Guiding the Lines

Recommendations to Improve Hanoi Metro Station Accessibility

Presented by:
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EXECUTIVE SUMMARY

Hanoi's metro network has entered its initial phase of operation at a moment when the city is seeking to shift travel behaviour toward more sustainable and efficient modes of transport. This study assesses station accessibility with the aim of improving ridership and promoting pedestrian-oriented access to the metro system. Conducted during the post-operational phase and prior to the network's further expansion, the research evaluates current accessibility conditions in order to inform both targeted improvements to current stations and the design of future stations.

Beyond the narrow focus of universal accessibility, the study adopts a multi-faceted understanding of accessibility, structured around six interconnected factors: intermodality, safety, environmental comfort, access to services, visual communication, and connectivity. These dimensions form the conceptual foundation of the analysis and provide a comprehensive framework for evaluating how users experience metro stations in their daily journeys. Improving accessibility across these dimensions is therefore a critical lever for encouraging sustained modal shifts and for securing the long-term effectiveness of public transit investments.

The research is based on a purposive sample of five metro stations – Cát Linh, Thái Hà, Vành Đai 3, Đại Học Quốc Gia, and Nhổn – located across the two lines currently in operation. Station selection aimed to capture a diversity of urban context, including central and peri-urban locations, end-of-line and intermediate stations, and surrounding environments ranging from educational campuses to major road corridors. A structured observation checklist was developed to evaluate station accessibility using a "traffic light" scoring system based on best-practice criteria. In parallel, in-person questionnaires were administered to active metro users at station entrances, with the support of undergraduate research assistants from the Hanoi University of Civil Engineering (HUCE). The final dataset combines observations with user perceptions across 13 survey questions.

Survey results indicate that nearly half of respondents use the metro five to seven days per week, revealing a substantial core of regular users. Most trips are related to work or education, although a significant share of users reported other purposes not initially anticipated. Approximately one-third of participants reported walking both to and from the metro stations without relying on any other mode. While this suggests a degree of walkability, it also points out a limited station catchment area and weak intermodal integration. In the context of a high-capacity system, the dominance of short walking trips highlights structural constraints in first- and last-mile accessibility.

All stations are elevated and located along high-traffic road corridors, allowing them to function as pedestrian overpasses. This configuration significantly shapes user perception of safety and connectivity, with stations often seen as safer alternatives to at-grade crossing where the pedestrian infrastructure is otherwise inadequate.

Beyond station-specific features, several cross-cutting issues emerged. First, accessibility depends not only on physical design such as elevators or signage, but also of operational reliability, particularly during heavy rainfall. Second, stations are increasingly acting as key connectors within the urban fabric, reinforcing their role as public spaces rather than merely transport infrastructure. Third, gaps persist between expert-based accessibility benchmarks and user satisfaction levels, suggesting the need for a two-tier approach that distinguishes between non-negotiable safety standards and longer-term enhancement targets.

Across the six accessibility factors, the findings reveal consistent patterns. Intermodality remains weak, with limited feeder integration and insufficient bus-metro coordination in terms of comfort, legibility, and passenger information. Informal pick-up and drop-off practices are widespread and generally tolerated. In terms of safety and connectivity, aerial stations compensate for deficient pedestrian infrastructure at street level and are generally perceived positively. Environmental comfort across studied stations is highly unequal, with exposed staircases and rain-related shutdowns of vertical circulation creating recurring safety and accessibility issues. Weather protection and heat management emerge as critical priorities for user satisfaction. Although many stations are located near a high concentration of services, visual communication and map legibility remain underutilized, a shortcoming that will become increasingly problematic as the network expands.

Overall, this research provides a baseline for iterative improvement. As Hanoi's metro network grows and travel patterns diversify, station-area accessibility will become a decisive factor in sustaining ridership, and in achieving the system's broader mobility and sustainability goals. Future research should include detailed built environment audits within a 400-500 m station influence area and a deeper analysis of bus-metro integration, including service frequency and transfer reliability.

RÉSUMÉ

Le réseau de métro de Hanoï est entré dans sa phase initiale d'exploitation à un moment où la ville cherche à orienter les comportements de déplacement vers des modes de transport plus durables et plus efficaces. Cette étude évalue l'accessibilité des stations dans le but d'accroître l'achalandage et de promouvoir un accès piétonnier au métro. Réalisée durant la phase post-opérationnelle et avant l'expansion ultérieure du réseau, cette recherche analyse les conditions actuelles d'accessibilité afin d'orienter à la fois les améliorations ciblées des stations existantes et la conception des futures stations.

Au-delà de la notion limitée d'accessibilité universelle, l'étude adopte une approche multidimensionnelle de l'accessibilité, structurée autour de six facteurs interconnectés : l'intermodalité, la sécurité, le confort environnemental, l'accès aux services, la communication visuelle et la connectivité. Ces dimensions constituent le fondement conceptuel de l'analyse et offrent un cadre complet permettant d'évaluer l'expérience des usagers dans leurs déplacements quotidiens. L'amélioration de l'accessibilité selon ces différentes dimensions représente ainsi un levier essentiel pour encourager un transfert modal durable et assurer l'efficacité à long terme des investissements en transport collectif.

La recherche s'appuie sur un échantillon ciblé de cinq stations de métro – Cát Linh, Thái Hà, Vành Đai 3, Đại Học Quốc Gia et Nhổn – situées le long des deux lignes actuellement en service. La sélection des stations visait à refléter une diversité de contextes urbains, incluant des secteurs centraux et périurbains, des stations terminales et intermédiaires, ainsi que des environnements allant de campus universitaires à de grands corridors routiers. Une grille d'observation structurée a été élaborée afin d'évaluer l'accessibilité des stations à l'aide d'un système de notation « feux de circulation », basé sur des critères de bonnes pratiques. Parallèlement, des questionnaires en personne ont été administrés à des usagers du métro aux entrées des stations, avec l'appui d'auxiliaires de recherche de premier cycle de l'Université de génie civile de Hanoï (HUCE). L'ensemble de données final combine donc des observations de terrain et les perceptions des usagers, à partir de 13 questions d'enquête.

Les résultats de l'enquête indiquent que près de la moitié des répondants utilisent le métro cinq à sept jours par semaine, révélant l'existence d'un noyau important d'usagers réguliers. La majorité des déplacements sont liés au travail ou aux études, bien qu'une proportion significative des usagers ait mentionné d'autres motifs de déplacement non anticipés. Environ un tiers des participants ont déclaré se rendre à la station de métro et en repartir exclusivement à pied, sans recourir à un autre mode de transport. Si cette situation témoigne d'un certain niveau de marchabilité, elle met également en évidence une aire de desserte limitée des stations et une faible intégration intermodale. Dans le contexte d'un système de transport à grande capacité, la prédominance des déplacements piétons de courte distance souligne des contraintes structurelles liées à l'accessibilité du premier et du dernier kilomètre.

Toutes les stations étudiées sont aériennes et implantées le long de corridors routiers à fort débit, ce qui leur permet de fonctionner comme des passerelles piétonnes. Cette configuration influence fortement la perception des usagers en matière de sécurité et de connectivité, les stations étant souvent perçues comme des alternatives plus viables aux traversées au niveau de la chaussée, dans des contextes où les infrastructures piétonnes sont insuffisantes.

Au-delà des caractéristiques propres à chaque station, plusieurs enjeux transversaux ont été soulevés. Premièrement, l'accessibilité dépend non seulement de la conception physique, comme la présence d'ascenseurs ou de signalisation, mais aussi de la fiabilité opérationnelle, en particulier lors de fortes pluies. Deuxièmement, les stations jouent de plus en plus un rôle clé dans le tissu urbain, renforçant ainsi leur fonction d'espaces publics plutôt que de simples infrastructures de transport. Troisièmement, des écarts persistent entre les critères d'accessibilité définis par les experts et les niveaux de satisfaction exprimés par les usagers, ce qui suggère la pertinence d'une approche à deux niveaux distinguant les normes de sécurité non négociables et les objectifs d'amélioration à plus long terme.

À travers les six facteurs d'accessibilité, les résultats mettent en évidence des tendances récurrentes. L'intermodalité demeure faible, marquée par une intégration limitée des modes d'apport et une coordination insuffisante entre autobus et métro en matière de confort, de lisibilité et d'information aux passagers. Les pratiques informelles de prise en charge et de dépose sont largement répandues et généralement tolérées. En matière de sécurité et de connectivité, les stations aériennes compensent les lacunes des infrastructures piétonnes au niveau de la rue et sont globalement perçues de façon positive. Le confort environnemental varie fortement d'une station à l'autre, les escaliers exposés et les interruptions de circulation verticale liées à la pluie engendrant des problèmes récurrents de sécurité et d'accessibilité. La protection contre les intempéries et la gestion de la chaleur apparaissent comme des priorités majeures pour la satisfaction des usagers. Bien que de nombreuses stations soient situées à proximité d'une forte concentration de services, la communication visuelle et la lisibilité des cartes demeurent sous-exploitées, des lacunes qui risquent de s'accentuer avec l'expansion du réseau.

Dans l'ensemble, cette recherche établit une base de référence en vue d'améliorations itératives. À mesure que le réseau de métro de Hanoï s'étend et que les habitudes de déplacement se diversifient, l'accessibilité des stations deviendra un facteur déterminant pour maintenir l'achalandage et atteindre les objectifs plus larges en matière de mobilité durable. Les recherches futures devraient inclure des évaluations détaillées de l'environnement bâti dans un rayon d'influence de 400 à 500 mètres autour des stations, ainsi qu'une analyse approfondie de l'intégration autobus-métro, notamment en ce qui concerne la fréquence des services et la fiabilité des correspondances.

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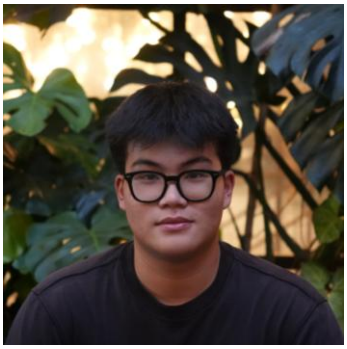

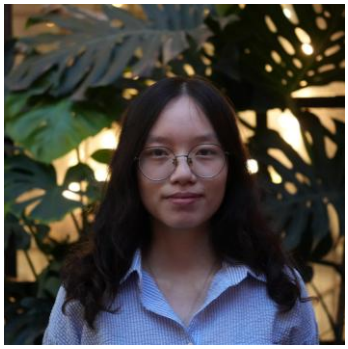

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INTRODUCTION

As Hanoi's metro network enters its initial phase of operation, station accessibility for pedestrian users – including those transferring to nearby transport modes – has become central to the system's long-term viability. Commissioned by HealthBridge Vietnam and carried out in collaboration with Hanoi's Department of Construction (DOC), this supervised research project assesses station accessibility with the aim of improving ridership and promoting pedestrian-oriented access to the city's metro lines. Focusing on stations of Line 2A and Line 3, the study evaluates accessibility conditions during a post-operational phase of the network, prior to the systems further expansion. Through an assessment of existing stations, the research seeks to derive lessons to inform both targeted improvements to current stations and the design of future stations as Hanoi continues to expand its metro network.

As outlined in more details below, the scope of this research extends beyond universal accessibility, to encompass a multi-faceted understanding of accessibility (see Figure 1). The six interconnected dimensions in the figure below form the conceptual foundation of the study and the analytical framework that guided the evaluation of metro stations from a comprehensive accessibility perspective.

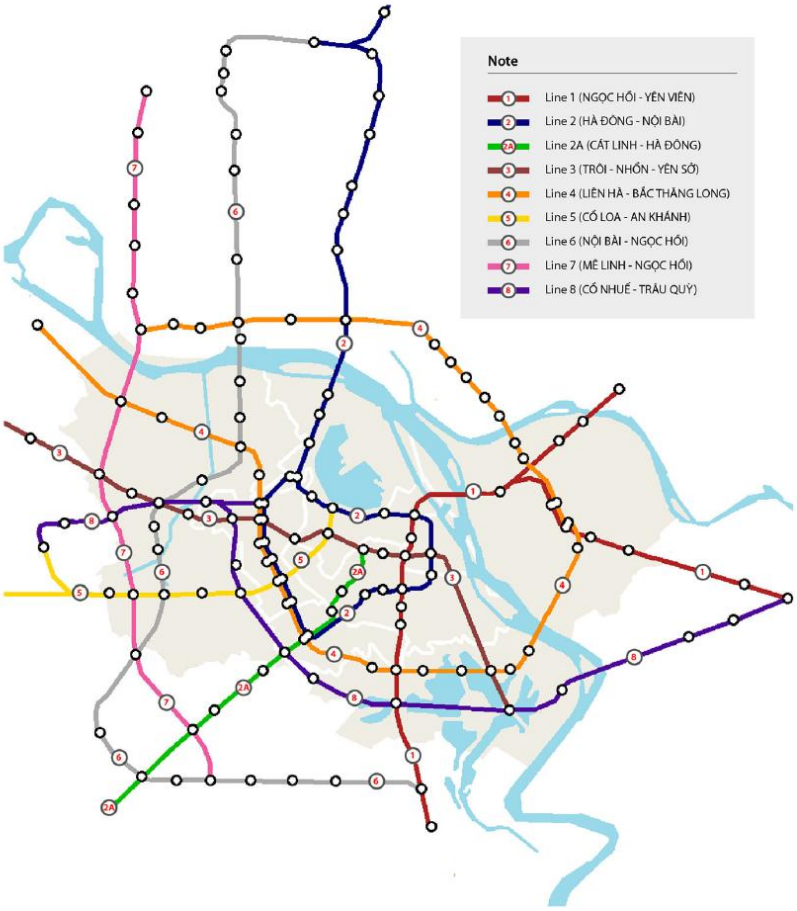
Figure 1. Different factors and sub-factors of accessibility

Source: authors

Considering these components is essential to the development of a high-quality metro system, particularly in Hanoi, where the city has recently adopted an ambitious 318 km

mass transit development plan (see Figure 2) amid rapid national urbanization[1]. As decision-makers seek to shift away from individual, motorized transports and move toward a more sustainable and attractive urban model (Turner *et al.,* 2024), new mass transit systems must be designed to accommodate a diverse range of users.

Figure 2. Planned Hanoi urban railway network



Source: Turner et al., 2024

Studying metro station accessibility is particularly relevant given the broader challenge of mobility habits in Hanoi. A recent origin-destination study indicates that 72% of daily trips are made by two-wheeled vehicles (scooters and motorcycles), while 7% are made by cars[2]. In contrast, only 4% of trips are made by bus and a mere 0.2% by metro (Paris Region Institute, 2024). While increases in public transport usage depend in part on

[1] Vietnam's urban population is growing at approximately 3% annually, significantly higher than the Southeast Asian average of 2.5%. As of late 2021, the country's population was 38% urban. It expected to surpass 50% by 2030 (UN-Habitat, 2023).

[2] A relatively low figure, but one expected to grow rapidly in the coming years (Hiep, 2025).

network coverage, the accessibility of stations and their surrounding environments plays a key role in retaining existing users and attracting new ones (Nyunt & Wongchavalidkul, 2020). In short, improving accessibility is therefore a critical lever for encouraging and sustaining modal shift and for securing the long-term effectiveness of public transit investments.

Hanoi Metro Conception and Construction

The two metro lines examined in this research were developed through official development assistance (ODA) and foreign engineering, procurement, and construction (EPC) contracts. Line 2A was implemented through a government-to-government EPC model financed by Chinese ODA, while Line 3 follows a multilateral contract led by Hanoi authorities with financing from the French Development Agency (AFD), the European Investment Bank (EIB), and the Asian Development Bank (ADB) (Turner *et al*. 2024; Musil & Molt, 2010; *Vietnam*, 2024). These delivery mechanisms will also be used for other metro lines planned for construction. Both lines include 12 stations and cover approximately similar distances (see Table 1).

Table 1. Infrastructure plan for the Hanoi Metro system and sources of financing

Line	Length (in km)	Construction	Number of stations	Status	Main financing / development partner
Line 1	25	Elevated	16	Planning stage	Japan
Line 2	11.5	Elevated and underground	15	Under construction	Japan
Line 2A	**13**	**Elevated**	**12**	**Completed in 2021**	**China**
Line 3	**12.5**	**Elevated and underground**	**12**	**Elevated section (8.8 km) completed in 2024, underground section under construction**	**France, EU, Asia**

Source: Adapted from Musil & Molt (2010), General Plan of Hanoi City Urban Railway Network (n.d.), Metro Report International, 2021, and Vo, 2024; emphasis added

Despite Line 2A being in operation since 2021 and Line 3 since 2024 (Metro Report International, 2021; Vo, 2024), their planning and construction had no shortage of setbacks and controversies related to land expropriation, insufficient worker compensation, and safety (see Kee 2024, Turner & Nguyen 2024, Turner *et al*. 2024). The low ridership figures mentioned earlier may partly reflect public skepticism toward the metro system stemming from these controversies. However, a more significant constraint lies in the difficulty of integrating the metro system into Hanoi's existing urban fabric and transportation system. Encouraging a modal shift remains difficult, particularly given that the only two lines

currently in operation do not yet intersect (the underground section of Line 3 which will connect them is still under construction at the time of writing).

Figure 3. Hanoi metro lines and stations studied

Source: authors

The remaining of this report is organized as follows: the next section introduces the six factors of mass transit station accessibility examined in this study. We then present the selected case study stations, the research methodology, and a profile of the participants. The findings are subsequently discussed in relation to each accessibility factor. The report concludes with a set of recommendations and best practices aimed at improving stations currently in operation and at guiding the design of future stations.

FACTORS OF MASS TRANSIT STATION ACCESSIBILITY

As mentioned earlier, in this research, accessibility is defined as a multi-dimensional concept encompassing an array of factors that shape both the overall quality of a transportation network and the user experience. An accessible transportation system addresses both the physical and mobility needs of its users, which allows for inclusive access. This is achieved through multi-modal integration—including feeder buses and active transportation routes—as well as through a high-quality public realm that ensures safe pedestrian access and supports first- and last-mile connectivity (World Bank, 2021 a, p. 236).

The accessibility factors and sub-factors documented and analyzed in this study were derived from international transportation reports, best-practice guidelines and academic literature. Many of these factors are interdependent, working symbiotically to foster a convenient and comfortable travel experience. The methodology outlined in the next section explains how the remaining six informed the structure and approach of the research.

1. Intermodality

Intermodality refers to both the ease with which users can transfer between modes of transport (ex: from walking to metro, from metro to bus, etc.) and the diversity of interconnected transportation options available to them (ITDP, 2019, p.7). In the context of high-capacity urban rail systems, intermodality is a key condition for effective station accessibility, as metro stations function as nodes where multiple modes conver ge (bus, taxis, walking, cycling, etc.). In this study, this factor is examined at the station scale through two complementary sub-factors: transfers and vehicular access. Together, these sub-factors capture how stations accommodate the arrival, departure, and movement of users and vehicles as they transition between modes within the station's immediate surroundings.

1.1. The *transfers* sub-factor refers to the ease with which users can move from one public transportation mode to another, such as between metro and bus services. It encompasses key elements shaping the legibility and convenience of intermodal transfers for users, including the clarity of directional signage, proximity of bus stops to stations' entrances, and the quality and continuity of pedestrian infrastructure (ITDP, 2019, p. 26).

1.2. The *vehicular access* sub-factor addresses how well the street environment surrounding metro stations accommodates the inflow and outflow of personal vehicles, app-based mobility services (i.e., ride-hailing motorbikes and cars), bicycles, and regular taxis. In Hanoi's mobility context, these modes play a critical first- and last-mile role in connecting users to the metro system. Good practice in this regard includes the provision of designated drop-off and pick-up zones, or lay-bys, that help prevent congestion, and avoid

interference with reserved bus lanes (World Bank, 2021 b, p. 274). Combined, these sub-factors support efficient and safe intermodal connections within the transit system.

2. Safety

Safety is a critical factor influencing users' perception of metro stations and, consequently, their willingness to use the transit network. In this study, safety is examined through two complementary sub-factors: pedestrian-road safety and user safety.

2.1. *Pedestrian-road safety* refers to the extent to which the roadways and street environments around metro stations are designed to protect pedestrians. Observable indicators include the presence and continuity of sidewalks, short crossing distances, pedestrian refuge islands, clearly demarcated crossings, and protective street furniture such as bollards (ITDP, 2018; TransLink, 2012). These features contribute to traffic-calming by enhancing pedestrian visibility and reducing vehicular speeds near stations.

2.2. The *user safety* sub-factor assesses elements which shape perceptions of personal safety among station users. Indicators include passive public surveillance, high levels of pedestrian activity and nighttime lighting in public spaces (ITDP, 2018, p.24). These conditions help reduce potential harm and encourage more inclusive use of the transit system, supporting the presence of more vulnerable users, such as women traveling alone at night.

3. Environmental Comfort

Environmental comfort considers how the physical conditions of the areas surrounding a station affect users' physical experience when accessing transit. In this study, this factor is examined through a single sub-factor: *pedestrian comfort*, which focuses on the quality of the walking environment to and from metro stations. Indicators include the presence of shade or canopies that mitigate heat, street furniture and seating areas where users can rest, transit shelters that protect against climatic elements, and the overall width and surface quality of sidewalks along stations' access route (ITDP, 2018; TransLink 2012). Pedestrian comfort further extends beyond the streetscape to include nearby parks, playgrounds, or green areas, which enhances the urban experience and contributes to a healthier and more dynamic environment (ITDP, 2018). Particularly in environments subject to extreme weather, such as Hanoi, integrating environmental comfort into station design can enhance the quality of access and strengthen the long-term viability of pedestrian-oriented transit use.

4. Access to Services

Although access to services is more difficult to directly integrate into public transport projects, taking a transit-oriented development approach would help address access to

services, which remains a critical factor influencing how and why people use the transit network. Proximity to essential services such as food outlets, street vendors, retail, healthcare facilities, and schools, encourage localized trips and increase overall transit use (Urban Transport Group, 2019; ITDP, 2017). Locating these services near major transit corridors enables users to reach them within a short walking distance at the beginning or end of their journeys (TransLink, 2012, p.20). Alternatively, transit projects constructed around existing services can enhance accessibility by connecting stations to nearby institutions through the built environment, using strategies such as clear wayfinding and improved pedestrian pathways (ITDP, 2019). By considering access to services as part of station-area planning, transit systems can better support user convenience and contribute to a more complete and attractive mobility experience.

5. Visual Communication

Visual communication is often overlooked in transit system design, particularly in an era dominated by smartphones and digital navigation tools. Nevertheless, physical signage and maps integrated into the built environment remain essential components of station accessibility, especially for first-time users and in complex station environments.

In this study, visual communication is assessed through two closely related sub-factors: signage and wayfinding. Key aspects considered include the visibility, legibility and quality of signs, situational maps, exit and entrance indicators and timetables (ITDP, 2019). Clear signage that communicates essential information (i.e. route direction and stations' names) is fundamental in creating a legible and navigable environment for users. Situational maps are especially important in stations with underground components, as they help orient pedestrians reorient themselves upon exiting. By providing information on street names, cardinal directions, and nearby landmarks, these maps facilitate wayfinding in the surrounding environment (ITDP, 2019, p.18).

6. Connectivity

In the context of public transportation, connectivity refers to how easily users can move between the station and its surrounding environment, as well as how seamlessly they can enter and exit the station itself. In this study, connectivity is examined through two sub-factors: pedestrian facilities and universal accessibility.

6.1 The *pedestrian facilities* sub-factor reflects the walkability of the environment within a short radius of the station and the ease of movement between the street and the station entrances. Indicators include a direct connection to sidewalks from the station entrances and exits, safe at-grade crossing, and minimized walking distances within the station's surroundings (ITDP, 2017; 2019).

6.2 *Universal accessibility* focuses on the range of mobility needs which a station's physical environment accommodates. Indicators include the presence of elevators, escalators and universally accessible at-grade crossings that support independent movement for users with diverse physical abilities (ITDP, 2019, p.25). Addressing universal accessibility is key to ensuring the public transport system is inclusive, and to encourage a wide range of passengers, including individuals with limited mobility, caregivers with strollers and users traveling with young children.

METHODOLOGY

Selection of metro stations

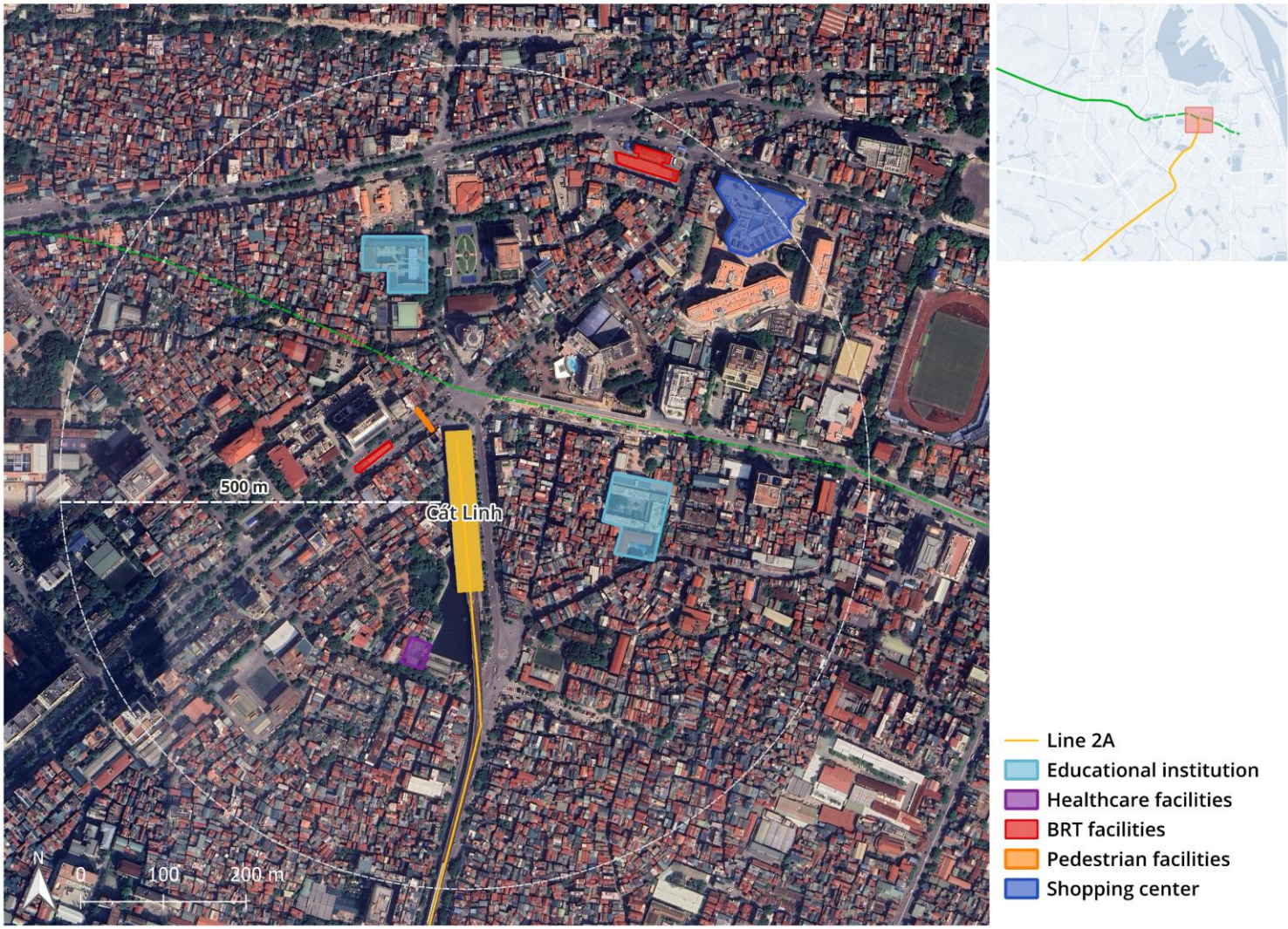
Given the limited scope of this study and associated resource constraints, the research focused on a purposive sample of five metro stations located across the two lines currently in operation in Hanoi. Station selection aimed to capture a diversity of conditions within the network, including station position (end of line versus intermediate stations), location within the city (central versus peri-urban), and characteristics of the surrounding urban environment (i.e., proximity to educational institutions, commercial areas, or major road infrastructure).

To ensure balanced coverage, two stations were selected on each line, with a fifth station identified as a future interchange point between lines. At the start of fieldwork in Vietnam, we conducted reconnaissance visits to all stations on both lines to develop an initial understanding of the range of urban contexts they traverse. A rapid characterization of the station surroundings informed the final selection and ensured that the chosen sites allowed for comparative assessment of accessibility across contrasting urban environments. The following presents the five metro stations studied, describes their environmental characteristics, and discusses the justification for selecting them.

1. Cát Linh

This terminus station is located on Line 2A within the urban core of Hanoi. Currently, it is the innermost station in the metro network and will act as an interchange between Line 3 and Line 2A once the construction of the underground portion of Line 3 is completed. It is adjacent to the first stop on Hanoi's BRT01 line (Kim Mã – Yên Nghĩa), and at walking distance from healthcare and recreational facilities.

Figure 4. Cát Linh station and its surrounding environment



Source: authors

2. Thái Hà

Two stops south of Cát Linh on Line 2A, Thái Hà station is located between the first and second ring road of Hanoi, near numerous educational and healthcare facilities. It is also at walking distance from recreational hubs like the Hoang Cau Football Field (Sân Bóng Hoàng Cầu) and Đống Đa lake, and open public space with leisure walking paths.

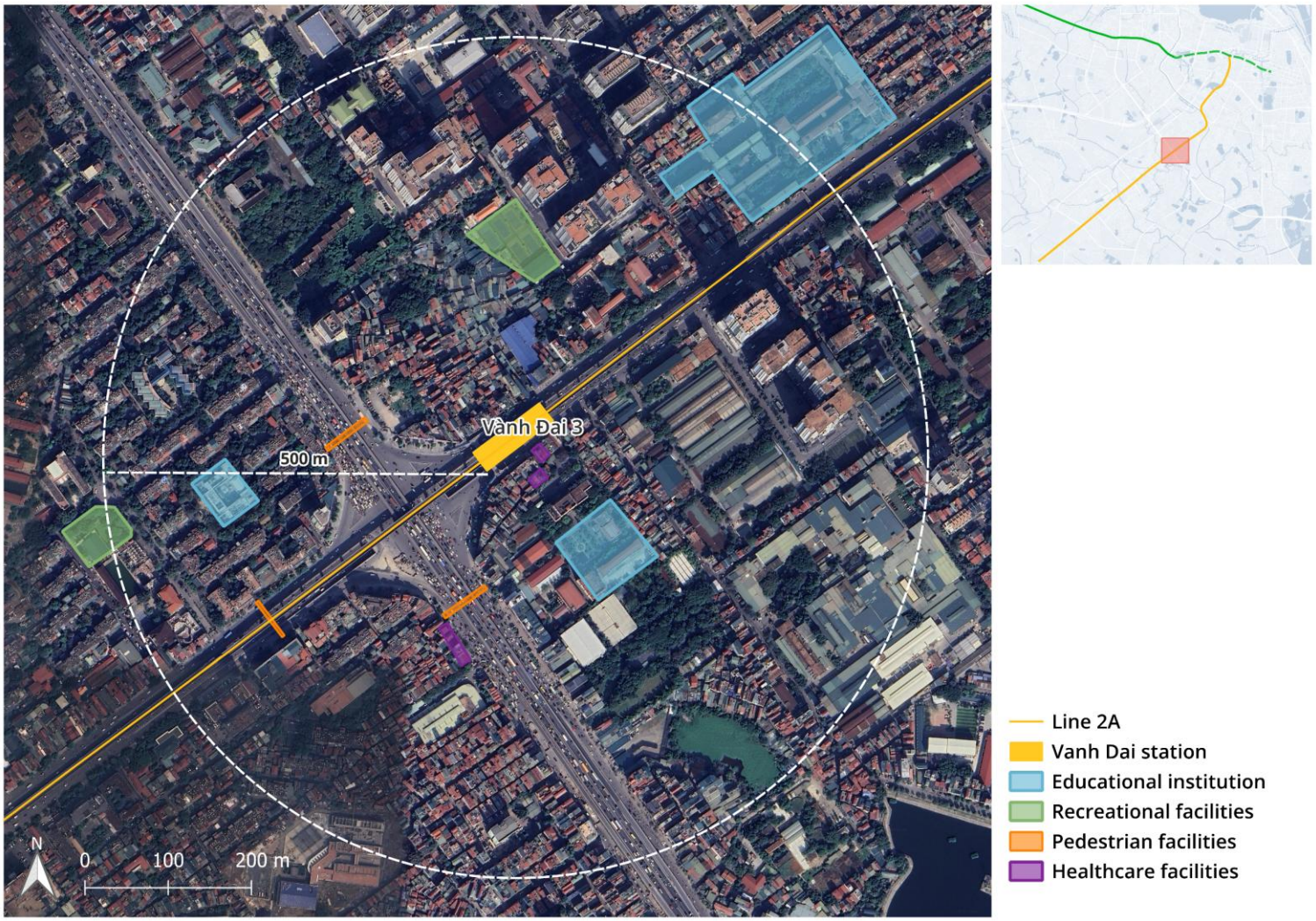
Figure 5. Thái Hà station and its surrounding environment

Source: authors

3. Vành Đai 3

The station (often referred to as "VD3") is located three stops away from Thái Hà continuing down Line 2A and is directly adjacent to the third ring road of Hanoi (hence the station's name). This major thoroughfare is one of the busiest highways in Hanoi acting as an urban belt connecting national highways around the urban core (Ngan, 2023). This presented a unique opportunity to evaluate the quality of user accessibility at a station surrounded by multi-level highway infrastructure, notably given the presence of educational and healthcare facilities within walking distance from the station.

Figure 6. Vành Đai 3 station and its surrounding environment

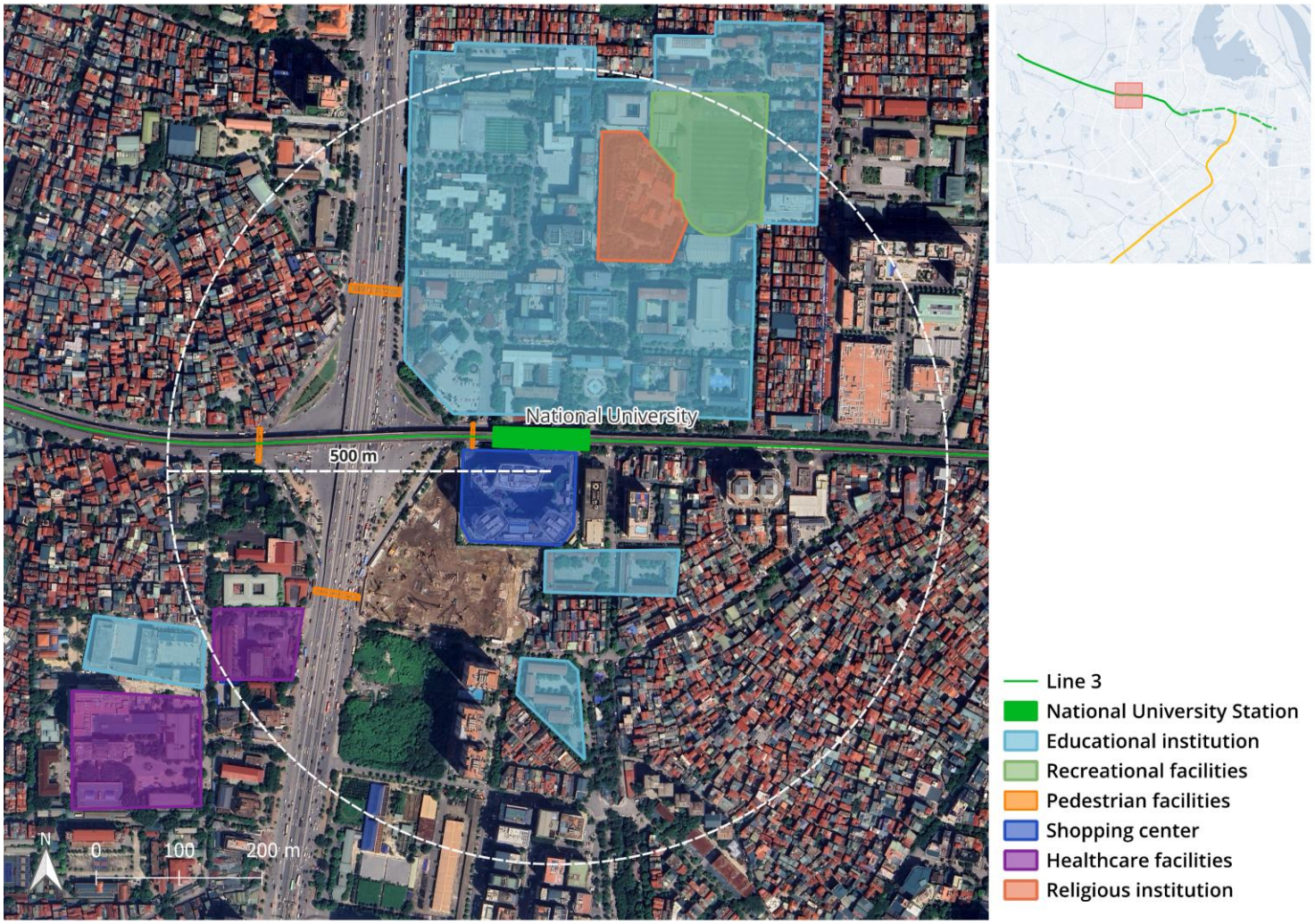


Source: authors

4. Đại Học Quốc Gia (National University)

Hereby referred to as “National University”, this station is located on Line 3 at the junction of ring road 3 and ring road 2.5. Its name derives from its immediate proximity to one of the main campuses of the Vietnam National University. It is also immediately adjacent to the Indochina Mall, a high-end complex which comprises commercial, recreational and residential functions, and several healthcare facilities such as a branch of the Ha Noi Traditional Medicine Hospital (Bệnh viện đa khoa Y học Cổ truyền Hà Nội).

Figure 7. National University station and its surrounding environment

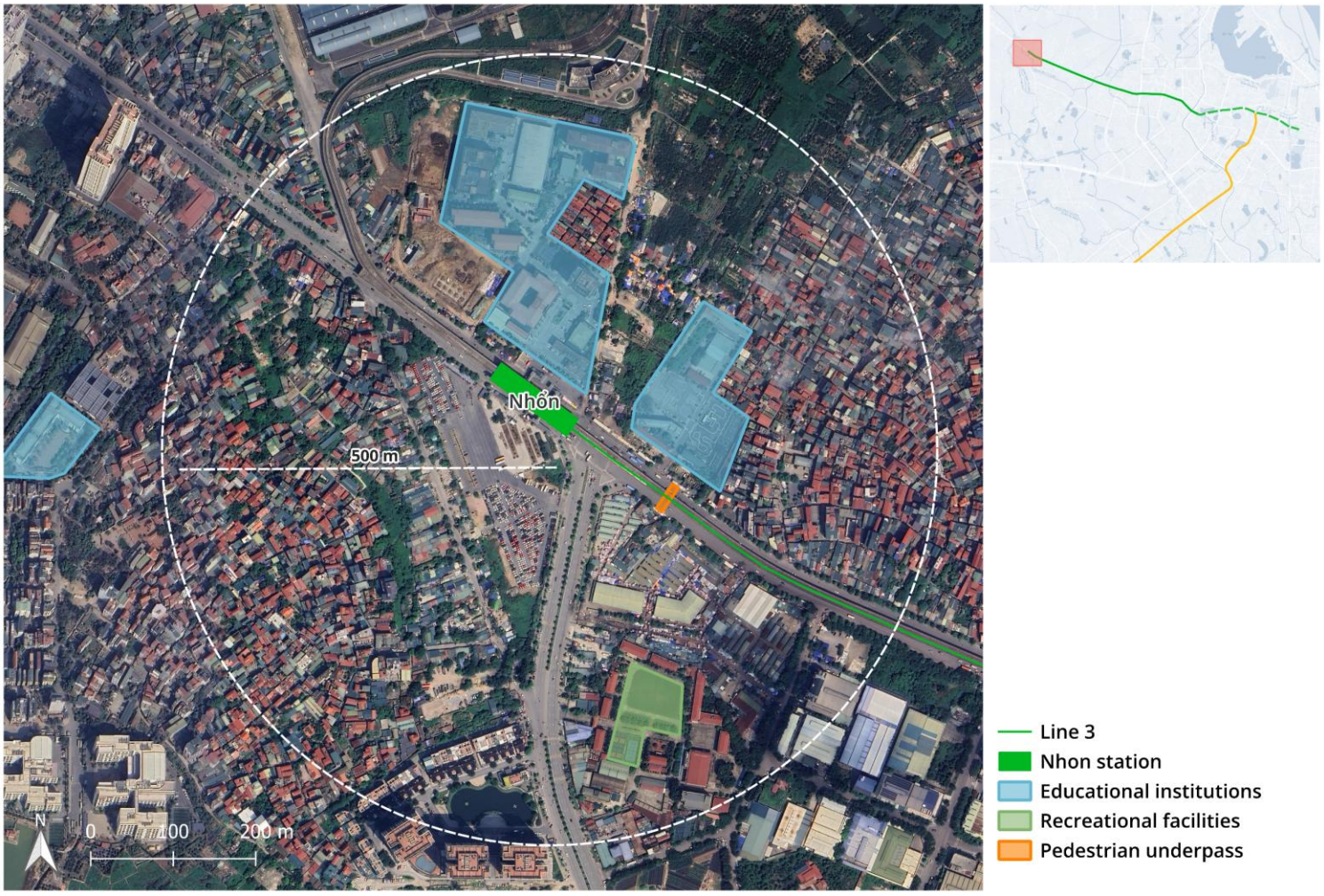


Source: authors

5. Nhổn

This end-of-line terminus station of Line 3 was selected for its different urban environment. Due to its location in the peri-urban region of Hanoi, Nhổn acts as a gateway for inter-regional travel as many regional bus stops are located around this station. In addition, this station is adjacent to numerous educational facilities such as the Hanoi University of Industry. Despite the relatively low-density development in the surrounding area, Nhổn allowed us to evaluate a more diverse array of station types.

Figure 8. Nhổn station and its surrounding environment



Source: authors

Data for this study was collected during the summer of 2025 using a mixed-method, sequential research design combining site-based visual observations and user surveys. This strategy was designed to capture both the physical conditions shaping station accessibility and users' lived experiences of accessing and using the metro system. Data collection took place in two successive phases. The observational phase, conducted during the month of June provided a systematic assessment of accessibility conditions at the five selected stations and informed the identification of key issues. These issues were then used to refine and structure a questionnaire survey to document users' perceptions and practices. This two-step approach enabled triangulation between our own observations and assessment of the physical conditions of the station and user experience. It further allowed us to ground analysis and recommendations in both empirical assessment and everyday use. Below, we outline the design and implementation of each data collection instrument, reflecting the sequential logic described above.

Observational Tool

Drawing on the site-level checklist developed by TransLink (2012), we developed a structured observation checklist designed to evaluate the current state of accessibility, based on the factors and sub-factors outlined above (see Observational Tool in **Appendix I**). Given the limited pedestrian infrastructure surrounding many stations, particular attention was given to universal accessibility (e.g., presence, location, and functionality of elevators and escalators). Using a "traffic light" scoring system, each accessibility factor and sub-factor was assessed against a predefined set of observable features and best-practice criteria. For each item, one of three ratings was assigned: green, yellow, or red. A green rating indicates that accessibility requirements are fully met; a yellow rating indicates that they are only partially met; and a red rating indicates they are not met. Sub-factors receiving yellow or red ratings were flagged as areas where adaptive measures may be required to achieve best-practice accessibility standards. However, as discussed below, several conditions identified as shortcomings through this assessment were perceived by users as satisfactory. This divergence between expert-based benchmarks and user perceptions was considered in the formulation of recommendations, recognizing both the contextual specificity of Hanoi's mobility practices and the fact that users may have limited points of comparison with international best-practice standards.

User Questionnaire Survey

For feasibility reasons, participant recruitment and questionnaire administration were conducted directly at the stations[3]. The questionnaire was therefore designed to take no more than five minutes to complete. Open-ended questions were minimized in favor of closed format yes/no questions, with a limited number of follow-up prompts (e.g., "Why?")

[3] This approach was informed by prior fieldwork experience of researchers conducting survey-based research in Vietnam, which indicated that on-site recruitment at stations was the most feasible and effective strategy.

allowing participants the opportunity to elaborate where relevant. All questionnaires were administered in person to individuals entering or exiting the station turnstiles, ensuring respondents were active metro users and not passersby on the street below[4]. To encourage candid responses, all data was collected anonymously.

The questionnaire opened with questions about trip frequency and purpose to provide contextual information on respondents' commuting patterns and familiarity with the metro system. This helped situate responses to subsequent questions related to perceived accessibility. To ensure consistency in the interpretation of commuting patterns, participants were also asked how they would reach their final destination after exiting the metro.

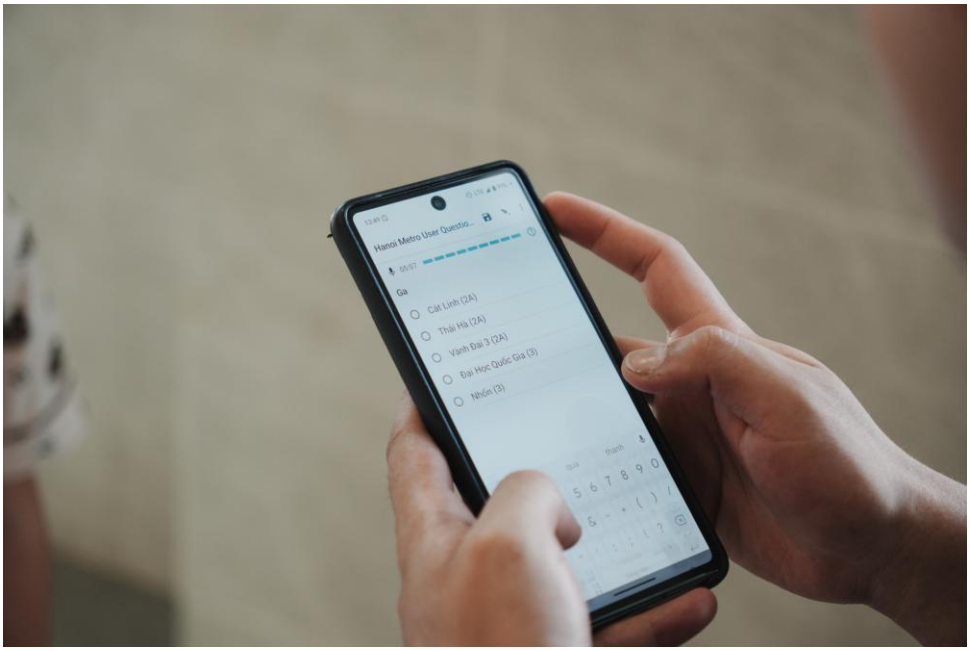
Subsequent questions sought to document the accessibility factors previously discussed. For example, to assess intermodality, participants were asked about their arrival and departing transport modes when accessing the metro. For participants who accessed the station on foot, a follow-up question documented approximate walking time (in minutes), allowing for an assessment of the station's pedestrian catchment area. Expanding on this, the questionnaire included a set of questions related to pedestrian access to areas surrounding the metro stations. These questions examined both the proximity of services and respondents' willingness to walk to them, alongside their perceived level of environmental comfort along pedestrian routes. They also assessed whether nearby facilities were considered walkable and whether the signage and wayfinding in and around stations contributed to the legibility and navigability of the surrounding urban environment. Finally, all participants were asked whether there are any accessibility-related elements that we had not discussed that they would change in the metro stations. These user-issued improvements (see Question 12 in **Appendix II**) are integrated into the discussion of each respective factor, where applicable.

With the help of undergraduate research assistants from the Hanoi University of Civil Engineering (HUCE), the questionnaire was translated into Vietnamese to ease the administration process. These students also acted as interlocutors so participants would have the choice of completing the questionnaire in English or in Vietnamese. The final questionnaire consisted of 13 questions (see **Appendix II**) addressing the aforementioned accessibility factors, with some initial questions meant to collect data on demographics and metro user behaviour for future cross-analysis. The questionnaires were administered using the KoboToolbox software, an open-source data collection, management and

[4] Our decision to exclude non-metro users from the study is due to the limited scope of the project. It would relevant for a future study to analyze the perception of the metro by non-users.

visualization tool mainly used in the non-profit sector[5]. User responses were then transferred to a master sheet on Excel (.csv) and translated into English for analysis.

Figure 9. Metro user questionnaire being administered



Source: authors

Participant Characteristics

In total, the questionnaire was administered to 310 participants over 18 visits to all five selected stations. To ensure the recruiting of a variety of participant profiles, site visits were conducted at different times of the day and during both weekdays and weekends. Our goal was to administer approximately 20 questionnaires per site visit, totaling an average of 62 participants per station (see Figure 10). While we were able to recruit an approximately equal number of men (49.7%) and women (50.3%), we could not achieve a similar balance in terms of age group. This was mainly due to older metro users being less willing to participate in our survey. As a result, over 70% of participants to the questionnaire survey are between 15-39 years old, and users over 60 years old represent less than 10% of our sampling (see Figure 11).

[5] Source: https://www.kobotoolbox.org/about-us/software/

Figure 10. Number of participants per station, in % (n = 310)

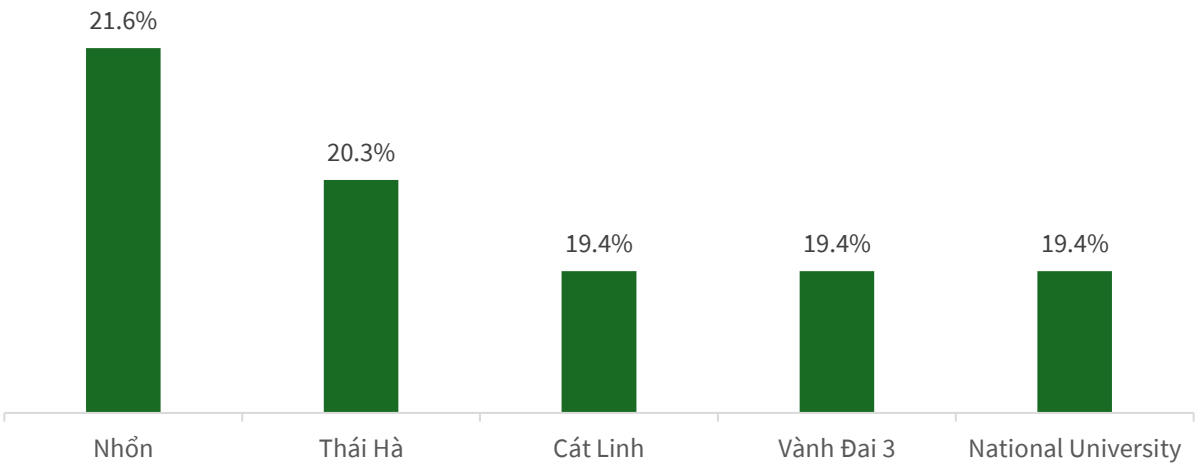
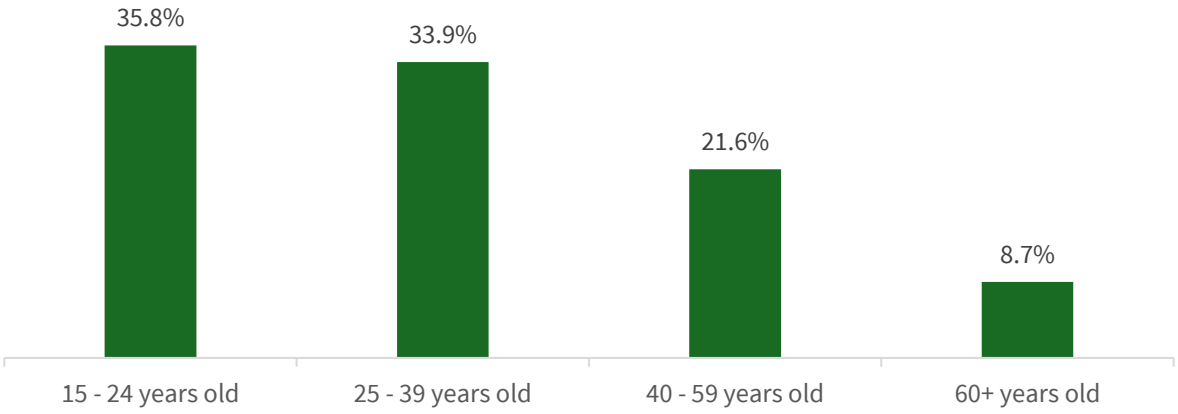


Figure 11. Proportion of participants per age group, in % (n = 310)



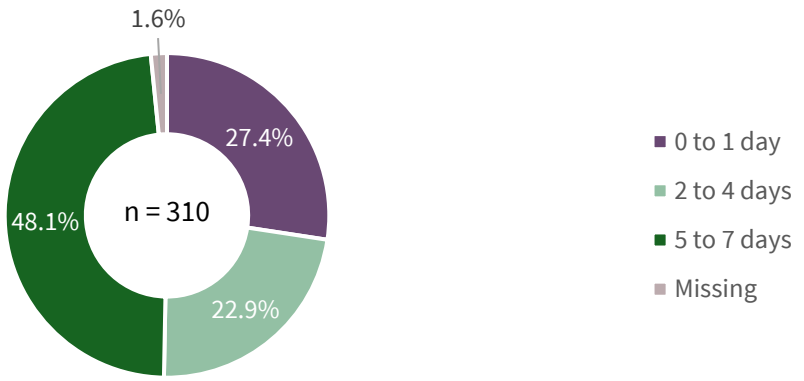
FINDINGS: BRIDGING OBSERVATIONS AND USER EXPERIENCES

This section presents the main findings of the study. It begins with a background portrait of user behavior and travel patterns based on questionnaire data, which provides essential context for interpreting users' perceptions of accessibility. The analysis then turns to the six accessibility factors discussed earlier, drawing on evidence from both the observational survey and the user questionnaire.

Background Portrait: Usage Frequency and Trip Purpose

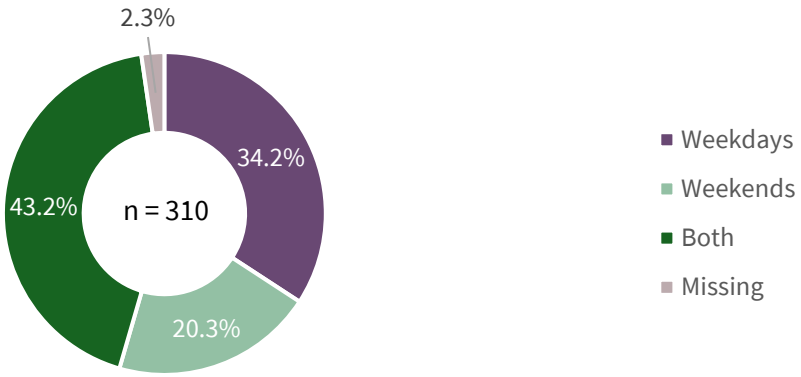
Nearly half of survey participants (48%) reported using the metro five to seven days per week, indicating a substantial core of regular users. Participants who use the metro rarely (0-1 day/week) or use it occasionally (2-4 days/week) each represented approximately a quarter of our sample.

Figure 12. Frequency of metro use per week among participants, in %



Participants were also asked whether they typically use the metro on weekdays, weekends, or both. Almost half (48%) reported using the metro on both weekdays and weekends, while weekday-only use (34%) was more common than weekend-only use (20%).

Figure 13. Distribution of metro use throughout the week, in %



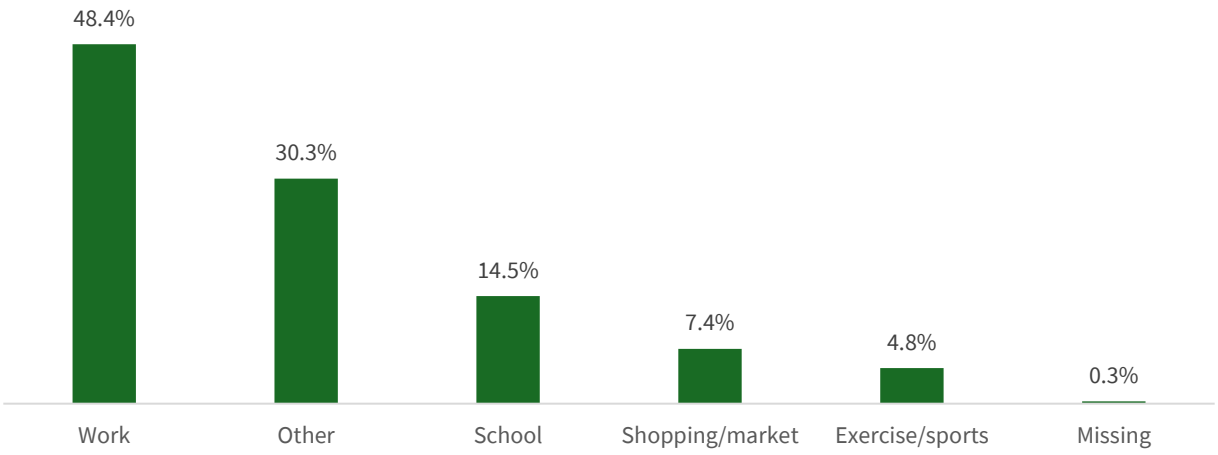
When these two variables are examined together, distinct usage patterns emerge. Participants who rarely use the metro are more concentrated in weekend-only usage, whereas occasional users are more evenly distributed across the week. In contrast, regular users overwhelmingly use the metro on both weekdays and weekends, with a significant share (17%) using it on weekdays only.

Table 2. Distribution of weekly usage based on frequency, in % (n = 310)

Weekly	Distribution		
Frequency	Weekdays	Weekends	Both
0 to 1 day	5.2%	15.8% [6]	5.2%
2 to 4 days	11%	4.5%	7.4%
5 to 7 days	17.4%	0.0%	30.6%

The second key behavioral dimension used to contextualize findings concern the purpose of each metro trip. Participants were asked to select the option that best represented their reason(s) for their metro trip on the day of the survey, with the possibility of specifying an alternative purpose if predefined categories did not apply.

Figure 14. Trip purposes reported by participants (multiple choice), in % (n = 310)[7]

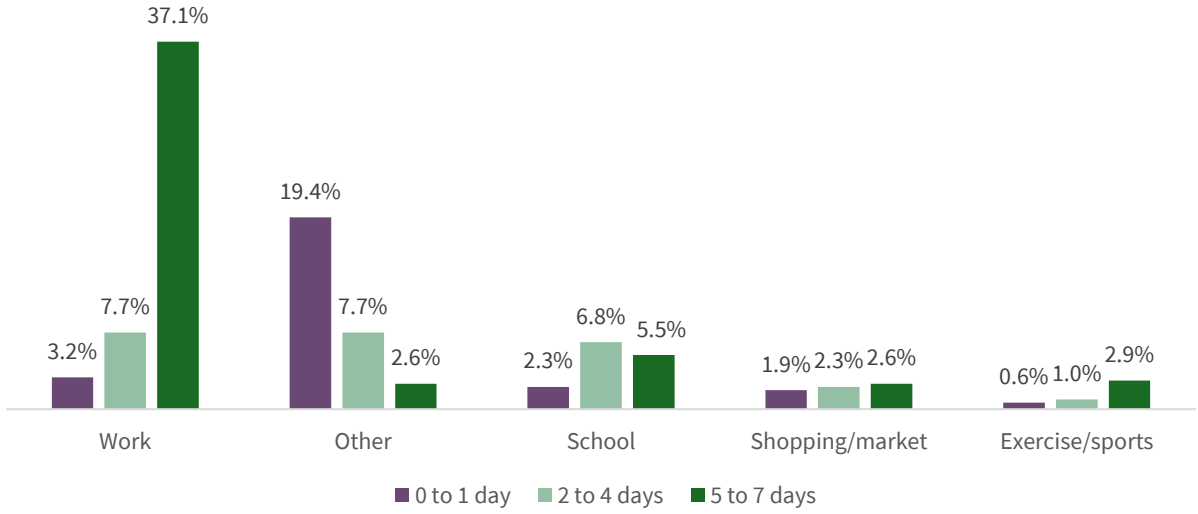


[6] The results presented for the *distribution of weekly metro usage based on frequency* should be interpreted with caution. Some responses suggest a possible misunderstanding of the question, which may have led to inconsistencies in how usage frequency was reported.

[7] Since participants were able to select multiple options, and that we wish to cross-reference this with other questions, we are choosing to base these percentages on the total number of participants (310), rather than the number of occurrences (327). This explains the total percentage that is greater than 100%.

While most trips were related to work or school, a substantial share of participants selected “Other”, revealing purposes not initially anticipated. These included trips undertaken to explore the new metro system (13%), and trips associated with social activities (9%). Cross-analysis of trip purpose and frequency of use shows that regular users predominantly rely on the metro for work-related travel, with very limited engagement in non-work trips. Conversely, infrequent users are more heavily concentrated in leisure-related purposes, including tourism or social-related activities.

Figure 15. Trip purpose by frequency of metro use, in % (n = 310)



Considering the presence of major educational institutions near some of the selected stations, particularly at National University station, we initially expected a higher proportion of trips related to education. One plausible explanation for the relatively low number of student trips is the timing of data collection, which coincided with the summer break for both K-12 and university students in Hanoi.

Another noteworthy pattern is the relatively high proportion of participants that used the metro for either leisure or social outings. Both the questionnaire and observational data suggest that many users (locals and visitors alike) are still in an exploratory phase of engagement with the metro system. Numerous participants expressed excitement toward the metro, and several others were observed taking photographs or navigating the system for what appeared to be their first time. While sporadic users do not yet signal a sustained modal shift towards the metro, it contrasts with the behavior of regular users, whose metro use is largely limited to work-related travel. The absence of broader, non-work-related metro usage among frequent users highlights a potential barrier to significant mobility change in Hanoi, an issue that will be examined further in the following sections.

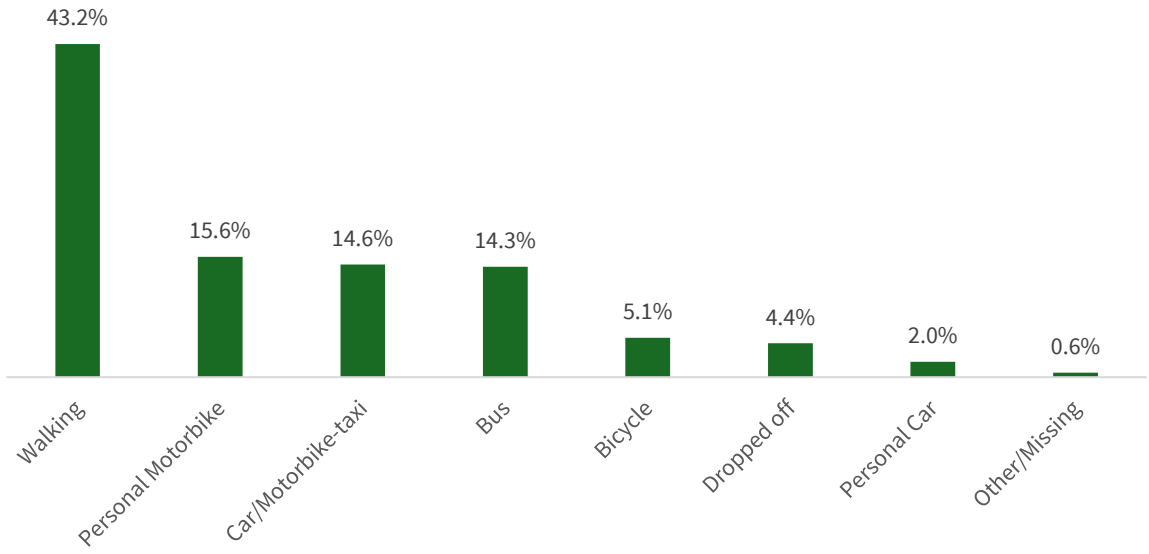
Figure 16. A woman and children exploring Line 3

Source: authors

Intermodality: Transfers (Public Transport) and Vehicular Access

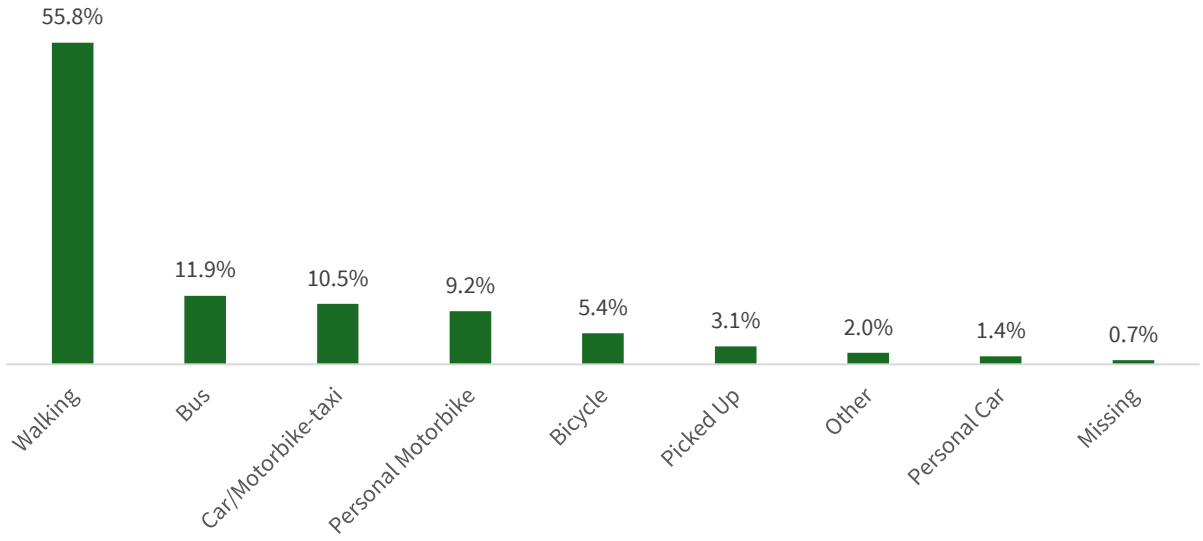
Intermodality is examined here by analysing the modes of transport participants use to access and to leave metro stations, which provide a direct indication of how effectively the metro connects with other forms of mobility. Walking emerges as the dominant mode used to access stations (43%). This mode is followed by approximately equal shares, hovering at around 15% of users arriving at stations by personal motorbikes, car- or motorbike-taxis, or buses. Less frequently reported access modes include bicycles, being dropped off by a private vehicle, and parking a personal car at a station.

Figure 17. Mode of arrival to metro stations, in % (n = 294) [8] [9]



Mirroring arrival patterns, a majority of respondents (55%) reported walking after exiting the metro. Personal motorbikes, car- or motorbike-taxis, and buses were again used in comparable proportions as when arriving.

Figure 18. Mode of departure from metro stations, in % (n = 294)



[8] The sample size differs from the total number of respondents, as some participants selected multiple access modes (e.g., bus + walking). For consistency, only responses indicating a single mode of access were retained. This approach also reduces the risk of including responses from participants who may have misunderstood the question (e.g., "How do usually arrive at the metro?").

[9] "Bicycle" was translated to include standard bicycles, folding bicycles, and standing electric scooters (*xe điện scooter*)

When access and egress modes are analyzed jointly, a telling pattern emerges. Approximately a third of participants reported walking both to and from the metro stations, without relying on any other mode of transportation. While such a high proportion of walking trips may initially appear positive, it also suggests a limited catchment area for the metro system[10]. Reported walking durations support this interpretation: just over half of these users indicated walking times of 10 minutes or less, with an overall average of **under 8 minutes**. A further 42% reported walking between 10 and 20 minutes, while only about 5% walked 20 minutes or more.

Figure 19. Walking time to metro stations, in % (n = 127) [11]

The high proportion of short walking trips highlights limitations in the metro's current intermodal accessibility. Although short distances are typically associated with good walkability, in the context of a high-capacity system such as a metro, they may instead signal a constrained catchment area. Ideally, key metro stations should attract users from lower-density urban areas through effective feeder systems, including park-and-ride facilities and high-quality bus connections. The predominance of short walking trips therefore suggests limited integration with other transport modes.

For example, despite high rates of motorbike ownership among households in Hanoi (Labbé, 2021), relatively few respondents reported accessing the metro using this mode of transportation. Several factors may explain this trend. For some users, once a motorbike is taken out, it may be more convenient to continue directly to the destination rather than transfer to the metro. To further explore this issue, personal motorbike users were asked whether sufficient parking was available at metro stations. Contrary to our expectations, 31 out of 46 respondents answered positively. This finding contrasts with our field observations. Indeed, only two of the studied stations, Cát Linh and Nhổn, have official parking near their entrances, which were visibly crowded on many of our field visits (see

[10] A catchment area refers to the geographic zone from which a transport facility draws its users, typically defined by walking distance, travel time, or travel patterns (Andersen & Landex, 2008).
[11] This sample includes only participants who selected "walking" as their sole access mode.

Figure 21). Other stations provide unofficial motorbike parking spaces on nearby sidewalks.

Figure 20. Motorbike users' perception of parking availability (n = 46) [12]

Taken together, these findings suggest that low motorbike use for metro access is less a function of parking availability than of broader structural factors, including a preference for door-to-door travel and a limited metro network which does not yet serve a sufficiently wide range of destinations. This hypothesis may similarly explain the very low share of car users in the sample, despite the growing prevalence of private car ownership in Hanoi (Labbé, 2021, p.9-10). In addition to a preference for door-to-door travel, limited station-area parking further constrains private car-to-metro intermodal transfers. Based on our observations, only Nhổn station had a designated parking lot for cars, in the form of a VinFast charging station for electric vehicles.

[12] This question was asked only to participants who reported arriving at the station by personal motorbike.

Figure 21. A busy designated parking lot at Cát Linh station

Source: authors

The relatively low share of participants arriving or leaving stations by car- or motorbike-taxi (14% and 10% respectively) was similarly unexpected, given the widespread use of ride-hailing applications in Hanoi (e.g., *Grab*, *Be*). However, this result is consistent with our on-site observations. Most of the stations analyzed provide limited or no designated pick-up and drop-off zones. In addition, official signage prohibits car- and motorbike-taxi drivers from waiting inside metro stations (Figure 22). Enforcement of these restrictions was visible at end-of-line stations such as Cát Linh, where drivers were observed waiting for passengers just outside the station's main entrance (Figure 23).

Figure 22. Hanoi Metro sign banning taxi drivers from picking up or dropping off passengers in the stations

Source: authors

Figure 23. Taxi drivers waiting at the entrance of Cát Linh station

Source: authors

Despite these conditions, participants who accessed a station by being dropped off from a motorbike or car expressed positive perceptions of comfort. Of the 60 respondents using this access mode, 51 reported no discomfort related to the absence of designated drop-off zones. This pattern suggests that informal pick-up and drop-off practices are widely accepted in Hanoi, where boarding and disembarking from vehicles in the rightmost traffic lane or on the sidewalk is a common and normalized practice. As a result, formalized drop-off zones, often emphasized in international transit station design guidelines (ITDP, 2019), may be perceived as less essential in the local context.

Figure 24. Motorbike-taxi driver waiting for passengers on the sidewalk near National University station

Source: authors

As indicated above, the proportion of bus-to-metro transfers among participants was relatively low (about 14% for access and 12% for egress). The data collected in this study do not allow for the identification of a single factor explaining this result. Service-related variables, such as route coverage, service frequency, and network connectivity, likely play a significant role here, but fall outside the scope of the present analysis. However, observational data point to several weaknesses that can be addressed to improve bus-metro transfer experience at the scale of stations and their immediate surroundings. We noted limited attention to bus infrastructure, notably the absence of transit shelters and lay-bys, which can significantly affect user comfort. Except for National University station, as well as

one side of Nhổn station, none of the stations had transit shelters for buses. As for lay-bys, none of the stations studied had them. Bus users were observed seeking shelter under nearby structures when raining, or walking into traffic lanes while exiting or entering a bus, exposing themselves to incoming traffic (see Figure 25). Other elements related to public transport integration, such as signage and wayfinding, are addressed in the Visual Communication section of the findings.

Figure 25. Bus users exit into the carriageway

Source: authors

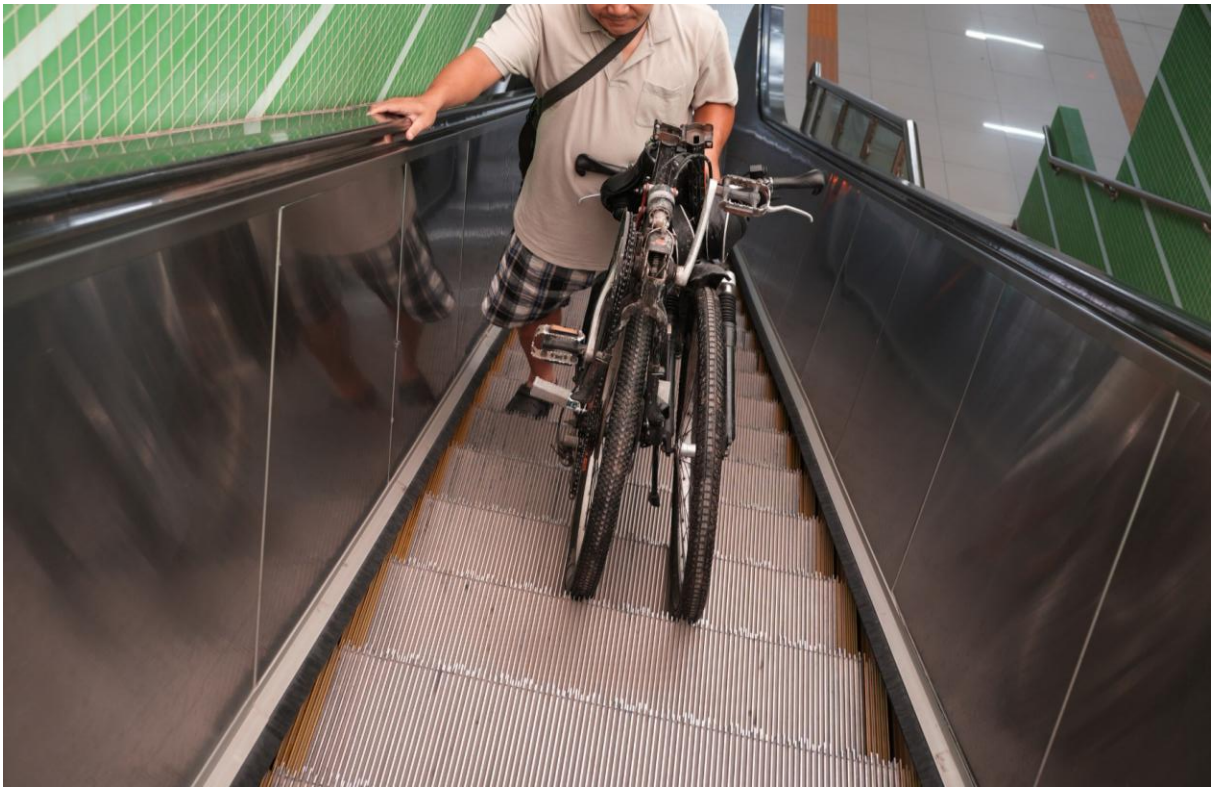
Figure 26. Singular transit shelter near Nhổn station

Source: authors

Finally, while only 5% of participants reported accessing or leaving stations by bicycle, these users highlighted specific accessibility issues. A frequent complaint concerned the lack of dedicated bicycle ramps and difficulties caused by non-operational elevators during rainy conditions (see Environmental Comfort section). These comments closely correspond with our observations. At central stations such as Cát Linh, several bicycle users were observed relying on elevators or escalators to carry their bicycles to platform level. We further noted that bicycle racks at busy stations (e.g., Cát Linh) were often overcrowded. Additional requests included more bicycle racks and expanded bicycle-sharing programs. This reflect our observations, with only one of the studied stations (Thái Hà) being equipped with a bicycle-sharing facility at the time of our survey[13].

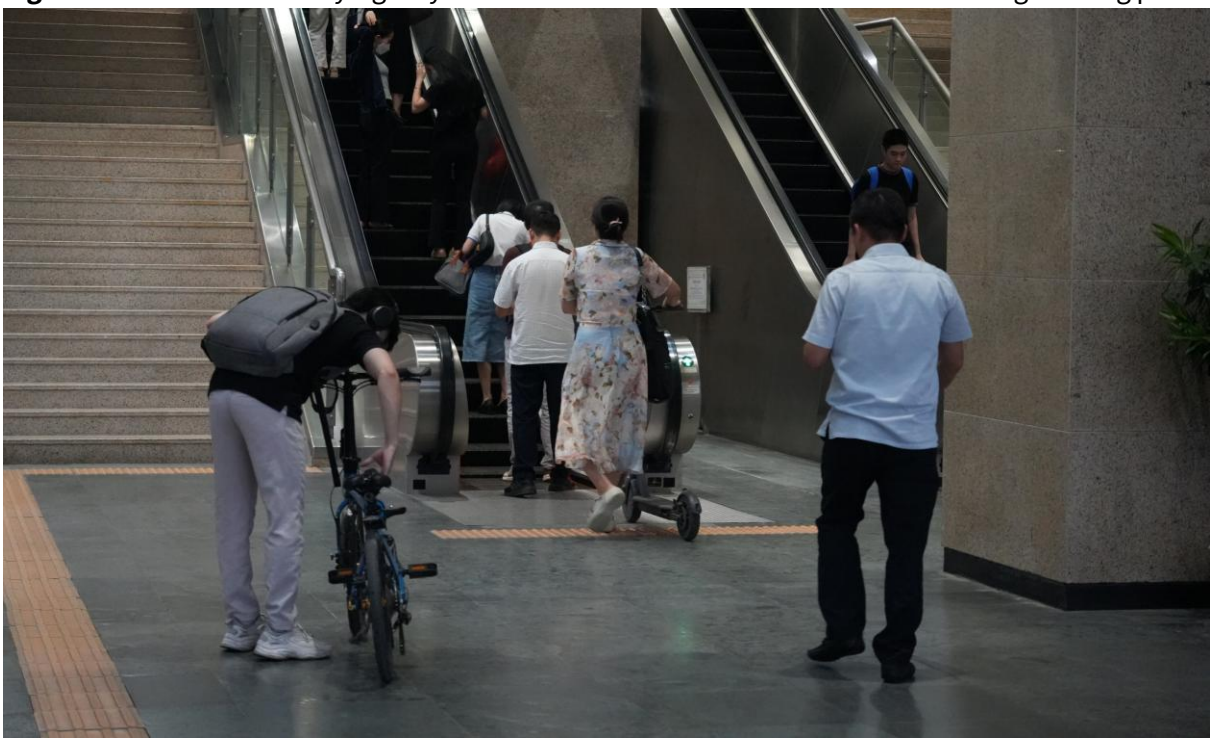
[13] The introduction of a bike-sharing system in Hanoi is very recent (around 2023), and the network's stations are mainly concentrated in the city center. Recent government announcements promise a significant expansion of the network, coupled with the addition of electric scooters (VnExpress, 2025). There is significant intermodal potential with the metro, but the city would need to expand the area covered.

Figure 27. Bicycle user carrying equipment on an escalator



Source: authors

Figure 28. Metro users carrying bicycles and kick-scooters at Cát Linh station during evening peak



Source: authors

Figure 29. Overcrowded bicycle racks at Cát Linh station

Source: authors

Safety and Connectivity: Pedestrian Facilities, User Safety and Universal Accessibility

Given significant overlap, the *Safety* and *Connectivity* factors are examined jointly in this section, with a focus on pedestrian safety within the station area, as well as elements related to universal accessibility.

As explained earlier, all current stations of Line 2a and 3 (including the five studied) are elevated and located along major road corridors, with non-paying areas accessible from both sides of the roadway. All studied stations, except Thái Hà, are also equipped with elevators or escalators on both sides of the street, allowing them to function as pedestrian overpasses during operating hours. This configuration provides a useful context for examining perceived pedestrian safety and connectivity.

When asked whether they would go out of their way to use the station as a pedestrian overpass rather than cross at street level, 76% of participants reported that they would do so, with no significant variations according to age or gender. This suggests that station infrastructure is perceived as safer and more convenient than at-grade crossings and that they play an important role in mitigating road-related safety concerns in their surrounding environments.

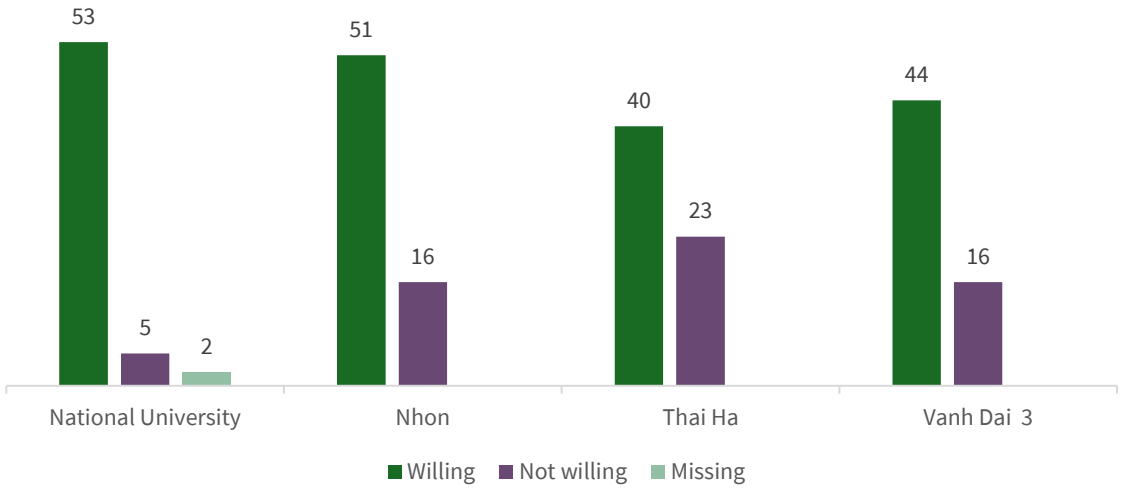
This interpretation is strongly supported by field observations and applies to both metro users and non-users. Street-level pedestrian infrastructure around the stations studied is generally inadequate to support safe crossings (Figure 30). None of the observed stations featured traffic-calming measures such as raised crosswalks, pedestrian signals, or other design elements intended to reduce vehicle speeds or improve pedestrian visibility (TransLink, 2012; ITDP, 2018). In this context, station design – specifically the physical connection between both sides of the road and the availability of vertical access facilities – appears to actively encourage pedestrians to use station infrastructure rather than cross traffic at grade. In the case of Thái Hà station, the lack of universal accessibility may force those with limited physical mobility to take lengthy detours to reach the other side of the road.

Figure 30. Pedestrians crossing the road beneath Thái Hà station

Source: authors

To further explore perceived safety, we examined whether a correlation exists between stations' surrounding urban environment and willingness to use the station to cross the road. At National University station, nearly all participants (53/60) expressed a willingness to detour to use the station as a crossing point. Similarly, at Nhổn station, 51 out of 67 participants reported feeling safer crossing via the station.

Figure 31. Willingness to use station infrastructure to cross the road, by station (n = 250) [14]



These findings align closely with field observations. At both National University and Nhổn stations, physical barriers actively prevent pedestrians from crossing the roadway at grade. As shown in Figure 32, despite high pedestrian activity near National University (driven by the presence of Indochina Mall and university campuses) and Nhổn station, makeshift fencing and concrete barriers line the road medians, causing physical obstructions preventing pedestrian crossings (Figure 33).

Figure 32. Pedestrian attempting to cross the road beneath National University station

Source: authors

[14] Cát Linh station was excluded from this question, as it is located at a junction rather than above a median.

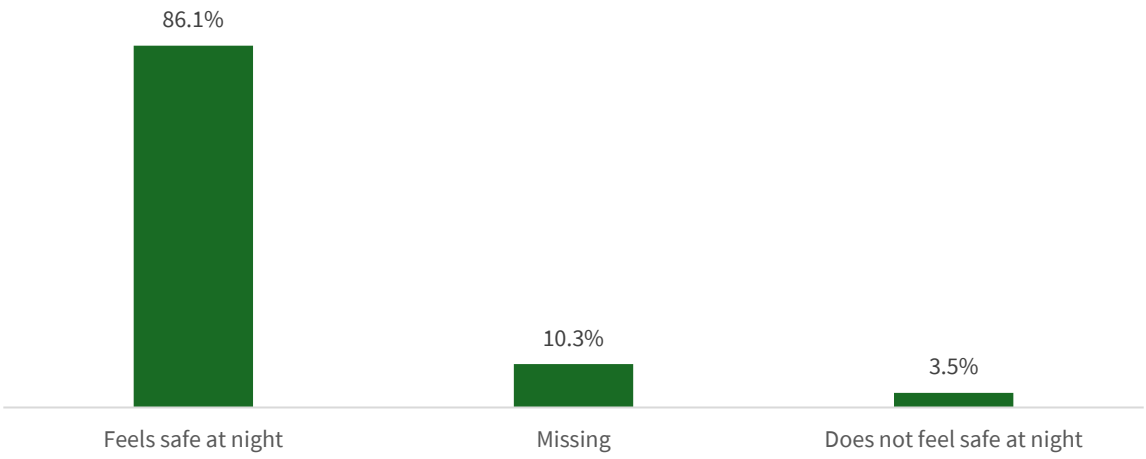
Figure 33. Industrial surroundings and pedestrian barriers at Nhổn station

Source: authors

By contrast, while Thái Hà station and VD3 station remain challenging environments for pedestrians, they offer relatively more permissive crossing conditions. Thái Hà features a wide, landscaped median (Figure 30), and VD3 station benefits from nearby traffic signals and pedestrian underpasses. These contextual differences may explain variations in perceived safety and willingness to detour in varying urban typologies.

Regarding nighttime safety around stations, over 85% of participants reported feeling safe using the metro at night. Common explanations included the presence of security guards and surveillance cameras, adequate lighting, and a general sense of safety stemming from surrounding activity.

Figure 34. Perceived level of safety around stations at night, in % (n = 310)



This predominantly positive perception of safety contrast in part with our field observations. Lower user volumes were observed at night and lighting conditions in station surroundings were assessed as insufficient. We also anticipated gender-based differences in perceived nighttime safety; however, the analysis revealed no significant gender-related variation. This pattern may be explained by the presence of station staff, together with Hanoi's high population density and forms of informal surveillance, which collectively contribute to a positive "eyes on the street" effect for nearby pedestrians.

Despite expectations that participants would suggest improvements related to pedestrian infrastructure or nighttime lighting, very few respondents raised such issues when invited to suggest changes at the end of the questionnaire. This absence of feedback suggests that existing safety conditions, while falling short of international best practices, are largely perceived as acceptable by users within the local context, reinforcing the gap observed throughout this section between expert assessments and user expectations.

Environmental Comfort: Pedestrian Comfort and Public Space

The Environmental Comfort factor examines accessibility-related conditions associated with protection from weather and climatic exposure. In this regard, a key issue highlighted by the observational survey concerns the lack of adequate overhead coverage on exterior walkways and staircases, namely at Thái Hà (Figure 35) and VD3 station (Figure 36). During rainy conditions, exposed stairs become particularly hazardous, as wet surfaces are highly slippery. In such situations, escalators and elevators – which normally facilitate access to stations – are often shut down to prevent power failures, forcing users to rely

exclusively on stair access. Even where staircases or walkways are partially covered, wind-driven rain frequently reaches pedestrian areas, compromising both comfort and safety.

Figure 35. Exposed staircase at Thái Hà station

Source: authors

Figure 36. Metro users supporting one another while descending an exposed staircase at VD3 station during a rainfall

Source: authors

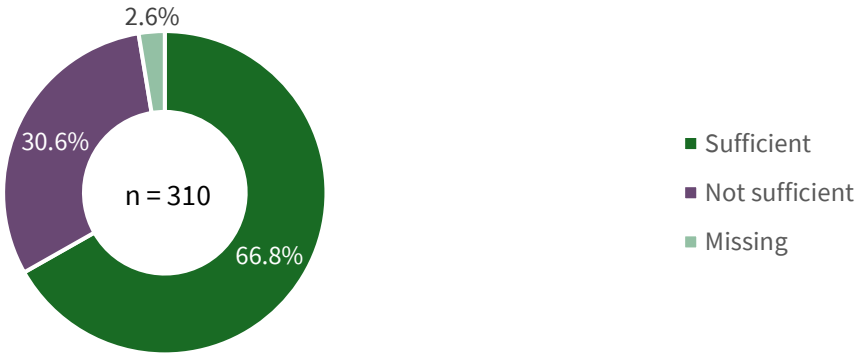
Design limitations are also evident during sunny conditions. At National University station and Nhổn station, staircases and walkways lack sufficient shading, increasing exposure to direct sunlight (Figures 37 and 38). In these cases, the use of transparent roofing further exacerbates heat exposure by trapping solar radiation, intensifying localized heat accumulation.

Figures 37 and 38. Glass canopies at National University station (left) and Nhổn station (right)

Source: authors

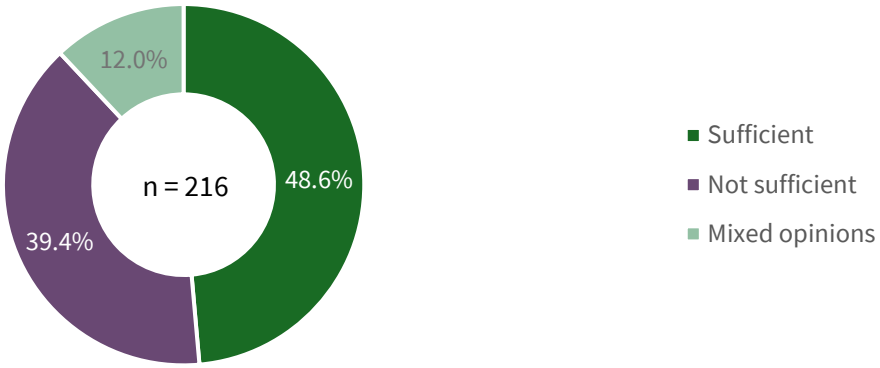
Contrasting with shortcomings raised by the observational survey, nearly 67% of participants reported no issues with current station layouts and considered overall protection from the elements to be adequate.

Figure 39. Perceived level of protection from heat or rain, in %



However, the justifications provided by participants for their answer reveal more nuanced evaluations. Several respondents expressed mixed views, with recurring concerns related to the lack of covered waiting areas outside stations, the shutdown of elevators and escalators during rainfall, and excessive heat on platforms.

Figure 40. Perceived level of protection from heat or rain, with justification, in % (n = 216)



Contrasting again with our analysis, user feedback emphasized the need for covered waiting areas outside stations, particularly for bus or pick-up transfers, rather than additional coverage along staircases and walkways. Additionally, while our observational assessment highlighted safety risks associated with slippery surfaces during rainfall (especially when elevators and escalators are shut down), participants rarely articulated this concern explicitly. However, noting the small sample of seniors, a fear of falling may not have been adequately reflected in these results.

Moreover, although our observations did not initially identify heat as a major issue inside stations, numerous participants commented on uncomfortable temperatures on platforms while waiting for trains. As illustrated by the two comments from users below, the open-air design of platforms, likely intended to enhance ventilation and reduce construction costs, appears to have unintended consequences for user comfort during hot periods.

> *"The station is very hot, especially in the summer"*
>
> *"I have to wait inside the station when I'm being picked up"*

These findings are further reinforced by participant-issued recommendations. Of the 337 improvement suggestions collected, nearly 18% related to environmental comfort. While many respondents emphasized the need for continuous operation of elevators, the most frequent concern involved insufficient ventilation or air conditioning within stations.

Several participants also highlighted the lack of seating areas, both on platforms and near station entrances, as a factor negatively affecting comfort.

Access to Services: Essential Services

This factor examines two main variables: the availability of services in the vicinity of metro stations, and the level of accessibility to those services. Services are generally abundant near the metro stations studied, as all of them are located along major transit corridors with a wide range of commercial activities, and institutional, administrative and healthcare facilities. However, the presence of services does not necessarily imply that they are easily accessible.

Participants reported accessing a variety of services in the areas surrounding the metro stations studied. Across all stations, the services most frequently accessed were commercial, recreational and entertainment spaces, which together accounted for 63%. Educational institutions represented the second most common category, (20%) followed by governmental services (8%), medical facilities (4%), and places of worship (3%).

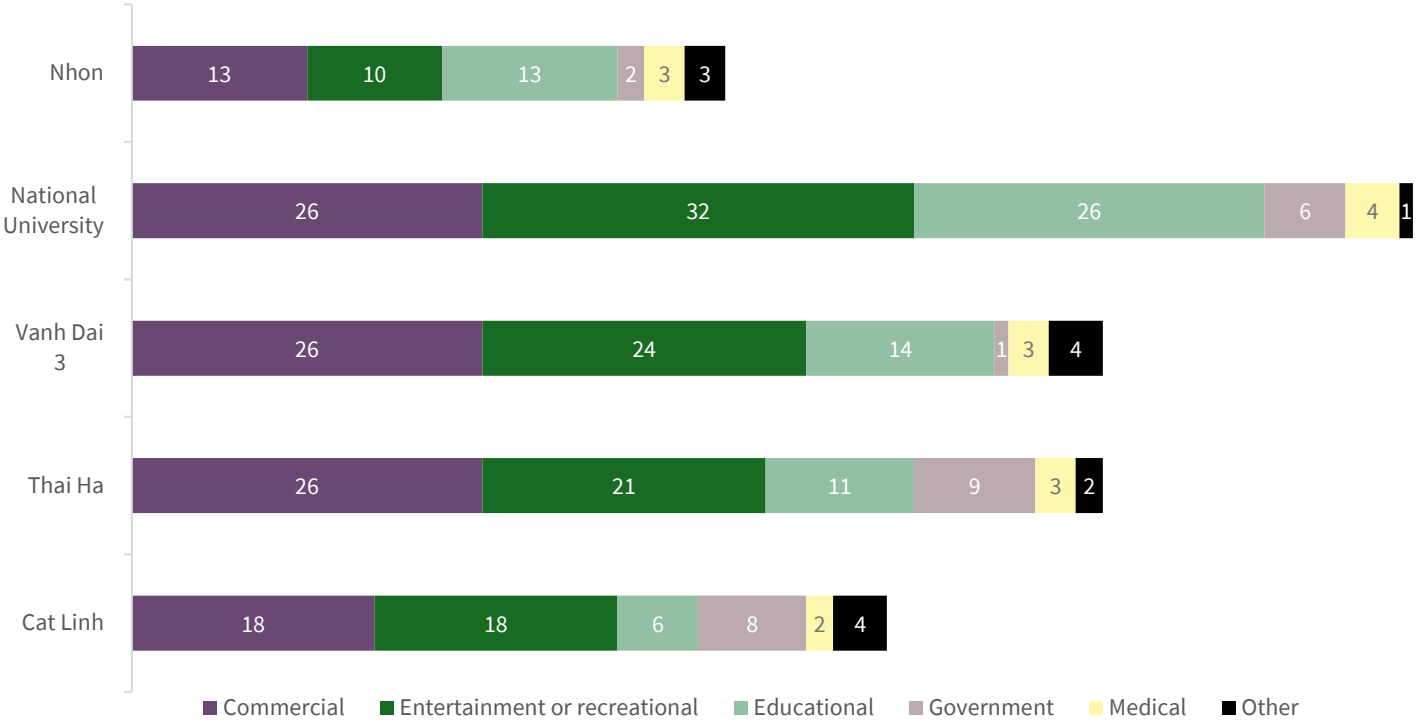
The predominance of commercial, recreational, and entertainment-related services accessed around metro stations indicates that station areas are primarily used for short, discretionary activities – such as shopping, eating, or leisure – rather than for essential services that structure daily mobility routines. This pattern is likely explained primarily by the limited spatial coverage of Hanoi's metro network at its current stage of development. With only two non-intersecting lines in operation, the system serves a relatively narrow set of origins and destinations, which constrains the extent to which users engage with station surroundings beyond immediate and incidental uses. This also helps explain why metro use among frequent users remains largely confined to work-related trips, while engagement with non-work-related services around stations is more common among occasional users.

The weaker-than-expected use of medical, educational, and government services in station surroundings further suggests that the metro is not yet fully embedded in users' everyday activity spaces. In part, this reflects temporal effects, such as the summer break reducing education-related activity. More fundamentally, however, it points to a mismatch between the spatial distribution of essential services and the current reach of the metro network. Even when such services are located near stations, limited first- and last-mile connectivity may discourage users from accessing them as part of their metro-related movements.

More broadly, current patterns of service use around metro stations likely reflects the early stage of social familiarization with the metro system. For many users, stations appear to function primarily as points of passage rather than as anchors of everyday activity. This

transitional condition is likely to evolve as the network expands, intersections increase, and users develop greater confidence in combining metro travel with other activities. In the interim, station-area accessibility interventions can play an important role in supporting this transition, but their effects should be understood as incremental and contingent on broader network maturation.

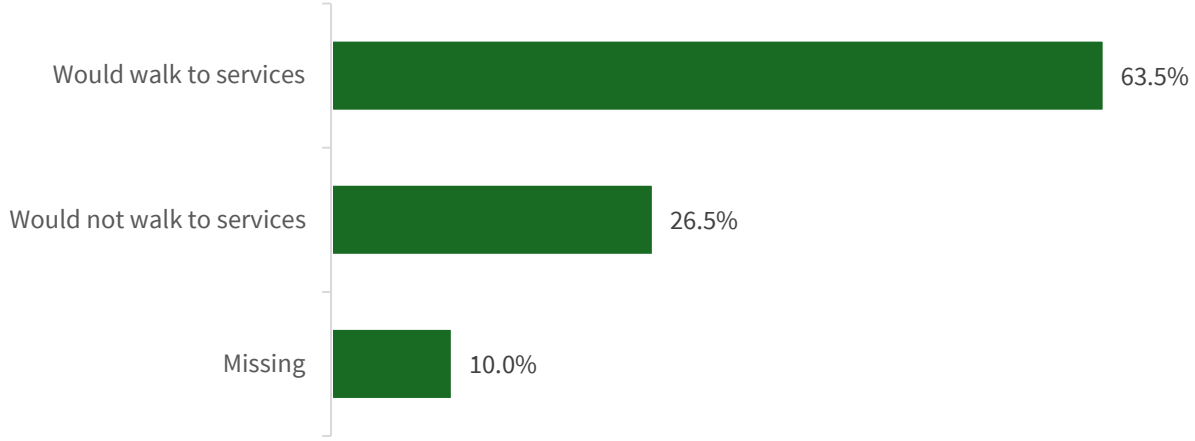
Figure 41. Number of times services were selected around each metro station (n = 339)[15]



Our analysis of service access also considers their level of accessibility, examining participant willingness to walk to nearby destinations. Nearly 64% of participants reported having no issues walking to nearby services if needed. However, by focusing on the 200 participants who elaborated on their responses, we gain additional insight into why pedestrians may choose to walk (or not) to nearby services.

[15] These percentages are based on the number of occurrences (339) rather than the number of respondents (247), as it was not possible to determine whether participants who did not select any service categories do not use such services or simply chose not to respond to the question.

Figure 42. Participant overall willingness to walk to nearby services, in % (n = 310)



For the most part, 52% explained that they are willing to walk to reach the services they frequent because they are close and convenient. A smaller proportion (7.5%) also said they would walk to reach services to maintain physical fitness. Conversely, participants who said they would not walk to nearby services cited distance and discomfort as primary barriers (17.5%). Additionally, some respondents stated that they would prefer to use another mode of transport, such as a taxi or a bicycle (12.5%). A small proportion of participants indicated that they do not use services around the station at all, as they only "use" the area for work purposes (4.5%).

Although these results highlight issues that extend beyond the scope of this study, they generally align with our observations and experiences. Walking in Hanoi, while feasible, is not always a pleasant experience[16]. Sidewalks are often wide enough but are frequently obstructed by parked vehicles, street vendors, uneven surfaces, or construction. As a result, pedestrians are often forced to walk on the carriageway, increasing their exposure to moving vehicles.

[16] Forsyth (2015) defines a pleasantly walkable environment as one that is **traversable** (free of major impediments and smooth), **compact** (offering short distances to destinations), **safe** (free from traffic-related harm) and **physically-enticing** (providing pedestrian infrastructure).

Figure 43. Parked vehicles on a sidewalk near a metro station on Line 3

Source: authors

To examine whether willingness to walk to nearby destinations is primarily shaped by the built environment around stations or by established mobility practices, we cross-analyzed respondents' stated willingness to walk with their reported mode of arrival at the station. As expected, a clear majority of participants who arrived on foot indicated that they would also walk to nearby services (100 out of 127), establishing walking as a consistent mode across trip segments for these users. Conversely, only about half of participants who accessed the station by motorbike, bus, or taxi said they would walk to nearby destinations, despite being exposed to the same urban environments.

Table 3. Willingness to walk to nearby destinations, by arrival mode (n = 294)

	Arrived by								
Would walk to nearby services	Walking	Personal motorbike	Car/Motorbike-taxi	Bus	Bicycle	Dropped off	Personal car	Other/Missing	Total
Yes	100	22	25	23	7	6	2	1	186
No	17	17	13	15	6	5	3	1	77
Missing	10	7	5	4	2	2	1	0	31
Total	**127**	**46**	**43**	**42**	**15**	**13**	**6**	**2**	**294**

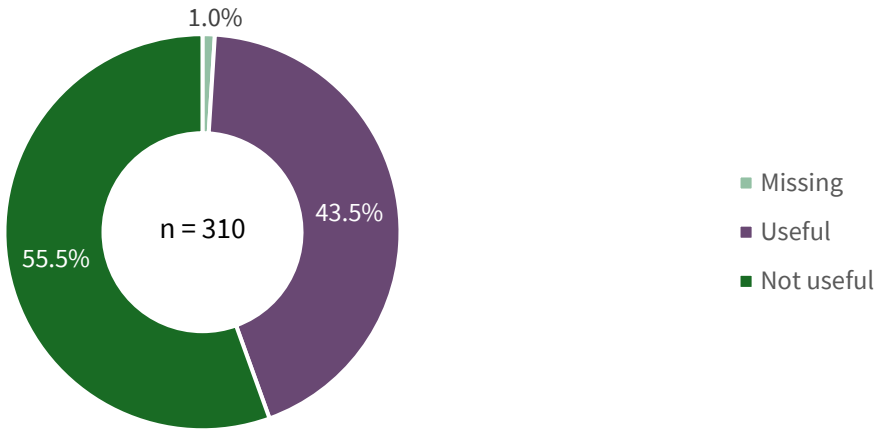
Taken together, these patterns suggest that willingness to walk is shaped less by immediate station-area conditions than by established mobility practices and mode choice. While the built environment around stations may not be as prohibitive to walking as our observation survey suggested, walking to nearby destinations is predominantly taken up by users who already arrive on foot. This indicates that improvements to pedestrian infrastructure alone are unlikely to encourage walking among users arriving by other modes without broader shifts in travel behavior.

Finally, participant comments about access to services focused not on issues of walkability to services in the vicinity of stations, but rather on the lack of services *within* the stations themselves. Nearly 38% of all participant-issued improvement suggestions mentioned the need for additional in-station services, making this the most frequently cited category of recommendations by a significant margin. Participants expressed a strong desire for amenities such as convenience stores or vending machines, water fountains, and ATMs.

Visual Communication: Signage and Wayfinding

The final accessibility factor addresses the legibility and usefulness of signage and wayfinding within metro stations. A key variable is whether users find station maps valuable, as well as whether directional signage enables them to navigate the space effectively. When asked whether they find station maps useful, responses were nearly evenly split, with a slight majority indicating that they do not find them useful (55%). Regardless of preference, when we asked them their opinion about the maps, most respondents told us they had never noticed them in the first place.

Figure 44. Perceived usefulness of metro station maps and signs, in % (n = 310)



Out of the 55.5% of participants who did not find signage helpful, nearly 70% stated that the information was difficult to understand. A further 25% indicated a preference for using their smartphones instead of relying on station maps or signs, while a smaller proportion cited familiarity with the area or reliance on station staff for directions (7.5%).

Conversely, participants who explained why they did find signage useful were less likely to rely on smartphones or staff assistance and stated that they were familiar with the surrounding area. Given these results, we speculate that they were navigating areas they already knew.

Based on our own evaluations of signage and wayfinding, we expected responses to be more critical, particularly for new users who were not familiar with the surrounding area. While the presence of maps was generally satisfactory (all stations had sufficient network maps, timetables and fare information), we assessed their placement at main station entrances as not noticeable enough. Also, the maps themselves were often too vague and failed to provide sufficient information to help users determine which exit to take (Figure 45). In several instances, particularly on Line 3, maps and information boards were visually cluttered and overly dense, significantly reducing legibility (Figure 46).

Figure 45. Example of a map on Line 2A, at Thái Hà station

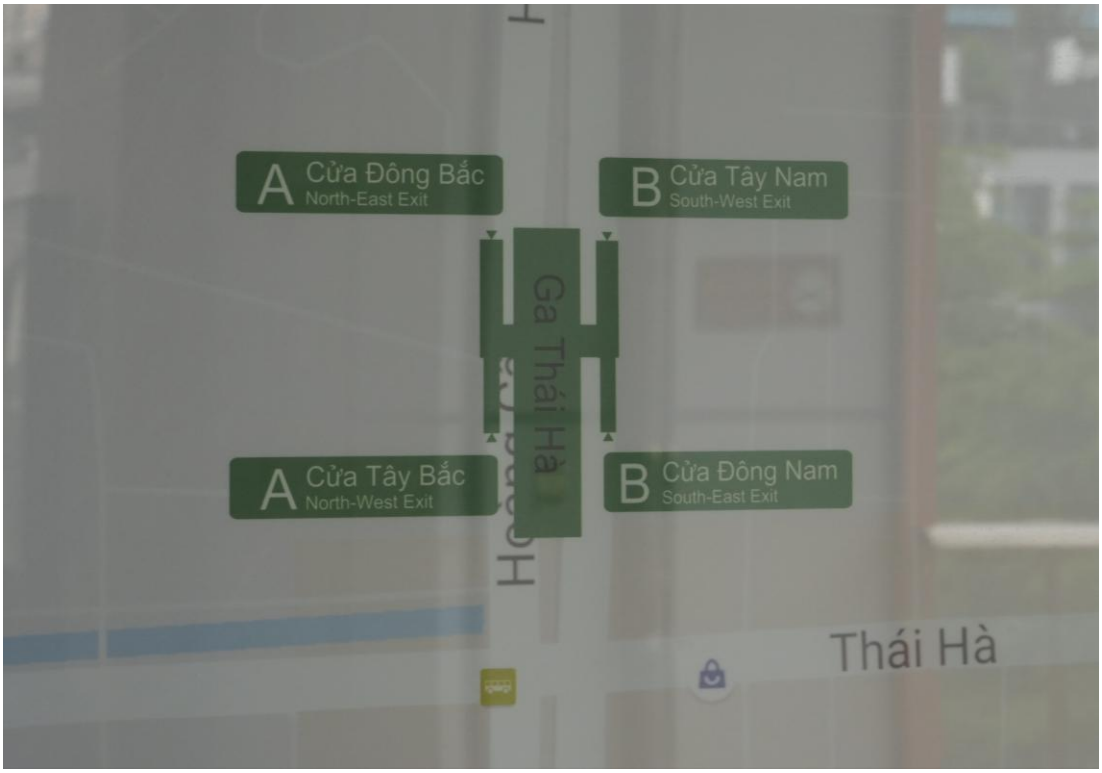
Source: authors

Figure 46. Example of a map on Line 3, at National University station

Source: authors

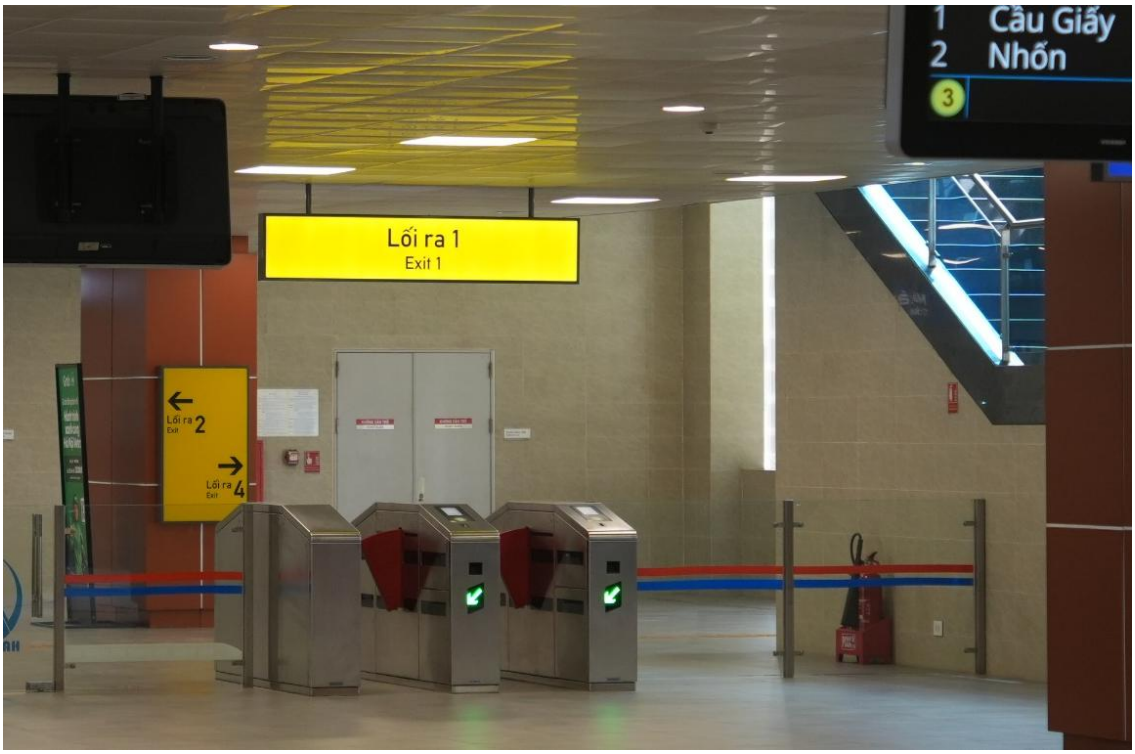
Similar issues were observed with wayfinding signage. Line 2A stations featured additional maps differentiating exits (Figure 47), whereas such maps were absent on Line 3. Moreover, exit signage on Line 3 was at times contradictory, with the same gates displaying multiple exit numbers (Figure 48).

Figure 47. Additional exit-differentiation maps on Line 2A



Source: authors

Figure 48. Conflicting exit signage on Line 3 at Nhổn station



Source: authors

To examine whether these issues were line-specific, we compared responses across both metro lines. Contrary to our expectations, no significant bias emerged in favor of Line 2A, despite our more positive assessment of its signage.

Table 4. Signage and wayfinding usefulness, by metro line, in % (n = 310)

Signage and wayfinding are useful	Line 2A	Line 3
No	59.6%	49.6%
Yes	39.3%	49.6%
Missing	1.1%	0.8%
Total	100%	100%

The final variable examined was whether information is adequately displayed to support intermodal travel. When asked whether they would know where to board a bus if it were their first time at the station, nearly all bus-metro users (39/42) reported they would have no difficulty locating the nearest bus stop, largely due to their close proximity beneath stations. As noted in the Intermodality section, the spatial proximity of bus stops to metro stations was observed as a positive feature. While we anticipated more critical feedback from bus-metro users regarding bus-related signage, these perceptions may change as the network expands and includes other types of stations (e.g., underground stations), where bus stops may be less immediately visible.

Finally, participant-issued recommendations related to signage represented only 2% of all suggested improvements. Some users reported uncertainty about where taxis would pick them up, while others mentioned observing passengers boarding the wrong platform due to confusing signage. Given these comments, and our own critical assessment of Hanoi Metro's signage and wayfinding, we expected a higher level of dissatisfaction to be expressed by participants.

Taken together, these findings suggest that visual communication currently plays a limited role in how users navigate Hanoi's metro system and that deficiencies in visual communication are not yet strongly perceived as a constraint by most users. In contrast with observational findings, the absence of strong user dissatisfaction may, here again, reflect the early stage of the network, the limited complexity of travel patterns, and the predominance of habitual users, rather than the adequacy of existing signage. As the metro network expands, incorporates more underground stations, and attracts a broader range of users and trip purposes, the importance of clear, intuitive, and visible wayfinding is likely to increase substantially.

In addition, observed inconsistencies in visual communication between the two metro lines likely reflect the nature of their respective development processes (see Introduction). As the network continues to expand, the need for standardized signage and wayfinding across

all lines will become increasingly critical. At a broader scale, the limited physical and visual integration with other modes of transport may point to a fragmented approach to public transport management in Hanoi. As future metro lines attract more users and play a greater role in shaping mobility patterns, a more holistic transit authority will be necessary to standardize branding and integrate fares across all modes (e.g., metro, bus, BRT, tram), thereby making public transit as accessible as possible.

RECOMMENDATIONS AND CONCLUSION

Recommendations

Beyond station-specific features, the findings highlight several cross-cutting issues that shape the overall quality and accessibility of Hanoi's metro system. First, accessibility is not only a matter of physical design (e.g., elevators, signage, spatial layout), but also of operational reliability, particularly during heavy rainfall. Second, the results show stations are functioning as de facto overpasses and connectors within the urban fabric, which should be integrated into a "safe crossing package" to further improve pedestrian safety at street level. Third, gaps were observed between expert-based accessibility benchmarks and user satisfaction levels, suggesting the need for a two-tier approach to differentiate between minimum safety and comfort thresholds (non-negotiable), and longer-term enhancement targets (best practice). Lastly, many accessibility challenges relate to first- and last-mile conditions. The results repeatedly show that station accessibility depends on what happens just outside the station, which requires clearer coordination between transport operators, road authorities, and local districts through a simple governance mechanism such as a station-area responsibility matrix and a recurring joint site audit.

The following section outlines recommendations for improving Hanoi's metro system through both short-term and long-term interventions. These recommendations are organized according to key accessibility factors identified in the literature, beginning with intermodality. Short-term recommendations refer to those which can be implemented with limited financial burden and minimal delays, while long-term recommendations address larger infrastructural or policy changes that are more feasible to integrate into planning and construction of additional metro lines. The recommendations are informed by a combination of international best practice guidelines, field observations, questionnaire results, and direct user feedback.

Intermodality

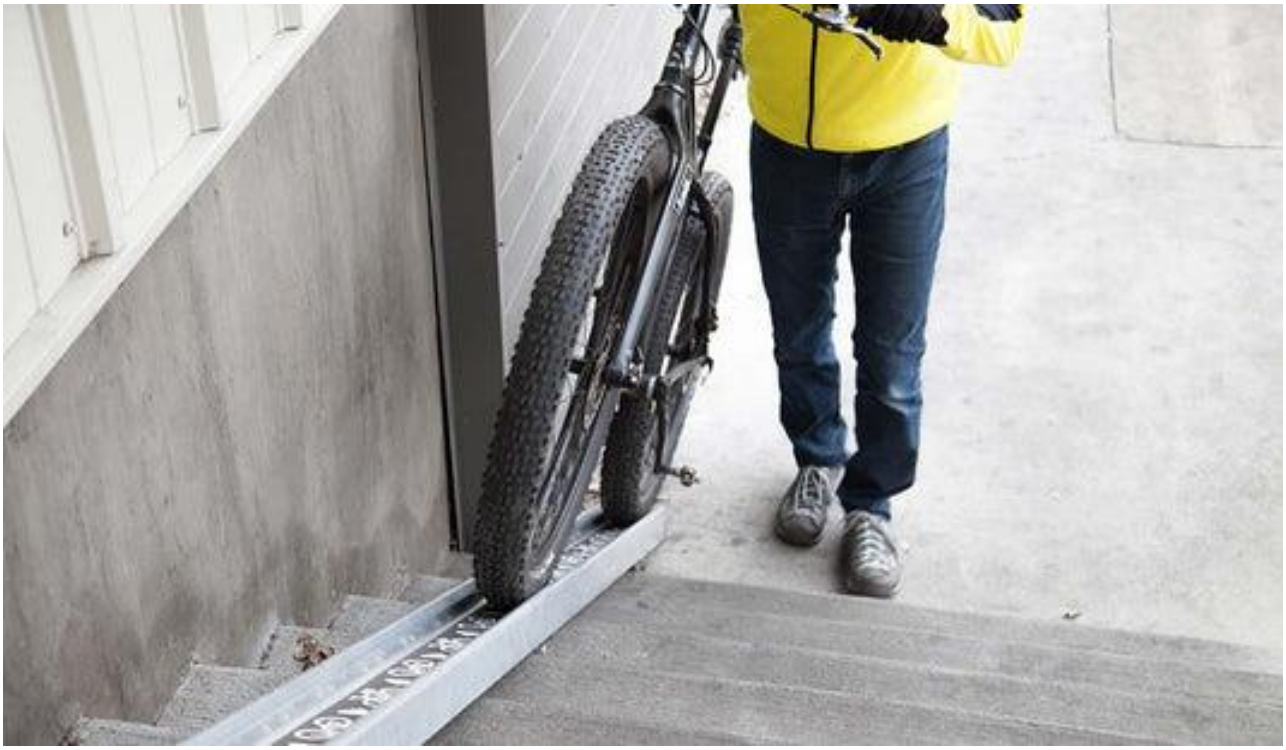
Intermodality: Short-term Solutions

To encourage intermodality and improve overall user experience, we recommend several short-term interventions. First, transit shelters at bus stops surrounding the metro stations should be improved, as most currently lack any form of shelter. At minimum, all bus transfer points at the stations should include weather-protected shelters, seating, and clear

bus stop identification. Considering that a near-equal proportion of users arrived by bus, personal motorbike, and taxi, further investment in bus stop infrastructure would help enhance the attractiveness of the bus system. Improving thermal comfort through shelters would not only protect users from sun and rain but also increase the perceived quality of service and highlight the proximity of bus stops to metro stations. This type of intervention appears feasible within a reasonable timeframe and with limited financial burden.

Similarly, to further encourage intermodal transportation, we recommend implementing ramps along staircases and providing additional bicycle racks at stations. For active transportation users who rely on bicycles or kick scooters to access the metro, respondent expressed a desire for ramps to ease the process of carrying their equipment to the platform. These interventions would reduce physical barriers and strengthen micro-mobility.

Figure 49. Bicycle access ramp installed on stairway



Source: Saris Infrastructure, 2024

Although only a small proportion of metro users currently travel by bicycle, introducing barrier-free design features could encourage more cyclists to integrate the metro into their daily travel if appropriate accommodations are provided. In addition, existing public bike-sharing stations should be prioritized around station exits to allow users to reach further destinations more efficiently than by walking.

Figure 50. TNGo public bicycle station

Source: authors

The final short-term recommendation concerns drop-off and motorbike-taxi access. Rather than fully formalizing pick-up and drop-off zones at every station, we recommend a strategy of "managed informality". Given that many users already rely on informal motorbike-taxi practices and appear comfortable with this mode of access, the priority should be to identify the safest curbside locations at each station for when this activity occurs, so that it can be recognized through signage or surface markings. Short curb segments could be designated for quick drop-offs, while no-stopping zones should be enforced elsewhere to reduce conflicts with pedestrians and buses. This approach would improve safety and legibility without attempting to eliminate informal practices that are already embedded into local mobility.

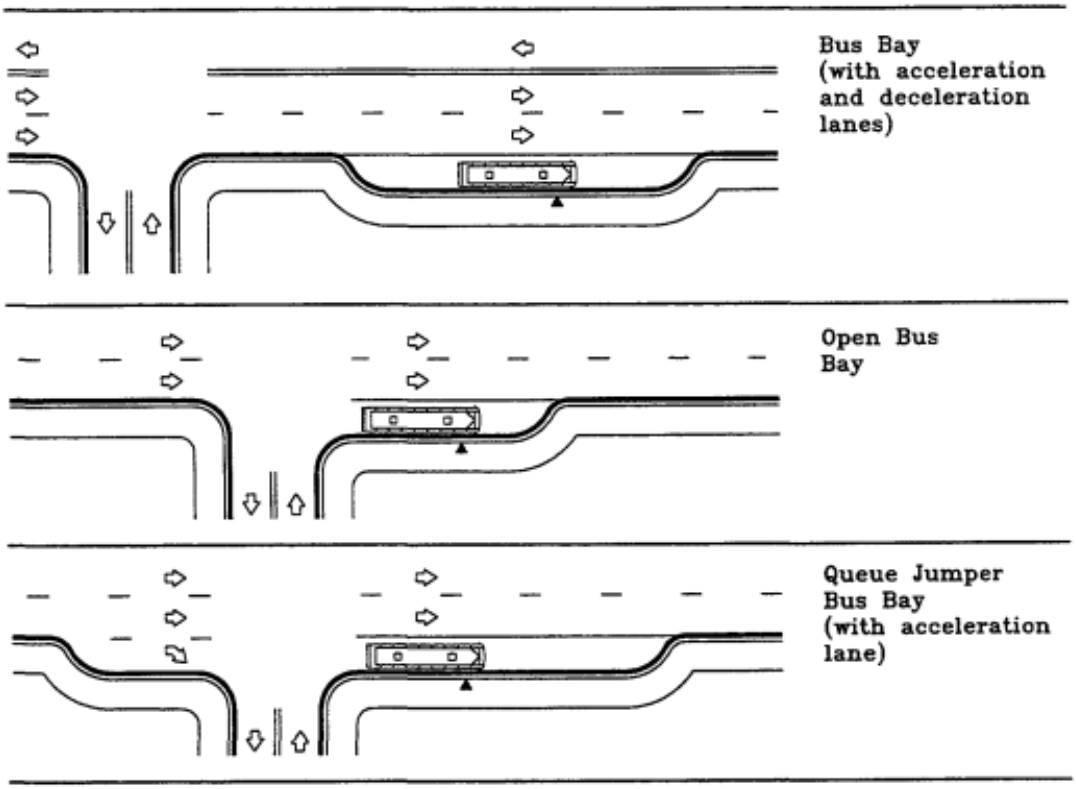
Intermodality: Long-term Solutions

For long-term recommendations applicable to both existing and future metro lines, we suggest strengthening the bus network through the implementation of feeder bus services reaching areas of the city that are currently underserved by public transportation. Considering that 43% of users arrive on foot while only 14% arrive by bus, a stronger supporting transport system may be necessary to expand the metro's influence and

catchment area. Without feeder services, metro systems risk functioning as isolated infrastructure rather than integrated networks.

Related to the bus network, we also recommend the construction of lay-bys at bus stops, particularly near the metro stations. Observations revealed that all stops lack lay-bys, forcing buses to stop directly in traffic lanes. As a result, passengers must navigate oncoming traffic while boarding or exiting, especially as motorbikes frequently pass between the bus and the sidewalk. This situation not only contributes to traffic congestion but also discourages use among vulnerable users and significantly increases both perceived and real safety risks.

Figure 51. Bus stop zone design types



Source: Transit Cooperative Research Program, 2003

Finally, implementing a standardized ticketing systems across the network and different modes of transport, supported by modernized payment methods, is essential to ensuring a high-quality transit system. Fragmented ticketing systems increase mental and financial barriers to transit use, particularly for occasional and potential users, thereby undermining the principle of seamless mobility and integrated public transportation.

Figure 52. BRT-LRT station integration design recommendation

Source: Institute for Transportation and Development Policy, 2019

Safety and Connectivity

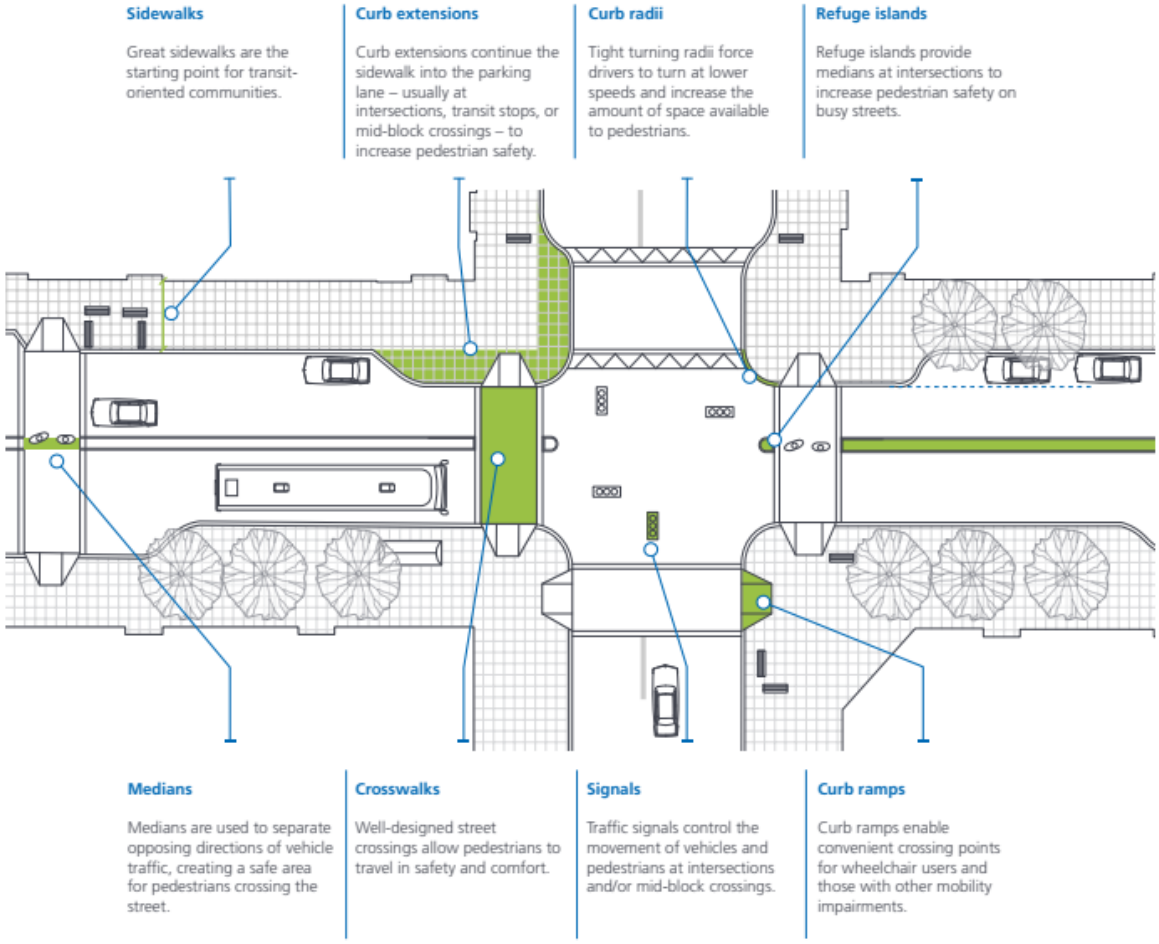
Safety and Connectivity: Short-term Solutions

Short-term recommendations to improve pedestrian safety and connectivity around metro stations include extending or maintaining after-hours pedestrian access through stations that currently function as pedestrian bridges. Given that the metro system typically ceases operation around 10:00 PM, stations that serve as key pedestrian infrastructure become inaccessible at night. This limits safe crossing opportunities in areas where alternative pedestrian infrastructure is absent or inadequate. We hypothesized that allowing continued pedestrian access after operating hours could significantly reduce exposure to nighttime traffic risks by using these stations as safe crossing points. While this intervention would require appropriate security and management measures, it represents a low-cost opportunity to enhance pedestrian connectivity in the short term.

More broadly, this recommendation can be suited within a “safe crossing package” defined around the station (approximately 200-300 meters from entrances). Rather than proposing large-scale city redesign, this package would consist of small replicable interventions focused on pedestrian needs. These include continuous sidewalks, clearly marked pedestrian crossings at high-volume areas, implementing refuge islands, and installing pedestrian barriers for collision protection. This approach reflects the study’s findings regarding the use of station overpasses, which suggest pedestrian are willing to detour

when safe infrastructure is provided. Together, these measures offer a practical solution for improving pedestrian-road safety in the immediate surroundings of metro stations.

Figure 53. Pedestrian elements to create a safe, welcoming, and comfortable environment



Source: TransLink, 2012

Safety and Connectivity: Long-term Solutions

Over a longer term, optimizing pedestrian-road safety through improvements to the street environment surrounding metro stations is essential to creating an accessible and comfortable transit experience. Current conditions around many stations do not prioritize pedestrians' safety, as roadways and sidewalks often lack traffic-calming measures and clearly defined pedestrian infrastructure which place vulnerable users such as the elderly, children, people with disabilities at a higher risk. A safe, welcoming and walkable environment depends on the integration of multiple streetscape elements, including clearly marked and elevated crosswalks, pedestrian signage, protected medians, and dedicated pedestrian traffic signals (see Figure 53). By emphasizing pedestrian presence and safety

within the design of the station's surrounding area, both the perceived and objective safety can be improved, strengthening local connectivity. In turn, it presents walking as a viable and attractive way to access the metro and supports broader goals of sustainable transportation.

Figure 54. BRT station at-grade crossing

Source: Institute for Transportation and Development Policy, 2019

Environmental Comfort

Environmental Comfort: Short-term Solutions

Depending on Hanoi's seasonal climate, users frequently experience extreme heat or torrential rainfall, making environmental protection a key factor in improving comfort around metro stations. Providing protective features in station-adjacent spaces can therefore significantly enhance user experience. In terms of climatic comfort, covered waiting areas outside stations would be a feasible short-term intervention that could be implemented with relatively limited resources. Given that users reported experiencing heat more frequently than initially observed during fieldwork, platform heat mitigation should also be considered as a low-cost intervention rather than a major infrastructural change. These small improvements include additional ventilation or fans, and the use of heat reflective materials, that could be tested and evaluated based on user feedback before committing to larger-scale investments.

Similarly, we observed at many stations, particularly along Line 3, a lack of seating in the general station lobby before entering the turnstiles, limiting the opportunity for users to rest. This is especially problematic for users who require more frequent breaks, such as

elderly and children, especially after walking in extreme heat. Adding seating areas would complement our recommendations regarding drop-off and pick-up zones, as these features would help reduce the physical strain and improve the overall commuting experience.

Environmental Comfort: Long-term Solutions

Although many of the long-term solutions are beyond the scope of this study, improving the conviviality of the walking experience within a 400–500 m radius around stations would have a great impact on user comfort. Given that large proportions of respondents access the stations on foot, providing continuous shade along pedestrian routes would help mitigate the effects of urban heat islands and reduce thermal stress.

Figure 55. Connecting canopy along the sidewalk

Source: Institute for Transportation and Development Policy, 2019

This principle also applies during heavy rainfall, which should be treated as a core design condition rather than an exceptional circumstance. Our findings regarding slippery staircases and service disruption justify recommending a comprehensive integration of non-slip surfacing, improved drainage systems, and protective overhangs along key pedestrian routes. Weather-protected waiting zones at ground level for transfers should be prioritized to align with user feedback and our short-term recommendations.

In relation to overall weather conditions, users frequently mentioned the need for improved cooling and ventilation on station platforms. Despite stations on both lines being semi-open-air structures, air circulation remains insufficient during peak temperatures.

Further investigation into design adaptations or mechanical solutions to enhance ventilation and cooling would be beneficial for long-term user comfort.

Access to Services

Access to Services: Short-term Solutions

Hanoi's urban density allows many residents to live within a reasonable proximity to everyday services. Leveraging this condition around metro stations can strengthen the attractiveness of commuting via public transportation. One short-term strategy is the implementation of seasonal or temporary markets within designated areas surrounding stations, which would encourage localized trips and increase pedestrian activity outside of commuting hours.

Improving access to in-station services also represents an opportunity to make use of vacant spaces and support local vendors. Since "in-station services" emerged as the strongest recommendation category in the questionnaire, this should be translated into operational pilot programs. A limited set of basic amenities such as drinking water fountains, ATMs, and vending machines or small kiosks, could be tested based on foot traffic and transfer intensity. Managing these services through a concession model would allow amenities to be introduced without placing additional financial burden on station operations.

For the short term, improved service legibility within station areas can also act as a substitute for limited network coverage. Given that the current reach of the metro is limited, maximizing the perceived usefulness of the stations in operation becomes important. This could include implementing walking-time signage (in minutes rather than meters) to commonly accessed nearby services and destinations, particularly commercial and recreational facilities that data show are most frequently used by passengers. Investing in these services can enhance the functionality of stations, improve user convenience, and contribute to a more positive public image of the metro system.

Visual Communication

Visual Communication: Short-term Solutions

Among the most feasible recommendations to implement, improving and modernizing the metro's visual communication system represents a low-cost intervention that could significantly facilitate network usage. However, before improving the informational content of maps, their visibility and placement must first be addressed, and one of the most evident findings is that many users did not notice existing maps. Situational maps should

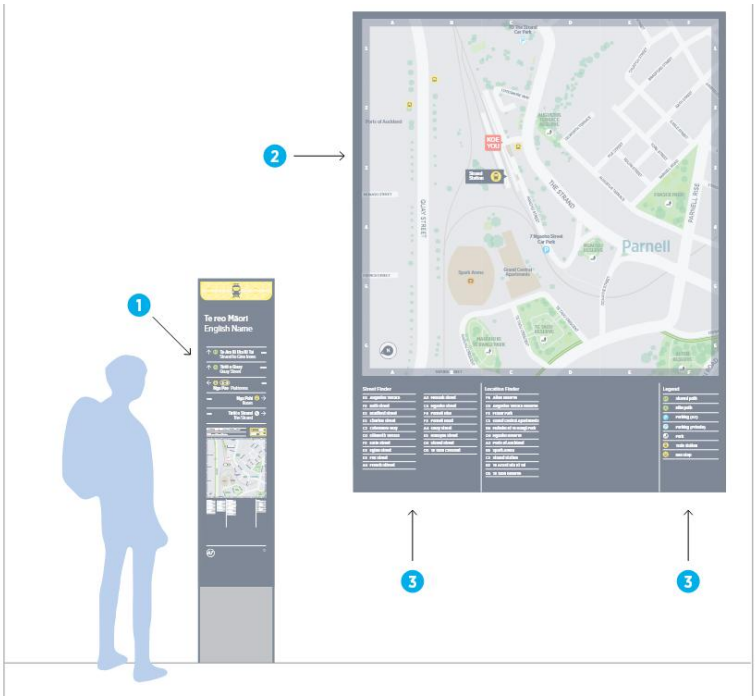
be placed at key desire points such as turnstiles and main exits, use a standardized "*You are here*" figure, and follow a clear visual hierarchy to improve immediate legibility.

Figure 56. Exit sign hierarchies for mass transit systems

Source: Puttipakorn & Upala, 2017

Enhancing exit signage and indicating distance to key connections such as landmarks, destinations, and taxi pickup zones, in minutes rather than meters would allows users to better estimate walking times and decide whether to continue by foot or seek alternative modes of transport. Once basic legibility is obtained, exit differentiation and the inclusion of nearby landmark and service cues can further support wayfinding.

Figure 57. Simplified situational maps



Source: Auckland Transport, 2025

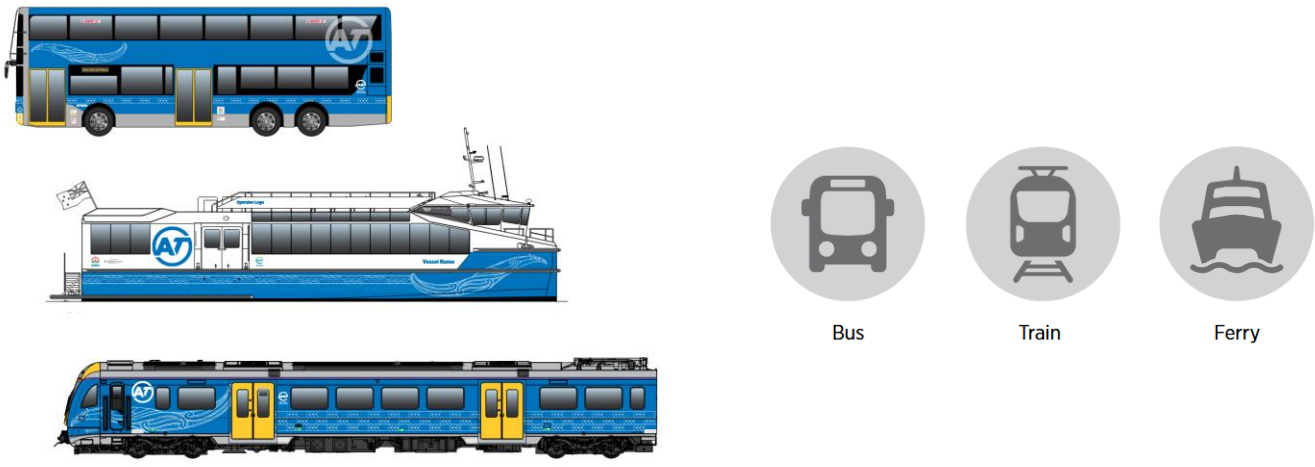
Intermodal wayfinding should also be implemented as a standardized map layer. While bus users currently rely on visual presence of stops, this will become even more important when stations transition underground. Incorporating explicit directions to bus stops, taxi stands, and ride-hailing pick-up zones would be greatly beneficial to future stations. This will be especially relevant as the metro network expands and different station typologies are introduced. One observed example is Cát Linh station, which current provides no visual indication of the nearby BRT stop located approximately 100 meters away. Finally, these recommendations emphasize a need for standardized maps and signage across both lines to ensure network coherence, legibility, and a consistent user experience.

Visual Communication: Long-term Solutions

As noted in the Intermodality recommendations, standardized ticketing systems should be implemented not only across all metro lines, but also across different modes of transport. The establishment of an integrated transit authority will be necessary should authorities continue to invest in public transport. Adopting a holistic approach to public transit would help ensure standardization in both planning practices and levels of service.

The same principle applies to visual communication: users should experience the network as a single, cohesive public transit system, regardless of whether they are using a bus, metro, or the eventual tram. To support this objective, a Hanoi Transit Authority could adopt a clear and recognizable brand identity across all modes and operators.

Figure 58. Standardized liveries and pictograms across different modes of public transport

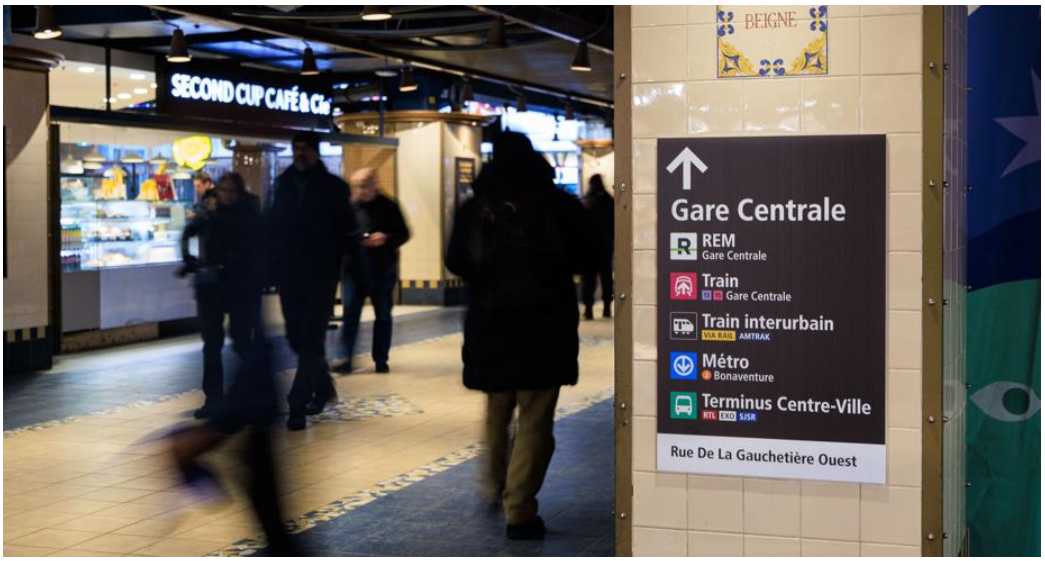


Source: Auckland Transport, 2025

This branding should also be reflected in the built environment surrounding major high-capacity transit corridors (BRT, metro, tram, rail, etc.). Public spaces and key destinations –

such as parks, shopping centres, educational institutions, and administrative offices – should incorporate wayfinding elements that guide pedestrians toward the nearest transit services.

Figure 59. Public transport signage integrated into Montreal's central commercial facilities



Source: Ouellette-Vézina, 2025

Figure 60. Public transport catchment signs in surrounding environment

Source: Auckland Transport, 2025

Conclusion

This study assessed pedestrian-oriented station accessibility through the lens of international standards and design guidelines. The assessment focused on users accessing and exiting stations on foot, as well as those transferring to nearby modes, across Lines 2A and 3. To do so, we combined observational assessments and user perceptions at five selected stations. The objective was to derive actionable lessons to improve existing stations and to inform future station development as the network expands.

The primary findings across the six accessibility factors are as follows. Intermodality at the station level is currently weak, characterized by relatively small catchment areas and limited feeder integration. Walking dominates first- and last-mile trips; bus integration at stations is insufficient in terms of comfort, legibility, and passenger information. Informal pick-up and drop-off practices are widespread and generally tolerated. In terms of safety and connectivity, aerial stations function as de facto pedestrian overpasses and are perceived as safer than at-grade crossings, compensating for inadequate pedestrian infrastructure at street level. Environmental comfort – particularly weather protection and heat management – is inconsistent across the network. Rain-related shutdowns of vertical circulation and exposed staircases create recurring accessibility, safety, and comfort issues. Prioritizing covered waiting areas and improved thermal comfort is therefore essential for user well-being. Finally, although many stations are located near a high concentration of services, visual communication and map legibility remain underutilized. These shortcomings will become increasingly consequential as the system grows more complex with its projected expansions.

These findings point to the need for action-oriented recommendations centered on two levers: (a) immediate, station-level improvements, including comfort, wayfinding, and bus transfer quality; and (b) network-wide integration with surrounding areas through feeder services, completed interchanges, and consistent design standards. However, the application of international best-practice benchmarks must be aligned with local expectations by incorporating user perceptions to better prioritize investments, while maintaining safety and comfort standards. The recommendations were organized by accessibility factor and by implementation horizon, distinguishing short-term, low-cost operational measures from longer-term design and governance adaptations. These measures aim to strengthen accessibility at both current and future stations and to avoid the repetition of existing shortcomings.

Several limitations were encountered during fieldwork. User questionnaires were administered during the secondary and post-secondary summer break, resulting in fewer student respondents than would be expected during the academic year. Elderly users were also difficult to solicit, limiting the representativeness of findings across age groups. Similarly, despite observing a notable number of cyclists and electric scooter users on site,

this group is underrepresented in the sample due to the time required for each interview. Language barriers and the translation from English into Vietnamese also led to some inconsistencies in responses, with a small number of answers contradicting the intent of the questions. Finally, it should be noted that factors beyond accessibility and walkability – such as policy, ticketing systems, marketing, and branding – also influence ridership levels but fall outside the scope of this study.

To build on these findings, future research should conduct a detailed built environment audit within a 400-500 m station influence area, with particular attention to pedestrian continuity and comfort. Additional studies should examine bus-metro integration by analyzing routes, service frequency, and transfer reliability. Lastly, an expanded wayfinding assessment should evaluate surrounding public spaces (e.g., shopping centres, institutions, and parks) and their integration with stations through signage, landmarks, and pedestrian routes.

Among the limited number of post-occupancy studies conducted to date on Hanoi's metro stations, this research provides a baseline for iterative improvement. As the metro network expands and travel patterns diversify, station-area accessibility will become a decisive factor in sustaining ridership and in achieving the system's broader mobility and sustainability objectives.

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APPENDIX I – OBSERVATIONAL TOOL

_____ Metro Station: Accessibility Audit			
Date and time:		**Environment/Typology:**	
	Factors	**Rating**	**Comments**
Visual Communication			
Indicators/Sub-factors	**1. Signage and Wayfinding**		
	1.1. Presence of metro network map and timetables at the metro station		
	1.2. Presence of situational map and available bus lines at the metro station		
	1.3. If situational maps are present, they are legible and clearly visible		
	1.4. Metro station signage integrated into the surrounding built environment		
Intermodality			
Indicators/Sub-factors	**2. Transfers (public transport)**		
	2.1. Bus stop located as near as possible to metro entrance/exit		
	2.2. Presence of laybys for buses		
	2.3. Presence of transit shelters at bus stops		
	2.4. Presence of bike-share zone		
	3. Vehicular Access		
	3.1. Designated zones for drop-off/pick-up		
	3.2. Designated waiting area for Grab/taxi		
	3.3. Designated park and ride facilities		
Connectivity			
Indicators/Sub-factors	**4. Pedestrian Facilities**		
	4.1. Entrances and exits have direct connection to sidewalk		
	4.2. Presence of at-grade crossing or means to connect to other side (besides the station)		
	5. Universal Accessibility		
	5.1. Elevators present on both sides of the station		
	5.2. Escalators present on both sides of the station		
	5.3. If at-grade crossing or other means are present, they are universally accessible		
Safety			
Indicators/Sub-factors	**6. Pedestrian-Road (excluding station, up to a distance of 150m)**		
	6.1. If at-grade crossing is present, the refuge islands in medians are large enough to accommodate volumes of people		
	6.2. If at-grade crossing is present, Zebra markings are paired with signage, traffic calming or traffic signals		
	6.3. Dedicated sidewalks protected from vehicular traffic (curb or other adequate devices such as bollards) with sufficient width		
	7. User Safety		
	7.1. Adequate lighting at night		
	7.2. High pedestrian activity/Passive public surveillance		
	7.3. Presence of metro staff or security at stations		
Environmental Comfort			
Indicators/Sub-factors	**8. Pedestrian Comfort**		
	8.1. Shade: canopies along walkway or sufficient vegetation		
	8.2. Sidewalk quality (leveled surface and well maintained)		
	8.3. Station cleanliness and WC presence		
	9. Public Space		
	9.1. Presence of parks, playgrounds, sit-down area (street furniture)		
Access to Services			
Indicators/Sub-factors	**10. Essential Services**		
	10.1. Access to food and commerce within a short walking distance (shops or street vendors)		
	10.2. If major facilities are present (education/healthcare/offices/commerce), they are well integrated into the built environment		
Notes/Non-systematic observations			

APPENDIX II – USER QUESTIONNAIRE SURVEY

Question	Sub-question (if applicable)	Link to factors (and sub-factors)
1. How many days per week do you typically take the metro?		Background info
2. Typically, do you take the metro on weekends, weekdays, or both? (check all that apply)		Background info
3. What is the purpose of your trip? (check all that apply)		Background info
4. By what means of transportation did you arrive at this metro station today?		Intermodality
	4a. **If "walking" was selected:** How long does it take you to walk to the metro (in minutes)?	Intermodality Connectivity Safety
	4b. **If "bus" was selected:** If it was your first time here, would you know where to go to take the bus?	Visual communication (signage and wayfinding) Intermodality (transfers)
	4c. **If "personal car or motorbike" was selected:** Is there enough parking at the station?	Intermodality (vehicular access)
	4d. **If "moto-taxi" or "dropped off" was selected:** Is there a well-designated and comfortable drop-off zone?	Intermodality (vehicular access)
5. How will you reach your destination after you exit the metro?		Intermodality
	5a. How long does it take you to reach your destination (in minutes)?	Intermodality Connectivity Safety
6. Which of the following would you access around this station?		Access to services (essential services) Visual communication (signage and wayfinding)
7. If you want to access those services around the station, would you walk there?		Access to services (essential services)
8. Would these maps and signs help you find your way around the area?		Visual communication (signage and wayfinding)
9. In general, if you are walking around this area, would you go out of your way to cross the street using the metro station?		Connectivity (pedestrian facilities, universal accessibility) Safety (pedestrian-road)
10. Do you feel safe in the area around the metro at nighttime?		Safety (user safety)
11. Is there enough cover around the metro station to protect you from the heat or rain?		Environmental comfort (pedestrian comfort)
12. Based on what we discussed, is there anything that could be improved in the metro stations?		All
13. Year of birth		Characteristics
14. Sex of participant		Characteristics
15. Station		Characteristics