic management, etc. It is therefore impossible to find a series of roads that are exactly alike and allow for absolute comparisons between Tender S.U.R.E. roads and control roads.

Stakeholder perceptions of road and footpath quality are not as impacted by this issue as assessments of traffic volume and flow. Here, features such as land use can significantly impact the resultant numbers. To address this, greater focus has been placed on pre- and post-Tender S.U.R.E. road development data (wherever available) for analysis. Additionally, some sub-group road comparisons have been employed to match Tender S.U.R.E. and control roads up more directly. *Table A_01* outlines three sets of such comparison roads with similar features.

Set 1 roads are both sub-arterial roads with similar road widths and types of usage. They can therefore be used to assess the impact of Tender S.U.R.E. guidelines on the flow, speeds, and variations in usage. A comparison of bicycle counts is also indicative of the road's ability to support non-motorised modes of transport. For Set 1 in particular, since both roads present such similar characteristics, it establishes a fair basis for comparisons of user perceptions of both roads.

Set 2 roads are both collector roads with similar road widths and types of usage.

Set 3 roads are both local roads, unique in their own right, and with a heavy mix of vehicular and pedestrian usage. They are both primarily retail and commercial in their zoning. However, Church Street has a major metro station on it, resulting in high pedestrian volumes, and Bazaar Street has a prominent temple which generates its own type of pedestrian volumes with temple-related informal vending along the street.

	SET 1		SET 2		SET 3	
	TENDER S.U.R.E. ROAD	CONTROL ROAD	TENDER S.U.R.E. ROAD	CONTROL ROAD	TENDER S.U.R.E. ROAD	CONTROL ROAD
	RESIDENCY ROAD	DOUBLE/ KH ROAD	ST MARK'S ROAD	DEVANGA SAMAJA ROAD	CHURCH STREET	ULSOOR BAZAAR STREET
AREA	CBD	CBD	CBD	CBD	CBD	CBD
CLASSIFICATION	Sub-arterial	Sub-arterial	Collector	Collector	Local	Local
DIRECTION OF TRAVEL	One-way	Two-way, with a median	One-way	One-way	One-way	One-way
TRAVEL LANE WIDTH	9m	9m, each direction	6m	6m	6m	6m
NO. OF LANES	3	2 on each side	2	2	2	2
PRIMARY USAGE ALONG ROAD	Institutional, schools, offices, hotels	Govt offices, BMTC bus terminal, offices	Institutional, schools, offices, govt banks	BBMP offices, hostels, hospitals, convention centres	Metro station, commercial, retail, offices	Religious, public, commercial, retail

Table A_01. Selection of roads for comparison of data

5.3 | ANNEX 03
Data Collection

In order to evaluate each of these buckets, a range of research activities were undertaken as described below.

Pedestrian perception surveys

The intention was to survey 5–6 pedestrians per road (totalling 70 pedestrians across the 13 roads). Trained surveyors visited the roads at different times of the day and on different days of the week (including the weekend) to ensure diversity of respondents. Although the selection of citizens was random, efforts were made to ensure an adequate gender and age balance. All surveys were conducted in July 2022.

Vehicle (motorised/non-motorised) user perception surveys

Since it was not feasible to interview vehicle users while they used the road, we approached pedestrians and asked them whether they also used the road with a vehicle (whether motorised or non-motorised).

If they did, the survey proceeded. The target was to interview 5–6 vehicle users per road (totalling 70 vehicle users across the 13 roads). Trained surveyors visited the roads at different times of the day and on different days of the week (including the weekend) to ensure diversity of respondents. Although the selection of citizens was random, efforts were made to include respondents who used the road in a range of vehicles, namely private cars, cabs, cycles, buses, or two-wheelers. All surveys were conducted in July 2022.

Surveys with traffic police overseeing the sampled roads

Traffic police stations servicing each of the sampled roads were identified. Trained surveyors approached these police stations to request interviews with relevant traffic police personnel. They also visited the sampled roads to speak with the police stationed there. The aim was to interview two police personnel per sampled road, with both personnel being familiar with, and having been stationed at, the respective road.

During these interviews, surveyors also requested the respective traffic police to share any available data on road traffic accidents as well as traffic violations.

Surveys with road engineers overseeing the sampled roads

Field executives attempted to arrange interviews with chief engineers, executive engineers, and assistant executive engineers from the BBMP's Road Infrastructure Department. Calls and visits were made to arrange interviews with those familiar with Tender S.U.R.E. roads as well as other roads in Bengaluru's Central Business District.

Quantitative traffic surveys

A traffic survey agency was commissioned to undertake a series of road traffic surveys covering the following across all 13 roads:

1. Traffic volume on roads
   - Including vehicle types/pedestrians on the road.
2. Traffic speed on roads
3. Pedestrian volume on footpath
   - Including gender and approximate age of pedestrians
   - Including volume of wheelchairs/buggies.

The traffic surveys were all conducted in July 2022 on an average weekday (Tuesday/Thursday) over a period of 12 hours (8am to 8pm) to capture numbers and types of vehicles on the roads at peak and non-peak hours. Speed data was gathered by capturing the time taken for a vehicle to traverse a 100m stretch of road with no intersection, major crossroads or pedestrian crossings. The data was captured for 90 vehicles at peak hours and 60 vehicles at non-peak hours, on each road.

Objective footpath surveys

The footpaths/road-sides were reviewed objectively from the lens of:

1. The number and size of obstructions and encroachments on the footpath
2. The number and size of potholes and cracks on the pavement
3. Lux levels (after 7pm)

A Lux reading was taken every 20m on the path.

These measures were done in July-August, 2022.

5.4 | ANNEX 04

Framework for Monitoring

Table A_02 outlines the key features of Tender S.U.R.E. roads, the specifications for their ideal state, and the mechanisms for checking the state of these features both before and after execution of road design.

Parameter	Definition	Ideal state (or as per Tender S.U.R.E. guidelines)	Prior to building/re-building road	Post- Tender S.U.R.E.	Data source
Continuous, wide footpath	Footpath, a main element in NMT design, is a space on one or both sides of the street that is designated for pedestrian walking. It may include landscaping, street furniture, above-grade utilities, and signage. In some cases, it is shared by bicycle users. Its width is linked to the size of travel lanes and parking spaces, as well as to the number of pedestrians using the road. Material choices range from concrete pavers to granite slabs, and they continue to evolve.	1. Width: min. 1.5m, max. 3m. 2. Kerb height: 15cms–25cms. 3. Provision: Continuous and uniform laying on both sides of ROW, with slopes at crossings for wheelchairs/ strollers. 4. Universal access: Continuous provision of tactile pavers along the footpath. 5. Safety: Buffer between travel lane and footpath; bollards to prevent vehicles from using the footpath; well-designed and suitably located pedestrian crossings.	Data from geospatial survey undertaken prior to design for presence, continuity, and condition of footpaths.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Uniform travel lanes	The width of travel lanes depends on road classification, space available, type of vehicles plying, desired speed of movement, and expected traffic volume. Wider lanes allow for higher speeds and uniform widths are preferred to prevent bottlenecks.	1. Arterial road (48m): 3m–3.5m lane width, 20–80kmph. 2. Sub-arterial road (30m): 3m–3.5m lane width, 15–60kmph. 3. Collector road (21m): 2.75m–3.5m lane width, 12.5–50kmph. 4. Local road (10m): 2.5m–3m lane width, 7.5–30kmph.	Data from geospatial survey undertaken prior to design for width and condition of travel lanes.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Quality of material and construction of road/footpath	The quality of construction specifications, materials, and finishes is important to sustain the traffic load over time and avoid repeated resurfacing of the road/footpath.	1. For footpaths: a high-quality concrete paver, tightly laid onto an even, well-compacted base and a sand bed, to the required slope, without any cement filling in the joints. 2. For road surfaces: a 5-layer composition, with the thickness of each layer designed according to the soil below and the traffic loads above the road surface.	N.A.	N.A.	Contracting agency

Table A_02. Framework for monitoring

Framework for Monitoring

Parameter	Definition	Ideal state (or as per Tender S.U.R.E. guidelines)	Prior to building/re-building road	Post- Tender S.U.R.E.	Data source
Bus stops	Bus stops integrate into larger networks of public transport, reducing private vehicle dependence and promoting sustainability. Suitably designed bus stops must be placed at regular intervals, ensuring shelter and safety for commuters while also providing information like route maps, trip planners, etc.	1. Size of stop: Length based on the number of buses using it at any given time; covered width of min. 1.2m. 2. Distance b/w bus stops: 500m for arterial/sub-arterial roads; 300m–400m for collector/local roads. 3. Location on road: › Nearside clearance of 35m (before an intersection). › Far side clearance of 42m (after an intersection). › Mid-block clearance of 25m (between intersections). 4. Quality: Space for route maps, bus schedules; clear 1m for pedestrian movement on footpath. 5. The area where passengers alight should be clear of trees, utility poles, wires, etc.	Data from geospatial survey undertaken prior to design for presence and condition of bus shelters.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Lighting	Street lights provide night vision and safety for both motorists and pedestrians. They therefore need to be designed at appropriate distances and heights to provide optimum illumination. The design of street lighting is dependent on the type and width of the road, and LED fixtures are preferred to traditional sodium-vapour lamps due to their low power consumption.	1. Local/sub-local road: Single-sided, at 10m intervals; 3m–6m height. 2. Collector: Staggered/opposite sides, at 15m intervals; 9m height. 3. Sub-arterial: Central, at 30m intervals; 12m height. 4. Arterial: Central+opposite, at 30m intervals; 12m and 6m heights. 5. Light type: LED. 6. Distance from kerb: 0.5m.	Data from geospatial survey undertaken prior to design for presence and uniformity of light poles.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	1. JUSP archives and on-site data collection 2. Janaagraha survey using Lux-meter
Landscaping	Space adjacent to the kerb (along footpaths, medians, and roundabouts) is dedicated to plants and trees that act as a safety buffer between vehicles and pedestrians while also improving the environment and aesthetics of the street. Landscape spaces are also used to accommodate above-grade utilities like street furniture, light poles, signage, etc.	1. Width: Can vary based on available footpath width; min. 0.4m. Can go up to 1m or more where permissible. 2. Distance from kerb (for plants/trees): 0.7m. 3. Guidelines don't mention recommendations on the scale and type of landscaping.	Data from geospatial survey undertaken prior to design for presence of landscape.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection

Table A_02 (CONTD). Framework for monitoring

Framework for Monitoring

Parameter	Definition	Ideal state (or as per Tender S.U.R.E. guidelines)	Prior to building/re-building road	Post- Tender S.U.R.E.	Data source
Solid waste management	Segregated bins for solid waste collection are placed along footpaths to prevent littering and allow routine collection by municipal agencies.	On commercial roads: Twin bins at 30m intervals mounted on street light poles. No public bins mandated in residential areas.	Data from geospatial survey undertaken prior to design for presence of waste bins.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Underground utilities	Provision of dedicated space for utility lines underground, with regularly spaced access chambers to each. This facilitates easy repair and maintenance, negating the need to dig up roads and footpaths.	1. Subterranean pipes laid under the footpath to carry all utilities, with regularly spaced access chambers. 2. The following material specifications are made to ensure durability and longevity: › HDPE pipes for power, data, fibre optic cables, gas, and streetlight wiring. › MS pipes for water supply. › NP3 concrete pipes for stormwater side drains and sewerage. › FRP manhole covers.	Data from geospatial survey undertaken prior to design for presence and design of power and data lines.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Stormwater management	Stormwater channels are also moved below grade to avoid open slab drains that accumulate litter and clog. Road and footpath surfaces are sloped suitably towards kerb-side inlets with gratings, leading to the underground side drains. Access chambers are located at suitable intervals. Landscape spaces are also designed with exposed earth to encourage rainwater percolation.	1. Road surface set to 2.5% slope, footpath slope at 3%, with unobstructed drain inlets along the length of the footpath. 2. Landscape strips and pits to have exposed soil.	Data from geospatial survey undertaken prior to design for presence and design of sewage and stormwater drains.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Cycle track presence	Cycles are considered a core mode of urban transport. A dedicated lane is often not needed on some collector and local roads since vehicle speed is low. A well-designed track needs uniform width, suitable surface material, and buffers/bollards for safety.	1. Width: min. 1.5m (one-way), 2.5m (two-way). 2. Material: asphalt or concrete (pavers to be avoided). 3. Elevation: 15cm above carriageway for stormwater run-off. 4. Buffer: 0.5m between the cycle track and travel lane/parking. 5. Bollards: to block access to motorists.	Data from site surveys conducted prior to design.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection

Table A_02 (CONTD). Framework for monitoring

Framework for Monitoring

Parameter	Definition	Ideal state (or as per Tender S.U.R.E. guidelines)	Prior to building/re-building road	Post- Tender S.U.R.E.	Data source
Vendor kiosks	Appropriate spaces are carved out of the ROW to provide dedicated units or pitch sites for hawking/vending. The spaces are designed to be easily accessible with good visibility.	[Where allocated] Kiosk units are 1m x 1m or 1.5m x 1.5m.	Data from site surveys conducted prior to design.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection
Parking spaces	Provision of on-street parking depends on available road width, road type, and surrounding land use.	1. 4-wheeler parking bay size: 2.75m x 6m (min. 2m x 5m). 2. 2-wheeler parking bay size: 1.2m x 2.5m (min. 1m x 2m). 3. Parallel parking on local roads where travel lanes are narrow. 4. Perpendicular parking on collector roads for long-duration usage. 5. Angular parking on arterial/collector roads with faster turnaround time. 6. Number of parking bays: no specific recommendations. 7. Ideally limited to collector and local roads.	Data from geospatial survey undertaken prior to design, for presence of designated and non-designated parking.	1. Tender S.U.R.E. design proposal 2. Site survey of actual built condition	JUSP archives and on-site data collection

Table A_02 (CONTD). Framework for monitoring

5.5 | ANNEX 05: MONITORING STUDY

The following pages document the detailed monitoring scores for each of the Tender S.U.R.E. roads.

St Mark's Road

Figure A_01. Location: St Mark's Road

Figure A_02. St Mark's Road

PROMOTING MULTIMODAL STREETS

1.7m
wide continuous cycle track

ORGANIZED UTILITIES

1158m
of new stormwater pipes added

GENDER SAFETY

58
LED lamps at regular intervals

Named after the oldest Anglican Church in Bengaluru, St Mark's Road is a landmark street of the city synonymous with established eateries. The 0.90km road is a part of the Central Business District, linking MG Road at Anil Kumble Circle in the north and with Residency Road at the Cash Pharmacy Junction in the south.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	FOOTPATH WIDTH	1.2m–5.4m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	Min. 2m footpath on both sides; 890m of uninterrupted footpath with tactile pavers, ramps at kerb edges, bollards with 1m gaps, and accessible pedestrian crossings	3.2m–4.2m wide footpath on both sides. Discontinuous tactile pavers, ramps at kerb edges of 150mm height, bollards at 1m gap, and easily accessible pedestrian crossings	94.4%
	QUALITY OF MATERIAL & CONSTRUCTION	Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	ROAD WIDTH	11m–14m wide travel lanes; 3 in number	6m total travel lane (2 lanes) and 9m total travel lane (3 lanes), with designated holding and parking bays	6m total travel lane (2 lanes) and 9m total travel lane (3 lanes), with designated holding and parking bays	100%
	BUS STOPS	3 bus stops; inconveniently placed, inaccessible, and passengers waiting in the lane	1 designated bus shelter at a suitable distance from intersections, with seating, lighting, space for maps, etc.	1 designated bus shelter in good condition, at a suitable distance from intersections, with seating, lighting, space for maps, etc.	100%
ELEMENTS	LIGHTING	66 poorly-placed sodium-vapour lamps resulting in non-uniform lighting	58 LED lamps placed at regular intervals to provide uniform lighting	58 LED lamps placed at irregular intervals at some points	100%
	LANDSCAPE	Not available on any side	750mm wide and 310 m long landscape strip as buffer between travel lanes and pedestrian footpath	310m long landscape strip; some trees on footpath causing obstruction	100%
	WASTE MANAGEMENT	Not available on any side	40 new bins for segregated waste collection at 30m intervals	40 new bins for segregated waste collection at 30m intervals	100%
UGD	UNDERGROUND UTILITIES	Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,872m of ducts for power, telecom and gas with 28 access chambers; 1,658m of new sewer lines with 56 access chambers	All networked infrastructure moved underground with frequent access chambers; no cables seen above	100%
	STORMWATER DRAINAGE	Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,158m of underground stormwater pipes with 58 percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA	CYCLE TRACK	Not available on any side	1.5m–2m wide cycle track on each side; 810m of designated, continuous cycle track	1.7m wide cycle track on each side; track is discontinuous in some parts	83.3%
	VENDOR KIOSKS	Not available on any side	Areas in the footpath dedicated to vendors/ hawkers which do not cause an obstrucion to the pedestrians	Provision of areas in the footpath dedicated to vendors/ hawkers which do not obstryct pedestrian movement	100%
	PARKING BAYS	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 6 3-wheeler: 9 4-wheeler: 3 Bicycles: 4	100%

Table A_03. Monitoring overview and scores of implementation: St Mark's

Residency Road

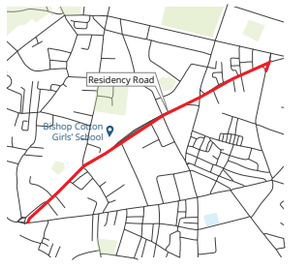


Figure A_03. Location: Residency Road

Figure A_04. Residency Road

PROMOTING MULTIMODAL STREETS

1.3m
wide continuous cycle track

INCREASING ACCESSIBILITY

1990m
uninterrupted footpath

ORGANIZED UTILITIES

3598m
underground power ducts

During the colonial period, the British representative maintained a residence within the cantonment area of the city. His quarters were called the Residency, giving Residency Road its name. The road is a part of the Central Business District, linking MG Road at the Mayo Hall Circle in the north and Richmond Circle in the south.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	FOOTPATH WIDTH	1.6m–7.2m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	Min. 2m footpath on both sides; 1,990m of uninterrupted footpath with tactile pavers, ramps at kerb edges, bollards at 1m gaps, and pedestrian crossings	3.2m–4.2m wide footpath on both sides. Provision of continuous tactile pavers, ramps at kerb edges of 150mm height, bollards at 1m gap, and easily accessible pedestrian crossings at most points	94.4%
	QUALITY OF MATERIAL & CONSTRUCTION	Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	ROAD WIDTH	16m–22m wide travel lanes; 4 in number	9m total travel lane width, 3 travel lanes with designated holding and parking bays	9m total travel lane width, 3 travel lanes with designated holding and parking bays	100%
	BUS STOPS	5 bus stops; inconveniently placed, inaccessible, and with passengers waiting in the lane	2 designated bus shelters at a suitable distance from intersections, with seating, lighting, space for maps, etc.	2 designated bus shelters with ineffecient lighting and obstructions on the footpath in some places	60%
ELEMENTS	LIGHTING	76 sodium-vapour streetlights with poor overall lighting	147 LED street lights with 25m distance from the centre	147 sodium-vapour streetlights placed at irregular intervals in some parts	33.3%
	LANDSCAPE	Not available on any side	750mm wide and 338m long landscape strip as buffer between travel lanes and pedetsrian footpath	500mm–750mm wide and 338m long landscape strip along the footpath, only on one side of the road	50%
	WASTE MANAGEMENT	Not available on any side	54 new bins for segregated waste collection at 30m intervals	No bins installed	0%
UGD	UNDERGROUND UTILITIES	Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	3,598m of power ducts with 59 access chambers, 3,397m of telecom ducts, 2,867m of new sewer lines with 156 access chambers	Most utilities are installed below grade but some wires and cables are seen above ground	75%
	STORMWATER DRAINAGE	Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,838m of underground stormwater pipes with 70 percolation-cum-catch pits	Underground stormwater drains and landscape pits with soil for rainwater percolation; kerb side drains are missing gratings	66.7%
ADDED INFRA	CYCLE TRACK	Not available on any side	1.5m width cycle track on each side; 866m of designated, continuous cycle track	1.3m wide cycle track on each side	50%
	VENDOR KIOSKS	Not available on any side	Areas in the footpath dedicated to vendors/ hawkers which do not cause an obstruction to pedestrians	Provision of areas in the footpath dedicated to vendors/ hawkers which do not obstruct pedestrian movement	100%
	PARKING BAYS	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 3 3-wheelers: 3 4-wheelers: 1 Bicycles: 2	100%

Table A_04. Monitoring overview and scores of implementation: Residency Road

Cunningham Road

Figure A_05. Location: Cunningham Road

Figure A_06. Cunningham Road

INCREASING ACCESSIBILITY

1500m
uninterrupted footpath

INCREASING PEDESTRIAN SAFETY

75%
reduction in pedestrian crossing distance

INCREASING GREEN COVER

105sqm
increase in landscape area

Cunningham Road, which is 1.54km in length, is among the most frequented arterial roads in Bengaluru. It caters to all kinds of structures from malls and hospitals, to restaurants and other commercial centres. It originates from Balekundri Circle (Indian Express junction) and extends up to Bellary Road. It intersects with 3 important corridors — Ambedkar Veedhi, Millers Road, and Bellary Road. Traffic flows in one direction from Indian Express to Millers Junction, beyond which it becomes two-way till Bellary Road.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH		**FOOTPATH WIDTH** 2m–5.9m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	Min. 2m footpath on both sides; 1,500m of uninterrupted footpath with tactile pavers, ramps at kerb edges, bollards with 1m gaps, and accessible pedestrian crossings	2.4m–4.6m wide footpath on both sides. Discontinuous tactile pavers, ramps at kerb edges of 150mm height, bollards at 1m gap and damaged pedestrian crossings at some points	88.9%
		QUALITY OF MATERIAL & CONSTRUCTION Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT		**ROAD WIDTH** 19m–24m ROW; 6m–9m total travel lane width; 3 lanes; no designated parking	6m total travel lane width; 2 lanes; with shoulder for halting and designated parking bays	6m total travel lane width; 3 lanes; with shoulder for halting and designated parking bays	100%
		BUS STOPS Not available	2 designated bus shelters at a suitable distance from intersections, with seating, lighting, space for maps, etc.	1 designated bus shelter in good condition, at a suitable distance from intersections, with seating, lighting, space for maps, etc.	50%
ELEMENTS		**LIGHTING** 76 poorly-placed sodium-vapour lamps resulting in non-uniform lighting	74 LED lamps placed at regular intervals to provide uniform lighting	74 sodium-vapour lamps placed at irregular intervals at some points	33.3%
		LANDSCAPE Not available on any side	105sqm increase in landscape area including a continuous 0.4m wide landscape strip along the footpath	105sqm increase in landscape area; continuous landscape strip along the footpath	100%
		WASTE MANAGEMENT Not available on any side	42 new bins for segregated waste collection at 30m intervals	No bins installed	0%
UGD		**UNDERGROUND UTILITIES** Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	4,079m power and telecom ducts with 19 access chambers; 1,872m ducts for gas; 1,500m sewer lines with 77 access chambers	Some poles for broadband cable are seen above the ground; electricity cables not concealed	75%
		STORMWATER DRAINAGE Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,377m of underground stormwater pipes with 60 percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA		**CYCLE TRACK** Not available on any side	1.5m width cycle track on each side; 706m of designated, continuous cycle track	Not implemented	0%
		VENDOR KIOSKS Not available on any side	Not intended in design		N/A
		PARKING BAYS Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 4 3-wheelers: 5 4-wheelers: 2 Bicycles: 2	100%

Table A_05. Monitoring overview and scores of implementation: Cunningham Road

Commissariat Road

Figure A_07. Location: Commissariat Road

Figure A_08. Commissariat Road

INCREASING ACCESSIBILITY

660m
uninterrupted footpath

INCREASING PEDESTRIAN SAFETY

75%
reduction in pedestrian crossing distance

GENDER SAFETY

30
LED lamps at regular intervals

Commissariat Road runs between two important junctions: Mayo Hall at MG Road and D'Souza Circle at Richmond Road. Scattered landmarks, a football stadium, landmark shopping malls, and the Ashok Nagar Police Station among others make this a very intriguing street, with a wide variety of uses and users.

	PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	**FOOTPATH WIDTH** 2m–5.9m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	Min. 2m footpath on both sides; 660m of uninterrupted footpath with tactile pavers, ramps at kerb edges, bollards with 1m gaps, and accessible pedestrian crossings	2.8m–3.8m wide footpath on both sides. Pedestrian crossings not implemented as per design. Discontinuous tactile pavers, ramps at kerb edges of 150mm height, bollards at 1m gap and easily accessible pedestrian crossings	94.4%
	QUALITY OF MATERIAL & CONSTRUCTION Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	**ROAD WIDTH** 19m–24m ROW; 6m–9m total travel lane width; 3 lanes; no designated parking	6m total travel lane width; 2 lanes; with shoulder for halting and designated parking bays	6m total travel lane width; 3 lanes; with shoulder for halting and designated parking bays	100%
	BUS STOPS Not available	1 designated bus shelter at a suitable distance from intersections, with seating, lighting, space for maps, etc.	1 designated bus shelter in good condition, at a suitable distance from intersections, with seating, lighting, space for maps, etc.	100%
	LIGHTING 30 poorly-placed sodium-vapour lamps resulting in non-uniform lighting.	30 LED lamps placed at regular intervals to provide uniform lighting.	30 LED lamps placed at regular intervals to provide uniform lighting.	100%
ELEMENTS	**LANDSCAPE** Not available on any side	556sqm increase in landscape area including a continuous 0.4m wide landscape strip along the footpath	556sqm increase in landscape area including a continuous 0.4m wide landscape strip; some trees on footpath causing obstruction	83.3%
	WASTE MANAGEMENT Not available on any side	16 new bins for segregated waste collection at 30m intervals	16 new bins for segregated waste collection at 30m intervals	100%
UGD	**UNDERGROUND UTILITIES** Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,433m power ducts with 19 access chambers; 2,936m telecom ducts with 12 access chambers; 885m sewer lines with 31 access chambers	Some poles for broadband cable are seen above the ground; electricity cables not concealed	75%
	STORMWATER DRAINAGE Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	575m of underground stormwater pipes with 15 percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA	**CYCLE TRACK** Not available on any side	Not intended in design	Not implemented	N/A
	VENDOR KIOSKS Not available on any side	Not intended in design		N/A
	PARKING BAYS Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 5 3-wheelers: 3 4-wheelers: 1 Bicycles: 2	100%

Table A_06. Monitoring overview and scores of implementation: Commissariat Road

Queens Road

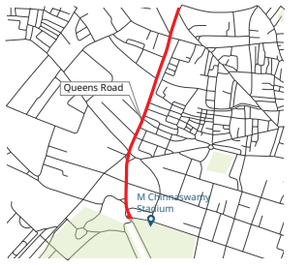


Figure A_09. Location: Queens Road

Figure A_10. Queens Road

EQUITABLE RIGHT OF WAY

3m

wide travel lanes at all 3 segments

INCREASING PEDESTRIAN SAFETY

75%

reduction in pedestrian crossing distance

INCREASING GREEN COVER

654sqm

increase in landscape area

Queens Road is a major north-south connector running from Cantonment Railway Station to MG Road. As part of Tender S.U.R.E., a section of Queens Road, excluding the segment from Minsk Square to MG Road, was considered. The considered section can be divided into two segments based on width and traffic flow. The first allows for one-way traffic from Cantonment Railway Station to Balekundri Circle. It is an important connector for buses travelling south or to the Shivaji Nagar bus terminus.

The second segment of Queens Road from Balekundri Circle to Minsk Square also supports one-way traffic, but is much narrower than the first segment. It is part of an important one-way loop which connects areas north of MG Road to MG Road. This part of the road is lined with offices, with the police commissioner's office being the most important landmark.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	FOOTPATH WIDTH	Segment 1: 1.3m–1.6m; Segment 2: 1.4m–3.2m; Segment 3: 2.9m–3.5m. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	Seg. 1: 1.3m–2.3m; Seg. 2: 2m–2.7m; Seg. 3: 1m–3m Footpaths on both sides with tactile pavers, ramps at kerb edges, bollards with 1m gaps, and accessible pedestrian crossings	1.3m–2.2m wide footpath on both sides of travel lanes with uneven height; Ramps, bollards and pedestrian crossings are present only in some parts of the footpath	55.6%
	QUALITY OF MATERIAL & CONSTRUCTION	Irregular footpath surface with several encroach-ments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	ROAD WIDTH	Seg. 1: 9.5m ROW, 9.3m, 3 lanes; Seg. 2: 15.9m ROW, 15.1m, 4 lanes; Seg. 3: 13.9m ROW, 12.8m, 4 lanes	3m travel lanes for all segments; 3 lanes for Segment 1, and 4 lanes for Segments 2 and 3	3m travel lanes for all segments; 3 lanes for Segment 1, and 4 lanes for Segment 2 and 3; Shoulder bays absent	50%
	BUS STOPS	2 bus stops	2 designated bus shelters at a suitable distance from intersections, with seating, lighting, space for maps, etc.	2 designated bus shelters in mediocre condition with inadequate seating and lighting, and no space for info.	43.7%
ELEMENTS	LIGHTING	79 poorly-placed sodium-vapour lamps resulting in non-uniform lighting.	78 LED lamps placed at regular intervals to provide uniform lighting.	78 sodium-vapour lamps placed at regular intervals to provide uniform light-ing.	66.7%
	LANDSCAPE	Not available on any side	654sqm increase in landscape area including a continuous 0.4m wide landscape strip along the footpath	654sqm increase in landscape area including a continuous 0.4m wide landscape strip along the footpath	100%
	WASTE MANAGEMENT	Not available on any side	15 new bins for segregat-ed waste collection at 30m intervals	No bins installed	0%
UGD	UNDERGROUND UTILITIES	Haphazard underground power lines perpendicularly crossing the road at 3m below travel lane	11,373m of power ducts and 1,985m of new sewer lines with regular access chambers	All poles for broadband cable are seen above the ground; electricity cables are not all concealed	37.5%
	STORMWATER DRAINAGE	Haphazard underground utilities, 1 water line crossing the road below travel lane	1,438m of underground stormwater lines with percolation-cum-catch pits	Percolation-cum-catch pits provided around land-scape, but side drains are inconsistent and gratings are missing	33.3%
ADDED INFRA	CYCLE TRACK	Not available on any side	1.2m width cycle track on each side for all segments	Not implemented	0%
	VENDOR KIOSKS	Not available on any side	Not intended in design		N/A
	PARKING BAYS	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 7 3-wheelers: 4 4-wheelers: 0 Bicycles: 0	100%

Table A_07. Monitoring overview and scores of implementation: Queens Road

Ulsoor Road

Figure A_11. Location: Ulsoor Road

Figure A_12. Ulsoor Road

ORGANIZED UTILITIES

1157m

of new sewer lines

GENDER SAFETY

39

LED lamps at regular intervals

INCREASING GREEN COVER

660sqm

increase in landscape area

Ulsoor Road is a two-way road with a discontinuous median connecting Dickenson Road to Ulsoor Lake. It is an important east-west connector, parallel to MG Road. The volume of traffic that runs west to east is double that which runs east to west. It has a mix of offices, restaurants, and residences as well as several old trees on both sides of the road. There are footpaths on both sides of the road.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	FOOTPATH WIDTH	1.8m–5.5m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	1.8m–5.5m width on both sides, continous footpath with tactile pavers, ramps at kerb edges of 150mm height, bollards at 1m gap, and easily accessible pedestrian crossings	1.4m–2.6m wide footpath on both sides. Ramps and tactile pavers are missing in some parts, and pedestrian crossings are not accessible at some intersections	83.3%
	QUALITY OF MATERIAL & CONSTRUCTION	Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	ROAD WIDTH	14.3m–16.6m ROW; 12.5m usable travel width; 2 lanes, no designated parking	9m with 2 travel lanes with shoulder for halting and designated parking bays.	9m with 2 travel lanes; absence of shoulder bay.	50%
	BUS STOPS	Not available	Not intended in design	Not implemented	N/A
ELEMENTS	LIGHTING	79 poorly-placed sodium-vapour lamps resulting in non-uniform lighting	34 LED lamps placed at regular intervals to provide uniform lighting	39 LED lamps placed at irregular intervals at certain spots	100%
	LANDSCAPE	Not available on any side	660sqm increase in landscape area, including a continuous 0.4m wide landscape strip along the footpath	660sqm increase in landscape area; including continuous landscape strip of 0.4m width; some trees on footpath causing obstruction	75%
	WASTE MANAGEMENT	Not available on any side	8 new bins for segregated waste collection at 30m intervals	Segregated bins for waste collection at 30m intervals	100%
UGD	UNDERGROUND UTILITIES	Haphazard underground power lines perpendicularly crossing the road at 3m below travel lane	5,317m of power ducts and 1,157m of new sewer lines with regular access chambers	All poles for broadband cable are seen above the ground; electricity cables run above ground	62.5%
	STORMWATER DRAINAGE	Haphazard underground stormwater lines; 4 lines crossing the road at 3m depth below travel lane	Underground pipes for stormwater lines with percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA	CYCLE TRACK	Not available on any side	1.2m width cycle track on each side	Not implemented	0%
	VENDOR KIOSKS	Not available on any side	Not intended in design		N/A
	PARKING BAYS	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 4 3-wheelers: 4 4-wheelers: 1 Bicycles: 2	100%

Table A_08. Monitoring overview and scores of implementation: Ulsoor Road

Kasturba Road

Figure A_13. Location: Kasturba Road

Figure A_14. Kasturba Road

EQUITABLE RIGHT OF WAY

3.3m
wide streamlined travel lane

ORGANIZED UTILITIES

1335m
of underground power ducts

PROMOTING MULTIMODAL STREETS

3
designated cycle parking spots

Kasturba Road is perhaps the most important road in Bengaluru. A continuation of MG Road, it connects to Richmond Circle and Hudson Circle via Vittal Mallya Hospital Road. Hudson Circle is home to the office of the city corporation. There are footpaths on both sides of the road. Kasturba Road is also lined with important public institutions such as the Government Museum, the Technological Museum, and Venkatappa Art Gallery.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	FOOTPATH WIDTH	2.2m–4.8m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	1.1m–5.1m width on both sides; continuous footpath with tactile pavers, Ramps at kerb edges of 150mm height, bollards at 1m gap, and easily accessible pedestrian crossings	1.76m–2.2m wide footpath on both sides of travel lanes. Absence of tactile pavers; ramps are missing at some pedestrian crossings	66.7%
	QUALITY OF MATERIAL & CONSTRUCTION	Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	ROAD WIDTH	20.4m–22.2m ROW; 18.5m usable travel width; 4 lanes, no designated parking	13.2m ROW; 3.3m usable travel width; 4 lanes; shoulder for halting and designated parking bays	13.2m ROW; 3.3m usable travel width; 4 lanes; shoulder for halting and designated parking bays	100%
	BUS STOPS	2 bus stops	2 designated bus shelters at a suitable distance from intersections, with seating, lighting, space for maps, etc.	2 designated bus shelters at a suitable distance from intersections, with seating, lighting, space for maps, etc.	100%
ELEMENTS	LIGHTING	19 poorly-placed sodium-vapour lamps resulting in non-uniform lighting	40 LED lamps placed at regular intervals to provide uniform lighting	40 LED lamps placed at regular intervals to provide uniform lighting	100%
	LANDSCAPE	Not available on any side	944sqm increase in landscape area, including a continuous 0.4m wide landscape strip along the footpath	944sqm increase in landscape area, including a 0.4m wide landscape strip along some parts of the footpath	75%
	WASTE MANAGEMENT	Not available on any side	10 new bins for segregated waste collection at 30m intervals	Regularly spaced segregated bins for waste collection	100%
UGD	UNDERGROUND UTILITIES	Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,355m of power ducts and 4,360m of new sewer lines, with regular access chambers	All utilities are below grade except for broadband cables which are seen on poles	87.5%
	STORMWATER DRAINAGE	Utilities existed at 3m depth under travel lanes causing leaks and frequent road digging	1,340m of underground stormwater lines with percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA	CYCLE TRACK	Not available on any side	1.2m width cycle track on each side	Not implemented	0%
	VENDOR KIOSKS	Not available on any side	Not intended in design		N/A
	PARKING BAYS	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 8 3-wheelers: 6 4-wheelers: 3 Bicycles: 3	100%

Table A_09. Monitoring overview and scores of implementation: Kasturba Road

Brigade Road

Figure A_15. Location: Brigade Road

Figure A_16. Brigade Road

INCREASING PEDESTRIAN SAFETY

60%
reduction in pedestrian crossing distance

GENDER SAFETY

40
LED lamps at regular intervals

ORGANIZED UTILITIES

667m
of new sewer lines

Brigade Road was once a landmark shopping street and the heart of the CBD, known for its bars and restaurants that attracted locals and tourists alike. This road is also an important north-south connector, allowing for traffic from MG Road to go towards Hosur Road. Auto-rickshaws are not allowed on the road. The MG Road metro station is just off the north end of the road, and there is a bus stop at War Memorial Junction to the south, providing great access to public transport.

		PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	FOOTPATH WIDTH	2.8m–3.8m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	3.1m–5.9m on both sides, continuous footpath with tactile pavers, ramps at kerb edges, bollards with 1m gaps, and accessible pedestrian crossings	2.3m–3.7m wide footpath on both sides. Discontinuous tactile pavers, with ramps at kerb edges of 150mm height, bollards at 1m gap and easily accessible pedestrian crossings	94.4%
	QUALITY OF MATERIAL & CONSTRUCTION	Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	ROAD WIDTH	10.6m–13.5m ROW; 10.5m usable travel width; 2 lanes, no designated parking	6m ROW; 3m usable travel width; 2 lanes, shoulder for halting and designated parking bays	6m ROW; 3m usable travel width; 2 lanes, shoulder for halting and designated parking bays	100%
	BUS STOPS	Not available	Not intended in design	Not implemented	N/A
ELEMENTS	LIGHTING	13 poorly-placed sodium-vapour lamps resulting in non-uniform lighting	40 LED lamps placed at regular intervals to provide uniform lighting	40 LED lamps placed at regular intervals to provide uniform lighting	100%
	LANDSCAPE	Not available on any side	357sqm increase in landscape area, including a continuous 0.4m wide landscape strip along the footpath	No landscaping implemented	0%
	WASTE MANAGEMENT	Not available on any side	8 new bins for segregated waste collection at 30m intervals	Regularly spaced segregated bins for waste collection	100%
UGD	UNDERGROUND UTILITIES	Underground power and sewer lines at 3m depth below travel lane causing leaks and road digging	3,190m of power ducts and 667m of new sewer lines with regular access chambers	All networked infrastructure moved underground with frequent access chambers; no cables seen above	100%
	STORMWATER DRAINAGE	Underground stormwater lines at 3m depth below travel lane causing leaks and road digging	Underground pipes for stormwater lines with percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA	CYCLE TRACK	Not available on any side	Not intended in design	Not implemented	N/A
	VENDOR KIOSKS	Not available on any side	Not intended in design		N/A
	PARKING BAYS	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 5 3-wheelers: 2 4-wheelers: 0 Bicycles: 0	100%

Table A_10. Monitoring overview and scores of implementation: Brigade Road

Castle Street

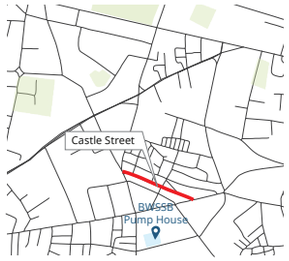


Figure A_17. Location: Castle Street

Figure A_18. Castle Street

ORGANIZED UTILITIES

673m
of new sewer lines

2147m
of underground power ducts

Wood Street, Castle Street, and Tate Lane create a smaller one-way traffic loop between Museum Road, Brigade Road, and Richmond Road. This system was introduced in an effort to decongest Vellara Junction. Castle Street runs parallel to Wood Street and connects traffic from Richmond Road to Museum Road and Residency Road. It also supports mixed land use and suffers from disorganised parking and negligible pedestrian infrastructure. Both Wood Street and Castle Street are lined with many old trees.

	PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	**FOOTPATH WIDTH** 2m–2.9m irregular width. Absence of tactile pavers, ramps, buffers like bollards, and pedestrian crossings	1.6m–4m on both sides, continous footpath with tactile pavers, ramps at kerb edges, bollards with1m gaps, and accessible pedestrian crossings	1m–2.2m wide footpath on both sides; footpath too narrow in some places. Tactile pavers, ramps and bollards missing in some places; pedestrian crossings accessible in most places	72.2%
	QUALITY OF MATERIAL & CONSTRUCTION Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	**ROAD WIDTH** 13.2m–14.7m ROW; 6.6m usable travel width; 2 lanes; no designated parking	7m ROW; 3.5m usable travel width; 2 lanes; shoulder for halting and designated parking bays	7m ROW; 3.5m usable travel width; 2 lanes; shoulder for halting and designated parking bays	100%
	BUS STOPS Not available	Not intended in design	Not implemented	N/A
ELEMENTS	**LIGHTING** 13 poorly-placed sodium-vapour lamps resulting in non-uniform lighting	19 LED lamps placed at regular intervals to provide uniform lighting	19 LED lamps placed at regular intervals to provide uniform lighting	100%
	LANDSCAPE Not available on any side	477sqm increase in landscape area, including a continuous 0.4m wide landscape strip along the footpath	Landscape strip provided in some parts only; some trees on footpath obstructing pedestrian movement	25%
	WASTE MANAGEMENT Not available on any side	5 new bins for segregated waste collection at 30m intervals	Regularly spaced segregated bins for waste collection	100%
UGD	**UNDERGROUND UTILITIES** Underground power and sewer lines at 3m depth below travel lane causing leaks, frequent road digging	2,147m of power ducts and 711m of new sewer lines with regular access chambers	Some broadband and power cables are still seen above ground	87.5%
	STORMWATER DRAINAGE Underground stormwater lines at 3m depth below travel lane causing leaks and road digging	704m of underground stormwater lines with percolation-cum-catch pits	Underground stormwater drains with kerb-side gratings; but no landscape pits provided for rainwater percolation	83.3%
ADDED INFRA	**CYCLE TRACK** Not available on any side	Not intended in design	Not implemented	N/A
	VENDOR KIOSKS Not available on any side	Not intended in design		N/A
	PARKING BAYS Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking for– 2-wheelers: 3 3-wheelers: 2 4-wheelers: 0 Bicycles: 0	100%

Table A_11. Monitoring overview and scores of implementation: Castle Street

Church Street

Figure A_19. Location: Church Street

Figure A_20. Church Street

EQUITABLE RIGHT OF WAY

5.5m
wide streamlined travel lane

PROMOTING NON-MOTORISED TRANSIT

2.1-3.3m
continuous footpath

Church Street in Bengaluru is a vibrant and popular destination known for its diverse array of shops, restaurants, and cultural attractions. Located in the heart of the city, this historic street underwent redevelopment between 2016 and 2018 as part of Phase 02 of the Tender S.U.R.E. initiative. The project involved the transformation of a total of 715m of the street into a modern, pedestrian-friendly destination. The redesign of Church Street was centred around the concept of "pedestrianisation". The use of locally-sourced cobblestone and sadarahalli granite stone added a sense of local culture, while also serving as a traffic-calming measure.

	PRE TENDER S.U.R.E.	INTENDED DESIGN	POST TENDER S.U.R.E.	SCORE
FOOTPATH	**FOOTPATH WIDTH** ROW of irregular width. Absence of tactile pavers, ramps, buffers like bollards and pedestrian crossings	[to be verified]	2.1m–3.3m wide footpath on both sides. Discontinuous tactile pavers, ramps at kerb edges of 150mm height, bollards at 1m gap, and easily accessible pedestrian crossings	94.4%
	QUALITY OF MATERIAL & CONSTRUCTION Irregular footpath surface with several encroachments and obstacles	Concrete pavers for footpaths, laid on a sand bed without any cement; 5-layer composition for travel lanes.	Unable to monitor this feature post execution	N/A
TRAFFIC MGMT	**ROAD WIDTH** 13.2m–14.7m ROW; 6.6m usable travel width; 2 lanes; no designated parking	7m ROW; 2 lanes; shoulder for halting and designated parking bays	5.5m usable travel lane width; 2 lanes; designated parking bays, but no shoulder for halting	50%
	BUS STOPS Road is not on a bus route, so no shelters are present	Not applicable to design	Not applicable	N/A
ELEMENTS	**LIGHTING** Poorly-placed sodium-vapour lamps resulting in non-uniform lighting	LED lamps placed at regular intervals to provide uniform lighting	LED lamps placed at regular intervals to provide uniform lighting	100%
	LANDSCAPE Not available on any side	Continuous 0.4m wide landscape strip along the footpath	Continuous 0.4m wide landscape strip along the footpath	100%
	WASTE MANAGEMENT Not available on any side	Bins for segregated waste collection at 30m intervals	Regularly spaced segregated bins for waste collection	100%
UGD	**UNDERGROUND UTILITIES** [to be verified]	[to be verified]	Some broadband and power cables are still seen above ground	87.5%
	STORMWATER DRAINAGE [to be verified]	[to be verified]	Underground stormwater drains with kerb-side gratings and landscape pits with soil for rainwater percolation	100%
ADDED INFRA	**CYCLE TRACK** Not available on any side	Not incorporated into the design	Not implemented	0%
	VENDOR KIOSKS Not available on any side	Not incorporated into the design	Not implemented	0%
	PARKING BAYS Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles	Designated parking bays for 2-,3-, and 4-wheelers as well as bicycles to avoid haphazard parking on roads	Designated parking bays provided. Number of parking bays to be verified	100%

Table A_12. Monitoring overview and scores of implementation: Church Street

5.6 | ANNEX 06

Monitoring Scores

	Parameter	Ideal State	#	Indicator	Benchmark
1	**Continuous, wide footpath**	**Width:** Min. 1.5m, max. 3m **Kerb height:** 15cm–25cm **Provision:** Continuous and uniform laying, on both sides of ROW, with slopes at crossings for wheelchairs and strollers **Universal access:** Continuous provision of tactile pavers along footpath	1.1	Is there a continuous footpath on either side of the road? a) Yes b) No	1
			1.2	Width of footpath (at 3 points on the map should be 1.5–3m)	1
			1.3	Height of footpath (at 3 points on the map should be 15–25cm)	1
			1.4	Ramps are provided at kerb edges to allow wheelchair/stroller access a) Yes b) No c) In some locations (mark on map)	1
			1.5	Tactile pavers are provided along the footpath for guidance of the visually impaired a) Yes b) No c) Tactile pavers are provided, but are not continuous	1
		Safety: Buffer between travel lane and footpath; bollards to prevent vehicles from using the footpath; well designed and suitably located pedestrian crossings.	1.6	Footpath has a buffer to provide access only to pedestrians (bollards, railings, landscape, etc) a) Yes b) No c) In some parts (mark on map)	1
			1.7	If bollards are present, 1m gaps are provided at the last bollard to allow movement of wheelchairs/strollers? a) Yes b) No c) In some parts (mark on map)	1
			1.8	Have pedestrian crossings been provided? a) Yes b) No c) In some parts (mark on map)	1
			1.9	Pedestrian crossing is easily accessible (at the same level as the footpath or sloped down to the road level)	1
				Footpath score	**9**
2	**Uniform travel lanes**	Uniform travel lanes ensure smooth movement of vehicles. The design of the travel lane is dependent on existing ROW width. Width and number of travel lanes are designed according to traffic volume and road classification.	1.1	Road width	0
			1.2	No. of lanes (at multiple points, if relevant)	0
			1.3	Has a shoulder/holding bay been provided? a) Yes (mark roughly on map) b) No	1
				Travel lane score	**1**
3	**Quality of material and construction of road/ footpath**	For footpaths: High-quality concrete paver, tightly laid onto an even, well-compacted base and a sand bed, to the required slope, without any cement filling in the joints. For road surface: 5-layer composition, with thickness of each layer designed according to the soil below and the traffic loads above the road surface.	1.1	[unable to monitor this feature post execution]	
4	**Bus stops**	**Size of stop:** Length based on no. of buses using it at a given time, covered width of min. 1.2m. **Distance b/w bus stops:** 500m for arterial/ sub-arterial roads, and 300m–400m for collector/ local roads. **Location on road:** Nearside clearance: 35m (before an intersection); Farside clearance: 42m (after an intersection); Midblock clearance: 25m (between intersections)	1.1	Are bus shelters provided?	1
			1.2	(On Tender S.U.R.E. roads only) Are bus shelters provided as per the design?	
			1.3	Length of each shelter	1
			1.4	Width of each shelter	1
			1.5	Is the shelter near an intersection?	
			1.6	Approx. distance before intersection?	1
			1.7	Approx. distance after intersection?	1
			1.8	Bus shelter quality	
			1.9	The shelter is good condition	1
			1.10	Seating is provided	1
			1.11	Lighting is provided	1

Table A_13. Rationale for monitoring scores

Monitoring Scores

	Parameter	Ideal State	#	Indicator	Benchmark
	Bus stops (Contd.)	**Quality:** Space for route maps, bus schedules; clear 1m for pedestrian movement on footpath; area where passengers alight should be clear of trees, utility poles, wires, etc.	1.12	Space is provided for route maps and/or bus schedules	1
			1.13	There is at least 1m provided for pedestrian movement on the footpath at the shelter	1
			1.14	The area where passengers alight is clear of trees, utility poles, wires, etc.	1
				Bus stop score	**11**
5	Lighting	Design of street lighting depends on road type and width. **Local/sub-local:** Single sided, at 10m intervals; 3m–6m height. **Collector:** Staggered/ opposite sides, at 15m intervals, 9m height. **Sub-arterial:** Central, at 30m intervals; 12m height. **Arterial:** Central+opposite, at 30m intervals; 12m and 6m heights. Light type: LED. Distance from kerb: 0.5m	1.1	Footpath on both sides of the road is well-lit with functional street light poles a) Yes b) No, there are no light poles c) No, streetlights are only on one side of the road d) No, streetlights are too far apart e) No, streetlights are at irregular intervals	1
			1.2	LED solar lights are used (not sodium-vapour) a) Yes b) No	0.5
				Lighting score	**1.5**
6	Landscape	**Landscape strip width:** min. 0.4m; can go up to 1m or more where permissible **Distance from kerb (for plants/trees):** 0.7m	1.1	(On Tender S.U.R.E. roads only) Cross check trees in design with actual number of trees on road (use map to verify)	0
			1.2	Planting buffer of 0.4m width (or more) is provided between road and footpath a) Yes b) No c) In some parts	1
			1.3	Trees and plants are planted along the footpath without obstructing pedestrian movement a) Yes b) No	1
				Landscape score	**2**

	Parameter	Ideal State	#	Indicator	Benchmark
7	Waste management	Provision of segregated bins at 30m intervals on commercial roads	1.1	The footpath segment has garbage bins placed at 30m intervals for both wet waste and dry waste a) Yes b) No	1
				Waste management score	**1**
8	Underground utilities	Subterranean pipes laid under the footpath to carry all utilities — power, data and fibre optic cables, gas, street light wiring, water supply, stormwater and sewerage — with regularly spaced access chambers to each that allow for maintenance without needing to dig up the footpath.	1.1	All electricity lines are concealed underground (as evidenced by BESCOM access chambers) a) Yes b) No c) Some electric poles are seen above ground	1
			1.2	All broadband/fibre optic lines are concealed underground (as evidenced by provider access chambers) a) Yes b) No c) Some poles for broadband cables are seen above ground	1
			1.3	All sewerage lines and stormwater drains are concealed underground (as evidenced by BWSSB access chambers) a) Yes b) No c) In some parts	1
			1.4	There are no open stormwater drains along the footpaths a) Yes b) No c) In some parts	1
				Underground utilities score	**4**

Monitoring Scores

	Parameter	Ideal State	#	Indicator	Benchmark
9	**Stormwater management**	Road surface set to slope with unobstructed drain channels along the length of the footpath; landscape planned with exposed earth to allow rainwater percolation.	1.1	Stormwater inlets are provided along the kerb as per Tender S.U.R.E. design (check against drawing) a) Yes b) No c) In some parts	1
			1.2	Stormwater inlets along kerbs have gratings to prevent litter from entering channels a) Yes b) No c) In some parts	1
			1.3	There is exposed earth around landscape pits to allow rain/ stormwater to percolate a) Yes b) No c) In some parts	1
				Stormwater management score	**3**
10	**Cycle track**	Continuous, uniform track of **Width**: min. 1.5m (one-way), 2.5m (two-way) **Elevation:** 15cm above carriageway for stormwater run-off **Buffer:** 0.5m between cycle track and travel lane/parking **Bollards:** to block access to motorists	1.1	Is there a continuous cycle track? a) Yes, on one side b) Yes, on two sides c) Yes, but cycle track is only present in some parts (mark on map) d) No, there is no cycle track	1
			1.2	Width of cycle track (at 3 points) [should be min. 1.5m (one-way), 2.5m (two-way)] a) b) c)	1
			1.3	What material is used? (photo/video required)	0
			1.4	Is there a buffer between the cycle track and travel lane/ parking? a) Yes b) No c) In some parts	1
				Cycle track score	**3**

	Parameter	Ideal State	#	Indicator	Benchmark
11	**Vendor kiosks**	Formalised pitch sites or kiosks for street vendors that don't block the footpath or road.	1.1	Does the footpath include areas for hawkers/vendors that do not obstruct the movement of pedestrians?	1
				Vendor kiosks score	**1**
12	**Parking**	Where feasible, designated short halt and parking bays are provided to not impact traffic flow.	1.1	Are designated parking bays provided? a) Yes b) No c) In some parts	1
			1.2	If yes, how many parking bays are provided? (a) For 4-wheelers (b) For 2-wheelers (c) For 3-wheelers (d) For bicycles	0
				Parking score	**1**

5.7 | ANNEX 07
Walkability Scores

A footpath is regarded as 'walkable' if two people can walk on it side-by-side without having to step onto the road. For each road in the study, the footpaths have been traversed to analyse this, noting the frequency and severity of obstructions or encroachments encountered.

Some obstructions to walkability are related to infrastructure maintenance, such as broken pavers, caving in of the pavement, road works, etc. Others are related to enforcement, such as vendor carts, parking, littering, etc. The obstructions are given a rating for severity on a scale of 1 to 5, where 1 is a minor obstruction that can be skirted around and 5 is a severe obstruction or encroachment that requires a pedestrian to step onto the road. Additionally, the non-existence of a footpath on any stretch of the road is also considered a Level 5 obstruction since it requires citizens to walk on the road. Obstructions with a score greater than 3 were measured in terms of length to indicate the magnitude of obstruction. The total length of obstruction was captured on each footpath (on both sides of the road). This was considered against the total length of the footpath and a 'walkability' score was attributed to each road. The breakdown of scoring for each road can be seen below.

Residency Road
Length of footpath surveyed = 2 km
Number of major obstructions (>3) = 4
Total length of obstruction = 6m+6m+10m+5m = 27m
% walkable = (1973m/2000m)*100 = **98.65%**

St Mark's Road
Length of footpath surveyed = 722m
Number of major obstructions (>3) = 1
Total length of obstruction = 5m
% walkable = (717m/722m)*100 = **99.3%**

Cunningham Road
Length of footpath surveyed = 732m
Number of major obstructions (>3) = 2
Total length of obstruction = 3m + 4m = 7m
% walkable = (725m/732m)*100 = **99.0%**

Commissariat Road
Length of footpath surveyed = 700m
Number of major obstructions (>3) = 2
Total length of obstruction = 3m + 2m = 5m
% walkable = (695m/700m)*100 = **99.3%**

Church Street
Length of footpath surveyed = 1346m
Number of major obstructions (>3) = 1
Total length of obstruction = 2m
% walkable = (1344m/1346)*100= **99.8%**

Queens Road
Length of footpath surveyed = 382m
Number of major obstructions (>3) = 3
Total length of obstruction = 17+3+2 = 22m
% walkable = (360m/382m)*100 = **94.2%**

Ulsoor Road
Length of footpath surveyed = 592m
Number of major obstructions (>3) = 2
Total length of obstruction = 3m + 3m = 6m
% walkable = (586m/592m)*100 = **98.9%**

Castle Street
Length of footpath surveyed = 744m
Number of major obstructions (>3) = 8
Total length of obstruction = 2+10+3+7+4+2+2+15 = 45m
% walkable = (699m/744m)*100 = **93.9%**

Brigade Road
Length of footpath surveyed = 592m
Number of major obstructions (>3) = 0
Total length of obstruction = 0m
% walkable = **100%**

Kasturba Road
Length of footpath surveyed = 1.5 km
Number of major obstructions (>3) = 3
Total length of obstruction = 3m + 4m +2m = 9m
% walkable = (1491m/1500m)*100 = **99.4%**

KH/Double Road
Length of footpath surveyed = 540m
Number of major obstructions (>3) = 5
Total length of obstruction = 4+4+3+3+4 = 18m
% walkable = (522m/540m)*100 = **96.6%**

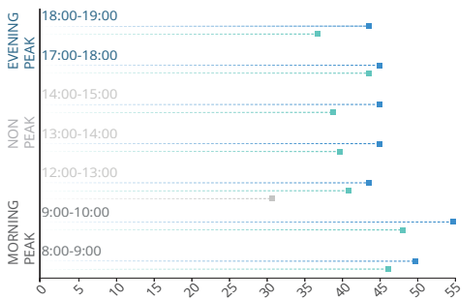
Ulsoor Bazaar Street
Length of footpath surveyed = 620m
Number of major obstructions (>3) = 5
Total length of obstruction = 1+5+10+6+262 = 284m
% walkable = (336m/620m)*100 = **54.2%**

Devanga Samaja Road
Length of footpath surveyed = 944m
Number of major obstructions (>3) = 15
Total length of obstruction = 27+3+2+1+1+3+3+78+26+20+10+6+2+6+4+5+12 = 209m
% walkable = (735m/944m)*100 = **77.8%**

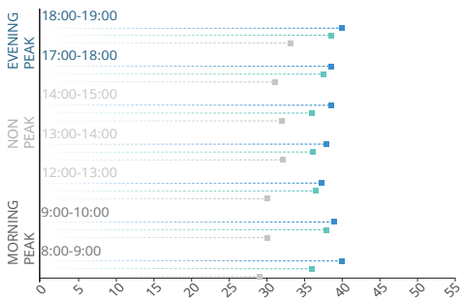
5.8 | ANNEX 08: TRAFFIC SURVEY

Traffic Speed

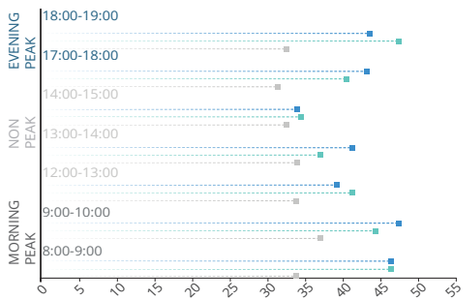
ST. MARKS ROAD



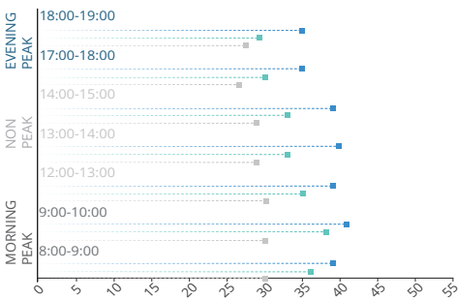
QUEENS ROAD



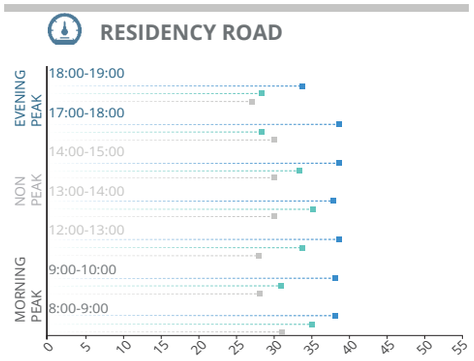
CUNNINGHAM ROAD



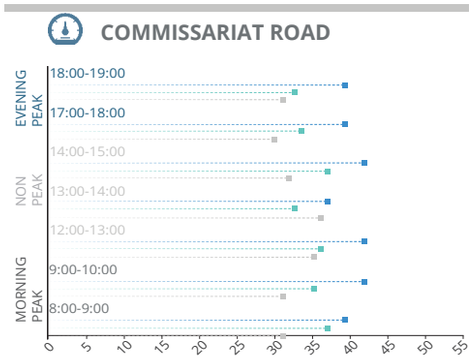
BRIGADE ROAD



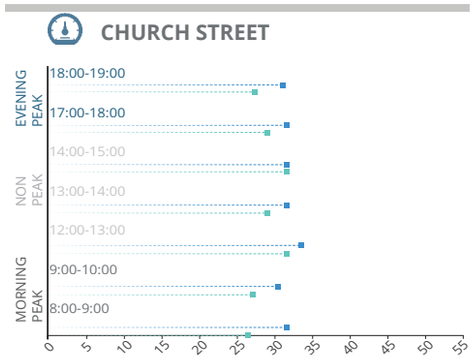
RESIDENCY ROAD



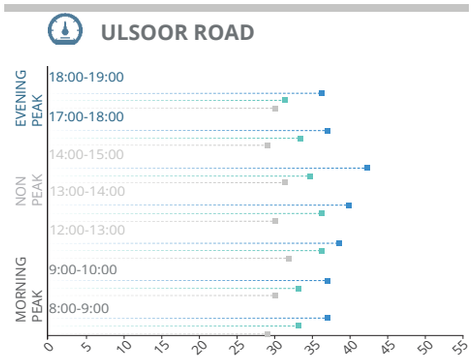
COMMISSARIAT ROAD



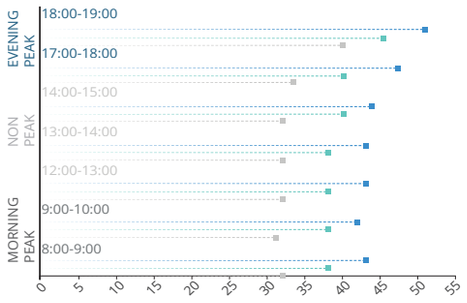
CHURCH STREET



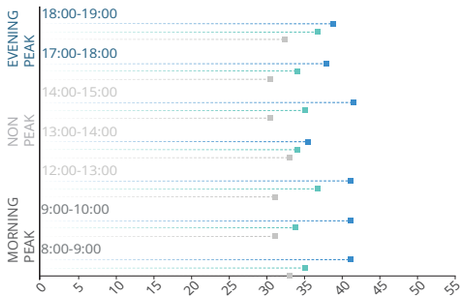
ULSOOR ROAD



KASTURBA ROAD



CASTLE STREET

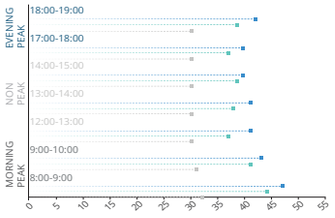


LEGEND

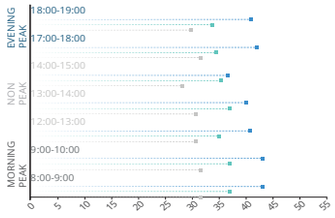
- 2 WHEELERS
- 4 WHEELERS
- BUS

Control Roads

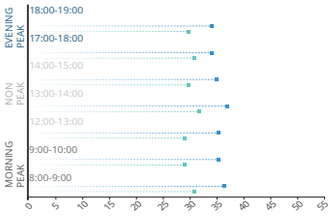
DOUBLE/ KH ROAD



DEVANGA SAMAJA ROAD

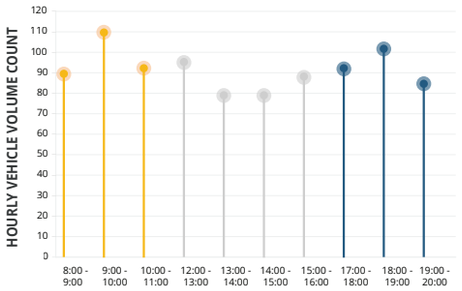


ULSOOR BAZAAR STREET

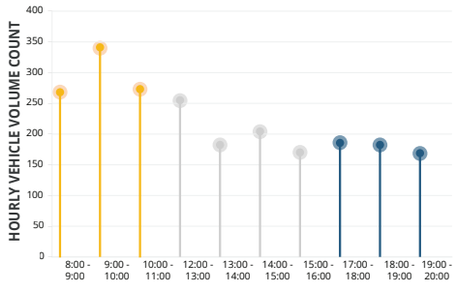


Traffic Volume

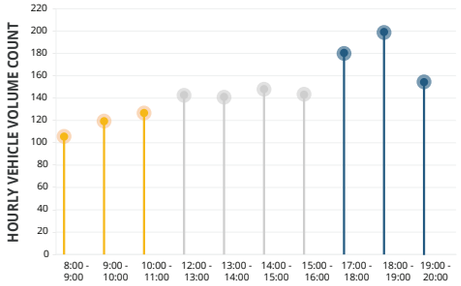
ST MARKS ROAD



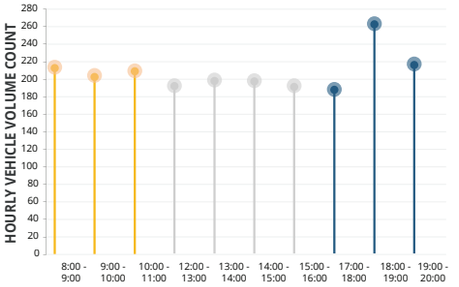
QUEENS ROAD



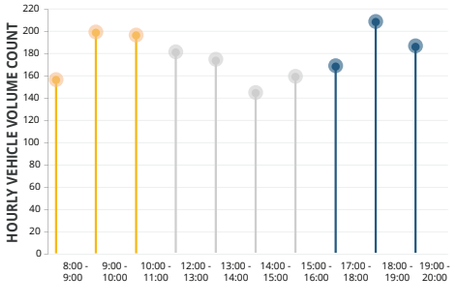
CUNNINGHAM ROAD



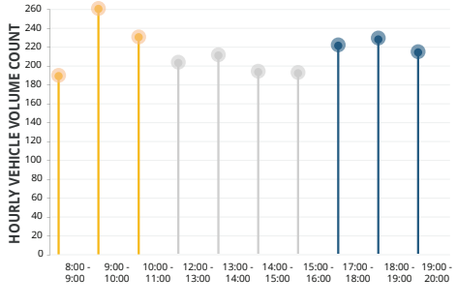
BRIGADE ROAD



RESIDENCY ROAD

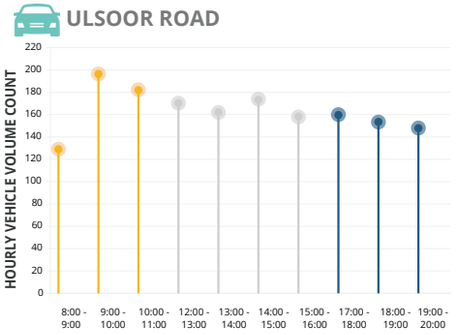


COMMISSARIAT ROAD

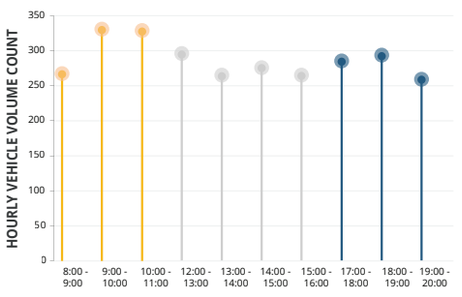


CHURCH STREET

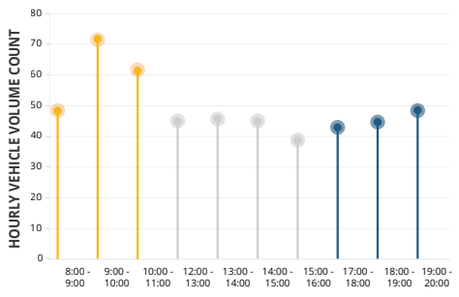
ULSOOR ROAD



KASTURBA ROAD



CASTLE STREET

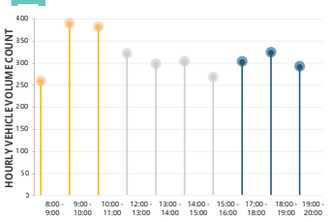


LEGEND

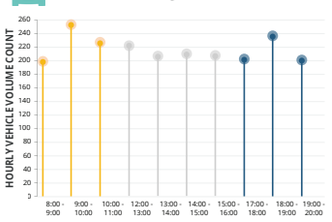
- MORNING PEAK
- NON PEAK
- EVENING PEAK

Control Roads

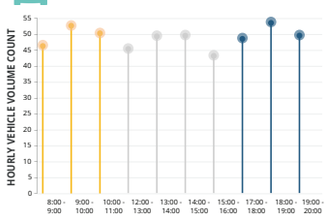
DOUBLE/ KH ROAD



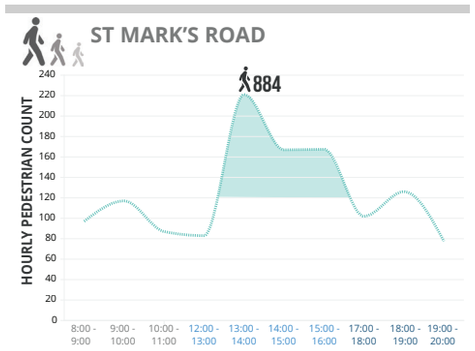
DEVANGA SAMAJ ROAD

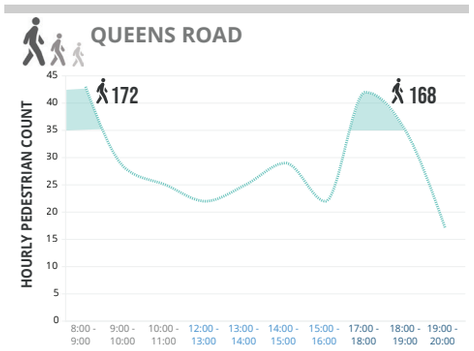


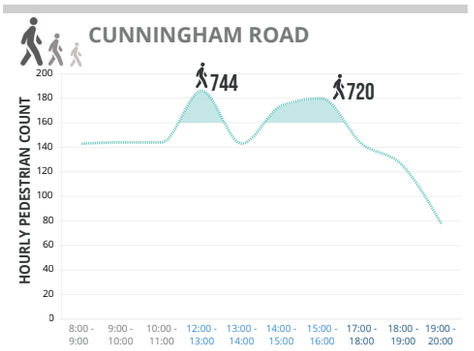
ULSOOR BAZAAR STREET

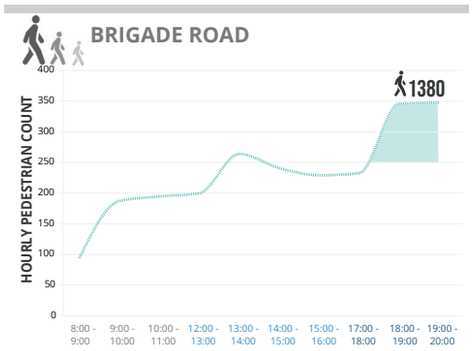


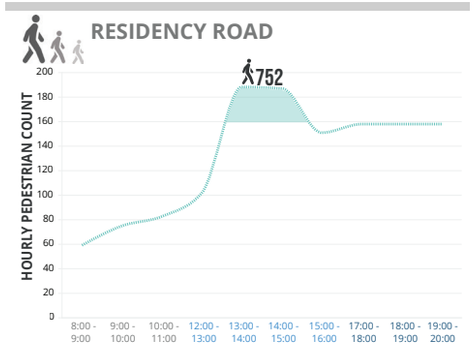
Pedestrian Count

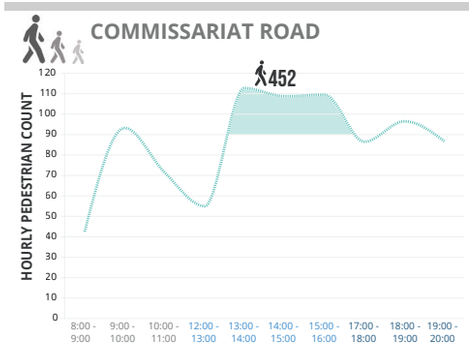


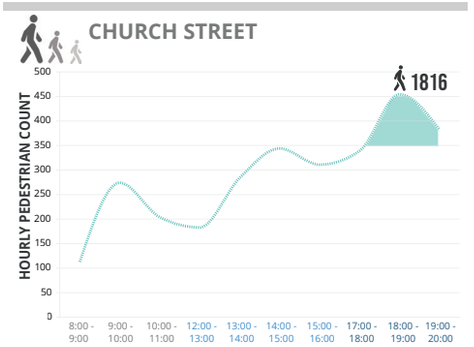


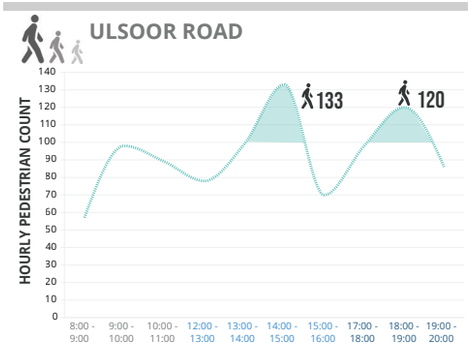


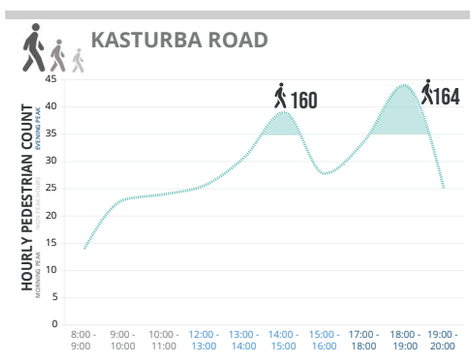


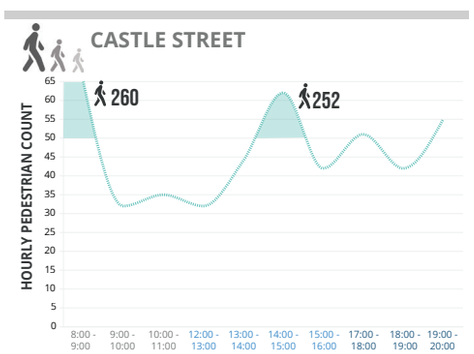








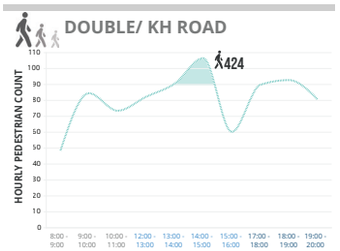


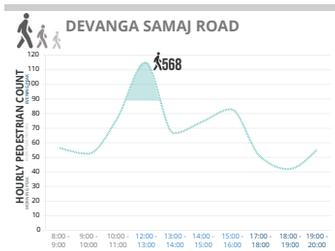


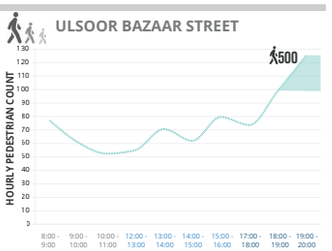
LEGEND

- MORNING PEAK
- NON PEAK HOURS
- EVENING PEAK

Control Roads







Glossary of Terms

TERM	DEFINITION
Arterial road	High-capacity urban road that sits below national/ state highways on the road hierarchy in terms of traffic flow and speed. It serves as a transition between highways and the city road network.
Bollard	A structure with a foundation, usually in metal, stone or concrete, placed strategically to prevent vehicular traffic from entering areas such as footpaths and cycle tracks.
Collector Road	A low-to-moderate-capacity road which serves to move traffic from local streets to arterial roads.
Corridor	An area of variable width between two points.
Cycle Lane	Portions of a roadway set aside for cycle use, with the lanes distinguished from the motor vehicle portion of the roadway by painted stripes, curbs or parking blocks.
Equitable Access	Ensures people with mobility impairments or vulnerabilities have the same opportunity as able-bodied people to access all parts of the network and at the same comfort levels.
Footfall	Presence and movement of people walking around in a particular space.
Intersection	An area shared by or a point where two or more roads meet. This area is designated for the vehicles to change their direction of movement, and for pedestrians to cross, to reach their desired destinations. Intersections can be signalised or non-signalised, to manage the traffic flowing across them.
Kerb	A stone edging to a pavement or raised path.
Local Road	A street that is primarily used to gain access to the property bordering it.
Maintenance	The process of preserving a condition or situation or the state of being preserved.
Mobility	The potential for movement and the ability to get from one place to another using one or more modes of transport.
Neighbour-hood	An area surrounding a particular place, person, or object, loosely demarcated by a group of streets, landmarks, etc.
Parking Lane	An auxiliary lane primarily for parking of vehicles. Demarcation of parking lanes can be made with paint or paver blocks.
Pedestrian	Any person walking on the road.
Pedestrian Crossing	Designated crossings where pedestrians may safely cross a road or intersection.
Ramp	An inclined plane, usually in RCC, allowing access to footpaths, and vehicular access to properties.
Right-of-way	The width of the public road and public area, belonging to the municipality — from property edge to property edge — to be used for mobility and public amenities.
Shoulder	The portion of the roadway adjacent to the travel lane for accommodation of parked vehicles, for emergency use, and for lateral support of the base and surface courses.

Glossary of Terms (continued)

TERM	DEFINITION
Sub-arterial Road	A road connecting arterial roads to areas of development and carrying traffic directly from one part of a region to another.
Sub-local Road	A road accessible by vehicles but not suitable for through-routes, including alleys and driveways.
Tender	A formal offer made for the supply of goods and services in response to an invitation for tender published.
Traffic Count	A count of total vehicular traffic passing a given point on a roadway during a specific time period.
Traffic Volume	The amount of traffic at a particular time.
Travel Lane	A strip of width 2.75m–3.5m, delineated with paint, on a road to accommodate a single line of vehicles.

List of Abbreviations

ABBREVIATION	DEFINITION
BBMP	Bruhat Bengaluru Mahanagara Palike
BESCOM	Bengaluru Electricity Supply Company Limited
BWSSB	Bengaluru Water Supply and Sewerage Board
CBD	Central Business District
LED	Light Emitting Diode
MEL	Monitoring, Evaluation, and Learning
NMT	Non-Motorised Transport
O&M	Operation and Maintenance
PPM	Parts Per Million
ROW	Right of Way
SOR	Schedule of Rates
TENDER S.U.R.E.	Specifications for Urban Road Execution
UGD	Underground Drainage
ULBs	Urban Local Bodies

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