CAG
Citizen consumer and civic Action Group

SAFE SCHOOL ZONES

SAFE SCHOOL ZONES

Enhancing Sustainable Mobility & Creating Safe School Routes in Chennai

AUTHOR

Sowmya Kannan, Researcher, CAG

ILLUSTRATION & DESIGN

Richa Shubangi

ACKNOWLEDGEMENTS

The author extends sincere gratitude to S. Saroja and Divya Senthil for their invaluable guidance and reviews of the report. The author also thanks Divya Arvind for her contributions to the study recommendations and to Mohan for coordinating with the volunteers. The author also thanks the volunteers that deployed the survey and undertook the infrastructure audit.

DISCLAIMERS

The information in this document has been obtained in good faith from sources that are believed to be reliable, but any potential interpretation of this report as making an allegation against a specific company or companies named would be misleading and incorrect. The author accepts no liability whatsoever for any direct or consequential loss arising from the use of this document or its contents.

SUGGESTED CITATION

Safe School Zones - Enhancing Sustainable Mobility & Creating Safe School Routes in Chennai | CAG. *cag.org.in*

COPYRIGHT

ABOUT CAG

Citizen consumer and civic Action Group (CAG) is a 39 year old non-profit, non-political and professional organisation that works towards protecting citizens' rights in consumer and environmental issues and promoting good governance processes including transparency, accountability and participatory decision-making.

TABLE OF CONTENTS

Picture courtesy : Unsplash

GLOSSARY OF TERMS

Arterial Road

An arterial road serves as a primary route for through-traffic, connecting different parts of a city and linking long-distance destinations.

Automatic Number Plate Recognition (ANPR) Cameras

Automatic Number Plate Recognition (ANPR) cameras are security devices designed to capture and process vehicle license plates in real time. They are used in applications like law enforcement, traffic management, parking enforcement, and toll collection.

Bollards

Bollards are sturdy, vertical posts placed along pathways or road edges to prevent vehicles from encroaching onto pedestrian areas and to improve pedestrian safety.

Carriageway

The carriageway is the part of a roadway specifically designated for motorized vehicles, separated from walking, cycling, and stationary activities, forming the central portion of the Right of Way.

Collector Street

A collector street distributes traffic between local streets and arterial roads.

Cross-Section of the Road

A road cross-section illustrates the spatial allocation for various elements within the Right of Way, including motorized vehicles, non-motorized vehicles, pedestrians, medians and other roadway components.

Footpath / Pedestrian Pathway

Footpaths are designated areas primarily for pedestrian use, located adjacent to roadways or as standalone pathways, facilitating safe and unobstructed pedestrian movement.

Illegal Parking

Illegal parking involves parking a vehicle in unauthorized zones, such as sidewalks, near bus stops, or in a manner obstructing traffic flow or access, violating regulations and subject to penalties under the Motor Vehicles Act.

Kerb Extensions

Kerb extensions, or curb extensions, are sidewalk widenings that extend into parking lanes or road shoulders, reducing pedestrian crossing distances and enhancing visibility and safety.

Land Use

Land use refers to the classification of land for specific purposes such as residential, commercial, industrial, and public spaces, shaping the character and functionality of urban areas.

Local Street

A local street primarily provides access to residences, businesses, or adjacent properties. It prioritizes local activities and non-motorized transport modes.

Non-Motorized Transport (NMT)

Non-Motorized Transport refers to modes of transportation that do not rely on a combustion engine or motor. Also known as active transport, it primarily includes walking and cycling, offering zero-emission mobility options that promote environmental sustainability.

On-Street Parking

On-street parking refers to spaces allocated for vehicles to park along the edges of streets or carriageways.

Particulate Matter 2.5

PM2.5 refers to fine particulate matter with a diameter of 2.5 micrometers or less. Due to its small size, PM2.5 can be inhaled deeply into the lungs, posing significant health risks with prolonged exposure.

Particulate Matter 10

PM10 denotes particulate matter with a diameter of 10 micrometers or less. These particles can cause adverse health effects after both short-term and long-term exposure.

Predominant Land Use

Predominant Land Use signifies the primary function or activity that dominates within a particular region or zone, reflecting the majority land-use type in that area.

Primary Access Road

A Primary Access Road provides the main vehicular entry and exit to a site or building.

Right of Way (ROW)

The Right of Way is the space between two property lines designated in a legal development or planning document for the movement of all transport modes.

Road Markings

Road markings are lines, patterns, or words applied to carriageways, kerbs, or adjacent surfaces to control, warn, guide, or inform road users about regulations and safety requirements.

Rumble Strips

Rumble strips are raised or grooved patterns on roads designed to alert drivers to potential hazards or speed reductions by creating audible vibrations when driven over.

Shoulder Width

The “shoulder” is the graded or surfaced area adjacent to the pavement, designed to provide lateral support to the road and accommodate stopped vehicles in emergencies. It also offers space for non-motorized users when needed.

Sign Boards / Signage

Traffic signage includes mandatory, regulatory, cautionary, directional, and informational signs for pedestrians, cyclists, public transport, and motor vehicle users, guiding safe road usage.

Traffic Calming Measures

Traffic calming measures are strategies designed to reduce vehicle speeds and enhance pedestrian and cyclist safety.

Vulnerable Road User (VRU)

Vulnerable Road Users (VRU) refers to a group of road users who face a higher risk of accidents and injuries compared to the average road user. This category typically includes pedestrians, cyclists, motorcyclists, and other individuals who are more exposed and less protected in traffic environments.

Zebra Crossing / Pedestrian Crossings

Zebra crossings are designated pedestrian pathways, marked with striped road markings or elevated as tabletop crossings, allowing safe movement across roads at mid-blocks and intersections.

EXECUTIVE SUMMARY

Historically, streets have been designed for motorized transport, excluding vulnerable road users. Children, one of the most vulnerable of road users, are at high risk on our roads, due to their limited physical and cognitive abilities. The majority of a child's travel is to school, and an unsafe school journey could potentially deny them their right to education. Poorly designed school roads increase reliance on motorized transport, causing congestion during peak school hours, higher air pollution, and unsafe environments. Children from middle- and low-income families are disproportionately affected, as they depend on walking and cycling, exposing them to road traffic injuries and air pollution in unsafe road conditions.

Citizen consumer and civic Action Group (CAG) conducted a study to analyse what would encourage the use of sustainable transport modes by school children, by identifying existing challenges in the road environment surrounding the schools and proposing targeted solutions to enhance safety and mobility for children. The study was conducted between July and September 2024 across three schools in Chennai: St. Gabriel's Higher Secondary School (Broadway), Ramakrishna Mission School (T. Nagar), and Maharishi Vidya Mandir (Chetpet). The study included perception surveys with parents, infrastructure audits focusing on ease of movement and road safety, focus group discussions with children and observational studies to analyze road user behavior and safety risks during school peak hours. St. Gabriel's Higher Secondary School, Broadway, is located in a mixed-use, predominantly commercial zone.

Around 68% of parents reported difficulty in their children crossing or navigating roads near the school. Key challenges include congestion, unsafe vehicle reversing, and the absence of designated pick-up/drop-off zones. Parents' top suggestions to improve road safety were reducing congestion (29%), deploying traffic police (17%), and implementing speed control measures like speed breakers (12%). Most students walk, cycle, or use MTC buses to commute. However, pedestrian pathways near the school are largely unusable due to encroachments and illegal parking.

Within 100 meters of the school, obstructions make the footpaths inaccessible. Despite no-parking signs, illegal parking is rampant, and heavy vehicles frequently use the area, worsening congestion. The highest traffic volume was observed at 4:00 PM, coinciding with school dispersal, with two-wheelers being the dominant mode of transport and a surge in pedestrian movement. Air quality analysis indicated a strong correlation between peak school traffic hours and pollution spikes.

Recommendations to improve road safety include enhancing walkability by removing obstructions and utilizing shoulder space, strict no-parking enforcement and restricting commercial activities during school hours , establishing designated pick-up/drop-off zones and restricting U-turns to reduce congestion and ensuring safe crossings, visible school signage, and improved traffic management.

Ramakrishna Mission School, T. Nagar is located in a mixed-use area of shops and residences, where students are dropped by parents on two-wheelers, MTC buses, bicycles, walking, and private autos for travel.

> Key issues include U-turns in front of the school (31%), traffic congestion (29%), and the absence of designated drop-off zones (24%). About 79% of parents reported their children facing difficulties crossing or navigating roads near the school. Parents highlighted reducing congestion (24%), continuous footpaths and bicycle paths (11%), stricter speed limit enforcement (10%) as critical to encouraging sustainable transport. Burkit Road, which runs along the school compound, has footpaths which are continuous, but are encroached by vendor stalls and parked vehicles, making them unusable. Dhandapani Street to which the school gate opens, has no footpaths and its unpaved shoulders are similarly encroached.

Traffic congestion worsens during school hours due to vehicles stopping on the road in front of the school gate. Improper U-turns at the barricaded Dhandapani Street junction exacerbate congestion on Burkit Road. The highest traffic congestion at 4:00 PM (1058

vehicles) is driven by peak two-wheeler (560) and pedestrian (198) movement. Air quality data shows PM2.5 (53.0 µg/m³) and PM10 (74.5 µg/m³) levels peaking during evening school pick-up, indicating increased emissions from high vehicle density.

Recommendations include signalizing the junction or temporary road closure for Dhandapani Street during school hours, utilizing parking bays on Burkit Road as drop-off areas, replacing the transformer with a compact unit and introducing traffic calming measures, zebra crossings, and school zone signages.

Maharishi Vidya Mandir, Chetpet is located on Dr. Guruswamy Road, a residential street off the arterial EVR Periyar Salai.

> Dr. Guruswamy Road lacks continuous footpaths, and the existing one near the school is poorly designed. Encroachments on unpaved shoulders leave no space for walking. At the junction with EVR Periyar Salai, left-turning vehicles mix haphazardly with oncoming traffic, creating frequent congestion. Traffic congestion peaks during school arrival and dispersal, with cars (105) and two-wheelers (128) being the dominant modes, highlighting the need for better traffic management. Air quality analysis shows PM2.5 (189 µg/m^3) and PM10 (165 µg/m^3) spiking during peak school hours, linking school traffic to increased pollution levels.

Recommendations include providing paved shoulders for walking and cycling on Dr. Guruswamy Road, removing encroachments and relocating auto stands, restricting on-street parking on EVR Periyar Salai and installing barricades to manage traffic flow and enhancing school zone visibility with markings and signages.

The study shows that even though two schools (Ramakrishna and St. Gabriel's Higher Secondary School) had well-designed pedestrian infrastructure for children's active travel, encroachments and lack of enforcement have made these unusable. Continuous monitoring and collaboration among stakeholders—school authorities, parents, children, enforcement, and road agencies—are key to maintaining safe school zones. Road

safety challenges not only heighten crash risks but also limit children's independence. Active travel improves their physical and mental health, decision-making, and spatial awareness. There is an urgent need for cities to prioritize inclusive street design that caters to all, especially vulnerable users like children.

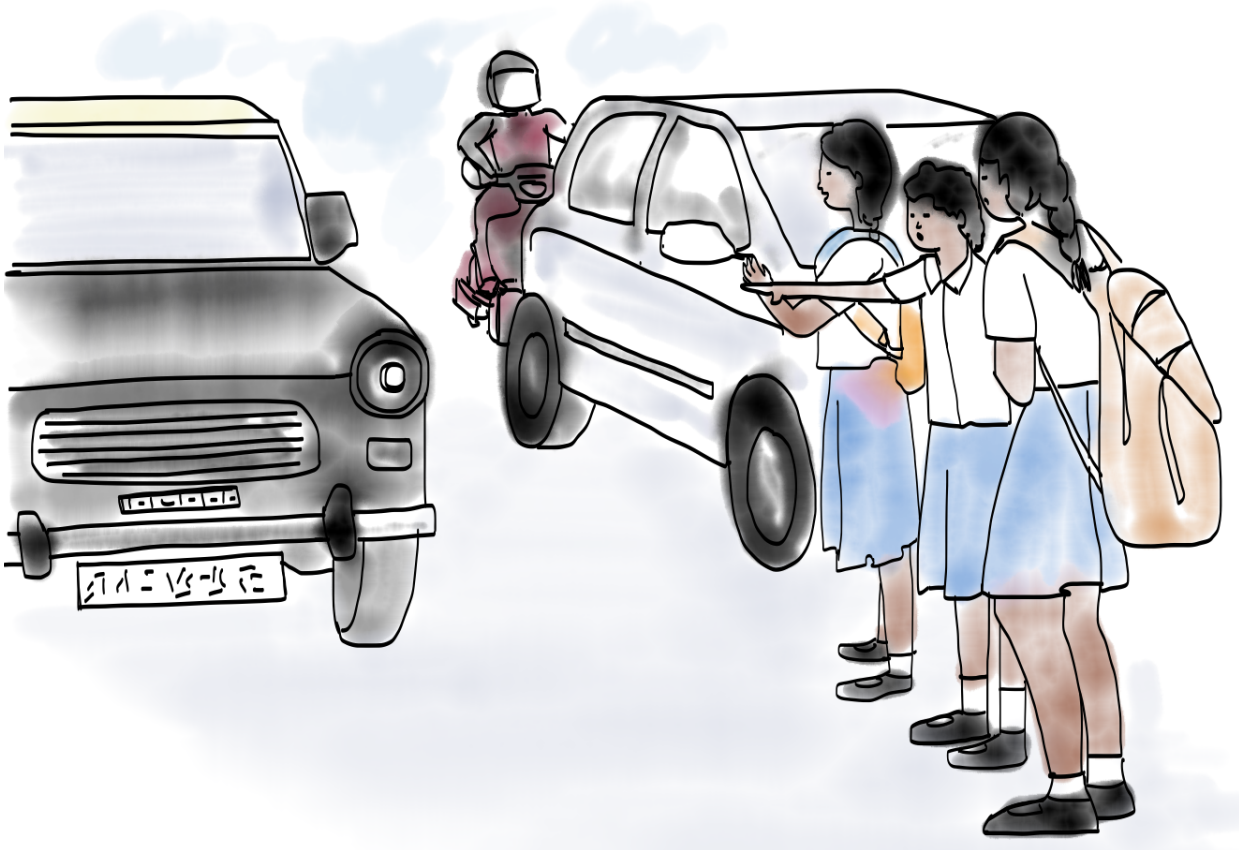
Picture courtesy : Unsplash

1.BACKGROUND

According to the World Health Organization (WHO), road traffic injuries are the leading cause of death among young people aged 5 to 29 years worldwide[1]. The situation is even more dire in low- and middle-income countries, where road traffic fatality rates among children are nearly three times higher than those in high-income nations. In India, road traffic injuries are the primary cause of fatalities for children aged 5 to 19[2], highlighting an urgent need for road safety interventions tailored to young and vulnerable road users. Road crashes disproportionately affect individuals during their most productive years, resulting in significant health, social, and economic consequences. The loss of young lives to preventable traffic incidents not only devastates families but also weakens the broader fabric of society. This stark reality underscores the pressing need to make roads safer, especially for children who rely on public spaces for mobility, education, and recreation.

1 World Health Organization: WHO. "Road Traffic Injuries: Children" December 6, 2023. https://www.who.int/news-room/questions-and-answers/item/road-traffic-injuries-children

2 Traffic injuries leading cause of death among children: Nimhans report. Deccan Herald, Dated February 4, 2025. https://www.deccanherald.com/india/karnataka/bengaluru/traffic-injuries-leading-cause-of-death-among-children-nimhans-report-3387711



Historically, streets have been designed with a strong emphasis on motorized vehicles, often neglecting the needs of pedestrians, cyclists, and other vulnerable road users. Children, in particular, are at high risk as they are less visible to drivers, have limited cognitive abilities to assess traffic risks, and are more likely to be involved in crashes or near-miss incidents[3]. Recognizing children as part of the Vulnerable Road User (VRU) category is crucial in framing policies and urban planning strategies that ensure their safety. Streets should be accessible and designed to accommodate all users, enabling children to travel independently and safely. The concept of 'Children's Independent Mobility (CIM)', introduced by researcher Mayer Hillman, refers to the ability of children to move freely within their neighborhoods and cities without adult supervision[4]. This freedom is fundamental to a child's physical, social, cognitive, and personal development, fostering independence, problem-solving skills, and a deeper connection with their surroundings. However, the growing risks posed by unsafe streets have drastically curtailed this independence, forcing children to rely more on adult-supervised or motorized transport.

---

3 Child And Adolescent Road Safety in South Asia, UNICEF. https://www.unicef.org/rosa/media/28141/file/Child%20and%20Adolescent%20Road%20Safety%20in%20South%20Asia.pdf

4 Children's Independent Mobility: Current Knowledge, Future Directions, and Public Health Implications. International Journal of Environmental Research and Public Health https://doi.org/10.3390/ijerph15112441

1.1 NEED FOR SAFER SCHOOL ZONES

A significant portion of a child's daily travel revolves around commuting to and from school. School zones, however, pose unique and complex road safety challenges. During peak hours, that is during morning arrivals and afternoon departures, the school zones witness a high density of children and a convergence of different transport modes, including private cars, school buses, bicycles, pedestrians, and public transport. This concentrated movement twice a day creates an environment with heightened risks, making these areas more accident-prone than typical road environments. The fundamental right to education should not come at the cost of children's safety; thus, ensuring safe school zones must be a priority.

When school neighborhoods are not designed to support safe, active travel, there is a marked increase in private vehicle usage. This, in turn, exacerbates traffic congestion around schools, contributes to rising air pollution levels, increases road crash risks, and ultimately leads to unsustainable urban mobility patterns. Additionally, unsafe streets discourage walking and cycling, depriving children of essential physical activity. Globally, 81% of adolescents aged 11-17 years are insufficiently physically active, posing long-term health risks such as obesity, cardiovascular diseases, and poor mental well-being[5].

The global impact of unsafe school environments is evident in multiple studies.[6] In Canada, research shows that the average distance between the site of a child's road injury and a school is less than 500 meters. Similarly, in Chile, 95% of child casualties occurred within 500 meters of a school, with 70% within just 250 meters. In the UK, one-third of all child road traffic injuries occurred on the way to or from school. These statistics highlight the urgent need for better road safety measures near educational institutions.

5 School streets: Putting children and the planet first. Child Health Initiative. FIA Foundation & Child Health Initiative. https://www.childhealthinitiative.org/media/792262/school-streets-globally.pdf

6 ibid

1.2 NEED FOR CLEANER AIR NEAR SCHOOL ZONES

Beyond the risk of injuries, children are also highly vulnerable to air pollution, which is exacerbated by increased vehicle emissions in school zones. According to WHO, 91% of the global population lives in areas where air pollution exceeds safe limits.[7] Young children are particularly at risk, as their developing lungs and brains make them more susceptible to the harmful effects of toxic pollutants.[8]

This issue is also deeply tied to social justice; poorer communities, which often lack adequate infrastructure for safe, non-motorized transport, bear the brunt of both road traffic injuries and air pollution exposure.[9] While this disparity is evident in high-income nations, it is even more pronounced in low- and middle-income countries, where 93% of all global road traffic fatalities occur.

Designing school streets with a car-centric approach not only compromises safety but also significantly reduces children's opportunities for active travel. Walking and cycling to school provide multiple benefits beyond just mobility. These activities support children's physical health, improve mental well-being, enhance social connectedness, and help develop core life skills such as decision-making, spatial awareness, and independence. [10]

With rapid urbanization and rising vehicle numbers globally, cities must proactively invest in creating safe and healthy school routes for all children. Citizen consumer and civic Action Group (CAG) conducted a study of three schools in Chennai, during the months of July, August and September of 2024, to identify key road safety challenges and propose targeted solutions for transforming them into safer school zones.

7 ibid

8 Air pollution and child health: prescribing clean air. World Health Organisation, 2018. https://iris.who.int/bitstream/handle/10665/275545/WHO-CED-PHE-18.01-eng.pdf?sequence=2

9 Global status report on road safety 2018. World Health Organisation. https://cdn.who.int/media/docs/default-source/searo/india/health-topic-pdf/global-status-report-on-road-safety-2018.pdf?sfvrsn=1de25920_2

10 School streets: Putting children and the planet first. Child Health Initiative. FIA Foundation & Child Health Initiative. https://www.childhealthinitiative.org/media/792262/school-streets-globally.pdf

2.AIM

The aim of this study is to encourage the use of sustainable transport modes by school children, by identifying existing challenges in the road environment surrounding the schools and proposing targeted solutions to enhance safety and mobility for children.

3.OBJECTIVES

Assess perceptions on road safety

Evaluate students' and parents' perceptions regarding the safety of children walking or cycling to school.

Identify road safety and infrastructure challenges

Conduct a school zone audit to document key road safety and infrastructural issues affecting children's mobility.

Propose solutions for safer school zones

Develop targeted interventions to improve road safety for children commuting on foot or by bicycle. Using data from the perception survey and road safety audit, establish key elements that constitute a safe school zone.

Picture courtesy : Reuters

4.METHODOLOGY

The study examined road safety from three key perspectives:

1. **Road Infrastructure**
2. **Road User Behavior**
3. **Parents' Perceptions of Safety in school zones**

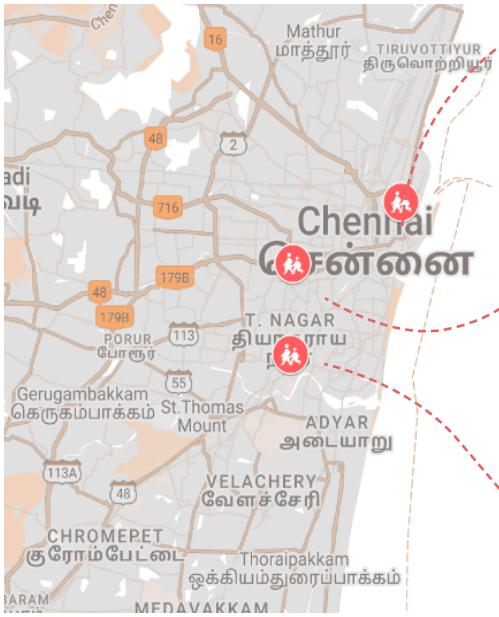
A combination of audits, mapping exercises, observational surveys, and stakeholder discussions was used to develop a holistic understanding of the issues at hand.

4.1 DEFINING THE SCHOOL ZONE

The school zone is defined as the area surrounding the school with high pedestrian activity and vehicular traffic, particularly during peak school hours. This zone typically extends 100 meters on either side of the school gate.

4.2 SCHOOL SELECTION CRITERIA

Three schools were selected for the study, from different zones of Chennai: North, South, and Central Chennai. The schools were selected based on land use patterns, road user mix, and socio-economic diversity to capture a comprehensive understanding of road safety challenges in different urban contexts. These schools were:



1 **NORTH CHENNAI**

ST. GABRIEL'S HIGHER SECONDARY SCHOOL
(A unit of Don Bosco school), Broadway

2 **CENTRAL CHENNAI**

MAHARISHI VIDYA MANDIR
Chetpet

3 **SOUTH CHENNAI**

RAMAKRISHNA MISSION SCHOOL
T. Nagar

The selected locations vary significantly in traffic volume and road user composition, influencing children's mobility and safety. Additionally, these schools serve students from different socio-economic backgrounds, offering insights into how economic factors shape travel behavior. This approach helped identify both common challenges and location-specific risks, facilitating the development of targeted interventions to improve road safety for children.

4.3 PERCEPTION SURVEY WITH PARENTS

A structured perception survey was conducted with parents to understand their concerns regarding their children's road safety. This survey explored parents' confidence in allowing their children to walk or cycle to school, their perception of existing road safety measures and their preferences for potential improvements in school zones. (Refer Annexure 1 for the survey questionnaire).

To gain first-hand insights from students, focus group discussions were conducted (Refer Annexure 2). These sessions helped highlight the specific difficulties children face while walking or cycling to school and children's views on unsafe locations and problematic road behaviors.

4.4 ROAD INFRASTRUCTURE AUDIT AND MAPPING

To assess the built environment, an infrastructure audit was conducted using Mergin Maps, a mobile mapping tool that allows for the spatial recording of road safety parameters. The audit focused on two critical aspects:

EASE OF MOVEMENT

This included factors that facilitate safe and comfortable movement for children using non-motorized transport (NMT) such as:

- Availability and condition of pedestrian pathways
- Presence of cycling infrastructure
- Encroachments and parking obstructions
- Shoulder width and road space for non-motorized users

ROAD SAFETY ELEMENTS

The audit evaluated factors that influence children's safety while navigating school streets, including:

- Availability and visibility of traffic signs
- Presence of road markings and pedestrian crossings
- Speed calming measures such as speed breakers and rumble strips
- Visibility concerns (e.g., faded markings)

The audit also included an observational survey to understand how different road users interact with school environments, during peak school hours. This survey studied road user compliance with traffic rules, the level of vulnerability of children in the traffic mix, school dispersal patterns etc.

4.5 TRAFFIC CONGESTION AND ITS IMPACT ON AIR QUALITY

A traffic volume count was conducted to analyze congestion by identifying the number and types of vehicles on the school road at different times of the day. To understand the relation between congestion, peak school hours and air quality, PM2.5 and PM10 levels were monitored. These measurements were recorded during peak school hours and also throughout the day to compare air pollution levels during both peak and off-peak periods. The pollution levels were recorded using a handheld air quality monitor. By correlating traffic volume data with air quality trends, the study aimed to assess the indirect impacts of congestion, such as increased exposure to harmful pollutants.

4.6 LIMITATIONS

The perception survey and focus group discussion with children could not be conducted at Maharishi Vidya Mandir school due to difficulties in arranging this with the school authorities, limiting the dataset for parental feedback from this location.

5. ST. GABRIEL'S HIGHER SECONDARY SCHOOL

(A UNIT OF DON BOSCO SCHOOL), BROADWAY

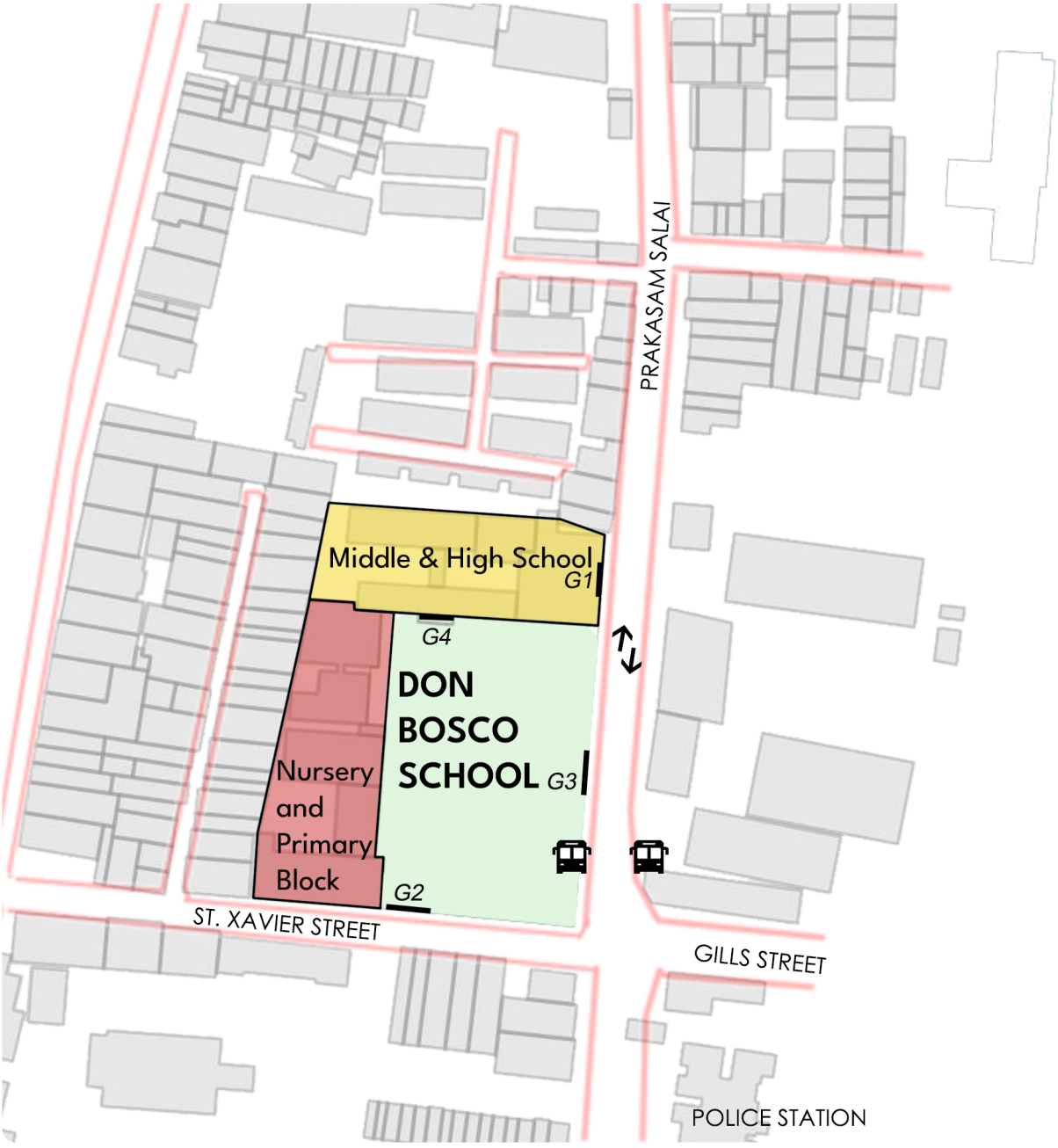


Figure 1. Map showing the St. Gabriel's Higher Secondary School layout

School Gates : (Refer Figure 1)

Gate 1 (G1)	Main entrance for middle & high school students (opens onto Prakasam Salai).
Gate 2 (G2)	Entrance for nursery & primary students (opens onto St. Xavier's Street)
Gate 3 (G3)	Gate leading to the school ground (opens onto Prakasam Salai)
Gate 4 (G4)	Internal gate connecting both compounds

5.1 SCHOOL PROFILE

Location: Broadway, Chennai

• The school is ***situated at a busy intersection*** in Prakasam salai, surrounded by commercial establishments, wholesale markets, and high-density traffic zones, making road safety a critical concern.

• Another school - ***Bishop Corrie School*** is also located on Prakasam Salai, approximately 600 meters away.

Predominant land use: Mixed-use (Commercial & Residential)

Total strength: Approximately 1,000 students

Cycle parking: Dedicated space available inside the school premises.

School timings:
Middle & High school: 8:15 AM – 4:15 PM
Nursery & Primary school: 8:15 AM – 3:15 PM

School Layout & Entry Points:
The school is spread across two compounds -

Nursery & Primary block
Includes an open ground and has two gates.

Middle & High school block
Located in an adjacent compound with a separate entrance.

5.2 ACCESS TO PUBLIC TRANSPORTATION

The school benefits from strong connectivity to public transport:

Bus stop
Located within 100 meters of the school gate, near the intersection.

Mannady metro station
Situated around 600 meters away, providing access to the metro network.

Auto bay
Available near the bus stop, offering last-mile connectivity

5.3 STREET RIGHT OF WAY (ROW) & ROAD CONDITIONS

PRAKTASAM SALAI (PRIMARY ACCESS ROAD)

This main road provides access to the school, serving as a key transit corridor. Two of the school's gates (G1 & G3) open onto this road.

Road type

Collector street, handling high vehicular flow, including buses.

Road characteristics

- Total width: 7–7.5 meters
- Shoulder width: 2 meters
- Pedestrian pathway: Present
- Traffic direction:
  Two-way street without a median
- Bus route: Yes

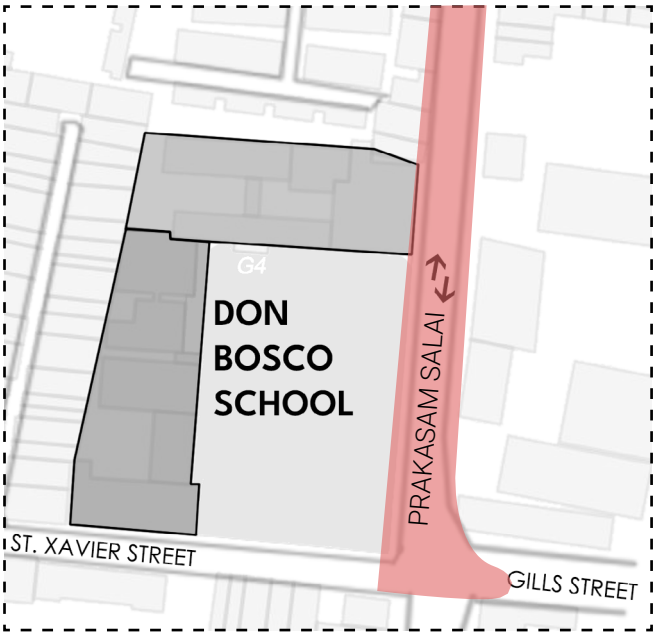


Figure 2. Street cross section of Prakasam Salai, Broadway

ST. XAVIER'S STREET

Provides access to the nursery & primary block via Gate G2.

Road type:
Local street, with lower traffic volume compared to Prakasam Salai.

Road characteristics:

- Total width: 4–5 meters
- Shoulder space & Pedestrian pathway: Not available
- Traffic flow: Narrow street with mixed-use movement, lacking proper pedestrian infrastructure.

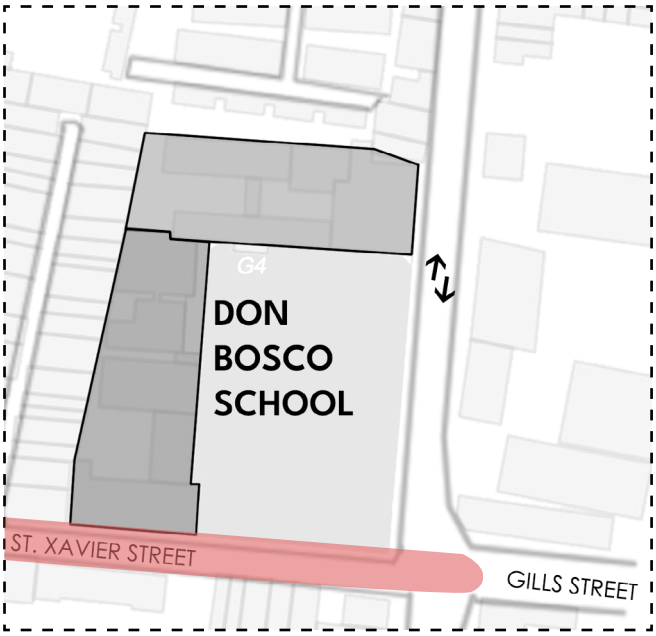


Figure 3. Street cross section of St. Xavier's Street, Broadway

5.4 PERCEPTION SURVEY (The sample size varied from 250 to 270)

1. MODES OF TRANSPORT & TRAVEL DISTANCE

The top three modes of transport used by students and parents are walking, MTC buses, and bicycles.

Over **40%** of respondents **live within 1 km** of the school, which explains the high number of pedestrians.

Additionally, **73%** of parents stated that they **take the same route to school daily**, emphasizing the need for consistent safety measures along these routes. Distance and safety were the major reasons cited for choosing the respective transport modes.

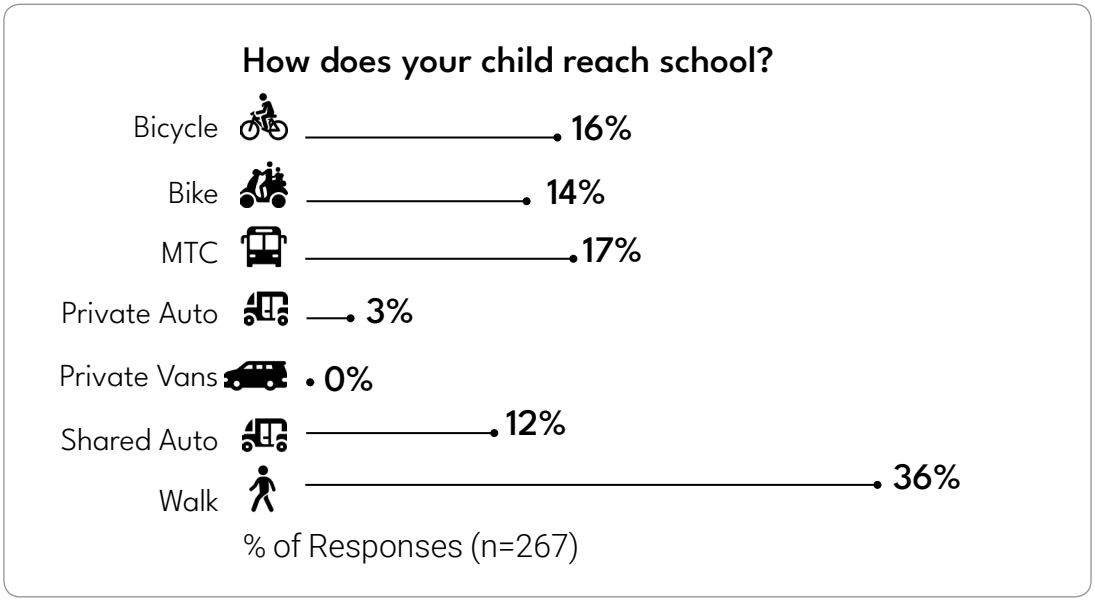


Figure 4. Mode of transport

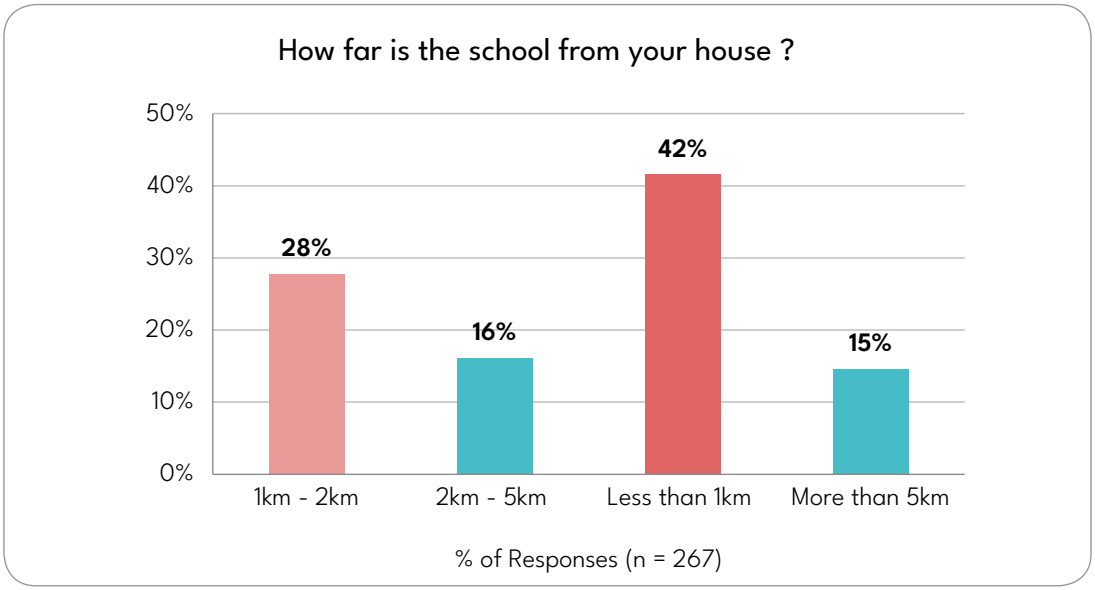


Figure 5. Travel Distance

2. CHALLENGES IN NAVIGATION & PICK-UP/DROP-OFF ISSUES

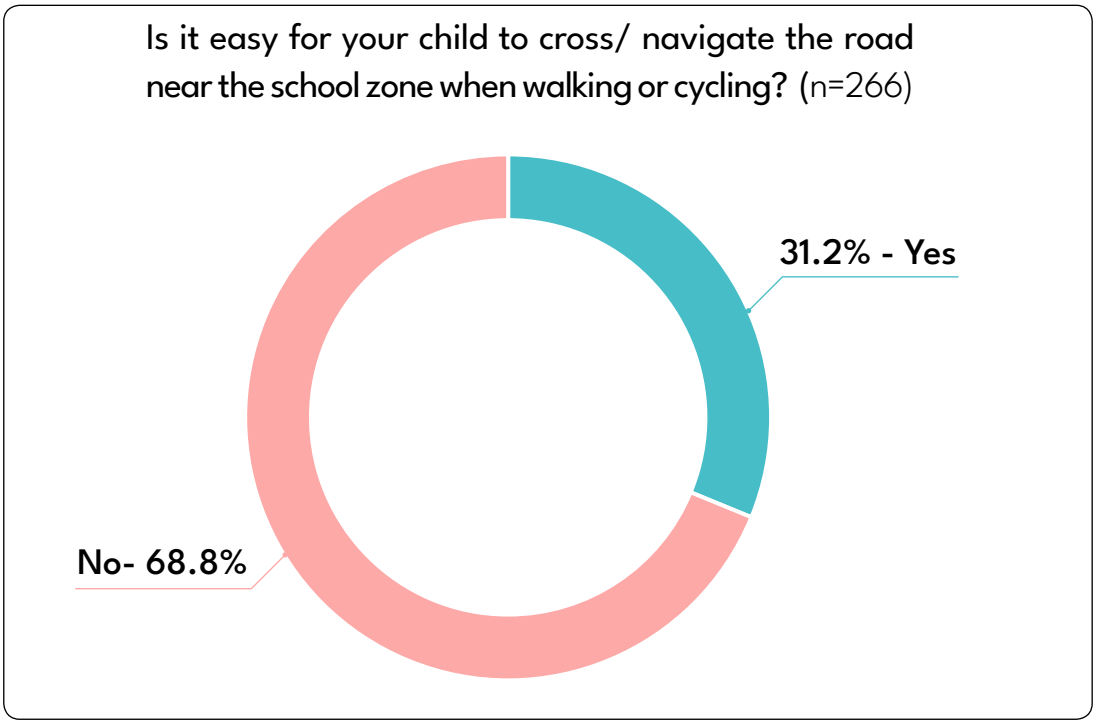


Figure 6. Difficulties in Navigation

About 68% of respondents found it difficult for children to cross or navigate roads near the school.

The most common challenges during pick-up and drop-off were **congestion, unsafe vehicle reversing, and the lack of designated pick-up/drop-off zones.**

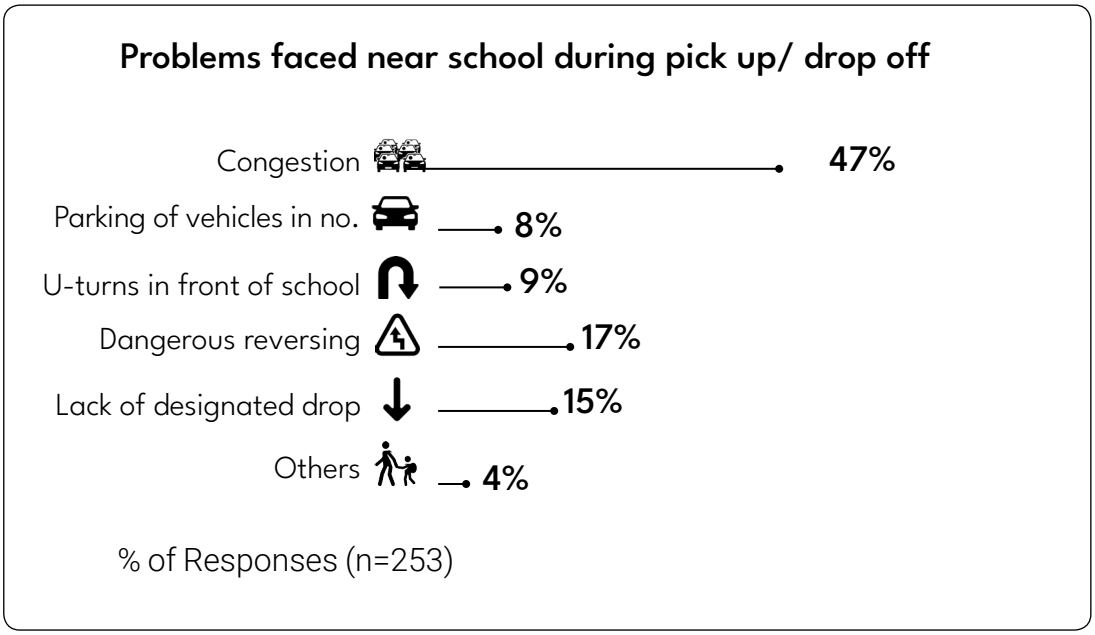


Figure 7. Problems during pick up/drop off

3. BARRIERS TO WALKING & CYCLING

The primary reasons parents avoid allowing children to walk or cycle to school **include high traffic speeds, congestion, and unsafe intersections/ crossings.** Additional concerns included distance and poor sidewalk conditions.

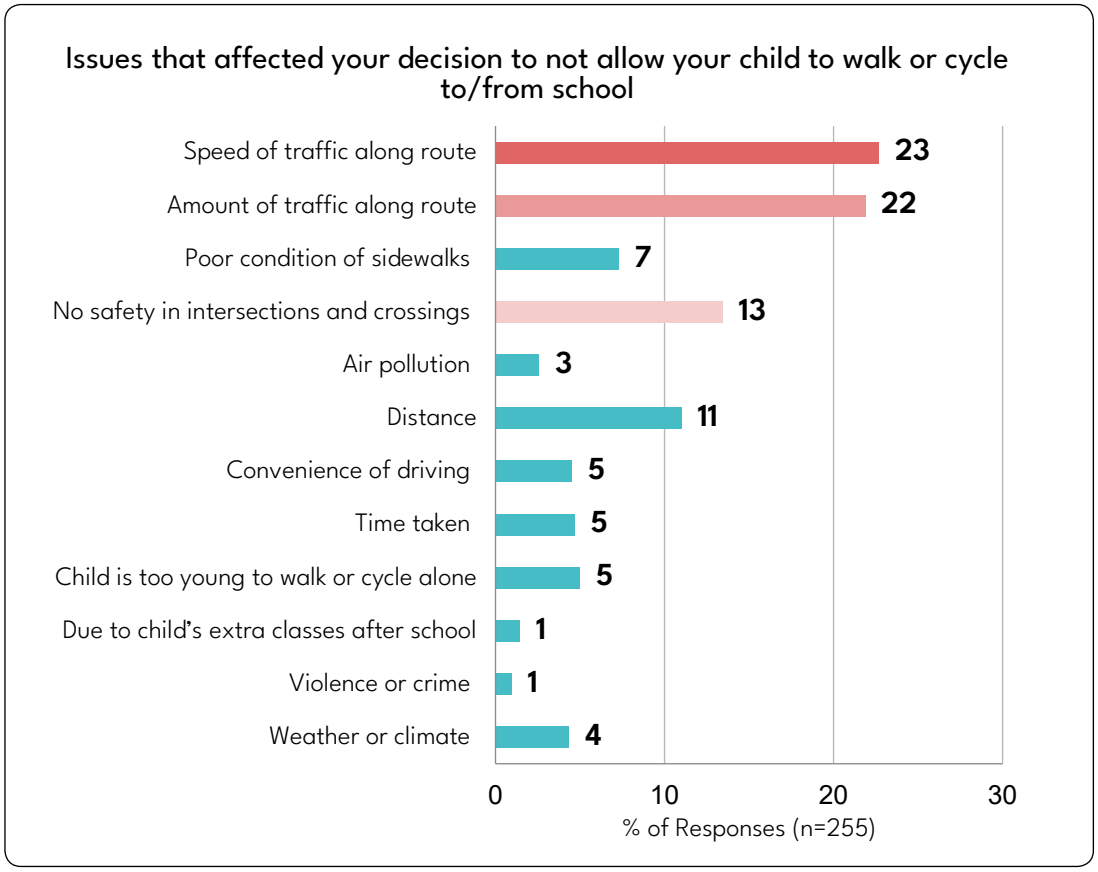


Figure 8. Reasons for not preferring walking or cycling to school

The most significant obstacles for students commuting by foot or bicycle were

Speeding vehicles,

Peak-hour congestion, and

Unsafe pedestrian crossings.

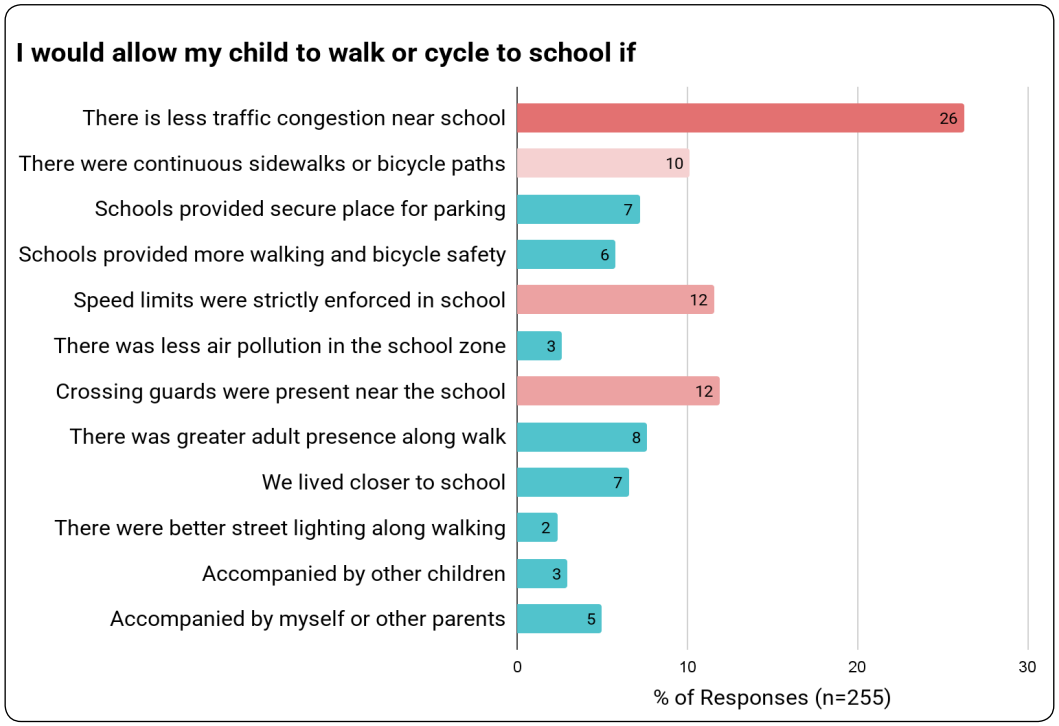


Figure 10. Factors needed to shift to walking or cycling to school

Factors for a shift to sustainable transport

26% requested **reduced congestion** near the school.

12% wanted **crossing guards** near the school entrance.

12% emphasized the need for stricter **speed enforcement**.

10% wanted **continuous footpaths and cycling paths** along school routes.

4. PARENTAL AWARENESS OF SCHOOL INITIATIVES

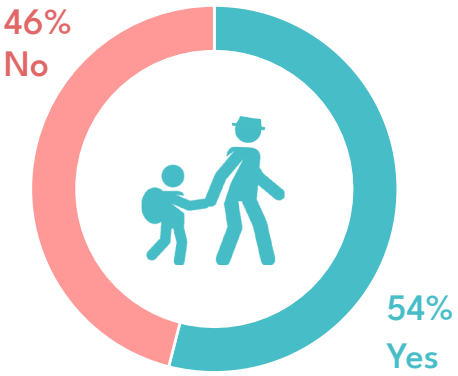
School Initiatives

The school had a Road Safety Patrol for students and occasionally conducted awareness sessions on road safety with the help of traffic police. However, these sessions were infrequent and typically held only on significant international road safety days, focusing on traffic rules and safety awareness.

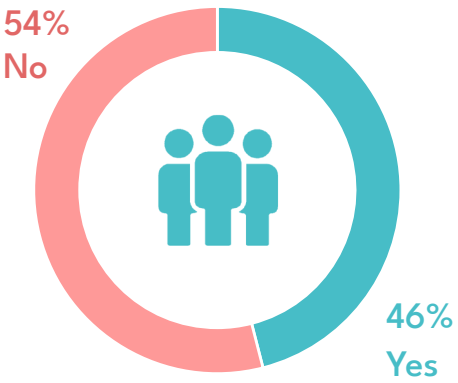
There was no dedicated committee in the school to address road safety concerns.

While the school provided cycle parking within the campus, it did not actively promote sustainable modes of transport.

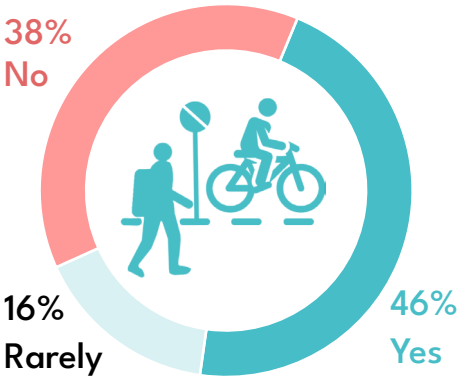
Parental Awareness of road safety initiatives was mixed:



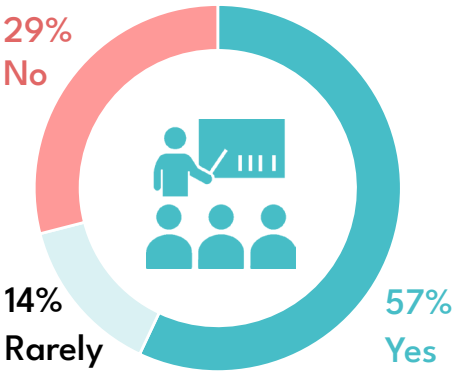
Is there a student road safety patrol (RSP) in your child's school?



Is there any committee in the school to address concerns regarding road safety?



Does the school actively promote travelling by walk, bicycle, school buses or public transport?



Are there any classes or courses provided by the school to educate the students regarding road safety?

5. ROAD SAFETY PERCEPTIONS & SUGGESTED IMPROVEMENTS

Accident & near misses

45% of respondents had never witnessed an accident or near-miss in the school zone, while 38% had seen incidents once or twice.
However, 5% had witnessed more than 10 incidents.

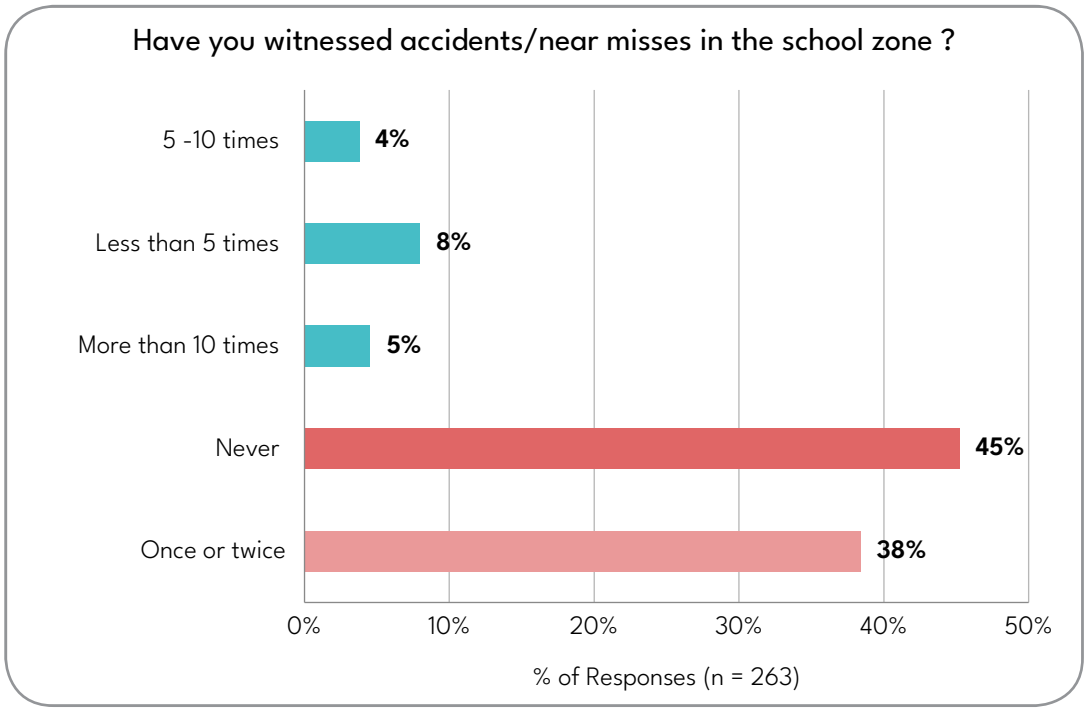


Figure 11: Accidents/near misses near school

School zone safety rating

30% rated the school zone's road safety as bad or very bad,
20% rated it good to very good, while
50% rated fair.

Top suggestions by parents on improving road safety

- **29%** suggested reducing congestion.
- **17%** wanted the presence of traffic police.
- **12%** emphasized the need for speed control measures like speed limits and speed breakers.

5.5 INFRASTRUCTURE AUDIT

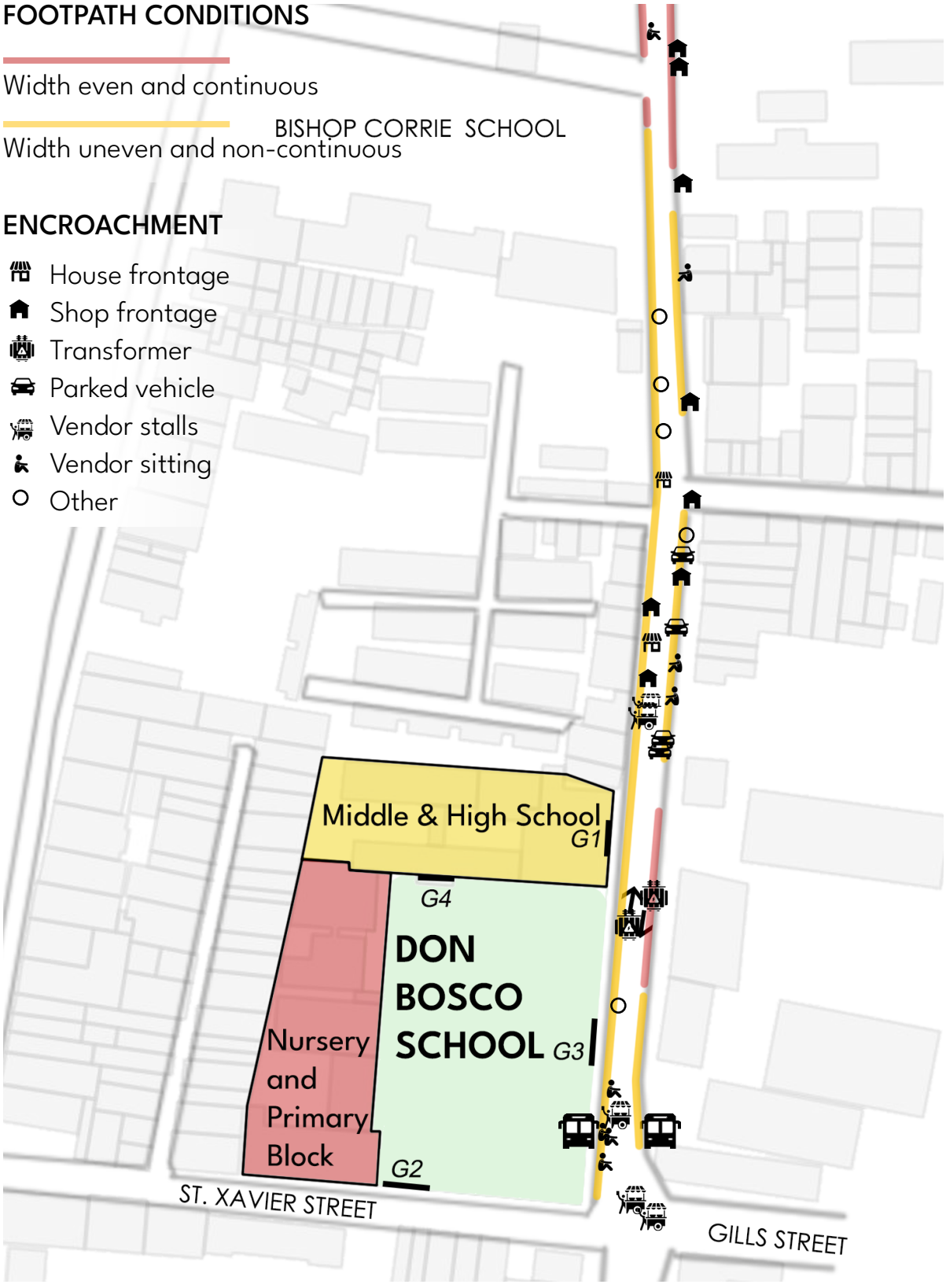


Figure 14. Map showing footpath condition and encroachments near St. Gabriel's school

5.5.1 CHALLENGES - EASE OF MOVEMENT

The pedestrian pathway along the mapped road section varies significantly in width due to encroachments, making movement challenging, especially for school children. While the footpath is originally designed to be 2 meters wide, its effective width is reduced to just 0.5 to 1 meter in several stretches due to vendor stalls, parked vehicles, shop frontages, and loading/unloading activities by commercial establishments.

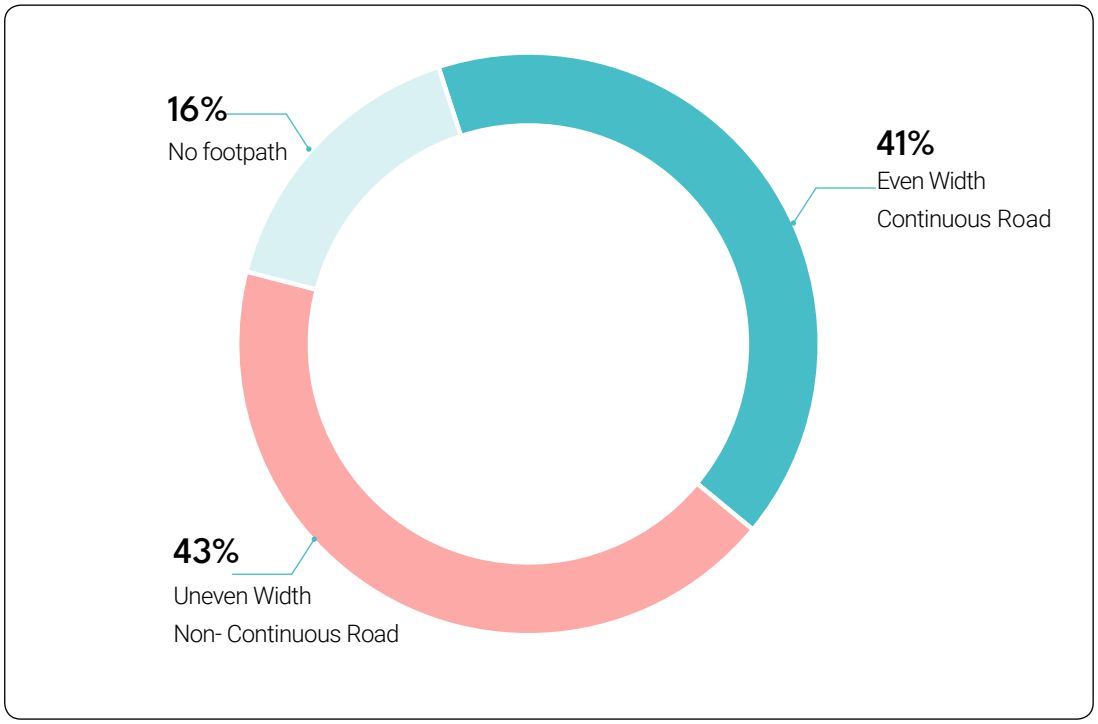


Figure 15: Footpath condition in Prakasam Salai, Broadway

In the total mapped stretch, **43% of the footpath was found to be of uneven** width and discontinuous, often interrupted by building extensions and encroachments, making it unsafe for pedestrian use. The footpath near the school, specifically within 100 meters on either side, was largely inaccessible due to these obstructions. In contrast, **41% of the footpath remained continuous and walkable**, primarily near the college area where there were fewer commercial activities and, consequently, fewer encroachments. Additionally, **16% of the mapped stretch lacked a footpath entirely**. In front of the St. Gabriel's School ground, an unused built structure further obstructs pedestrian movement.

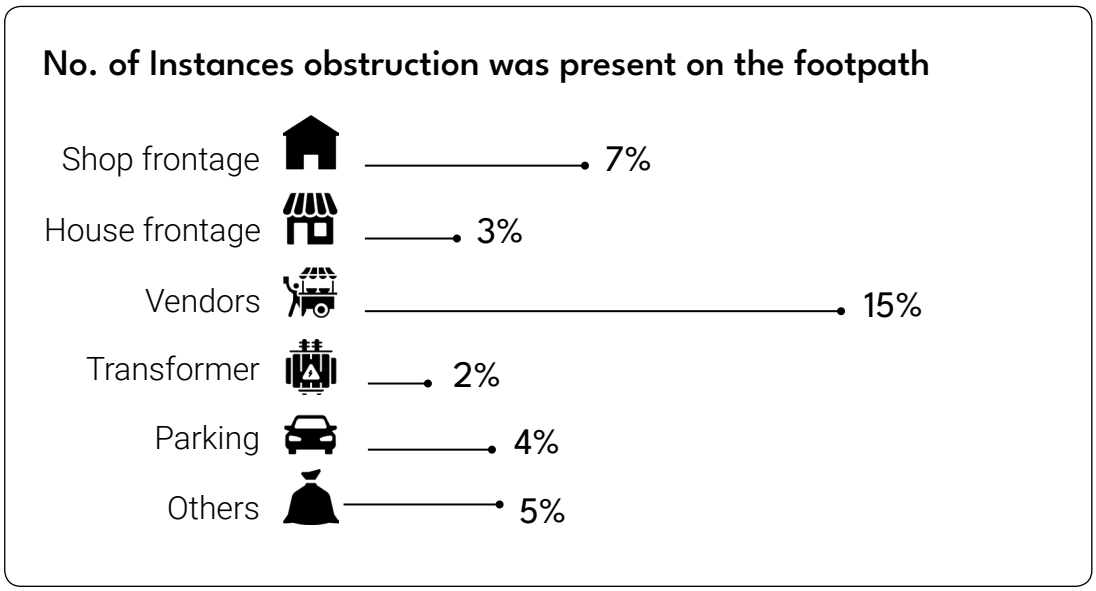


Figure 16: Encroachments on the footpath in Prakasam Salai, Broadway

Despite the presence of a 2-meter shoulder space, on-street parking further restricts pedestrian movement, forcing people, including school children, to walk on the carriageway. This creates a hazardous situation, increasing the risk of conflicts between pedestrians and vehicles, particularly during peak school hours. Students walking and cycling on the carriageway due to limited pedestrian space also contribute to traffic congestion.

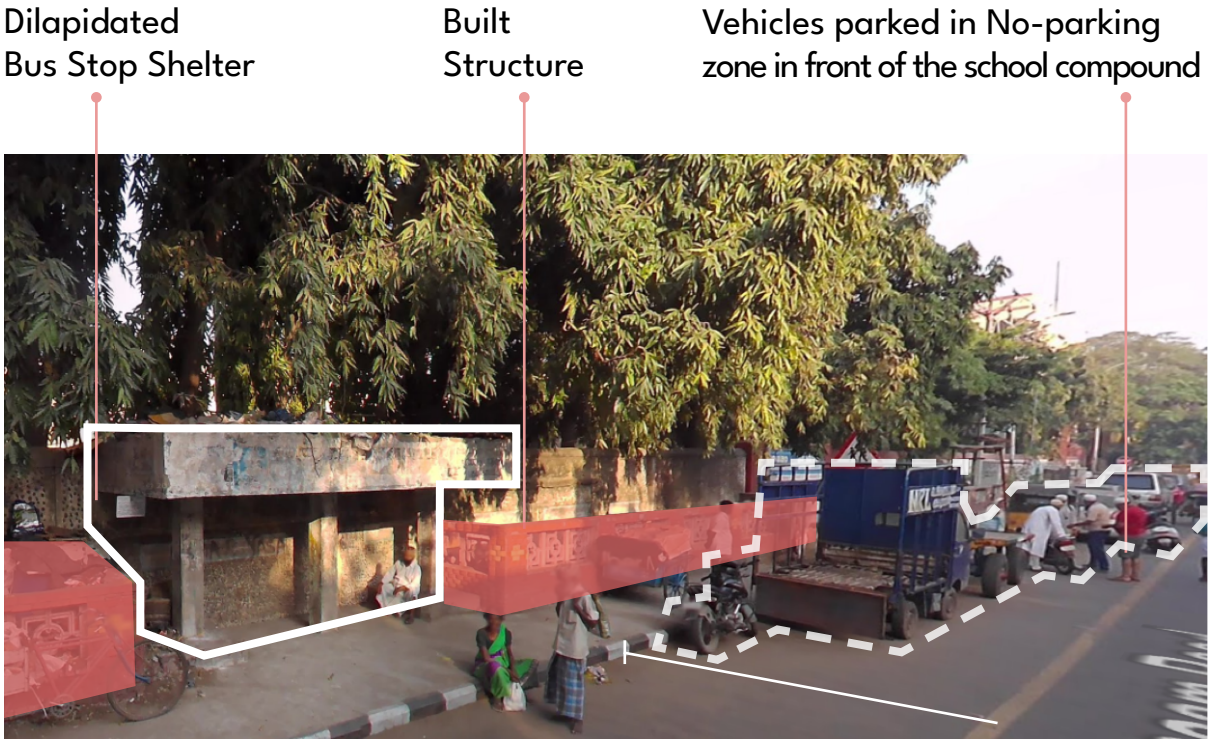


Figure 17.Encroachments on footpath near bus stop in Prakasam Salai

Figure 18. Built structure encroaching the footpath in front of St. Gabriel's school

On St. Xavier's Street, additional challenges arise due to squatter settlements encroaching onto the road and on-street parking reducing the available carriageway width. This obstruction leads to severe congestion, particularly during school drop-off and pick-up hours, as vehicles struggle to enter or exit the narrow passage. The lack of dedicated pedestrian infrastructure and the encroachment of public space not only compromise safety but also hinder the efficient movement of all road users in the school zone.

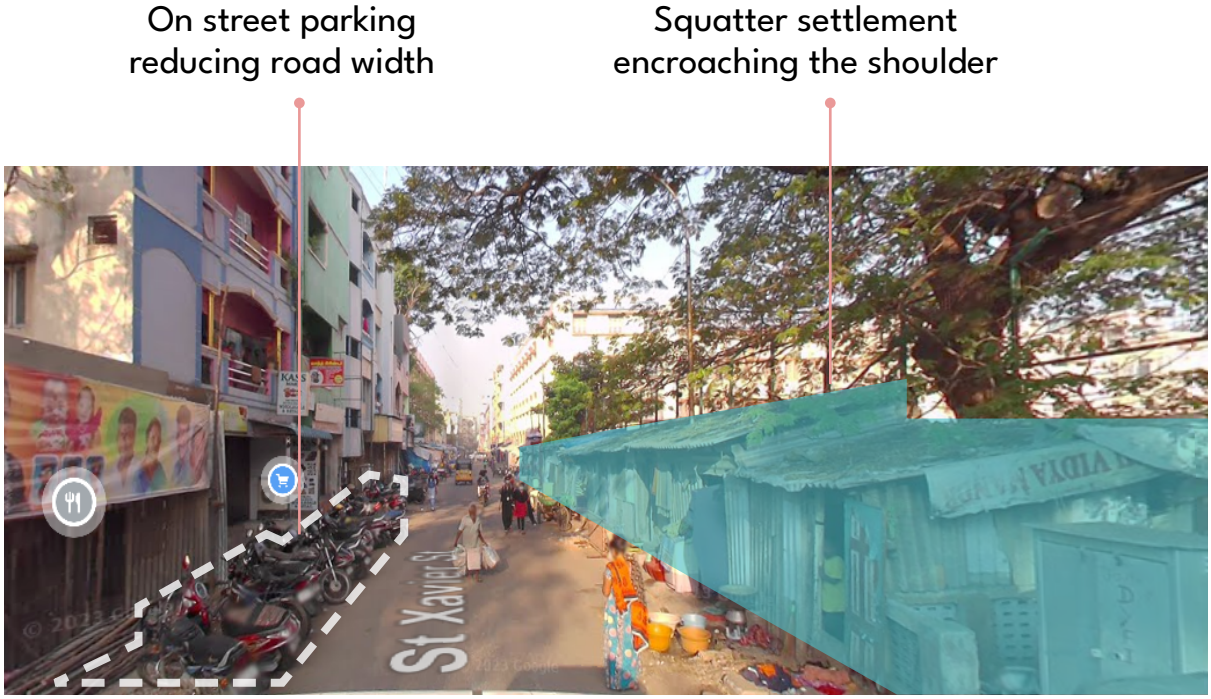


Figure 19. Squatters and on-street parking in St.Xavier's street

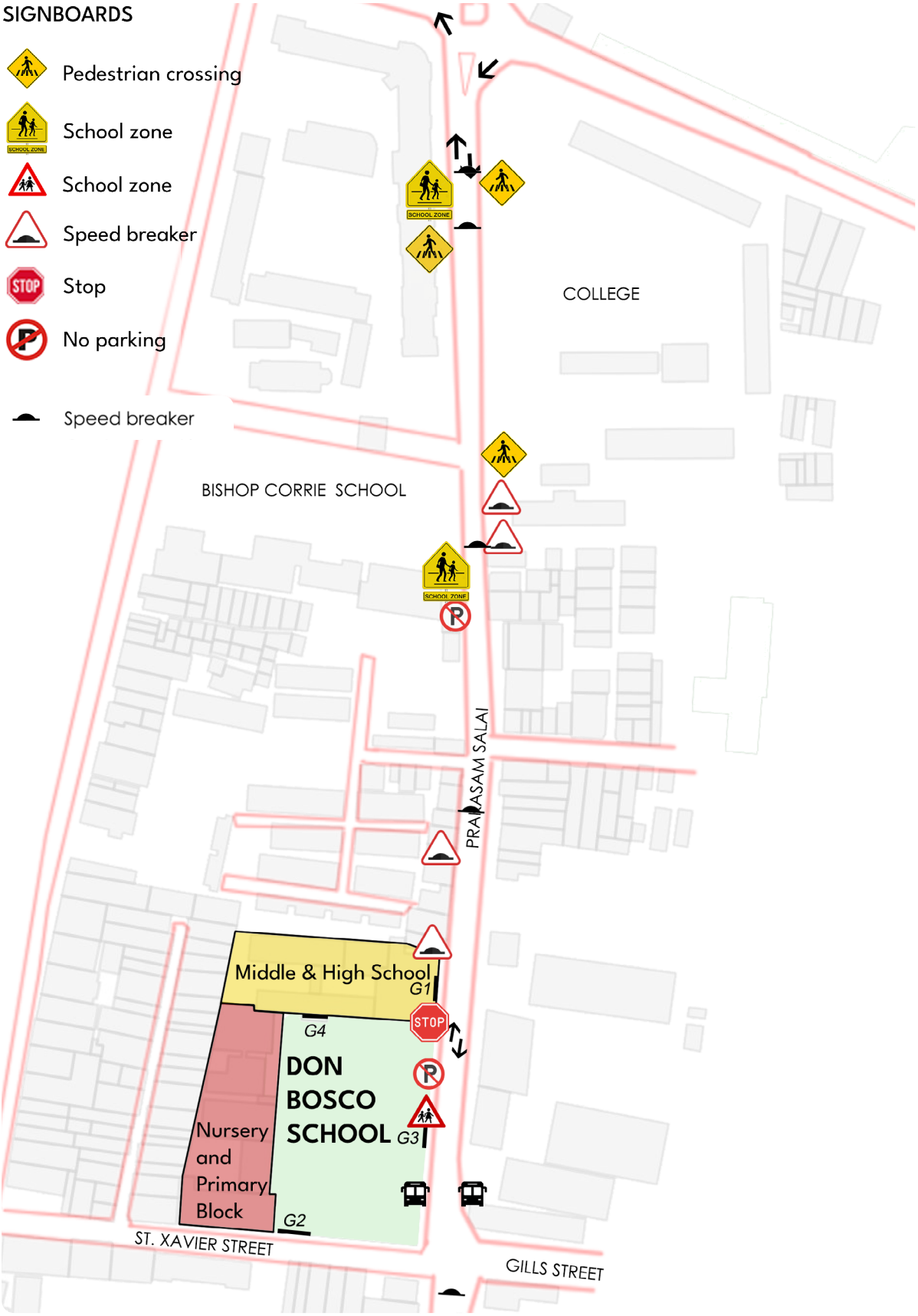


Figure 20: Map showing speed calming measures and signboards near St. Gabriel's school

5.5.2 CHALLENGES - ROAD SAFETY

The mapped stretch includes four zebra crossings, but they are faded, reducing visibility and effectiveness. At the junction near the school, a crossing is present only on one side, making it difficult for children to cross safely in other directions.
There are five speed breakers along the stretch, including one near the school junction. **However, their faded markings and the lack of additional traffic calming measures fail to ensure proper speed regulation in the school zone.** Additionally, the chequered markings on speed breakers are often mistaken for zebra crossings, leading to confusion among pedestrians.

Signage is inadequate, with no speed limit sign near St. Gabriel's School and a fallen school zone sign near Bishop Corrie School. While no-parking signs and road markings exist in front of the school, illegal parking in the shoulder space forces children to walk on the carriageway, increasing safety risks.

Additionally, while the shoulder is marked, there is no centerline marking on the carriageway, impacting lane discipline and overall road safety.

Despite the presence of no-parking sign boards and road markings near the school, illegal on-street parking is prevalent throughout Prakasam Salai, occupying the shoulder space. With footpaths already encroached upon by vendor stalls and shopfronts, pedestrians, including students and parents accessing the nearby bus stop, are forced to walk on the carriageway, putting them at risk of conflicts with moving vehicles. This issue persists despite the availability of pedestrian infrastructure, highlighting the lack of enforcement and maintenance.

As a commercial area, the road sees frequent movement of heavy vehicles such as lorries transporting goods. These vehicles contribute to traffic congestion, especially **during loading and unloading, causing roadblocks and reducing maneuverability for other road users**.

The absence of a designated pick-up and drop-off area exacerbates congestion in front of the school. The dispersal of students primarily happens through the middle and high school gate (G1), where parents, two-wheelers, and autos gather in limited space. **Many two-wheelers and autos make sudden U-turns or reverse dangerously near the school entrance, further adding to the chaotic traffic conditions**. Additionally, instances of haphazard driving and speeding within the school zone increase the safety risks for students and pedestrians.

5.6 TRAFFIC CONGESTION AND ITS IMPACT ON AIR QUALITY

5.6.1 TRAFFIC VOLUME COUNT

The highest traffic volume was recorded at **4:00 PM** (1019), coinciding with school dispersal, with a significant surge in pedestrian movement and two-wheeler traffic.

Two-wheelers (996) remained the dominant mode of transport throughout the day. **Pedestrian** numbers saw a sharp rise in the evening (596), indicating that many students either walk home or rely on public and shared transport.

Car and bus traffic remained relatively stable across all time slots. **Shared auto** movement was higher (70) at **4:00 PM**, aligning with the dispersal of students, highlighting the reliance on intermediate transport.

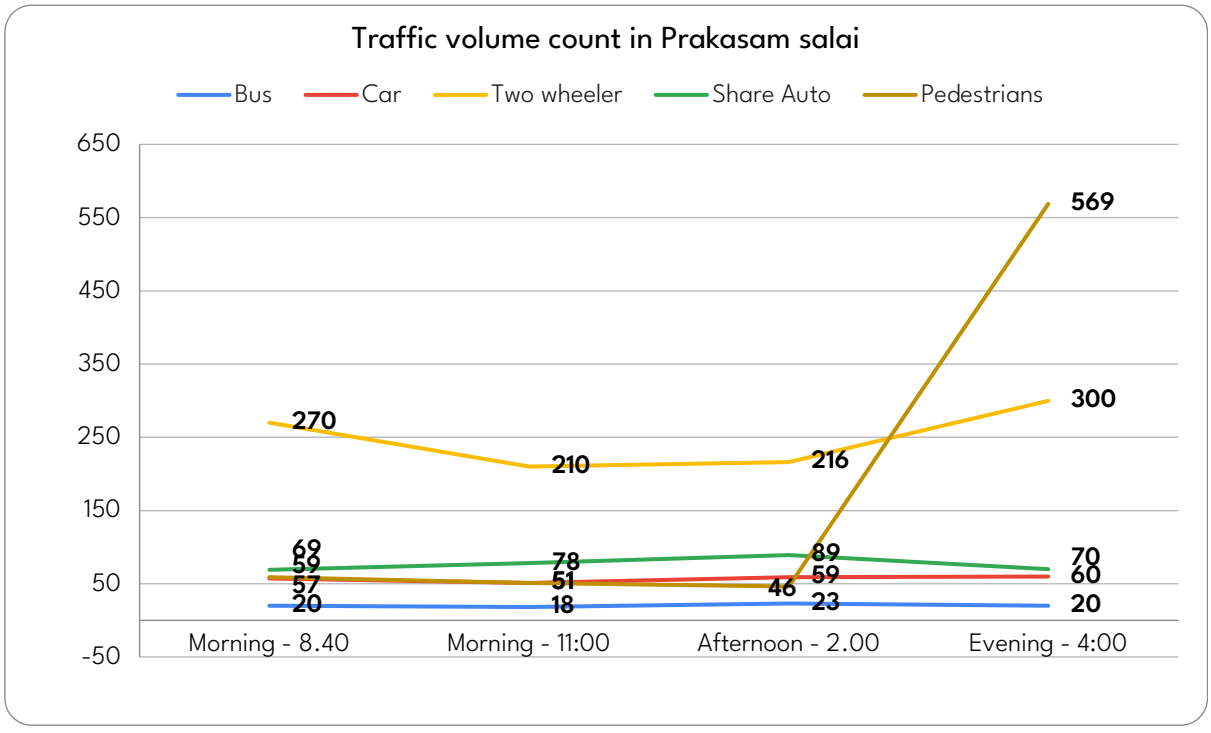


Figure 21. Traffic volume count in Prakasam Salai, Broadway

5.6.2 AIR QUALITY

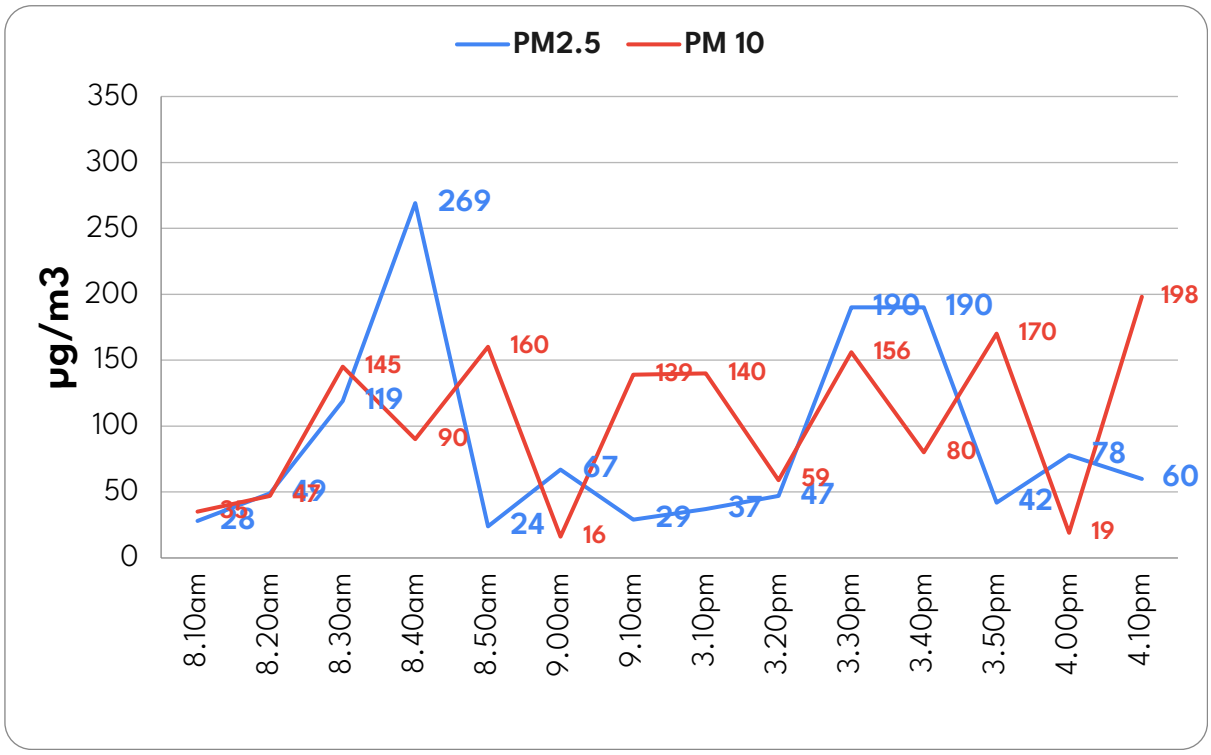


Figure 22. PM 2.5 in Prakasam Salai during morning and afternoon peak hours

The air quality data clearly shows a connection between traffic congestion and pollution levels during school peak hours.

In the morning, pollution levels surged during drop-off times when traffic was at its peak. At 8:40 AM, with 270 two-wheelers, 69 shareautos, and 57 cars on the road, **PM2.5 spiked to 269 µg/m³**, and **PM10 peaked at 160 µg/m³** by 8:50 AM.
This suggests that emissions from these vehicles played a major role in deteriorating air quality.

The evening dispersal period also showed a similar pattern. Traffic volume was highest at 4:00 PM, with 569 pedestrians and 300 two-wheelers, leading to a noticeable rise in pollution levels before dispersal. By 3:30 PM, **PM2.5 had increased to 190 µg/m³**, while **PM10** remained high, **reaching 156 µg/m³** at 3:30 PM and **170 µg/m³** at 3:50 PM.
This spike in pollution aligns with the rush of vehicles and pedestrian activity as students leave school.

PM2.5 and PM10 levels were monitored throughout the day to understand how air quality changes during peak and off-peak hours.

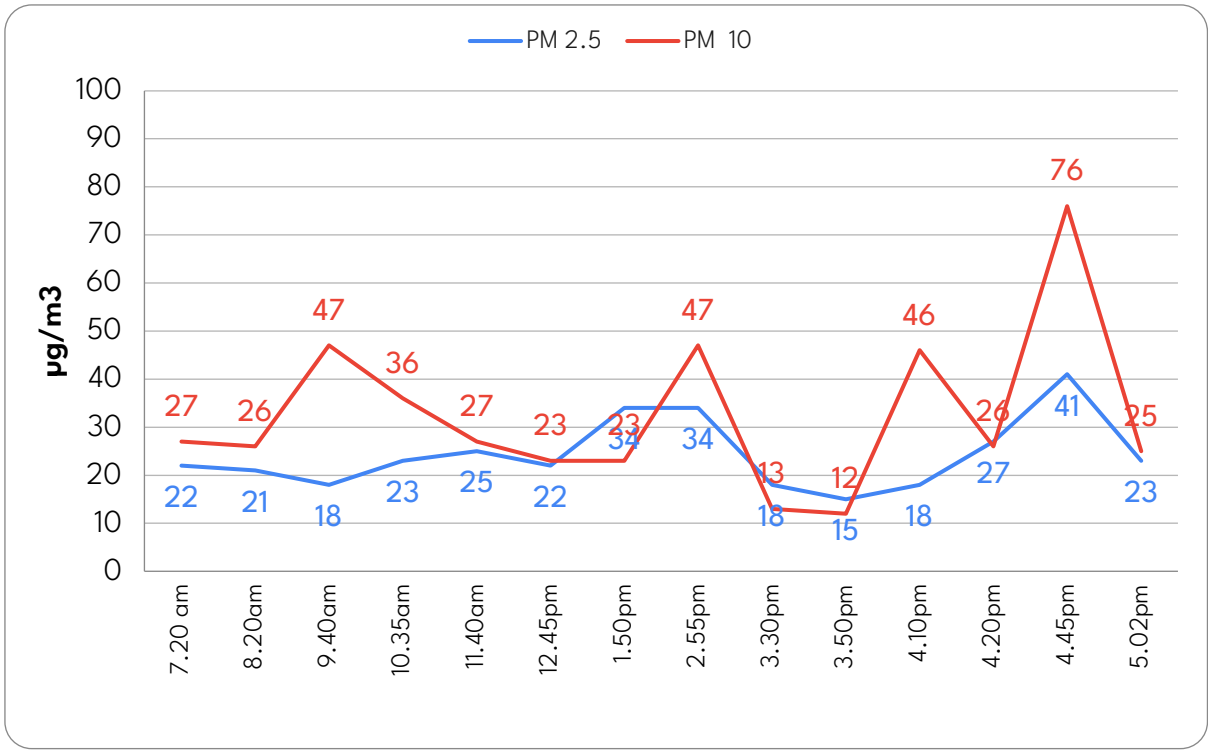


Figure 23. PM2.5 and PM10 in Prakasam Salai

On average, the PM2.5 and PM10 levels exceeded the limits recommended by the WHO but remained within the permissible range set by India's National Ambient Air Quality Standards (NAAQS).

AVERAGE PM2.5 -24.36 µG/M³ (WHO limit: 15 µg/m³ – Exceeds WHO standard, NAAQS limit: 60 µg/m³ – Within safe limits)

AVERAGE PM10 - 32.43 µG/M³ (WHO limit: 20 µg/m³ – Exceeds WHO standard, NAAQS limit: 100 µg/m³ – Within safe limits)

A noticeable spike in PM10 levels was observed in the morning, rising from 26 µg/m³ at 8:20 AM to 47 µg/m³ at 9:40 AM, coinciding with the morning school rush.

In the evening, pollution levels peaked again during dispersal time, with PM2.5 increasing from 15 µg/m³ at 3:50 PM to 41 µg/m³ at 4:45 PM, while PM10 jumped from 12 µg/m³ to 76 µg/m³ in the same period.

These pollution spikes clearly align with school opening and closing hours when heavy traffic congestion caused by parents picking up and dropping off students leads to increased emissions.

The air quality measurements are noticeably lower during off peak hours (between 10:35 AM and 2:55 PM), when traffic volume is lower due to the absence of school-related activities.

5.7 PROPOSED MEASURES FOR IMPROVING SCHOOL ZONE SAFETY

Impact level	Traffic management measures	Tactical urbanism measures	Infrastructural changes
High impact	Using school ground for pick up and drop off	Kerb extensions for waiting and bollards to minimize pedestrian-vehicle conflicts.	Removing footpath encroachments
	Restrict commercial activities and heavy vehicles during school hours	Painting the carriageway with vibrant colors	Tabletop zebra crossing near school
	Enforce no-parking with ANPR (Automatic Number Plate Recognition) enforcement		Pedestrian crossings with rumble strips
	Traffic police assisting crossings		
Medium impact	Trained crossing guards	Repaint speed breakers and zebra crossings	Maintain uniform footpath width
	Flashing beacon to alert road users	Painting school walls with vibrant colors	Barricades to restrict U-turns
	Using shoulder space for pick up and drop off	School zone road markings and signboards	
Low impact	Speed limit sign boards	Zig zag road marking to restrict parking	Paved shoulder as a cycle lane
		Convex vibration markings for centreline	

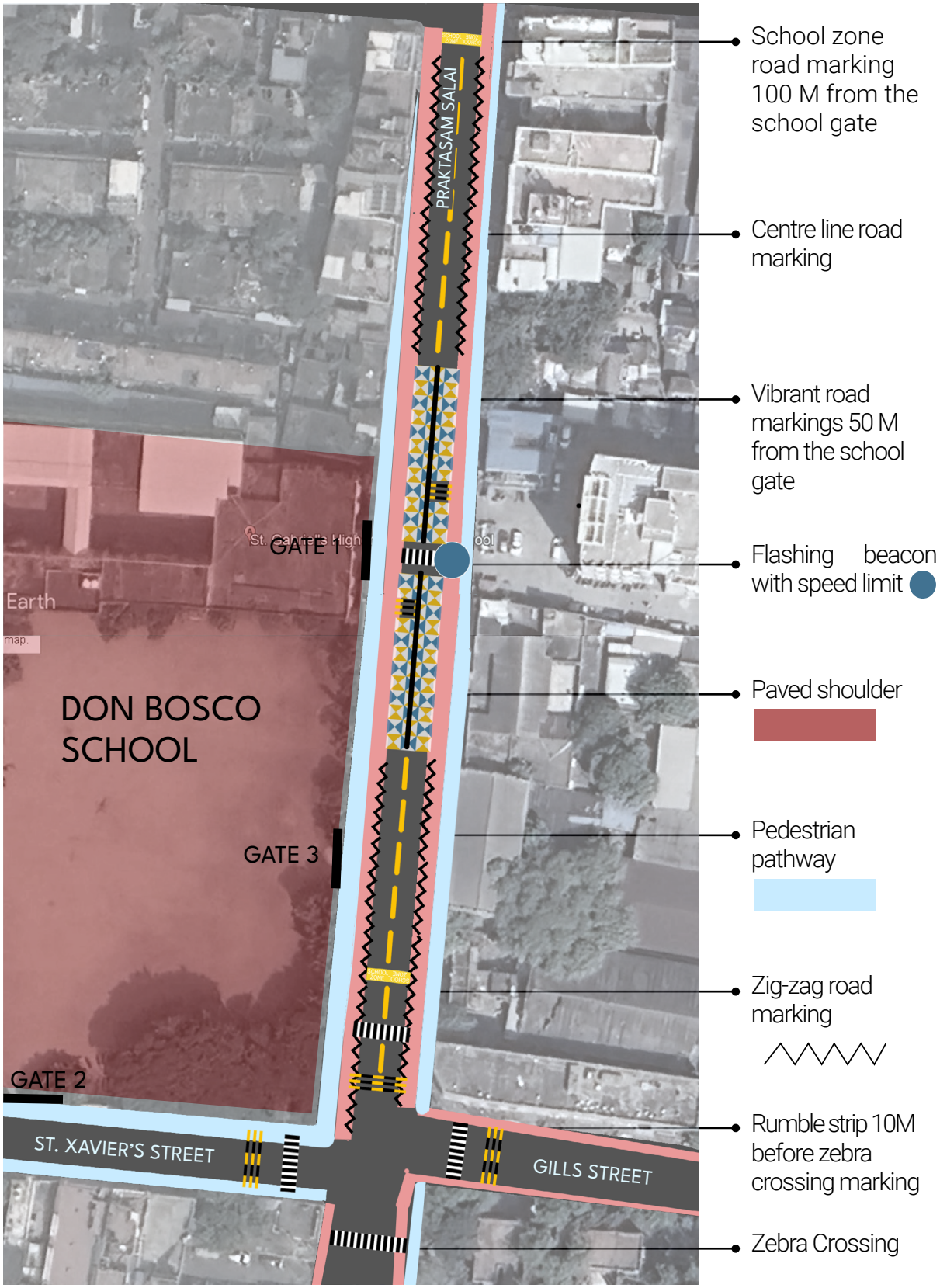


Figure 24. Map showing recommendations for road safety measures near St. Gabriel's school

5.7.1 RECOMMENDATIONS FOR PRAKASAM SALAI

ENHANCE WALKABILITY & REMOVE OBSTRUCTIONS

Ensure a **uniform 3m-wide pedestrian pathway** throughout the entire stretch of the Prakasam Salai from the school gate till the intersection with Old Jail road.

Remove encroachments and restore the original footpath width, including the built structure in front of the school.

Relocate footpath vendors to designated vending zones away from the school.

Introduce kerb extensions (bulb-outs) near the school gate for safe waiting areas and reduced crossing distances.

Extend bollards/ pedestrian guardrails for 10m along the footpath near the school gate to minimize pedestrian-vehicle conflicts.

RESTRICT COMMERCIAL ACTIVITIES DURING SCHOOL HOURS

Ban loading/unloading along Prakasam Salai **during school hours** to prevent blockages on footpaths.

Strictly enforce **time restrictions for heavy vehicles**, prohibiting entry between 8 AM - 5 PM in the school zone.

STRICT NO-PARKING ENFORCEMENT

Enforce existing **no-parking zones near the school gate** (100m from the school gate- G1) to free up shoulder space and reduce congestion.

Restrict on-street parking on the opposite side of the school, during peak school hours (8-9 AM & 4-5 PM) with clear signage. (Refer Annexure 3)

Install ANPR (Automatic Number Plate Recognition) cameras to monitor illegal parking and speeding violations.

Redesign the dilapidated **bus stop shelter** to improve usability.

Add zig-zag lane/shoulder markings (as per Indian Roads Congress (IRC) Code 35) to indicate restricted parking areas near the school.

INTRODUCE CYCLE LANES

Convert the shoulder width into a **dedicated cycle lane** by paving it with a different material to prevent illegal parking.

Raise and pave a **100m-long cycle lane** on either side of the school gate (G1), with long-term plans to extend it along the entire road.

IMPROVE PEDESTRIAN INFRASTRUCTURE

Upgrade the faded zebra crossing near the school to a tabletop crossing with vibrant colors for better visibility.

Repaint all zebra crossings in red and white stripes (as per IRC SP 32) (Refer Annexure 3).

Install rumble strips (Refer Annexure 3) 10-20m before all zebra crossings to slow down vehicles.

Provide **zebra crossings and rumble strips at all four arms** of the police station junction for better pedestrian access.

Repaint speed breakers with alternating black and white bands to prevent confusion with zebra crossings.

ENSURE SAFE ROAD CROSSINGS FOR CHILDREN

Install a flashing beacon (Refer Annexure 3) with a speed limit sign opposite the school to alert drivers. The speed limit must be 25 kmph in the school zone.

Station crossing guards near the school gate to assist children.

Ensure continuous presence of **traffic police during peak hours** to monitor congestion.

Train student road safety patrol members to assist with traffic control and pedestrian crossings.

IMPROVE SCHOOL ZONE VISIBILITY

Paint the **road carriageway with vibrant markings for 100m** on either side of the school gate to increase visibility.

Add '**SCHOOL ZONE' road markings** 100m from both directions to warn drivers.

Repaint the school compound wall in vibrant colors for better visibility.

REDUCE CONGESTION BY RESTRICTING U-TURNS

Paint convex vibration markings as a centerline to **separate lanes.**

Deploy barricades or lane separator poles in the middle of the carriageway **for 20m in front of the school** to divide traffic lanes and restrict unsafe U-turns.

ESTABLISH DESIGNATED PICK-UP & DROP-OFF ZONES

Option 1 - Utilize the shoulder space in front of the ground gate (G3) (2-2.5m wide)

Direct autos to wait in the shoulder space by removing on-street parking.

Ensure a clear pedestrian pathway from the school gate to the waiting autos.

Option 2 - Use the school ground gate

The autos can be directed to enter the school premises through the ground gate (G3), which can serve as both the entry and exit point for them. Two-wheelers can use the nursery gate (G2) for pick-up and drop-off. Students being picked up on two-wheelers should be guided to use the internal gate (G4) to directly access the nursery gate (G2).

To prevent congestion, autos should be instructed to arrive at the school 15 minutes before the starting and ending times (i.e., 8:00 AM and 4:00 PM). To facilitate the smooth turning of autos from the road into the school premises, a traffic personnel or school guard can be stationed at the ground gate.

Additionally, two personnel should be deployed at the intersection to guide two-wheelers towards the nursery gate and autos towards the ground gate. Another personnel should be positioned at the main entrance to assist school children in crossing the road. This role can eventually be taken over by the Student Road Safety Patrol for long-term management.

5.7.2 RECOMMENDATIONS FOR ST.XAVIER'S STREET AND GILL'S STREET

Remove squatters on St. Xavier's Street and pave 2m-wide shoulders for walking and install street furniture on the shoulder to prevent future encroachments.

Clear encroachments along Gill's Street and pave the shoulder for walking and cycling.

6. SRI RAMAKRISHNA MISSION HIGHER SECONDARY SCHOOL,

T.NAGAR

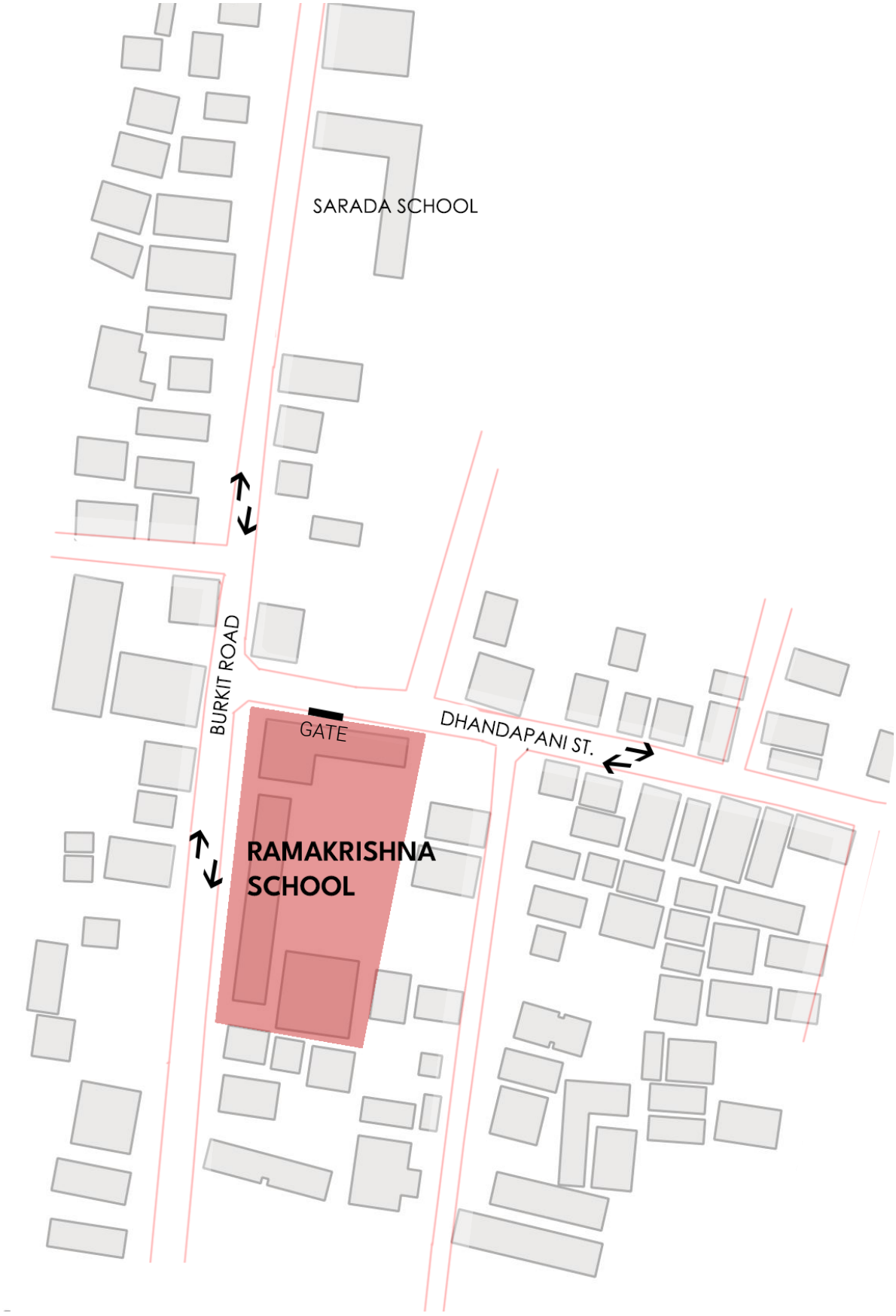


Figure 25. Map showing the Ramakrishna school layout

6.1 SCHOOL PROFILE

School Gates : There is only one school gate, which is located on Dhandapani Street and serves as the main entry/exit point for students and staff.

Location: Intersection of Dhandapani Street and Burkit Road, T. Nagar

Predominant land use: Mixed-use zone (Commercial & Residential)

Total strength: Approximately 777 students

Cycle Parking: Available inside the school premises for students.

Staff Parking: Space allocated within the school compound.

School timings: The school operates on a staggered schedule for different grade levels.

UKG & Primary school - 8:45 AM – 3:30 PM
Middle & 9th Standard - 8:45 AM – 4:45 PM
10th, 11th & 12th Standard - 8:45 AM – 5:15 PM

These staggered timings result in varying levels of pedestrian and vehicular traffic near the school throughout the day, with peak congestion during drop-off (8:30 – 9:00 AM) and pick-up hours (3:30 – 5:30 PM).

Photo. Ramakrishna mission school, T.Nagar | CAG

6.2 ACCESS TO PUBLIC TRANSPORTATION

Ramakrishna School is situated at a key intersection in T. Nagar, one of Chennai's busiest commercial and residential hubs. The school compound is bounded by Burkit Road on one side and Dhandapani Street on the other, with the main entrance located on Dhandapani Street.

The school has access to multiple modes of public transport, but they are too far from the school posing challenges for students commuting on foot:

- **Nearest bus stop:** 350m from the school
- **Nearest metro station:** 2 km away
- **Nearest suburban railway station:** 1.2 km away

6.3 STREET RIGHT OF WAY (ROW) & ROAD CONDITIONS

DHANDAPANI STREET (School gate facing road)

Carriageway width: 7 meters

Lane: No marked lanes, operating as a two-way street without any separation.

Shoulder space: 1.2 to 1.5 meters on both sides, but unpaved and poorly maintained.

Traffic flow:
Primarily local traffic, but experiences significant congestion during school hours due to vehicles stopping for pick-up/drop-off and on-street parking near the school gate.

Pedestrian facilities:
No dedicated footpath, forcing pedestrians, including students, to share space with vehicular traffic.

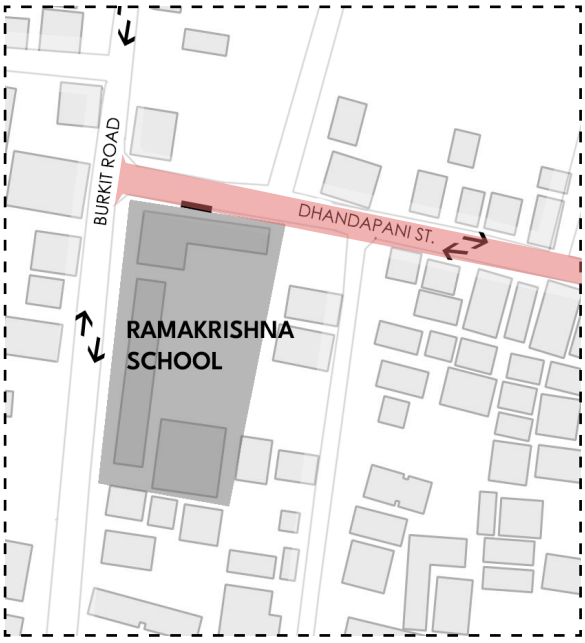


Figure 26. Street cross section of Dhandapani street, T.Nagar

BURKIT ROAD (Runs along the school compound)

Carriageway width: 6.5 to 7 meters

Lane :

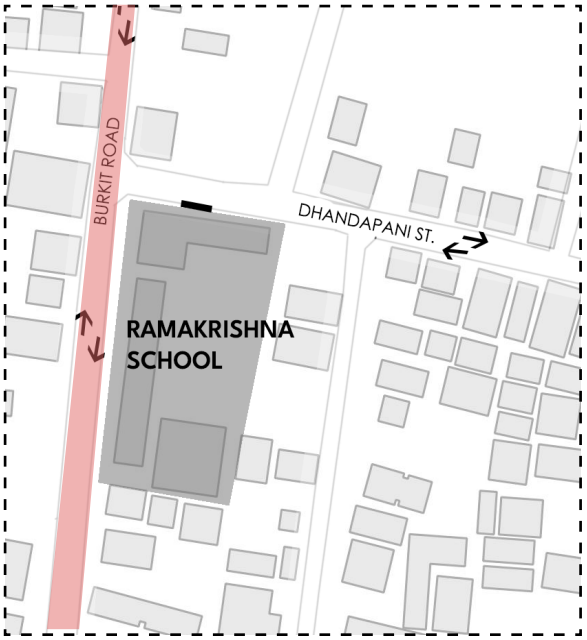
Two-way road with a centerline marking and is a bus route road.

Pedestrian facilities:

Footpath on both sides (~2m wide), but encroachments and poor maintenance in certain sections reduce its usability.

Traffic flow:

More structured than Dhandapani Street due to lane markings and pedestrian pathways, but still faces congestion.



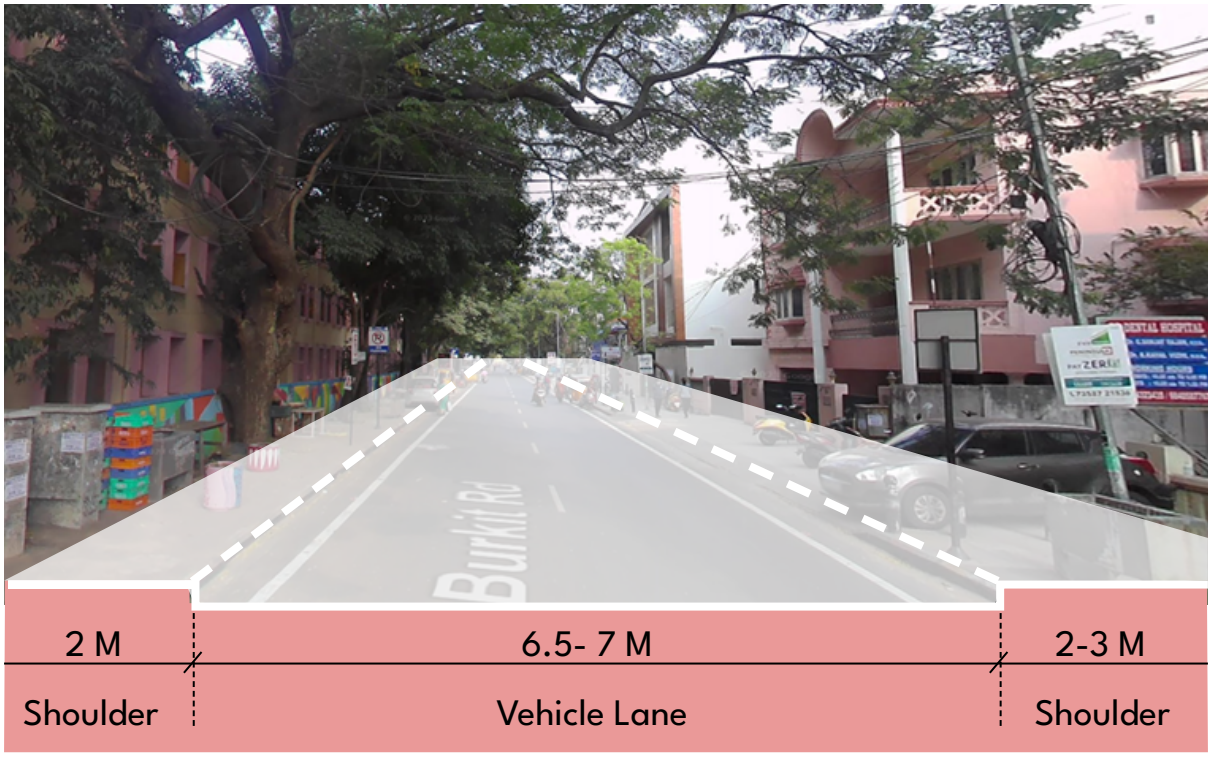


Figure 27. Street cross section of Burkit road, T.Nagar

6.4 PERCEPTION SURVEY (The sample size varied from 338 - 370)

1. MODES OF TRANSPORT & TRAVEL DISTANCE

The primary modes of transport used by school children include two-wheelers, MTC buses, and bicycles, followed by walking and private autos. The choice of transport is largely influenced by distance and safety considerations.

A significant **48%** of respondents **live within 2 km** of the school, with the majority (28%) residing between 1 to 2 km or 2 to 5 km away. **67%** of respondents stated that they **take the same route** every day.

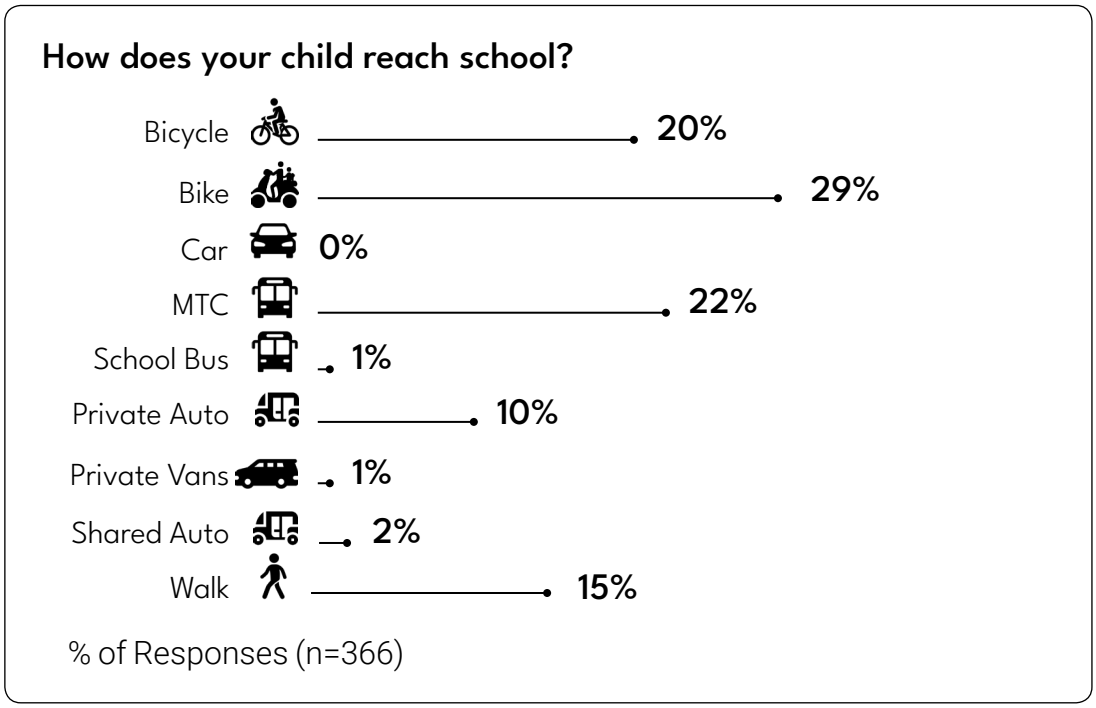


Figure 28. Mode of transport

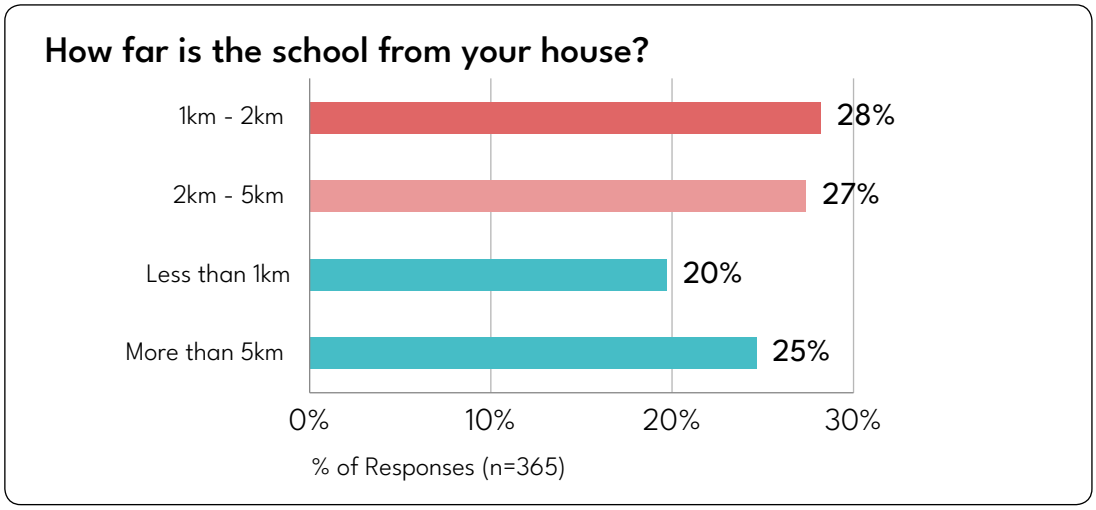


Figure 29. Travel distance

2. CHALLENGES IN NAVIGATION & PICK-UP/DROP-OFF ISSUES

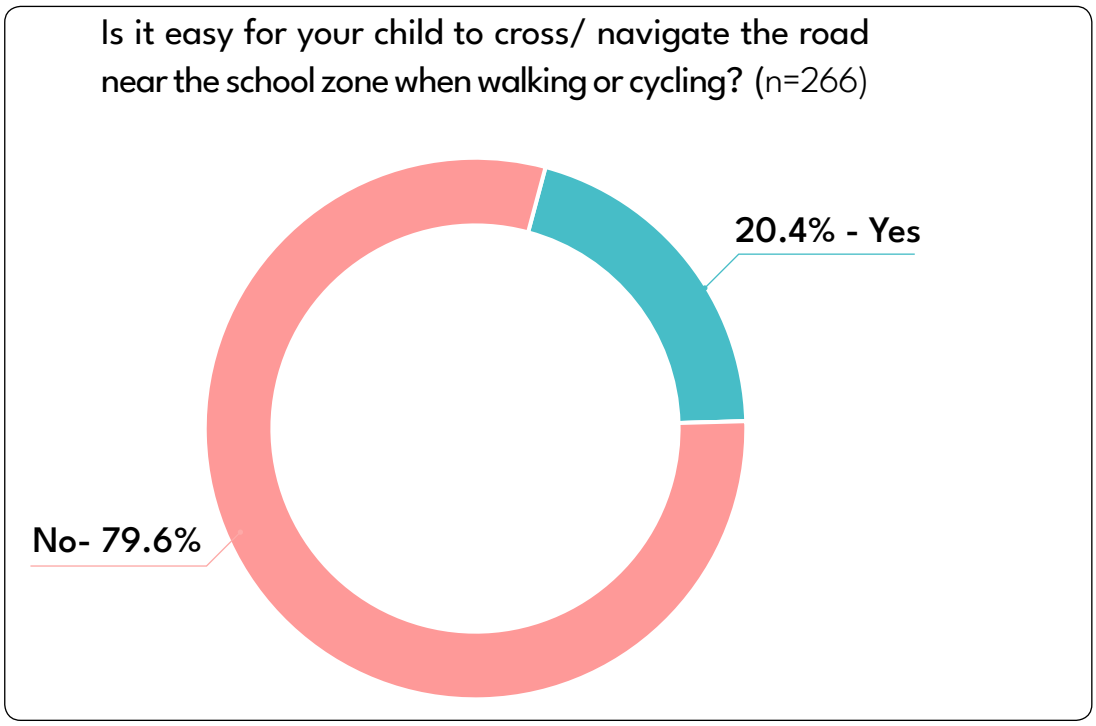


Figure 30. Difficulties in navigation

79% of parents stating that their child faces difficulties crossing or navigating the road near the school.
The most cited issue was **vehicles making U-turns in front of the school (31%),** contributing to congestion, followed by general **traffic congestion (29%)** and the **lack of designated drop-off zones (24%).**

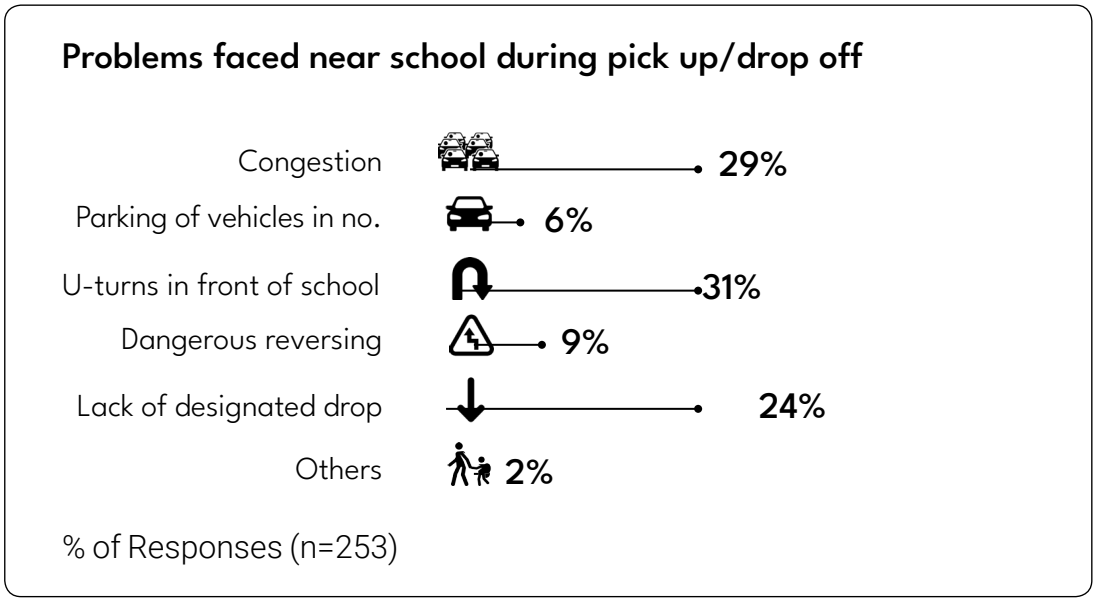


Figure 31. Problems during pick up/drop off

3. BARRIERS TO WALKING & CYCLING

The most significant hazards for children walking or cycling were **speeding vehicles (24%), unsafe crossing conditions (15%), & traffic congestion during school hours (15%).**

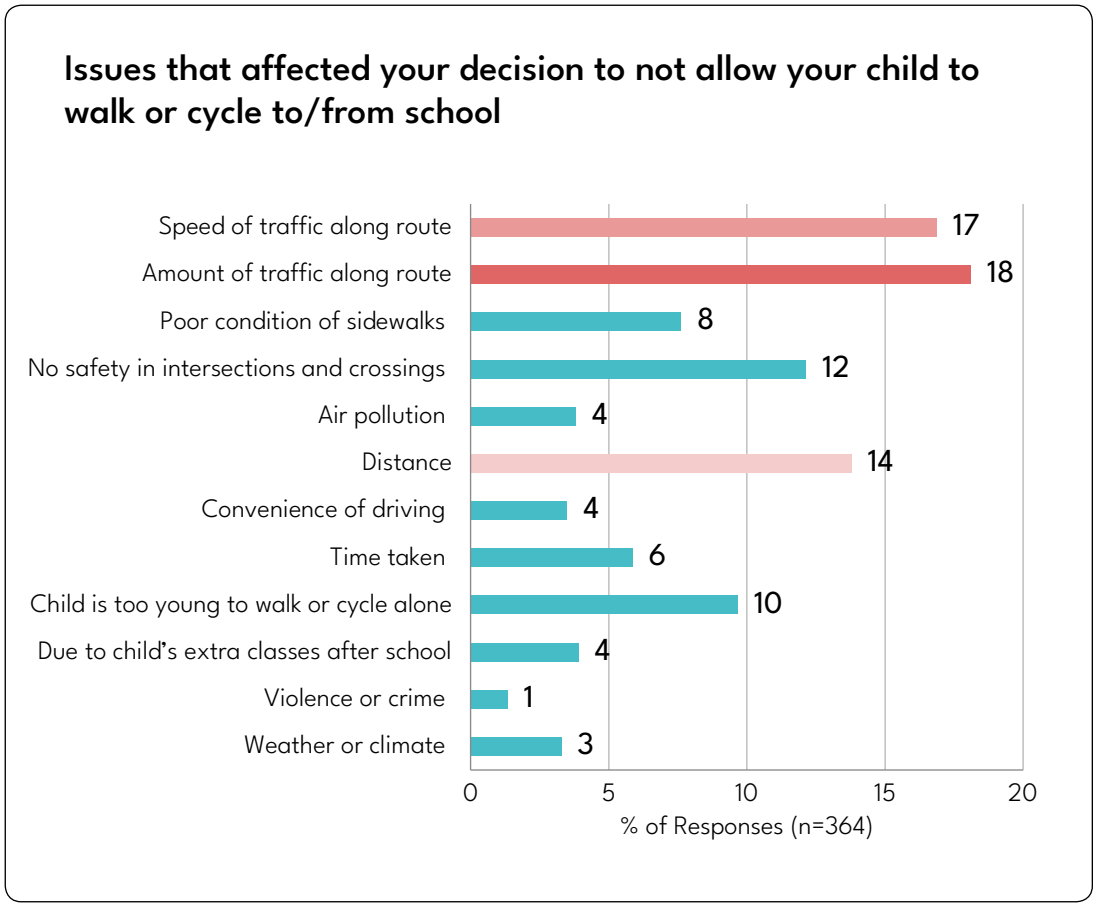


Figure 32. Reasons for not preferring walking or cycling to school

The majority said the amount of traffic along the route (18%) was the reason they didn't allow their child to walk or cycle to school, followed by speed of traffic along the route (17%) and distance (14%).

Factors for a shift to sustainable transport

24% of parents said they **would consider it if traffic congestion** near the school was **reduced**.

Others emphasized the **need for continuous footpaths and bicycle paths** from their neighborhoods to the school (**11%**)

Strict **enforcement of speed limits** in school zones (**10%**), the presence of **crossing guards** near the school entrance (**10%**), and **living closer** to the school (**10%**)

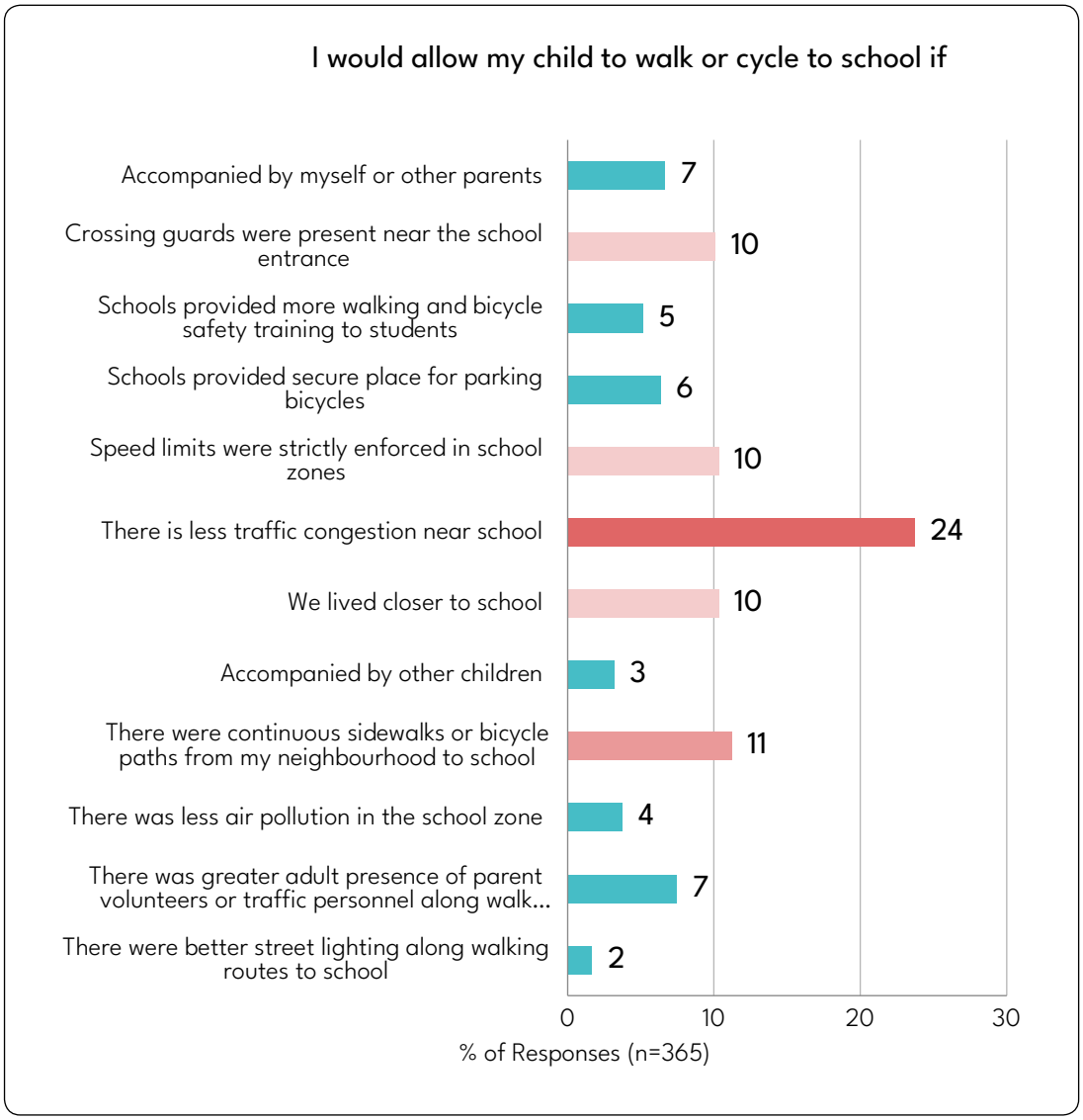


Figure 34. Factors needed to shift to walking or cycling to school

4. PARENTAL AWARENESS OF SCHOOL INITIATIVES

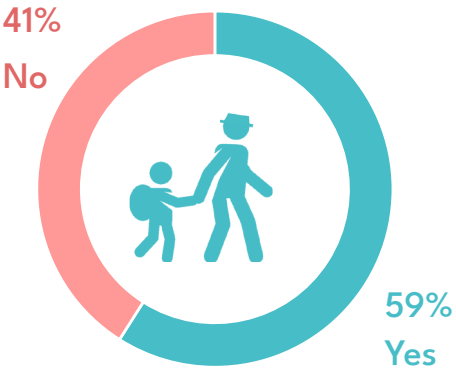
School initiatives

The school currently has a Road Safety Patrol for children but does not have any specific committees dedicated to road safety.

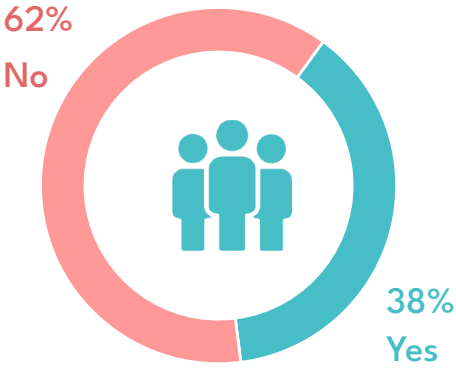
Regular awareness sessions on road safety and first aid are conducted with the support of NGOs.

Sustainable transport is passively encouraged by providing infrastructure such as cycle parking within the school. Additionally, traffic police assist in managing traffic and helping students cross safely during peak hours, supporting pedestrian safety.

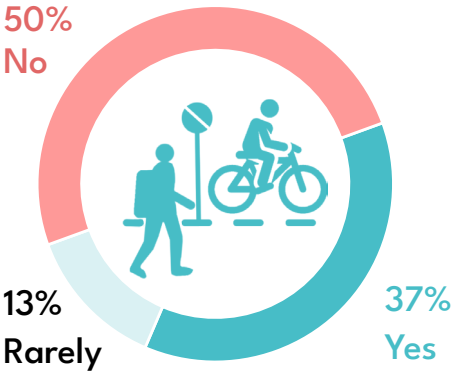
Parental awareness



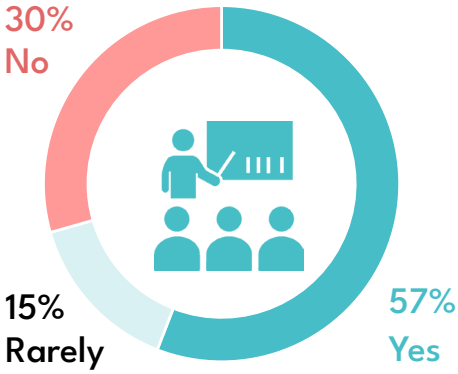
Is there a student road safety patrol (RSP) in your child's school?



Is there any committee in the school to address concerns regarding road safety?



Does the school actively promote travelling by walk, bicycle, school buses or public transport?



Are there any classes or courses provided by the school to educate the students regarding road safety?

5. ROAD SAFETY PERCEPTIONS & SUGGESTED IMPROVEMENTS

Accident & near misses

43% of respondents reported witnessing accidents or near-miss incidents in the school zone at least once or twice, while 39% had never witnessed such incidents.

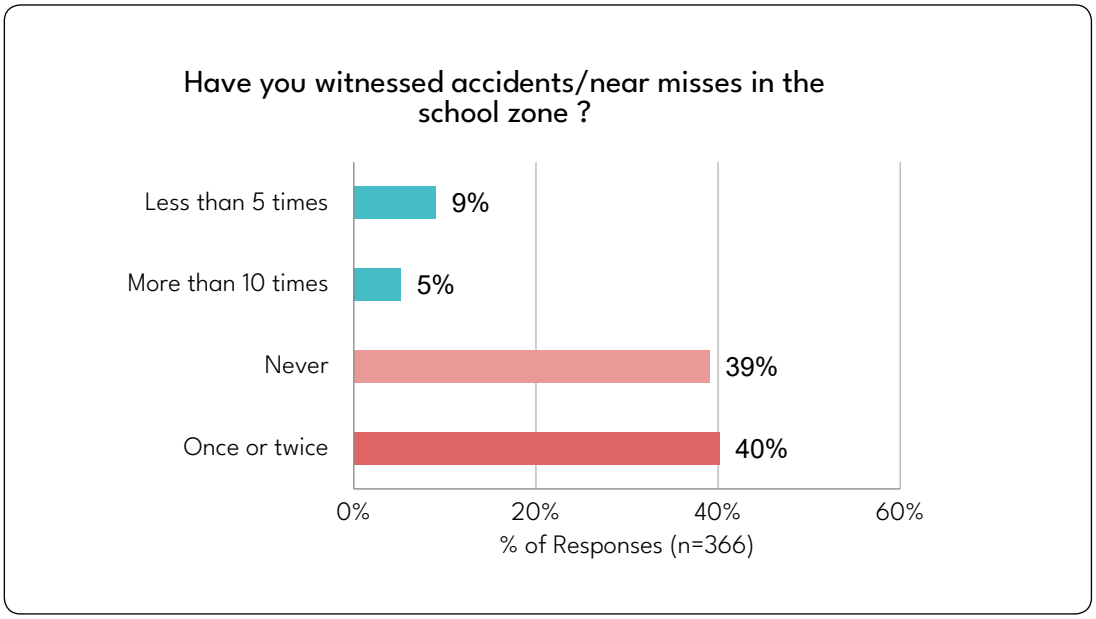


Figure 35. Accidents/near misses near school

School zone safety rating

27% rated the road safety conditions in the school zone as very bad or bad
23% rated them as good to very good
49% gave a neutral rating between good and bad.

Top suggestions by parents on improving road safety

23% suggested reducing congestion

18% emphasized stricter enforcement of traffic rules, removal of encroachments, and road widening, while

14% stated the need for increased presence of traffic police.

6.5 INFRASTRUCTURE AUDIT

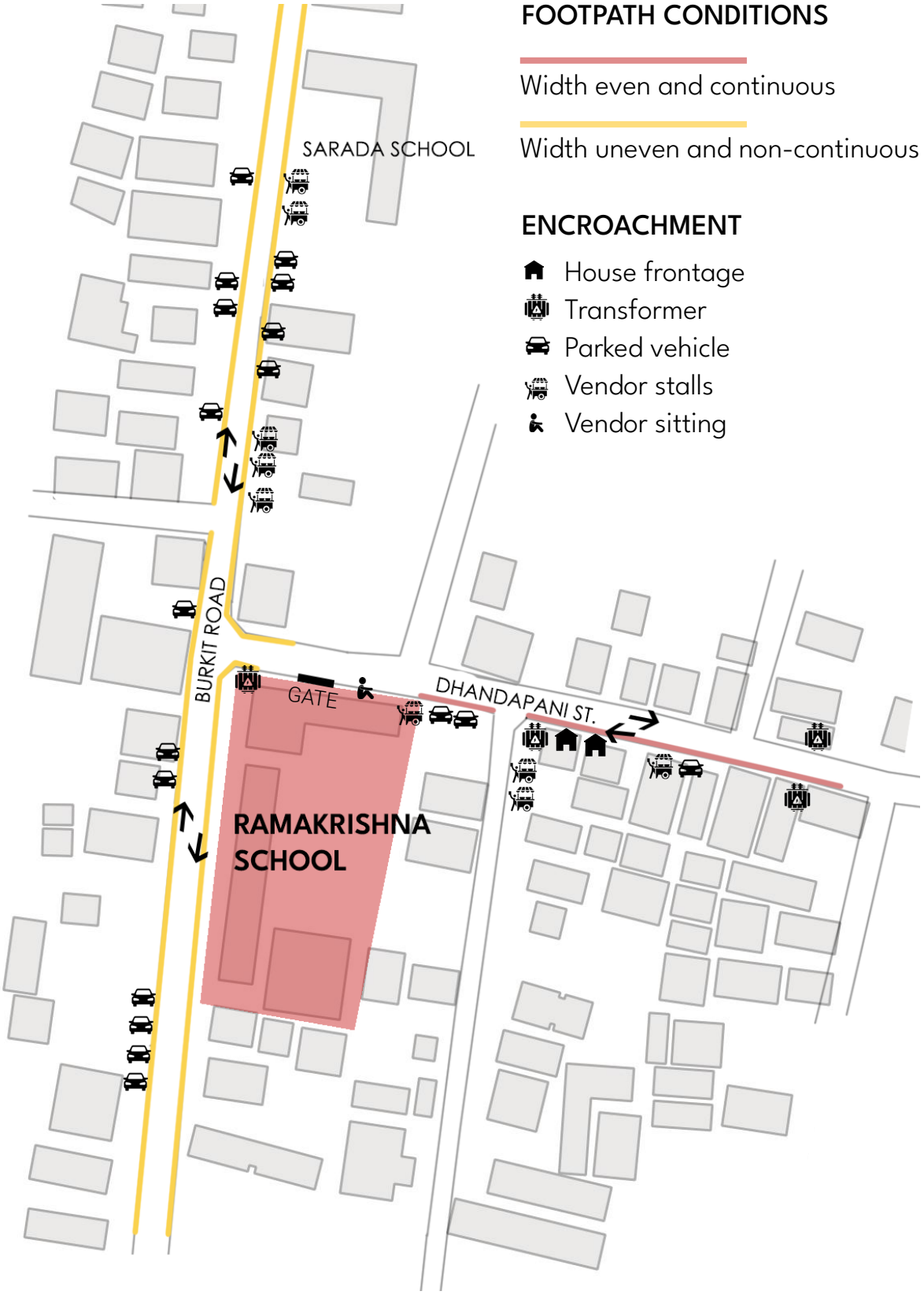


Figure 38. Map showing footpath condition and encroachments near Ramakrishna school

6.5.1 CHALLENGES - EASE OF MOVEMENT

BURKIT ROAD

The pedestrian pathway along Burkit Road is 2 meters wide, continuous, and equipped with street furniture, offering potential for a comfortable pedestrian experience. However, it is largely unusable due to encroachments, which significantly restrict pedestrian movement.

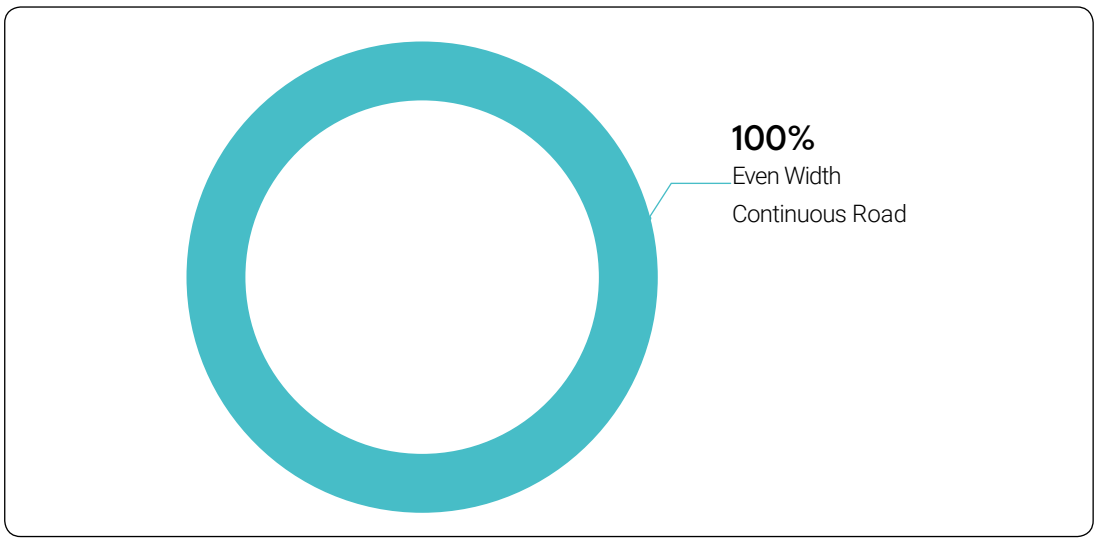


Figure 39. Footpath condition in Burkit road, T.Nagar

Encroachments vary throughout the stretch, with **illegally parked vehicles and vendor stalls being the most prominent obstructions.** These reduce the effective walking space, forcing pedestrians, including students and parents, to walk on the carriageway.

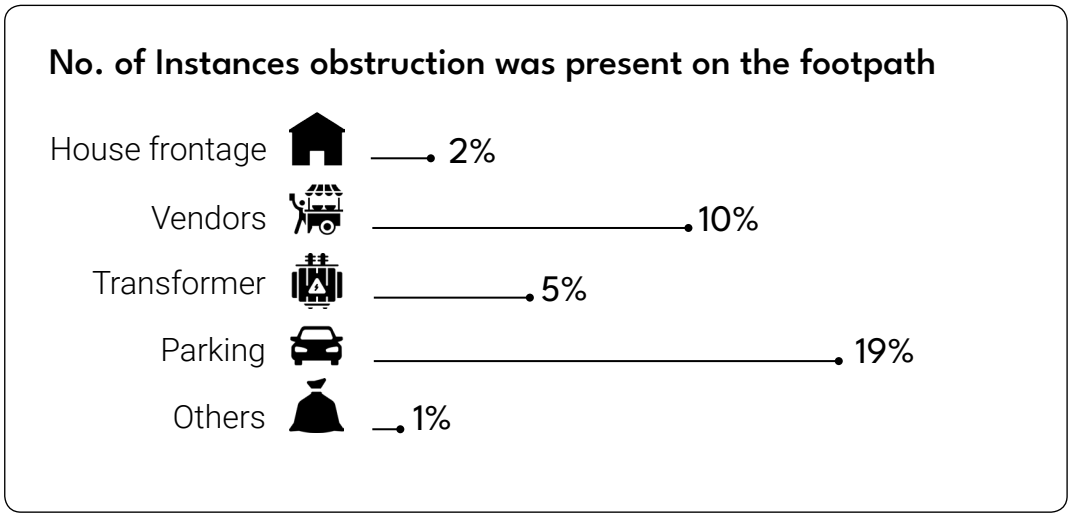


Figure 40. Encroachments on the footpath in Burkit road, T.Nagar

In 2019, Burkit Road was redesigned under the Smart City project, where the pedestrian pathway was revamped, and designated parking zones were introduced. Initially functioning as a one-way street, the ongoing flyover construction led to a temporary change, allowing two-way traffic to pass through. This road is a major bus route, and due to the left-turn restrictions at the junction, **barricades are manually adjusted by police personnel each time a bus passes through**, highlighting inefficiencies in traffic management.

To accommodate the new traffic flow, previously designated parking spaces along the footpath were converted into no-parking zones, enforced through no-parking signage and monitored by a tow-away truck. Despite these regulations, **illegal on-street parking** continues, encroaching on pedestrian space and limiting the footpath's usability.
The school's compound wall along Burkit Road is colorfully painted, improving its visibility and presence in the urban landscape. However, the encroachments near the school still pose significant challenges to pedestrian access and safety.

DHANDAPANI STREET

The only entrance to the school opens onto Dhandapani Street, which lacks a footpath. The street has unpaved and unmarked shoulders on both sides, which are frequently obstructed by small vendor stalls, shop frontages, parked vehicles, and other encroachments. The **shoulder space within 50 meters of the school gate is particularly affected**, making pedestrian movement unsafe and inconvenient.

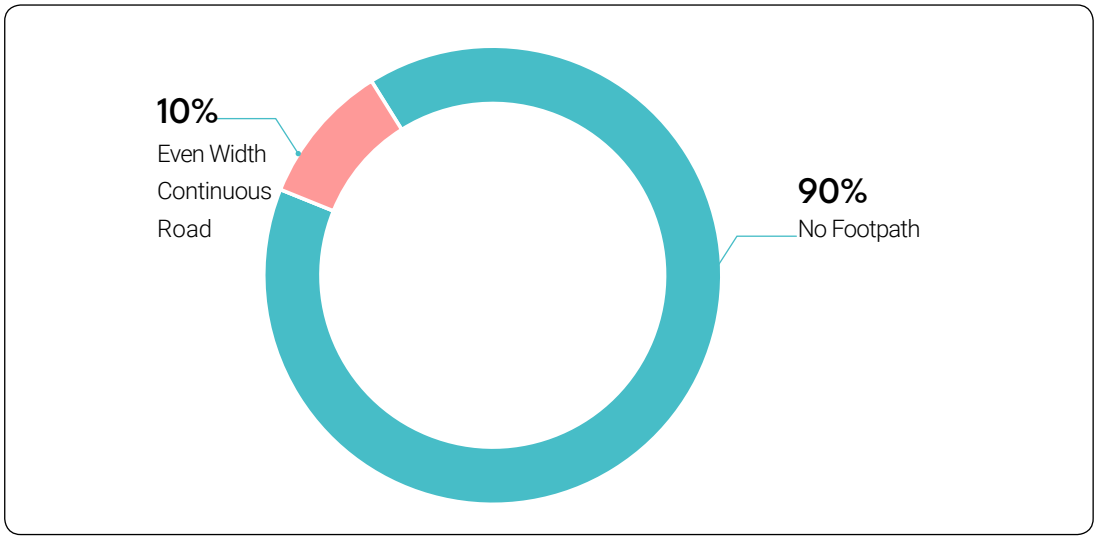


Figure 41. Footpath condition in Dhandapani street, T.Nagar

Additionally, barricades have been placed in the middle of the carriageway at the Dhandapani Street junction to enforce left turns. However, this creates operational inefficiencies, as vehicles take immediate U-turns after the barricades, leading to further traffic congestion on Burkit Road.

Photo: Transformer near Ramakrishna school | CAG

Photo: Only left imposed using barricades | CAG

At the junction near the school gate, **a transformer is enclosed** by protective panels, **encroaching on the already limited pedestrian space**. This forces pedestrians, including school children and parents, to walk directly on the carriageway, exposing them to oncoming traffic, which is already congested due to the left-turn restrictions enforced by barricades.

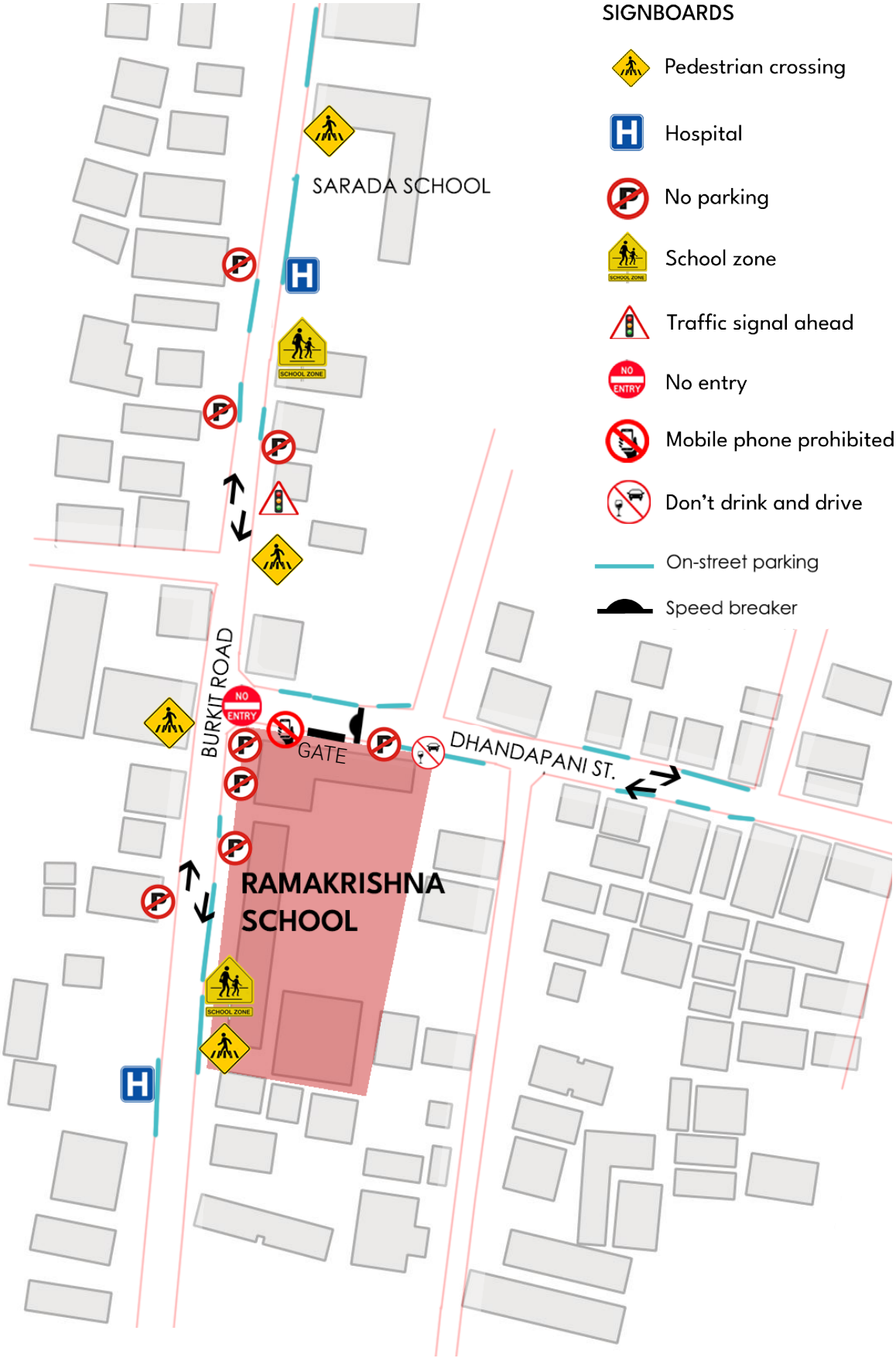


Figure 42. Map showing speed calming measures and signboards near Ramakrishna school

6.5.2 CHALLENGES - ROAD SAFETY

Dhandapani Street has almost **no traffic calming measures**, except for a single unmarked speed breaker near the school gate. The lack of paint or signage makes it less visible to drivers, reducing its effectiveness in slowing down vehicles.
There are **no zebra crossings** on either Dhandapani Street or Burkit Road near the school, making it unsafe for students and parents to cross the road, especially during peak hours.

Burkit Road has **no-parking sign boards** installed, but enforcement remains weak as on-street parking persists. Vehicles continue to **park illegally, encroaching on pedestrian pathways** and further narrowing the already congested road space.

Dhandapani Street, where the school's only entrance is located, lacks school zone signage to alert drivers.

Significant traffic congestion occurs **in front of the school gate during peak drop-off and pick-up hours** due to the narrow road width and lack of designated waiting zones for vehicles. While the school allows two-wheelers to wait inside the school premises during pick-up times, many parents on two-wheelers still drop off children directly in front of the gate, causing blockages.

Autos waiting to pick up and drop off students **line up along the school gate**, further contributing to traffic build-up and restricting the movement of other vehicles. This congestion makes it extremely difficult for students to cross the road safely.

6.6 TRAFFIC CONGESTION AND ITS IMPACT ON AIR QUALITY

6.6.1 TRAFFIC VOLUME COUNT

The traffic volume analysis reveals that **4:00 PM** experiences the highest congestion (1058). In contrast, **1:30 PM records the lowest traffic** volume (411) across all modes of transport.

Two-wheelers dominate throughout the day (1618), reaching their peak in the evening(560). **Share autos and pedestrian movement** also see a sharp rise at **4:00 PM**, indicating increased commuter activity.

The **high traffic volume in the evening** necessitates better traffic control measures to ease congestion. Additionally, pedestrian safety must be improved due to the significant foot traffic (198) at this time.

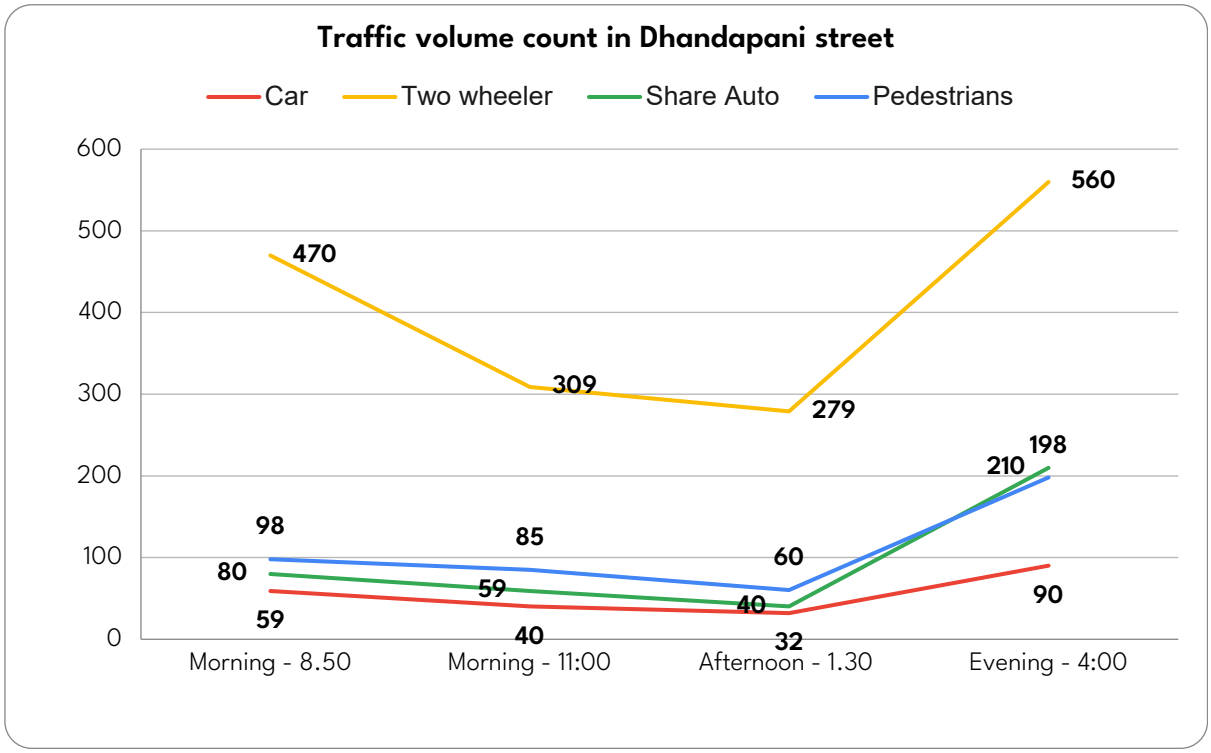


Figure 43. Traffic volume count in Dhandapani street, T.Nagar

6.6.2 AIR QUALITY

Air quality data aligns with peak school pick-up times, showing a direct link between traffic congestion and pollution levels.

In the morning (8:15–9:15 AM), when vehicle count peaked at 470 two-wheelers, 80 share autos, and 59 cars (8:50 AM), **PM10 spiked to 145 µg/m³** at 9:05 AM, indicating emissions from vehicles, during school drop off hours.

However, **in the evening** (3:45–5:15 PM), despite even higher traffic at 4:00 PM, **PM2.5 remained at 40 µg/m³,** suggesting better dispersion or different traffic patterns.

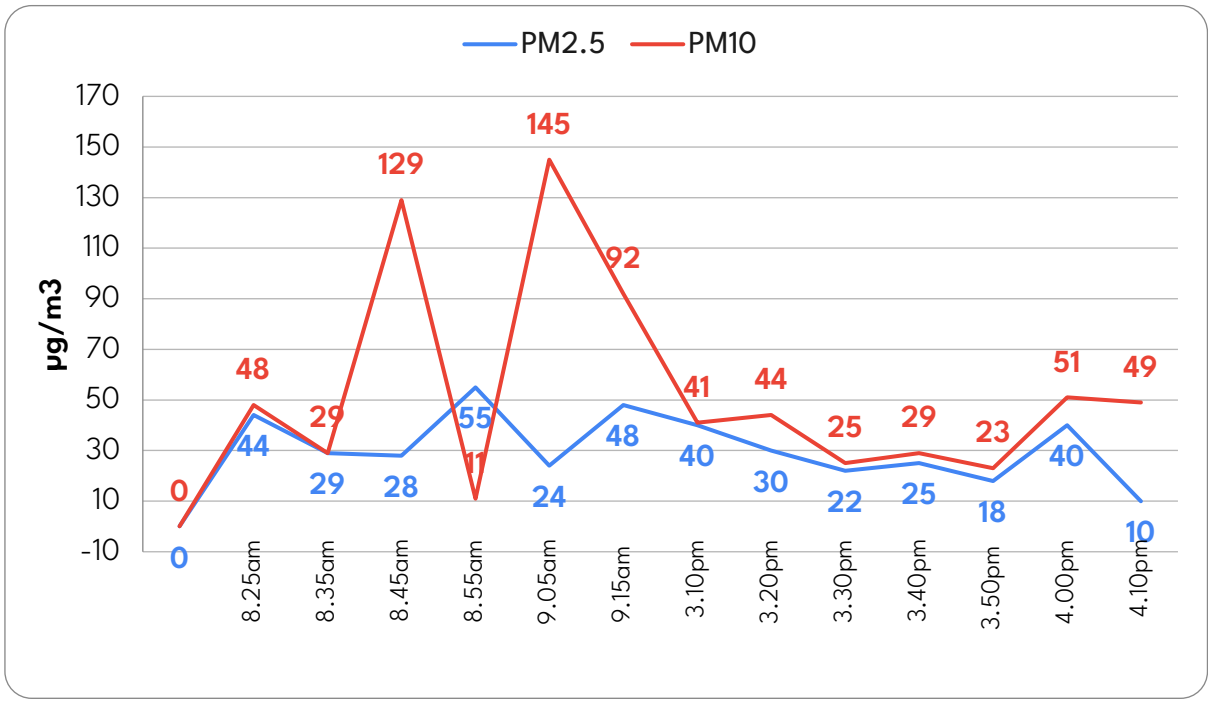


Figure 44. PM2.5 and PM10 in Dhandapani street during morning and afternoon peak hours

PM2.5 and PM10 levels were monitored throughout the day to understand how air quality changes during peak and off-peak hours.

AVERAGE PM2.5 -36.58 µG/M³ and **AVERAGE PM10** - 51.92 µG/M³ levels exceed WHO standards and within the National Ambient Air Quality Standards.

Air pollution is significantly higher during school pickup timings in the evening (PM2.5=53.0 µg/m³, PM10=74.5 µg/m³), likely due to increased vehicular emissions and congestion.

Drop-off times in the morning show relatively lower pollution compared to the evening pickup times, but still exceed WHO limits.

During off peak hours (10:30 AM - 2:20 PM), air quality is better than during peak drop-off and pick up periods.

PM10 levels remain elevated in the evening, possibly indicating high dust and vehicular emissions.

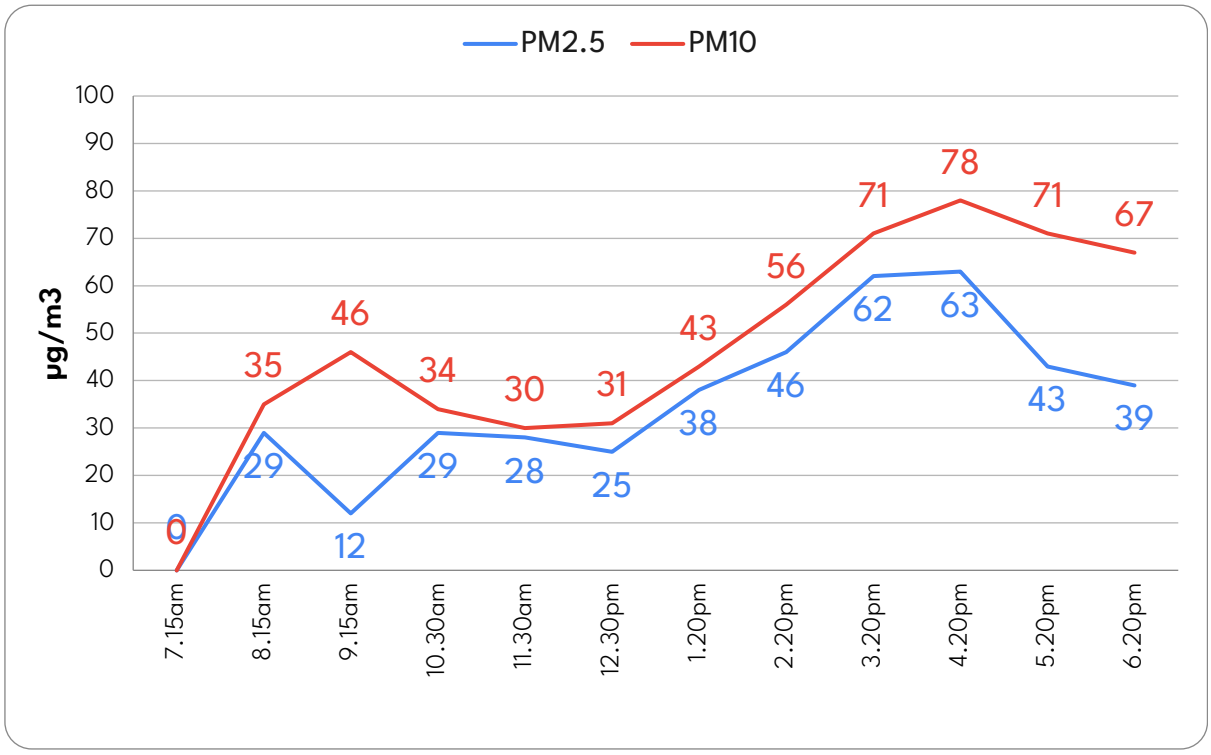


Figure 45. PM 10 in Dhandapani street during morning and afternoon peak hours

6.7 PROPOSED MEASURES FOR IMPROVING SCHOOL ZONE SAFETY

Impact level	Traffic management measures	Tactical urbanism measures	Infrastructural changes
High impact	Signalized junction for Dhandapani Street	Painting the carriageway with vibrant colors	Removing footpath encroachments
	Temporary road closure & traffic diversion during school hours		Pedestrian crossings with rumble strips
	Traffic police assisting crossings		Replacing the transformer with a compact RMU
Medium impact	Using parking bays as drop-off areas with ANPR enforcement	Painting school walls with vibrant colors	Paved shoulder for walking and cycling
	Trained crossing guards	School zone road markings and signboards	Removing shoulder encroachments
Low impact	Speed limit sign boards		

Figure 46: Map showing recommendations for road safety measures near Ramakrishna school

6.8.1 RECOMMENDATIONS FOR DHANDAPANI STREET AND BURKIT ROAD

DESIGNATED PICK-UP AND DROP-OFF ZONES & PEDESTRIAN SAFETY MEASURES

Option 1: Signalized junction for Dhandapani street

Currently, barricades at the Dhandapani Street–Burkit Road junction enforce a left-turn-only rule, but this creates traffic bottlenecks due to immediate U-turns. This is particularly inconvenient for buses passing through the junction. Replacing the barricades with a signalized intersection would allow smoother movement of vehicles, reduce congestion, and improve safety for pedestrians crossing the road.

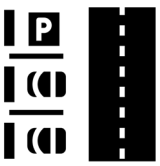
Option 2: Temporary road closure & traffic diversion during school hours

A more controlled approach would be to temporarily close Dhandapani Street at its intersection with Burkit Road during peak school hours. Traffic can be rerouted through Mahalakshmi Street, which is located before the school gate.

• **Only school-related vehicles** (parents, auto-rickshaws, and school buses) would be allowed access beyond this point.

• The space in front of the school can be converted into a **designated pick-up and drop-off zone**, ensuring that children can safely enter and exit vehicles without disrupting general traffic flow.

Option 3: Using parking bays on Burkit road as drop-off areas



The existing parking bays along Burkit Road, adjacent to the school compound wall, can be designated as a drop-off/pick-up area for auto-rickshaws during peak hours. (Refer Annexure 3)

• **A maximum of 10 auto-rickshaws** can be accommodated at a time.

• To prevent unauthorized parking by other vehicles, **parking restrictions should be enforced during school hours**.

• **ANPR cameras should be installed** to enforce the no-parking rule, ensuring only permitted vehicles use the drop-off zone.

PEDESTRIAN INFRASTRUCTURE ENHANCEMENTS

The **existing shoulder encroachments** in Dhandapani street must **be removed**, and the area should be paved to provide a dedicated walking and cycling path.

The encroachments on the pedestrian pathway such as **parked vehicles and vendor stalls** in Burkit road **must be removed** to facilitate walking.

A clearly marked pedestrian crossing must be installed directly in front of the school gate in Dhandapani street, ensuring children can cross safely.

Pedestrian crossings should also be **installed in Burkit road**, on the other two sides of the intersection, to enhance pedestrian safety.

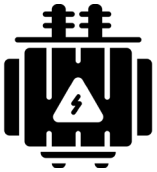
Rumble strips should be placed **10 meters before the pedestrian crossings** to slow down approaching vehicles.

Speed limit sign boards (Refer Annexure 3) should be installed along Dhandapani Street to enforce slower driving speeds in the school zone.

Traffic police already present at the location should continue **to regulate movement** and assist students in crossing the road safely. The school should also deploy trained crossing guards near the gate and in the intersection to further enhance pedestrian safety.

TRANSFORMER

Currently, a large transformer enclosed by panels in Dhandapani street obstructs the pedestrian pathway near the school gate, forcing pedestrians to walk on the road, exposing them to traffic risks.



- The **existing transformer should be replaced with a more compact RMU (Ring Main Unit)**, which occupies less space and allows for a wider pedestrian walkway.

- The **enclosure panels should be redesigned to minimize the space** occupied.

ENHANCING VISIBILITY & SCHOOL ZONE MARKINGS

• The **carriageway should be painted with vibrant colors 50 meters from the junction** on all three approach roads (Dhandapani street and both arms of Burkit road), alerting drivers to slow down as they enter the school zone.

• The **school's outer compound wall** along Dhandapani Street should also **be painted in bright, noticeable colors**, increasing visibility.

• **School zone road markings should be painted 100 meters from the junction** on all three approach roads (Dhandapani street and both arms of Burkit road), reinforcing awareness among road users.

• **School zone sign boards** (Refer Annexure 3) **must be installed along Dhandapani Street,** ensuring all road users are aware of the special zone ahead.

7. MAHARISHI VIDYA MANDIR SCHOOL,

CHETPET

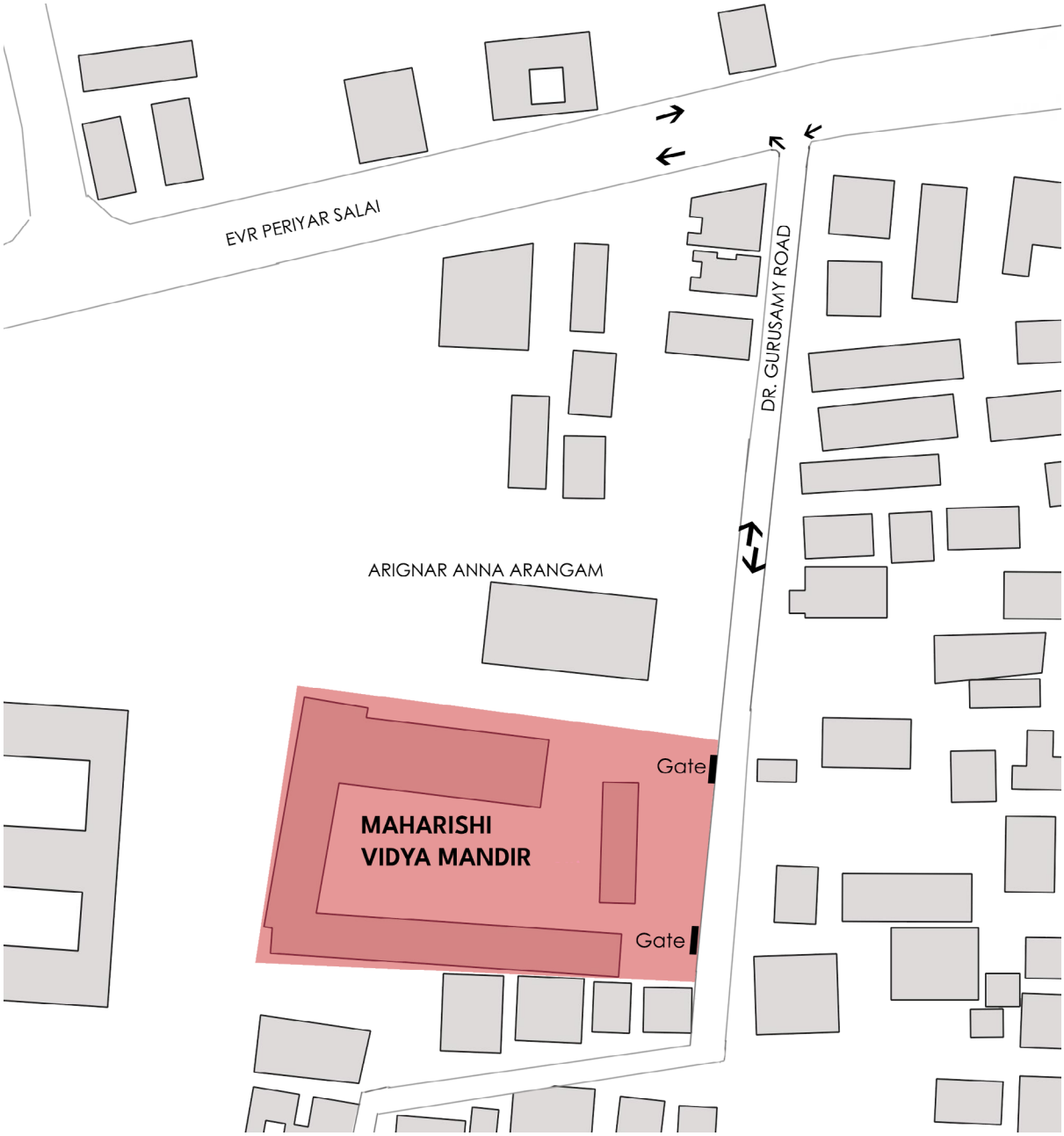


Figure 47. Map showing the Maharishi Vidya Mandir school layout

7.1 SCHOOL PROFILE

Location: Dr. Guruswamy Road, Chetpet

Maharishi Vidya Mandir School is located on Dr. Guruswamy Road, a residential street branching off EVR Periyar Salai, one of Chennai's major arterial roads.

Predominant land use: Residential

The predominant land use in the vicinity is residential, including a hospital at the end of Dr. Guruswamy Road, which contributes to local traffic movement.

Parking facilities:

Inside the premises, dedicated cycle parking facilities are available for students, along with designated parking space for staff members

School timings: Primary school: 8:30 AM – 3:30 PM
High school: 7:30 AM – 2:30 PM

School gates: The school has two entry gates that regulate student and staff movement.

Photo: Maharishi Vidya Mandir school, Chetpet | CAG

7.2 ACCESS TO PUBLIC TRANSPORT

Bus stop

The nearest bus stop is 350 meters away, located along EVR Periyar Salai.

Metro station

The nearest metro station is just 600 meters from the school.

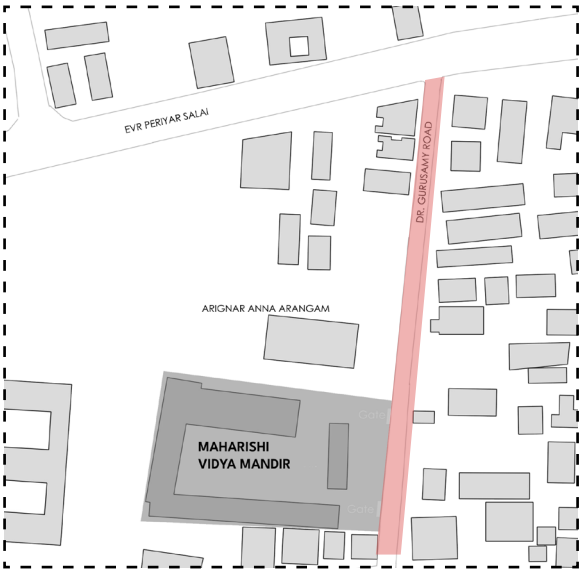
7.3 STREET RIGHT OF WAY (ROW) & ROAD CONDITIONS

DR. GURUSWAMY ROAD (LOCAL STREET)

This is a narrow residential street with a carriageway width of 5 meters.

The street has unpaved shoulders of approximately 1.5 meters on both sides.

Traffic on Dr. Guruswamy Road is predominantly residential, with additional vehicle movement generated by the hospital at the street's end.



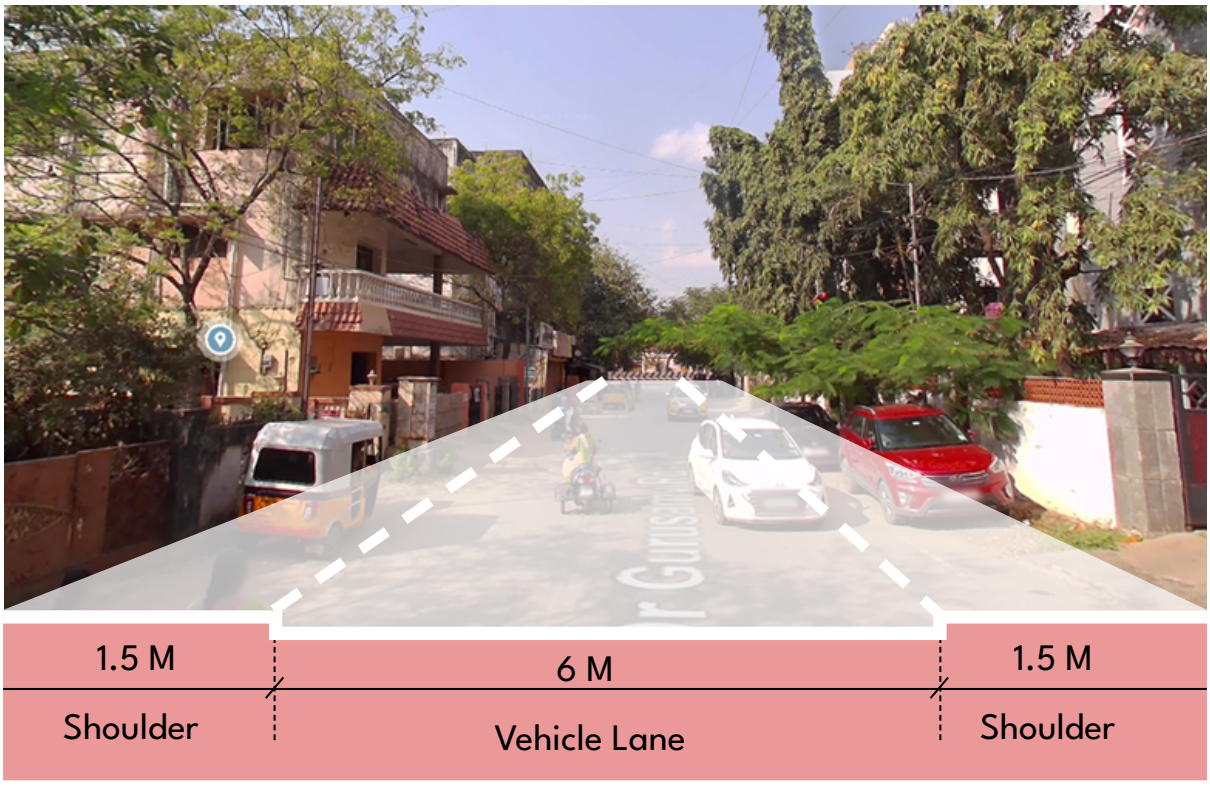


Figure 48. Street section of Dr. Guruswamy road, Chetpet

EVR PERIYAR SALAI (ARTERIAL ROAD)

EVR Periyar Salai is a two-way arterial road with a central median, facilitating heavy vehicular movement, including buses, private vehicles, and commercial transport.

It serves as a key connector for multiple neighborhoods and institutions, including the school, contributing to peak-hour congestion near its intersection with Dr. Guruswamy Road.

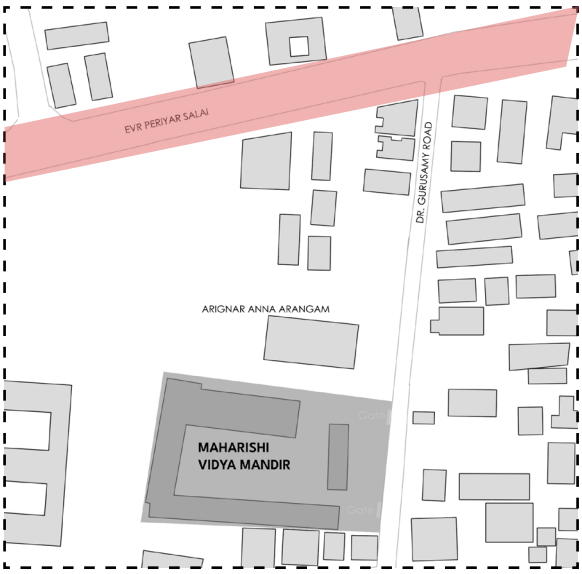


Figure 49: Street section of EVR Periyar Salai, Chetpet

ENCROACHMENT

- Shop frontage
- House frontage
- Transformer
- Vendor stalls
- Trees
- Construction waste
- Garbage

FOOTPATH CONDITIONS

Width even and non-continuous

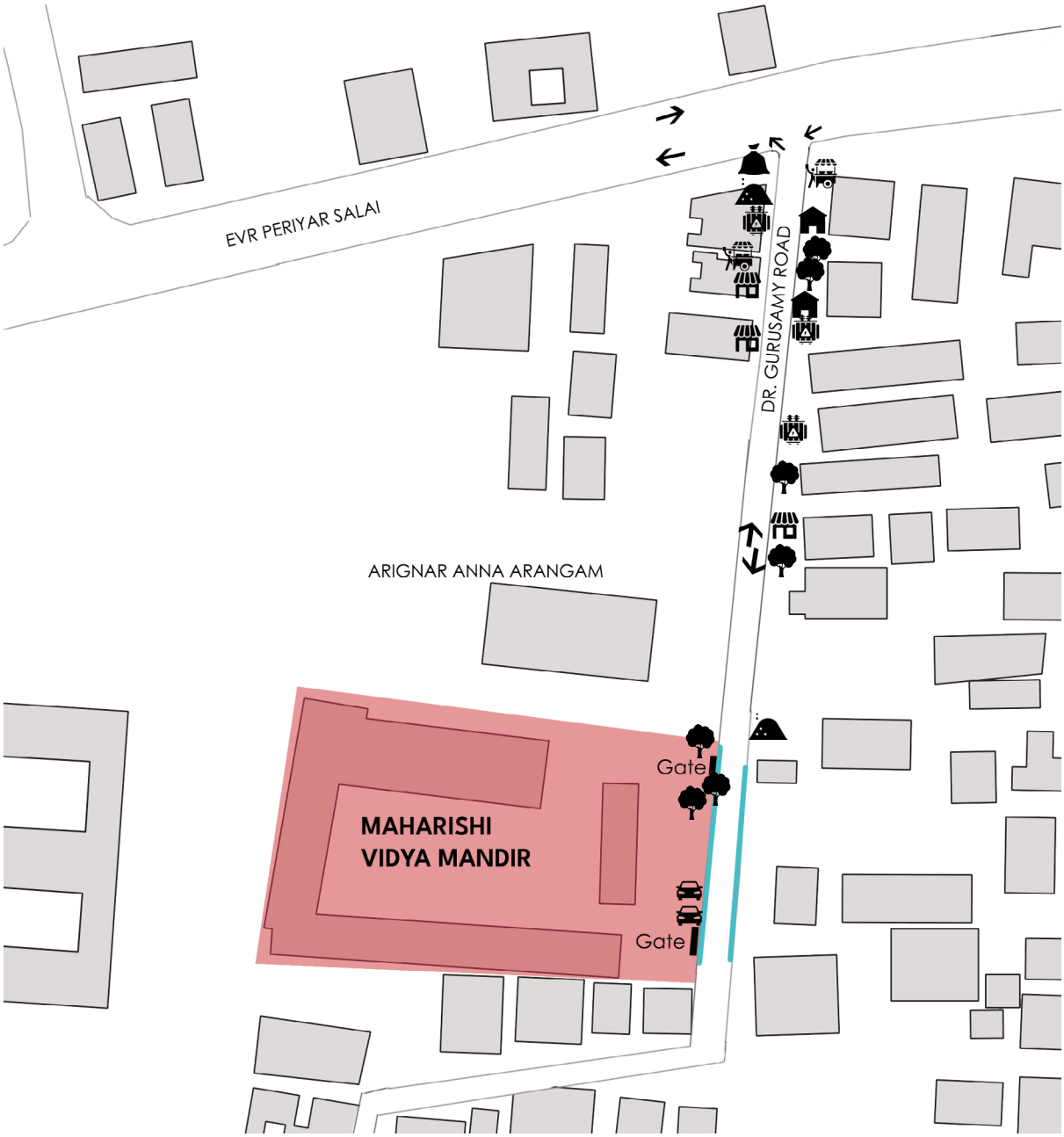


Figure 50. Map showing footpath condition and encroachments near Maharishi Vidya Mandir school

7.4 INFRASTRUCTURE AUDIT

7.4.1 CHALLENGES - EASE OF MOVEMENT

Dr. Guruswamy Road lacks a continuous footpath, making pedestrian movement difficult. Of the **250-meter road stretch** audited, **only 22% has footpaths**, while the rest of the stretch is without any pedestrian infrastructure.
Although a footpath exists in front of the school, it is inadequate, with a width of less than 0.8 meters and an excessive height of over 1 meter, making access difficult for children.

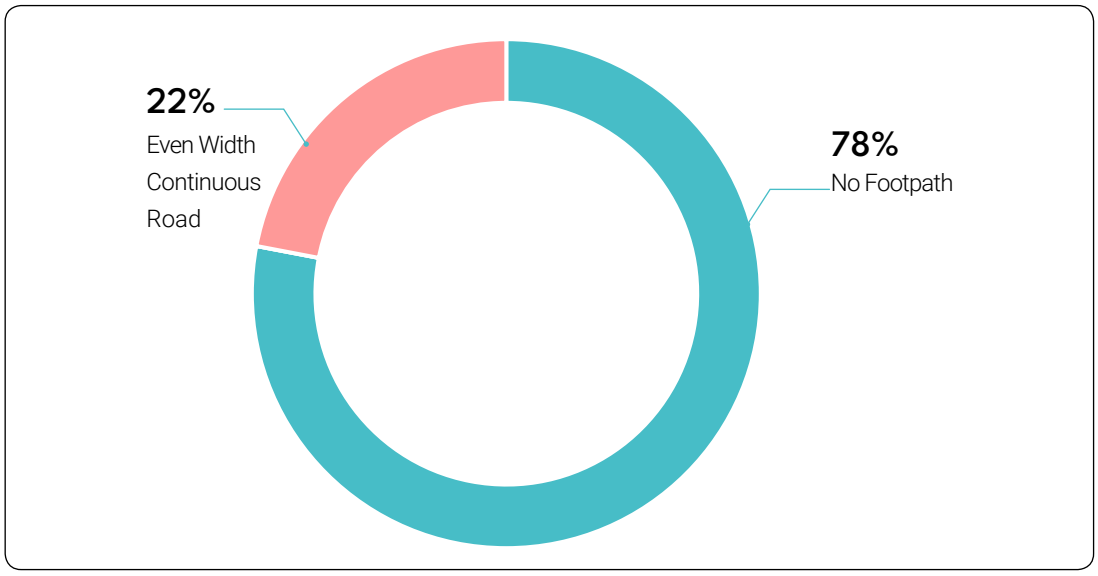


Figure 51: Footpath condition in Dr. Gurusamy road, Chetpet

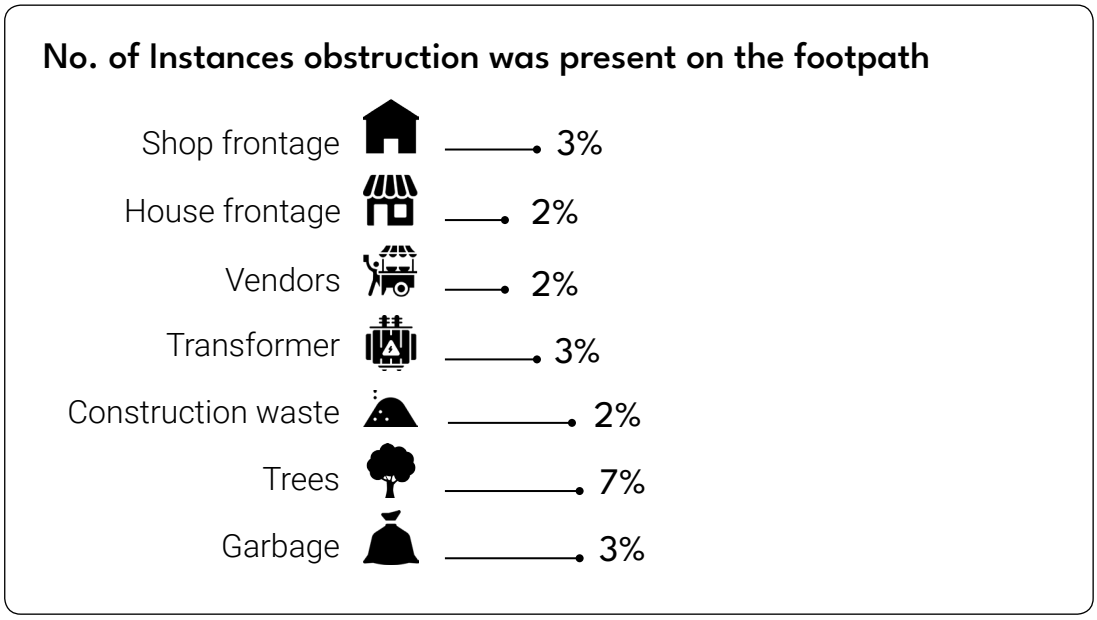


Figure 52: Encroachments on the footpath in Dr. Gurusamy road, Chetpet

On both sides of the road, there is an **unpaved shoulder without proper markings**. This space is frequently encroached upon by parked vehicles, shop extensions, garbage piles, and construction materials, further restricting pedestrian movement. The lack of a designated walking space forces pedestrians to share the narrow carriageway with vehicles, increasing safety risks, especially during school hours.

FOOTPATH CONDITIONS

Figure 53. Map showing speed calming measures and signboards near Maharishi Vidya Mandir school

7.4.2 CHALLENGES - ROAD SAFETY

Dr. Guruswamy Road has no lane markings to distinguish two-way traffic, leading to disorderly vehicle movement. In front of the school gate, temporary barricades are placed to regulate traffic flow, but they do not completely prevent congestion.
During school dispersal, the school allows cars, two-wheelers, and auto-rickshaws to wait inside the premises for student pick-up. However, some autos and private vehicles **park directly in front of the school gate, causing congestion and blocking entry and exit movements**. This disrupts smooth traffic flow, particularly during peak pick-up and drop-off hours.

At the junction, where vehicles turn left from Dr. Guruswamy Road onto EVR Periyar Salai, there is frequent congestion due to the haphazard mixing of left-turning vehicles with oncoming traffic. The absence of proper traffic management leads to unsafe conditions for both school traffic and general commuters.

Speed calming & traffic signage

Two speed breakers are installed in front of the school gate, one on either side, and they are properly painted for visibility.
Another speed bump near the junction is unpainted and barely visible, reducing its effectiveness.
School zone sign boards are present at the edge of Dr. Guruswamy Road but are **poorly placed and not clearly visible** to approaching motorists.
No signage or traffic calming measures exist on EVR Periyar Salai to alert drivers about the school zone, posing a risk to students and pedestrians crossing the road.

On-Street parking & congestion

There is **no official parking regulation** on the road, leading to illegal on-street parking of cars and autos, further reducing road space.
Two auto-rickshaw stands are located near the school gate, occupying the shoulder space and leaving no room for pedestrians.

7.5 TRAFFIC CONGESTION AND ITS IMPACT ON AIR QUALITY

7.5.1 TRAFFIC VOLUME COUNT

The traffic volume count on the school street shows peak congestion during student arrival and dispersal times. At **8:40 AM**, a high volume of cars (87) and two-wheelers (102) **indicates school drop-offs, contributing to traffic**.

During afternoon dispersal at 2:00 PM, vehicle numbers remain moderate. However, at **3:10 PM**, the **highest congestion is observed,** with **105 cars, 128 two-wheelers, and 56 shareautos**. Pedestrian movement (44) also peaks at this time, suggesting increased student activity.

The data highlights **traffic surges during school opening and closing times**. It is clear that the major modes of transport used are **cars and two-wheelers**. Autos also contribute a significant portion to the traffic on the school road.

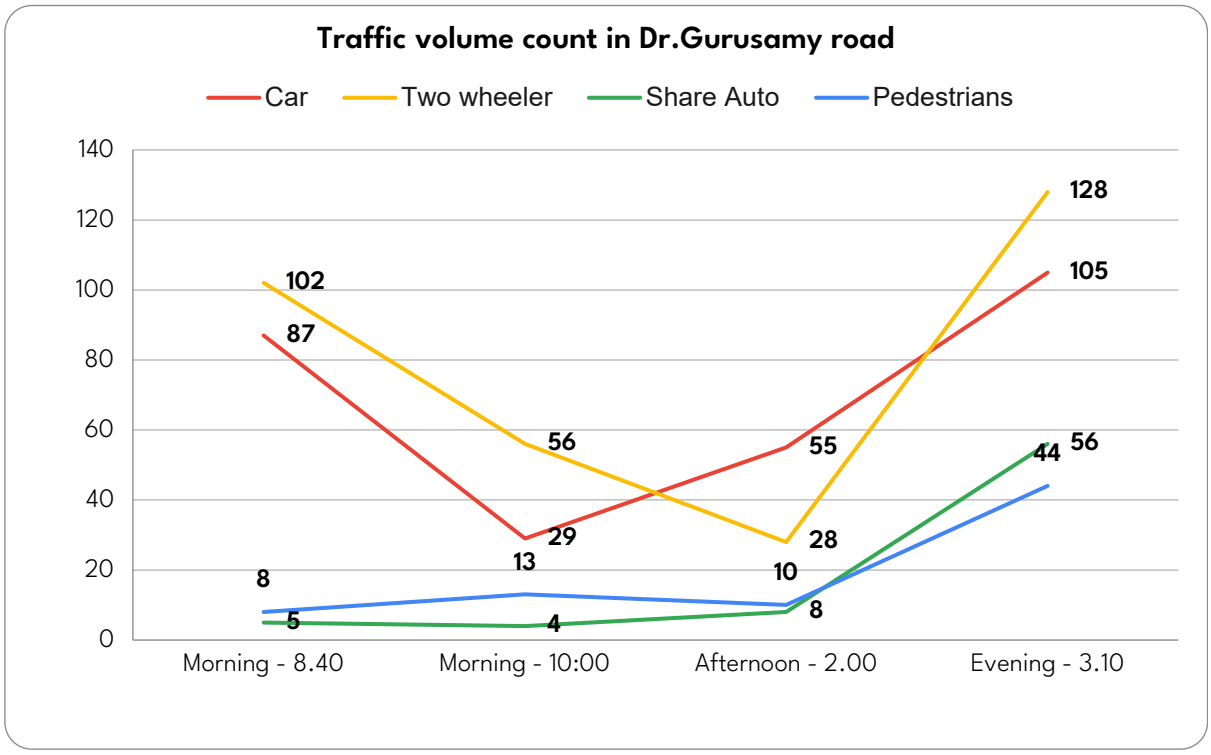


Figure 54. Traffic volume count in Dr. Gurusamy road, Chetpet

7.5.2 AIR QUALITY

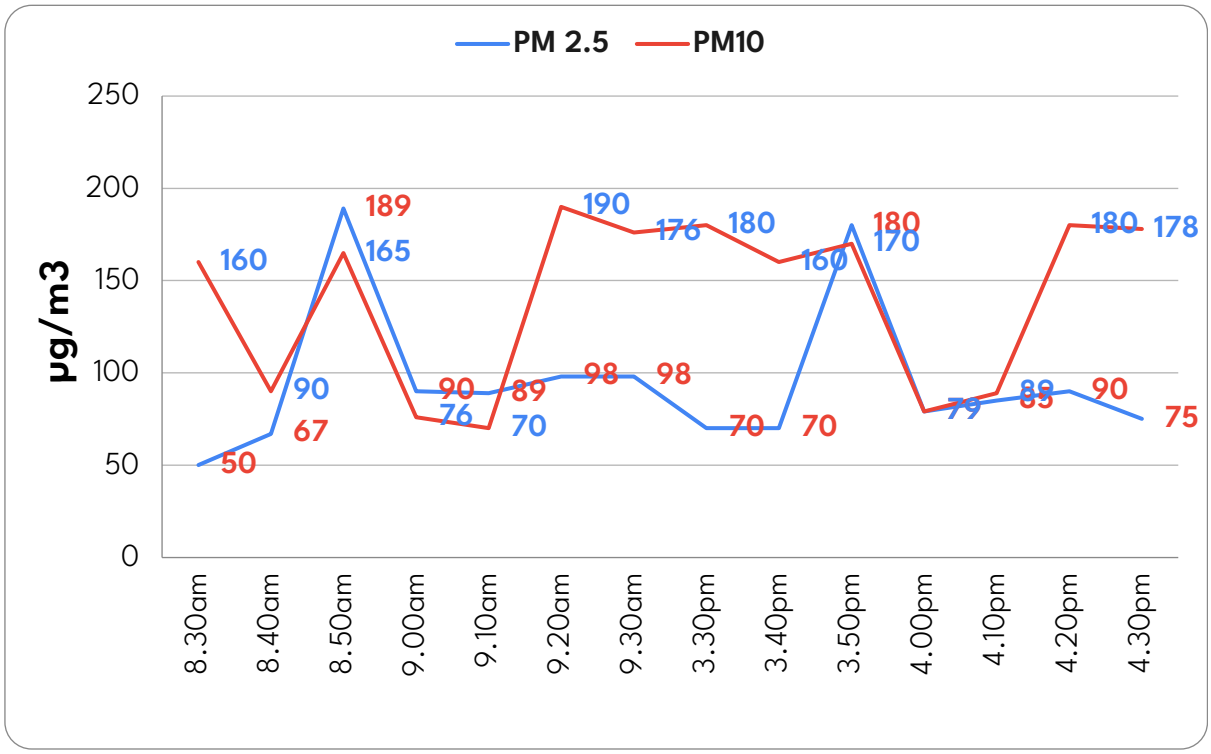


Figure 55. PM2.5 and PM10 in Dr. Gurusamy road during peak school hours

A sharp rise in **PM2.5 (189 µg/m³)** and **PM10 (165 µg/m³)** at 8:50 AM coincides with peak school arrival traffic, where 87 cars and 102 two-wheelers contribute to congestion and emissions. Pollution levels drop post-9:00 AM, aligning with reduced traffic.

In contrast, air quality worsens again around 3:50 PM, with **PM2.5 spiking to 180 µg/m³** and **PM10 reaching 170 µg/m³**, correlating with heavy dispersal traffic (105 cars, 128 two-wheelers, and 56 share autos at 3:10 PM).

PM10 levels are relatively high throughout the afternoon which consistently reflect the presence of coarser particles, likely from vehicular movement and construction activities nearby.

Between 3:30 - 3:40 PM, pollution remains stable but rises sharply with increased vehicle idling and road dust during pick-up. The data highlights a strong link between school traffic and poor air quality.

PM2.5 and PM10 levels were monitored throughout the day to understand how air quality changes during peak and off-peak hours.

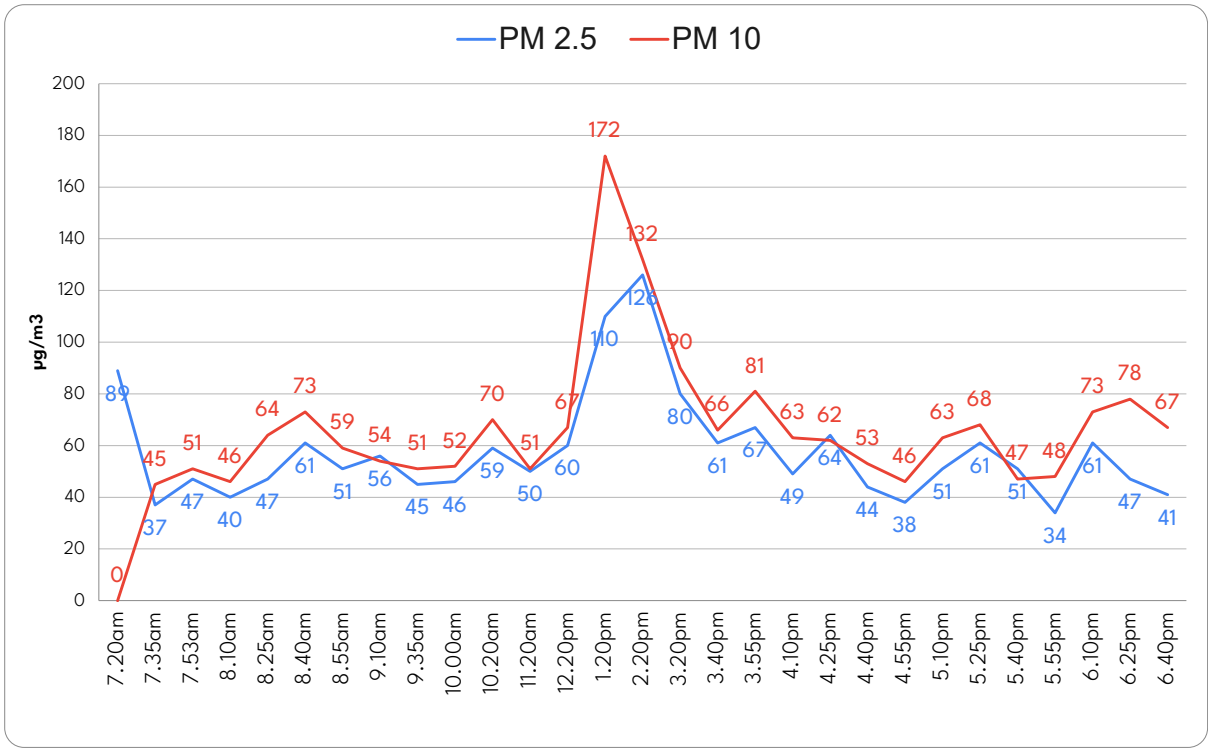


Figure 56. PM2.5 and PM10 in Dr. Gurusamy road

The peak school operating hours varied when monitoring the above air quality values, with the school starting in the afternoon due to exams.

Both PM2.5 and PM10 values peak during the afternoon from 12.20 to 2.20pm, which were the peak school operating hours at the time. The values also spike slightly in the evening from 5pm to 6pm, which may be due to the school dispersal time.

AVERAGE PM2.5 - 58 µG/M^3 (WHO limit: 15 µg/m³ – Exceeds WHO standard)

AVERAGE PM10 - 68 µG/M^3 (WHO limit: 20 µg/m³ – Exceeds WHO standard)

Both PM2.5 and PM10 average values are within the National Ambient Air Quality Standards.

7.6 PROPOSED MEASURES FOR IMPROVING SCHOOL ZONE SAFETY

Impact level	Traffic management measures	Tactical urbanism measures	Infrastructural changes
High impact	Trained crossing guards to ensure proper pick up and drop off and assisting students	Painting the carriageway with vibrant colors	Pedestrian crossings with rumble strips
	Relocation of auto stands		Paved shoulder for walking and cycling
			Removing shoulder encroachments
Medium impact	Flashing beacon to alert road users in EVR Salai	Painting school walls with vibrant colors	Continuous footpath in EVR Salai
		On street parking restrictions in EVR Salai	Barricades near intersection for traffic control
		Repaint speed breakers	
Low impact	Speed limit sign boards	Convex vibration markings for centreline	
		Zig zag road marking to restrict parking	

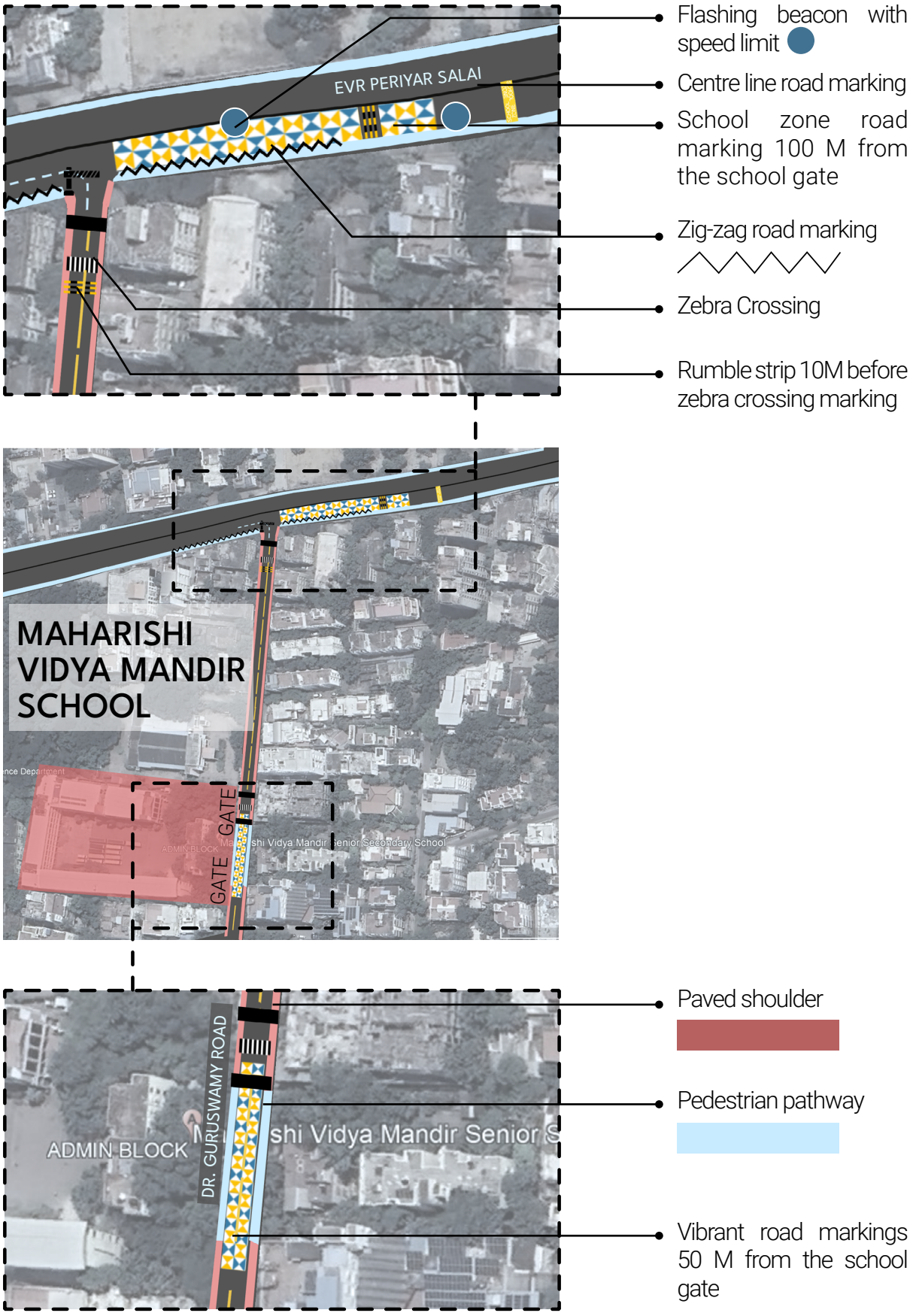


Figure 57. Map showing recommendations for road safety measures near Maharishi Vidya Mandir

7.6.1 MEASURES IN DR. GURUSWAMY ROAD

PAVED SHOULDER FOR WALKING & CYCLING

The **1.5 meter wide unpaved** shoulders on both sides of the road should be **properly paved to serve as a dedicated pedestrian and cycling space**. This will ensure safer movement for students, parents, and local residents who currently have no designated walking space.

RELOCATION OF AUTO STANDS

The existing auto stands near the school gate occupy the shoulder width, creating congestion and obstructing pedestrian movement. These stands should be relocated to a designated space away from the school entrance to reduce traffic buildup and improve accessibility.

TRAINED GUARDS

To regulate traffic and reduce congestion near school during peak hours, **trained volunteers from school must be present** to ensure there is no parking of vehicles outside the school gate instead of using the school ground for pick up and drop off. The volunteers can also assist children to cross or navigate the street reducing pedestrian-vehicle conflicts.

PEDESTRIAN CROSSINGS FOR SAFETY

To facilitate safe pedestrian movement, **zebra crossings** must be installed in front of the school and near the junction with EVR Periyar Salai. These crossings should be well-marked and accompanied by proper signage to ensure vehicles slow down for pedestrians.

CENTRE LINE MARKING FOR TRAFFIC REGULATION

The road currently lacks lane markings, leading to chaotic two-way vehicle movement. **Convex vibration** markings should be installed along the center of the road to regulate and guide vehicles in their respective lanes, improving safety.

SPEED BREAKER MAINTENANCE

The speed breakers in front of the school must be repainted with high-visibility markings to ensure they are easily noticeable to drivers, preventing overspeeding.

7.6.2 MEASURES IN EVR PERIYAR SALAI

BARRICADES AT JUNCTION FOR TRAFFIC CONTROL

Vehicles turning left from Dr. Guruswamy Road to join EVR Periyar Salai, often merge haphazardly with high-speed traffic. **Barricades should be placed strategically** to facilitate and streamline the left turn and prevent unnecessary congestion.

ON-STREET PARKING RESTRICTIONS

Unregulated parking along EVR Periyar Salai causes congestion and reduces road capacity. **Strict no-parking enforcement** should be implemented, especially near the school zone.

ZIG-ZAG MARKINGS TO PREVENT PARKING

To prevent vehicles from parking too close to the school, **zig-zag road markings should be painted for at least 50 meters.** This will create a clear no-parking zone and improve sightlines for approaching drivers.

ROAD PAINTING FOR SCHOOL ZONE AWARENESS

To alert motorists about the presence of a school, **"School Zone"** road markings should be **painted for 50 meters from the intersection** with Dr.Guruswamy road. This visual cue will prompt drivers to reduce speed and drive cautiously.

CONTINUOUS FOOTPATH FOR PEDESTRIAN SAFETY

The e**xisting footpath along EVR Periyar Salai is incomplete** and forces pedestrians to walk on the carriageway. A continuous, properly designed footpath should be constructed to ensure safe pedestrian movement, particularly for students walking to and from school.

SPEED REDUCTION

Flashing beacons should be installed in EVR Salai, within 50 metres from the intersection with Dr.Guruswamy road, to alert approaching vehicles and encourage them to slow down.

SPEED LIMIT SIGNAGE FOR COMPLIANCE

Speed limit signs must be installed near the school zone road marking, to regulate vehicular speed. The recommended speed limit for school zones is 25 km/hr.

Picture courtesy : Unsplash

8. WAY FORWARD:

ESTABLISHING SAFE SCHOOL ZONES IN URBAN AREAS

The findings from the study highlight critical challenges faced by students and road users in school zones, including pedestrian safety, traffic congestion, and inadequate infrastructure. To address these challenges and ensure a safer environment for students, a comprehensive and sustainable approach is essential. The following measures provide a general roadmap for cities to establish and maintain safe school zones.
By adopting a phased implementation strategy, cities can address critical safety issues in the short term while laying the groundwork for sustainable urban design interventions in the long term.

8.2 PHASED IMPLEMENTATION STRATEGY

8.2.1 SHORT-TERM MEASURES (FIRST 6 MONTHS)

Short-term interventions focus on immediate safety improvements in the selected schools through tactical urbanism. These measures can serve as pilot interventions for the expanded network of schools.

Traffic management
Deploy personnel to regulate crossings and enforce no-parking zones near school entrances.

Enhanced visibility:
Paint vibrant school zone markings and install temporary “School Zone” signage.

Safe crossings:
Introduce temporary raised zebra crossings and speed calming measures (e.g., rumble strips).

Awareness campaigns:
Conduct road safety sessions with students, parents, and community members.

8.2.2 MID-TERM MEASURES (6-12 MONTHS)

Mid-term interventions focus on infrastructure upgrades and refined strategies based on feedback from short-term measures.

Pedestrian infrastructure
Standardize footpaths, remove encroachments, and install guardrails and kerb extensions.

Pick-up/drop-off zones
Establish dedicated zones to reduce congestion and enhance safety.

Cycling infrastructure
Convert road shoulders into temporary cycle lanes.

Evaluation
Periodic audits and stakeholder feedback to improve and adapt interventions.

8.2.3 LONG-TERM MEASURES (12-24 MONTHS)

Long-term measures aim to create permanent, city-wide solutions based on the pilot study results.

Traffic calming
Implement permanent speed breakers, road markings, and urban design interventions like street closures during peak hours.

Sustainable mobility
Develop a comprehensive network of cycling lanes and shaded pedestrian pathways.

Community engagement
Scale awareness campaigns and foster collaborations between schools, authorities, and local businesses.

8.3 EXPANDING TO A CITYWIDE NETWORK

The methodology used in the pilot study can be applied across the city by:

Standardizing processes: Develop a toolkit based on the pilot study for consistent audits, surveys, and stakeholder engagement across schools.

Prioritizing high-risk zones: Identify schools in areas with heavy traffic or inadequate infrastructure and prioritize interventions.

Data-driven decision-making: Use spatial data and stakeholder feedback to refine strategies and ensure targeted solutions.

Collaborative planning: Engage schools, municipal authorities, and local communities to co-develop and implement measures.

Policy integration: Incorporate safe school zones into municipal transportation and urban planning policies.

By prioritizing pedestrian safety, enforcing regulations, and fostering community engagement, cities can transform school zones into safer and more accessible environments. This approach not only enhances the quality of life for students but also promotes sustainable and inclusive urban development.

REFERENCES

1.World Health Organization. 2015. “Road Traffic Injuries: Children.” May 4, 2015. https://www.who.int/news-room/questions-and-answers/item/road-traffic-injuries-children

2.DHNS. 2025. “Traffic Injuries Leading Cause of Death among Children: Nimhans Report.” Deccan Herald. February 3, 2025. https://www.deccanherald.com/india/karnataka/bengaluru/traffic-injuries-leading-cause-of-death-among-children-nimhans-report-3387711

3.UNICEF. 2024. “Child And Adolescent Road Safety in South Asia” https://www.unicef.org/rosa/media/28141/file/Child%20and%20Adolescent%20Road%20Safety%20in%20South%20Asia.pdf

4.Marzi, Isabel, and Anne Reimers. 2018. “Children’s Independent Mobility: Current Knowledge, Future Directions, and Public Health Implications.” International Journal of Environmental Research and Public Health 15 (11): 2441. https://doi.org/10.3390/ijerph15112441.

5.Child Health Initiative. 2022. “School Streets: Putting children and the planet first. A Political Economy Analysis Of The Rise Of School Streets In Europe And Around The World.” https://www.fiafoundation.org/media/hr3fmhin/school-streets-report-pages.pdf

6.Kothari, Archana, Chaitali Patil, Chinmay Nagpurkar, and Dashma Soni. 2023. “School Priority Zone Guidelines School Priority Zone Guidelines Supported by Project by Roads Department, Pune Municipal Corporation Team 1 Team 2 Team 3.” https://roadsafetynetwork.in/wp-content/uploads/2023/12/PMC-STIP-Guidelines-Final.pdf .

7.“A TACTICAL URBANISM GUIDEBOOK.” n.d. https://www.transformative-mobility.org/wp-content/uploads/2023/03/TrainingMaterial_A_Tactical_Urbanism_Guidebook-5zZpKb.pdf

8.World Health Organization. “AIR POLLUTION AND CHILD HEALTH.” AIR POLLUTION AND CHILD HEALTH, 2018. https://iris.who.int/bitstream/handle/10665/275545/WHO-CED-PHE-18.01-eng.pdf?sequence=2&isAllowed=y.

9.World Health Organization. “Global Status Report on Road Safety 2018.” https://cdn.who.int/media/docs/default-source/searo/india/health-topic-pdf/global-status-report-

on-road-safety-2018.pdf?sfvrsn=1de25920_2.

10.Marzi, Isabel, and Anne Reimers. 2018. “Children’s Independent Mobility: Current Knowledge, Future Directions, and Public Health Implications.” International Journal of Environmental Research and Public Health 15 (11): 2441. *https://doi.org/10.3390/ijerph15112441*

11.“Manual For Development Of School Road Safety Plan Making School Areas/Zones Safer from Road Crashes.” n.d. Accessed February 14, 2025. *https://www.ceeindia.org/pdf_files/School%20Road%20Safety%20Plan%20Manual.pdf*

ANNEXURE 1

PERCEPTION SURVEY QUESTIONNAIRE

Name of the parent :
Profession :
What is the age of your child ?

How does your child reach school ?

i. Bicycle
ii. Bike
iii. Walk
iv. School bus
v. MTC bus
vi. Car
vii. Private autos
viii. Share autos
ix. Vans

Why do you use the current transport mode ?

i. Safety
ii. Convenience
iii. Cost
iv. Distance

What are the issues faced by your child when walking or cycling to school ?

i. Speeding vehicles
ii. Lack of footpaths
iii. Encroached footpaths
iv. Lack of cycle lanes
v. Lack of zebra crossing
vi. Unsafe crossings
vii. Congestion during school start and end times
viii. Potholes on the road
ix. Unsafe riding behaviour
x. Lack of shade
xi. Waterlogging during monsoon
xii. Air polluted due to congestion

How far is the school from your house ?

i. Less than 1km
ii. 1km - 2km
iii. 2km - 5km
iv. More than 5km

Do you & your child take the same route to school everyday?

Yes
No

What are the problems that you face near school when you pick up/drop off your child ? (If more than one answer, select multiple options)

i. Congestion
ii. Parking in no parking zones
iii. U - turns in front of school causing congestion
iv. Dangerous reversing
v. Lack of designated drop off zones
vi. Others_____

Have you witnessed accidents/near misses in the school zone ?

i. Once or twice
ii. Less than 5 times
iii. 5 -10 times
iv. More than 10 times
v. Never

Is it easy for your child to cross /navigate the road near the school zone when walking or cycling?

Yes
No

Are there any classes or courses provided by the school to educate students regarding road safety ?

Yes
No
Rarely

Is there a student Road safety patrol in your child's school ?

Yes
No

Is there any committee in the school to address concerns regarding road safety ?

Yes

No

Does the school actively promote walking, cycling, school buses or public transport ?

Yes

No

Which of the following issues affected your decision to not allow your child to walk or bicycle to/from school? (If more than one answer, select multiple options)

i. Speed of traffic along route
ii. Amount of traffic along route
iii. Poor condition of sidewalks
iv. No safety in intersections and crossings
v. Air pollution
vi. Distance
vii. Convenience of driving
viii. Time taken
ix. Child is too young to walk or cycle alone
x. Child's before or after-school activities
xi. Violence or crime
xii. Weather or climate

I would allow my child to walk or cycle to school if (If more than one answer, select multiple options)

i. There is less traffic congestion near school
ii. There were continuous sidewalks or bicycle paths from my neighbourhood to school
iii. Schools provided secure place for parking bicycles
iv. Schools provided more walking and bicycle safety training to students
v. Speed limits were strictly enforced in school zones
vi. There was less air pollution in the school zone
vii. Crossing guards were present near the school entrance
viii. There was greater adult presence of parent volunteers or traffic personnel along walk routes to schools
ix. We lived closer to school
x. There were better street lighting along walking routes to school
xi. Accompanied by other children
xii. Accompanied by myself or other parents

What is the one thing that you think should be done to improve road safety in your child's school zone?

On a scale of 1 to 5, rate your child's school zone road safety ?

1 - Very bad
2 - Bad
3 - Neutral
4 - Good
5 - Very good

ANNEXURE 2

FOCUS GROUP DISCUSSIONS WITH CHILDREN

Focus group discussions (FGD) were conducted with middle school students from St. Gabriel's School, Broadway and Sri Ramakrishna Mission School. These sessions were designed to understand the students' travel experiences, identify challenges they face while commuting to school, and raise awareness about road safety.

1. Understand commuting patterns:

Students were encouraged to share the modes of transport they commonly use for commuting to and from school, including walking, cycling, public transportation, or private vehicles.

2. Identify challenges:

The children described the difficulties they face during their daily commute, particularly while walking or cycling. This included concerns such as poor pedestrian infrastructure, lack of safe crossings, inadequate cycling paths, and issues related to traffic congestion or reckless driving near school zones.

3. Corroborate existing findings:

The children's inputs were used to validate the observations made during the earlier perception survey and infrastructure audit. Their perspectives provided valuable firsthand insights into the safety concerns and infrastructure gaps, adding depth to the overall study.

4. Common issues highlighted:

The children pointed out several recurring issues, such as broken or non-existent sidewalks, lack of proper signage, difficulty in crossing busy roads, and the absence of cycling infrastructure. Their concerns closely aligned with the findings of the perception survey and infrastructure audit.

5. Increased awareness:

The sessions not only gathered important data but also served as an educational platform. The sessions also included a brief introduction to basic traffic rules and safe road behaviors. Key topics covered included the importance of using pedestrian crossings, wearing helmets while cycling, and being cautious near moving vehicles.

These focus group discussions played a dual role in the overall study:

1. Validation and depth: They validated the data collected through other methodologies while providing insights from the perspective of young commuters.

2. Awareness building: They contributed to the broader goal of fostering a culture of road safety among children, empowering them to adopt safer commuting practices.

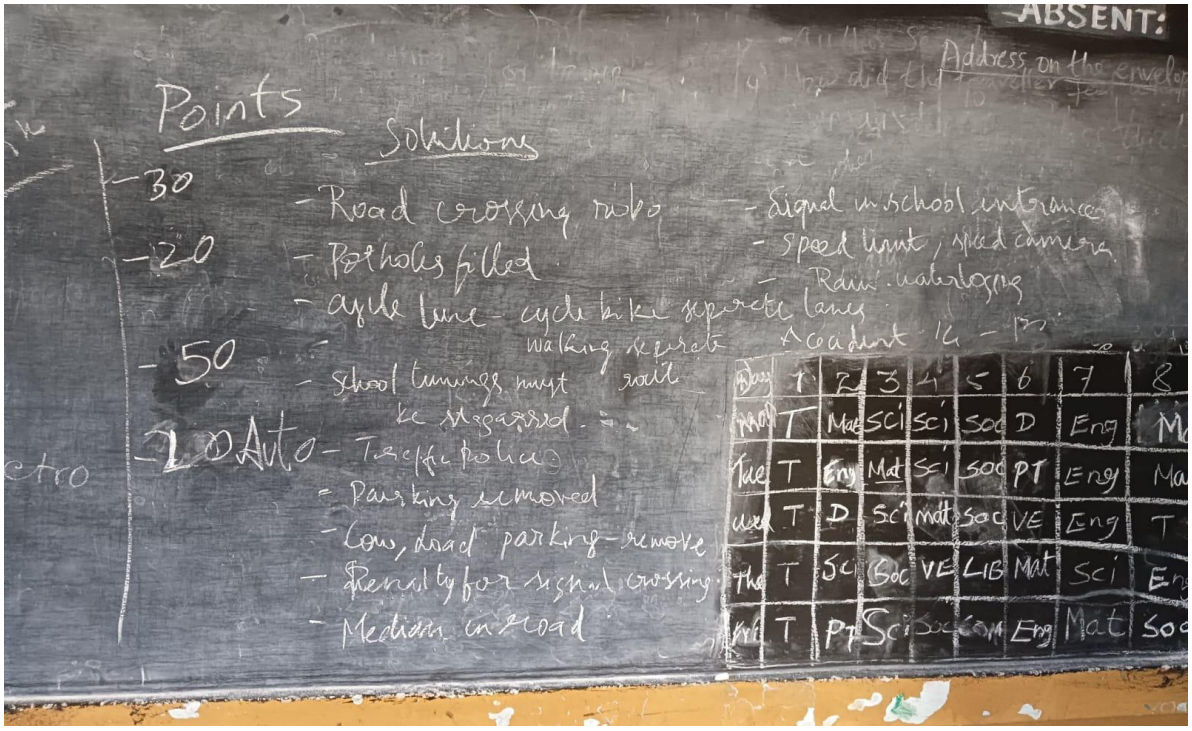
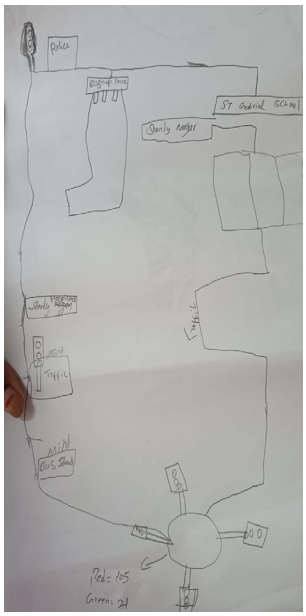


Photo: Issues identified by the children in St. Gabriel's school during the FGD | CAG



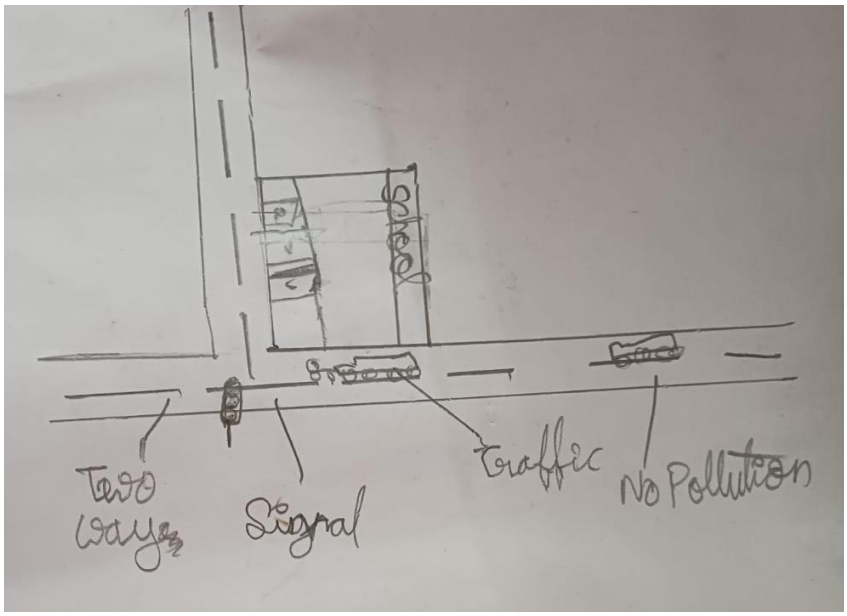


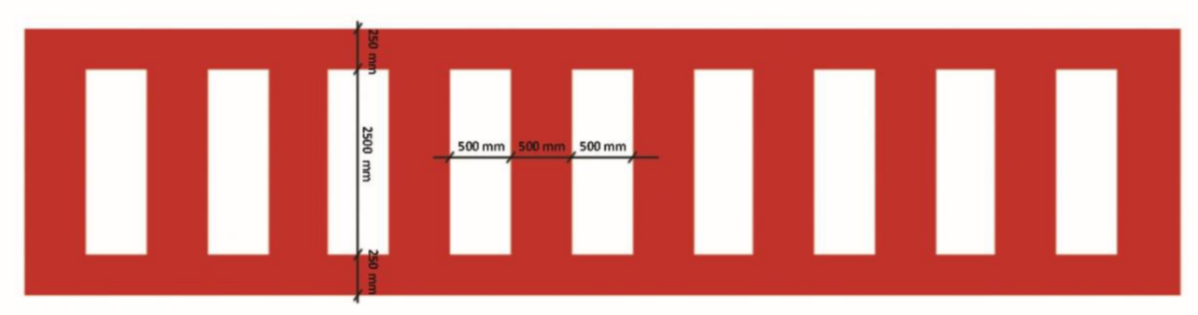
Photo: Children's drawings highlighting commute challenges at Sri Ramakrishna Mission School during FGD | CAG

ANNEXURE 3

SIGNAGES AND ROAD MARKINGS IN SCHOOL ZONES

1. Pedestrian crossing (IRC SP 32)

As per IRC: 35, pedestrian crossing is painted as alternate white and black of 500 mm width each. The black, however, is the unpainted surface of the tar road and in the case of school zones; it shall be painted in red colour, instead.



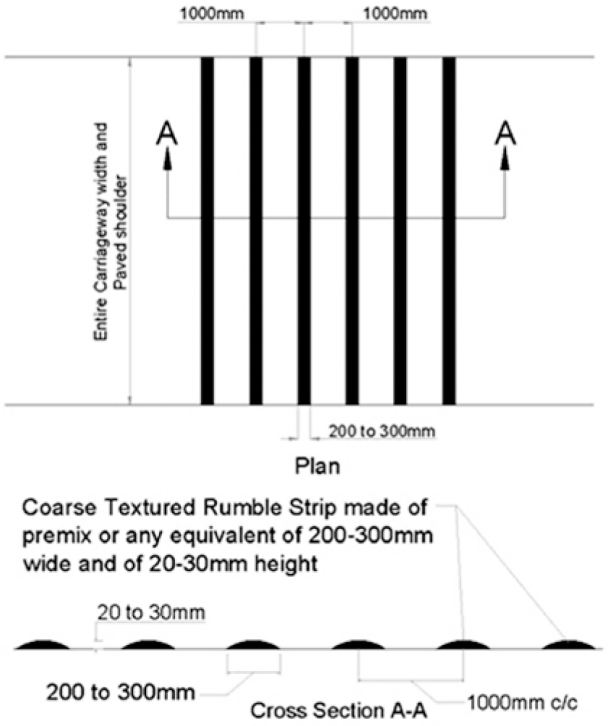
2. Zig Zag markings to enforce No-Parking (IRC 35)

3. Parking restriction for traffic management (IRC SP 32)

The sign should be erected where the parking is not allowed to specific durations for traffic management.

4. Rumble strips (IRC 99)

Raised section should be 20 to 30 mm high, 200-300 mm wide and spaced about one meter centre to centre of roughly 6 numbers at one location.



5. Signboard showing drop and ride facilities (IRC SP 32)

The sign should be erected at the Drop and Ride designated area for parents picking up or dropping their children by circulation of vehicles.

6. School Ahead Sign Board (IRC SP 32)

Cautionary signs should be provided at the start of a school zone to warn motorists of the presence of a school and hence the possibility of children entering the roadway. The background of the school zone ahead sign shall be fluorescent yellow-green colour.

7. Speed limit Sign Board (IRC SP 32)

To reduce vehicle speeds to improve pedestrian safety during times of high pedestrian activity (i.e., arrival and dismissal). Oversized sign may be used for applications that require increased emphasis, improved recognition or increased legibility.

Speed Limit Sign

8. Flashing beacons (IRC SP 32)

Flashing yellow beacons (ref Fig 5-26) are most effectively applied where drivers would not otherwise note school zone signage due to traffic conditions, speed of travel and competing signage.

CAG
Citizen consumer and civic Action Group

No.103, First Floor,
Eldams Road, Teynampet, Chennai,
Tamil Nadu, India - 600018

+91-44-2435 4458
+91-44-2435 0387

www.cag.org.in

@cagchennai