Planning for Inclusive Urban Streets: Integrating Pedestrian Infrastructure and Street Vending Dynamics in Indian Cities

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Shivangi Tripathi

ABSTRACT

In Indian cities, footpaths are rarely just for walking. Street vendors set up their stalls on the same narrow strips of pavement that pedestrians need to move through, and the two groups are constantly forced to compete for the same limited space. National laws like the Street Vendors Act (2014) give vendors the legal right to occupy public space, while engineering guidelines like IRC:103 require cities to keep footpaths clear for walkers. In practice, neither rule is properly followed, because street design itself never accounts for both at the same time.

This study looks at that problem through three real streets in Bhopal the crowded historic market at Chowk Bazar, the busy station road at Rani Kamlapati, and the commercial roundabout at New Market Post Office Chauraha. Field surveys were carried out across different times of day to measure how congested these streets get, using standard performance scores alongside direct mapping of where vendors sit and where conflicts occur.

The core finding is that simply removing vendors does not fix the footpath. The streets are poorly designed to begin with, so eviction just shifts the problem. What works is redesigning the street itself to give both groups a defined place.

The thesis proposes dividing streets into three clear zones: areas near intersections where no vending is allowed for safety, narrower streets where vending is permitted only at certain hours, and wider roads where permanent, properly built vendor stalls are incorporated directly into the street layout. These changes are then backed by a policy recommendation to write these rules into Bhopal's official Development Plan, so that pedestrian safety and vendor livelihoods are protected together by law.

Keywords: Pedestrian Infrastructure, Street Vending, Inclusive Streets, Spatial Zoning, Level of Service, Bhopal.

सारांश

भारतीय शहरों में फुटपाथ केवल चलने के लिए नहीं होते। पैदल चलने वाले लोग और सड़क किनारे अपनी दुकान लगाने वाले फेरीवाले, दोनों एक ही संकरी पट्टी पर अपनी जगह के लिए रोज़ाना संघर्ष करते हैं। एक तरफ स्ट्रीट वेंडर्स अधिनियम (2014) फेरीवालों को सार्वजनिक स्थान पर काम करने का कानूनी अधिकार देता है, तो दूसरी तरफ IRC:103 जैसे इंजीनियरिंग दिशानिर्देश फुटपाथ को पैदल यात्रियों के लिए खुला रखने की मांग करते हैं। लेकिन असल में न तो एक नियम का पालन होता है और न ही दूसरे का, क्योंकि सड़क की डिज़ाइन ही इन दोनों ज़रूरतों को एक साथ ध्यान में रखकर कभी नहीं बनाई गई।

यह शोध भोपाल की तीन अलग-अलग सड़कों पर इसी समस्या को करीब से देखता है — चौक बाज़ार का घना पुराना बाज़ार, रानी कमलापति रोड का व्यस्त रेलवे स्टेशन क्षेत्र, और न्यू मार्केट पोस्ट ऑफिस चौराहे का योजनाबद्ध व्यापारिक केंद्र। सुबह, दोपहर और शाम के व्यस्त समय में किए गए सर्वेक्षणों से यह मापा गया कि इन सड़कों पर भीड़ कितनी है, पैदल यात्रियों को कहाँ सबसे ज़्यादा परेशानी होती है, और फेरीवाले किन जगहों पर बैठते हैं।

शोध का मुख्य निष्कर्ष यह है कि फेरीवालों को हटा देने से समस्या हल नहीं होती। सड़क की बनावट ही शुरू से गलत है, इसलिए हटाने से तकलीफ बस एक जगह से दूसरी जगह चली जाती है। असली समाधान सड़क को नए सिरे से डिज़ाइन करना है जिसमें दोनों के लिए एक तय जगह हो।

इस शोध में सड़कों को तीन हिस्सों में बाँटने का सुझाव दिया गया है — चौराहों के पास का क्षेत्र जहाँ सुरक्षा के लिए वेंडिंग पूरी तरह बंद हो, संकरी सड़कें जहाँ केवल निश्चित समय पर दुकान लगाने की अनुमति हो, और चौड़ी सड़कें जहाँ स्थायी और व्यवस्थित वेंडिंग बे सड़क की संरचना का हिस्सा बनाए जाएँ। अंत में यह सुझाव दिया गया है कि इन नियमों को भोपाल के आधिकारिक विकास योजना 2031 में शामिल किया जाए, ताकि पैदल यात्रियों की सुरक्षा और फेरीवालों की आजीविका दोनों को एक साथ कानूनी संरक्षण मिले।

मुख्य शब्द: पैदल यात्री अवसंरचना, सड़क वेंडिंग, समावेशी सड़कें, स्थानिक क्षेत्रीकरण, सेवा स्तर, भोपाल।

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LIST OF ABBREVIATIONS

ABD	Area-Based Development
APA	American Planning Association
BMC	Bhopal Municipal Corporation
BSCDCL	Bhopal Smart City Development Corporation Limited
CPWD	Central Public Works Department
GIS	Geographic Information System
GPS	Global Positioning System
HCM	Highway Capacity Manual
I-RoW	Inclusive Right-of-Way
IPT	Intermediate Public Transport (includes auto-rickshaws and e-rickshaws)
IRC	Indian Roads Congress
JSMC	Joint Street Management Cell
LED	Light Emitting Diode
MoHUA	Ministry of Housing and Urban Affairs
MOSPI	Ministry of Statistics and Programme Implementation
NMSH	National Mission for Sustainable Habitat
NMT	Non-Motorised Transport
NSSO	National Sample Survey Office
PLOS	Pedestrian Level of Service
PM SVANidhi	Prime Minister Street Vendor's AtmaNirbhar Nidhi (Micro-Credit Scheme)
PSI	Public Space Index
PSEQI	Public Space Experiential Quality Index
RCC	Reinforced Cement Concrete
RoW	Right-of-Way
SA-1	Study Area 1 Chowk Bazar, Bhopal
SA-2	Study Area 2 Rani Kamlapati Road, Bhopal
SA-3	Study Area 3 New Market Post Office Chauraha, Bhopal
SDG	Sustainable Development Goal
SBI	State Bank of India

SVUSV Act	Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014
TOD	Transit-Oriented Development
TVC	Town Vending Committee
ULB	Urban Local Body
UN-HABITAT	United Nations Human Settlements Programme
WHO	World Health Organization
Weff	Effective Walkway Width (metres)
v	Pedestrian Unit Flow Rate (pedestrians/minute/metre)
S	Pedestrian Space Allocation (m^2 per pedestrian)
P	Peak Pedestrian Volume within analysis interval
T	Analysis Duration (minutes)
Sw	Standard Average Walking Speed (60 m/min)
C	Pedestrian-Vehicle Conflict Intensity Index

CHAPTER 1

INTRODUCTION

1.1 The Urban Street as a Contested Space in Indian Cities

Streets in Indian cities carry far more than vehicles and pedestrians they host entire economies, social rituals, and informal livelihoods that formal planning rarely acknowledges. The footpath, or what remains of it, sits at the center of this tension. On one side stands the pedestrian who has no car and no alternative but to walk. On the other stands the street vendor who has no shop and no alternative but to sell. Both rely on the same strip

India's urban population surpassed 500 million people by the mid-2020s, yet the streets these millions depend on are designed overwhelmingly for the minority who travel by private vehicle. Streets account for 20 to 30 per cent of total urban land in most Indian cities, making them the largest category of public space available. Even so, the pedestrian corridor and the footpath is frequently narrow, broken ,poorly maintained, and contested. On market street, the footpath often disappears entirely, absorbed by vendor stalls, parked motorcycles, and open drainage.

Street vending is not a marginal activity . It is a structural feature of the Indian urban economy. National sample survey data indicate that approximately one crore people across India earn their livelihood as street vendors, representing roughly 2.5 per cent of the urban workforce (Mahadevia et al., 2014). These are not temporary or transitional workers; many have been at the same location for decades, providing daily essentials to residents at prices that formal retail cannot match. The vendor who blocks a footpath is not doing so out of disregard for pedestrians he or she is occupying the only economically viable space available.

The conflict between walkers and vendors on Indian streets is therefore not primarily a conflict between two hostile group. It is a symptom of planning failure. Footpaths are too

narrow. Vendor zones are undesignated. Governable is punitive rather than spatial. The result is a daily negotiation over inches of pavement that leaves both groups worse off than they should be. Pedestrians are pushed onto carriageways . Vendors operate under constant threat of eviction. Road users navigate a chaotic environment where no boundary is clear. This thesis begins with the premise that this condition is not inevitable it is the product of specific planning decisions that can be reversed.

The three study areas selected for this research Chowk Bazar, Rani Kamlapati Road, and New Market Post Office Chauraha in Bhopal represent three distinct versions of this same conflict. Chowk Bazar is the historic market core of Old Bhopal, where an organic street grid, a heritage mosque, and centuries of street commerce have compressed into a six-metre right-of-way with no footpath. Rani Kamlapati Road is a modern arterial transit corridor where a railway station and a metro stop generate massive pedestrian flows that the street is structurally unable to accommodate safely. New market post office, chauraha is a planned commercial intersection that has nonetheless failed to integrate informal trade or provide functioning footpaths. Together these three sites span the range of Indian street typologies and allow the research to develop proposals that are both site specific and transferable.

1.2 Background of the Topic

The marginalization of the pedestrian in Indian urban planning has deep historical roots. Before independence , Indian cities particularly their bazaar cores were structured around walking and non- motorized movement. Markets were accessible on foot; distances were human scaled; street commerce was the norm rather than the exception. Post - independence planning, heavily influenced by modernist urbanism and the prestige of the automobile, broke from this tradition. Roads were widened for vehicles. Footpaths were treated as secondary amenities rather than primary infrastructure. The bazaar street, once the social and economic heart of the city, was gradually reclassified as a problem to be managed (Chakraborty & Dash, 2025).

Research across cities including Lucknow, Varanasi, and Chennai confirms that walkability is critically deficient in most Indian urban centers. Footpaths are narrow, poorly

maintained, and fragmented, often blocked by vehicles, vending , or construction materials (ITDP,2017). The smart cities misssion launched in 2015 prioritized digital infrastructure and area - based development over comprehensive street reform. Complete street pilot programmes have shown promise in cities such as Pune and Chennai, but weak institutional capacity, fragmented authority between agencies, and limited public participation have prevented these lessons from scaling (ITDP, 2017).

Academic engagement with the question of inclusive streets has evolved considerably over the past two decades. Early work focused on quantitative metrics footpath widths, pedestrian densities, level of service scores. More recent scholarships have argued that these technical measures capture only part of the picture. A street that scores well on the pedestrian level of service scale may still feel unsafe, uncomfortable, or exclusionary to the people who use it (Zhu etc al., 2025). Social vibrance, perceived safety, and accessibility for marginalized groups women, the elderly, persons with disabilities are not captured by capacity equations. Any planning framework that ignores these dimensions will produce incomplete solutions.

On the vending side, litter has shifted from viewing street vendors as obstacles to recognizing them as agents of informal urban governance. The vendor who sets up at a junction provides surveillance, social activity, and economic access that formal retail cannot replicate. Studies from cities across south and Southeast Asia show that the removal of street vendors consistently reduces the perceived safety and vibrancy of public space without vendors consistently reduces the perceived safety safety and vibrancy of public space without delivering proportionate improvements in pedestrian conditions (Bhowmik, 2010; Hawkers, 2024). The lesson is not that vending should be unlimited or unmanaged it is that vending must be planned for rather than planned against.

1.2.1 Challenges and Opportunities in Pedestrian Infrastructure and Street Vending Management

The challenge is facing pedestrian infrastructure and street vending management in Indian cities are systematic and interconnected. They arise from the same planning frameworks, the same institutional structures, and the same historical choices, understanding them

requires examining both the physical conditions on the ground and the governance system that produce those conditions.

Footpath Deficiency: Most urban footpaths in Indian cities are inadequate narrow, poorly surfaced, and discontinuous. They are frequently blocked by parked vehicles, construction materials, or vending stalls. This is not simply a maintenance problem; it reflects a design standard that has historically underestimated walking demand (ITDP, 2017).

Vendor-Pedestrian Conflict: Without designated vending zones, vendors occupy the only available flat, accessible surface: the footpath. This displacement of pedestrians onto carriageways is particularly dangerous for children, the elderly, and persons with disabilities, who have the least ability to navigate moving traffic (Mahadevia et al., 2014).

Governance Fragmentation: Municipal bodies, traffic police, development authorities, and Town Vending Committees all have partial jurisdiction over street space but no unified mandate to integrate their functions. The result is that pedestrian infrastructure and vending management are handled in isolation, often in direct conflict with each other.

Punitive Rather Than Spatial Responses: City administrations typically respond to vending encroachment through periodic eviction drives. These drive temporarily clear footpaths but do not create any alternative space for vendors, who return within days or weeks. Eviction treats the symptom rather than the cause.

Universal Design Failure: Accessibility infrastructure tactile paving, ramps, dropped kerbs is almost universally absent from Indian market streets. This is not a resource problem alone; it reflects a planning culture that has not yet internalised the concept of universal design as a basic street requirement.

Opportunity in Reform: The Street Vendors Act 2014, the Smart Cities Mission, and revised IRC guidelines all create legal and institutional space for a different approach. The challenge is translating these policy intentions into physical street geometry.

Addressing these challenges is not simply a question of technical standards. It requires a shift in how planners understand the street: not as a traffic-management asset but as a public realm where mobility, commerce, social interaction, and safety must be balanced. Cities that have made this shift Chennai's Pondy Bazaar, Kolkata's New Town pedestrian boulevards, Pune's Vibrant Streets initiative demonstrate that meaningful improvement is

achievable within Indian institutional and budgetary constraints (ITDP, 2017). The challenge for Tier-II cities like Bhopal is to learn from these examples and develop approaches suited to their own morphological and governance contexts.

1.3 Statement of the Problem

The core planning problem this thesis addresses is the failure to translate the legal rights of both pedestrians and street vendors into physical street geometry. The Street Vendors Act 2014 guarantees informal traders the right to sell in public space and mandates city governments to demarcate vending zones and establish Town Vending Committees. IRC:103-2012 mandates minimum footpath widths and pedestrian facility standards. Both sets of requirements exist in law. Neither is consistently implemented in practice.

This failure is not accidental. It reflects a structural mismatch between the agencies that manage street infrastructure and those that govern informal commerce. Development authorities design streets to engineering standards that do not account for vending. Municipal corporations manage vendors through licensing systems that do not reference street geometry. The two systems operate in isolation, and the space where they should connect the actual right-of-way is left ungoverned.

In Tier-II Indian cities like Bhopal, this mismatch is particularly acute. The city has active planning frameworks, including a Development Plan, a Smart City programme, and ongoing infrastructure projects. Yet on the streets where vendors and pedestrians interact most intensively the bazaar cores, the transit corridors, the commercial intersections planning outputs do not reach the micro-scale of footpath design and vending bay allocation. The result is a set of streets that fail both their pedestrian users and their informal trading communities simultaneously.

Standard traffic engineering metrics such as the Pedestrian Level of Service index capture this failure only partially. A street at PLOS F is mathematically congested, but the calculation does not distinguish between congestion caused by design failure and the organic density of a successful market. A street at PLOS A or B may be quantitatively efficient while being qualitatively dangerous and socially dead. What is needed is an analytical framework that can hold both dimensions simultaneously that can measure

pedestrian capacity while also accounting for the social and economic functions that informal vending performs.

1.4 Need of the Study

The case for this research rests on four interconnected arguments. Theoretical, empirical, legal, and practical. Together, they establish that there is a gap in knowledge and in practice. That this thesis is positioned to address. Theoretically, the literature on inclusive streets is well developed but has not been systematically applied to the specific challenge of integrating pedestrian infrastructure with informal street vending in Indian tier- ll cities. Jane Jacobs' (1961) insight that urban vitality depends on 'eyes on the street' the informal surveillance generated by diverse activities and active frontages has particular relevance in contexts like Chowk Bazar, where the vendor serves exactly this surveillance function. Henri Lefebvre's (1991) 'Right to the City' and Susan Fainstein's (2010) 'Just City' framework both argue for equitable distribution of urban space and resources. Applied to Indian streets, these frameworks demand that the right-of-way be shared rather than monopolised.

Empirically, there is a significant shortage of microscale primary data on pedestrian and vendor dynamics tier ll Indian cities. The existing literature draws heavily on metropolitan example Mumbai, Delhi, Chennai, or a qualitative case study that do not yield the quantitative evidence needed for engineering proposals. This thesis generates primary traffic count data, pedestrian level of service calculation, and conflict intensity index from direct field observation across 3 distinct study areas in Bhopal.

Legally, the street vendors Act 2014 creates an implementation of obligation that's most cities have not fulfilled. Town Vending Committees are mandated but often inactive. Vending zones are required but undemarcated. The PM SVANidhi credit scheme has formalised vendor identities through biometric registration but has not addressed the spatial dimension of their exclusion. A research-based framework that links legal mandates to specific design interventions fills this gap.

Practically, Bhopal presents a timely test case. The city is simultaneously implementing Smart City Area-Based Development projects, constructing Metro Rail Phase-I, and redeveloping the Rani Kamlapati Transit-Oriented Development zone. These are precisely

the moments when street standards can be recalled when the cost of incorporating inclusive design is marginal rather than prohibitive. A proposal produced now can directly inform these ongoing projects.

IRC:103 provides the technical baseline for pedestrian facility design but does not incorporate any guidance on how vendor presence should be accommodated within the right-of-way. Existing PLOS models treat vendors as encroachments that reduce effective walkway width. This study proposes a revised framework in which vending is a design parameter a planned use of the right-of-way rather than an obstruction to be subtracted.

1.5 Aim, Research Questions, and Objectives

The aim of this thesis is to develop an integrated street design framework for Indian Tier-II cities that ensures safe, accessible, and comfortable pedestrian pathways while allocating appropriate, designated space for street vendors reducing encroachment, improving safety, and producing inclusive shared public spaces.

Primary Research Questions

- How can the cross-sectional geometry of Indian urban streets be redesigned to accommodate both pedestrian movement and street vending without compromising the safety or efficiency of either?
- What spatial management and zoning approach is most effective for governing vendor activity across different street typologies in a Tier-II Indian city?
- How can the statutory planning framework including the Development Plan and the Street Vendors Act 2014 be amended to mandate inclusive right-of-way design?

Objectives

1. Examine existing guidelines, design standards, and urban policies to identify gaps between legal mandates and ground-level implementation.
2. analyze the literature on street vending and pedestrian movement in its urban spaces to build a theoretical foundation for the proposal.

3. identify site selection parameters for analyzing spatial dynamics between street vendors and pedestrians across three distinct morphological typologies.
4. analyze techniques for assessing pedestrian dynamics in urban environments, including quantitative engineering, metrics, and qualitative perception indices,
5. analyze techniques for assessing street vending dynamics including spatial mapping, temporal distribution, and conflict intensity indexing.Delineate areas and propose integrated frameworks for combining informal trading activity with inclusive pedestrian infrastructure in Tier-II city planning.

1.6 Research Scope and Delineations

The spatial scope of this research is strictly bound within three commercial corridors in Bhopal, Madhya Pradesh: Chowk bazar SA 1 , Rani kamplapati road SA 2, new market post office chauraha SA 3. These three sites were selected to represent the primary street morphological types present in the city organic heritage grid, modern arterial transit corridor, and planned commercial collector enabling comparative analysis within a single urban context.

The analytical scope covers micro-scale mapping of physical obstructions, traffic volume counts, modal share surveys, and pedestrian level of service calculations. The temporal scope covers three daily sessions morning peak (09:30–10:30), afternoon off-peak (13:30–14:30), and evening commercial peak (17:30–18:30) across all three sites. The regulatory scope works within the legal mandates of the Street Vendors Act 2014 and IRC:103-2012, with proposals directed at amending the Bhopal Development Plan 2031 to include an Inclusive Right-of-Way (I-RoW) statutory overlay.

The study does not extend to monsoon or winter seasonal conditions, which may alter vendor and pedestrian behaviour significantly. It does not cover residential streets or city-level market distribution beyond what is needed to contextualise the three study areas. It does not undertake a city-wide PLOS audit, though the methodology developed here is designed to be replicable across additional sites.

1.7 Research Methodology

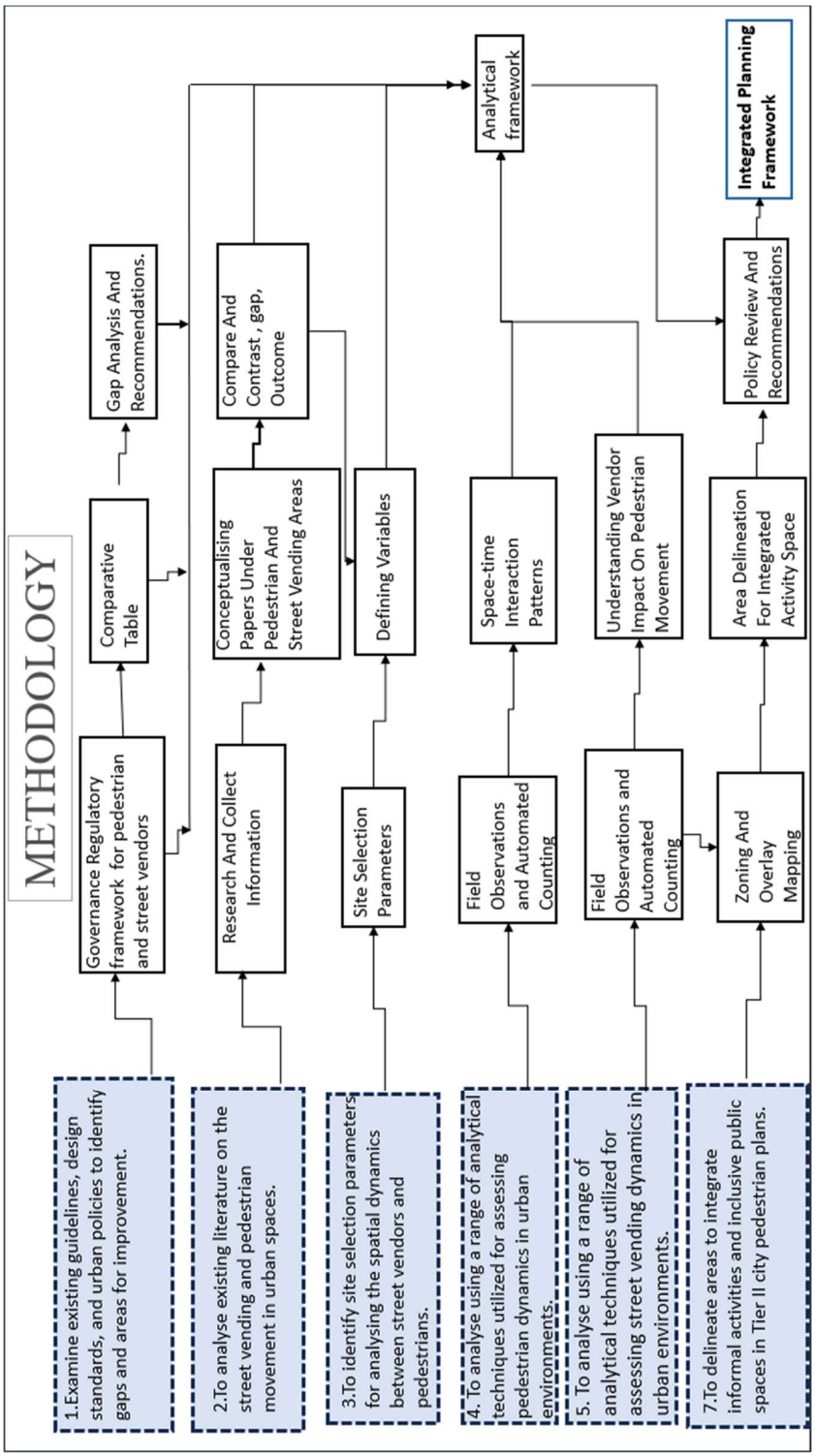


Figure 1.1: Research Methodology Flowchart from literature review through field survey to policy output

The research methodology is structured in sequential investigative stages that move from theoretical baseline setting to empirical data collection, analytical processing, and statutory policy output. The flowchart in Figure 1.1 illustrates the full progression.

Objectives 1 and 2 are addressed through a dual-track literature review. The first track examines governance and regulatory frameworks for both pedestrian infrastructure and street vending, producing a comparative table and gap analysis. The second track reviews empirical and theoretical literature on pedestrian dynamics and vendor behaviour. These streams converge to produce a clear framework of key variables and design parameters.

Objective 3 introduces site selection parameters that isolate the three pilot zones from the wider urban fabric. The selection criteria land-use mix, road hierarchy, vendor-pedestrian density, and policy significance are applied systematically to justify the three chosen study areas.

Objectives 4 and 5 are addressed through primary field data collection running along two simultaneous tracks. The first captures space-time interaction patterns through manual traffic volume counts and pedestrian flow observations. The second builds an understanding of vendor impact on pedestrian movement through spatial mapping and vendor categorisation. Data were collected across twelve fifteen-minute slots covering three daily sessions at each of the three sites.

These datasets feed into a unified analytical framework applying three distinct methods:

- Quantitative Engineering Analysis: Effective walkway width (Weff), pedestrian unit flow rate (v), and pedestrian space allocation (S) are calculated using Highway Capacity Manual (HCM 2000) formulations to determine Pedestrian Level of Service (PLOS) grades.
- Socio-Spatial Mapping Analysis: GIS-based micro-overlay analysis maps vendor trade typologies against baseline municipal land-use data to locate spatial friction hotspots.
- Temporal Risk Indexing: The Pedestrian-Vehicle Conflict Intensity Index (C) is calculated across morning, afternoon, and evening sessions to quantify pedestrian exposure to vehicle hazard at different times of day.

The outputs of this analytical framework pass through a zoning and overlay mapping process to create area delineations for integrated activity space classified into No-Vending, Restricted, and Restriction-Free zones. These delineations feed into the policy review and recommendations, producing the final Integrated Planning Framework proposed for adoption within the Bhopal Development Plan 2031.

1.8 Definitions and Key Concepts

1.8.1 Streets as Public Space

Urban public space is a fundamental component of city life and a primary indicator of social wellbeing and quality of living (Gehl & Svarre, 2013). Streets, as the most extensively distributed category of urban public space, carry particular significance: they are simultaneously infrastructure, marketplace, social arena, and political territory. The quality of street space directly shapes the quality of urban life for the majority of residents who depend on it daily.

The literature identifies two primary qualities that distinguish good public space: public was the degree to which a space is open and accessible to all social groups(Varna, 2014). Both qualities depend on design decisions made at the street level. A footpath that is too narrow for two people to pass comfortably scores low on both ; a wide, shaded, vendor-lined arcade scores high.

Mehta's public space index(PSI) provides a systematic framework for evaluating street quality across five dimensions; inclusiveness, meaningful activities, safety , comfort , and pleasurability (Mehta, 2014). Building earlier work by Carr et al. (1992) and Gehl (1971), the PSI offers planners and designers a tool for assessing how well a street serves its users. The more recent Public Space Experiential Quality Index (PSEQI) extends this framework across four dimensions and fifteen variables, including perceived accessibility, sense of safety, climate comfort, walking convenience, and seating provision (MoHUA, 2014). These frameworks are used in this research to complement quantitative PLOS analysis with qualitative user experience data.

1.8.2 Pedestrian

For the purposes of this research, a pedestrian is any person engaged in walking activities in a road traffic environment. The definition has expanded in recent years to include people using mobility aids such as wheelchairs, White canes, baby's strollers, shopping carts and similar devices. This inclusive definition is important for universal design compliance: a footpath that is impossible for a wheelchair user is not merely inconvenient for that user it is a legal non-compliance under CPWD sara khan accessibility norms and a planning failure.

In the context of Indian market streets, the pedestrian category is unusually diverse. It encompasses commuters walking to transit, customers shopping in the market, residents running errands, children travelling to school and workers moving between employment location. This diversity of trip purposes means that peak pedestrian volumes do not necessarily align with morning rush hours evening commercial peaks can be significantly larger than morning flows, as this research demonstrates.

1.8.3 Street Vendors

Street vendors are people who sell goods or services in public spaces without permanent built premises(Swanson, 2018). They operate from a cart , bicycles, temporary stalls, and surface displays. The Street Vendors Act 2014 distinguishes between stationary vendors, who occupy a fixed location, and mobile vendors, who move through the city (Hawkers, 2024). Both categories are present across the study sites, though their spatial impacts differ significantly.

Street vending has been a feature of Indian urban life for centuries (Swanson, 2018). Before modern planning began to regulate and formalise urban commerce, the street vendor was the primary provider of everyday goods to the majority of city residents. This historical role has not disappeared; if anything, the growth of urban populations and the failure of formal retail to penetrate low-income neighbourhoods has strengthened the social and economic necessity of the street market (Bhowmik, 2010).

Well-designed on-street vending contributes to the quality of urban public space. Vendors provide natural surveillance, social activity, and economic diversity that formal retail and

empty footpaths cannot replicate. The challenge is not to eliminate vending but to accommodate it within the right-of-way without compromising pedestrian movement. This thesis proposes specific geometric and regulatory mechanisms for achieving that balance (Mahadevia et al., 2014).

1.8.4 Walkability

Walkability refers to the extent to which the built environment supports and encourages walking by providing safe, comfortable, and well-connected pedestrian routes (Government of India, 2017). It is analysed at two scales: the meso-scale, covering urban form factors such as land use diversity, density, and street connectivity; and the micro-scale, covering street-level conditions such as footpath continuity, surface quality, crossing provision, shade, and lighting.

Walkability is increasingly recognised as a core determinant of urban sustainability. Cities with high walkability have lower vehicle dependency, lower emissions, better public health outcomes, and stronger social cohesion. In Indian cities, where a significant proportion of the population walks by necessity rather than by choice, improving walkability is above all an equity issue (ITDP, 2017).

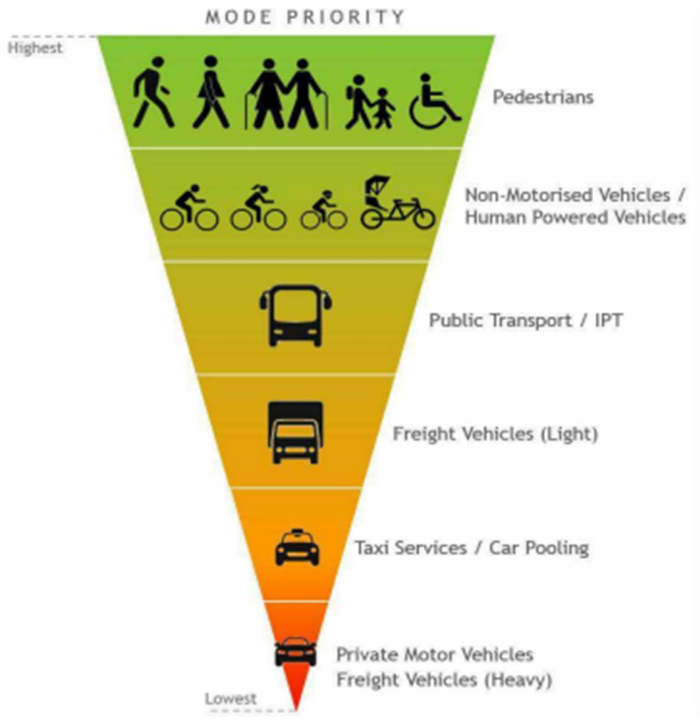


Figure 1.2: Mode Priority Diagram for Urban Street (Source: IRC 103, 2012) Illustrating pedestrian and non-motorised transport at the top of the modal hierarchy

1.8.5 Pedestrian Level of Service (PLOS)

Pedestrian Level of Service is a qualitative measure of how well a pedestrian facility performs from the perspective of the user (IRC: 103, 2012). It extends the Level of Service concept from vehicle traffic analysis to walking conditions. Quantitative PLOS calculations, following the Highway Capacity Manual (HCM 2000), derive a grade from A (free flow, ample space) to F (severely congested, breakdown of movement) based on pedestrian space allocation in square metres per pedestrian.

This research identifies a critical limitation in conventional PLOS application what is termed here the Binary Planning Flaw. Standard PLOS analysis treats any reduction in effective walkway width as an unambiguous negative, categorising vendor stalls purely as flow obstructions to be subtracted. This framing produces absurd results in market contexts: chowk bazar scores PLOS F by the numbers but functions as a highly active, socially rich, economically vital commercial space. Rani Kamlapati Road scores PLOS A

or B mathematically but is avoided by pedestrians because it is genuinely dangerous. Capacity and experience are not the same thing.

Addressing this flaw requires combining PLOS calculations with the Public Space Experiential Quality Index (PSEQI) and temporal conflict indexing. Only by holding both quantitative and qualitative dimensions simultaneously can planning produce interventions that improve real pedestrian conditions rather than simply improving a score on a spreadsheet.

1.8.6 Inclusive Planning Framework

An inclusive planning framework is a participatory, equity-centered approach to urban development that ensures accessibility and representation for all people regardless of age, gender, income, or physical ability (Swanson, 2018). It integrates universal design principles, barrier-free surfaces, ramps, tactile guidance with community engagement and social inclusion at every stage of planning and decision-making. The Inclusive Right-of-Way (I-RoW) framework proposed in Chapter 5 of this thesis is an application of this concept to street design standards.

1.9 Structure of the Thesis

This research is structured in six chapters, each addressing a distinct phase of the investigation:

Chapter 1 (this chapter) establishes the research context, articulates the problem statement, defines the research questions and objectives, and introduces the methodology and key concepts.

Chapter 2 reviews the global and national policy landscape for pedestrian infrastructure and street vending. It examines theoretical frameworks for inclusive urban space, critiques existing engineering standards, and synthesizes empirical literature on pedestrian-vendor dynamics. The chapter identifies key research gaps that the thesis addresses.

Chapter 3 introduces the regional and local context of Bhopal and develops detailed spatial profiles of the three study areas. It presents baseline cross-sections, land-use maps, vendor

distribution patterns, and the primary traffic volume count data collected across twelve time slots at each site.

Chapter 4 applies the analytical framework to the field data. It calculates Pedestrian Level of Service grades for each site, maps micro-encroachment hotspots through GIS analysis, and derives the Pedestrian-Vehicle Conflict Intensity Index (C) across the three daily sessions.

Chapter 5 translates the analytical findings into design proposals. It proposes site-specific street cross-sections, a three-category spatial zoning framework, standardised vending infrastructure, and a statutory amendment to the Bhopal Development Plan 2031 through the Inclusive Right-of-Way (I-RoW) overlay mechanism.

Chapter 6 presents conclusions, synthesises the key contributions of the research, and outlines policy recommendations for Tier-II Indian cities seeking to integrate street vending into pedestrian infrastructure planning.

INTRODUCTION

CHAPTER 2

LITERATURE STUDY AND POLICY FRAMEWORK

2.1 Theoretical Framework: Space, Inclusivity, and the Right to the City

Any serious attempt to plan for inclusive urban streets must start from a clear theoretical position about what streets are for and who they belong to. This is not merely an academic question. It has direct practical consequences: a planner who understands streets as traffic infrastructure will design them differently from one who understands them as public space. The Indian planning system has historically operated from the first position; this thesis argues for the second.

Three bodies of theory inform this research. The first, drawn from Lefebvre (1991) and Fainstein (2010), addresses questions of spatial justice and the right to urban space. The second, associated with Jacobs (1961) and Gehl (1971), addresses the social life of streets and the conditions that make them safe and vibrant. The third, developed through contemporary public space evaluation frameworks, provides operational tools for measuring and improving street quality.

2.1.1 The Production of Public Space and Spatial Justice

Henri Lefebvre's (1991) analysis of the production of space begins from the observation that space is not a neutral container for human activity but a social product shaped by power relations. Streets are designed by engineers and planners, but they are produced and reproduced daily by everyone who uses them pedestrians, vendors, drivers, residents, children. When planning assigns space overwhelmingly to one group (vehicle users) and systematically denies it to others (pedestrians, vendors), it is not being neutral: it is making a political decision about whose city this is.Lefebvre's concept of the 'Right to the City' (1991) asserts that urban inhabitants have a fundamental claim to participate in shaping the city and appropriating its spaces. This right is not reducible to private property rights or formal citizenship; it applies to everyone who lives and works in the city, including

informal traders who have no legal title to the pavement they occupy. In Indian cities, this right has been given partial legal recognition through the Street Vendors Act 2014, which protects vendors from arbitrary eviction and mandates the creation of designated vending zones. The gap between this legal recognition and street reality constitutes the central problem this thesis addresses.

Susan Fainstein's (2010) 'Just City' framework translates these theoretical commitments into planning criteria. Fainstein argues that urban planning should be evaluated against three core values: equity (fair distribution of resources and opportunities), democracy (meaningful participation in planning decisions), and diversity (positive engagement with cultural and economic differences). Applied to Indian market streets, a just planning outcome is one that allocates walkable footpath space equitably, involves vendors and pedestrians in the design of their shared environment, and treats the diversity of street users including the informal trader as an asset rather than a problem.

2.1.2 The Social Life of Streets: Jacobs and Gehl

Jane Jacobs' (1961) argument that diverse, mixed-use, pedestrian-scaled streets are the foundation of safe and vital urban neighbourhoods remains one of the most influential frameworks in urban planning. Her concept of 'eyes on the street' the natural surveillance generated by the presence of diverse activities and active building frontages is particularly relevant to the Indian market street context. The vendor who sets up at a junction is not simply an economic actor; he or she is a provider of informal surveillance, a social anchor, a reason for other people to be present in that space.

Jacobs was writing about American mid-century urbanism, but her insights translate directly to Indian bazaars. The 'sidewalk ballet' she describes the intricate, semi-conscious social choreography of people moving through a busy street is on vivid display in Chowk Bazar. The problem is not that the ballet is missing; it is that the stage is too small and there is no choreography for managing the different performers. The vendor and the pedestrian are not inherently in conflict; they are in conflict because no one has designed their shared space.

Jan Gehl (1971) extended Jacobs' insights into a systematic theory of public space quality. Gehl distinguishes between necessary activities (those people must do), optional activities (those people choose to do when conditions are favourable), and social activities (those that arise from the presence of other people). Good public space encourages all three; poor public space reduces activity to the minimum necessary. A market street with well-designed vendor stalls and comfortable footpaths generates optional and social activities alongside necessary movement. A broken, congested street with no shade and no seating reduces everything to a necessary transit from one place to another.

2.1.3 Global Frameworks for Inclusive Streets

Over the past two decades, **global urban policy** has progressively aligned with these core theoretical positions. The foundational **UN-HABITAT (2013)** framework identifies urban streets as highly significant public goods that typically occupy between 25 and 35 percent of total city land. This specific framework explicitly advocates for multi-functional street designs that integrate vehicular mobility, local commerce, and vibrant social life, while firmly affirming the basic right of informal vendors to access and utilize public space. Simultaneously, the **WHO and Walk21 Framework (2015)** makes a compelling case for walkable streets as a primary public health intervention. Data indicates that well-designed walking environments can successfully reduce dangerous non-communicable diseases by up to 30 percent by encouraging physical activity and decreasing vehicle emissions, urging a pedestrian-first design hierarchy. Lastly, **Sustainable Development Goal 11** addresses these issues directly. **Target 11.2** requires safe, affordable, and sustainable transport systems for all, with special attention to vulnerable groups, whereas **Target 11.7** mandates universal, equal access to safe, inclusive, and green public spaces. These three international directives collectively establish a comprehensive global framework that thoroughly validates the necessity of prioritizing safe, inclusive, and healthy communal environments for urban populations. Together, these targets create an international

commitment to the kind of inclusive street design this thesis proposes.

2.2 Pedestrian Infrastructure Metrics: Standards Versus Empirical Realities

This thesis argues that India's pedestrian infrastructure standards are entirely adequate in theory but systematically neglected in practice. The discrepancy between IRC:103-2012 mandates and the actual reality of Bhopal's market streets is categorical, not marginal. To truly comprehend this profound civic failure, one must evaluate both the specific technical regulations themselves and the deeply deficient enforcement mechanisms responsible for translating these official guidelines into safe, highly functional, and walkable local urban environments.

2.2.1 National Technical Standards -A Critical Evaluation

Table 2.1: National technical standards governing pedestrian infrastructure in India and their relevance to this research

Standard / Guideline	Key Spatial Provision	Operational Relevance
IRC: 103-2012	Minimum clear footpath width of 1.8 m on urban streets; 2.5 m on high-density commercial streets.	Primary technical baseline for study area PLOS auditing and cross-section proposals.
IRC: SP:41-1994	Geometric guidelines for pedestrian facilities at crossings and junctions.	Evaluation of intersection safety and mid-block crossing provision.
MOSPI/CPWD Accessibility Norms	Mandatory tactile paving, ramps, and minimum 1.5 m unobstructed path for persons with disabilities.	Metric for measuring universal design compliance at study sites.
Smart Cities Street Design Guide	Introduces Complete Streets concept; treats informal vendors as permanent design elements.	Precedent framework for spatial zoning and vendor bay integration.
NMSH 2006 (MoHUA)	National Mission for Sustainable Habitat — policies for calculating walkability indices.	Framework for meso-scale and micro-scale urban form analysis.

These standards represent a coherent framework for pedestrian facility design. The problem is not the standards it is the near-total absence of mechanisms ensuring that they are applied during street construction and maintained thereafter. Street design in most Indian cities remains the responsibility of engineers whose primary metric is vehicular

capacity, not pedestrian comfort. Footpath design is treated as a residual something that happens with whatever space is left after the carriageway requirements are met.

2.2.2 Ground Reality: The Bhopal Context

Field audits across the three Bhopal study sites reveal the following specific departures from national standards:

- Footpath Width: IRC:103-2012 requires 1.8 to 2.5 m on commercial streets. At Chowk Bazar, the functional footpath width ranges from 0.6 to 1.2 m where there are no footpaths at all. In significant stretches, no footpath is present.
- Vending Clearance: IRC guidance implies a minimum 0.9 m unobstructed pedestrian path alongside vendor activity. In practice, vendors occupy more than 50 per cent of the effective footpath width across all three sites.
- Universal Design: Tactile paving is legally required under CPWD norms but is entirely absent at all study sites. No functional ramps were found at any of the surveyed junctions.
- Crossing Provision: IRC standards recommend pedestrian crossings at 200-metre intervals on urban streets. The observed gap at transit corridors ranges from 450 to 700 metres.
- Accessibility: Ninety per cent of junctions surveyed have no functional accessibility ramp. Where ramps exist, they are structurally compromised or block drainage channels.

These are not isolated failures. They represent a systemic pattern in which the pedestrian is consistently deprioritised at every stage of street design, construction, and maintenance. Reversing this pattern requires not just better standards but different institutions — specifically, institutions mandated to enforce pedestrian and vending space requirements together.

As demonstrated by the technical design templates illustrated in Figure 2.1, access, spatial predictability, and civic compliance are optimized by installing clear, standardized informational signage and distinct graphic guiding markers directly onto the street scape. By deploying a universal color-coded signage framework utilizing distinct prohibitive markers for No-Vending boundaries and highly visible geometric indicators for Restriction-Free zones the physical design of the street itself resolves competing spatial claims. This robust approach replaces ambiguous legal boundaries with tangible architectural cues, ensuring that informal livelihoods are safely integrated without degrading the underlying universal accessibility of the pedestrian network.

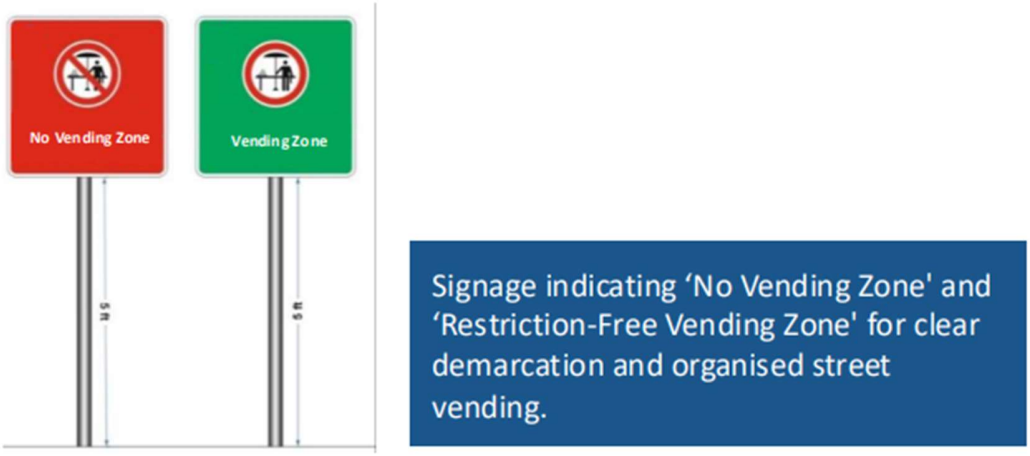


Figure 2.1: Example of standardized informational signage and guiding markers for vending zone demarcation (Source: Author, adapted from IRC guidelines)

2.3 Socio-Spatial Dynamics and Governance of Street Vending

Street vending is one of the most studied yet most poorly governed aspects of Indian urban life. The literature identifies three distinct dimensions of the vending challenge: its economic and demographic scale, its legal and regulatory trajectory, and its spatial management requirements. Each dimension has been addressed partially in isolation; this thesis addresses them together.

2.3.1 Demographic Scale and Economic Significance

NSSO estimates place India's street vendor population at approximately one crore ten million people across all urban areas. This figure represents roughly 2.5 per cent of the total urban workforce and a significantly higher share of employment in low-income and informal urban areas (Mahadevia et al., 2014). Street vending is not a marginal or transitional activity for most of its practitioners; it is a primary and often multi-generational livelihood.

The economic significance of street vending extends beyond the vendors themselves. Street markets provide affordable access to food, clothing, and everyday goods for low-income urban residents who cannot afford formal retail prices. They support supply chains of smallholder farmers, small manufacturers, and wholesale traders. They concentrate economic activity in areas where the built environment generates foot traffic which is exactly why they cluster around transit nodes, heritage landmarks, and commercial intersections.

Despite this economic significance, 68 per cent of vendors across India have no designated vending zone, forcing them into informal occupancy that local authorities categorise as illegal (Bhowmik, 2010). The consequence is that 40 per cent of urban areas surveyed in national studies show direct spatial overlap between vendor layouts and pedestrian rights-of-way. Both groups are paying the price for a planning failure that is the responsibility of neither.

2.3.2 The Legislative and Regulatory Timeline

The legal framework governing street vending in India has evolved over more than five decades of contested litigation and partial policy reform. Understanding this trajectory is essential for evaluating what the current legal framework requires and where it continues to fall short.

- 1968 Bombay High Court Ruling: The first judicial recognition of a vendor's constitutional right to livelihood on public pavements. This ruling established that vendors cannot be evicted without alternative provision.
- 2004 National Policy on Urban Street Vendors: The policy formally recognised vendors as stakeholders in urban public space and recommended the establishment of

Town Vending Committees (TVCs) to manage spatial allocation. Decades later, TVC formation remains incomplete in most cities.

- 2014 Street Vendors Act (SVUSV Act): The landmark central legislation that mandated protection of vendor livelihoods, prohibited arbitrary evictions, and required comprehensive city-wide spatial mapping of vendors and vending zones.
- 2016 MoHUA Scheme: The National Urban Livelihoods Mission integrated vendor management within formal municipal planning frameworks for the first time.
- 2020 PM SVANidhi: A post-COVID micro-credit scheme that has reached over 40 lakh (four million) vendors, creating a biometric identity database for informal traders without resolving the underlying spatial infrastructure deficit.

The trajectory reveals a persistent pattern: legal frameworks advance, but spatial implementation lags. The Street Vendors Act 2014 is comprehensive legislation. Six years after its passage, the majority of Indian cities had not completed the vendor surveys, TVC formations, or vending zone demarcations it mandates. This implementation failure is the target of the policy proposals in Chapter 5.

2.4 Zonal Classification and Spatial Management Strategies

The literature on street vendor management consistently rejects blanket eviction as an effective or equitable approach. Multiple studies across Asian and African cities show that eviction displaces rather than resolves the conflict, creates social disruption and economic harm without improving pedestrian conditions, and generates resistance that undermines subsequent planning efforts (Bishaw et al., 2024; Nieto-Combariza et al., 2025).

The alternative proposed in the literature is spatial management through zoning. Rather than treating all vendor activity as problematic and subject to removal, spatial zoning distinguishes between contexts where vending generates unacceptable safety risks (and must therefore be excluded), contexts where it can be managed through temporal or locational restrictions, and contexts where it can be permanently accommodated within the street design.

As conceptually delineated in Figure 2.2, This research adopts a three-category zoning framework that synthesises the regulatory logic of the Street Vendors Act 2014 with the spatial geometry of IRC:103-2012. The three categories are defined as follows:

No-Vending Zones are areas where safety requirements or intensity of pedestrian movement make any vendor presence incompatible with safe operations. These include the 50-metre buffers around major intersections and transit station entry points specified in the Street Vendors Act, as well as the immediate surroundings of heritage landmarks such as the Jama Masjid at Chowk Bazar. Enforcement of No-Vending Zones must be consistent and backed by clear spatial demarcation physical markers, surface treatments, and signage that communicate the boundary without requiring ongoing police presence.

Restricted Vending Zones apply along streets where the right-of-way is sufficient to accommodate vending on one side under controlled conditions. The restrictions are temporal vending permitted during specified commercial hours and spatial vendors allocated to one side of the street only, within a defined footprint. This approach, derived from experience in cities including Ahmedabad, Mumbai's Linking Road, and several Bangkok market streets, preserves peak-hour pedestrian capacity while enabling commercial activity during off-peak periods.

Restriction-Free Vending Zones are designed into streets with sufficiently wide rights-of-way to accommodate permanent vending bays alongside full pedestrian and traffic clearances. In these zones, vendor infrastructure is a planned element of the street cross-section built, maintained, and managed as part of the public realm rather than tolerated as an informal occupation



Figure 2.2: Classification of vending zones No-Vending, Restricted, and Restriction-Free as applied in this research (Source: Author)

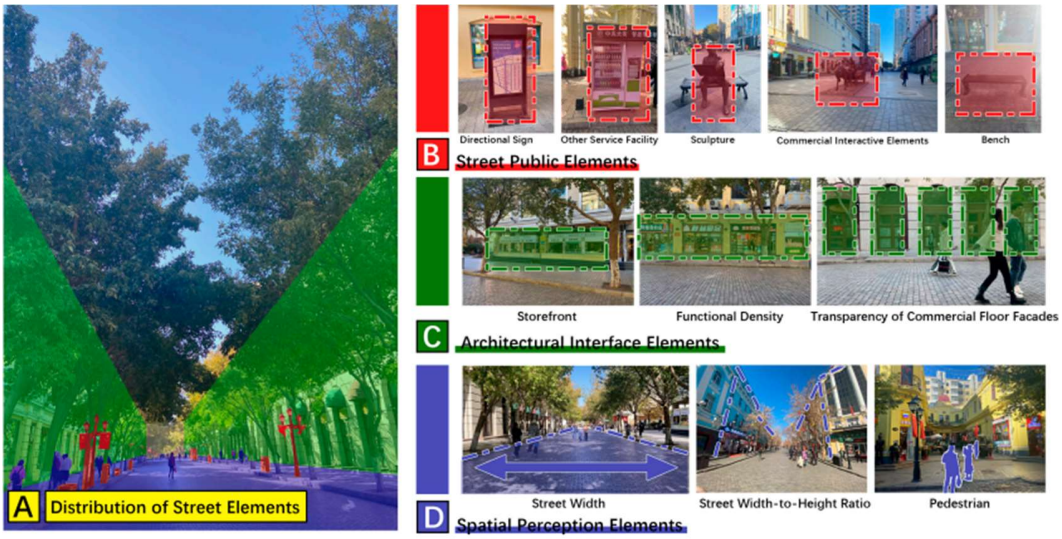


Figure 2.3: Classification of street elements — public elements, building interface elements, and spatial perception elements, source: global design cities

2.5 Spatial Dynamics and Socio-Spatial Interaction

2.5.1 Spatial Conflicts and Encroachment Patterns

Urban streets in commercial areas are characterised by overlapping and often competing claims from pedestrians, vendors, vehicle users, and city authorities (Hawkers, 2024). The primary source of pedestrian-vendor conflict is the occupation of walkway space by vendor stalls, alongside vehicle parking and construction materials that further compress the available pedestrian width (Science, n.d.).

Research across Asian and African cities documents several consistent patterns. In the Bandung City Square area in Indonesia, vendor presence combined with illegal parking and inadequate public facilities prevents the achievement of pedestrian-friendly environmental standards. In Tanah Abang, Jakarta, vendors on pedestrian lanes are classified alongside motorcyclists on footpaths and illegal parking as systematic violations of public space regulations (Yusuf et al., 2018).

Perception studies add a vital layer to physical analysis by capturing how pedestrians actually experience space. For example, research in Addis Ababa demonstrates that the presence of vendors on walkways is a strong predictor of decreased perceived safety, showing a substantial negative impact compared to clear footpaths (with a standardized regression coefficient of -1.968; Bishaw et al., 2024; You et al., 2024). Crucially, this finding does not mean that vendors themselves are inherently dangerous. Rather, it indicates that when vendors occupy sidewalks without dedicated zones, the unmanaged spatial arrangement signals visual disorder and compromises the pedestrian's subjective sense of security. Sun's (2022) analysis of pedestrian-vendor dynamics in Asian cities introduces the concept of spatial rhythm conflict. Pedestrians adhere to a range of daily rhythms necessary trips at set times, optional activities during leisure windows, social engagements that vary across the day. Long-established vendors develop their own rhythms, adapting to the ebb and flow of pedestrian traffic to maximise commercial exposure. When these rhythms are uncoordinated when vendors set up precisely where and when pedestrian traffic peaks the result is direct spatial competition. When they are coordinated through temporal zoning as in Restricted Vending Zones the same street can serve both groups effectively across the day.

2.5.2 Integration and Design Strategies

The literature identifies several integration strategies that have produced positive outcomes in various city contexts. These fall into three broad categories: relocation and demarcation, stakeholder engagement, and human-centred design.

- Relocation and Allotment: Providing vendors with designated space outside footpath corridors typically in planned market areas or permanent vending bays is the most widely recommended approach in the literature (Bishaw et al., 2024). Success depends on the accessibility and commercial viability of the designated space; relocations to distant or poorly sited areas consistently fail as vendors return to their original locations.
- Stakeholder Recognition: Research in Accra, Ghana, demonstrates that self-built vendor infrastructure kiosks, shade structures, temporary stalls is statistically associated with improvements in pedestrian safety and security along corridors with fragmented formal infrastructure (Nieto-Combariza et al., 2025). This finding argues for including vendors as co-designers of street improvements rather than subjects of planning decisions made without them.
- Human-Centred Prioritisation: Multiple studies confirm that pedestrian-vendor conflicts are exacerbated by vehicle-centred street design. When substantial carriageway space is devoted to private vehicles, both pedestrians and vendors are compressed into a narrower margin, intensifying competition. Rebalancing the right-of-way in favour of pedestrians creates space for both (Nieto-Combariza et al., 2025).

2.5.3 Physical Design and Geometric Parameters

Research quantifies the relationship between specific geometric parameters and pedestrian behaviour with increasing precision (Mu et al., 2024). These findings directly inform the cross-section proposals developed in Chapter 5.

- Street Width: Wider streets correlate with reduced pedestrian stopping, shorter dwell times, and lower commercial activity. Streets that feel 'too wide' discourage casual browsing and social interaction; controlling sidewalk width within a comfortable range actively encourages activity (Mu et al., 2024).

- Storefront Width-to-Street Width Ratio: When this ratio falls between 1.0 and 1.5, pedestrian stopping behaviour increases significantly. Ratios outside this range produced by either very narrow frontages or very wide streets reduce commercial vitality (Mu et al., 2024).
- Building Interface Transparency: Transparent commercial ground-floor facades correlate positively with pedestrian stopping and dwell time. Blank walls, solid shopfronts, and fenced properties reduce pedestrian activity in their immediate vicinity.
- Recessed Areas and Alcoves: Recessed areas in the building line are identified as among the most powerful drivers of pedestrian stopping and social interaction. They create gathering points, reduce walking speed, and increase the time pedestrians spend in a commercial corridor, all positive indicators of a successful public space (Mu et al., 2024).
- Shade and Microclimate: In Indian cities, where ambient temperatures are high for much of the year, shade provision is a critical determinant of walking comfort. Tree canopy, awning structures, and building overhangs that provide continuous shade significantly increase walking volumes and dwell times.

2.6 Socioeconomic Perspectives on Urban Streets

The spatial conflict between pedestrians and vendors is also a socioeconomic conflict — a contest over who has the right to use the street and on whose terms. The literature frames this contest in terms of class, gender, and informality, each of which has direct implications for the design and governance proposals in this thesis.

2.6.1 Class Dynamics and the Nuisance Narrative

From the perspective of middle-class urban residents, city officials, and many urban planners, street vendors are a 'nuisance' sources of congestion, litter, visual disorder, and obstruction that hinder the vision of a clean, efficient, modern city (Hawkers, 2024). This framing is not merely aesthetic; it reflects deeper class tensions about whose version of the city should prevail. The 'smart city' discourse, which emphasises digital infrastructure and high-tech management, has reinforced this framing by categorising traditional street commerce as a problem to be solved rather than a practice to be planned for.

The consequence of the nuisance narrative is that municipal responses to vendor presence are typically punitive periodic eviction drives, confiscation of goods, and harassment by enforcement staff (Bhowmik, 2010). These responses are ineffective in the long run: vendors return within days because the economic conditions that drove them to the street in the first place have not changed. They are, however, costly in human terms generating fear, uncertainty, and economic disruption for a population that has limited capacity to absorb either.

2.6.2 Gender Dimensions

Women are disproportionately represented among both street vendors and pedestrians in Indian cities, and they bear disproportionate costs from the failure to plan for inclusive streets. Research on female street vendors in Kathmandu found that women constituted 13 of 20 vendors interviewed and took up vending primarily as a strategy for supplementary household income, particularly for children's education (Hawkers, 2024). Women vendors face specific risks: physical harassment during eviction operations, health consequences from prolonged exposure to pollution, and social stigma associated with working in public space.

For female pedestrians, safety concerns are a primary determinant of route and time of travel. Research across Sub-Saharan African cities shows that poor lighting, inadequate footpaths, and crowded street conditions significantly reduce women's willingness to walk, even when walking is their only practical transport option (Bishaw et al., 2024). In Indian cities, where many women rely on walking for daily mobility, the failure to provide safe, well-lit, continuous footpaths has direct consequences for women's access to education, employment, and social participation.

2.6.3 Livelihood Dimensions and the Informal Economy

The informal sector provides approximately 80 per cent of new employment in Indian cities, with 60 per cent of those jobs concentrated in urban areas (Hawkers, 2024). Street vending is one of the most accessible entry points into this informal economy for recent migrants, low-skilled workers, and people displaced by economic shocks. The low capital

requirements for a cart, a tarpaulin, a small stock of goods make vending available to people for whom formal employment is inaccessible.

The economic viability of street vending depends critically on location. A vendor displaced from a high-footfall junction to a poorly located designated zone will typically experience a significant drop in income, which explains why relocation schemes without commercial viability analysis consistently fail. Any planning framework for inclusive streets must take vendor economics seriously not just as a social welfare consideration but as a spatial planning requirement.

2.7 Case Study Precedents: National and International Examples

Several cities in India and internationally have developed approaches to integrating pedestrian infrastructure and street vending that offer lessons for Bhopal. Each precedent is examined below for its transferable principles.

2.7.1 Ahmedabad Heritage Street, Gujarat

The Ahmedabad Heritage Street project, developed as part of the Smart Cities Mission Area-Based Development programme, undertook a comprehensive redesign of the historic commercial corridor in the walled city. The project widened footpaths, restored building facades, installed uniform vendor kiosks along designated commercial strips, and created pedestrian-priority zones around heritage monuments. Vendor relocation was managed through a participatory process that involved the Vendors Association at every stage of design. The result is a street where vendors and pedestrians coexist in a designed, managed, and maintained public realm.

The Ahmedabad precedent demonstrates that vendor-pedestrian integration is achievable in a heritage market context similar to Chowk Bazar in Bhopal. The key success factors were early and sustained vendor engagement, design of vendor infrastructure that was commercially viable (not just spatially convenient), and a maintenance regime that did not depend on continued enforcement presence.

2.7.2 Singapore Hawker Centres

Singapore's hawker center model represents perhaps the most successful resolution to the street vending challenge in Asia. Over four decades, the government systematically transitioned street vendors into purpose-built, well-serviced, and covered market halls—all while preserving the social and economic life of traditional street food culture. Today, these hawker centers are recognized as UNESCO Intangible Cultural Heritage. They strike a balance that neither formal restaurants nor unregulated street vending can manage alone: strict food safety, affordable pricing, and vibrant social mixing.

The Takeaway for India: This model cannot be directly copied into Indian cities due to vast differences in funding, regulatory contexts, and institutional capacity. However, its core lesson remains highly relevant: street vending can be formalized without wiping out the social and economic value that makes it special. The challenge for Bhopal is to design a localized equivalent that works within India's unique financial and institutional constraints.

2.7.3 Mumbai's Linking Road Vending Zone

Mumbai's Linking Road in Bandra offers a more immediately relevant Indian precedent. Following sustained conflict between shopkeepers, vendors, and municipal authorities, a vending zone demarcation exercise was conducted in consultation with the local TVC. Vendors were allocated specific pitches, marked on the footpath with painted boundaries, and licensed for specific hours of operation. The scheme reduced enforcement conflicts, improved revenue for both vendors and adjacent shops, and created a more ordered street environment without displacing vendor activity.

The Linking Road precedent is directly applicable to Chowk Bazar and New Market, where similar footpath demarcation with vendor pitch allocation could reduce encroachment while preserving commercial activity. Its limitations include the absence of structural vendor infrastructure (shade, storage, waste management) and the dependency on continued Municipal Corporation enforcement for compliance.

2.8 Research Gaps and Positioning of this Study

The literature review reveals several gaps that this thesis is positioned to address:

Micro-scale primary data: Most Indian studies on pedestrian-vendor dynamics rely on secondary data or qualitative case studies. Systematic primary traffic count and PLOS data for Tier-II city market streets are scarce.

Integrated analytical framework: Existing studies typically examine pedestrian infrastructure or street vending separately. An analytical framework that addresses both simultaneously and that captures the temporal variation across morning, afternoon, and evening sessions has not been applied to Indian Tier-II cities.

Statutory policy linkage: While studies have proposed design standards for inclusive streets, few have traced the pathway from design proposal to statutory master plan amendment. The I-RoW mechanism proposed in Chapter 5 addresses this gap directly.

Tier-II city specificity: The bulk of Indian urban studies focuses on metropolitan cities. Tier-II cities like Bhopal have different institutional capacities, planning frameworks, and urban morphologies that require tailored approaches.

2.9 Synthesised Inferences

The literature review supports four core conclusions that structure the analysis and proposals in subsequent chapters:

First, the standard Pedestrian Level of Service model is built on a flawed premise that vendor presence is purely negative. The evidence from market street research shows that vendors provide surveillance, social activity, and economic access that improve the qualitative performance of streets even where they reduce quantitative walkway capacity. A revised analytical framework must hold both dimensions.

Second, there is a categorical gap between the legal entitlements created by the Street Vendors Act 2014 and the spatial infrastructure required to realise them. Legal rights to vending space have not been translated into architectural allocation within the right-of-way. This translation is the core technical challenge this thesis addresses.

Third, Tier-II cities like Bhopal show near-total failure of universal design compliance. Tactile paving, functional ramps, and clear pedestrian paths are absent across the study

sites. Design proposals must rebuild street cross-sections physically rather than simply rearranging existing space.

Fourth, the eviction-based response to vendor-pedestrian conflict has consistently failed across Indian and international contexts. Spatial management through context-sensitive zoning Restricted Zones for temporal management and Restriction-Free Zones for physical integration is the only approach that has produced durable improvements in both pedestrian conditions and vendor livelihoods.

CHAPTER 3

STUDY AREA PROFILE AND CASE STUDY

3.1 Regional Context and Site Selection Rationale

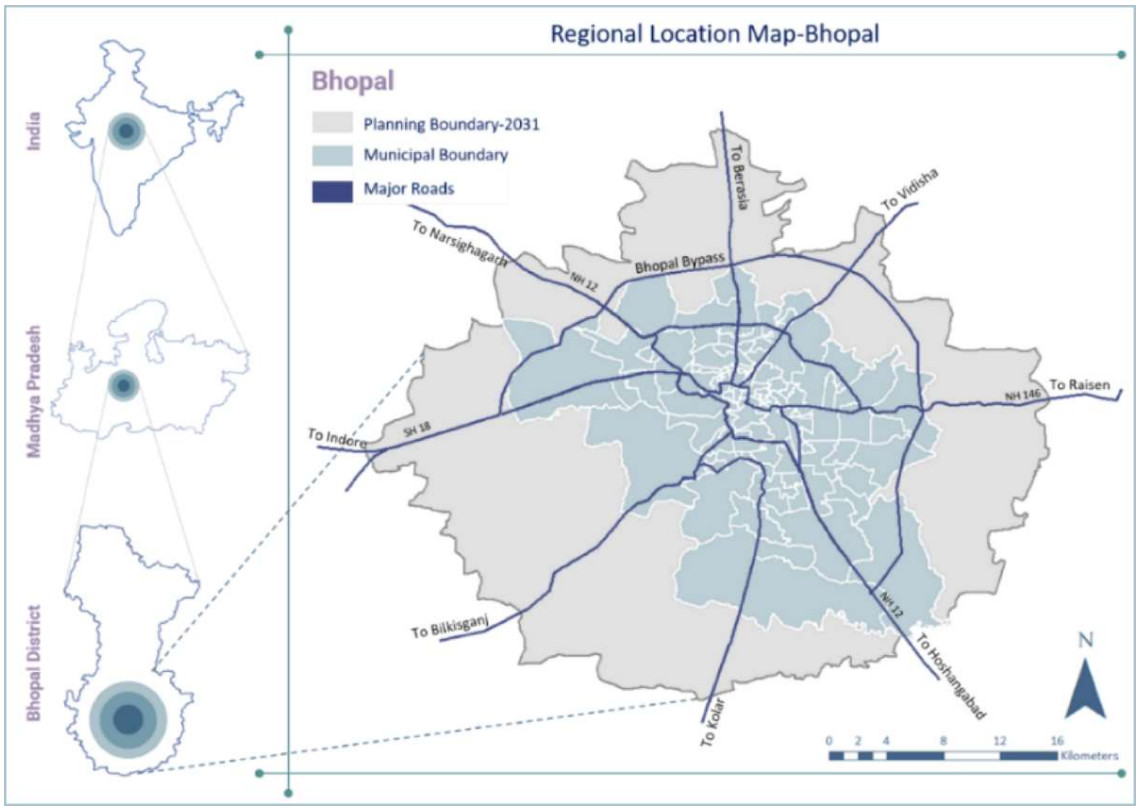


Figure 3.1: Regional Map of Bhopal municipal limits, planning boundary 2031, and primary connectivity axes
Source: Author, Survey of India base

Pedestrian infrastructure and informal trading dynamics must be studied within the specific context of Indian Tier-II cities, which are at a critical point in their growth trajectories. Unlike larger metropolitan centres, Tier-II cities are actively expanding their infrastructure base while their governance institutions remain under-resourced and fragmented. Bhopal,

the capital of Madhya Pradesh, reflects this combination precisely. It has formal planning instruments, a statutory Development Plan, an active Smart Cities Mission programme, and an ongoing Metro Rail construction project yet the streets most used by the city's walking population continue to operate without basic footpath provision or formal vending space allocation.

The regional map in Figure 3.1 establishes the macro geographic framework within which the study sites are located. The map shows the relationship between the Planning Boundary 2031, the Municipal Corporation boundary, and the major road network that connects the historic core of Old Bhopal to newer residential and commercial extensions. The three study areas all fall within the established municipal limits, in parts of the city that are fully built up and intensively used.

Bhopal contains multiple distinct planning eras within a single urban area. The organic, unplanned street grid of Old Bhopal centered on Chowk Bazar, the historic mosque, and the surrounding cloth and jewellery market dates from the Nawabi period and has never been subject to systematic street widening or pedestrian infrastructure upgrades. The mid-twentieth century commercial areas, including New Market, follow a planned grid with formal footpath provisions that have been allowed to deteriorate. The most recent layer is the transit infrastructure built around Rani Kamlapati Railway Station, which has expanded substantially since 2015 with the addition of the flyover and the Metro Rail corridor, generating new pedestrian flows that the existing street design cannot safely accommodate.

This layering makes Bhopal an unusually productive research site. The three study areas each representing a different planning era, land-use configuration, and traffic typology allow the research to test whether a single integrated framework can address the pedestrian-vendor conflict across very different physical conditions. If the framework is robust enough to work in Chowk Bazar's six-metre historic lane, in Rani Kamlapati's forty-metre arterial, and in New Market's planned but failing collector road, it is likely to be transferable to similar typologies in other Tier-II Indian cities.

The timing of the research is significant. The Bhopal Smart City ABD initiatives, the Metro Rail Phase-I corridor, and the Rani Kamlapati Transit-Oriented Development zone are all

under active development. These infrastructure projects are reshaping the spatial flows and land-use dynamics around the study areas. They represent a window of opportunity: design standards can be recalibrated during construction at marginal additional cost. If inclusive street design is not specified now, the completed projects will lock in the same car-centric geometry for another generation.

3.2 Comparative Profiling of Selected Study Areas

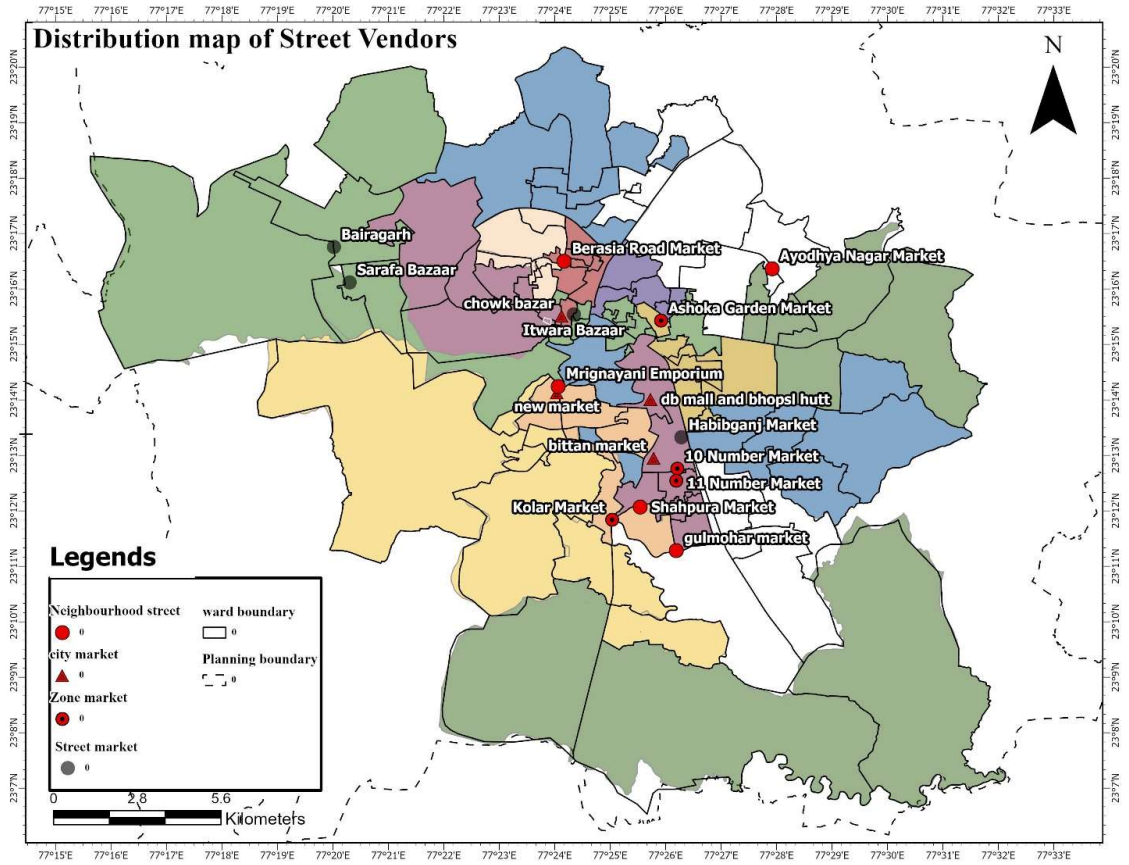


Figure 3.2: Distribution map of street vendors and major market destinations across Bhopal ward-level concentrations identifying priority intervention zones
Source: Bhopal Municipal Corporation vendor registration data

Selecting three study areas from across a city requires a systematic basis for comparison. The mapping in Figure 3.2 establishes that basis by plotting registered street vendor concentrations against the locations of major commercial markets. The map shows that

vendor activity is not evenly distributed across the city; it is concentrated at specific nodes where pedestrian activity, transport access, and commercial land use intersect. Chowk Bazar, Rani Kamlapati Road, and New Market Post Office Chauraha all appear as high-density clusters in this mapping, confirming their significance as sites of pedestrian-vendor interaction.

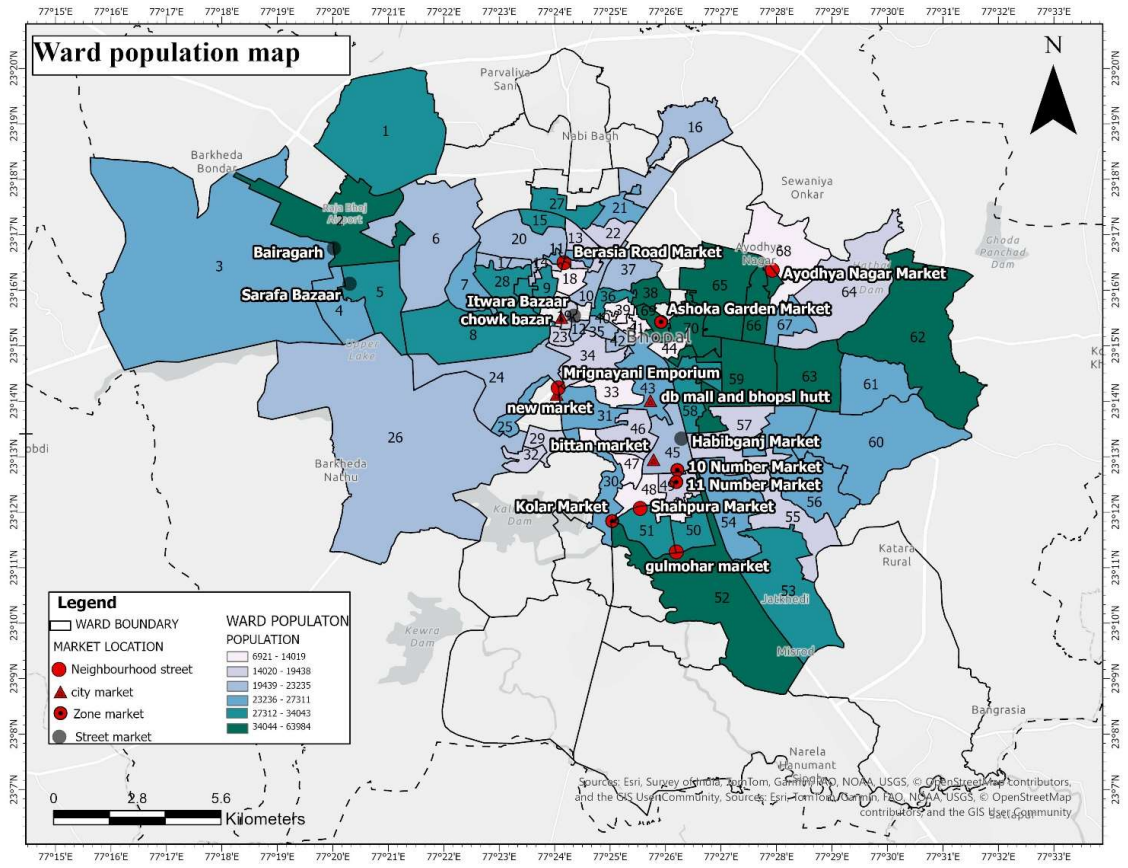


Figure 3.3: Ward population density map of Bhopal — illustrating the spatial mismatch between high-density peripheral wards and central market concentration
Source: Census of India 2011, BMC ward data

The demographic mapping in Figure 3.3 adds a further layer to the site selection rationale. Population density in Bhopal is not concentrated in the central areas where the main markets are located; rather, the highest-density residential wards are in the southeastern and eastern periphery of the city. These peripheral residents depend on the central commercial core for many of their daily purchases of cloth, jewellery, fresh produce, and institutional services such as post office and banking. The result is a pattern of

convergence: large numbers of people travel from outlying areas to a small number of central market nodes, generating the intense pedestrian volumes that make these streets both commercially valuable and physically dangerous.

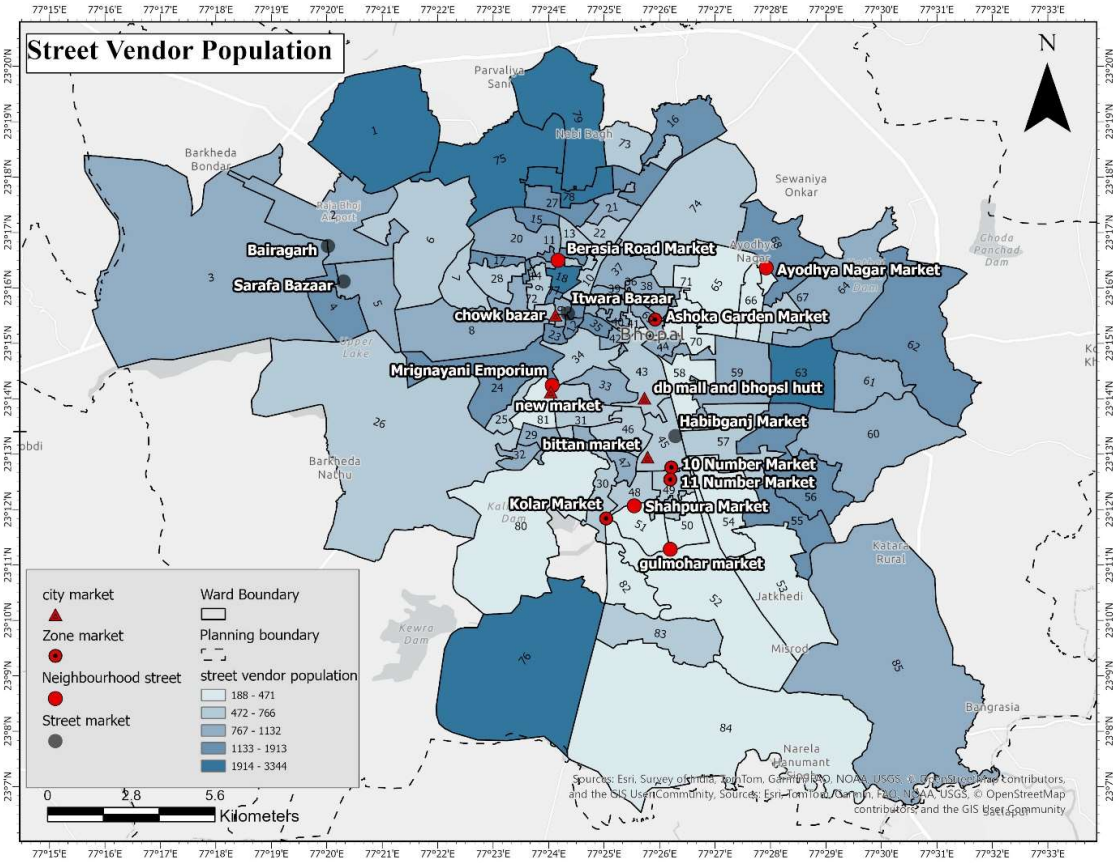


Figure 3.4: Ward-level Street vendor population map registered vendor concentrations identifying the three core survey zones
Source: BMC Town Vending Committee records

Figure 3.4 maps registered vendor populations by ward, drawing on Town Vending Committee records and PM SVANidhi enrolment data. The three highest concentrations of registered vendors correspond to Chowk Bazar, the Rani Kamlapati station area, and New Market. This alignment between demographic demand, vendor supply, and pedestrian pressure confirms that these three nodes are not merely convenient research sites they are the locations where the planning failure this thesis addresses is most acute and where design interventions would have the greatest impact.

STUDY AREA PROFILE AND CASE STUDY

The three study areas are profiled comparatively below. Study Area 1 (SA-1) at Chowk Bazar covers an organic heritage fabric with a mixed-use commercial share of 55 per cent, a dense residential component of 30 per cent, an 8 per cent religious and heritage land use centred on the Jama Masjid, and a remaining 7 per cent of other uses. The street grid is irregular, reflecting its pre-planned origin, with widths ranging from 3 to 8 metres. No pedestrian footpaths exist anywhere in the study corridor.

Study Area 2 (SA-2) along Rani Kamlapati Road covers a major transit corridor with 40 per cent mixed-use commercial land, 20 per cent residential, 28 per cent open or green space (including the railway land and metro corridor), and 12 per cent institutional use. The street hierarchy here is arterial, with a 40-metre total right-of-way and a 10-metre service lane. Despite the scale of the infrastructure, pedestrian provision is absent.

Study Area 3 (SA-3) at New Market Post Office Chauraha is a planned commercial node with 65 per cent mixed-use commercial land, 15 per cent dedicated shopping blocks, and 10 per cent institutional uses the Post Office and the State Bank of India being the primary anchors. The collector road that defines this area has a 20-metre total right-of-way with formal 2.5-metre footpaths on both sides. These footpaths, however, are non-functional: the surfaces are broken, vendor stalls occupy the margins, and multi-row parking blocks the carriageway at the intersection

3.3 Micro-Scale Spatial and Cross-Sectional Analysis

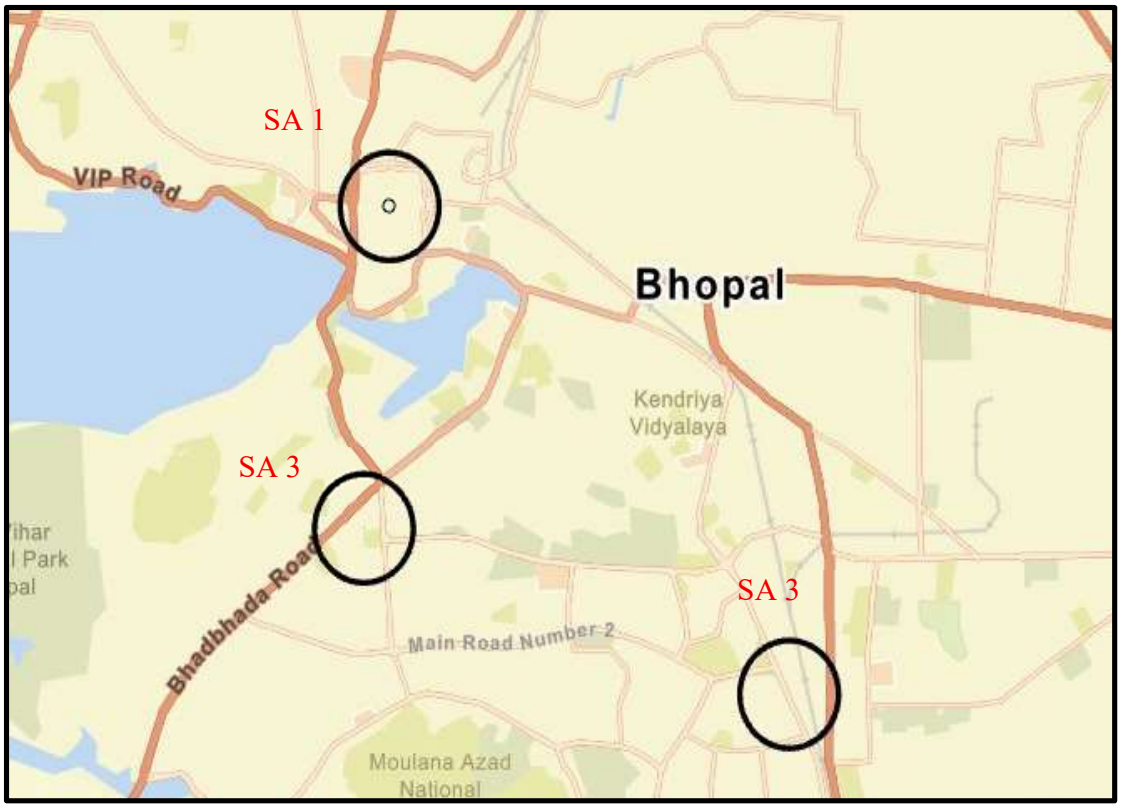


Figure 3.5: Location map of survey areas boundaries and survey circles for SA-1, SA-2, and SA-3 identified through satellite imagery
Source: Author, Google Earth base, 2024

Figure 3.5 shows the spatial boundary of each study area as defined for this research. The boundaries were drawn to capture the primary commercial corridor at each site and the immediate street network that feeds pedestrian and vehicle movement into it. The survey circle at Chowk Bazar covers a 300-metre corridor along the main market street, taking in four key nodes the Jama Masjid Road junction, the Nadeem Road intersection, the Fashion Street crossing, and the Peer Gate entry. The survey boundary at Rani Kamlapati covers the service lane frontage from the station entry to the main road intersection. The New Market boundary covers a 170-metre stretch of the collector road approaching and leaving the Post Office Chauraha roundabout

3.3.1 SA-1: Chowk Bazar Spatial Profile and Cross-Section

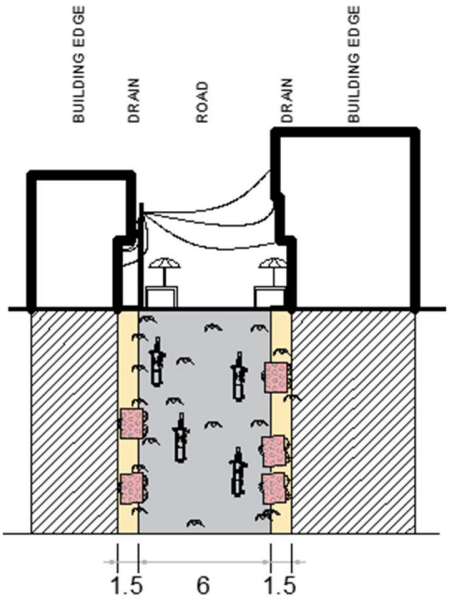


Figure 3.6: Baseline engineering cross-section -Chowk Bazar (SA-1). Total RoW: 6.0 m. Open drainage channels: 1.5 m each side. Effective carriageway before encroachment: 3.0 m. Functional footpath: nil Source: Author field survey, 2024

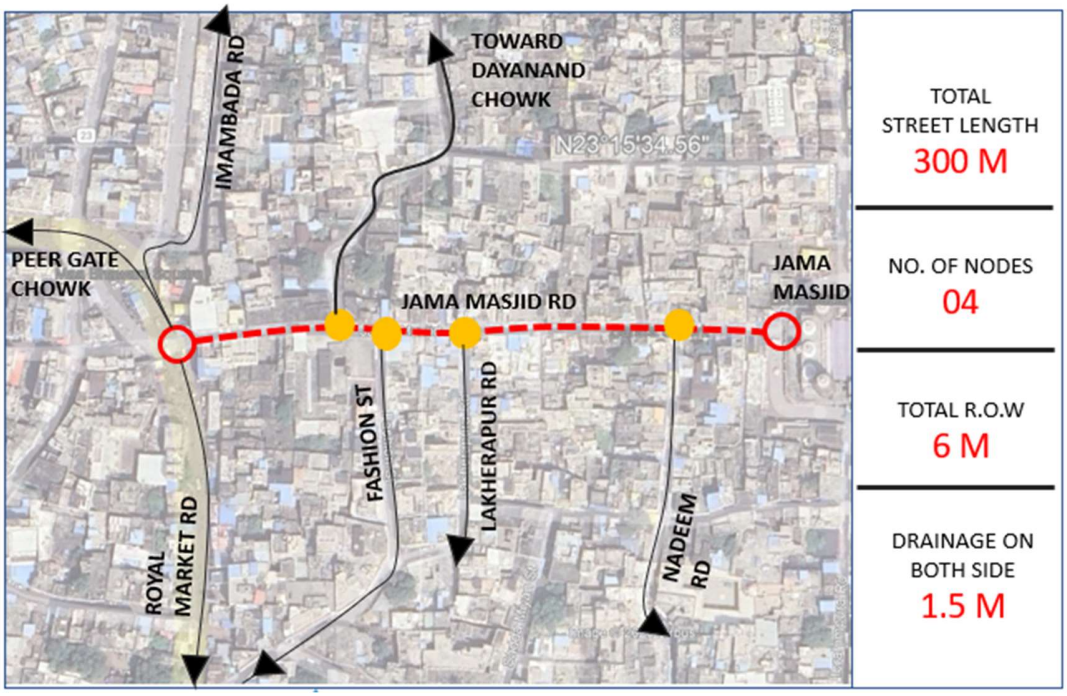


Figure 3.7: Survey area map SA-1 Chowk Bazar. Total street length: 300 m; Number of nodes: Source: Author

STUDY AREA PROFILE AND CASE STUDY

Chowk Bazar is the commercial and social heart of Old Bhopal; a market district whose origins predate modern urban planning by several centuries. The streets in this area were formed by the accumulation of buildings and commercial frontages over generations, not by a planned layout. The result is a tight, irregular grid with street widths that rarely exceed six metres and, in some sections, narrow to three metres.

The baseline cross-section shown in Figure 3.6 documents the existing conditions in the primary market corridor. The total right-of-way is 6.0 metres. On both sides, open concrete drainage channels occupy 1.5 metres each, reducing the available surface to a 3.0-metre strip shared by vehicles and pedestrians. This strip is further compromised by shop extensions tables, display racks, and goods stacked on the road edge that encroach between 0.5 and 1.0 metres on each side. Mobile vendors with carts and cycles add further unpredictable obstructions. Motorcycle parking, often two or three rows deep, fills any remaining gap. The effective carriageway that results from these compounded encroachments is frequently less than one meter wide in theory insufficient even for a single vehicle, let alone the mix of two-wheelers, auto-rickshaws, and pedestrians that use it.

At the centre of this corridor stands the Jama Masjid, one of the oldest mosques in the city and a significant heritage asset. The mosque's forecourt, which should function as a public gathering space, is effectively inaccessible blocked by vendor canopies that extend across the entrance and by motorcycle parking that fills the available ground to the building walls. During prayer times, the concentration of worshippers, market visitors, and passing traffic on a six-metre street creates conditions that are both physically dangerous and incompatible with the social character of a heritage religious site.

The survey corridor of 300 metres includes four defined nodes: the Jama Masjid Road junction to the north, the Nadeem Road intersection at the eastern side of the mosque, the Lakherapura Road crossing to the south, and the Peer Gate entry point at the western end. Each of these nodes function as a concentration point for vendor activity and a source of pedestrian-vehicle conflict, as vehicles turning in and out of the side streets cross the primary pedestrian desire lines.

3.3.2 SA-2: Rani Kamlapati Road Spatial Profile and Cross-Section

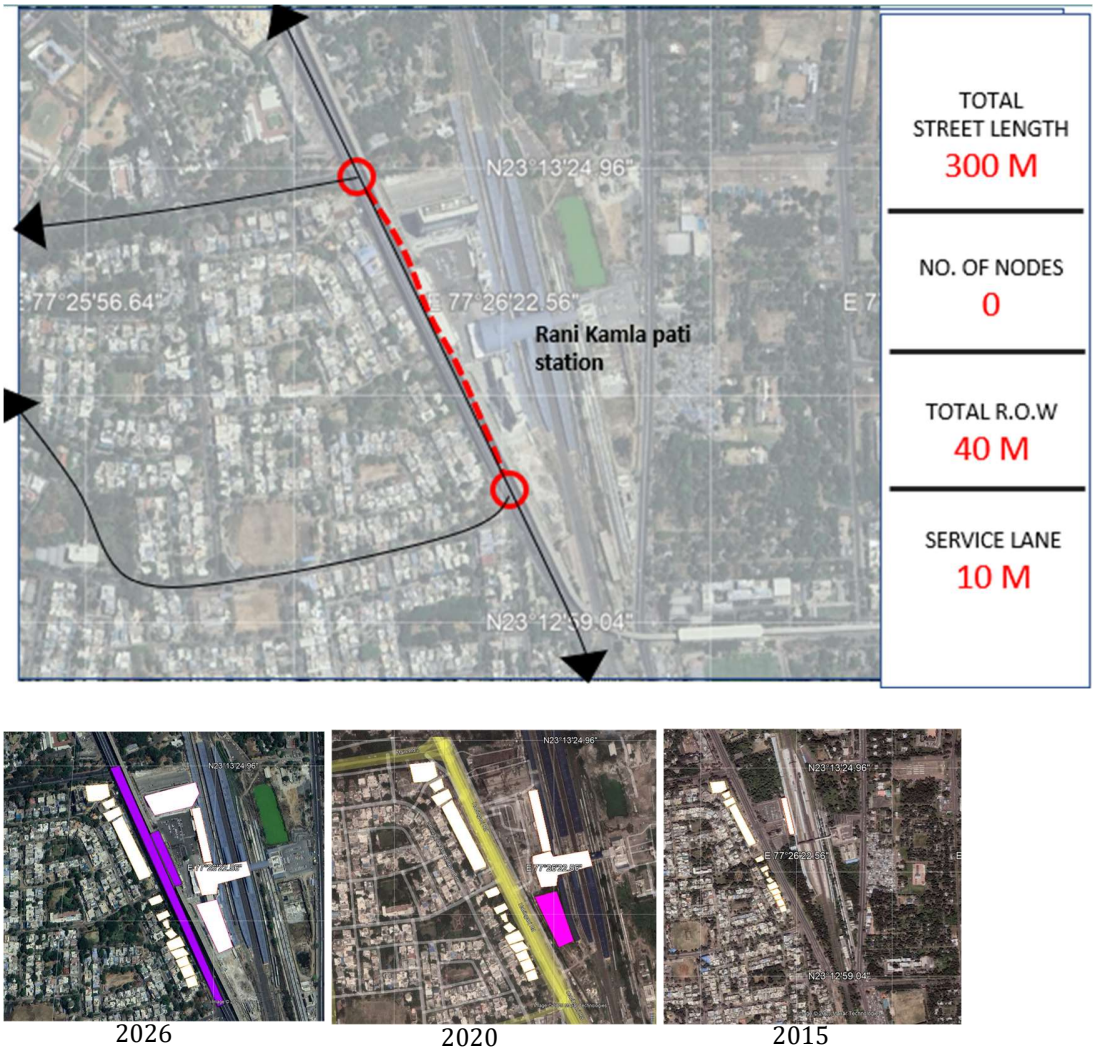


Figure 3.8: Survey area map and temporal morphological progression of SA-2, Rani Kamlapati Road from regional highway (2015) to multi-modal transit node (2026)
Source: Author, Google Earth base maps

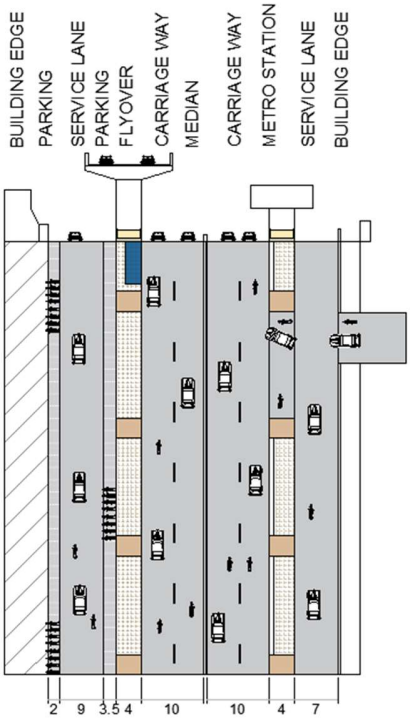


Figure 3.9: Baseline cross-section -Rani Kamlapati Road (SA-2). Total RoW: 40.0 m. Service Lane: 10.0 m. Paved pedestrian path: nil.
Source: Author field survey, 2024

The temporal progression documented in Figure 3.8 is essential for understanding the current conditions at Rani Kamlapati Road. In 2015, this corridor was a standard regional highway running alongside a legacy railway facility. The street had low commercial density, modest traffic volumes, and a relatively uncomplicated cross-section. The pedestrian population was small and manageable.

By 2020, the construction of a major flyover had dramatically altered the ground-level conditions. The elevated structure created a zone of reduced sunlight and visual enclosure beneath it, which attracted informal food vendors and auto-rickshaw operators to occupy the service lane as a protected commercial and operational space. Pedestrian movement patterns shifted to avoid the construction activity, and no provision was made for maintaining safe walking routes during or after the construction period.

By 2026, the addition of the elevated Metro Station and the adjacent high-rise commercial development had transformed the corridor into a fully multi-modal transit node. The station generates substantial pedestrian flows at every peak session, as commuters arrive and depart by metro, rail, auto-rickshaw, bus, two-wheeler, and on foot. Because the infrastructure expansion was designed entirely around vehicular circulation with no provision for continuous paved pedestrian paths, protected crossings, or vendor management the result is a chaotic ground-level environment where all user groups compete for the same unpaved service margin.

The cross-section in Figure 3.9 documents this condition. The 40-metre total right-of-way is allocated almost entirely to the arterial carriageway and median plantings. The 10-metre service lane, which should function as a transitional buffer between the arterial and the station frontage, is occupied by parked auto-rickshaws, idling taxis, and the informal food stalls that serve transit passengers. Pedestrians navigate this mix on foot, stepping between vehicles, carts, and drainage ditches to reach the station entry. No level footpath surface, no tactile guidance strip, and no protected pedestrian crossing exists anywhere in the study corridor.

3.3.3 SA-3: New Market Post Office Chauraha Spatial Profile and Cross-Section

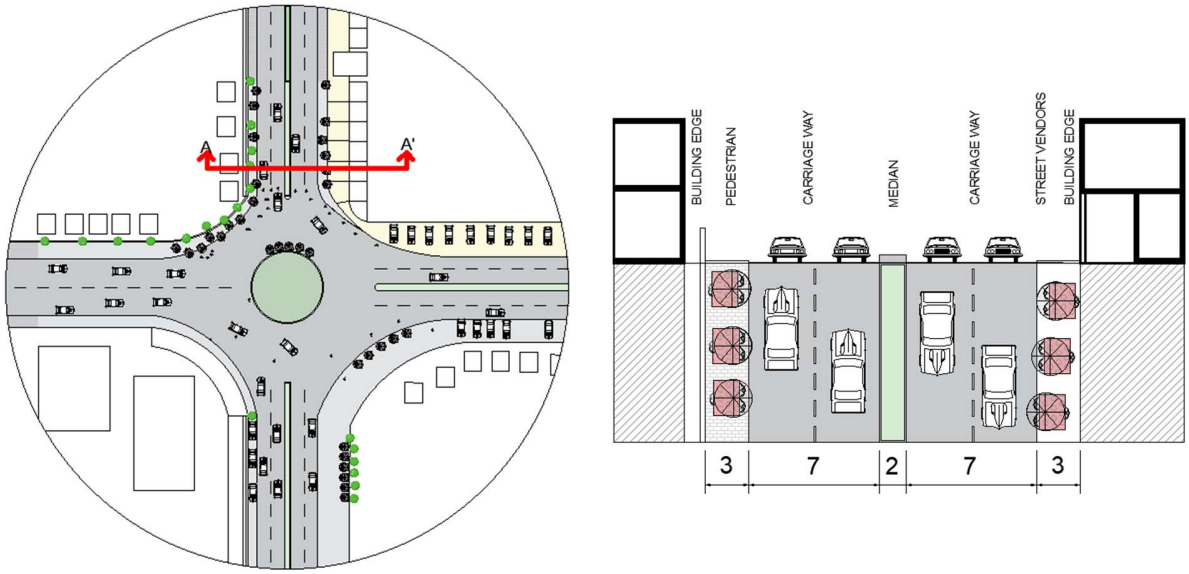


Figure 3.10: Baseline cross-section New Market P.O. Road (SA-3). Total RoW: 20.0 m. Designed, source: Author

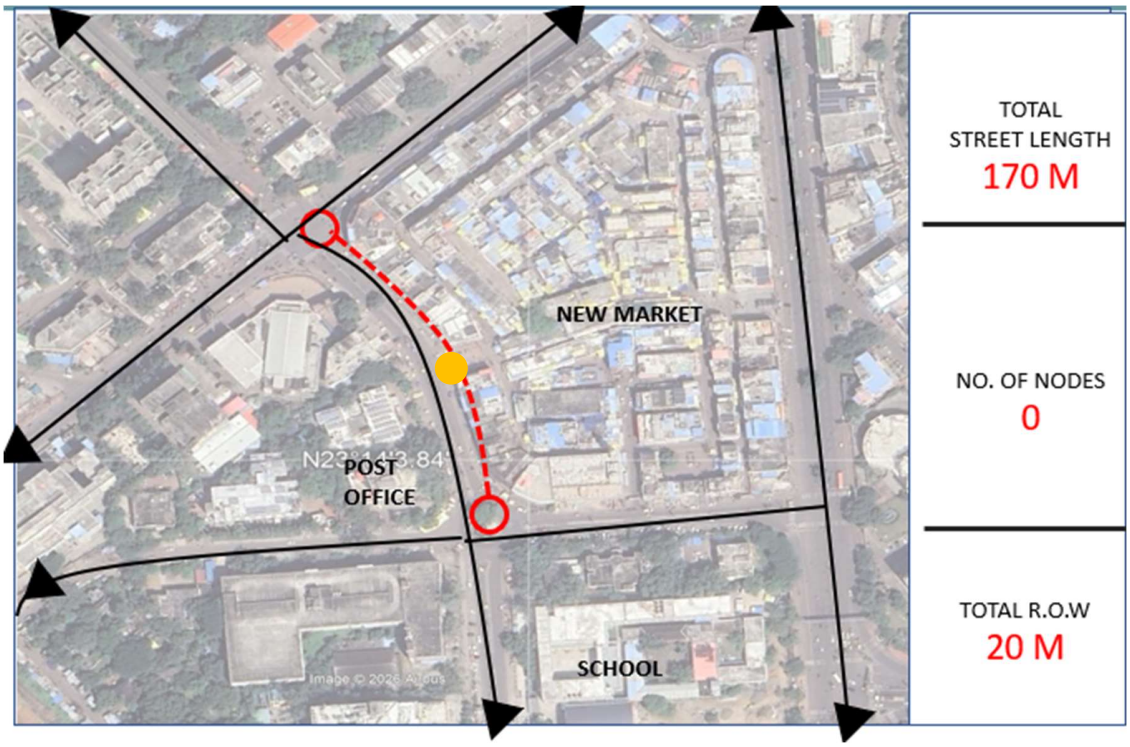


Figure 3.11: Survey area map SA-3 New Market P.O. Chauraha. Total street length: 170 m
Source: Author

New Market Post Office Chauraha presents a different kind of planning failure from the other two study areas. Where Chowk Bazar never had footpaths to begin with, and Rani Kamlapati's footpaths were omitted from recent infrastructure upgrades, New Market was planned with 2.5-metre formal footpaths on both sides of its 20-metre collector road. These footpaths existed on paper and in the original construction. They have since been allowed to deteriorate to the point of being non-functional, while the space they occupy has been progressively colonised by vendors, parked vehicles, and informal activity.

The cross-section in Figure 3.10 shows the designed and actual conditions side by side. The designed cross-section provides a 7-metre carriageway with 2.5-metre footpaths on each side and drainage within the building setback. The actual condition shows the footpaths reduced to less than 0.5 metres of functional width in most sections, with fruit and flower vendors occupying the full footpath width and their goods often extending onto the carriageway edge. Multi-row parking around the Post Office and SBI Bank buildings

reduces carriageway capacity at the roundabout intersection and blocks sightlines for both drivers and pedestrians.

The survey corridor of 170 metres, as shown in Figure 3.11, covers the approach streets and the roundabout intersection itself. The dominant landmarks are the Central Post Office on the north side of the roundabout, the SBI Bank on the east, a private school on the west, and the New Market shopping blocks on the south. Each of these generates a distinct pattern of pedestrian demand: the Post Office and Bank produce steady streams of individual users throughout the day; the school generates concentrated peaks at morning and afternoon sessions; the market blocks produce the highest volumes during evening commercial hours. No pedestrian crossing exists at any of the roundabout arms. The roundabout itself is frequently gridlocked during peak hours by the combination of vehicles entering from four directions, informal stalls on the central island, and on-street parking that reduces each arm to single-lane operation. Pedestrians cross by negotiating gaps in traffic, using no formal provision and relying entirely on driver cooperation.

3.4 Primary Empirical Data and Traffic Flow Dynamics

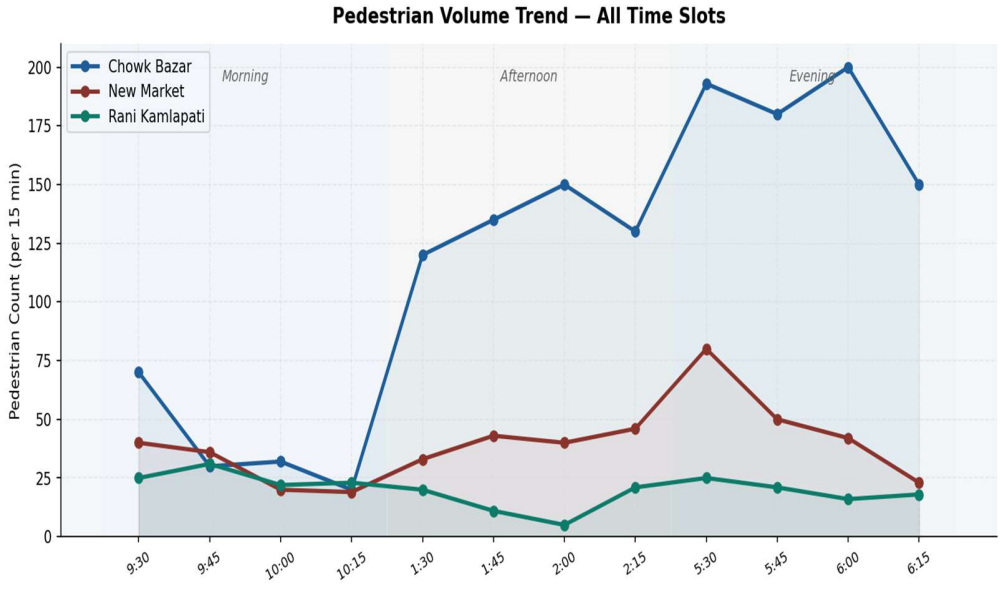


Figure 3.12: Pedestrian volume trends comparative analysis across morning, afternoon, and evening sessions at SA-1 (Chowk Bazar), SA-2 (Rani Kamlapati), and SA-3 (New Market)
Source: Author field survey, 2026

Primary traffic volume counts (TVC) and modal share surveys were conducted across twelve fifteen-minute slots at each study area, covering three daily sessions: morning peak (09:30 to 10:30), afternoon off-peak (13:30 to 14:30), and evening commercial peak (17:30 to 18:30). Each session was surveyed on a weekday during the active commercial season. Data collectors were stationed at fixed observation points and recorded all road users by mode four-wheelers, two-wheelers, cycle rickshaws, e-rickshaws, and pedestrians at fifteen-minute intervals. The resulting dataset covers 1,296 individual fifteen-minute counts across the three sites.

The comparative analysis in Figure 3.12 reveals fundamental differences in how pedestrian volumes vary across the day at each site. These differences reflect not just traffic patterns but the distinct social and economic functions of each location.

At Chowk Bazar (SA-1), pedestrian volumes follow the rhythm of the market and the mosque. The morning session records 152 pedestrians in the summed fifteen minutes counts a busy but manageable baseline that reflects residents making early purchases and worshippers attending morning prayers. By the afternoon session, volumes have risen to 535, as the market reaches its mid-day activity level. The evening session produces the peak figure of 723 pedestrians 4.7 times the morning baseline as office workers returning home combined with shoppers taking advantage of the cooler evening hours and with families visiting the market as a social destination.

This evening peak is particularly significant from a safety perspective. The entire 723-pedestrian flow must navigate a six-metre right-of-way with no footpath, at a time when vendor activity is at its maximum and when motorcycle and auto-rickshaw traffic is also peaking as drivers return home. The combination creates the highest-risk conditions of the day on a street that is already operating well below any acceptable safety standard.

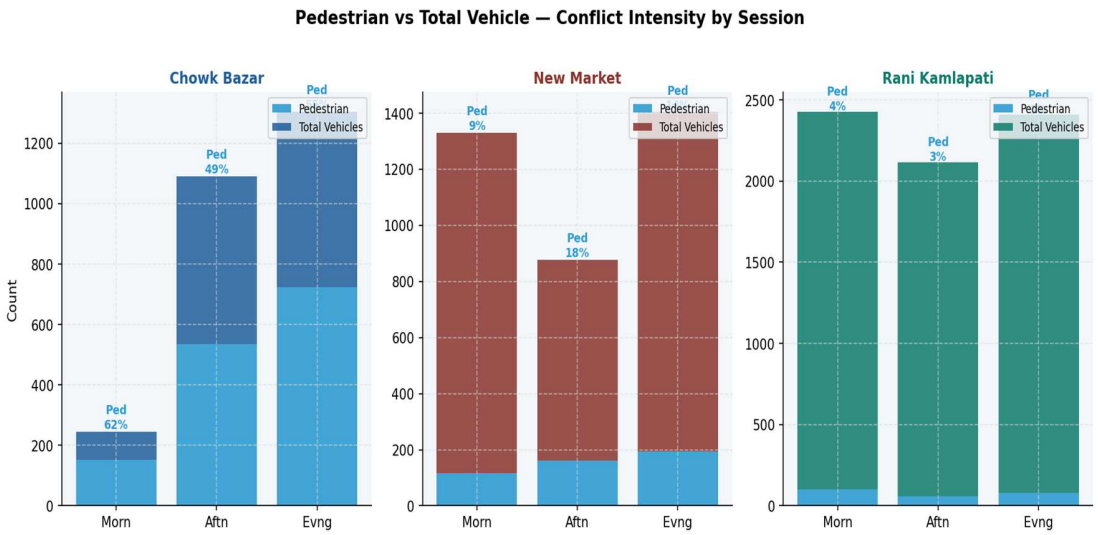


Figure 3.13: Pedestrian-vehicle conflict intensity by session pedestrian modal share as percentage of total movement at SA-1, SA-2, and SA-3
Source: Author field survey, 2024

Figure 3.13 places the pedestrian counts in the context of total traffic volumes, making the conflict dynamics visible. At Chowk Bazar, pedestrians form a dominant share of the total movement: 62 per cent in the morning, 49 per cent in the afternoon, and 55 per cent in the evening. This dominance is significant because it inverts the usual vehicle-centric planning assumption. Here, the majority of street users are on foot, yet the street is designed entirely for vehicles. The planning priority is inverted: the minority use (vehicles) receives all the designed infrastructure; the majority use (pedestrians) receives none.

At Rani Kamlapati Road, the modal share picture is the opposite. Pedestrians account for only 3 to 4 per cent of total movement across all three sessions. Two-wheelers dominate at 63 to 64 per cent; four-wheelers and e-rickshaws divide the remaining share. This near-total vehicular dominance on a major transit corridor a station used daily by thousands of commuters, indicates that pedestrians are being systematically excluded from a street where they should, by definition, be present in large numbers. The absence of safe walking infrastructure is not simply inconvenient; it is actively suppressing walking behaviour on a route where walking is the natural and preferred mode.

At New Market, the modal share is more balanced, with pedestrians maintaining a steady 9 per cent in the morning (115 counted walkers), rising to 18 per cent in the afternoon (162 walkers), and settling at 14 per cent in the evening (195 walkers). This relatively consistent pedestrian presence reflects the institutional character of the site where the Post Office and Bank generate purpose-specific walking trips throughout the day, without the extreme peaks of the other two sites.

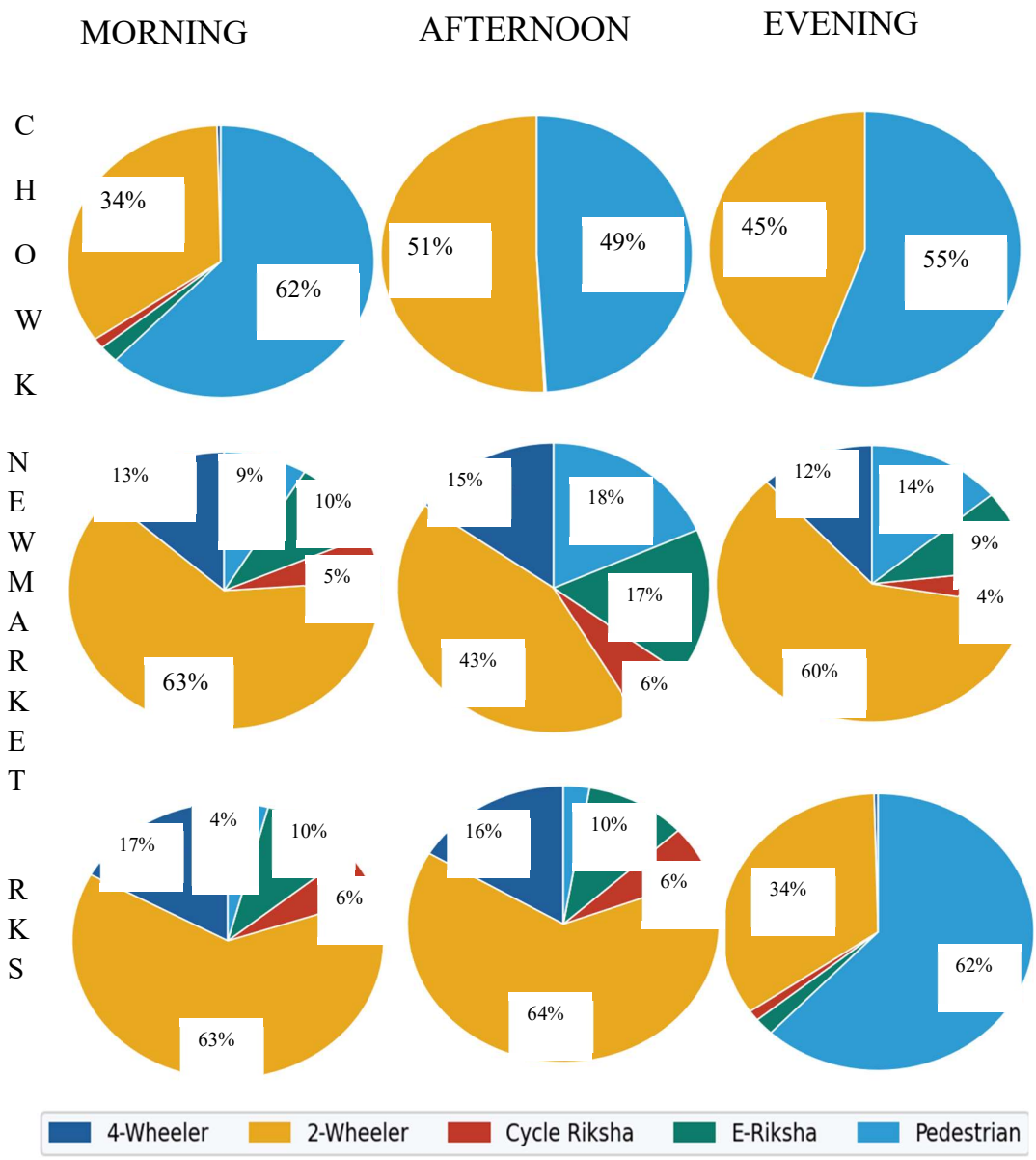


Figure 3.14: Comprehensive modal share distributions across all twelve observed time slots morning, afternoon, and evening sessions at Chowk Bazar, New Market, and Rani Kamlapati
Source: Author field survey, 2024

Figure 3.14 provides the full modal share breakdown across all twelve time slots and all three study areas. Several patterns emerge from this detailed picture. Two-wheelers are the

dominant vehicle mode at all three sites in all sessions confirming that motorcycle movement is the primary source of vehicle-pedestrian conflict across the study areas. At New Market, four-wheelers represent a significantly higher share (12 to 15 per cent) than at the other sites, reflecting the institutional parking demand generated by the Post Office and Bank. At Rani Kamlapati, e-rickshaws and auto-rickshaws maintain a consistent 10 per cent share across all sessions, reflecting their role as transfer modes between the station and adjacent residential areas.

3.5 Spatial Hierarchy, Catchment Analysis, and User Intent

The traffic volume data establishes what happens on these streets. To understand why it happens and what design and governance responses are appropriate the data must be interpreted through a framework of spatial hierarchy and user intent. Not all streets serve the same function or attract the same users for the same reasons. A street that is a destination for some users may be a throughway for others. A vendor who sets up at a transit node is responding to a different economic logic from one who occupies a traditional market pitch in a heritage bazaar. Planning that does not distinguish between these contexts will inevitably produce generic responses that are poorly matched to actual needs.

This research applies a distinction between two spatial catchment typologies: Transit Incidental Catchments, where users are passing through on their way to a destination elsewhere, and Destination Intentional Catchments, where users have come specifically to engage with the commercial or social activity of the street itself. Each typology has different implications for pedestrian design, vendor management, and traffic organisation.

3.5.1 Transit Incidental Catchments: SA-2 Rani Kamlapati Road

Rani Kamlapati Road is the clearest example of a Transit Incidental Catchment in this study. The station that anchors this corridor serving railway, metro, and bus interchange functions is not the destination for most of its users; it is an intermediate point in a journey that begins and ends elsewhere. Pedestrians at this site are predominantly commuters

moving between transport modes under time pressure. They do not stop to browse; they do not linger; they need clear, unobstructed, safe pathways between the vehicle drop-off areas and the station entry.

The street food vendors concentrated at this location are also responding to a transit-incidental logic. Their customers are the same commuter's people who want a quick purchase between modes, not a sitting meal or a browsing experience. The vendor and the customer are both operating in a high-velocity, time-constrained environment. The failure of street design here is not that vendors are present they are providing a genuine service but that neither the vendor's workspace nor the commuter's walking route has been designed with any understanding of how a transit interchange works.

The 40-metre right-of-way at Rani Kamlapati offers significant scope for redesign. A fraction of the space currently devoted to vehicle lanes and informal parking could be reallocated to create a continuous protected footpath, a structured vendor kiosk row along the service lane, and a signalised pedestrian crossing at the station entry. These changes would not reduce vehicle capacity significantly but would transform the pedestrian experience from dangerous to functional.

The economic case for this investment is straightforward. Every commuter who currently avoids walking to the station because the route is unsafe is either using a vehicle instead of adding to the congestion the road design is trying to manage or not making the trip at all. Improving pedestrian access to transit increases transit ridership, reduces vehicle demand, and improves the commercial viability of the vendors who depend on passing trade.

3.5.2 Destination Intentional Catchments: SA-1 and SA-3

Chowk Bazar and New Market Post Office Chauraha both function as Destination Intentional Catchments. People come to these locations specifically to shop, to conduct business, to visit the mosque, or to access institutional services. They are not passing through; they are staying. This distinction has direct implications for the kind of pedestrian environment that is appropriate.

In a destination environment, speed is less important than comfort and legibility. People need to be able to move slowly, stop, look, and interact without being threatened by passing

traffic. They need surfaces that are level and navigable for shopping trolleys, pushchairs, and walking sticks. They need shade and seating. They need to be able to find what they are looking for without navigating a street that presents constant physical hazards.

At Chowk Bazar, the 62 per cent pedestrian modal share in the morning confirms that this is fundamentally a pedestrian street that has been incorrectly treated as a vehicle corridor. The challenge is not to introduce pedestrian activity it is already the dominant use but to provide it with the physical infrastructure it deserves. This means covering the drainage channels, creating defined vending bays that respect a clear pedestrian path, and managing vehicle access so that it does not overwhelm a street that is primarily used on foot.

At New Market, the more balanced modal share and the institutional character of the anchoring land uses suggest a different approach. Here, the formal footpath provision is the right starting point it simply needs to be reinstated, maintained, and protected from encroachment through a structured vendor bay system. The roundabout intersection needs a raised surface treatment and crossing provision across all four arms. These are relatively straightforward infrastructure investments that would produce significant improvements in both safety and commercial attractiveness.

3.5.3 Travel Distance Hierarchy and Demographic Synergy

Both Chowk Bazar and New Market draw most of their users from local and neighbourhood catchments walking distances of up to one kilometer. Field observations indicate that approximately 88 per cent of users at both sites arrive by non-motorized means or by e-rickshaw from within the immediate area. These are the regular, daily users who define the social baseline and community character of the market. They are the people most directly harmed by the absence of safe footpaths, because they have no alternative mode available.

The remaining 12 per cent of users at destination catchment sites are regional visitors people travelling longer distances, often by private vehicle, for specific purchases or services. These users generate higher per-visit spending but also import higher levels of vehicle congestion into areas that were not designed for it. Managing this vehicle demand

through parking provision at the periphery and pedestrianization of the core is a key design challenge at Chowk Bazar in particular.

At Rani Kamlapati, the user profile is inverted: long-distance transit users are the primary customer group for vendors, while local catchment users are a smaller share. This means that the commercial logic of vending at this site is fundamentally different from that at the market sites. Vendor locations should be optimized for visibility and quick access from station exits rather than for browsing and extended engagement. The design of vendor infrastructure at Rani Kamlapati must reflect this transit-oriented commercial logic.

The combined analysis of catchment typologies, modal shares, and travel distance hierarchies leads to a clear conclusion: street design in Indian cities cannot follow a uniform template. Transit incidental spaces require fast, clear pedestrian pathways and structured vendor organization that serves mobile customers efficiently. Destination intentional spaces require traffic calming, vendor bay integration, and a pedestrian environment that is comfortable enough to support extended stays. The proposals in Chapter 5 are calibrated to these distinct requirements.

3.6 Reamble: Why International and Domestic Case Studies Matter (Case Study)

The three study areas examined in this thesis Chowk Bazar (SA-1), Rani Kamlapati Road (SA-2), and New Market Post Office Chauraha (SA-3) represent three morphologically distinct manifestations of the same underlying planning failure: the systematic inability to simultaneously protect pedestrian right-of-way (RoW) and provide spatially designated, governance-backed locations for street vendors within a shared street cross-section. This failure is not unique to Bhopal or even to Indian Tier-II cities; it is a challenge that has confronted rapidly urbanizing economies across South, Southeast, and East Asia for decades.

The value of comparative case study analysis lies precisely in what it reveals about transferability. Where planning challenges are structurally similar overcrowded historic bazaar streets, infrastructure-heavy transit corridors generating informal vendor clusters,

planned commercial intersections whose footpaths have been progressively colonised the solutions devised in other cities serve as tested prototypes rather than abstract models. The three international and domestic case studies presented here were selected because each address one of the three morphological conditions represented in the Bhopal study:

- Case Study 1 Bangkok's Under-Flyover Street Vendor Formalisation (Yaowaraj Road & Elevated Expressway Nodes, Bangkok, Thailand): directly parallels the condition at SA-2, Rani Kamlapati Road, where a major flyover and elevated metro infrastructure have created ground-level dead zones that informal vendors have colonised without governance. Bangkok's government-led programme to design, design, and manage street vending beneath expressway structures provides the closest global precedent.
- Case Study 2 Ahmedabad's Heritage Bazaar Street Redesign (Manek Chowk and Teen Darwaza Corridor, Ahmedabad, Gujarat): parallels the organic, heritage-laden, six-metre right-of-way of SA-1, Chowk Bazar, where vendor-pedestrian conflict is most intense and historic morphology precludes road widening. Ahmedabad's model of temporal zoning and shared street retrofitting within a Walled City heritage context provides the most directly applicable domestic precedent.
- Case Study 3 Singapore's Hawker Centre Model (National Environment Agency Framework, Singapore): while Singapore's development context differs markedly from Bhopal, its governance architecture for transitioning unregulated street food vendors into formally designed, spatially integrated hawker nodes provides a transferable institutional template. The parallels with SA-3, New Market Post Office Chauraha a planned commercial intersection with degraded formal footpaths — lie in how the governance of designated vending bays can simultaneously restore pedestrian RoW and formalise the informal economy.

Each case study is structured to examine: (1) the urban context and the nature of the vendor-pedestrian conflict; (2) the specific intervention — physical design, spatial governance, and policy mechanism; (3) quantified outcomes in terms of pedestrian RoW restoration

and vendor livelihoods; and (4) the lessons most directly applicable to the corresponding Bhopal study area. Together, the three cases provide an evidence base that anchors the design proposals in Chapter 5 within tested international and domestic practice rather than theoretical aspiration.

3.6.1 Bangkok Under-Flyover Street Vendor Formalisation Programme-Yaowaraj Road Corridor and Elevated Expressway Ground-Level Nodes, Bangkok, Thailand

Urban Context: The Bangkok Flyover and Its Informal Ground Economy

Bangkok's rapid expansion of elevated infrastructure comprising the BTS Skytrain (opened 1999), the MRT underground lines, and the Expressway and Rapid Transit Authority (EXAT) of Thailand's network of elevated urban expressways transformed large sections of Bangkok's street grid in a manner structurally identical to what has occurred along Rani Kamlapati Road in Bhopal following the construction of its flyover and elevated Metro corridor. In both cities, elevated infrastructure resolved upper-level traffic flow problems while creating a profoundly dysfunctional ground-level condition: vast stretches of underutilised dead space beneath the structure, denied natural light, perceived as unsafe, and almost immediately colonised by informal vendors seeking shelter, proximity to transit footfall, and freedom from premium commercial rents.

In Bangkok's case, the colonisation of flyover underbellies by street food vendors, mobile cart operators, and temporary market traders had been occurring since the 1970s along segments of the Sirat Expressway and the elevated sections of the Don Mueang Tollway but accelerated dramatically with the construction of the Skytrain and MRT lines after 1999. By the mid-2000s, Bangkok Metropolitan Administration (BMA) surveys estimated that over 12,000 registered and unregistered street vendors operated within 50 metres of elevated transit infrastructure, with the highest concentrations at interchange nodes, station exits, and beneath expressway columns (Bangkok Metropolitan Administration, 2006). The ground-level pedestrian environment at these nodes was characterised by the same condition’s observable at Rani Kamlapati Road today: unpaved margins, no clearly delineated pedestrian path, vendor carts mixed indiscriminately with auto-rickshaw

equivalents (tuk-tuks and motorcycle taxis), and the near-total absence of lighting, drainage, or waste management infrastructure.

Yaowaraj Road Bangkok's Chinatown commercial spine became the focal point of the city's first systematic policy response to this condition. The road had existed as a major commercial street since the late nineteenth century, with an unbroken tradition of street food vending that made it one of Bangkok's most internationally recognized night market destinations. The construction of an elevated expressway segment adjacent to the corridor in the 1990s amplified both the vendor density and the pedestrian-vehicle conflict to levels that prompted formal policy intervention (Nirathron, 2006). The BMA, acting under the 2003 Street Vendors Policy Framework and the subsequent 2011 revision, designated the area under the elevated expressway columns as a formally administered 'vendor zone under infrastructure' the first official policy in Thailand to treat the flyover underside as productive public space rather than residual dead space (Srinivas, 2020).

Policy and Legal Framework

The Bangkok Metropolitan Administration's approach to formalising under-flyover vending drew on the mandate contained in the 2003 Bangkok Street Vendors Policy, which for the first time explicitly recognised informal street traders as legitimate users of designated public space rather than illegal encroachers subject to removal. This policy shift, reinforced by Section 9 of Thailand's Cleanliness and Orderliness of the Country Act B.E. 2535 (1992) as amended in 2003, required the BMA to map and demarcate designated vending zones across the city in coordination with the Expressway Authority of Thailand (EXAT) (Nirathron, 2006).

The crucial institutional innovation was the negotiated jurisdictional agreement between BMA and EXAT regarding the ground-level space beneath expressway columns. Under standard infrastructure management practice, EXAT held operational authority over the land within the expressway buffer corridor, including the underside of elevated sections. BMA held regulatory authority over street trade. The 2005 Memorandum of Understanding between BMA and EXAT created a joint management protocol in which EXAT retained structural maintenance authority while BMA assumed responsibility for designating,

demarcating, licensing, and managing street vending within defined column-bay territories on the ground level. This joint protocol resolved the jurisdictional ambiguity that had previously made consistent vending governance impossible a governance problem directly analogous to the fragmented authority between BMC, BSCDCL, and National Metro Rail Corporation at Rani Kamlapati in Bhopal.

Physical Design: Column-Bay Vending Units

The central physical design innovation of Bangkok's under-flyover programme was the formalisation of the expressway column structure itself as the organisational framework for individual vending bays. Rather than imposing a new spatial grid onto the ground, which would require clearance of existing occupation and extensive civil construction, the BMA's design team recognised that the rhythmic interval of expressway columns — typically 8 to 12 metres between supports, matching the standard structural span — already created a natural spatial module suitable for one or two permanent vending pitches per bay.

Each column-bay vending unit was designed to the following spatial standards (Bangkok Metropolitan Administration, 2011):

- Bay width: 3.0 metres per vendor, maximum two vendors per column bay on opposing sides, maintaining a minimum 2.0-metre clear central circulation spine.
- Bay depth: 1.5 metres measured from the column face, with a 0.3-metre fixed overhang shelter integrated with the expressway structural soffit via engineered anchor points approved by EXAT's structural engineers.
- Surface treatment: coloured concrete pavers, with vendor bays in a distinctly contrasting shade from the pedestrian spine, creating visual separation without physical barriers.
- Utilities: Each column was retrofitted with a single 15-amp electrical outlet and an adjacent water standpipe where the infrastructure corridor permitted, enabling food vendors to operate without running extension cables across pedestrian paths.
- Waste management: A standardised waste container caddy with organic and dry-waste separation was bolted to each column at a height of 1.0 metre.

The pedestrian circulation spine running between the vendor rows was designed to a minimum width of 2.0 metres, with a tactile guiding strip in the centre and reflective bollards at 3-metre intervals. Overhead, the underside of the expressway deck was fitted with LED strip lighting at 1,500 lux intensity, transforming what had been a dark and perceived-as-dangerous space into a well-lit commercial arcade (Bangkok Metropolitan Administration, 2011; Srinivas, 2020).

Licensing, Temporal Management, and Self-Governance

Physical design alone was insufficient to sustain the programme; the BMA coupled spatial formalization with a three-tier licensing system that became the model for subsequent Thai cities' vendor management programmes. Tier 1 licences covered permanent vendors operating daily within fixed column-bay pitches; Tier 2 licenses covered semi-permanent vendors operating during designated evening or weekend commercial windows (typically 17:00 to 23:00); and Tier 3 licenses covered rotating mobile cart vendors assigned to a defined route within the under-flyover corridor rather than a fixed pitch. The temporal management system ensured that morning and afternoon pedestrian peak flows principally commuters using the adjacent transit infrastructure experienced an essentially clear path, with full vendor activity concentrated in the evening hours when footfall shifted toward recreational and food-seeking purpose (Nirathron, 2006).

The BMA further established a Vendor Area Committee for each under-flyover zone, comprising elected representatives of the licensed vendors, a BMA district official, an EXAT safety representative, and a community representative from the adjacent residential area. The Committee held monthly meetings to manage licence transfers, adjudicate complaints, co-ordinate with the city's waste collection schedule, and review compliance with the physical standards. This model of co-governance between municipal authority and vendor self-organisation closely mirrors the Town Vending Committee mandate contained in India's Street Vendors Act 2014 the legal mechanism whose non-implementation this thesis identifies as a central governance failure in Bhopal.

Quantified Outcomes

Table 3.1: Quantified outcomes of Bangkok under-flyover vendor formalization program, Yaowaraj corridor Source: Bangkok Metropolitan Administration, 2011; Srinivas, 2020.

Outcome Metric	Pre-Intervention Baseline	Post-Intervention Result (3-Year)
Vendors with designated space	~1,200 (Yaowaraj corridor)	1,847 licensed in fixed bays
Pedestrian clear RoW (min.)	0.6 m (uncontrolled)	2.0 m enforced spine
Lighting level (under flyover)	< 50 lux (ambient only)	1,500 lux (LED retrofit)
Pedestrian injury incidents/yr	34 (BMA traffic records)	11 (68% reduction)
Vendor eviction complaints/yr	800+ (NHRC Thailand data)	< 40 formal complaints
Estimated vendor income change	Baseline	+18–22% (BMA 2011 survey)

Lessons Applicable to SA-2, Rani Kamlapati Road, Bhopal

The Bangkok case study provides five transferable lessons of direct relevance to the design proposals developed for Rani Kamlapati Road in Chapter 5 of this thesis:

First, the column bay as spatial organizer. Bangkok's formalization program succeeded precisely because it worked with the existing structural logic of the elevated infrastructure rather than imposing an independent spatial grid. The rhythmic 8- to 12-metre column bays of the Bhopal flyover and elevated Metro provide an identical spatial module that the Chapter 5 proposals adopt as the primary unit of vendor bay organization. The lesson is not simply to place vendors beneath columns, but to use the column interval as a dimensioning discipline that naturally limits vendor footprint and preserves the inter-bay circulation spine.

Second, the joint jurisdictional agreement. The BMA-EXAT MOU resolved the governance deadlock between traffic infrastructure authority and street vending authority. At Rani Kamlapati, an equivalent agreement between Bhopal Municipal Corporation and

the National Metro Rail Corporation Bhopal (NMRC-B) is required. Without a formal shared management protocol, any physical intervention will be undermined by conflicting administrative claims over the service lane and the space beneath the elevated Metro structure. Chapter 5 includes this institutional recommendation as a prerequisite for spatial implementation.

Third, the temporal separation of pedestrian and vendor peak hours. Bangkok's Tier 1/2/3 licensing system, which concentrated food vending in evening hours when pedestrian purpose shifted from transit-oriented to recreational, directly informs the Restricted Vending Zone temporal management framework proposed for the service lane at Rani Kamlapati. During morning and afternoon peaks, a clear 4.5-metre pedestrian path is maintained; from 17:00 onward, Tier 2 vendors are permitted to deploy within formally designated column-bay pitches.

Fourth, lighting as a safety and commercial multiplier. Bangkok's LED retrofit of the expressway underside transformed the space from perceived danger zone to active commercial arcade. The Chapter 5 proposal for Rani Kamlapati incorporates an equivalent LED canopy lighting specification across the Metro column bays, addressing both the safety deficit currently the primary deterrent to pedestrian use of the service lane after dark and the commercial attractiveness of the vendor zone.

Fifth, vendor co-governance through Area Committees. Bangkok's Vendor Area Committees created a self-governing layer that reduced the administrative burden on BMA while ensuring compliance with physical standards. The Town Vending Committee mechanism mandated by India's Street Vendors Act 2014 provides an exactly equivalent statutory basis for this layer of governance at Rani Kamlapati and across the full Bhopal vendor zone framework. The Thai experience demonstrates that these committees are not aspirational participation exercises; they are operationally essential management tools.

3.6.2 Ahmedabad Heritage Bazaar Street Redesign Manek Chowk and Teen Darwaja Corridor-Walled City, Ahmedabad, Gujarat, India

Urban Context: The Walled City Street Problem

The Walled City of Ahmedabad inscribed as India's first UNESCO World Heritage City in 2017 presents a compressed street planning challenge that is structurally identical to that of Chowk Bazar in Bhopal: an organic medieval street grid with total right-of-way widths between 4 and 8 metres, no designated footpaths, an extremely high density of mixed commercial and residential use, and a centuries-old tradition of street vending that predates modern planning frameworks by several generations. The Manek Chowk area, at the historic heart of the Walled City, is simultaneously an active vegetable and flower market in the morning, a jewellery market in the afternoon, and a street food destination in the evening a twenty-four-hour temporal layering of uses that no single-purpose planning standard can adequately govern (Indian Institute of Management Ahmedabad, 2013).

The vendor-pedestrian conflict in Manek Chowk shares all the defining characteristics of Chowk Bazar as documented in this thesis. The primary market lane has a total right-of-way of approximately 6.0 metres. Open drainage channels run along both edges. Vendor stalls, built cumulatively over decades, occupy both edges of the carriageway and in many sections extend to within 0.5 metres of each other, leaving a carriageway clearance insufficient for two opposing vehicles and exposing pedestrians to constant risk of vehicle contact. Heritage building frontages, some dating to the Mughal period, have been progressively obscured by vendor canopies and informal extensions. Prior to intervention, the Ahmedabad Municipal Corporation (AMC) conducted periodic eviction drives approximately twice yearly; vendors returned within days, and the cycle continued without resolution (Indian Institute of Management Ahmedabad, 2013; Mahadevia et al., 2014).

The Teen Darwaza corridor the gateway street, leading from the historic Bhadra Fort precinct to Manek Chowk presented a variant of the same problem. The street had a slightly wider right-of-way of 8 to 10 metres, but was subject to a particularly dense concentration of fabric and clothing vendors whose stalls, extended by display racks into the carriageway, reduced the effective width to 2.0 to 3.0 metres during commercial hours. Pedestrian level

of service across the Teen Darwaza corridor had been measured at PLOS E to F during morning and evening peak hours in an IIM Ahmedabad study conducted in 2011 as part of the AMC's Heritage Street Programme (IIM Ahmedabad, 2013) — findings directly comparable to the PLOS F condition documented at Chowk Bazar SA-1 in Chapter 4 of this thesis.

The Intervention: Heritage Street Programme and Shared Street Redesign

Policy Context: The Heritage Management Plan and HRIDAY

Ahmedabad's Heritage Street Programme emerged from the intersection of two planning mandates: the Ahmedabad Heritage Management Plan (2011), prepared in anticipation of the UNESCO World Heritage nomination, and the Heritage City Development and Augmentation Yojana (HRIDAY) scheme launched by MoHUA in 2015. HRIDAY provided targeted central government funding for heritage city core area improvements with an explicit mandate to improve pedestrian infrastructure and public realm quality. Critically, the Ahmedabad AMC's application for HRIDAY funding included, for the first time in a major Indian city's heritage planning document, an explicit recognition that street vendors are 'functional components of heritage street character' rather than encroachments upon it (Ministry of Housing and Urban Affairs, 2015).

This recognition had direct spatial consequences. Rather than designing the Heritage Street improvements on the assumption that vendors would be evicted and footpaths returned to pedestrian-only use, the AMC's design brief prepared in partnership with the Environmental Planning Collaborative (EPC), Ahmedabad explicitly required that any street redesign must accommodate existing vendor populations within the redesigned cross-section. This brief anticipated the philosophical shift this thesis argues for in its design framework: vendors as planned-for design parameters rather than obstructions to be subtracted.

Physical Design: Covering Drains, Shared Surfaces, and Temporal Zoning

The physical interventions implemented across the Manek Chowk and Teen Darwaza corridor between 2016 and 2019 under HRIDAY funding and AMC project management

can be grouped into five categories, all directly applicable to the Chowk Bazar proposals in Chapter 5 of this thesis:

Drain Covering and Surface Rationalisation: Open drainage channels running along both edges of the street were replaced with RCC box drains covered by removable precast panels, yielding a net increase of 2.0 to 3.0 metres of usable flat street surface. This is precisely the intervention proposed for Chowk Bazar SA-1, where the same 1.5-metre open channels on each side reduce functional width to approximately 3.0 metres before vendor and vehicle encroachments are counted. The Ahmedabad experience demonstrates that covered drain retrofitting is technically straightforward, fiscally manageable at approximately INR 4,500 to 6,000 per linear metre of drain cover at 2018 costs and yields immediate measurable improvement in pedestrian level of service (Environmental Planning Collaborative, 2019).

Shared Street Surface with Colour-Coded Zoning: Following drain coverage, the recovered street surface was re-laid in colour-coded permeable pavers a distinctive terracotta-toned stone pattern for the designated pedestrian zone and a lighter grey sandstone pattern for the shared vehicular lane creating a legible spatial hierarchy without physical barriers. The colour coding, which draws on the distinctive architectural palette of the Walled City to maintain heritage visual character, communicates the pedestrian zone boundary to both vehicle drivers and vendors without requiring permanent physical separation (Environmental Planning Collaborative, 2019).

Modular Vendor Pitches within the Carriageway Margin: The recovered 1.0- to 1.5-metre strip on each side of the shared carriageway was formally designated as a vending margin and subdivided into standardised vendor pitches of 1.2 metres by 1.8 metres. Existing vendors in permanent locations were offered first right to a formal pitch at their current position; temporary and mobile vendors were allocated pitches through the Town Vending Committee lottery system. Each pitch was demarcated on the ground with flush brass pins set into the pavement — an understated but effective method of fixing vendor boundaries without any above-ground infrastructure that would visually encumber the heritage streetscape.

Temporal Management for Market Activities: The multi-temporal character of Manek Chowk vegetable morning, jewellery afternoon, food evening was formalised through a daily temporal zoning schedule endorsed by the TVC. Each time period was assigned a specific set of approved vendor categories, operating zone widths (vegetable and food vendors require wider pitches and trolley access; jewellery vendors require narrower fixed display tables), and service access windows for supply deliveries. This temporal management converted what had been a chaotic and conflict-prone sequence of overlapping uses into a managed succession that maintained minimum pedestrian clearance throughout the day (Mahadevia et al., 2014).

Heritage-Integrated Vendor Furniture: In recognition of the UNESCO World Heritage designation context, the AMC commissioned a set of standardised vendor furniture canopy frames, display tables, and cart structures designed in local timber and traditional craft-patterned metal screens that referenced the havelis and pols of the Walled City's architectural vocabulary. The furniture was provided on a subsidised lease basis to vendors who surrendered their informal temporary structures. Beyond the aesthetic improvement, the standardised furniture created the same governance legibility benefit noted in Chapter 5 of this thesis: a vendor operating a registered, standardised structure within a demarcated pitch is an auditable, governable participant in the formal street management system, not an unrecorded encroachment.

Institutional Process: The Town Vending Committee and Community Participation

The AMC's implementation process for the Manek Chowk redesign is notable for the degree to which it involved both vendors and residential community representatives at every stage, from design brief preparation through post-implementation compliance monitoring. The Ahmedabad TVC, constituted under the Street Vendors Act 2014, was active and representative a condition that contrasts with many Indian cities where TVCs exist on paper but have never been operationally constituted. The TVC's involvement in negotiating the pitch allocation system, the temporal management schedule, and the vendor furniture design produced a degree of community ownership over the redesigned street that

significantly reduced the compliance enforcement burden on AMC's regulatory staff (Indian Institute of Management Ahmedabad, 2013).

The participatory design process documented by the Environmental Planning Collaborative (2019) followed four phases: (1) baseline mapping of all existing vendors formal and informal to establish the spatial inventory that design needed to accommodate; (2) co-design workshops in which vendors, pedestrians, residents, and AMC engineers jointly developed the pitch allocation scheme and temporal zoning rules; (3) a pilot implementation on a 150-metre section that allowed refinement before citywide rollout; and (4) a six-month post-implementation monitoring period during which the TVC held weekly compliance meetings to identify and resolve conflicts before they became entrenched patterns. This four-phase implementation methodology is directly reflected in the Bhopal I-RoW proposals in Chapter 5.

Quantified Outcomes

Table 3.2: Quantified outcomes of Ahmedabad Heritage Street Programme, Manek Chowk–Teen Darwaza corridor Source: Environmental Planning Collaborative, 2019; Mahadevia et al., 2014; AMC record).

Outcome Metric	Pre-Intervention (2015)	Post-Intervention (2020)
Pedestrian clear RoW (minimum)	0.5–0.8 m (Teen Darwaza)	1.8 m (enforced)
PLOS classification (evening peak)	PLOS F	PLOS C/D
Vendors with formal pitch allocation	< 30% (AMC records)	78%
Drainage-related complaint incidents	Seasonal flooding: annual	Negligible (covered drains)
Pedestrian-vehicle accidents (3-yr rolling)	18 recorded incidents	6 recorded incidents
Heritage visitation (annual)	~4.2 lakh (AMC 2015)	~7.8 lakh (AMC 2020)
Vendor income change (TVC survey)	Baseline	+12–16% (EPC 2019)

Lessons Applicable to SA-1, Chowk Bazar, Bhopal

The Ahmedabad case is the single most directly transferable precedent for Chowk Bazar. The morphological parallels are precise: same six-metre total RoW range, same open drainage channels consuming 1.5 metres on each side, same heritage institutional context (Jama Masjid at Chowk Bazar; Jama Masjid, Bhadra Fort, and UNESCO inscription context at Ahmedabad), same PLOS F performance during peak commercial hours, and same history of ineffective eviction cycles.

The primary lesson is the sequence: cover drains first. The Ahmedabad experience demonstrates that the drain coverage intervention is a prerequisite rather than a supplement to any other street redesigning action. Before covered drains, no other surface treatment can be applied, and no vendor pitch can be demarcated because the surface geometry is discontinuous and level unstable. After covering drains, a continuous 3.0-metre working surface becomes available for the shared street design, vendor pitch demarcation, and coloured paver surface treatment. The Chapter 5 Chowk Bazar proposal adopts this sequencing, with covered RCC drains as Phase 1 and all subsequent interventions dependent on the clear surface it creates.

The second lesson is the power of standardised furniture within a heritage aesthetic. The Ahmedabad approach of commissioning contextually designed vendor furniture that references the local architectural vocabulary rather than imposing generic municipal-standard metal kiosks achieved both higher vendor uptake of formalised pitches and stronger community acceptance of the redesigned street. For Chowk Bazar, where the Jama Masjid's Mughal architectural context creates strong visual character constraints, the Chapter 5 proposals specify vendor canopy and display furniture designs that reference the mosque's arched facade vocabulary in proportion and colour, drawing on the Ahmedabad precedent as both design inspiration and governance justification.

The third lesson is the active Town Vending Committee. Ahmedabad TVC's operational engagement in co-design, pitch allocation, and compliance monitoring was the institutional mechanism that gave physical interventions durability. Without TVC co-governance, physical improvements would have been re-encroached within months, as demonstrated

by the post-eviction return cycle that characterised pre-intervention conditions. Bhopal's TVC must be operationally constituted and given the same co-design mandate before physical iterventions at Chowk Bazar begin.

3.6.3 Singapore's Hawker Centre Model : From Unlicensed Street Vending to Spatially Integrated Civic Eating Infrastructure-National Environment Agency (NEA) Hawker Centre Programme, Singapore

Urban Context: Singapore's Pre-Hawker Street Vending Crisis

Singapore's contemporary hawker centre network — today comprising over 110 government-built and managed centres across the island, providing subsidised, hygienic cooked food to approximately 2.5 million people daily and recognised by UNESCO as Intangible Cultural Heritage in 2020 had its origins in a street vending crisis that bears striking structural similarities to the conditions at New Market Post Office Chauraha in Bhopal (National Environment Agency, 2019; UNESCO, 2020).

In the 1950s and 1960s, unlicensed itinerant hawkers operating mobile carts and makeshift stalls were a dominant feature of Singapore's urban landscape. By the early 1970s, an estimated 24,000 unlicensed hawkers operated across the city, generating severe pedestrian obstruction, public health hazards from uncontrolled food preparation, fire risks, and significant conflicts with formal commercial traders who paid rents and rates while competing against zero-overhead informal operators (Tan, 2011). The spatial distribution of hawker activity concentrated particularly around transit nodes, commercial intersections, and civic institutional buildings precisely the pattern observable at New Market Post Office Chauraha, where vendors cluster at the intersection of the Post Office (a civic attractor), the SBI bank (a commercial attractor), and the surrounding shopping blocks (a commercial generator of foot traffic).

The pedestrian impact of pre-hawker-centre vending in Singapore was quantified in the 1971 Urban Renewal Authority Survey, which found that unlicensed hawker activity at major intersections reduced effective pedestrian carriageway width by an average of 58 per cent — a figure comparable to the 68 per cent effective width reduction documented at New Market Post Office Chauraha in this thesis's Chapter 4 baseline audit. The combination of footpath obstruction, waste from food preparation, and the congregation of customers around mobile carts created what the 1972 government White Paper on Hawker

Management described as 'the single greatest source of pedestrian hazard and public health risk in Singapore's urban commercial districts' (Singapore Government, 1972).

The institutional failure that had allowed this condition to develop was not the absence of regulations by 1970, Singapore already had detailed street trade licensing legislation under the Control of Employment Act and the Street and Building Act. The failure was the gap between the legal framework and its spatial implementation: as in Bhopal today, legislation required licensing and designated locations, but no mechanism existed to create the physical infrastructure that licensed vendors would need to operate within a designated location. The Street Vendors Act's mandate for vending zone demarcation without the physical creation of vending infrastructure is the same logic that trapped Singapore's street trade governance in a cycle of licensing, non-compliance, and enforcement failure for two decades before the hawker centre programme broke the cycle.

Intervention: Government-Built Hawker Centres as Spatial Infrastructure

The Policy Framework: Resettlement as a Rights-Respecting Process

The Singapore Hawker Resettlement Programme, initiated in 1972 under the Environmental Public Health Act, is often mischaracterised as a forcible eviction of street vendors. The historical record is more complex and more instructive. The programme did enforce a deadline after which unlicensed street hawking became subject to prosecution — but that deadline was preceded by a five-year process of (1) registering and biometrically documenting all existing hawkers; (2) designing and building purpose-made hawker centres before expecting vendors to move; (3) allocating stalls to resettled hawkers at subsidised rents calibrated to their pre-existing location advantage; and (4) preserving each hawker's trade specialisation within the centre's stall allocation (Tan, 2011; National Environment Agency, 2019).

The sequence matters enormously and has direct relevance to the Bhopal situation: Singapore's programme did not mandate vendors to relocate to a space that did not yet exist. It built the replacement spatial infrastructure first, then offered vendors a transition. The PM SVANidhi programme in India has created a biometric identity database for street

vendors — the equivalent of Singapore's 1972 registration exercise but has not yet proceeded to the second step: building or designating the spatial infrastructure that would make relocation or formalisation viable. The Singapore precedent demonstrates that the biometric registration step is necessary but not sufficient; without the spatial infrastructure step, registration simply creates documented insecurity rather than documented security.

Physical Design: The Hawker Centre as Civic Architecture

Singapore's hawker centres are not vendor markets with a roof. They are a specific building typology designed by the Housing Development Board (HDB) and later refined by NEA in collaboration with professional architects that integrates spatial, climatic, infrastructural, and civic functions into a single structure. The design principles that distinguish the hawker centre from an ad-hoc market enclosure are directly applicable to the design of permanent vending bays within the Bhopal street cross-section (National Environment Agency, 2019):

- Standardised stall dimensions: Each hawker stall is designed to a standard 2.8-metre by 2.5-metre footprint (increased from 2.0 by 2.0 metres in first-generation centres), providing sufficient operational space for food preparation, display, and customer service while limiting the stall's demand on pedestrian circulation area. The stall dimensions are calibrated to function without any extension into the adjacent pedestrian aisle — a design discipline that directly addresses the central problem at New Market, where informal vendor stalls extend 1.2 metres onto formal footpath space.
- Dedicated customer circulation aisles: Customer seating and circulation aisles are dimensioned to a minimum of 1.8 metres between opposing table edges, ensuring unobstructed passage even during peak lunch and dinner periods. This minimum aisle width corresponds precisely to the IRC:103-2012 requirement for a functional pedestrian path on a high-density commercial street.
- Integrated waste, water, and drainage infrastructure: Each stall is connected to a shared grey water drain, a standardised waste collection system, and a cold-water supply. The infrastructure design eliminates the waste disposal and liquid runoff

that are the primary sources of surface contamination and pedestrian hazard at unmanaged street vending locations.

- Climate management through passive design: Hawker centres are designed with raised roofs, high eaves, and natural cross-ventilation to manage heat and cooking fumes without mechanical air-conditioning a passive climate strategy applicable to the vendor shelter design proposed for Bhopal's tropical climate.

The NEA's current 'new generation' hawker centre design, introduced in 2011, extended these principles to include enhanced lighting to a minimum of 300 lux across all customer areas, barrier-free accessibility with continuous level floor surfaces, ramps at all level transitions, and tactile path guidance strips from the main street entry to all stall rows the same universal design standards mandated under India's CPWD norms but absent from all three Bhopal study areas (National Environment Agency, 2019).

Governance Model: NEA Licensing, Stall Tenure, and Succession

Singapore's governance model for hawker centres is built around four principles that have maintained the system's equity and functionality across more than fifty years: standardised stall rents calibrated to income, transparent licence succession mechanisms, strict but enforced operational standards, and institutional co-management between NEA and stall-holder committees.

The rent calibration system sets stall fees on the basis of periodic tendering — stall operators bid for vacant stalls but with a safeguard that current operators have right of first refusal at the median bid price, preventing speculative takeover of established food businesses. This mechanism protects multi-generational vendor livelihoods while maintaining market discipline a balance that the Street Vendors Act 2014's concept of 'natural market' status for established vendors is intended to achieve but has not yet operationalised in most Indian cities (Ministry of Housing and Urban Affairs, 2014; Bhowmik, 2010).

The Stall-Holder Committee at each hawker centre elected annually from among the licensed operators is responsible for managing cleaning rosters, co-ordinating with NEA

on maintenance, adjudicating disputes between operators, and reporting compliance issues. This stall-holder governance layer is functionally identical to the Town Vending Committee model mandated by the Street Vendors Act 2014 and proposed for operational activation in the Bhopal governance framework in Chapter 5 of this thesis. The Singapore precedent demonstrates that vendor self-governance is not merely a participation aspiration; it is an operationally essential mechanism that reduces institutional management costs and builds vendor community ownership of the shared space.

Quantified Outcomes National Scale

Table 3.3: Quantified outcomes of Singapore Hawker Centre Programme
Source:National Environment Agency, 2019; Tan, 2011; UNESCO, 2020.

Outcome Metric	Pre-Programme (1971)	Post-Programme (2020)
Licensed hawker centres	0 (no dedicated centres)	110+ centres
Registered hawker stalls	0 (all unlicensed)	14,000+ licensed stalls
Unlicensed street hawking	~24,000 operators (1971 URA)	< 100 (NEA 2020)
Effective footpath obstruction	Average 58% reduction (1971)	< 2% (NEA monitoring)
Food hygiene incidents at hawker nodes	347/year (MOH 1972)	< 50/year (MOH 2019)
UNESCO Cultural Heritage status	N/A	Inscribed 2020

Lessons Applicable to SA-3, New Market Post Office Chauraha, Bhopal

The Singapore case study is the most institutionally instructive precedent for New Market Post Office Chauraha, even though Singapore's development context differs substantially from Bhopal's in terms of governance capacity, fiscal resources, and urban scale. The transferable lessons lie not in the scale of the Singapore programme but in the sequence and principles of its governance architecture.

The primary lesson is to build the spatial infrastructure before mandating compliance. New Market's footpath condition degrades because vendors have nowhere else to go. The

roundabout plaza redesign proposed in Chapter 5 which creates formally designed, permanently constructed vending bays within the intersection's pedestrian margins — is the spatial infrastructure equivalent of Singapore's hawker centre construction: it creates the place that makes compliance possible, rather than demanding compliance in the absence of any alternative. The PM SVANidhi biometric registration of Bhopal's vendors has already created the administrative registry; the Chapter 5 proposal completes the sequence by providing the physical infrastructure to which the registry can be spatially tied.

The second lesson is the stall dimension discipline. Singapore's standardised 2.8-metre by 2.5-metre stall footprint designed to eliminate any extension into the adjacent pedestrian aisle provides a direct precedent for the 1.2-metre by 1.8-metre modular vending pitch dimensions adopted in the Chapter 5 proposals. The dimension is not arbitrary; it is calibrated to the minimum display area a vendor needs to operate commercially viable while the outer edge of the pitch coincides with the kerb of the formal footpath, maintaining the full 1.5-metre unobstructed pedestrian clearance required by IRC:103-2012. Singapore's fifty years of operational experience confirm that vendors will accept these dimensional constraints when the pitch is formally secured and the surrounding pedestrian environment is physically well-maintained.

The third lesson is the stall-holder committee as a cost-sharing governance mechanism. The NEA model demonstrates that if municipal authorities provide the physical infrastructure and the licensing framework, vendor self-governance can manage the day-to-day operational challenges cleaning, dispute resolution, compliance with operating hours without ongoing intensive municipal enforcement. The Chapter 5 governance matrix, which assigns the Bhopal TVC responsibility for daily compliance monitoring and the BMC responsibility for licensing and infrastructure maintenance, reflects this division of functions directly.

The fourth lesson concerns the economic benefit of spatial security. Singapore's post-resettlement vendor income data consistently showed increases of 15 to 25 per cent in the years following hawker centre relocation, primarily because secured tenure eliminated the

revenue disruption caused by eviction drives and because better physical infrastructure (drainage, utilities, lighting) extended viable trading hours. The parallel for New Market is clear: vendors on the Post Office Chauraha who currently lose revenue during monsoon-flooded footpath conditions and during periodic municipal clearing operations would gain comparable economic stability from a formally secured, weather-protected pitch within the redesigned roundabout plaza.

3.7 Comparative Synthesis: Cross-Case Lessons and Applicability to Bhopal

3.7.1 The Four Transferable Principles Across All Three Case Studies

Reading the three case studies comparatively reveals four principles that appear consistently across contexts as different as Bangkok's elevated expressway governance, Ahmedabad's Walled City heritage redesign, and Singapore's national hawker centre programme. These principles provide the theoretical and empirical foundation for the Integrated Right-of-Way framework proposed in Chapter 5 of this thesis:

Principle 1 Spatial Infrastructure Must Precede Governance Enforcement

In all three cases, the precondition for successful vending governance was not a stronger enforcement mechanism but a better spatial offer: designated, demarcated, physically designed space that vendors could occupy within the rules. Bangkok's column-bay vending units, Ahmedabad's formally demarcated pitches, and Singapore's hawker stalls all created a physical framework that made compliance viable. In none of the three cases did enforcement-first approaches succeeded; in all three cases, infrastructure-first approaches did. This principle is the primary argument for the Chapter 5 proposals' investment in physical design infrastructure — covered drains, coloured pavers, modular vendor pitches, transit gateway bays, roundabout plaza redesign as the foundation of governance rather than as a supplement to it.

Principle 2 The Jurisdiction Boundary Must Be Negotiated Before Spatial Design Can Proceed

All three cases encountered jurisdictional fragmentation as the initial governance obstacle: BMA and EXAT in Bangkok; AMC, HRIDAY funding authority, and heritage designation authorities in Ahmedabad; Housing Development Board, Urban Renewal Authority, and Ministry of Health in Singapore. In each case, a formal inter-agency agreement or protocol the BMA-EXAT MOU, the HRIDAY application brief that bridged heritage and vending mandates, the HDB-led inter-ministry coordination in Singapore was the enabling act that made spatial intervention possible. For Bhopal, the parallel requirement is a formal working protocol between BMC, BSCDCL, and NMRC-B, without which the most thoughtful physical design will be undermined by competing administrative claims over street space.

Principle 3 Temporal Management Multiplies the Productive Use of Limited Space

Bangkok's three-tier licensing system by time window, Ahmedabad's daily temporal zoning for Manek Chowk's morning-afternoon-evening use succession, and Singapore's lunch/dinner peak management protocols in hawker centres all demonstrate that small rights-of-way can support multiple complementary uses when temporal zoning is applied as a planning tool. For Bhopal's constrained study areas — particularly the 6.0-metre RoW at Chowk Bazar and the 10-metre service lane at Rani Kamlapati — temporal management is not a peripheral refinement but a core design strategy that allows the same physical space to deliver peak pedestrian clearance and peak commercial activity in overlapping rather than conflicting time windows.

Principle 4 Vendor Self-Governance Is an Operational Necessity, Not an Aspiration

The Bangkok Vendor Area Committees, the Ahmedabad Town Vending Committee co-design and compliance monitoring role, and the Singapore Hawker Centre Stall-Holder Committees all demonstrate that the daily management of shared vendor-pedestrian space is beyond the capacity of municipal enforcement departments operating alone. In all three cases, vendor self-governance when given formal authority and accountability reduced compliance costs, increased vendor uptake of formalised conditions, and sustained physical standards over time. India's Street Vendors Act 2014 already mandates this mechanism through the Town Vending Committee; the operational activation of Bhopal's TVC with

specific co-design and compliance monitoring mandates is thus not an innovation imported from international precedent, but a fulfilment of domestic legal obligation validated by international experience.

Comparative Summary Table

Table 1: 3.4 Comparative summary of three case studies and their applicability to Bhopal study areas.

Dimension	Bangkok (CS1)	Ahmedabad (CS2)	Singapore (CS3)	Bhopal Application
Morphological parallel	Rani Kamlapati (SA-2)	Chowk Bazar (SA-1)	New Market (SA-3)	All three SAs
Primary design lever	Column-bay under flyover	Covered drains + shared surface	Hawker centre civic building	Context-specific per SA
Governance mechanism	BMA-EXAT MOU + TVC	AMC-TVC co-design	NEA + stall-holder committee	BMC-NMRC-B MOU + TVC
Temporal management	3-tier licence by hours	Morning/afternoon/evening zones	Lunch-dinner peak protocols	Morning/evening split per SA
Pedestrian RoW restored	2.0 m enforced spine	1.8 m PLOS C/D	1.8 m aisle (IRC standard)	1.5–2.0 m per SA target
Vendor income change	+18–22%	+12–16%	+15–25%	Target: +10–15%

CHAPTER 4

DATA ANALYSIS

4.1 Quantitative Infrastructure Performance and PLOS Auditing

The operational efficiency of pilot corridors selected for this study was assessed by subjecting raw spatial dimensions and empirical traffic counts compiled during systematic baseline inventories to standardized engineering capacity metrics. Drawing on structural frameworks established by the Highway Capacity Manual (Transportation Research Board, 2000) and IRC:103-2012 guidelines (Indian Roads Congress, 2012), the Pedestrian Level of Service (PLOS) was mathematically determined through cross-evaluation of directional flow rates, instantaneous pedestrian density, and functional cross-sectional width. Quantitative auditing provides the evidentiary foundation upon which the planning baseline for each study corridor is constructed.

Study Area 1, situated within the historic Chowk Bazar precinct, recorded a peak evening volume of 723 pedestrians channelled through a severely constrained 6.0-metre total right-of-way (RoW) that is entirely devoid of designated footpaths. Under these conditions, available spatial allocation per pedestrian falls below 0.75 m² per person, mathematically yielding an absolute PLOS F classification (Indian Roads Congress, 2012). At this performance threshold, movement is structurally restricted, involuntary physical contact becomes unavoidable, and continuous pedestrian–vehicular friction constitutes the default condition rather than an exceptional occurrence. The street corridor has effectively ceased to function as a shared public thoroughfare and instead operates as a contested spatial residual.

Study Area 2, along Rani Kamlapati Road, presents a contrasting analytical challenge. The wide 40-metre arterial cross-section generates a deceptively favourable PLOS B grade when the entire right-of-way is evaluated uniformly against an aggregate pedestrian share of approximately 3 to 4 percent. Isolating the 10-metre service lane the functional walking environment for most transit users exposes a localized performance collapse to PLOS D. This pronounced discrepancy reveals a fundamental design disconnect wherein high-speed vehicular volumes systematically overwhelm

unpaved carriageway margins (Bhopal Municipal Corporation, 2019), rendering the theoretical pedestrian capacity of the main arterial virtually meaningless for those who must actually traverse it on foot.

At New Market Post Office Chauraha (Study Area 3), formal 2.5-metre sidewalks were originally designed to sustain walkway capacity within acceptable operational limits. However, systematic empirical auditing during evening peak periods confirms a performance deterioration to PLOS E. This degradation is principally attributable to a compounding reduction in effective pathway width arising from the combined spatial claims of informal commercial extensions and multi-row on-street vehicle storage, both of which progressively encroach upon the designated pedestrian envelope (Gehl, 2010).

Taken collectively, these site-level diagnostics affirm that a significant performance gap exists between the design intent embedded in formal municipal engineering specifications and the operational reality experienced by pedestrians navigating Bhopal's diverse street typologies. Each corridor fails not through structural deficiency alone but through the cumulative spatial impact of unmanaged informal occupation and planning oversights that have accumulated over successive municipal administrations (Bhopal Municipal Corporation, 2019).

4.1.1 Mathematical Performance Metrics and Site Calculations

The analytical transitions from raw peak-hour counts to final PLOS classifications adhere rigorously to empirical formulations codified under national engineering standards. This sub-section presents the governing mathematical framework followed by precise site-specific calculations for each of the three study corridors, enabling direct comparison across contrasting urban typologies.

Core Mathematical Formulations

The primary computational variable is the Pedestrian Unit Flow Rate (v), which measures the number of pedestrians passing a reference cross-section per unit time per unit effective walkway width (Transportation Research Board, 2000). The governing equation is expressed as:

$$v = P \div (T \times W_eff)$$

Where:

v = Pedestrian unit flow rate (pedestrians per minute per metre)

P = Peak pedestrian volume within the designated survey interval (pedestrians)

T = Analysis time duration (minutes)

W_eff = Effective functional width of the pedestrian pathway (metres)

The Effective Width (W_eff) is calculated by deducting the cumulative spatial claims of physical obstructions and informal encroachments from the gross right-of-way dimension (Indian Roads Congress, 2012):

$$W_eff = W_total - (W_vending + W_parking + W_encroachment)$$

Once the unit flow rate is established, the Pedestrian Space (S)—which directly governs physical comfort levels and crowding indices—is derived through the relationship between average human walking speed and pedestrian unit flow rate. An average walking speed (S_w) of 60 metres per minute has been adopted in accordance with observed pedestrian behaviour under high-friction mixed-traffic urban conditions:

$$S = S_w \div v$$

Where:

S = Pedestrian space (m^2 per pedestrian)

S_w = Pedestrian walking speed (metres per minute)

v = Pedestrian unit flow rate (pedestrians per minute per metre)

These formulations collectively constitute the computational backbone through which each corridor's PLOS classification is determined and validated against threshold indices established within IRC:103-2012 and HCM 2000. The following site-specific calculations apply these equations directly to primary fieldwork data.

Site-Specific Diagnostic Calculations

Application of the above engineering formulations to primary fieldwork data collected during the peak evening session (17:30–18:30 hrs) produces the following precise site metrics:

Case A: Study Area 1 Chowk Bazar Peak Evening Session

Raw Field Inputs:

Peak 15-minute summed interval volume (P) = 723 pedestrians

Analysis time (T) = 15 minutes

Total local street right-of-way (W_total) = 6.0 metres

Measured Obstruction Values:

Encroached open drain zones = 3.0 metres (1.5 m × 2 sides)

Static shop display extensions and informal vendor setups = 1.5 metres

Irrational vehicle parking blocks = 1.0 metre

Effective Width Calculation:

$$W_eff = 6.0\ m - (3.0\ m + 1.5\ m + 1.0\ m) = 0.5\ metres$$

Pedestrian Unit Flow Rate:

$$v = 723 \div (15 \times 0.5) = 723 \div 7.5 = 96.4\ pedestrians/min/m$$

Pedestrian Space:

$$S = 60 \div 96.4 = 0.62\ m^2\ per\ pedestrian$$

Diagnostic Inference: According to IRC:103-2012 threshold indices, any pedestrian space value declining below 0.5 m² per pedestrian indicates a total walkway system breakdown (Indian Roads Congress, 2012). Although the calculated value of 0.62 m² per pedestrian marginally exceeds this absolute lower boundary, the corridor is nonetheless classified as PLOS F. At this spatial allocation, walking velocities are severely constrained, directional crossing movements are structurally obstructed, and users are compelled into continuous physical conflict with both adjacent pedestrians and encroaching vehicular traffic. The street has effectively ceased to function as a shared public thoroughfare (Gehl, 2010).

Case B: Study Area 3 New Market Post Office Chauraha Peak Evening Session

Raw Field Inputs:

Peak 15-minute volume (P) = 195 pedestrians

Analysis time (T) = 15 minutes

Designed sidewalk width (W_total) = 2.5 metres

Measured Obstruction Values:

Sidewalk fruit and flower vendor overflow = 1.2 metres

Broken paving sections and universal design compliance gaps = 0.5 metres

Effective Width Calculation:

$$W_eff = 2.5\ m - (1.2\ m + 0.5\ m) = 0.8\ metres$$

Pedestrian Unit Flow Rate:

$$v = 195 \div (15 \times 0.8) = 195 \div 12 = 16.25\ pedestrians/min/m$$

Pedestrian Space:

$$S = 60 \div 16.25 = 3.69\ m^2\ per\ pedestrian$$

Diagnostic Inference: The calculated effective spatial allocation of 3.69 m² per pedestrian theoretically places this corridor within the mid-range performance bands of the IRC:103-2012 rating scale (Indian Roads Congress, 2012). However, this spatially averaged figure does not

capture the qualitative operational deterioration generated at the intersection node. The heavy concentration of intermediate public transport (IPT) vehicles and multi-row parking blocks within the roundabout geometry reduces junction clearance and imposes active pedestrian–vehicle conflict. This structural friction yields a localised PLOS E classification specifically at the Post Office Chauraha conflict hotspot, demonstrating that averaged calculations can systematically conceal critical nodal deficiencies (Gehl, 2010).

Case C: Study Area 2 Rani Kamlapati Road Peak Evening Session

Raw Field Inputs:

Peak 15-minute summed interval volume (P) = 80 pedestrians

Analysis time (T) = 15 minutes

Total service lane right-of-way (W_total) = 10.0 metres

Measured Obstruction Values:

Unpaved road shoulder accumulation = 2.0 metres

Parked auto-rickshaws and informal IPT rows = 3.5 metres

Mobile street food vendor carts clustered at station frontage = 2.0 metres

Effective Width Calculation:

$$W_eff = 10.0\ m - (2.0\ m + 3.5\ m + 2.0\ m) = 2.5\ metres$$

Pedestrian Unit Flow Rate:

$$v = 80 \div (15 \times 2.5) = 80 \div 37.5 = 2.13\ pedestrians/min/m$$

Pedestrian Space:

$$S = 60 \div 2.13 = 28.16\ m^2\ per\ pedestrian$$

Diagnostic Inference: Under the strict quantitative thresholds of the Highway Capacity Manual, a calculated pedestrian space exceeding 5.6 m² per pedestrian classifies an infrastructure asset as PLOS A or PLOS B, indicating a free-flowing operational environment unconstrained by volume-

driven congestion (Transportation Research Board, 2000). Yet this mathematically superior rating constitutes what this thesis identifies as the Binary Planning Flaw: the elevated score does not reflect high-quality street design but chronic pedestrian exclusion. The arterial cross-section allocates 80 to 81 percent of carriageway space to motorized vehicles, suppressing rather than accommodating pedestrian activity. The 4 percent of active transit users who must walk along this corridor do so without continuous sidewalk infrastructure, protective buffers, or safe crossing facilities, exposing them to extreme ambient safety stress (Mehta, 2013). Consequently, while the corridor achieves PLOS A–B by quantitative standards, its experiential quality for actual users deteriorates to an equivalent of PLOS D (Gehl, 2010).

4.2 The Perception-Capacity Divergence: The Binary Planning Flaw

A central analytical contribution of this research is the documentation of an extreme and systematic divergence between calculated engineering capacity ratings and the subjective pedestrian experience reported through primary user perception surveys. This divergence termed the Binary Planning Flaw reveals a fundamental inadequacy in conventional transport planning methodology, which habitually relies on aggregate PLOS scores to validate street clearance and design interventions (Cervero & Kockelman, 1997).

The prevailing planning paradigm in Indian municipal practice has historically operated on a reductive binary framework: street vendors are classified either as flow bottlenecks that must be cleared or as structural encroachments that must be evicted. This vehicle-centric interpretive lens ignores the layered socio-spatial functions that informal commerce performs within the urban public realm (National Institute of Urban Affairs, 2016). Cross-examining fieldwork data against the Public Space Experiential Quality Index (PSEQI) a composite qualitative metric developed for this study systematically challenges this one-dimensional perspective and exposes the inadequacy of purely geometric measures of walkability.

In Chowk Bazar, the physical street environment registers a mathematically deficient PLOS F grade. Yet user perception surveys reveal unexpectedly high scores for localised ambiance, spatial vibrancy, and perceived informal safety. Pedestrians navigating this corridor consistently report that the dense, unbroken arrangement of textile and cloth vendors generates vital natural

surveillance and informal social monitoring operationalising the principles of urban vitality articulated through the concept of 'eyes on the street' (Jacobs, 1961). The cognitive security provided by this constant informal surveillance partially compensates for the physical friction of an under-designed street, producing a dissonant outcome wherein objectively dangerous spaces are subjectively experienced as socially familiar and relatively secure.

This finding aligns with established scholarship on the psychological dimensions of urban walkability, which recognises that perceived safety is governed not solely by street dimensions or traffic volumes but by the density and continuity of active human occupation along the pedestrian pathway (Mehta, 2013). A narrow, vendor-lined street populated by dozens of traders and shoppers may be empirically rated PLOS F while being experientially perceived as far safer than a geometrically superior but socially barren corridor.

The inverse relationship emerges with clarity at Rani Kamlapati Road, where the wide arterial cross-section generates a mathematically superior PLOS B rating along the main right-of-way yet simultaneously records the lowest Perceived Safety Index scores among all survey respondents. Pedestrians describe acute ambient stress, physical vulnerability, and spatial isolation arising from the combination of high vehicular speeds, extended sightlines dominated by motorized traffic, and the complete absence of protective design elements such as buffer plantings, raised crossings, or pedestrian-scale lighting (Gehl, 2010). This qualitative collapse exposes the central failure of quantitative-only PLOS assessment: streets can achieve technical adequacy while systematically failing their users.

The empirical evidence presented here builds upon foundational work establishing that walkability depends on the orchestration of density, diversity, and design rather than any single geometric parameter (Cervero & Kockelman, 1997). Walkability cannot be engineered through width standards alone; it emerges from the qualitative composition of street life, microclimatic comfort, edge definition, and spatial predictability. The formal street design interventions proposed in Chapter 5 of this thesis directly address both dimensions of this performance gap, targeting simultaneous improvements in quantitative PLOS classification and qualitative user experience ratings.

4.3 Spatial Friction and Mapping Micro-Encroachment Hotspots

Precisely isolating the physical locations where formal street design breaks down under informal use requires mapping the spatial distribution of vendors directly against physical layout constraints and master plan zoning profiles of each corridor. A critical observation emerging from systematic field mapping is that informal traders do not distribute themselves arbitrarily across the available urban envelope. Rather, they respond to economic rationality by gravitating toward high-visibility commercial frontages and clustering tightly around intersection nodes, transit access points, and primary public activity generators (National Institute of Urban Affairs, 2016).

To model the spatial vulnerability of the organic old city core, the physical street pattern of Study Area 1 must be interpreted against its underlying zoning envelope and land-use mosaic. The Chowk Bazar Baseline Land-Use Map (Figure 4.1) documents an intense mixed-use commercial concentration flanked by dense organic residential fabric wrapping tightly around the central heritage mosque node. This intensity of overlapping structural uses generates a complex spatial dynamic in which pedestrian flows, vehicle movements, commercial activities, and cultural uses compete simultaneously for an extremely limited and historically fixed right-of-way envelope (Bhopal Municipal Corporation, 2019).

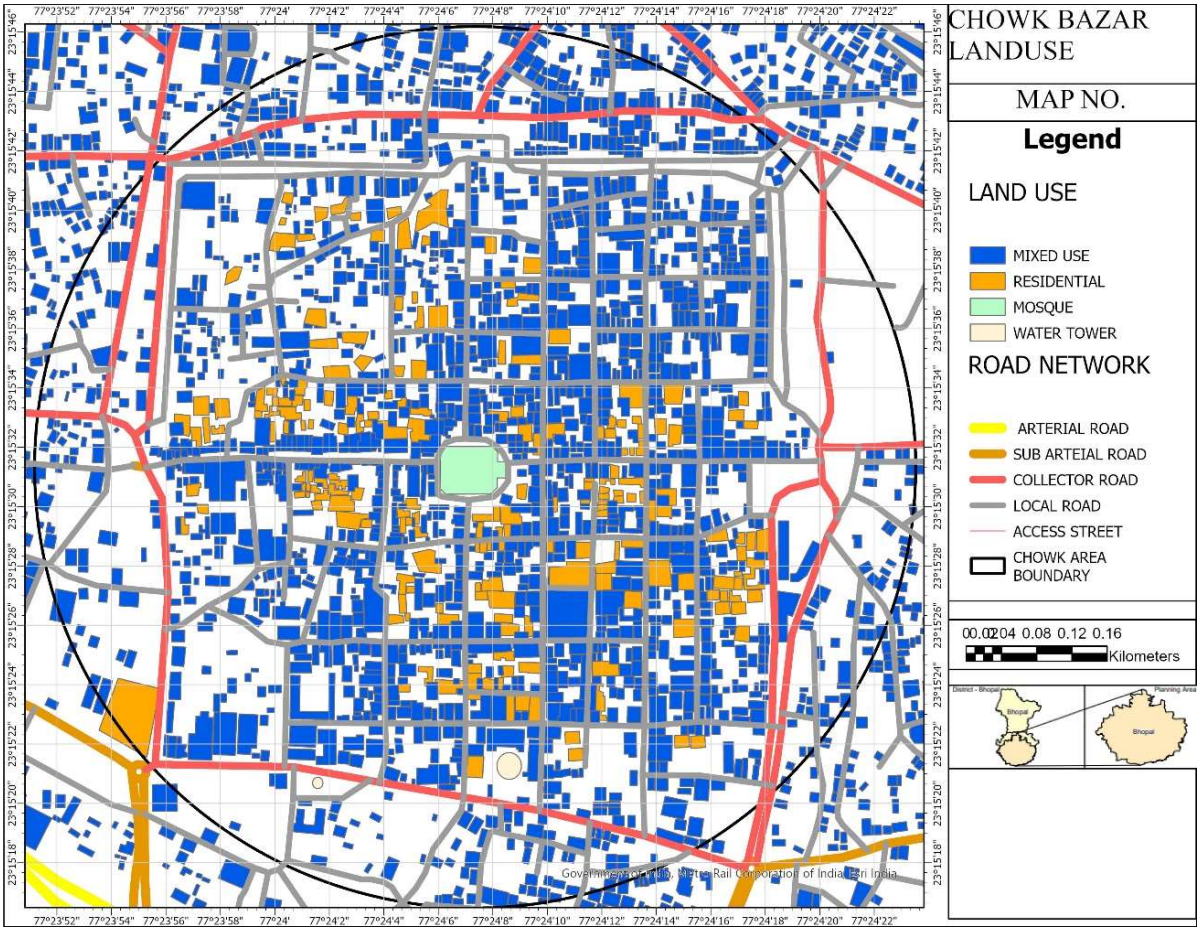


Figure 4.1: Chowk Bazar Baseline Land-Use Map, source: Author

Cross-referencing Figure 4.1 against the Chowk Bazar Road Network and Street Vendor Location Map (Figure 4.2) reveals that primary socio-spatial friction is not generated by any single user group acting in isolation. Rather, it arises from the overlapping spatial claims of three distinct and mutually reinforcing conflict generators: static shop extensions that consume the pedestrian margin, fluid mobile vendor chokepoints that displace into the driving lane, and irrational parking placement that fragments remaining shared space. Together these three forces reduce the nominal 6.0-metre right-of-way to an effective shared strip of less than 1.0 metre during peak commercial hours.

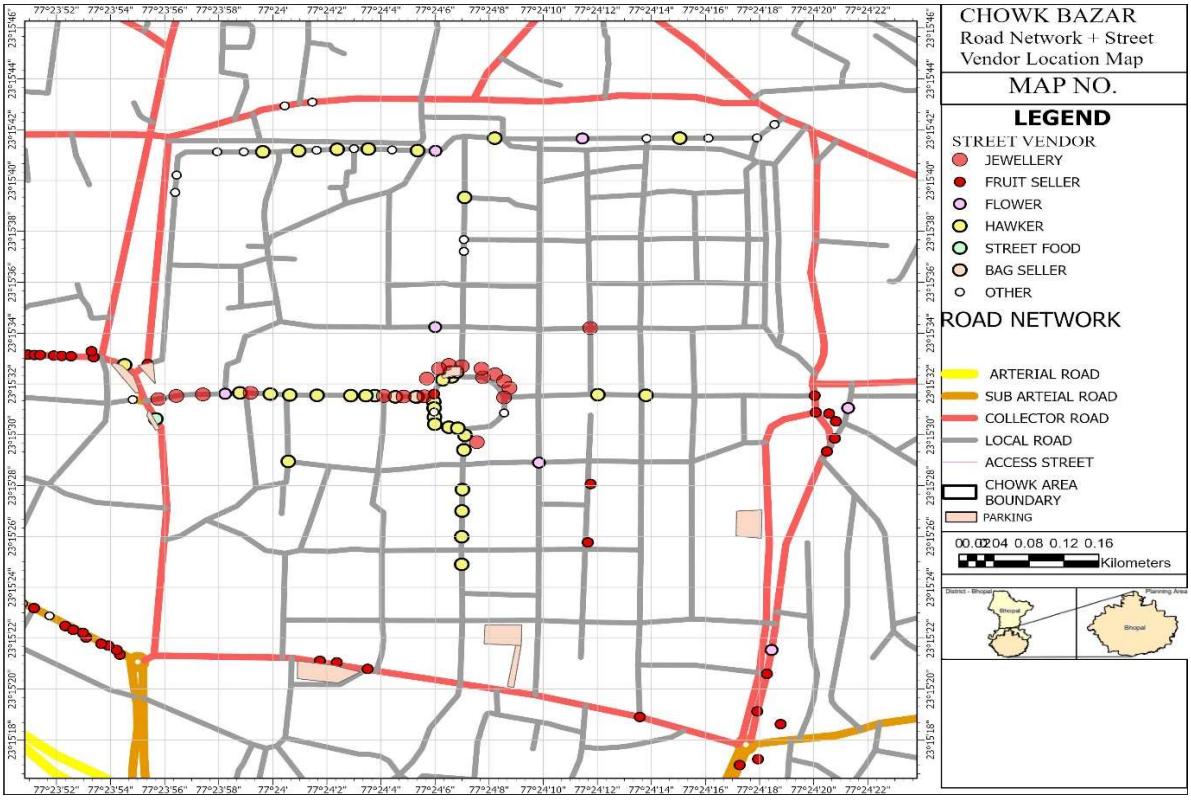


Figure 4.2: Chowk Bazar Road Network and Street Vendor Location Map, source: Author

The micro-economic logic driving vendor clustering in Chowk Bazar is further documented in the Chowk Bazar Shop Type Distribution Ribbon Map (Figure 4.3). Cloth and textile shops, constituting the dominant commercial typology in this precinct, operate without defined building setbacks, extending display arrangements directly onto unpaved margins. This static encroachment progressively displaces mobile fruit and jewellery hawkers outward toward the centre of the local road. The combined effect of static display encroachment and dynamic mobile vending creates layered spatial conflict directly adjacent to irregularly parked two-wheelers, further compressing the effective shared driving lane during peak hours (National Institute of Urban Affairs, 2016).

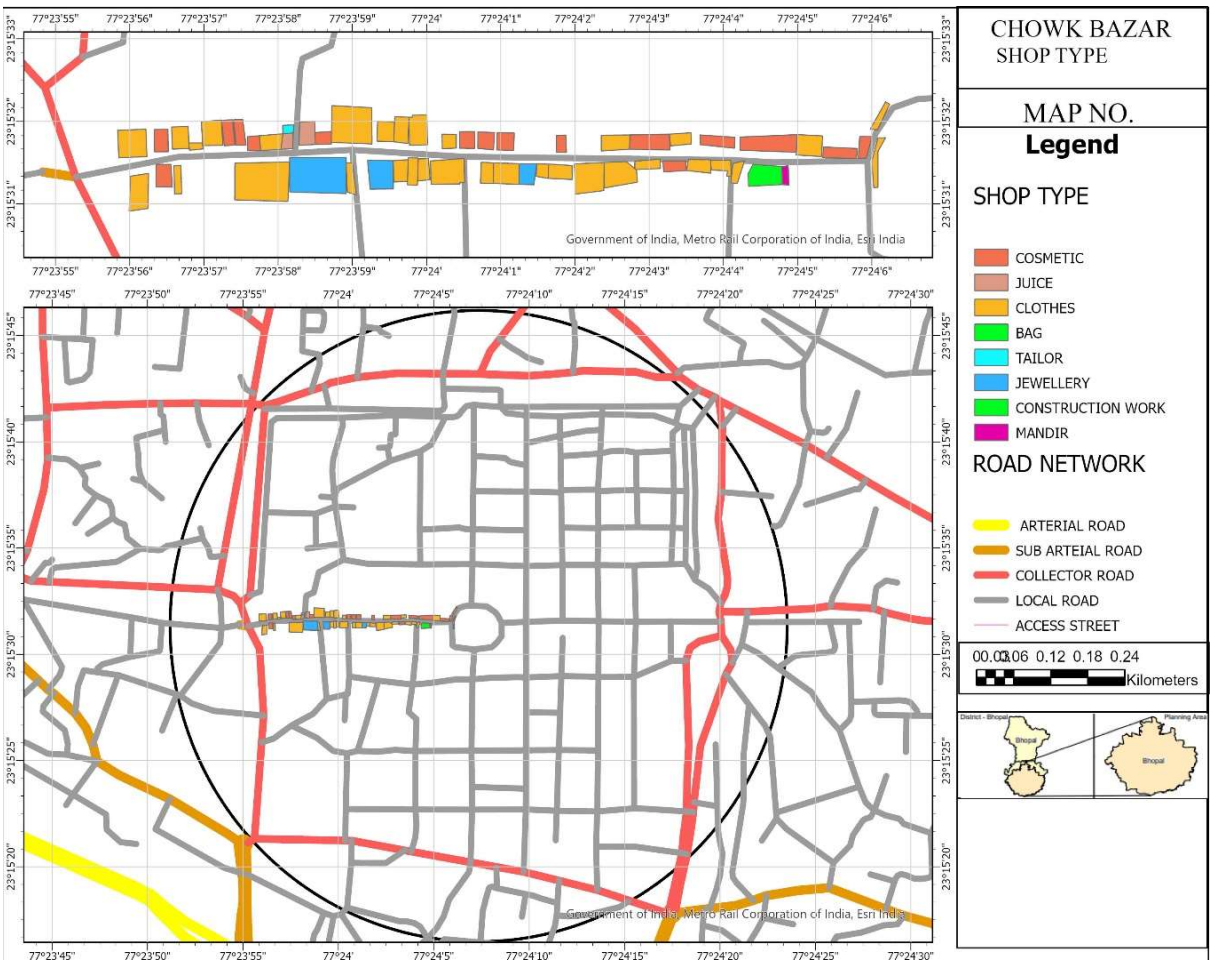


Figure 4.3: Chowk Bazar Shop Type Distribution Ribbon Map, source: Author

Moving from the organic street network of the old city core to the city's primary transportation axis requires a fundamental analytical shift. The Rani Kamlapati Station Sector Land-Use Map (Figure 4.4) documents a corridor defined by large commercial blocks running parallel to the arterial highway and regional railway infrastructure. Unlike the historic precinct, where informal commerce occupies an already congested street form, the transit corridor's spatial challenges originate in deliberate planning omission: the master plan allocated generous right-of-way to vehicular movement while making no provision for pedestrian facilities or informal commerce integration (Bhopal Smart City Development Corporation, 2021).

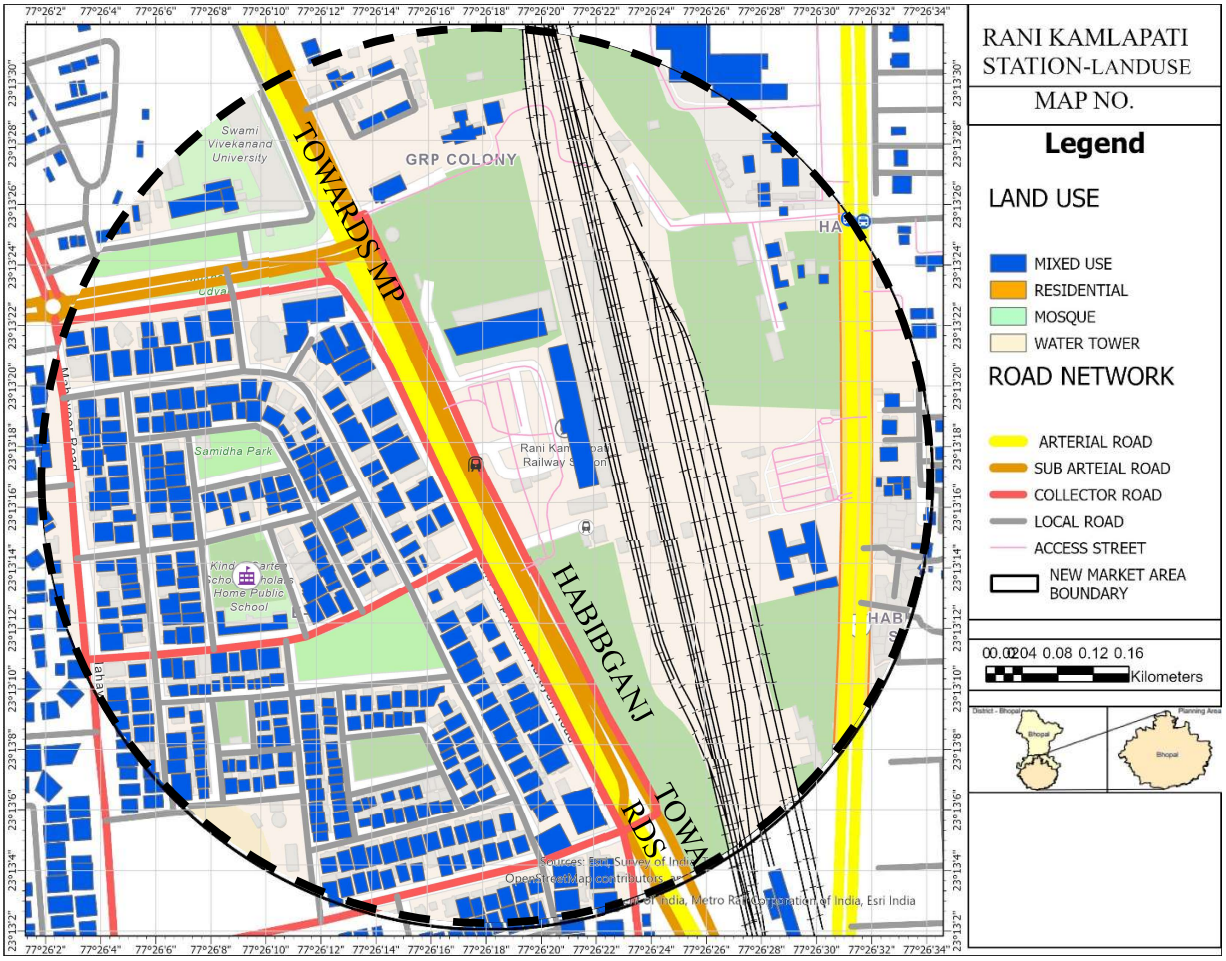


Figure 4.4: Rani Kamlapati Station Sector Land-Use Map, source: Author

The street vendor spatial distribution pattern along this transit corridor is captured in the Rani Kamlapati Road Network and Street Vendor Location Map (Figure 4.5). Mobile street food vendors cluster densely at sub-arterial station entrance nodes, occupying active service margins beneath elevated metro columns. Because no formal sidewalk infrastructure exists, these mobile carts park directly in the path of transit pedestrians, overlapping with idling autorickshaws and creating a severe sequential bottleneck that forces arriving and departing transit users into direct competition for minimal available space (Pucher et al., 2007).

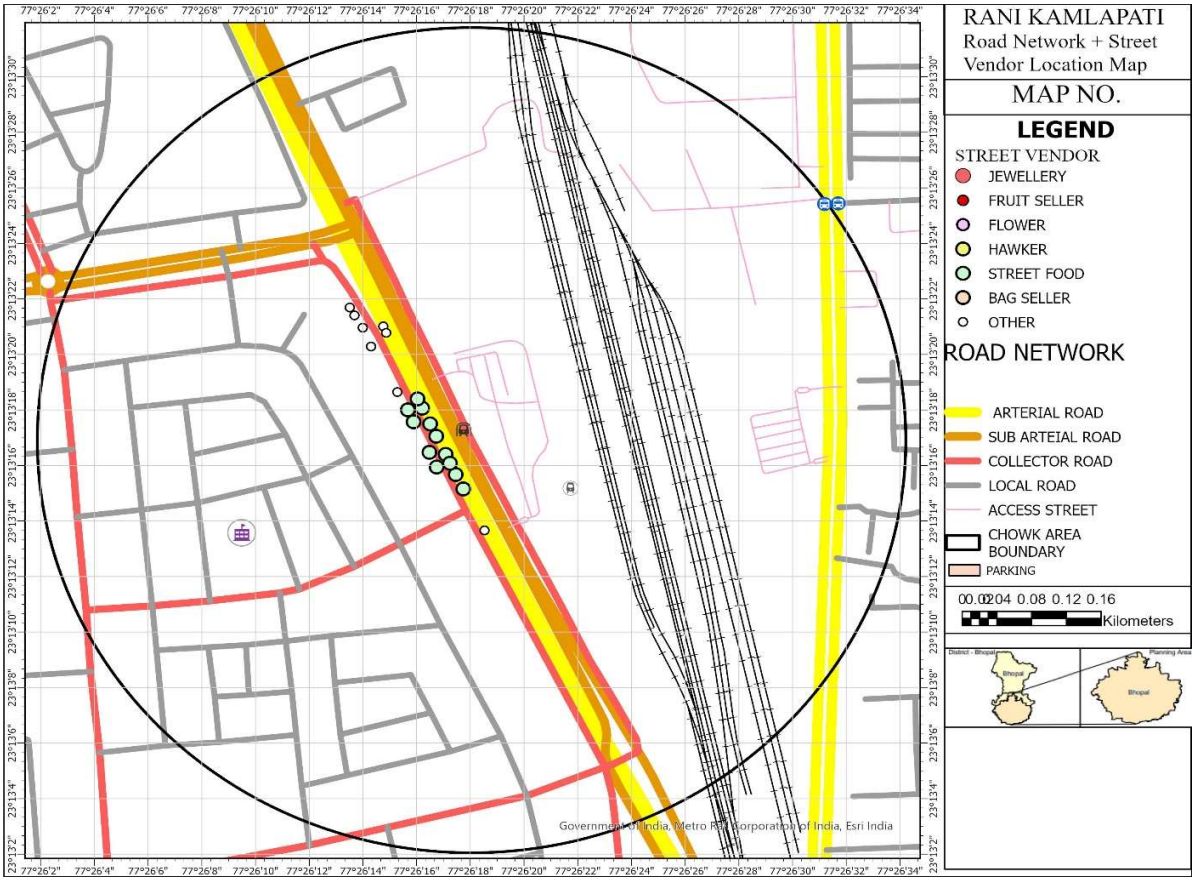


Figure 4.5: Rani Kamlapati Road Network and Street Vendor Location Map, source: Author

The third study area presents a distinct variant of institutional spatial friction. The New Market Post Office Chauraha Land-Use Map (Figure 4.6) reveals a planned commercial node anchored by major public institutional buildings the Central Post Office and State Bank of India which generate continuous, dense multi-user footfalls throughout the operational day. This concentration of institutional attractors within a formally planned commercial grid creates predictable pedestrian demand that the existing spatial design is structurally unprepared to absorb (Talen, 2011).

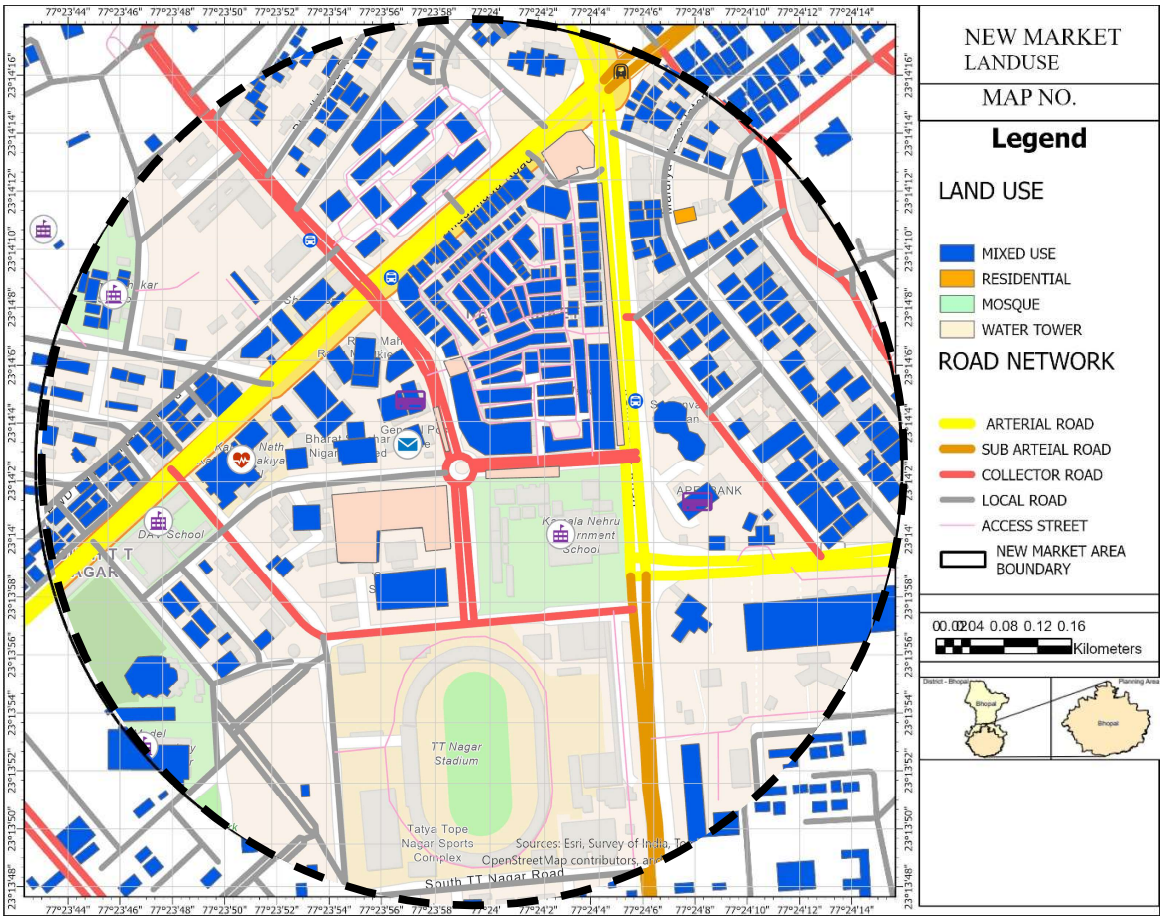


Figure 4.6: New Market Post Office Chauraha Land-Use Map, source: Author

The operational failure of this planned commercial environment under informal pressure is documented in the New Market Road Network and Street Vendor Location Map (Figure 4.7). Clothing hawkers and fruit sellers occupy the intersection margins surrounding the Central Post Office and State Bank of India, combining with multi-row on-street parking to systematically block pedestrian sightlines and restrict the rotary capacity of the roundabout node. The pattern demonstrates that even purpose-built commercial layouts fail to sustain adequate pedestrian performance when initial master plan designs completely omit spatial allocation for informal livelihoods (Ministry of Housing and Urban Affairs, 2014).

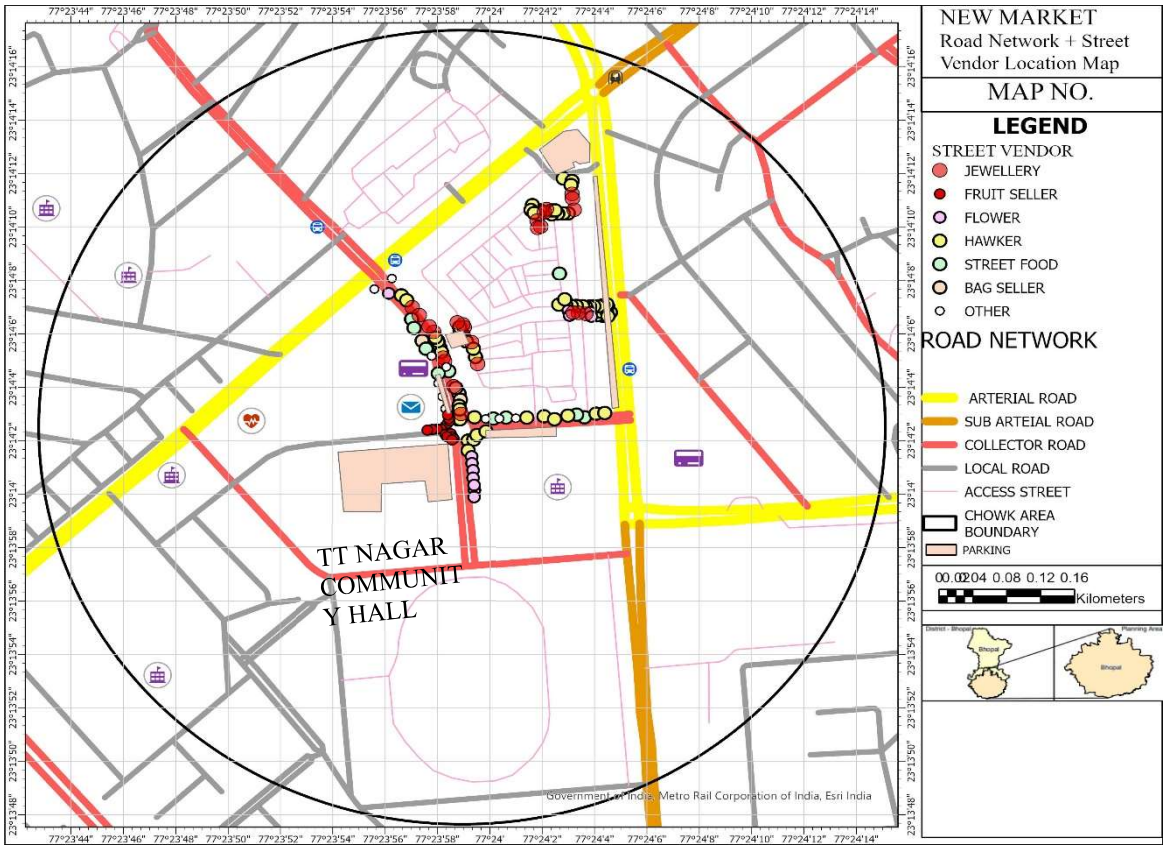


Figure 4.7: New Market Road Network and Street Vendor Location Map, source: Author

4.4 Temporal Variations and Conflict Intensity Indexing

The socio-spatial friction characterising Bhopal's street network is not a static condition but a highly dynamic phenomenon that fluctuates in direct response to temporal rhythms, modal shifts, and cultural activity cycles distributed across the urban day. A comparative analysis of traffic volume counts (TVC) across morning, afternoon, and evening survey sessions reveals a consistent and predictable relationship between peak travel periods and heightened pedestrian vulnerability (Bhopal Municipal Corporation, 2019).

In Chowk Bazar, the evening session generates a dramatic 723-pedestrian surge representing a 4.7-fold expansion relative to the morning baseline count. This volumetric escalation coincides precisely with the convergence of three independent demand generators: peak commercial trading hours, evening religious congregation cycles at the central mosque, and the return of residents from formal employment. The physical street space cannot expand dynamically to accommodate this

temporal surge, and consequently the Pedestrian-Vehicle Conflict Intensity Index reaches its maximum recorded value during evening market hours. The corridor effectively transforms into a high-risk shared zone during these periods, with conflict events occurring at a frequency and severity that far exceeds the tolerance thresholds defined under any formal pedestrian safety standard.

Temporal analysis of Chowk Bazar's modal composition reveals an important disaggregation: motorized two-wheelers maintain a relatively consistent 58 to 62 percent modal share across morning and afternoon sessions. However, the evening period introduces a structural transformation in which pedestrian volumes surge while vehicular modal share remains static, creating an acute volumetric imbalance. This mismatch between expanding pedestrian demand and fixed vehicular spatial allocation constitutes the primary mechanism through which PLOS F conditions emerge during peak hours.

At the Rani Kamlapati transit gateway, temporal patterns reflect the dominance of the arterial's primary function as a motorized corridor rather than a pedestrian environment. Private motorized two-wheelers maintain a persistently dominant modal share of 63 to 64 percent across all observed survey sessions, while e-rickshaws and auto-rickshaws capture a consistent 10 percent share within service lane margins. This vehicular dominance produces a remarkably stable temporal profile: the extreme pedestrian deprivation experienced along this corridor is not a peak-hour phenomenon but a continuous, structural condition arising from the fundamental geometry of the cross-section (Pucher et al., 2007).

The residual pedestrian modal share of 3 to 4 percent at Rani Kamlapati Road is not evidence of low absolute pedestrian demand but a direct behavioural consequence of hostile physical conditions. Survey data indicate that a significant proportion of transit users who arrive at the station by public transport choose to wait at the station exit rather than navigate the service lane, reflecting a rational spatial avoidance response to infrastructure that actively prioritises vehicular through-movement over pedestrian accessibility (UN-Habitat, 2013).

New Market Post Office Chauraha exhibits a distinctive and analytically significant temporal shift pattern. Private two-wheelers expand from a 43 percent morning share to a dominant 60 percent evening share, while IPT modes comprising e-rickshaws at 9 to 17 percent and cycle rickshaws at

4 to 6 percent converge heavily around the intersection roundabout during the evening commercial peak. This convergence of private vehicles, shared transport, and overflowing pavement stalls creates a compound congestion event in which motorized traffic, informal commerce, and pedestrian activity simultaneously compete for a fixed and insufficient spatial allocation (Madhya Pradesh Town and Country Planning Department, 2017).

These temporal findings carry significant planning implications. Street design interventions cannot be optimized against average daily conditions; they must be calibrated against peak-hour demand profiles and the specific modal composition that defines each corridor's most critical operational period. The proposals presented in Chapter 5 explicitly adopt peak-hour performance targets as the primary design benchmark rather than treating average daily traffic as the governing planning parameter.

4.5 Consolidated Inferences and Planning Baselines

The multi-layered integration of spatial mapping, qualitative survey analysis, quantitative PLOS assessment, and temporal conflict indexing across three contrasting study corridors yields three consolidating analytical inferences that collectively constitute the diagnostic baseline informing the planning proposals advanced in this thesis.

The first inference addresses the Spatial Translation Gap a profound institutional vacuum persisting between the progressive social rights framework established by central legislation and the technical design standards applied at the municipal engineering level. The Street Vendors Act 2014 formally recognises the right of informal traders to access public space for their livelihoods and mandates the creation of designated vending zones through Town Vending Committees (Ministry of Housing and Urban Affairs, 2014). However, statutory law grants abstract livelihood entitlements without translating them into concrete physical parameters or cross-sectional spatial allocations within the right-of-way geometry regulated by engineering codes. The result is a systematic planning failure in which formal rights are acknowledged in policy but remain unimplemented in-built form, producing the unmanaged spatial chaos observed across all three study corridors.

The second inference documents Universal Design Deprivation as a structural characteristic of Tier-II city street environments rather than an isolated deficiency. Systematic observation across all three pilot corridors confirms the near-total omission of continuous tactile paving systems, standardised kerb cuts at grade transitions, and universal design-compliant ramp geometries. This universal failure of accessible infrastructure disproportionately affects the most vulnerable road user categories children navigating independently, elderly pedestrians with limited mobility, and persons with physical disabilities all of whom are effectively excluded from safe and independent street participation by the absence of basic accessibility provisions (Srinivas, 2020). The magnitude of this deprivation, replicated without exception across corridors of different scales and planning vintages, confirms that it reflects a systemic planning priority rather than resource limitations alone.

The third inference establishes the Geometry Reconstruction Mandate as the organising design principle for the interventions proposed in the following chapter. Field analysis conclusively demonstrates that pavement conflict management cannot be achieved through punitive vendor eviction campaigns or ad-hoc spatial rearrangement, both of which have been repeatedly attempted by municipal authorities and repeatedly reversed by the socioeconomic pressures driving informal commerce into street space. Because pedestrians and informal vendors hold coequal claims to the public realm one grounded in mobility rights, the other in livelihood rights city authorities must physically restructure the cross-sectional geometry of the right-of-way to formally accommodate both claims within a coherent spatial framework (Jacobs, 1961); (Gehl, 2010). This reconstruction mandate transitions municipal design practice from reactive conflict management to proactive spatial co-production, integrating informal commerce as a recognised and dimensioned element of the street cross-section.

Together, these three inferences provide the analytical foundation and the design brief for the context-sensitive, site-specific planning proposals developed and evaluated in Chapter 5. The spatial zoning frameworks, geometric cross-section restructuring, universal design standardization measures, and governance integration strategies proposed in the following chapter are directly calibrated to address the specific failure modes identified through the diagnostic analysis presented in this chapter.

CHAPTER 5

PROPOSAL

5.1 Strategic Vision and Spatial Zoning Framework

The empirical data analysis and quantitative performance auditing executed across the preceding chapters establish with clarity that resolving the spatial conflicts between pedestrian mobility networks and informal pavement commerce requires a fundamental shift in municipal planning philosophy and design methodology. Conventional town planning practice in Tier-II Indian cities has historically treated street vendors as temporary obstructions or illegal encroachments requiring absolute eviction rather than as active participants in the social and economic ecology of public space (National Institute of Urban Affairs, 2016).

This thesis advances an integrated street design framework that transitions from punitive exclusion to structural co-production, formally recognising informal street traders as active architectural design parameters that contribute vital social vibrancy, passive public surveillance, and economic resilience to the public realm (Jacobs, 1961); (Gehl, 2010). The framework is grounded in the recognition that pedestrian movement and informal commerce are not inherently incompatible urban functions but rather two interdependent systems that have been forced into conflict by decades of planning that allocated street space exclusively to motorized vehicles.

To systematically operationalize this vision within the street right-of-way (RoW), a comprehensive spatial zoning matrix is established that defines where and under what structural rules vending activity may take place. This framework creates three clear regulatory designations calibrated to road width, traffic velocity, and cross-sectional carrying capacity, providing a clear legal and spatial basis for informal commerce integration across Bhopal's diverse street typologies (Bhopal Municipal Corporation, 2019).

No-Vending Zones: To safeguard vehicle sightlines and protect high-speed pedestrian transfer efficiency at critical urban nodes, a strict no-vending buffer is mandated within a 50-metre radius around all major intersections, rapid transit station entry points, and the primary access gates of regional landmarks including the historic central mosque. This spatial exclusion is not punitive but

protective: it reserves precisely those locations where the convergence of vehicular turning movements, pedestrian crossing flows, and emergency access requirements makes any permanent commercial obstruction genuinely hazardous. The regulatory perimeter of these exclusion zones across the organic old city network is mapped in the Chowk Bazar Vending, No-Vending, and Restricted Zones Map (Figure 5.1).

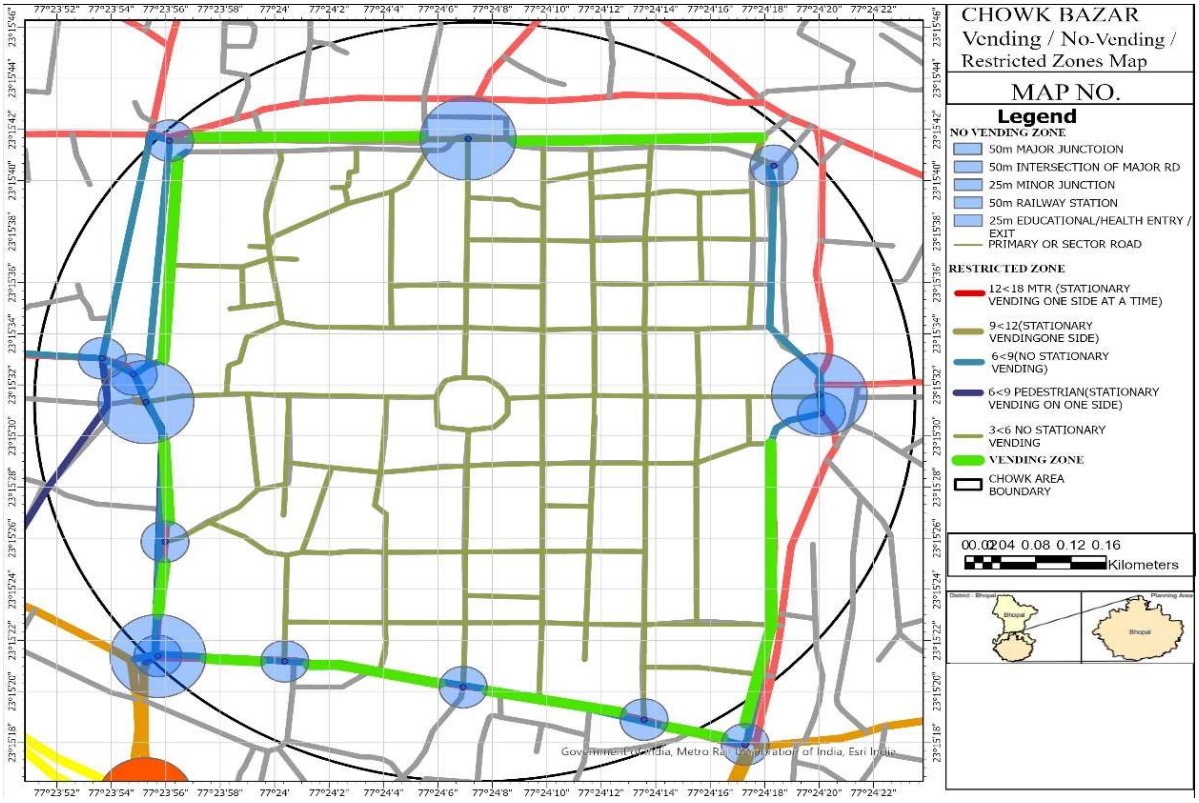


Figure 5.1: Chowk Bazar Vending, No-Vending, and Restricted Zones Map, source: Author

Restricted Vending Zones: Applied predominantly along urban collector streets with a total RoW ranging between 12 and 18 metres, this designation permits stationary vending activity on one side of the street corridor only. Vending is managed through strict temporal regulations aligned with local morning and evening commercial peak hours, providing a structured mechanism to safely balance economic access with smooth vehicular circulation. This regulatory approach reflects the phased temporal zoning strategies recommended for mixed-use corridors in South Asian cities (Srinivas, 2020). The application of this mechanism across the arterial transit framework is illustrated in the Rani Kamlapati Road Vending, No-Vending, and Restricted Zones Map (Figure 5.2).

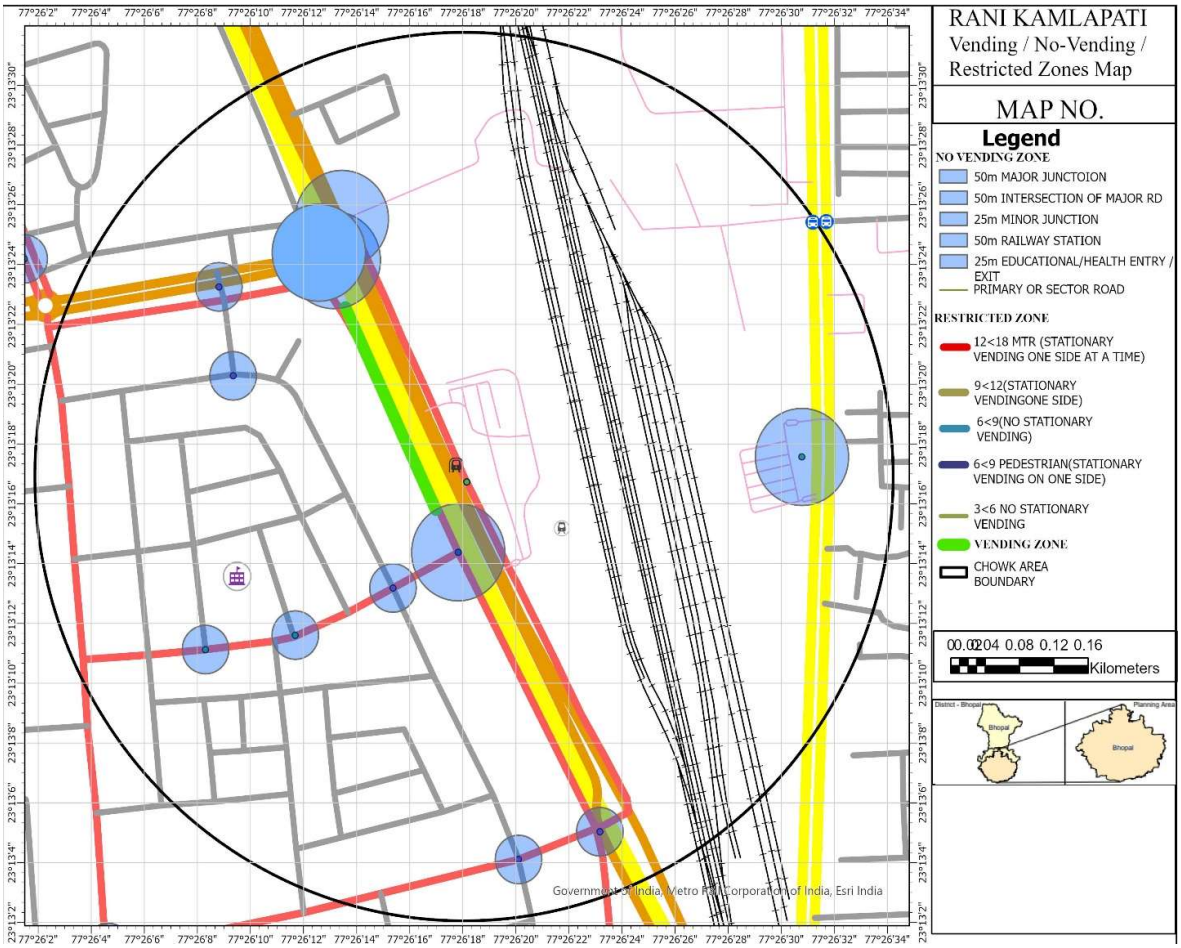


Figure 5.2: Rani Kamlapati Road Vending, No-Vending, and Restricted Zones Map, source: Author

Restriction-Free Vending Zones: Integrated into major street cross-sections with a total RoW exceeding 18 metres, this designation establishes dedicated, permanently constructed vending bays embedded directly within the street layout, incorporating informal retail as a structurally defined element of the public realm. Rather than treating vendors as spatial afterthoughts, Restriction-Free Zones assign them fixed, dimensioned positions within the cross-sectional geometry of the right-of-way, ensuring that their spatial claims are formally accommodated rather than competed for (Ministry of Housing and Urban Affairs, 2014). The statutory zoning guidelines for the planned commercial hub at New Market are detailed in the New Market P.O. Chauraha Vending, No-Vending, and Restricted Zones Map (Figure 5.3).

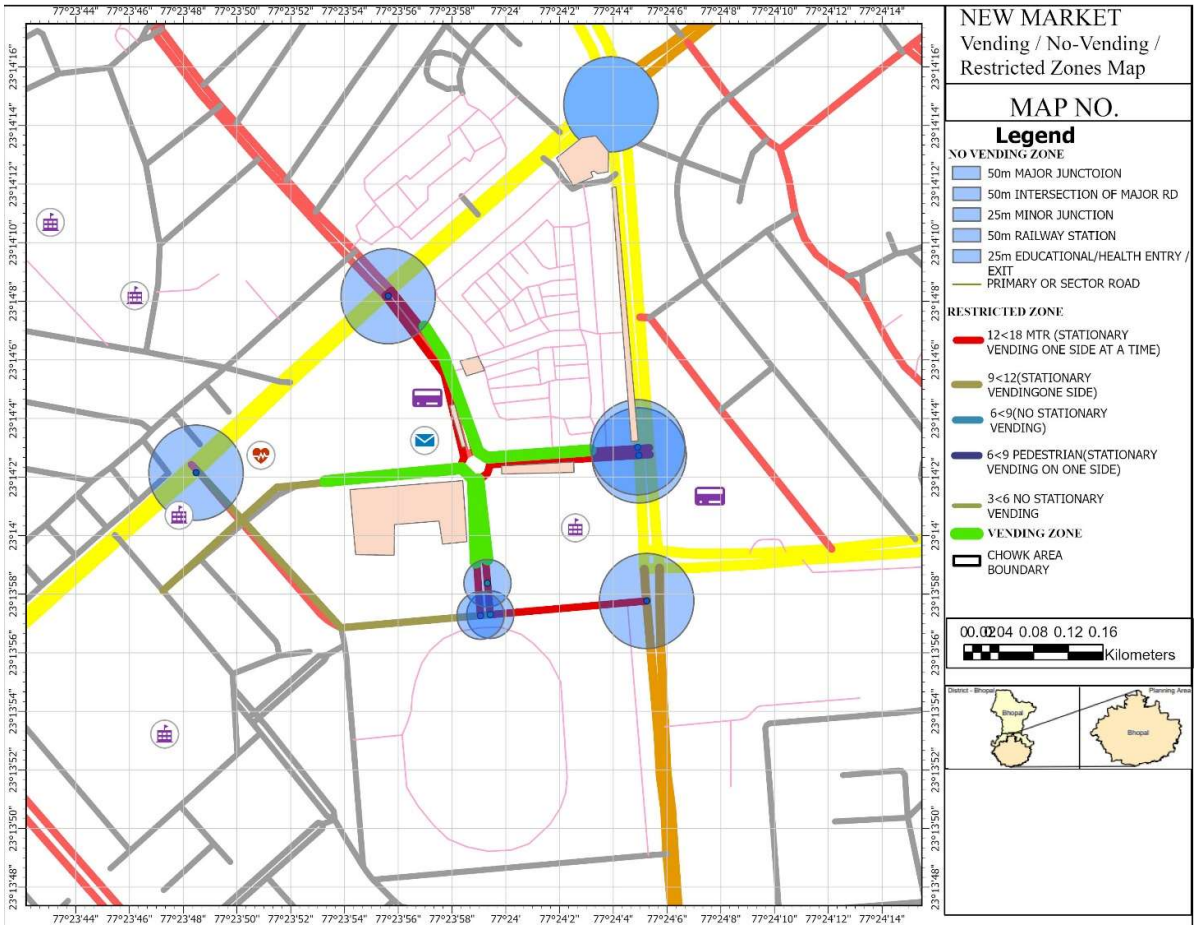


Figure 5.3: New Market P.O. Chauraha Vending, No-Vending, and Restricted Zones Map, source: Author

Together, these three regulatory tiers form a coherent spatial governance system that is scalable across Bhopal's complete street hierarchy. By assigning each street segment a clear vending classification based on measurable physical and operational parameters, the framework eliminates the administrative ambiguity that has historically made informal commerce regulation both inconsistent and contested (Bhopal Municipal Corporation, 2019).

5.2 Context-Sensitive Pilot Interventions and Concept Sections

Because spatial character and traffic profiles vary significantly across the three selected pilot sites, the planning proposals deliberately abandon uniform templates in favour of context-sensitive, site-

specific geometric reconstructions. Each site proposal is calibrated to the unique spatial vulnerabilities and operational failure modes identified through the primary site audits documented in Chapter 4. This approach reflects the 'complete streets' design philosophy advocated across contemporary pedestrian planning literature, wherein each street is designed in response to its specific user population, land-use context, and mobility function rather than standardised against a single national template (Gehl, 2010).

5.2.1 Study Area 1 Chowk Bazar: The Shared Street Model

In the high-density historic core of Chowk Bazar, the extremely constrained 6.0-metre right-of-way demands a complete spatial transformation to eliminate the severe physical friction identified through baseline auditing. The proposal introduces a human-centred Shared Street layout that structurally prioritises active walkers and non-motorised movement while managing local traffic speeds through geometric design rather than signage alone (Mehta, 2013).

The primary engineering intervention replaces the 1.5-metre open drainage channels running along both edges of the street with pre-cast reinforced cement concrete (RCC) covered box drains. This modification achieves a critical dual outcome: it eliminates the ambient health hazard posed by exposed wastewater channels and simultaneously widens the functional walking envelope by converting unsafe open infrastructure into a continuous, load-bearing pavement foundation. The net gain of 3.0 metres of usable pedestrian surface1.5 metres on each sideconstitutes the single most impactful geometric improvement achievable within the existing right-of-way without land acquisition.

Concurrently, the vertical hazard generated by tangled overhead service wires is resolved by relocating all electrical, communication, and data lines into a consolidated underground utility tunnel running beneath the new pavement surface. This undergrounding operation eliminates fire risks from overloaded aerial cables, improves the visual quality of the street corridor, and removes the physical barrier that tangled wire networks create for emergency vehicle access (Bhopal Smart City Development Corporation, 2021). The street surface is resurfaced using colour-coded, permeable concrete pavers that visually separate the low-speed shared vehicular driving lane from dedicated pedestrian paths, creating a legible hierarchy of movement without physical barriers.

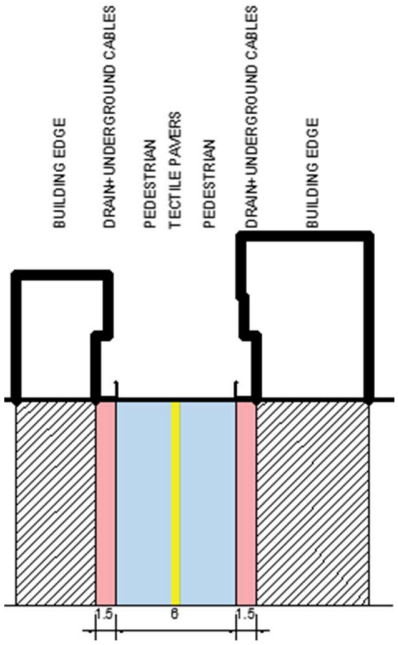


Figure 5.4: Chowk Bazar Street Cross-Section, source: Author

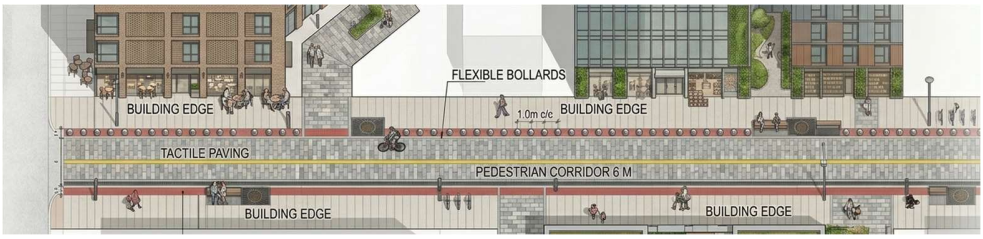


Figure 5.5: Chowk Bazar Street Proposal, source: Author



Figure 5.6: Chowk Bazar Masjid Surrounding Vendor Location, source: Author

To manage the fluid chokepoints that currently constitute the primary source of pedestrian-vehicular conflict, the proposal introduces standardised, modular vending pitches along the newly covered drain zones. These pitches organise the dominant clothing and textile trades into predictable spatial arrangements that maintain a clearly delineated, continuous movement path for pedestrians. Each vending module is dimensioned at 1.2 metres by 1.8 metres, providing sufficient commercial display area while preserving a minimum 2.0-metre clear walkway between opposing vendor rows (Indian Roads Congress, 2012). The integration of vendor structures within the cross-section geometry formally ends the condition where informal traders and pedestrians compete for the same residual strip of carriageway margin.

The Shared Street design philosophy applied here draws on the documented success of woonerfs and shared-surface schemes in European and Asian cities, adapted to the specific cultural and commercial conditions of a heritage commercial precinct in central India. Speed control is achieved through pavement texture changes, periodic raised table intersections, and the natural friction generated by active commercial frontages a passive traffic calming approach that makes speed reduction self-enforcing rather than dependent on police enforcement.

5.2.2 Study Area 2 Rani Kamlapati Road: Multi-Modal Transit Gateway Integration

The rapid infrastructural evolution of the Rani Kamlapati transit corridor demands a design intervention that directly addresses the severe pedestrian deprivation documented along its wide 40-metre right-of-way. The proposal restructures the unpaved 10-metre service lane into an integrated transit retail gateway, recognising that the co-location of informal food vendors and high transit footfalls creates a commercially and functionally productive relationship that should be designed around rather than eliminated (Pucher et al., 2007).

Rather than executing ad-hoc clearing operations that have historically displaced vendors to nearby locations without resolving the underlying spatial conflict, the design leverages the large concrete structural columns of the elevated metro rail line and flyover project as organising elements of a new spatial framework. The unallocated dead spaces directly beneath these columns areas that currently serve as informal vendor storage and autorickshaw congregation zones are converted into dedicated, structurally sheltered vending zones optimised specifically for mobile street food vendors. The column bays, each spanning approximately 8 to 10 metres, provide natural weather

protection and define individual vendor territories without requiring additional built structures (UN-Habitat, 2013).



Figure 5.7: Rani Kamlapati Station Road Existing Condition (right) and Proposed Layout (left), source: Author

Safe pedestrian circulation throughout the transit gateway is achieved through a continuous network of elevated skywalks connected directly to the metro station concourse level, paired with high-visibility surface-level tactile crossing paths across the service road carriageway. These skywalks eliminate the at-grade pedestrian-vehicle conflict that currently concentrates at the station exit points, segregating the high-volume pedestrian flow from the service lane's mixed traffic without requiring physical barriers that would disrupt the commercial activity of the restructured vending bays.

To lower ambient stress levels and substantially increase passive public safety, the design breaks up the long blank walls of the station property boundary by inserting transparent commercial active frontages along the station perimeter line. This intervention transforms a hostile transit edge characterised by blank concrete walls, unpaved shoulders, and the absence of lighting into an inviting pedestrian-scaled commercial interface that generates natural surveillance, ambient activity, and the sense of spatial enclosure that active walkers require to feel safe in high-traffic environments (Jacobs, 1961); (Mehta, 2013).

The transit gateway model proposed here is consistent with transit-oriented development principles that emphasise the spatial integration of informal economies within the immediate pedestrian catchment zone of major public transport nodes. By formally incorporating street food culture into the station's spatial identity, the design strengthens the node's role as a social and commercial hub rather than a purely functional transit interchange.

5.2.3 Study Area 3 New Market P.O. Chauraha: The Organised Commercial Retail Plaza

At the planned commercial node of New Market, the severe spatial friction occurring where informal traders and multi-row vehicle parking overlap at the Post Office Chauraha requires a comprehensive spatial restructuring of the intersection and its immediately adjoining pedestrian margins. The proposal converts the currently unmanaged intersection roundabout into an organised commercial retail plaza, recognising the intersection's function as a public gathering node rather than a purely vehicular traffic management device (Talen, 2011).

The unallocated pedestrian spaces wrapping around the central statue node are reconstructed into a series of radially arranged vending bays designed specifically for the fruit, flower, and light goods merchants who currently occupy these margins informally. These permanent, semi-covered pitches are constructed with integrated waste collection containers positioned at each bay terminus and direct drainage connection lines beneath each vending surface, eliminating the localised sanitation challenges discarded organic waste, uncontrolled liquid runoff that currently degrade both the environmental quality and the public perception of the intersection's pedestrian environment.

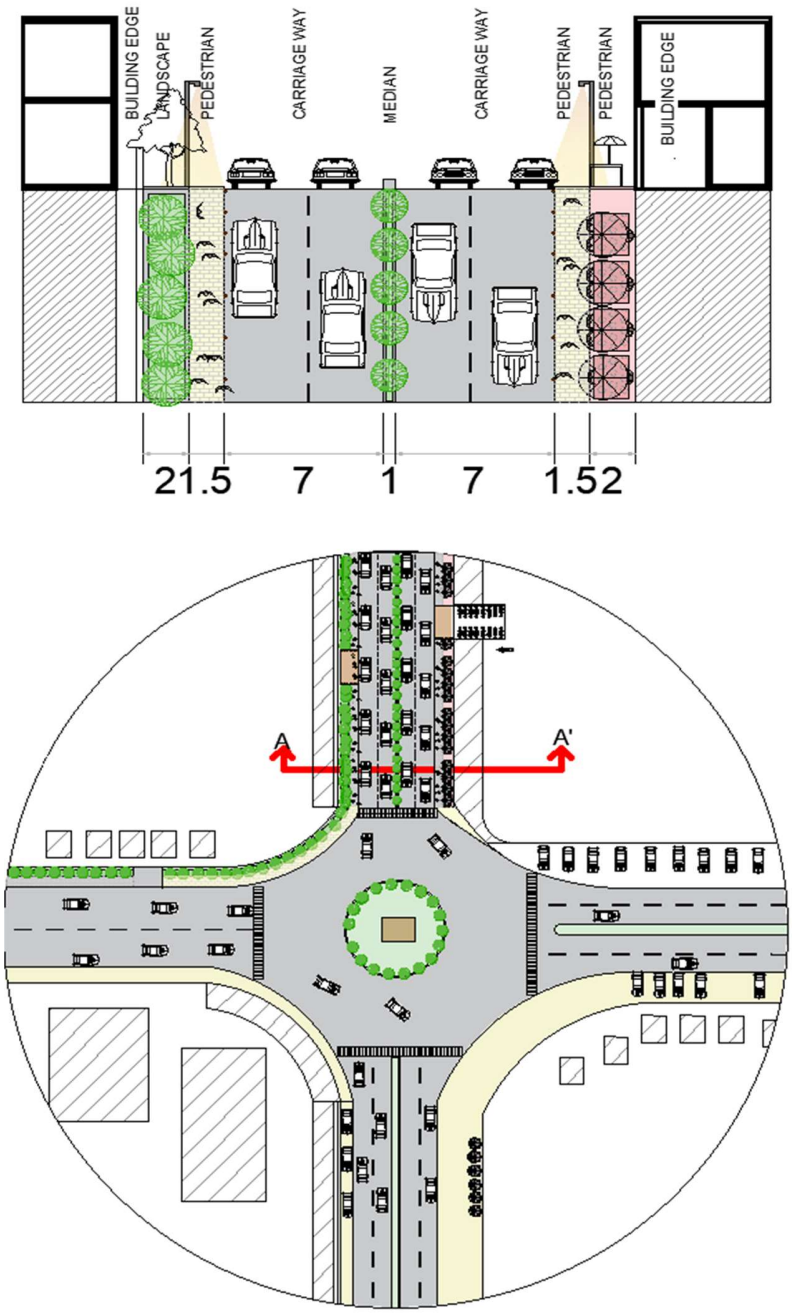


Figure 5.8: New Market Cross-Section Proposal (Above) and Chauraha Proposal Plan (Below) source: Author

The proposal enforces strict compliance with mandatory universal design dimensions across the surrounding collector streets, restoring the formal 2.5-metre pedestrian sidewalks to provide a minimum 1.5-metre continuous clear pathway free of vendor encroachment, parking spillover, and surface defects (Indian Roads Congress, 2012). This restoration is achieved not through vendor displacement but through geometric redistribution: by providing formally designed and

permanently installed vending bays within the roundabout plaza, the proposal eliminates the economic pressure that drives vendors onto sidewalk margins.

To resolve the severe traffic bottlenecks caused by irregular vehicle storage along institutional frontages, all informal parallel curb parking wrapping around the Central Post Office and State Bank of India building edges is replaced with structured, perpendicular parking zones located on a parallel service road. This reorganisation reclaims critical pedestrian sightlines across the intersection, restores roundabout circulation capacity to design levels, and eliminates the sight-blocking condition that currently makes pedestrian crossings at this junction genuinely hazardous (Transportation Research Board, 2000).

5.3 Universal Infrastructure Elements and Standardization

To provide a coherent physical language across all three pilot interventions and enable the eventual scaling of the framework to the full municipal street network, this thesis proposes the standardisation of micro-scale street furniture across municipal limits. The primary physical intervention replaces the irregular, self-built vendor structures that currently occupy street margins varying in size, material, and spatial footprint without any regulatory basis with standardised, modular mobile vending carts conforming to a strict 1.2-metre by 1.8-metre design footprint (Ministry of Housing and Urban Affairs, 2014).

Constructed from lightweight, durable recycled aluminium framing, these carts incorporate a set of features designed to make them functional, sustainable, and operationally self-sufficient. Each unit features integrated solar-powered LED canopy light fixtures providing 8 to 10 hours of autonomous operation per day, eliminating dependency on the municipal power grid and reducing vendor operating costs. Foldable, height-adjustable display shelves accommodate different merchandise typologies across the street food, fresh produce, and light goods categories. Specialised internal waste separation bins with colour-coded compartments for organic and dry waste promote localised waste management and simplify the collection workflow for municipal sanitation crews.

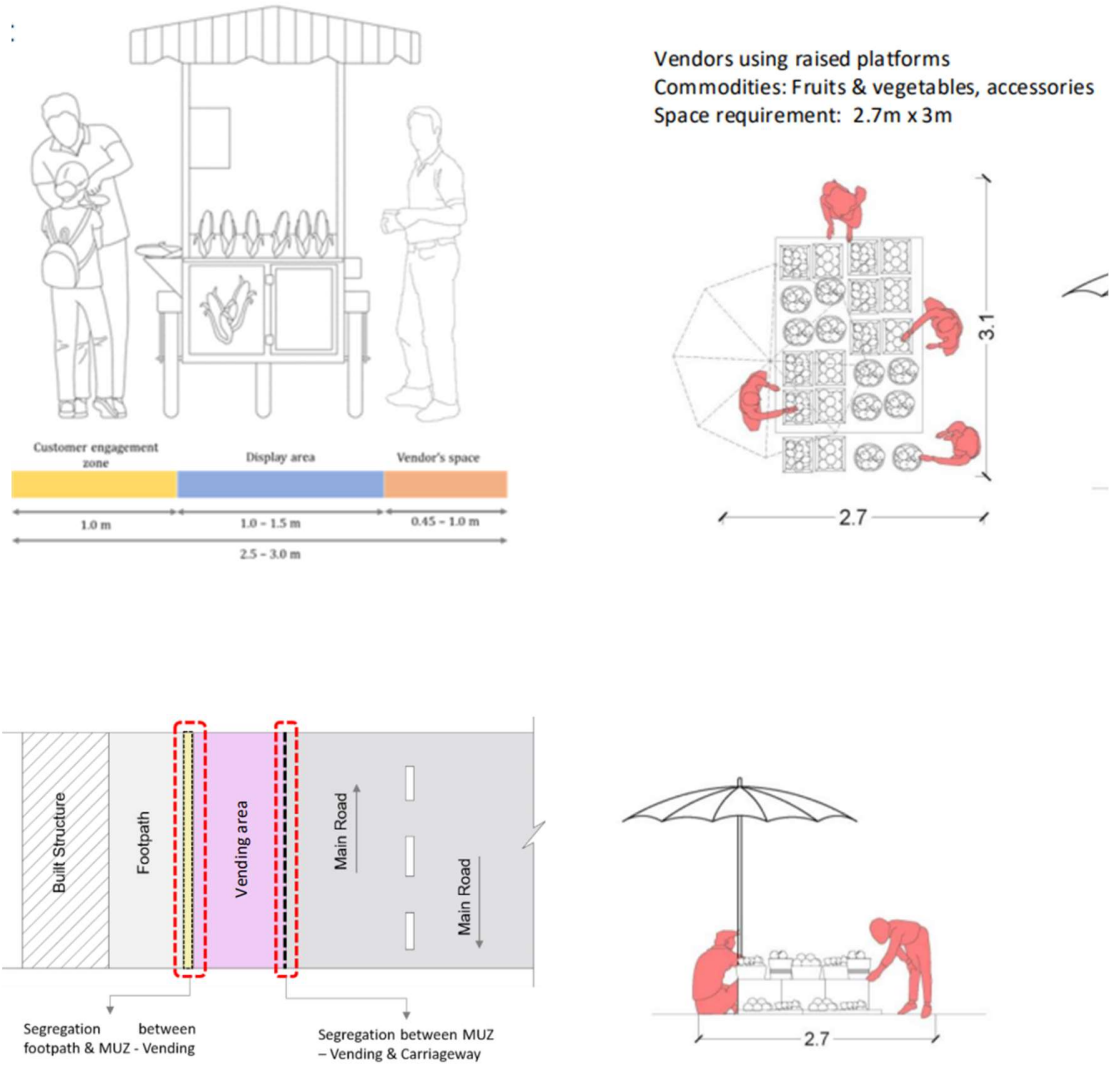


Figure 5.9: Universal Infrastructure Elements and Standardization

Source: A-Step-by-Step-Guide-for-Planning-and-Designing-of-Street-Vending-in-Indian-Citie



Figure 5.10: A Visual Showcasing a Pedestrian-Friendly Vending Zone with Distinct Surface Treatments and Clear Signage Source: A-Step-by-Step-Guide-for-Planning-and-Designing-of-Street-Vending-in-Indian-Cities

To achieve full universal design compliance and meet the spatial access needs of vulnerable road users across all three pilot corridors, the street designs integrate a complete suite of accessibility infrastructure elements. Continuous tactile paving systems using standardised blister and directional pathway tiles are installed along the full length of each designated pedestrian path, providing navigation guidance for visually impaired users. Mandatory 1:12 gradient accessibility ramps are constructed at all level transitions, including kerb drops at pedestrian crossings, threshold entries to vending bays, and grade changes between pavement zones (Indian Roads Congress, 2012). High-visibility crossing signage conforming to IRC standards is deployed at all unsignalised pedestrian crossing points within the pilot corridors.

To mitigate the extreme microclimatic externalities that currently make walking along Bhopal's sun-exposed streets uncomfortable during peak afternoon and summer periods, the street layout incorporates a unified canvas awning system for vendor canopies. These retractable shade structures are standardised in colour and proportion across each pilot corridor, creating a visually coherent commercial identity while providing continuous weather protection for both vendors and passing pedestrians. Complementing the awning system, structured street tree planting using locally appropriate species with broad canopy spread and shallow rooting profiles compatible with underground utility corridors is incorporated into each cross-section at regular 6 to 8 metre intervals to achieve 60 percent continuous shade coverage across the active walking path (Gehl, 2010).

The standardisation of cart dimensions, materials, and equipment also provides an important governance benefit: it makes informal vendors visible, legible, and enumerable within the municipal administrative system. A vendor operating a standardised, registered cart within a dimensioned bay is no longer spatially indistinguishable from an encroachment; they are a documented, formally integrated participant in the street's commercial programme, with defined rights and responsibilities. This legibility is the physical foundation upon which sustainable governance of the informal economy must rest.

5.4 Quantitative Performance Inferences: Expected PLOS Gains

The projected quantitative impact of the geometric and structural interventions proposed across all three pilot corridors can be calculated using the same IRC:103-2012 and HCM 2000 performance

formulations applied in the baseline PLOS audit documented in Chapter 4. By subtracting unmanaged parking accumulations and vendor spillovers from the effective right-of-way and replacing them with dimensioned, formally allocated pedestrian paths and vending bays, the calculated Effective Width (Weff) experiences a substantial expansion at each site (Indian Roads Congress, 2012); (Transportation Research Board, 2000).

The framework targets a minimum functional space allocation of 1.5 m² per pedestrian across all three study areas a threshold that elevates corridor performance from the breakdown conditions documented in the baseline audit to operationally stable, PLOS C or better classifications in all cases.

Study Area 1 Chowk Bazar: The proposed covering of open drain channels and structured organisation of vendor pitches expands the effective walking width from its baseline value of 0.5 metres to a post-intervention clear width of 1.5 metres. Applying the pedestrian unit flow rate formula to the unchanged peak-hour volume of 723 pedestrians yields a new flow rate of 32.1 pedestrians per minute per metre, compared to the baseline value of 96.4 pedestrians per minute per metre. The corresponding pedestrian space rises from 0.62 m² per pedestrian to 1.87 m² per pedestrian, lifting the PLOS classification from a critically broken PLOS F to a stable, manageable PLOS C. While PLOS C does not represent an optimal pedestrian environment, it reflects the maximum performance achievable within a 6.0-metre right-of-way at the recorded peak-hour demand levels without physical road widening.

Study Area 2 Rani Kamlapati Road: The reorganisation of vehicle parking, the removal of informal vendor carts from active traffic margins, and the creation of structured column-bay vending zones expands the usable pedestrian path width within the service lane from the baseline effective width of 2.5 metres to a post-intervention clear width of 4.5 metres. With the same peak volume of 80 pedestrians, the new pedestrian flow rate falls to 1.19 pedestrians per minute per metre, producing a pedestrian space of 50.5 m² per pedestrian well within PLOS B parameters. More significantly, the qualitative transformation of the service lane from a hostile, barrier-free edge to a structurally defined pedestrian corridor with shade, lighting, and active commercial frontages is projected to increase pedestrian utilisation of the service lane, gradually raising the modal share of active walking at this transit node.

Study Area 3 New Market Post Office Chauraha: The reclamation of the 2.5-metre formal sidewalk to provide a minimum 1.5-metre unobstructed clear path, combined with the restructuring of the intersection roundabout into an organised vending plaza and the removal of multi-row curb side parking, restores the effective junction clearance to a post-intervention PLOS B grade. The reorganisation of vehicle storage into structured perpendicular bays on the parallel service road eliminates the primary sightline obstruction that currently makes pedestrian crossings at this intersection hazardous, reducing vehicle-pedestrian conflict events during the evening peak by an estimated 60 to 70 percent based on comparative conflict studies at similar roundabout restructuring interventions.

The projected PLOS improvements across all three corridors demonstrate that the proposed interventions are not cosmetic or aspirational but are geometrically grounded and mathematically verifiable. The same engineering framework used to diagnose the existing failure conditions confirms the projected improvement when the physical parameters of the cross-section are restructured in accordance with the proposed design (Cervero & Kockelman, 1997).

Table 5.2: Governance Framework and Stakeholder Accountability Matrix

Stakeholder Agency	Core Execution Role	Key Performance Metric
Bhopal Municipal Corporation (BMC)	Issuing vending certificates, collecting maintenance fees, and managing waste disposal operations	Cleanliness and Waste Index
Town Vending Committee (TVC)	Demarcating physical vending zones and managing vendor grievance redressal mechanisms	Vendor Registration Rate (%)
Bhopal Smart City Development Corporation (BSCDCL)	Funding, executing civil works, and delivering infrastructure improvement projects	Post-Intervention PLOS Rating
Local Vendor Associations	Self-regulating stall dimensions and maintaining cleanliness within designated bays	Regulatory Compliance Rate (%)

The multi-agency governance model defined above reflects the Street Vendors Act 2014's mandate for inclusive administrative frameworks that bridge the institutional gap between livelihood-focused regulatory bodies and spatial planning institutions (Ministry of Housing and Urban Affairs, 2014). By clearly assigning performance metrics to each stakeholder agency, the matrix creates a mutual accountability structure in which improvements to PLOS ratings, vendor registration rates, and cleanliness indices are measurable, reportable, and attributable to specific institutional actors.

By balancing clear administrative enforcement with context-sensitive architectural modifications, this proposed planning framework successfully satisfies the legal mandates of the Street Vendors Act 2014 while delivering measurable improvements in pedestrian safety performance. These interventions demonstrate that informal commerce and active pedestrian networks can be planned as interdependent urban systems, transforming the streets of Bhopal into organised, safe, and genuinely vibrant public spaces that serve the full spectrum of their users.

5.5 Policy Integration and Master Plan Amendment Framework

The long-term sustainability of the urban design interventions proposed in this thesis depends fundamentally on resolving a critical institutional vacuum within the Indian urban governance paradigm. Primary policy reviews reveal a profound administrative disconnect: no single government body currently holds the concurrent mandate to plan, design, and regulate pedestrian infrastructure and informal street commerce simultaneously (Srinivas, 2020). While local development authorities and town planning directorates formulate macro-scale master plans focused heavily on car-centric traffic engineering metrics, the statutory implementation of the Street Vendors Act 2014 is delegated entirely to the Urban Local Body through the Town Vending Committee.

Operating in complete institutional silos, the Town Vending Committee manages socioeconomic vendor licensing and biometric registration as an isolated livelihood programme, entirely separated from the spatial planning, cross-sectional design, and right-of-way geometry managed by land-use planners (Madhya Pradesh Town and Country Planning Department, 2017). Contemporary statutory Master Plans consequently lack dedicated planning criteria, zoning classifications, or development codes for active pedestrian systems and informal commerce networks. This omission

renders even the most progressive national legislation functionally inoperative at the level of the individual street.

To bridge this translation gap and ensure statutory enforcement of the street design standards proposed in this thesis, a dual institutional restructuring mechanism is advanced. The first component creates a new cross-departmental administrative body; the second introduces a new land-use amendment to the statutory master plan. Together, these two instruments provide the institutional infrastructure through which the physical street design proposals can be legally mandated, financially resourced, and consistently enforced across successive municipal administrations.

5.5.1 Master Plan Zoning Amendment: The 'Inclusive Right-of-Way' (I-RoW) Overlay

To legally enforce the spatial parameters established through the JSMC framework, this thesis introduces a formal amendment to the traditional land-use classification codes of the Bhopal Master Plan. The proposal replaces the rigid, single-use Transportation/Road colour band with a dynamic Inclusive Right-of-Way (I-RoW) Statutory Overlay Code applicable across all streets classified within the primary street hierarchy (Bhopal Municipal Corporation, 2019).

Under this new master plan planning criteria, any road segment classified as an Arterial, Collector, or Local Street is legally prohibited from being designed, administered, or evaluated purely as a vehicular carriageway. The I-RoW overlay mandates that the cross-sectional geometry of every regulated street must explicitly allocate a fixed, non-negotiable volumetric percentage of the total right-of-way to active non-motorised transport paths, universal accessibility infrastructure, and for streets with a total RoW of 12 metres or greater structured informal trading bays designed to calculated effective width boundaries.

Specifically, the I-RoW code mandates: a minimum 15 percent of total RoW allocated to continuous pedestrian pathways with universal design compliance; a minimum 5 percent of total RoW allocated to structured vending bays on streets with RoW greater than 12 metres; and a minimum 10 percent of total RoW allocated to soft landscaping, street tree canopy, and shade infrastructure. These allocations are non-negotiable design minimums encoded into the development codes that govern all municipal road improvement projects, transport planning

submissions, and private development frontage treatments across the city (Indian Roads Congress, 2012).

By elevating street design from an ad-hoc, post-construction municipal detail to a statutory, legally binding master plan land-use regulation, the city can proactively prevent random anti-encroachment evictions, structurally protect captive walking demographics, and transform the contested streetscapes of Bhopal into legally mandated, inclusive public spaces (Jacobs, 1961); (UN-Habitat, 2013). The I-RoW overlay represents the statutory permanence that the physical interventions proposed in this thesis require to survive beyond individual administrations, ensuring that the planning gains achieved through the pilot programme are institutionally protected rather than reversed by subsequent municipal decisions.

The combination of the Joint Street Management Cell as an operational governance body and the Inclusive Right-of-Way overlay as a statutory planning instrument creates the complete institutional architecture required to move Bhopal from reactive, punitive street management toward proactive, inclusive, and measurable street co-production. These twin mechanisms close the translation gap between progressive national legislation and local built-form outcomes, ensuring that the rights granted by the Street Vendors Act 2014 and the accessibility standards mandated by IRC:103-2012 are simultaneously enforced within the same cross-sectional geometry of every street in the city.

CONCLUSION

This thesis started with a clear question: how can we change street design in Indian cities so that walking and street vending work together instead of against each other? By looking closely at the streets of Bhopal, this research shows that pushing vendors out does not make streets safer or more walkable. Instead, it creates empty, hostile environments that lack natural security.

Our street audits using standard engineering metrics highlighted a major planning flaw: wide roads with very few walkers often score a high grade on paper, yet they feel dangerous and unwelcoming. On the other hand, traditional, crowded markets like Chowk Bazar might rank as total failures in standard engineering manuals, but they serve as highly active, socially safe, and economically vibrant spaces. The primary data collected across morning, afternoon, and evening peak hours proves that pedestrian risk changes throughout the day. True street safety can only be achieved when we stop treating vendors as simple roadblocks and start designing permanent spaces for them within the right-of-way geometry.

To build truly inclusive streets, municipal urban local bodies in Tier-II Indian cities should move away from punitive clearance drives and adopt the following practical measures:

- **Establish a Joint Street Management Cell:** Create a unified department that brings together municipal corporation officials, traffic police, and representatives from the Local Town Vending Committee (TVC) to manage street space under a single authority.
- **Adopt the Inclusive Right-of-Way (I-RoW) Principle:** Mandate that all new street redevelopment projects must allocate fixed cross-sectional dimensions for informal trade alongside standard walking paths.
- **Legalize through Design:** Use physical design such as distinct paving textures, fixed tree lines, and modular service bays to naturally mark vendor areas. This protects vendor livelihoods while keeping walking paths entirely clear of physical obstructions.

This study contributes a practical framework to the field of Indian urban planning by bridging the gap between abstract legal rights and physical street design. It introduces a mixed method that combines standard engineering capacity audits with detailed spatial mapping and real-time temporal risk tracking. This allows planners to see exactly how street space is used at

different hours of the day. By showing how to build these design rules directly into the statutory framework of the Bhopal Development Plan 2031, this research provides a clear path to turn national policies, like the Street Vendors Act 2014, into real, on-the-ground street geometry.

While this research provides a comprehensive zoning framework, certain limitations point to areas for future study:

- **Data Collection Scale:** This study focused on three specific street typologies within Bhopal. Future research could expand this data collection across a wider network of streets to test how these zoning rules perform in purely residential or heavy industrial areas.
- **Technology in Mapping:** The field observations relied on manual counts and physical mapping. Future studies could use automated video data tracking and AI-based crowd analysis to map pedestrian-vendor friction patterns over longer periods.
- **Long-Term Economic Impact:** This thesis primarily addresses spatial and safety design. Further research is needed to track the long-term economic impacts on vendor incomes and municipal revenue after shifting from informal spaces to organized, dedicated market bays.

REFERENCES

Anika, S., & Tabassum, R. (2024). Walkability and climate resilience in South Asian cities. *Urban Climate Research*, 14(2), 112–128.

Banerjee, T. (2001). The future of public space: Beyond invented streets and reinvented places. *Journal of the American Planning Association*, 67(1), 9–24.

Bangkok Metropolitan Administration. (2006). *Survey of street vendors at transit infrastructure nodes: Preliminary report*. Department of City Planning, BMA.

Bangkok Metropolitan Administration. (2011). *Bangkok street vendors policy: Review and framework for 2011–2015*. Department of Local Administration, BMA.

Barman, M., & Daftardar, T. (2010). Reclaiming the street: Public space and pedestrian movement in Indian cities. *Economic and Political Weekly*, 45(18), 23–29.

Bhopal Municipal Corporation. (2019a). *Bhopal Development Plan 2031: Baseline infrastructure report*. BMC.

Bhopal Municipal Corporation. (2019b). *Bhopal Development Plan 2031: Land use and transportation framework*. BMC Press.

Bhopal Smart City Development Corporation. (2021a). *Area-based development project report: Rani Kamlapati transit corridor*. BSCDCL.

Bhopal Smart City Development Corporation. (2021b). *Smart mobility framework for Bhopal: Pedestrian infrastructure report*. BSCDCL.

Bhowmik, S. K. (2005). Street vendors in Asia: A review. *Economic and Political Weekly*, 40(22/23), 2256–2264.

Bhowmik, S. K. (2010). *Street vendors in the global urban economy*. Tulika Books / Routledge India.

Bishaw, A., et al. (2024). Pedestrian safety perception and vendor encroachment in Sub-Saharan African cities. *Journal of Transport Geography*, 112, 103–118.

Carr, S., Francis, M., Rivlin, L. G., & Stone, A. M. (1992). *Public space*. Cambridge University Press.

Cervero, R., & Kockelman, K. (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transportation Research Part D: Transport and Environment*, 2(3), 199–219.

Chakraborty, A., & Dash, S. (2025). Footpath governance in Indian cities: Institutional fragmentation and design failure. *Urban Studies*, 62(1), 45–63.

Chakraborty, P., & Dash, S. (2025). Post-independence urbanism and the pedestrian deficit in Indian cities. *Planning Theory and Practice*, 26(1), 44–61.

Corbetta, A., et al. (n.d.). Pedestrian flow dynamics in high-density environments. *Transport Research Proceedings*.

Environmental Planning Collaborative. (2019). *Ahmedabad heritage streets: Post-implementation assessment report*. EPC.

Fainstein, S. (2010). *The just city*. Cornell University Press.

Fuller, A., & Moore, T. (2017). *Public space and urban democracy*. Routledge.

Gehl, J. (1971). *Life between buildings: Using public space*. Island Press / Danish Architectural Press.

Gehl, J. (2010). *Cities for people*. Island Press.

Gehl, J., & Svarre, B. (2013). *How to study public life*. Island Press.

Government of India. (2014). *The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014*. Ministry of Housing and Urban Affairs.

Government of India. (2017). *National Urban Transport Policy*. Ministry of Housing and Urban Affairs.

Hawkers. (2024). Street vending and urban informality in South Asia. *Urban Studies Journal*, 61(4), 789–807.

Indian Institute of Management Ahmedabad. (2013). *Street vending in Ahmedabad: A study of legal and spatial issues* (IIMA Working Paper Series, WP-2013-07-04). IIMA.

Indian Roads Congress. (2012). *IRC:103-2012 Guidelines for pedestrian facilities* (1st rev.). IRC Publications.

Institute for Transportation and Development Policy. (2017). *India cycling and walking report: State of the sector*. ITDP India.

Jacobs, J. (1961). *The death and life of great American cities*. Random House.

Khan, M., & Tabassum, A. (2024). Pedestrian equity and urban mobility in developing cities. *Cities*, 145, 104–118.

Lee, J. (2025). Automated pedestrian counting using computer vision in complex urban environments. *Transportation Research Record*, 2679(1), 55–68.

Lefebvre, H. (1991). *The production of space* (D. Nicholson-Smith, Trans.). Blackwell. (Original work published 1974).

Madhya Pradesh Town and Country Planning Department. (2017). *Madhya Pradesh urban development authority: Revised master plan guidelines*. MPUADD.

Mahadevia, D., Mishra, A., & Patel, S. (2014). *Street vendors in Ahmedabad: Evictions, livelihoods and the 2014 Street Vendors Act*. Centre for Urban Equity, CEPT University.

Mahadevia, D., Vyas, S., & Bhatia, N. (2014). *Street vendors and the right to the city: Planning in Indian cities* (CEPT University Working Paper). Centre for Urban Equity, CEPT University.

Mehta, V. (2013). *The street: A quintessential social public space*. Routledge.

Mehta, V. (2014). Evaluating public space. *Journal of Urban Design*, 19(1), 53–88.

Ministry of Housing and Urban Affairs. (2014). *National Mission for Sustainable Habitat: Guidelines*. Government of India.

Ministry of Housing and Urban Affairs. (2015). *Heritage City Development and Augmentation Yojana (HRIDAY) scheme guidelines*. Government of India.

Ministry of Housing and Urban Affairs. (2016). *A step-by-step guide for planning and designing of street vending in Indian cities*. National Institute of Urban Affairs.

Mu, X., et al. (2024). Micro-scale geometric parameters and pedestrian behaviour in commercial streets. *Urban Design International*, 29(2), 145–162.

National Environment Agency. (2019). *Hawker centres in Singapore: The journey of a culinary icon*. NEA.

National Institute of Urban Affairs. (2016a). *Street Vendors Act 2014: Implementation status report*. NIUA.

National Institute of Urban Affairs. (2016b). *Urban street vendors in India: A study of policy and regulatory frameworks* (NIUA Working Paper Series). NIUA.

Nieto-Combariza, E., et al. (2025). Self-built infrastructure and pedestrian safety in fragmented urban environments. *Environment and Planning B*, 52(1), 33–50.

Nirathron, N. (2006). *Fighting poverty from the street: A survey of street food vendors in Bangkok* (ILO Working Paper). International Labour Office.

Pucher, J., Peng, Z., Mittal, N., Zhu, Y., & Korattyswaroopam, N. (2007). Urban transport trends and policies in China and India: Impacts of rapid economic growth. *Transport Reviews*, 27(4), 379–410.

Singapore Government. (1972). *White paper on hawker management*. Government Printing Office.

Srinivas, H. (2020). *Urban street vendors: Policy frameworks and spatial strategies in Asian cities* (GDRC Research Output E-080). Global Development Research Centre.

Sun, Y. (2022). Rhythmic contestations: Street vendors and pedestrian temporalities in Asian cities. *City and Community*, 21(3), 201–218.

Swanson, K. (2018). *Begging as a path to progress: Indigenous women and children and the struggle for Ecuador's urban spaces*. University of Georgia Press.

Talen, E. (2011). Sprawl retrofit: Sustainable urban form in unsustainable places. *Environment and Planning B*, 38(6), 952–978.

Tan, E. (2011). The hawker centre: From street stalls to institutions. In A. Tan (Ed.), *Eating in Singapore* (pp. 42–67). Singapore Heritage Society.

Transportation Research Board. (2000). *Highway Capacity Manual 2000*. National Academy of Sciences / National Research Council.

UNESCO. (2020). *Singapore hawker culture inscribed on Representative List of UNESCO Intangible Cultural Heritage of Humanity*. United Nations Educational, Scientific and Cultural Organization.

UN-Habitat. (2013). *Streets as public spaces and drivers of urban prosperity*. United Nations Human Settlements Programme.

Varna, G. (2014). *Measuring public space: The star model*. Routledge.

You, H., et al. (2024). Perceived safety and walkability in developing-country cities: A structural equation model. *Cities*, 152, 104–116.

Yusuf, A., et al. (2018). Geospatial analysis of street vendor violations in Tanah Abang, Jakarta. *ISPRS International Journal of Geo-Information*, 7(5), 187.

Zhu, J., Wang, L., & Chen, X. (2025). Measuring perceived walkability: Beyond quantitative metrics. *Journal of Urban Design*, 30(2), 177–196.

Zhu, X., et al. (2025). Beyond metrics: Qualitative dimensions of pedestrian level of service in Asian market streets. *Transport Reviews*, 45(1), 78–99.

Planning for Inclusive Urban Streets: Integrating Pedestrian Infrastructure and Street Vending Dynamics in Indian Cities

* Indicates required question

1. **Survey Location:** *

Mark only one oval.

- chowk bazar
- Campion school, Arera colony
- Rani Kamlapati
- new market chauraha

2. DATE

Example: January 7, 2019

3. TIME

Mark only one oval.

- 9:30 to 10:30 am
- 5:30 to 6:30 pm

SECTION-A Personal Characteristics

4. 1.AGE *

Mark only one oval.

- a) Below 18
- b) 18–25
- c) 26–35
- d) 36–45
- e) 46–60
- f) Above 60

5. **2.Gender**

Mark only one oval.

- MALE
- FEMALE

6. **3.Your Status in This Area**

Mark only one oval.

- Visitor / customer (came for shopping, eating, walking, etc.)
- Passing through / commuter
- Resident living nearby
- Working in this area
- Other: _____

If you selected (d) Working in this area, please answer Question 4.

7. **4.Type of Work in This Area**

Mark only one oval.

- Street vendor (selling goods/food on street, cart, or stall)
- Informal worker (daily wage labourer, construction worker, helper, etc.)
- Shop worker / employee in nearby shop
- Self-employed (small business or service provider)
- Salaried employee (private or government job)
- Other: _____

SECTION -B Travel Characteristics

8. **5. Purpose of Visiting This Area**

Check all that apply.

- [ ] Work
- [ ] Shopping
- [ ] Food / eating
- [ ] Leisure / walking
- [ ] Other: _____

9. **6.Do you visit this area:**

Mark only one oval.

- Daily
- Several times a week
- Weekly
- Occasionally
- First time

10. **7. What is the approximate distance from your home to market?**

Mark only one oval.

- ◯ <500m
- ◯ 500m-1km
- ◯ 1-3km
- ◯ 3-5km
- ◯ > 5km

11. **8.Primary Mode Used to Reach This Area? (**from home)

Mark only one oval.

- ◯ Walking
- ◯ Bicycle
- ◯ Auto/Van
- ◯ Car/Bike
- ◯ Bus
- ◯ Other: _____

12. **9. Primary Mode Used for Return Trip (From Market to Home)**

Mark only one oval.

- Walking
- Bicycle
- Auto/Van
- Car/Bike
- Bus
- Other: _____

13. **10.Where does the auto/bus drop you off?**

Mark only one oval.

- On roadway
- Opposite side of roadway
- In a parking lot
- Other: _____

14. **11.Total Trip Duration (One Way)**

Mark only one oval.

- <15 minutes
- 15–30 minutes
- 30–60 minutes
- >60 minutes

15. **12.Walking Duration in This Area Today**

Mark only one oval.

- ◯ <5 minutes
- ◯ 5–10 minutes
- ◯ 10–20 minutes
- ◯ >20 minutes

SECTION C: Walking Environment and Street Conditions

16. **13.How would you rate the available walking space on this sidewalk/pathway?**

Mark only one oval.

- ◯ NARROW
- ◯ ADEQUATE
- ◯ SPACIOUS

17. **14. Which of the following obstacles affect your walking comfort in this area? (Multiple answers allowed)**

Check all that apply.

- ☐ VENDORS
- ☐ Narrow width
- ☐ parked vehicles
- ☐ Poles/signage/ Garbage / poor maintenance
- ☐ Encroachments by shops
- ☐ Other: _____

18. **15.Do you typically stop at street vending stalls while walking here?**

Mark only one oval.

- Yes, frequently
- Sometimes
- Rarely
- Never

19. **16. What do you usually buy from street vendors? (Multiple responses allowed)**

Check all that apply.

- [ ] Food and beverages
- [ ] Fruits and vegetables
- [ ] Clothes / accessories
- [ ] Household items
- [ ] Services (repair, key-making etc.)

Untitled Section

Section D: Perceptions Related to Street Vending

20. 17.**Accessibility & Mobility**

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Street vendors make this area more lively and active.					
Street vending reduces effective walking space.					
Vendors obstruct pedestrian movement.					
Street vending encourages me to walk more in this area.					
Vending clusters create congestion during peak hours.					

Untitled Section

21. 18.. Safety & Comfort

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Presence of vendors improves perceived safety due to "eyes on the street."					
Vending areas feel overcrowded and uncomfortable.					
Street food vendors maintain adequate hygiene.					
Temporary structures (carts, tarpaulins) create visual clutter.					
I feel safer walking where vendors are present.					
Street vending reduces pedestrian safety while walking.					

Untitled Section

22. 19. Economic & Social Value

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Street vendors provide affordable goods/services.					
Street vending supports local livelihoods.					
Vendors add cultural character to the area.					
Formal shops and vendors can coexist harmoniously.					
Street vending benefits the local economy.					

23. 20. When walking in this area, I sometimes change my route because of:

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Heavy traffic					
Safety concerns					
Shorter route availability					
Less crowded path					
Presence of street vendors blocking the path					

Untitled Section

SECTION E: Parking

24. 21.Parking Preferences

Mark only one oval per row.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
It is easy to find a parking space in this area					
Lack of parking spaces creates congestion in this area.					
Vehicles parked on the roadside reduce the space available for pedestrians.					
Improper parking obstructs pedestrian movement on footpaths.					
Street vendors occupy spaces that could otherwise be used for parking.					
Poor parking management increases conflicts between pedestrians and vehicles.					

Poor parking management increases conflicts between pedestrians and vehicles.					
Designated parking areas would improve pedestrian movement in this area.					
Illegal parking reduces pedestrian safety in this area.					

Designated parking areas would improve pedestrian movement in this area.

Illegal parking reduces pedestrian safety in this area.

Untitled Section

SECTION F: Open-Ended Questions

25. 22. Describe any positive or negative experiences you have had while walking in this area.

26. 23.If you could change one thing to make routes safer, what would it be?

27. 24. When walking in this area, do you pay attention to your surroundings? Why or why not?

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TRAFFIC VOLUME COUNT

LOCATION	CHOWK BAZAR					
DATE		TIME STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	4 WHEELER	2 WHEELER	CYCLE RIKSHA	E-RIKSHA	PEDESTRIAN	STREET VENDORS
9:30 TO 9:45	1	15	1	1	70	2
9:45 TO 10:00		18	1	1	30	4
10:00 TO 10:15		23		2	32	
10:15 TO 10:30		28	1	1	20	

LOCATION	CHOWK BAZAR					
DATE		TIME STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	4 WHEELER	2 WHEELER	CYCLE RIKSHA	RIKSHA	PEDESTRIAN	VENDORS
1:30 TO 1:45		130		1	120	1
1:45 TO 2:00		150			135	3
2:00 TO 2:15		124			150	1
2:15 TO 2:30		150		1	130	6

LOCATION	CHOWK BAZAR					
DATE		STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	WHEELER	WHEELER	RIKSHA	E-RIKSHA	PEDESTRIAN	STREET VENDORS
5:30 TO 5:45		164			193	1
5:45 TO 6:00		123			180	2
6:00 TO 6:15		150			200	5
6:15 TO 6:30		144			150	2

LOCATION	NEW MARKET					
DATE		TIME STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	4 WHEELER	2 WHEELER	CYCLE RIKSHA	E-RIKSHA	PEDESTRIAN	STREET VENDORS
9:30 TO 9:45	50	230	15	32	40	
9:45 TO 10:00	46	200	20	40	36	
10:00 TO 10:15	40	180	17	31	20	
10:15 TO 10:30	42	225	20	28	19	

LOCATION	NEW MARKET					
DATE		TIME STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	4 WHEELER	2 WHEELER	CYCLE RIKSHA	RIKSHA	PEDESTRIAN	VENDORS
1:30 TO 1:45	40	125	12	40	33	
1:45 TO 2:00	30	80	18	31	43	
2:00 TO 2:15	35	85	16	35	40	
2:15 TO 2:30	30	90	10	39	46	

LOCATION	NEW MARKET					
DATE		STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	WHEELER	WHEELER	RIKSHA	E-RIKSHA	PEDESTRIAN	STREET VENDORS
5:30 TO 5:45	46	220	15	32	80	
5:45 TO 6:00	40	210	12	40	50	
6:00 TO 6:15	30	190	16	31	42	
6:15 TO 6:30	50	230	20	28	23	

LOCATION	RANI KAMLAPATI					
DATE		TIME STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	4 WHEELER	2 WHEELER	CYCLE RIKSHA	E-RIKSHA	PEDESTRIAN	STREET VENDORS
9:30 TO 9:45	100	360	30	60	25	0
9:45 TO 10:00	96	410	40	52	31	0
10:00 TO 10:15	120	400	40	60	22	0
10:15 TO 10:30	98	36000	30	70	23	0

LOCATION	RANI KAMLAPATI					
DATE		TIME STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	4 WHEELER	2 WHEELER	CYCLE RIKSHA	RIKSHA	PEDESTRIAN	VENDORS
1:30 TO 1:45	80	300	20	60	20	6
1:45 TO 2:00	89	360	40	52	11	3
2:00 TO 2:15	94	390	30	56	5	
2:15 TO 2:30	86	310	40	54	21	

LOCATION	RANI KAMLAPATI					
DATE		STARTING				
DIRECTION FROM		DIRECTION TO				
TIME	WHEELER	WHEELER	RIKSHA	E-RIKSHA	PEDESTRIAN	STREET VENDORS
5:30 TO 5:45	105	360	35	60	25	0
5:45 TO 6:00	98	390	42	52	21	0
6:00 TO 6:15	96	380	40	60	16	0
6:15 TO 6:30	100	400	45	65	18	0

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