

URBAN CALM: A Socio-Climatic Phenomenological Framework for Reclaiming Infrastructural Voids in Bengaluru

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Abstract - Rapid urbanization in Bengaluru has created numerous infrastructural voids, spaces beneath metro viaducts, flyovers, and building setbacks that remain neglected, fostering environmental discomfort from noise, heat, and visual disorder. This research develops a socio-climatic phenomenological framework to transform these lost spaces into restorative urban environments. A mixed-methods sensory audit evaluated case studies along MG Road and Indiranagar metro corridors plus Richmond Road flyover under-space, combining quantitative measures of decibel levels, temperature differentials, and height-to-width ratios with qualitative tools including behavioral mapping, serial vision photography, and user interviews. Findings reveal that strategies like morphological enclosure, deep shading, acoustic masking, and hospitable edges enhance thermal comfort, reduce sensory stress, and boost pedestrian dwell time. The study proposes a design toolkit featuring urban room geometries, shaded sequences, tactile materials, and climate-responsive landscapes. Infrastructural voids should be reframed as opportunities for urban calm rather than residuals. Small-scale interventions can yield inclusive public sanctuaries promoting environmental comfort, mental well-being, and social interaction in dense tropical cities.

Key Words: urban calm, infrastructural voids, sensory audit, thermal comfort, H/W ratio, Bengaluru.

1. INTRODUCTION

Bengaluru has undergone a rapid transformation from the “Garden City of India” into a dense technology-driven metropolitan region. Historically, the city’s urban form included courtyards, shaded verandas, lakes, and botanical gardens that acted as climatic buffers and social gathering spaces. However, contemporary urban growth has replaced many of these meaningful open spaces with fragmented residual areas beneath transport infrastructure and between buildings.

These areas, often referred to as **urban voids or lost spaces**, typically occur under flyovers, along metro corridors, and within building setbacks. Although they occupy valuable urban land, they are frequently neglected, underutilized, and uncomfortable due to noise pollution, excessive heat, and lack of spatial definition. Such conditions discourage social interaction and contribute to urban stress.

This research investigates how these neglected infrastructural voids can be transformed into **calming public spaces** through architectural design strategies. By examining spatial enclosure, shading, materiality, and microclimatic performance, the study aims to develop a framework for reclaiming these spaces as restorative urban environments.

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Urban voids have been widely discussed in urban design literature as by-products of modern planning. Roger Trancik describes these areas as “lost spaces” that emerge when buildings are treated as isolated objects rather than part of a cohesive spatial structure. In such contexts, open spaces lack enclosure and fail to function as meaningful public environments. Urban calm can be understood through four theoretical perspectives:

2.1. Morphological Structure Urban morphology explains how spatial form influences the usability of open spaces. Proper height-to-width ratios create a sense of enclosure, allowing voids to function as “urban rooms.”

2.2. Kinetic Perception The theories of Kevin Lynch and Gordon Cullen emphasize the role of movement and visual sequence in shaping spatial experience. Calm environments emerge when spaces provide visual clarity and gradual spatial transitions.

2.3. Social Ecology Research by Jan Gehl and William H. Whyte demonstrates that public spaces support social

interaction only when edges are hospitable and provide seating, shade, and opportunities to pause.

2.4. Tropical Phenomenology In tropical climates such as Bengaluru, Charles Correa highlights the importance of shade, ventilation, and climatic responsiveness. Open spaces can act as **thermal lungs** that reduce heat and improve outdoor comfort.

Existing literature largely focuses on large public parks or plazas, while **infrastructural voids beneath metro lines and flyovers remain understudied**, especially in rapidly urbanizing cities of the Global South. This research addresses that gap by examining these overlooked spaces as potential environments for urban calm.

3. RESEARCH METHODOLOGY

The study adopts a **mixed-methods sensory audit** to evaluate both the physical and experiential qualities of urban voids.

3.1. Research Approach

The methodology integrates quantitative environmental measurements with qualitative behavioral observations to understand how people experience these spaces.

3.2. Case Study Selection

Three locations along Bengaluru’s high-density transit corridors were selected:

1. MG Road Metro Boulevard
2. Indiranagar–MG Road Metro Corridor
3. Richmond Road Flyover Under-space

These sites were chosen due to their high pedestrian activity and the presence of neglected infrastructural spaces.

3.3. Data Collection Methods

Several tools were used during fieldwork:

- Decibel meter applications for acoustic mapping
- Temperature comparison between shaded and exposed surfaces
- Laser measurements to determine height-to-width ratios
- Behavioral mapping to record pedestrian stay-time and movement
- Serial vision photography documenting spatial experience
- Informal user interviews on perceived comfort and calmness

Table -1: Analytical Framework

Analytical Layer	Method	Purpose
Morphological Analysis	Figure-ground mapping	Identify spatial enclosure
Environmental Analysis	Decibel and temperature readings	Measure heat and noise
Experiential Analysis	Serial vision sketches	Evaluate spatial perception
Social Analysis	Behavioral mapping	Understand human activity

4. RESULTS AND DISCUSSION

The field investigations revealed several recurring patterns across the selected sites.

4.1. Spatial Enclosure

Spaces with a **height-to-width ratio between 1:2 and 1:3** were more comfortable and encouraged people to pause and interact. Areas lacking enclosure felt exposed and were primarily used for transit.

4.2. Thermal Performance

Deep shade beneath metro structures produced a temperature reduction of up to 5°C compared to adjacent streets, indicating the potential of infrastructural voids to function as microclimatic cooling zones.

4.3. Acoustic Conditions

Noise levels near major traffic corridors often exceeded 70–80 dB, making these spaces uncomfortable. However, vegetation and water features could partially mask traffic noise.

4.4. Social Behaviour

Pedestrian stay-time was significantly higher near shaded edges and seating areas, confirming Jan Gehl’s theory that people prefer edges rather than open central zones.

Table -2: Key Empirical Findings

Parameter	Measurement	Observation	Design Implication
Thermal Comfort	Surface temperature	Up to 5°C cooler in shade	Provide deep shadow
Acoustic Comfort	Noise levels 70–80 dB	Traffic noise dominant	Introduce acoustic masking
Social Activity	Stay-time	People stay longer near edges	Provide seating and niches
Spatial Geometry	H/W ratio	1:2 to 1:3 optimal	Design enclosed urban rooms

5. DESIGN PRINCIPLES FOR URBAN CALM

Based on the field observations and literature review, the research proposes ten design principles:

1. Create **urban room geometries** through spatial enclosure.
2. Introduce **deep shading strategies** using structures or vegetation.
3. Use **tactile materials** such as stone or wood to enhance sensory experience.
4. Incorporate **water features and planting** to mask traffic noise.
5. Provide **hospitable edges** with seating and shaded ledges.
6. Encourage **slow movement paths** through textured paving.
7. Frame sequential views using **serial vision planning**.
8. Use **landscape buffers** to filter noise and dust.
9. Integrate **small social spaces** for vendors and informal gatherings.
10. Treat infrastructural spaces as **urban sanctuaries rather than residual land**.

6. CONCLUSIONS

This research demonstrates that infrastructural voids within dense urban environments possess significant potential to function as restorative public spaces. Through morphological enclosure, climatic responsiveness, and

sensory design strategies, these neglected areas can be transformed into calm urban environments.

The study highlights that urban calm is not simply the absence of disturbance but a **designable spatial condition**. By combining architectural form, microclimatic performance, and social usability, cities can reclaim overlooked infrastructural spaces as inclusive and climate-responsive public environments.

In rapidly growing cities such as Bengaluru, small-scale interventions beneath metro corridors and flyovers can contribute meaningfully to **urban well-being, environmental comfort, and public life**.

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