SMART Grant Program Stage I

Final Implementation Report

Inclusive Wayfinding Through NaviLens

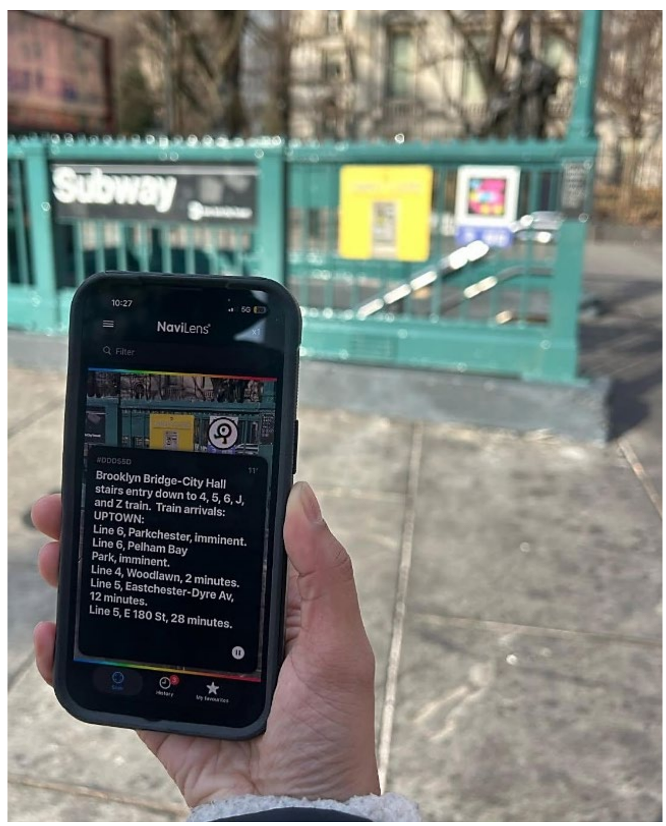
Metropolitan Transportation Authority

Fiscal Year of Award: 2022 | Grant ID: SMARTFY22N1P1G45

Period of Performance: September 1, 2023, - September 1, 2025

Organization Preparing the Implementation Report: Metropolitan Transportation Authority (MTA)

Submission Date: December 31, 2025



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Part 1: Executive Summary

The Metropolitan Transportation Authority (MTA) implemented “Inclusive Wayfinding Through NaviLens” as a Systems Integration project to improve wayfinding and access to real-time service information—particularly for blind/low-vision and Limited English Proficiency (LEP) riders who may not benefit from text signage. NaviLens uses high-sensitivity, colorful codes detectable from significant distance and angles, delivering context-specific information through two apps: NaviLens (audio, accessibility-focused) and NaviLens GO (visual-first for wider, general users). Stage 1 demonstrated the feasibility of an end-to-end wayfinding system across subway stations, bus stops, and rolling stock, while identifying requirements for at-scale deployment.

Stage 1 deployed more than 5,000 codes across the 6-subway line and Bx12 bus corridor, including 36 subway stations, 79 bus stops, 39 bus shelters, 418 subway cars, and 192 buses, in partnership with NaviLens Projects Corp., NYC DOT, and community stakeholders such as the Advisory Committee for Transit Accessibility (ACTA), the Lavelle School, and Lighthouse Guild of New York. Evaluation combined usage-based scan data and survey-based user feedback, acknowledging limitations such as non-unique scan counts and varying deployment timelines. Despite these constraints, results demonstrated sustained real-world use and positive user reception.

The deployment generated over 130,000 scans from July 2024 to August 2025, primarily on bus assets; approximately 75% of scans were from NaviLens GO and 25% from NaviLens, with multilingual use led by English (~86%) and Spanish (~12%). Survey results (April–September 2025; 69 NaviLens and 67 NaviLens GO respondents) showed over 75% satisfaction, strong intent to continue use and recommend the apps, and over 85% support for further deployment.

While Stage 1 was completed, schedule impacts driven by procurement, approvals, staffing, and fabrication capacity resulted in delays and a no-cost 6-month Period of Performance extension. Key lessons learned indicate that successful scaling depends less on the technology itself and more on adequate staffing, streamlined procurement, standardized installation guidance, and durable materials that reduce maintenance and vandalism. Stage 1 cost approximately $2M; anticipated Stage 2 costs range from $10M–$20M, with benefits expected to outweigh costs by expanding access to real-time, multilingual navigation and improving rider confidence and safety.

Part 2: Introduction and Project Overview

The “Inclusive Wayfinding Through NaviLens” MTA project is a Systems Integration solution in the MTA subway and bus systems in partnership with NaviLens. NaviLens is a smartphone-based application that uses highly sensitive, colorful codes to provide users with context-specific indoor/outdoor wayfinding and service information. Codes can be detected instantly with a phone's camera from up to 150 feet away and at 160-degree angles. NaviLens has two apps, NaviLens and NaviLens GO. The NaviLens app, designed for users who are blind or low vision, provides audio information and helps guide the users to the exact location of the code, including the user's distance and angle from the code (e.g., “stairs entry down to Uptown and the Bronx-bound 6 train platform”, or “bus stop East Fordham Road & Jerome Avenue, 50 feet away, angled to the right”). This information is further verified through haptic or audio feedback to ensure user confidence. Once the user arrives at the location, additional real-time service information is presented, including train and bus arrival times, elevator status, and any service changes. NaviLens GO app, designed for all sighted users, provides real-time train and bus arrival information, elevator and escalator status, service alerts, and relevant route changes. NaviLens is also now capable of delivering instant, simple verification that a user is boarding the correct vehicle (e.g., “yes, this train goes to World Trade Center, all elevators working at this station” or “elevator out at Fulton St, board this train to World Trade Center instead”). This instant verification allows all users to board trains with certainty, fostering independence and safety for all.

NaviLens expands access by addressing real-world challenges and offers tailored features for a variety of use cases. It helps overcome the lack of legible visual signage, especially overhead signs that can't be tactile or in braille, and the language barriers often faced by people with Limited English Proficiency (LEP) or cognitive/learning disabilities when visual/text signage is only in English. It can also supplement conductor announcements, particularly in stations/subway cars that are not yet equipped with modern Public Address (PA) systems. With NaviLens, users can automatically translate audio/visual information into more than 40 languages, improving system reliability and customer experience by delivering real-time multimodal trip information. It expands access for blind or low-vision and LEP populations that are historically underserved, enhances connectivity across infrastructure, vehicles, and pedestrians, supports resilience during outages or diversions, and improves access to jobs, healthcare, and essential services through better, independent navigation. Nearly 200,000 New Yorkers are blind or have low vision, and about 25% of LEP New Yorkers who do not benefit from static visual signage can independently and confidently navigate the MTA network with NaviLens, showing measurable progress in accessibility efforts.

For Stage 1, MTA selected the 6-subway line and Bx12 bus corridor after collecting feedback from members and representatives of the disability community and continued engagement throughout the project, including the Advisory Committee for Transit Authority (ACTA), New York Transit Museum, Lavelle School for the Blind, Lighthouse Guild of New York, and others. This ongoing collaboration reflects a shared commitment to accessibility, ensuring the community's needs are prioritized and respected throughout the project. See Appendix for full lists of stations and bus stops included in the project as well as a map of NaviLens locations (pages 41-43).

During Stage 1, MTA deployed over 5,000 NaviLens codes at all 36 stations along the 6-line, except for Grand Central-42 St and Parkchester stations due to ongoing construction, all 79 bus stops and 39 bus shelters along the Bx12 route/corridor, and all 192 buses and 418 train cars serving both lines. Most NaviLens codes have a blue call-to-action (CTA) banner with the MTA and NaviLens logos, and an “App Clip” QR code that lets the user test NaviLens GO without downloading the app. NaviLens codes range in sizes from 2 square inches to 10 square inches depending on available space, and NaviLens codes with CTAs range from to 4x6 inches to 10x14 inches. MTA determined the placement of NaviLens in subway stations, buses, and train cars based on location and available space. Not all stations are the same, as each has its own unique infrastructure, and in buses with limited space, some NaviLens code sizes vary with or without CTA. See Appendix for image of code locations on vehicles and the information NaviLens returns for each of those codes.

The project is a Systems Integration deployment, which includes static and dynamic sign content, real-time arrival APIs, GTFS Pathways data for route modeling, and code management systems. The planning phase of Stage 1 was expected to last 6 months but took a full year due to delays in procurement and hiring, which in turn led to delays in surveying and installation. Throughout the planning phase, the procurement with NaviLens was completed six months into the Period of Performance (PoP). Subway station surveys began in April 2024 and continued until the end of the PoP due to staffing and contracting limits. MTA did not execute the contract or pursue a partnership with New York University Langone due to delays. The installation phase began in July 2024, when all Bx12 bus stops were first equipped with NaviLens. The MTA started installing NaviLens in subway stations in Fall 2024, with all stations completed by August 2025. The installation of rolling stock on train cars and buses, the procurement of materials (e.g., vinyl decals and metal plates), and marketing efforts were delayed by complex internal vendor approval processes. Although there were some challenges and significant deviations during the project, MTA completed it within a 24-month PoP, with a 6-month extension.

Upon the grant award, New York State Senators Kirsten Gillibrand and Chuck Schumer announced that the MTA had received funding for the NaviLens wayfinding app. The exposure helped the MTA gain considerable media and public attention, including coverage in *Mass Transit Mag*: MTA Pilots Smartphone App to Help Blind and Low-Vision Bus Riders, and *Auto Evolution*: Smartphone App Overhauls New York City Transportation For the Blind, among others. Upon the conclusion of the PoP, *Able News* also published an article promoting the project: Subway App Brings Accessibility Info Right to the Phones of NYC Travelers. This coverage highlights the project's visibility and the MTA's commitment to advancing accessibility for all.

The remainder of this report summarizes what MTA learned from the Stage 1 proof-of-concept and what would be required to scale NaviLens in a future phase. Proof-of-Concept Evaluation Findings presents results from both system usage activity and customer feedback to assess whether the deployment demonstrated meaningful real-world use and perceived value across stations, bus stops, and rolling stock. Anticipated Costs and Benefits of At-Scale Implementation discuss how Stage 1 lessons inform expectations for a broader deployment, including cost considerations and the associated accessibility, parity, and customer experience benefits.

Challenges & Lessons Learned documents the primary implementation barriers encountered during Stage 1—such as staffing constraints, procurement and approval timelines, internal coordination, materials durability, and data integration—and translates them into actionable lessons for future delivery. Deployment Readiness outlines the conditions under which MTA would be prepared to proceed with a broader rollout, including workforce capacity, contracting readiness, process standardization, and long-term operations and maintenance planning. Finally, the Wrap-Up summarizes overall conclusions from Stage 1 and the key prerequisites for a scalable, sustainable expansion, with supporting reference material provided in the Appendix.

Part 3: Proof-of-Concept Evaluation Findings

3.1. NaviLens Code Scan Data (Usage-Based Findings)

This section summarizes NaviLens and NaviLens GO scan activity recorded during the Stage 1 Period of Performance (PoP). Scan data represents real-world usage of deployed codes across the Stage 1 footprint and is used to assess whether the proof-of-concept demonstrated sustained use and operational relevance across different transit environments. The available data window differs by category because codes were installed on varying schedules across modes (i.e., subway stations, bus stops, subway cars, and bus vehicles).

To evaluate proof-of-concept performance using observed system activity, MTA analyzed NaviLens platform usage logs (“scan data”) generated when riders scanned deployed NaviLens or NaviLens GO codes during the Stage 1 Period of Performance (PoP). Each record represents a single scan and includes a timestamp, the scanned code identifier, the app used (NaviLens or NaviLens GO), and the device language setting. Scan timestamps were converted from UTC to Eastern time for consistency.

3.1.1. Evaluation Methodology and Data Limitations

Scan data provides strong evidence of real-world use, but it is not a direct measure of unique riders, trip completion, or outcomes such as reduced travel time or fewer navigation errors. Key dataset limitations include:

Scans are event counts, not unique users. A single user may generate multiple scans in a single trip or repeated scans across multiple trips. Repeat use cannot be separated from single-use engagement.

Installation occurred on different schedules across bus stops, subway stations, and rolling stock. As a result, the available scan data window differs by category, and cross-category comparisons must consider differences in exposure time and code availability.

Operational context is not captured in the scan logs. Scan data does not include information about service disruptions, elevator outages, special events, station crowding, or marketing/outreach campaigns, all of which may influence scan activity and month-to-month variation.

Device and user behavior affect scan counts. Scan frequency can be influenced by rider familiarity, confidence, and accessibility needs. For example, users may scan repeatedly for confirmation, while others may scan only once per trip. Similarly, differences between NaviLens and NaviLens GO reflect user needs and app design, not necessarily differences in installation quality.

Despite these limitations, scan logs are a reliable indicator of whether deployed codes were detected and used in real operating conditions. When interpreted alongside deployment schedules, installation scope, and user feedback findings, the usage dataset provides meaningful evidence that the Stage 1 proof-of-concept was operationally viable and actively used across multiple transit environments.

Scan records were cleaned and categorized to support analysis across installation environments. Code identifiers were mapped to location and mode using a series of lookups developed during Stage 1 implementation, including: (1) bus stop pole identifiers, (2) bus shelter identifiers linked to stop IDs, and (3) subway station identifiers for the 6-line deployment footprint. Rolling stock records (bus vehicles and subway cars) were also identified through consistent naming patterns and vehicle/car reference lists. After these steps, each scan event was assigned to a standardized code category representing the deployment environment:

- Bus stop (further classified as Pole or Shelter)
- Subway station
- Subway car
- Bus vehicle

Usage findings were summarized using descriptive statistics and visualizations. Core outputs included: monthly scan totals over time, scan totals by mode, bus stop scan totals by shelter vs. pole, and the highest-usage locations by total scans. Where relevant, outputs were disaggregated by app type (NaviLens vs NaviLens GO) to support the interpretation of how the deployment served different user groups.

Table 1 below summarizes the duration of available usage data, scale of deployed codes, and total scans recorded for each NaviLens installation type during the Stage 1 PoP.

Table 1. NaviLens Deployment Scope and Usage by Code Location

Mode / Code Location	*Date Range of Data (Codes installed on varying schedules)*	*# Months of Data*	*Total Codes Installed* at End of PoP*	*Total Scans*	*Average Scans Per Month*
Bus Stops	July 2024— August 2025	14	314	58,506	4,179
Subway Stations	September 2024— August 2025	12	3,228	32,111	2,676
Subway Cars	March 2025— August 2025	6	3,344	6,343	1,057
Bus Vehicles	August 2025	1	771	930	930

*** Note: "Total Codes Installed" reflects individual physical code instances; duplicate codes may be installed at the same location (e.g., multiple signs at one stop or station).*

Since installations occurred on a rolling basis, exploring the average number of scans per month shows how time and use-case affect natural use of this technology. The data indicates that having NaviLens codes at bus stops (including shelters where present) is the most universal, organic use-case. Riders are more likely to notice and read a sign about NaviLens when waiting at a bus stop than in a subway station or while riding the subway, where cellular connectivity might be more limited. The Bx12/Fordham Rd corridor is one of the busiest transit corridors in the city, and many stops serve several high-frequency routes, making instant identification critical. Additionally, most bus stops do not have any audio or visual live status information, so customers are more likely to look around for a number to text or a code to scan to find out when the next bus is coming. However, subway car and bus codes could become even more popular over time in a broader deployment due to increased awareness of the app's features.

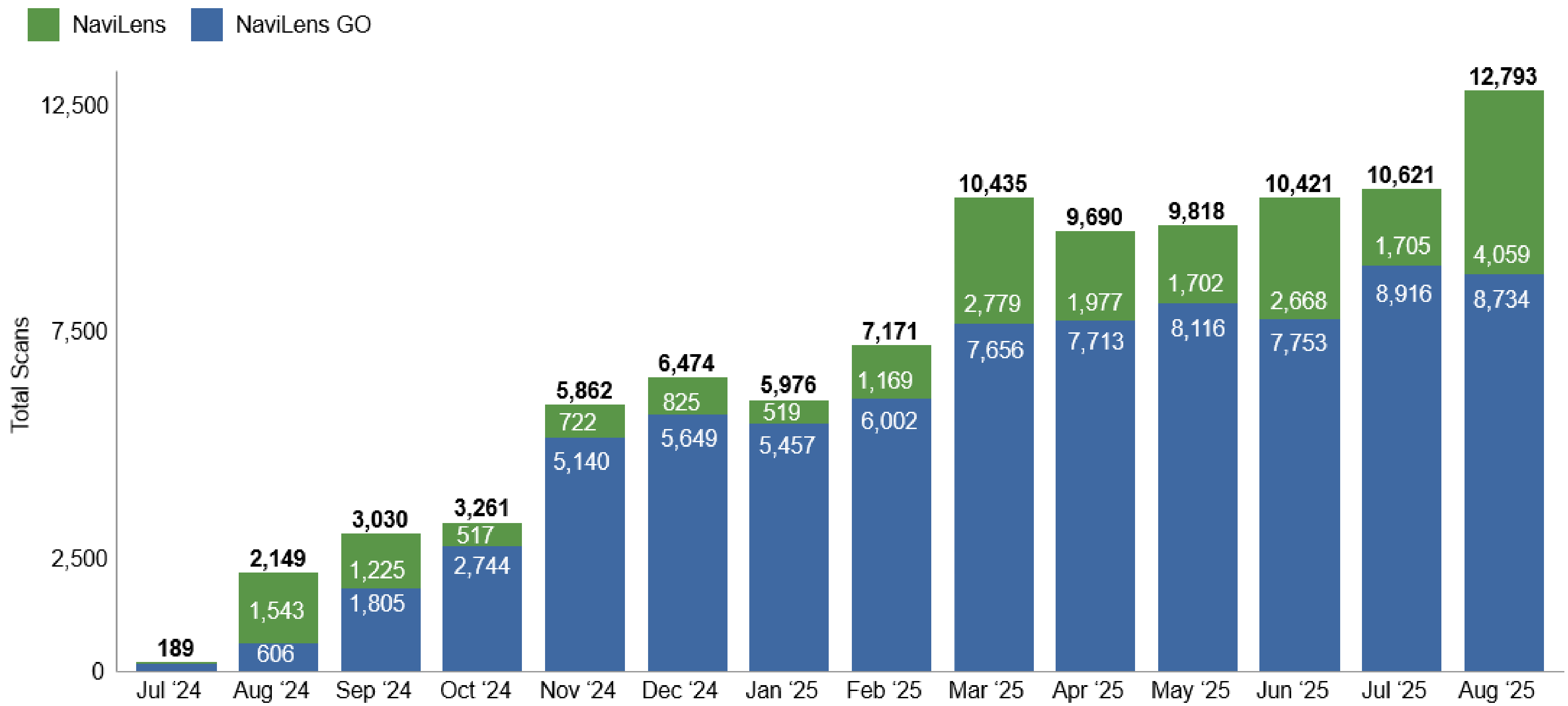
3.1.2. Scan Trends Over Time (Monthly)

Monthly scan totals show sustained usage across the PoP. Scan activity increased over time following deployment phases and remained consistent through multiple seasons, suggesting continued use beyond initial awareness or novelty effects.

Figure 1 below shows total NaviLens code scans by month, for each app version.

Metropolitan Transportation Authority

Figure 1. Total NaviLens and NaviLens GO Scans by Month



Source: MTA NaviLens Usage Data (USDOT SMART Grant Stage 1 Deployment), July 2024-August 2025

The mostly steady rise in usage aligns with the rolling installations and increasing marketing/outreach that began in April and ramped up in the summer. The NaviLens development team also visited in March and did significant testing with the MTA project team. The ratio of app-type usage also tracks with the different user groups for each app. The NaviLens user group largely consists of individuals who are blind or low vision and use it for the audio feature. These users are mostly learning about NaviLens through direct outreach. In comparison, the NaviLens GO user group, spans all range of needs and abilities, offering more use-cases with visual wayfinding information that also works with screen-reader technology, may discover NaviLens (GO) through visually noticing NaviLens codes and/or seeing MTA's marketing campaign which was mostly visual (but included audio ads on Spotify)

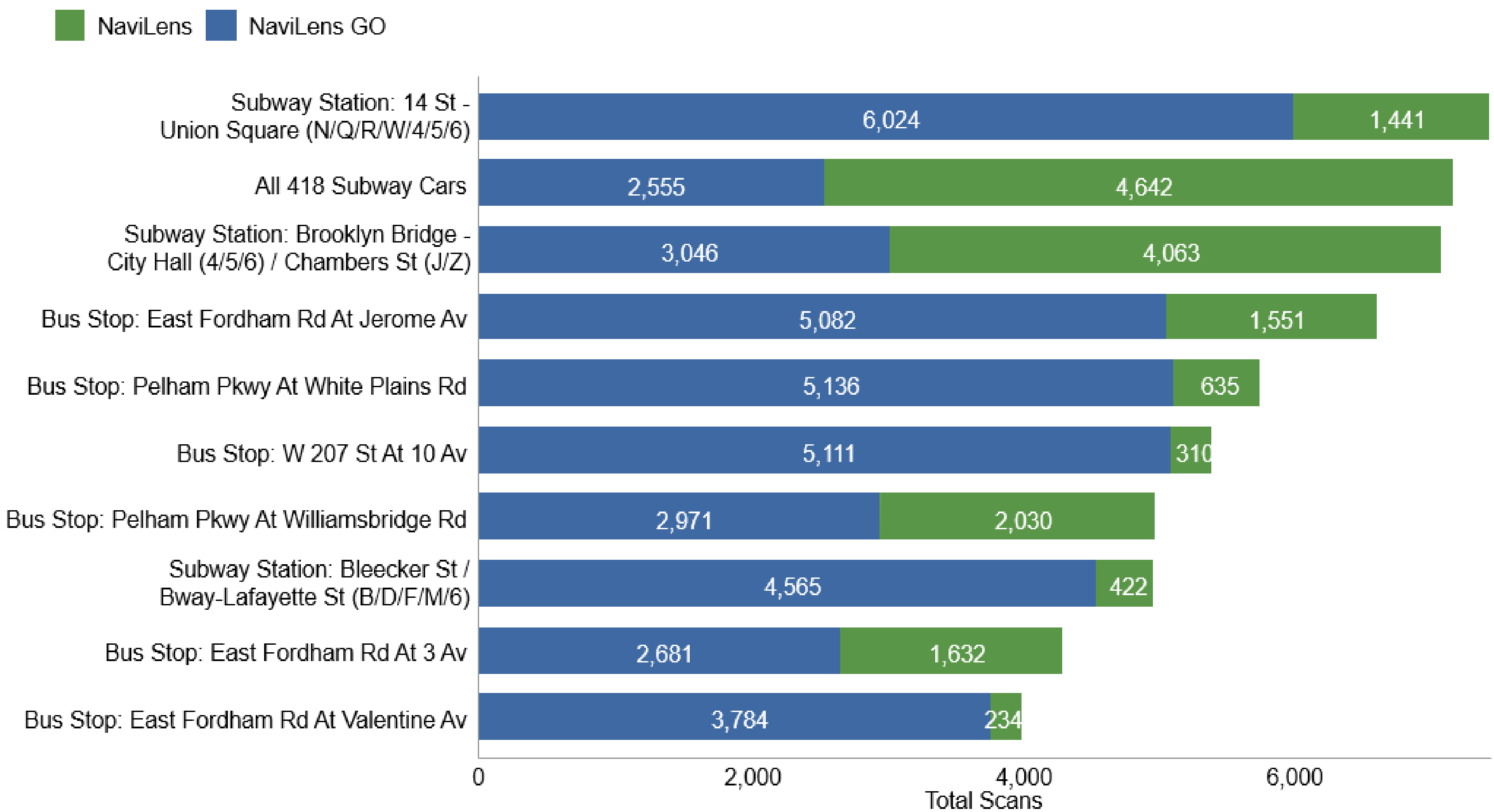
3.1.3. High-Usage Locations/Use-Cases

Figure 2 below shows the top 10 locations that received the highest number of scans in the PoP, which helps us understand where NaviLens delivered the most value. This analysis identifies high-usage bus stops and subway stations and includes system-wide categories for rolling stock (all 192 bus vehicles and all 418 subway cars) for context.

The locations below with the highest use are some of the busiest bus stops along the Bx12 corridor, and many are major transfer points to other buses and subway lines. Brooklyn Bridge/City Hall subway station, the southern terminal of the 6-line, is one of the largest stations with NaviLens, and was the first subway station installed as part of this project. It is the closest 6-station to MTA Headquarters, therefore serving as a regular testing and feedback location throughout the PoP. The Project Team held 5 rounds of outreach (e.g., tabling, guided journeys) at both Brooklyn Bridge-City Hall and 14 St-Union Square stations, due to their ease of access and complexity—each station offered an opportunity to thoroughly test the NaviLens and NaviLens GO user experiences for the station environment specifically.

Lastly, the most surprisingly high-use location was subway cars. Considering NaviLens was only installed on subway cars for 5 months, the results show a high adoption rate on subway cars, especially for the NaviLens app. The 6-line runs some of the oldest subway cars in the system, and they lack modern Passenger Announcement (PA) systems found on newer train cars elsewhere in the subway system. NaviLens helps provide real-time stop (e.g., "this is a Pelham Bay Park-bound 6 train, the next stop is Astor Place in 2 minutes") and service change information an audio/visual format. NaviLens provides audio/visual assurance that a user is on the correct train and that they know what stop comes next. The high rate shows that NaviLens is filling this information gap of providing real-time service status of the specific train car a user is riding.

Figure 2. Top 10 NaviLens Deployment Locations by Total Scans



Note: Time range for location categories varies, see Table 1 for details.
Source: MTA NaviLens Usage Data (USDOT SMART Grant Stage 1 Deployment), July 2024-August 2025.

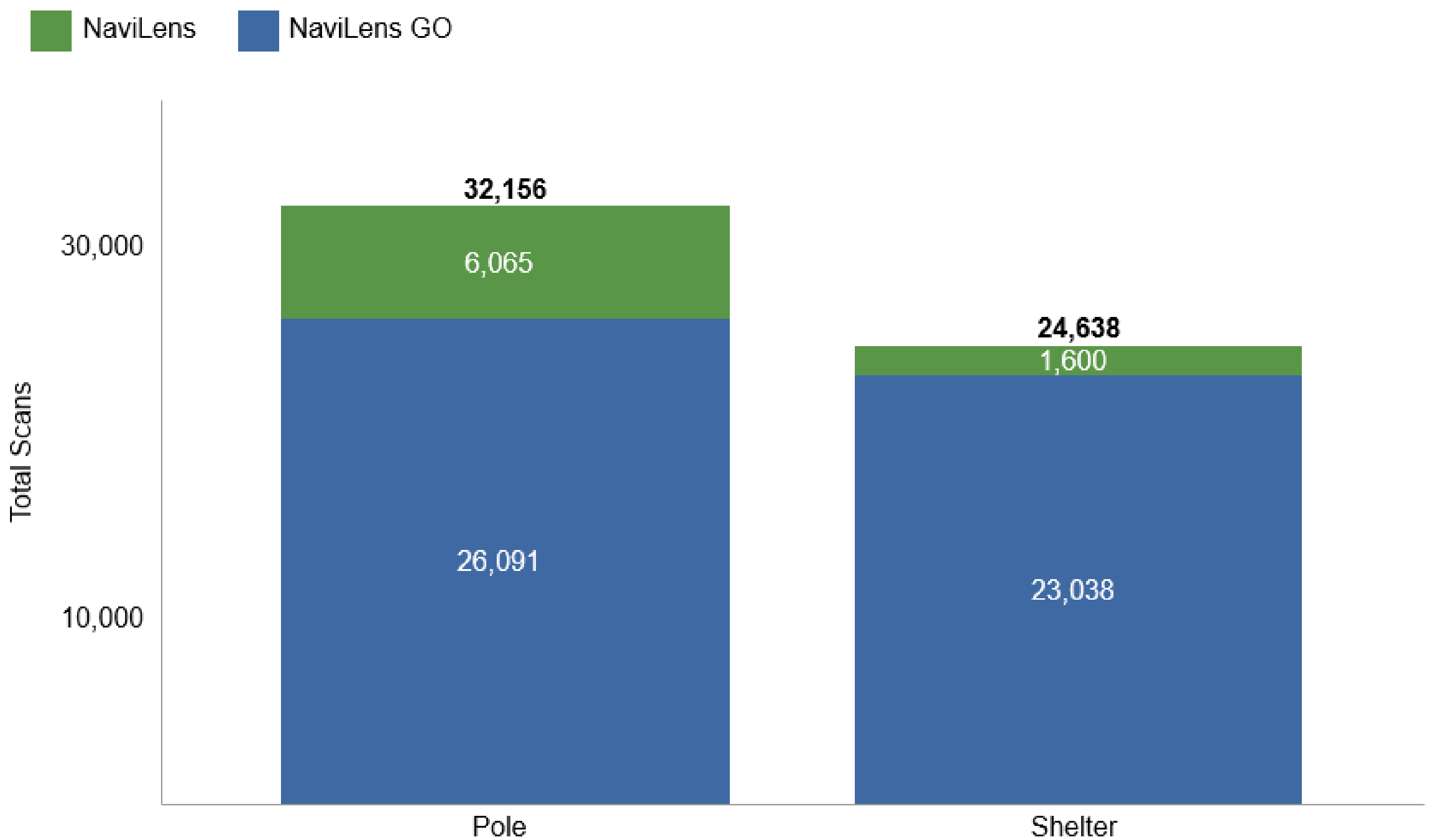
3.1.4. Bus Stop Usage: Shelter vs. Pole

Bus stop scan data shows differences in scan activity between shelters and poles, shown in Images 1 and 2 below. This is an important operational finding because bus stop infrastructure varies by location, and the installation context may influence how easily codes can be detected and used.

Image 1. A back view of a bus shelter with NaviLens codes on Bx12 route.

Image 2. A view of the bus stop pole including "Guide-A-Ride" information box with NaviLens codes on Bx12 and Bx12-SBS route.

Figure 3. NaviLens Scans at Bus Stops with Shelters, by Code Location



Note: Includes only bus stops where both Pole and Shelter codes are present.

Source: MTA NaviLens Usage Data (USDOT SMART Grant Stage 1 Deployment), July 2024-August 2025

Although roughly half of the bus stops along the Bx12 corridor include shelters, scan activity is not evenly distributed between shelter and pole installations. When analysis is limited to bus stops that contain both pole and shelter codes, shelter-mounted NaviLens codes receive substantially higher scan volumes than pole-mounted codes.

This finding suggests that shelters function as especially effective locations for code placement. Shelters provide larger, more visible surfaces; allow for consistent mounting height and orientation; and are locations where riders typically wait for longer periods. These factors likely increase both code detectability and the likelihood that riders will engage with NaviLens while waiting for bus service.

This pattern persists even when controlling for stop-level design, indicating that higher shelter scan volumes are not simply a function of shelters being present at higher-ridership stops. Instead, the results point to the installation context itself as a meaningful driver of usage. Codes that are larger and more visible to customers are more likely to be scanned. This has direct implications for future deployment strategy, suggesting that prioritizing shelters—where available—can maximize rider engagement and accessibility benefits.

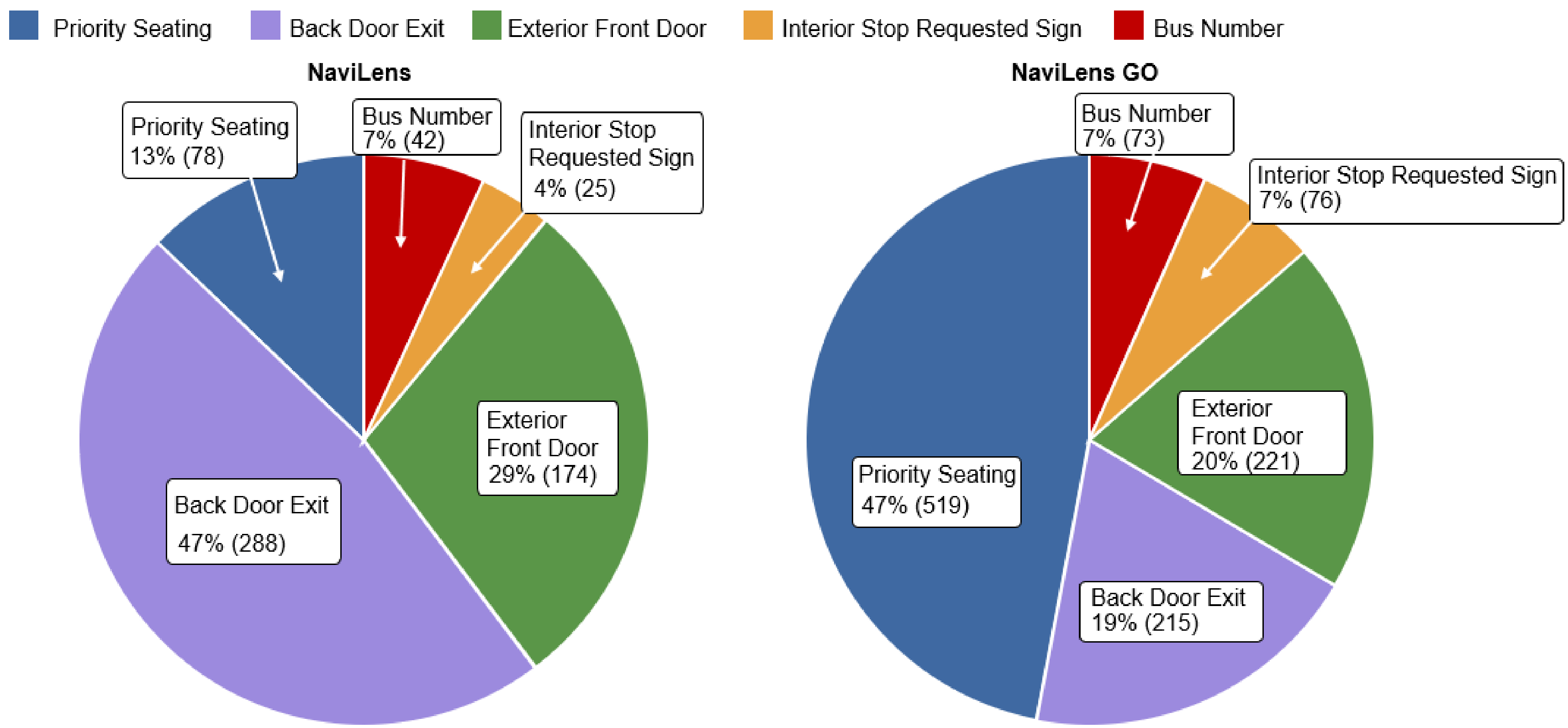
3.1.5. Bus Vehicle Usage: Which Codes Were Scanned Most?

Usage data from bus vehicles indicate a clear concentration of scans on the doors (interior and exterior) and priority seating areas. These codes were scanned more frequently than interior bus code locations such as the stop request or bus number, which may have been installed in slightly less visible or “scannable” locations (see Images 8 and 9 in Appendix).

This pattern suggests that users are significantly engaging with NaviLens on buses to verify that they are on the correct vehicle, and to navigate within the vehicle itself. For blind and low-vision riders, exterior confirmation reduces uncertainty at the point of boarding and minimizes the risk of entering the wrong bus. Since many of the city’s bus corridors serve multiple bus routes, this helps those with access needs and/or are unfamiliar with the network with greater confidence and autonomy.

Figure 4 below shows the breakdown of scans for bus vehicles.

Figure 4. Bus Vehicle Scans by Code Type, by App, August 2025



Source: MTA NaviLens Survey Data (USDOT SMART Grant Stage 1 Deployment), August 2025

Codes in the priority seating area make up for nearly 50% of NaviLens GO scans; this may be related to the visibility of the codes in that location as well as the codes' inclusion of the “call-to-action” (CTA) blue banner that says NaviLens and includes a QR code to test the NaviLens GO app. Overall, codes that had this CTA added contextual information and QR code to test in the moment

The concentration of door scans also reflects the deployment timeline of bus vehicle codes, which occurred late in the PoP. Despite a shorter data window, bus vehicle scans demonstrated immediate uptake, indicating latent demand for vehicle-level confirmation tools. These findings support prioritizing exterior-facing codes on buses in any future expansion and suggest that interior vehicle features may play a secondary, supportive role.

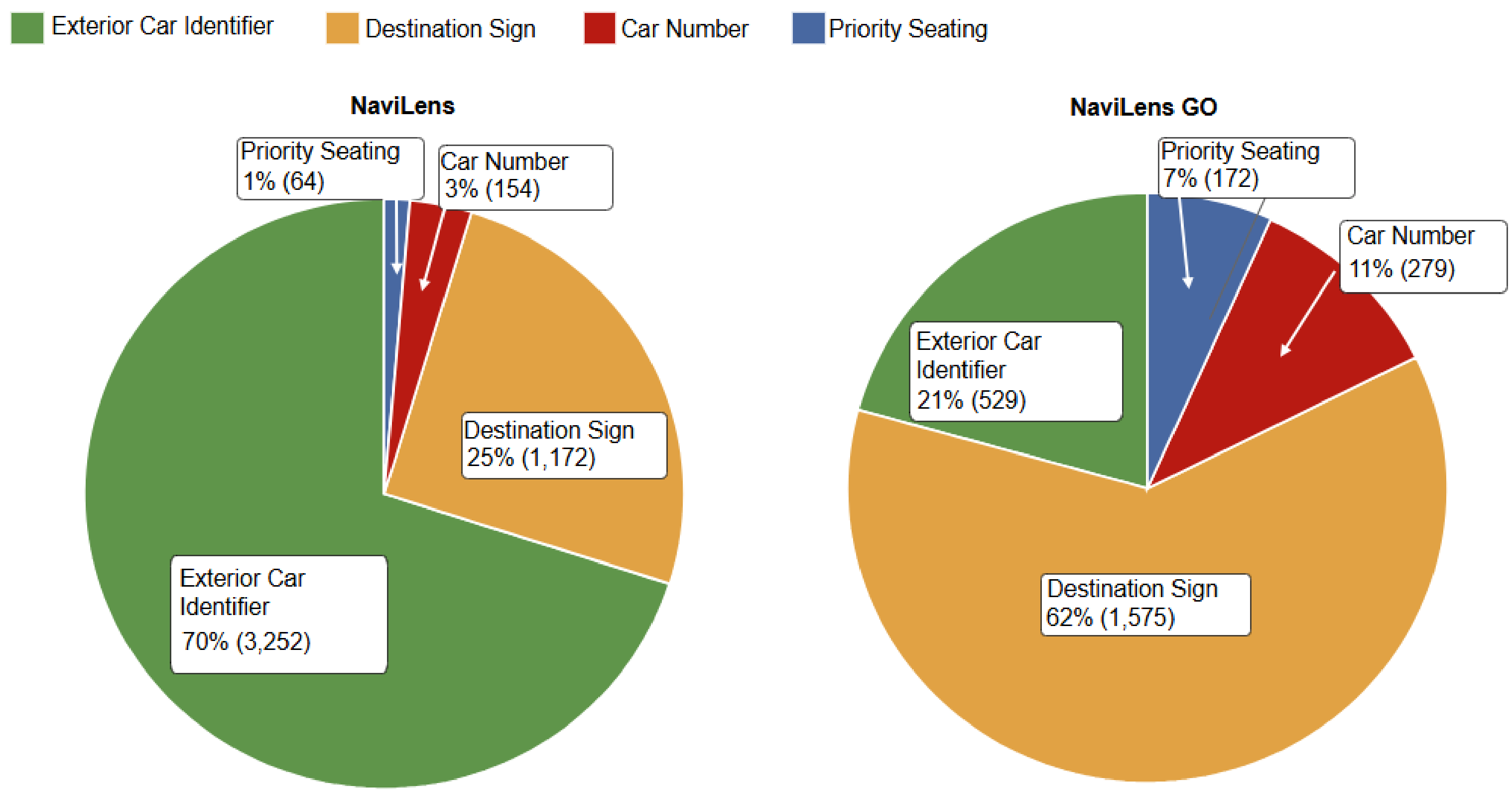
The distribution of scan activity across bus vehicle code types reinforces the importance of minimizing uncertainty at the point of boarding. Easily-spotted codes—particularly those associated with vehicle door identification and priority seating—appear to meet an immediate, high-value need for confirmation before entry. Interior bus number and stop request codes would likely be scanned more if placed in more visible locations on the bus, so that they can play a complementary role for riders who require additional orientation or reassurance once onboard. Additionally, all buses along the Bx12 corridor have Digital Information Screens (DIS), which provide real-time audio/visual stop announcements, so users might not be seeking this information from NaviLens.

3.1.6. Subway Car Usage: Which Codes Were Scanned Most?

Usage data from subway cars indicates that riders actively engage with NaviLens codes installed on rolling stock, particularly for functions that support confirmation and reassurance during travel. Across all subway car scans, NaviLens accounted for a larger share of usage than NaviLens GO. This pattern contrasts with usage observed at bus stops and subway stations, where NaviLens GO accounts for most scans. The higher relative use of NaviLens on subway cars suggests that blind and low-vision riders may derive more value from vehicle-level wayfinding and confirmation once onboard.

Scan activity on subway cars was concentrated among codes with exterior information, and destination or service confirmation generated the highest engagement. Those associated with vehicle number and priority seating received the least engagement. These use cases align with rider needs during boarding and in-motion travel, when access to visual signage or conductor announcements may be limited or unreliable. Figure 5 below shows this breakdown.

Figure 5. Subway Car Scans by Code Type, by App, March 2025-August 2025



Source: MTA NaviLens Usage Data, (USDOT SMART Grant Stage 1 Deployment), March 2025-August 2025

Importantly, the relative balance between NaviLens and NaviLens GO usage on subway cars is broadly consistent with patterns observed for other vehicle-based codes. This consistency suggests that differences in app usage by mode reflect context-specific needs rather than shortcomings in app design or deployment. In other words, higher NaviLens usage on subway cars appears to reflect the accessibility value of the information being delivered, rather than different adoption of the apps themselves.

The 6 line runs some of the oldest trains in the system, and they lack modern Passenger Announcement (PA) systems found on newer train cars elsewhere in the subway. NaviLens helps provide real-time stop (e.g., “next stop is Astor Place in 2 minutes) and service change information in an audio/visual format. This information is beneficial to not only those who need audio navigation guidance, but also to Deaf people who might not have received manual announcements.

Overall, subway car usage data indicate that vehicle-level NaviLens installations support real, ongoing rider needs—particularly for riders who rely on audio and haptic feedback. These findings help address potential concerns that vehicle-based codes would be underutilized and instead demonstrate that rolling stock is a viable and valuable component of an end-to-end wayfinding system.

3.1.7. Subway Station Usage: Patterns and Information Demand

Unlike bus stops and vehicles, subway stations contain a wide variety of NaviLens codes serving different purposes, including entrances, exits, platforms, transfers, elevators, and system-wide informational assets such as Help Points. As a result, station usage is less easily categorized by a single dominant function.

Several patterns emerge from the usage data:

- Scans are concentrated at large transfer hubs and terminal stations.
- Codes associated with orientation and decision points—such as platform identification, transfer corridors, and exits—receive higher engagement than codes located in less ambiguous areas.
- System-wide informational assets (e.g., Help Points and MetroCard/fare vending machines) receive comparatively lower scan volumes when analyzed alongside location-specific station codes.

Together these patterns suggest that users are primarily seeking situational awareness and navigational confirmation within stations, rather than general informational content.

NaviLens appears to be most valuable at moments where traditional signage is complex, visually dense, or difficult to interpret non-visually.

3.1.8. Language Translation Data

Users accessed both NaviLens and NaviLens GO in multiple languages throughout the PoP. Language selection varies by location and code type, with higher rates of non-English usage observed at bus stops and subway stations serving more diverse neighborhoods and major transfer points.

The presence of multilingual scans demonstrates that NaviLens is functioning as intended for riders with Limited English Proficiency (LEP), enabling access to real-time wayfinding and service information in the user's preferred language. While the dataset captures language selection at the time of scan, it does not directly measure user demographics; therefore, findings should be interpreted as indicative of demand rather than population-level representation.

Roughly 15% of NaviLens scans were not in English and Spanish accounted for most of these scans. This is consistent with the demographics of the LEP population along the 6 line and Bx12 bus corridor, suggesting broader language access benefits.

In addition to Spanish, users accessed NaviLens content in at least eight other languages, including French, Chinese, German, Japanese, Italian, Portuguese, and Korean. While scan volumes for these languages were lower, their presence demonstrates the system's capacity to support broader multilingual navigation. This capability is important in one of the world's most linguistically diverse cities.

A small share of scans was recorded under an "Other" language category, reflecting fewer common languages. These scans further indicate additional translation usage beyond English and Spanish and are treated as a data limitation rather than non-use.

3.1.9. Usage Data Summary

The usage data provides strong evidence that the NaviLens Stage 1 proof-of-concept achieved meaningful real-world engagement across multiple transit environments as intended. Key findings include:

- Sustained and growing scan activity over time, indicating continued use beyond initial deployment.
- Concentrated usage at bus stops and subway stations, where wayfinding challenges are most acute.
- Clear demand for vehicle-level confirmation on buses and subway cars.

- Strong engagement from NaviLens users, particularly in contexts requiring non-visual/audio verification.
- Demonstrated multilingual usage, supporting the project's access goals.

These patterns align closely with the project's original objectives and support the conclusion that NaviLens is a viable, scalable wayfinding solution. The usage data show that NaviLens is most heavily used at moments of uncertainty—when riders are waiting, choosing, or confirming their next action. Patterns observed across mode, code locations, and languages reinforce the conclusion that the proof-of-concept successfully addressed real navigation gaps for blind, low-vision, and LEP riders. These findings provide actionable guidance for prioritizing future deployments toward high-impact locations, code types, and installation contexts.

3.2. User Experience and Perceived Effectiveness (Survey-Based Findings)

3.2.1. Purpose of the Evaluation

One objective of evaluating the Stage 1 proof-of-concept deployment of NaviLens and NaviLens GO is to understand whether the technology meets user expectations and demonstrates sufficient value to justify at-scale implementation. As outlined in the Evaluation Plan, user experience, perceived usefulness, and willingness to continue use are key indicators of whether the proof-of-concept achieved its intended goals, particularly for riders with disabilities or are LEP.

This subsection presents findings from customer survey data collected during Stage 1 and focuses specifically on user perceptions and experiences. Analysis of system usage data, implementation processes, materials, and maintenance considerations are addressed in separate subsections of Part 3.

3.2.2. Evaluation Methodology and Data Limitations

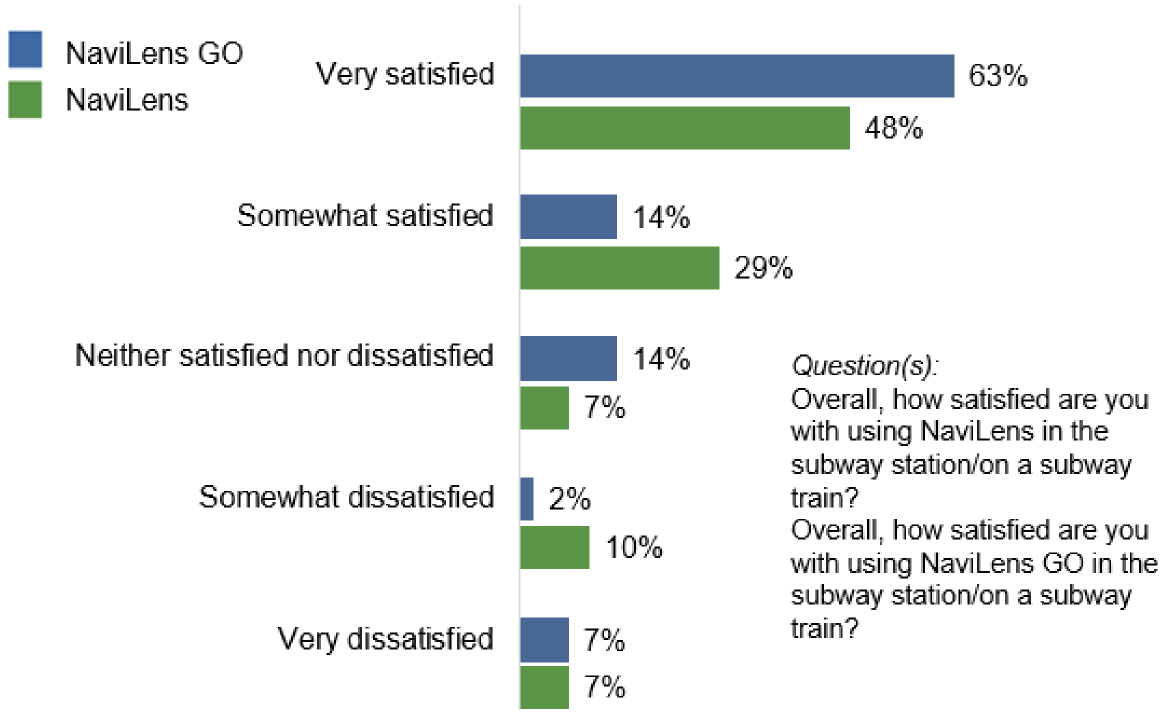
Customer feedback was collected via an online survey administered between April 2025 and September 1, 2025. The survey was primarily accessed through QR codes on NaviLens promotional posters in subway stations, through the MTA Accessibility website, and via the MTA Accessibility newsletter. It was also included in QR codes on physical brochures that were distributed through various outreach activities. Respondents were required to be at least 18 years old and to have used either NaviLens or NaviLens GO on the subway or bus system.

A total of 69 NaviLens users and 67 NaviLens GO users responded during the reporting period. Some questions—particularly those related to bus and bus stop usage and comparisons with other wayfinding applications—had sample sizes below 50. As a result, findings should be interpreted as directional rather than statistically representative of the full rider population. Nevertheless, the survey provides meaningful qualitative and perceptual insight into the effectiveness of the proof-of-concept from the perspective of actual users.

3.2.3. Findings: Overall User Satisfaction

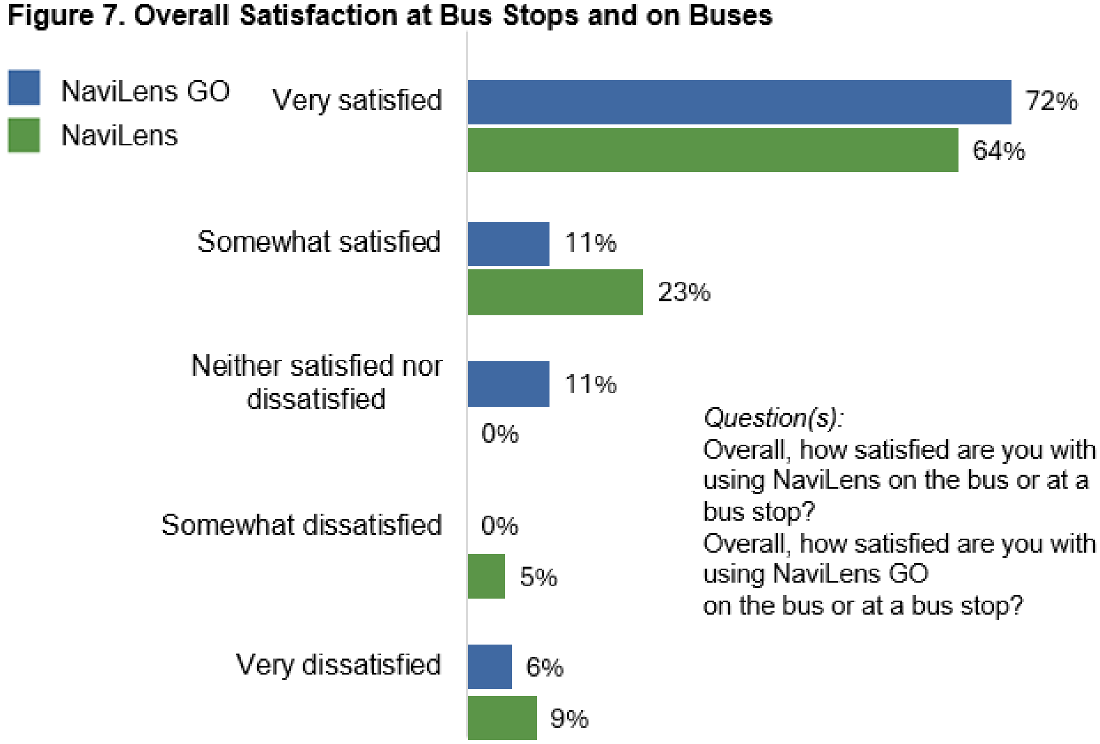
Survey results indicate high overall satisfaction with the NaviLens proof-of-concept across multiple environments. More than 75% of respondents reported being satisfied with their experience using NaviLens and NaviLens GO in subway stations, on subway trains, on buses, and at bus stops. Figures 6 and 7 below show this data:

Figure 6. Overall Satisfaction in Subway Stations and on Subway Cars



Source: MTA NaviLens Survey Data, May 2025—August 2025 (USDOT SMART Grant Stage 1 Deployment)

Figure 7. Overall Satisfaction at Bus Stops and on Buses



Note: Sample size <50
Source: MTA NaviLens Survey Data (USDOT SMART Grant Stage 1 Deployment), May 2025-August 2025

The consistency of satisfaction across both fixed infrastructure (stations and stops) and moving environments (trains and buses) suggests that the proof-of-concept performs reliably across the range of contexts required for an end-to-end transit journey. While bus-related findings are based on smaller sample sizes, the overall pattern of responses supports the conclusion that the proof-of-concept meets user expectations for usability in multimodal settings.

3.2.4. Findings: Perceived Usefulness and Ease of Navigation

Most users agreed with statements indicating that NaviLens and NaviLens GO:

- Are easy and comfortable to use
- Provide clear and accurate information
- Help users reach their destination without difficulty

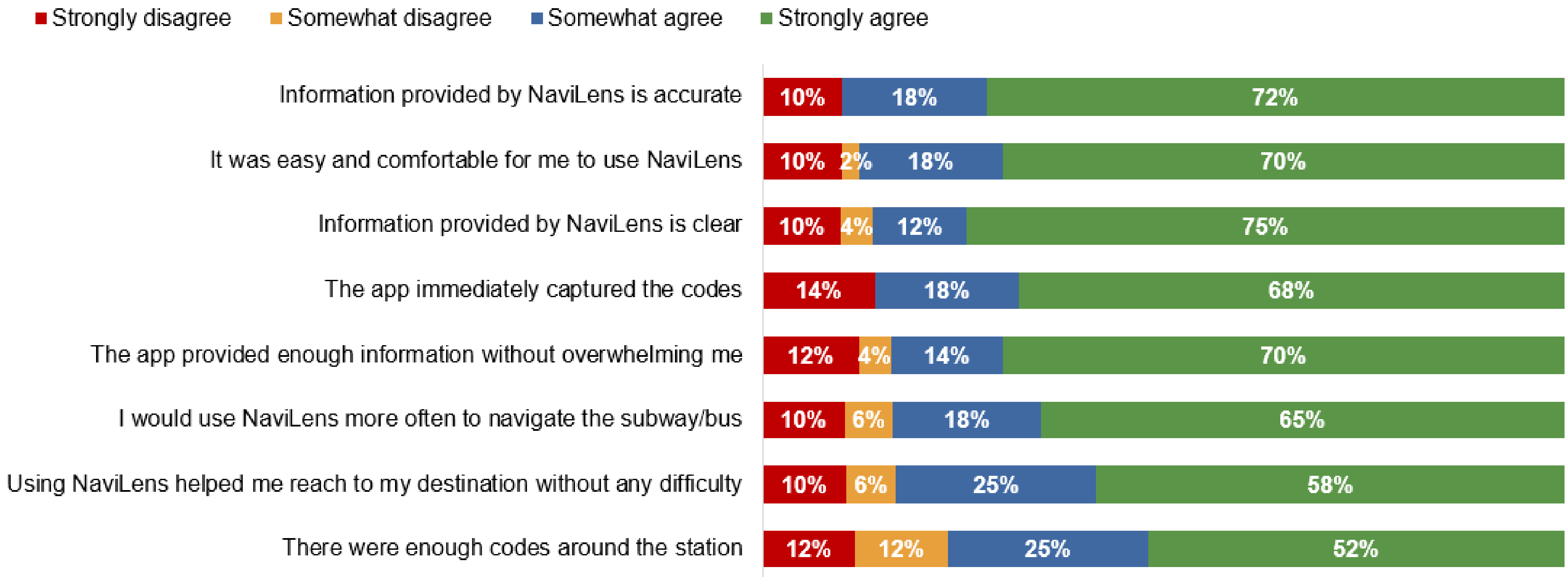
Figures 9 and 10 below show how this data breaks down through the sliding scale survey questions for NaviLens and NaviLens GO.

The relative percentages for NaviLens and NaviLens GO users are similar, showing consistently positive experiences across modes and between the two apps. Users of both apps agree that more NaviLens codes are needed to improve the user experience.

Open-ended responses further reinforce these findings. Users described the system as helpful in identifying correct platforms and exits, providing orientation within complex stations, and alerting them when they were moving in the wrong direction. These responses indicate that the proof-of-concept successfully addresses one of the primary goals outlined in the project proposal: reducing navigation uncertainty for users who cannot rely on visual signage alone.

NaviLens GO users’ higher relative satisfaction also suggests broader benefits and utility beyond the disability community and the app’s original intended audience. However, the results suggest that app improvements can be made to improve satisfaction for both NaviLens and NaviLens GO.

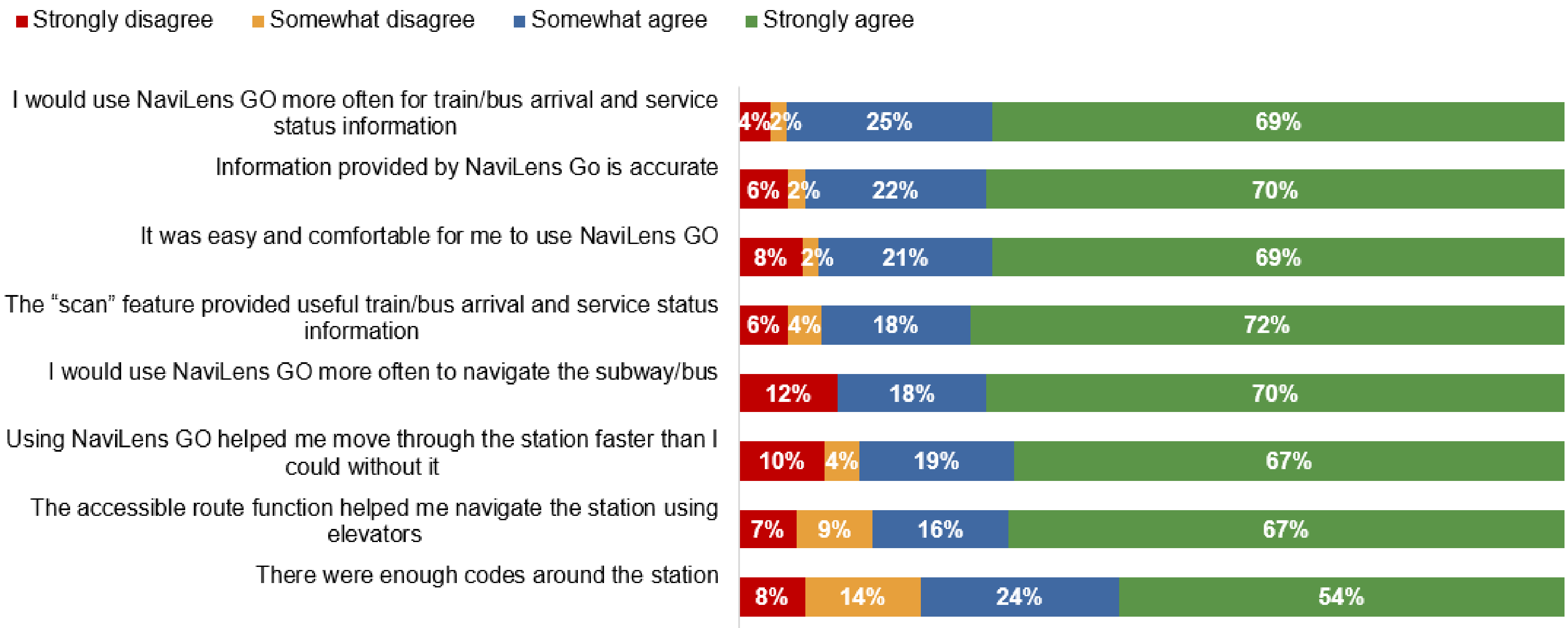
Figure 9. NaviLens User Experience Feedback



Question(s): To what extent do you agree or disagree with the following statements about your experience using NaviLens?

Source: MTA NaviLens Survey Data
(USDOT SMART Grant Stage 1 Deployment), May 2025—August 2025

Figure 10. NaviLens GO User Experience Feedback



Question(s): To what extent do you agree or disagree with the following statements about your experience using NaviLens GO?

Source: MTA NaviLens Survey Data
(USDOT SMART Grant Stage 1 Deployment), May 2025-August 2025

3.2.5. Findings: User Confidence and Independence

Qualitative feedback suggests that NaviLens contributes to increased confidence and independence when navigating the transit system. Several respondents noted that the app helped them recover from navigation errors and better understand station layouts in real time.

These findings are particularly relevant for blind, low-vision, and even hearing-impaired users, including those using braille displays and haptic feedback. The ability of the proof-of-concept to support these use cases indicates that it meets expectations for accessibility-focused wayfinding and aligns with the project's parity objectives.

3.2.6. Findings: Willingness to Continue Use and Recommend

Survey results show strong indicators of adoption potential across both apps:

- More than 80% of respondents reported being likely to recommend NaviLens or NaviLens GO to others
- Most users indicated that they plan to continue using the apps

High recommendation and continued-use intent suggest that users perceive ongoing value in the proof-of-concept beyond a single trip or novelty use. These findings support the feasibility of at-scale deployment from a user acceptance perspective.

3.2.7. Findings: Demand for Expanded Deployment

One of the most consistent findings across the survey is user demand for broader coverage. Over 85% of respondents expressed a desire to see more NaviLens and NaviLens GO codes in additional stations, on more trains, and across more bus routes.

This feedback directly informs expectations for at-scale implementation. Users repeatedly emphasized that the value of the system increases as coverage expands, reinforcing the importance of continuity for an end-to-end wayfinding solution.

3.2.8. Findings: Comparison With Other Wayfinding Tools

Among respondents who reported using other wayfinding or travel applications (sample size below 50), NaviLens and NaviLens GO were identified as the preferred wayfinding tools by 46% and 48% of respondents respectively. Users cited advantages related to accessibility features, orientation clarity, and compatibility with assistive technologies.

While limited by sample size, these findings suggest that the proof-of-concept fills a gap not adequately addressed by existing applications and supports the project's original rationale for testing a dedicated, accessibility-first wayfinding solution.

3.2.9. User-Identified Limitations and Improvement Areas

Open-ended responses identified several areas for improvement:

- Code placement and orientation clarity in some locations
- Battery usage concerns with certain devices
- Minor interface issues when using braille displays or haptic feedback
- Desire for stronger marketing, clearer onboarding, and potential integration with the MTA app

These comments generally focused on refinements rather than fundamental flaws, indicating that the proof-of-concept we have developed is functional but would benefit from iterative improvements as part of at-scale deployment.

3.2.10. Assessment Against Original Expectations

Based on survey findings, the NaviLens Stage 1 proof-of-concept meets the original expectations stated in the project proposal with respect to usability, accessibility, and user acceptance. Usage patterns were also consistent with other cities' experiences with NaviLens technology (e.g., Melbourne, Australia; Boston). While this evaluation does not yet include quantitative system performance metrics (such as scan volumes or travel time impacts), the perceptual and experiential data demonstrate that users find the technology useful, trustworthy, and worthy of expansion.

These findings provide strong evidence that NaviLens is a viable proof-of-concept and that further evaluation—using usage analytics, operational data, and maintenance assessments—will be valuable in refining expectations for at-scale implementation.

3.3. Overall Findings

The usage-based and survey-based findings present a consistent and complementary picture of the Stage 1 proof-of-concept. Usage data demonstrate sustained, real-world engagement across bus stops, subway stations, rolling stock, and multilingual contexts, while survey responses provide qualitative confirmation that users perceive the system as useful, accessible, and confidence-enhancing.

The convergence of these data sources strengthens the validity of the findings. High scan volumes at complex locations align with user feedback emphasizing reduced uncertainty and improved orientation. Strong multilingual usage supports survey responses from LEP users indicating satisfaction with translated information. Similarly, concentrated use of vehicle-level exterior codes aligns with user-reported needs for boarding confirmation and reassurance.

At the same time, the findings highlight areas for deeper analysis in future phases, including longitudinal usage patterns as coverage expands, correlations between scan activity and service disruptions, and more granular evaluation of outcomes such as trip completion and error recovery. External factors—such as marketing intensity, seasonal travel patterns, and system conditions—should also be considered when interpreting usage trends at scale.

Overall, the combined evidence from Stage 1 demonstrates that NaviLens is not only technically feasible but also meaningfully used and valued by riders. The proof-of-concept achieved its intended goals and provides a strong empirical foundation for considering a future at-scale deployment.

Part 4: Anticipated Costs and Benefits of At-Scale Implementation

During Stage 1, MTA initially expected to install NaviLens in all 38 stations and all train cars on the 6-line, including all Bx12 bus stops and shelters, and on buses within 18 months. Despite delays, the project was completed in the 24-month PoP, with NaviLens installed in all 36 stations along the 6-line (2 were excluded due to ongoing construction), all 79 bus stops and 39 shelters along the Bx12 corridor, and all 192 buses and 418 subway cars serving those routes. Stage 1 used $2 million, so the anticipated cost of an at-scale implementation for Stage 2 will range from $10 million to $20 million.

Due to delays in procurement, staffing, funding, and time constraints in Stage 1, in Stage 2 MTA will prioritize aligning the procurement process with hiring additional staff and obtaining approvals in advance from internal MTA agencies and vendors. MTA will also determine a specific number of bus routes, subway lines, and commuter railroads through more research on case studies from other transit systems, more community outreach, and evaluation of Stage 1 results. MTA will focus on first installing NaviLens at additional bus stops across the five boroughs and then at key subway transfer points, including commuter railroad complexes. Bus stops and shelters were the first to be installed with NaviLens when the Stage 1 project started. And approximately 58% of systemwide NaviLens scans came from bus stops and shelters.

At-scale implementation of NaviLens for Stage 2 will have positive impacts across the MTA transportation system. Installing NaviLens at all subway stations and bus stops will require additional funding, time, labor, and personnel. However, for Stage 2, MTA will scale down the scope of work to increase feasibility and bandwidth for completing this project's goal. The outcomes and lessons from the Stage 1 project will inform efficiencies that can be implemented to accelerate NaviLens installation at scale. The benefits will outweigh the costs as this project will enable more collaboration with various organizations and agencies, and usage of NaviLens, not just for the blind or low vision customers, but also for tourists, all LEP communities, neurodivergent, Deaf or Hard-of-Hearing, and customers with cognitive/learning disabilities, to easily navigate the MTA system and access real-time information in their own languages. The project increases reliability and safety by providing instantaneous real-time arrival information for trains and buses with NaviLens.

Stage 1 shows that NaviLens can automatically translate to the phone's default language, providing tourists and all LEP users equal access to their own languages, and can display any last-minute service alerts, especially for Deaf or Hard-of-Hearing riders, and all riders who cannot hear the last-minute real-time announcement. Stage 2 will expand this parity and access across the MTA transportation system. MTA has partnered with the NaviLens team since the beginning of the project and will continue to build through weekly check-ins, engaging with various organizations and advocates, and continuing to host presentations and in-person demo tours or guided journeys in Stage 2, with more organizations and agencies to add. This will help strengthen the relationships between MTA and the NaviLens team, and other communities and organizations, such as New York Transit Museum (NYTM), Lavelle School for the Blind, National Federation for the Blind (NFB), Mayor's Office for People with Disabilities (MOPD), and Lighthouse Guild, that will provide more detailed feedback. With the new features developed by the NaviLens team during Stage 1, Stage 2 will help modernize and integrate NaviLens apps and code-scanning technology into MTA's newer version of subway and bus apps

At-scale implementation for Stage 2 will require additional funding to hire more dedicated staff for Station Signage, Sign Shop, and Accessibility, to ensure an efficient and successful implementation process for Stage 2. With additional staff for each department, at least a total of five new positions will help streamline the survey, quality assurance, fabrication, and installation processes for NaviLens codes. All new employees hired for these dedicated roles will receive training and have access to educational programs and activities through their employment at the MTA.

MTA anticipated the costs and benefits of Stage 2 at-scale implementation based on lessons learned from challenges and barriers encountered. To implement NaviLens for Stage 2, the expected costs are between $10 million and $20 million, serving a limited number of subway stations, commuter railroads, and bus stops. The funding will include durable materials, additional staff, NaviLens codes, labor, and community outreach.

Part 5: Challenges & Lessons Learned

The project faced many challenges and hurdles during Stage 1, but these lessons were informative for planning a potential larger, Stage 2 expansion. The project experienced challenges with Procurement and Budget, Partnerships, Technology Suitability/Integration with Incumbent Systems, Workforce Capacity, and Internal Project Coordination.

One of the biggest challenges was the limited number of staff on the MTA's Station Signage team – which fabricated and installed the codes – and the Accessibility team. This impacted the pace of surveying, auditing, fabricating, installing, and configuring code languages. In Stage 1, two employees in Station Signage and Accessibility handled all surveying and auditing for all 36 subway stations, submitted work orders for code fabrication, ensured all codes were correctly installed, and configured code language. Station Signage handles the maintenance and installation of all subway signage and would often work on other timely signage initiatives instead of NaviLens, resulting in significant delays in code fabrication and installation. For much of the PoP, the Station Signage team was short staffed due to a previous organizational hiring freeze, which further strained its ability to meet demands. The team's staffing levels have since stabilized. Table 2 in the appendix shows the projected vs. actual dates for when stations had codes fully installed.

Most of the subway stations were delayed two to three months due to limited staff at Station Signage and its sign fabrication unit, who could not keep up with long fabrication queues for NaviLens codes. The 6-month extension was requested to accommodate all delayed subway stations. In a future expansion, the MTA will need at least two additional employees who will focus solely on NaviLens work orders and can track all fabrication and installation progress. The MTA will also need at least two more employees on Accessibility who can solely focus on surveying and auditing stations, creating and tracking code orders, configuring code language, and collecting and analyzing monthly usage data. Aside from limited staff, MTA learned that proper training is necessary for code/sign installers, who often incorrectly installed NaviLens codes. Incorrect installation also contributed to some of the delayed timelines. MTA and Station Signage will work together to create implementation and installation guidelines for future expansion.

Procurement hurdles also delayed project. Many approvals were required for internal and external agencies and vendors. The procurement with NaviLens took 6 months to complete. NYC DOT, which manages all bus stops, and JCDecaux, which manages citywide bus shelters, extensively coordinated with the project team and installed NaviLens at all bus stop poles and shelters by end of July 2024. However, the safety and decal approvals to install NaviLens on buses took many months and were finally granted in summer 2025, delaying installation until the last month of the PoP. Internal approvals from Car Equipment, which manages all subway cars, have also delayed installation on subway cars until March 2025. New staff joined Accessibility and Station Signage in June 2024 and September 2024, respectively. This delayed the station code surveys. The project team gained valuable insight into the time needed to survey stations for codes. Survey time largely depends on the size of the station, with larger complex stations (i.e., those with multiple line transfers) taking one person up to two weeks to survey. Smaller stations can be surveyed in as little as one to two days.

During quality assurance checks, which generally occurred 3-6 months after installation at each subway station, the project team encountered many codes that were missing, vandalized, or graffiti covered. Even though some codes were partially vandalized or damaged, both the NaviLens and NaviLens GO apps still captured them, demonstrating the resiliency of the technology. Most of the missing codes were on vinyl decals, which are easier to remove compared to those on more durable materials such as metal plates. However, some metal plates installed, sealed with silicone and rivets, were still removed forcibly. Longer-term, Station Signage and the project team recommend integrating codes into future porcelain signage. Porcelain signs are found throughout the subway system and are long-lasting and easier to clean if tagged with graffiti. However, porcelain signs are significantly more expensive than the metal and vinyl sign approach used in Stage 1. For future work, MTA will explore other vendors and different kinds of decals with stronger adhesion, printed NaviLens codes on porcelain plates, and develop an established implementation process for surveys and installation.

Stage 1 also presented data quality challenges. MTA and the NaviLens team worked together to resolve inconsistencies in train and bus arrival times and service status. NaviLens uses Application Programming Interfaces (APIs) from the MTA to pull all real-time service information, and API glitches would occasionally affect the accuracy of the data. For future implementation, both MTA and NaviLens will continue to meet on a weekly basis to troubleshoot and resolve API glitches as quickly as possible. The MTA project team will ensure that NaviLens receives access to the most up-to-date API to provide accurate real-time information and service status and will increase coordination with the MTA's IT department.

Other cities have also faced similar challenges, such as Melbourne, Australia, and Boston. The project team met with the Boston's MBTA and Yarra Trams from Melbourne to discuss their findings with their NaviLens own pilots. MBTA reported similar challenges with vandalism in subway environments. Yarra Trams experienced their own internal procurement and approval hurdles as it, too, exists in a large metropolitan area with multiple transit operators. Once installed, Yarra Trams saw significant usage with NaviLens GO, like the MTA with buses. Like with the MTA's project, they reported widespread use beyond the disability community to help passengers receive instant, real-time transit information. In fact, Yarra Trams is moving towards using NaviLens GO as their sole app provider for real-time tram information.

Finally, there are additional untapped use cases with NaviLens, and the MTA would like to include them for future implementation. Examples of these use cases include adding NaviLens to the service information screens on the subway platforms, paper signage used to communicate temporary disruptions, adding Augmented Reality (AR) arrows to help guide a user to a specific entrance or exit, adding audio/visual cues or confirmation to help users reach to their established destination, integrating American Sign Language (ASL), and code integration with tactile guideways (currently deployed in Singapore). Consideration should be given to user training, adoption strategies, and potential barriers to ensure these features are efficient. As NaviLens continues to develop new features, the MTA will continue to explore new use cases.

Part 6: Deployment Readiness

The Stage 1 proof-of-concept demonstrates that NaviLens is technically feasible, operationally viable, and capable of delivering meaningful accessibility benefits across multiple transit environments. However, readiness for at-scale deployment is contingent upon addressing several organizational, staffing, and process-related requirements identified during implementation. This section summarizes the conditions under which the MTA and project team would be prepared to advance a broader deployment.

6.1. Staffing and Workforce Capacity

Deployment readiness for an at-scale implementation is primarily constrained by staffing capacity. During Stage 1, a small number of staff within Station Signage, Sign Shop, and Accessibility were responsible for surveying locations, coordinating fabrication, configuring code content, overseeing installation, and monitoring usage data. This limited capacity significantly affected the pace of deployment and contributed to installation delays.

For a future at-scale deployment, the MTA would need to establish dedicated NaviLens-focused roles and onboard staff earlier in the project lifecycle. These positions would be responsible for surveying and auditing locations for code placement, managing code programming and language configuration, coordinating fabrication and installation, conducting quality assurance, and analyzing ongoing usage data. Adequate staffing is a prerequisite for maintaining installation schedules and ensuring consistency.

6.2. Procurement and Contracting Readiness

Procurement timelines emerged as a major barrier to deployment readiness during Stage 1. Contract execution, material approvals, and coordination across internal and external stakeholders delayed installation on both fixed infrastructure and rolling stock. Approvals related to bus installations extended into the final month of the Period of Performance.

For an at-scale deployment to proceed efficiently, procurement processes would need to be initiated earlier and structured to support continuous installation rather than one-time batches. This includes negotiating and executing a new contract with the technology provider, securing material and safety approvals in advance, and aligning procurement timelines with staffing availability and installation capacity. Accelerating these processes is critical to achieving deployment readiness.

6.3. Internal Coordination and Process Automation

Stage 1 identified opportunities to improve deployment readiness through stronger internal coordination and increased automation. Expanded use of standardized datasets—such as GTFS Pathways and real-time service feeds—would allow for more efficient code programming, reduce manual configuration effort, and support faster updates when service conditions change.

In addition, investments in fabrication capacity, including the purchase of additional printers and improvements to internal production workflows, would reduce bottlenecks experienced during Stage 1. Together, these changes would enable the MTA to scale installation volume while maintaining quality and consistency.

6.4. Operations and Maintenance Readiness

At-scale deployment will require a defined operations and maintenance framework to ensure that NaviLens codes remain functional, accurate, and responsive to system changes over time. Ongoing responsibilities would include periodic inspection, replacement of damaged or missing codes, updates to translations and content, and monitoring of data integrations that support real-time information delivery.

To support long-term deployment readiness, the MTA would need to identify sustained funding for maintenance activities and determine which NaviLens-related roles should continue beyond the initial installation phase. Maintenance funding would need to cover dedicated staff time, replacement materials, installation labor, and system updates throughout the lifecycle of the deployment.

6.5. Deployment Readiness Assessment

In summary, while the Stage 1 proof-of-concept confirms that NaviLens is a viable and effective accessibility technology, readiness for at-scale deployment is conditional. Achieving readiness will require earlier staffing, streamlined procurement, improved internal coordination, increased fabrication capacity, and a defined long-term maintenance strategy. With these conditions met, the MTA would be positioned to transition from a proof-of-concept deployment to a scalable and sustainable system-wide implementation in a future project phase.

Part 7: Wrap-Up

The Stage 1 implementation of Inclusive Wayfinding Through NaviLens demonstrated that the technology is technically feasible, operationally viable, and capable of delivering meaningful accessibility benefits across multiple transit environments. Deployment across subway stations, bus stops, and rolling stock confirmed that NaviLens can function effectively as an end-to-end wayfinding solution, supporting riders who are blind or low vision, riders with Limited English Proficiency, and other users who benefit from accessible, real-time information.

Evaluation findings from both usage data and user surveys indicate sustained engagement and positive user perception, validating the core premise of the proof-of-concept. While the technology itself performed as intended, the project also revealed critical implementation dependencies, particularly related to staffing capacity, procurement timelines, internal coordination, materials selection, and long-term maintenance planning.

These lessons clarify the conditions required for successful at-scale deployment. Future implementation would require earlier and expanded staffing, streamlined procurement and approval processes, standardized installation and quality-assurance practices, and investment in more durable materials to ensure long-term reliability. Addressing these organizational and operational factors is essential to maintaining deployment schedules and system performance as coverage expands.

Overall, Stage 1 met its objectives by demonstrating feasibility, identifying implementation challenges, and generating actionable insights to inform future phases. With the appropriate organizational, staffing, and process improvements in place, the MTA would be positioned to responsibly evaluate and pursue broader deployment of NaviLens as part of a scalable, sustainable accessibility strategy.

Appendix

Table 2. List of all subway stations on the 6-line installed with NaviLens and the number of unique NaviLens codes used for each station, excluding duplicates, and with installation completion dates, expected versus actual due to delays.

Station	Expected complete installation date	Actual installation complete date	Total number of NaviLens codes installed
Brooklyn Bridge-City Hall (JZ456)	September 2024	September 2024	245
Pelham Bay Park (6)	September 2024	September 2024	50
Buhre Ave (6)	September 2024	September 2024	46
Canal St (NQRWJZ6)	October 2024	October 2024	232
Spring St (6)	October 2024	October 2024	49
Middletown Rd (6)	October 2024	October 2024	45
Astor Place (6)	October 2024	November 2024	39
Zerega Ave (6)	October 2024	November 2024	41
Bleecker St/Broadway-Lafayette St (BDFM6)	October 2024	December 2024	196
23 St (6)	November 2024	January 2025	100
14 St-Union Sq (NQRWL456)	November 2024	February 2025	252
Castle Hill (6)	November 2024	February 2025	43
28 St (6)	November 2024	February 2025	63
33 St (6)	November 2024	February 2025	76
Morrison Ave-Soundview (6)	December 2024	March 2025	54
St. Lawrence Ave (6)	December 2024	March 2025	42
Elder Ave (6)	December 2024	March 2025	48
Whitlock Ave (6)	December 2024	March 2025	34
68 St-Hunter College (6)	December 2024	March 2025	88
77 St (6)	December 2024	April 2025	51
Hunts Point Ave (6)	January 2025	April 2025	61
Longwood Ave (6)	January 2025	April 2025	44
96 St (6)	January 2025	April 2025	46
103 St (6)	January 2025	April 2025	37
E 149 St (6)	January 2025	April 2025	60
E 143 St-Mary's St (6)	January 2025	May 2025	43
110 St (6)	January 2025	May 2025	37
Cypress Ave (6)	January 2025	May 2025	40
116 St (6)	February 2025	May 2025	39
Brook Ave (6)	February 2025	June 2025	42

125 St (456)	February 2025	June 2025	87
3 Ave-138 St (6)	February 2025	June 2025	64
Westchester Sq-East Tremont Ave (6)	October 2024	June 2025	69
51 St/Lexington Ave-53 St (EM6)	January 2025	July 2025	99
59 St/Lexington Ave (456)	April 2025	August 2025	200
86 St (456)	May 2025	August 2025	83

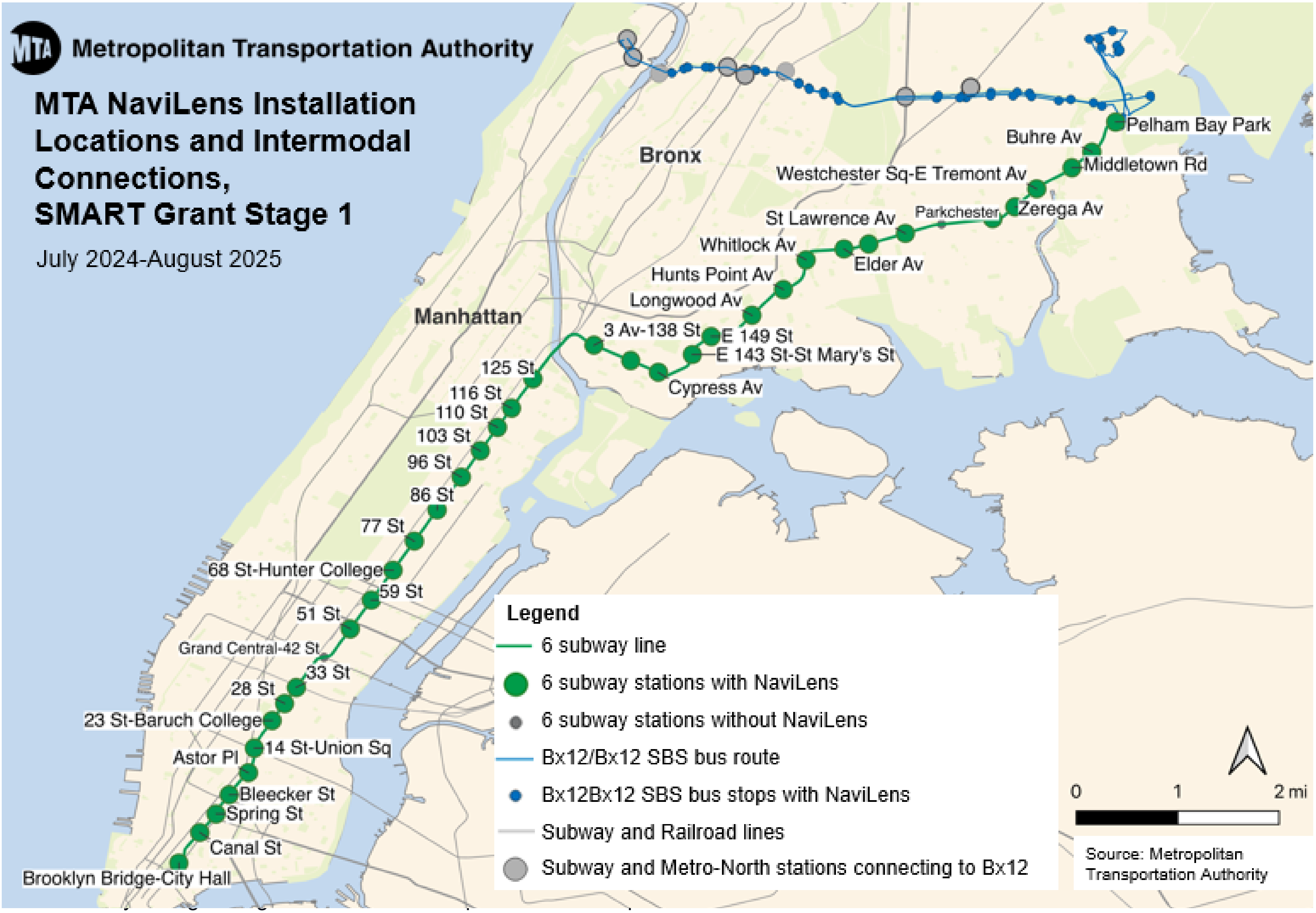
Table 3. List of all bus stop names installed with NaviLens, including whether the stop has a shelter or not (Y for yes, N for no).

Bus Stop Name	**Shelter (Y/N)**
Amendola Plaza at Wilkinson Avenue	N
Amendola Plaza at Westchester Avenue	N
Bartow Avenue at Co-op City Boulevard	Y
Bay Plaza Boulevard at Co-op City Boulevard	N
Bay Plaza Boulevard at IFO JC Penny	N
Baychester Avenue at New England Thruway Exit	N
Broadway at Isham Street	Y
Broadway at West 207 Street	N
Bruckner Boulevard at Wilkinson Avenue	Y
Bus Stop 104543 Pole*	N
Bus Stop 104673 Pole*	N
City Island Road at City Island Circle	N
City Island Road at Park Drive	N
City Island Road at Shore Road	N
East Fordham Road at 3 Avenue	Y
East Fordham Road at Bathgate Avenue	Y
East Fordham Road at Cambreleng Avenue	Y
East Fordham Road at Decatur Avenue	N
East Fordham Road at East 190 Street	Y
East Fordham Road at Elm Plaza	Y
East Fordham Road at Grand Concourse	Y
East Fordham Road at Hoffman Street	N
East Fordham Road at Jerome Avenue	N
East Fordham Road at Southern Boulevard	Y
East Fordham Road at Valentine Avenue	Y
East Fordham Road at Walton Avenue	Y

East Fordham Road at Webster Avenue	N
Edson Avenue at Bartow Avenue	Y
Orchard Beach Circle at City Island Road	N
Orchard Beach Circle at Orchard Beach	N
Pelham Parkway N at White Plains Road	Y
Pelham Parkway N at Williamsbridge Road	Y
Pelham Parkway S at Muliner Avenue	Y
Pelham Parkway S at Williamsbridge Road	Y
Pelham Parkway at Bronxwood Avenue	Y
Pelham Parkway at Eastchester Road	Y
Pelham Parkway at Esplanade Avenue	N
Pelham Parkway at Hone Avenue	N
Pelham Parkway at Jacobi Hospital	N
Pelham Parkway at Muliner Avenue	N
Pelham Parkway at Narragansett Avenue	N
Pelham Parkway at Saint Paul Avenue	N
Pelham Parkway at Seymour Avenue	Y
Pelham Parkway at Stillwell Avenue	Y
Pelham Parkway at Throop Avenue	Y
Pelham Parkway at White Plains Road	Y
Pelham Parkway at Williamsbridge Road	N
Sedgwick Avenue at Bailey Avenue	Y
Sedgwick Avenue at Webb Avenue	N
West 207 Street at 10 Avenue	Y
West Fordham Road at Cedar Avenue	Y
West Fordham Road at Grand Avenue	Y
West Fordham Road at Jerome Avenue	Y
West Fordham Road at Sedgwick Avenue	Y
West Fordham Road at University Avenue	Y

**Note: the bus stop name could not be identified internally, but the code is still getting scanned.*

Map 1. (next page) Geographic context for NaviLens Installation for SMART 1


Metropolitan Transportation Authority
MTA NaviLens Installation Locations and Intermodal Connections, SMART Grant Stage 1
July 2024-August 2025
Bronx
Manhattan
Pelham Bay Park
Buhre Av
Middletown Rd
Westchester Sq-E Tremont Av
Zerega Av
Parkchester
St Lawrence Av
Whitlock Av
Elder Av
Hunts Point Av
Longwood Av
3 Av-138 St
E 149 St
E 143 St-St Mary's St
Cypress Av
125 St
116 St
110 St
103 St
96 St
86 St
77 St
68 St-Hunter College
59 St
51 St
Grand Central-42 St
33 St
28 St
23 St-Baruch College
14 St-Union Sq
Astor Pl
Bleecker St
Spring St
Canal St
Brooklyn Bridge-City Hall
Legend
6 subway line
6 subway stations with NaviLens
6 subway stations without NaviLens
Bx12/Bx12 SBS bus route
Bx12Bx12 SBS bus stops with NaviLens
Subway and Railroad lines
Subway and Metro-North stations connecting to Bx12
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Source: Metropolitan Transportation Authority

Customer feedback survey questions for both NaviLens and NaviLens GO app.

Q1. Which of the following would you like to provide feedback for?

- NaviLens (app that provides audio information)
- NaviLens GO (app that provides visual service information)

NaviLens section

Q2. Where did you use NaviLens? (Select all that apply)

- At a subway station
- On a subway train
- At an M23 bus stop
- At an M66 bus stop
- At a Bx12 bus stop
- On a Bx12 bus

[if Q2=1] Q2a. At which subway station did you use NaviLens?

[if Q2=1, 2] Q3. Overall, how satisfied are you with using NaviLens in the subway station/on a subway train?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

[if Q2=3, 4, 5, 6] Q4. Overall, how satisfied are you with using NaviLens on the bus or at a bus stop?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

Q5. Have you used NaviLens in any language other than English?

- Yes
- No

[if Q5=1] Q5a. How satisfied are you with the information provided by NaviLens in a language other than English?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

Q6. To what extent do you agree or disagree with the following statements about your experience using NaviLens?

(Strongly disagree, somewhat disagree, somewhat agree, strongly agree, N/A) *randomize*

- It was easy and comfortable for me to use NaviLens
- Using NaviLens helped me reach to my destination without any difficulty
- Information provided by NaviLens is clear
- Information provided by NaviLens is accurate
- The app immediately captured the codes
- The app provided enough information without overwhelming me
- There were enough codes around the station
- I would use NaviLens more often to navigate the subway/bus

Q7. How likely are you to recommend NaviLens?

- Very unlikely
- Somewhat unlikely
- Neither likely nor unlikely
- Somewhat likely
- Very likely

Q8. Would you like to have more NaviLens codes in more stations / on more bus routes?

- Yes
- No
- Not sure

Q9. Have you used any other wayfinding/how-to apps besides NaviLens?

- Yes
- No [skip to Q10]

[if Q9=1] Q9a. Which other wayfinding/how-to apps have you used? (Select all that apply)

- Google Maps
- Apple Maps
- GoodMaps
- Be My Eyes
- Seeing AI GPS
- Aira
- Lazarillo
- Other (specify)

[if Q9=1] Q9b. Which of these wayfinding/how-to apps do you most prefer?

- NaviLens
- [piped in all choices from Q8a]

Q10. Is there anything else about your experience using NaviLens you would like to tell us about? [open ended]

NaviLens GO section

Q2. Where did you use NaviLens GO? (Select all that apply)

- At a subway station
- On a subway train
- At an M23 bus stop
- At an M66 bus stop
- At a Bx12 bus stop
- On a Bx12 bus

[if Q2=1] Q2a. At which subway station did you use NaviLens GO?

[if Q2=1, 2] Q3. Overall, how satisfied are you with using NaviLens GO in the subway station/on a subway train?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

[if Q2=3, 4, 5, 6] Q4. Overall, how satisfied are you with using NaviLens GO on the bus or at a bus stop?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

Q5. Have you used NaviLens GO in any language other than English?

- Yes
- No

[if Q5=1] Q5b. How satisfied are you with the information provided by NaviLens GO in a language other than English?

- Very dissatisfied
- Somewhat dissatisfied
- Neither satisfied nor dissatisfied
- Somewhat satisfied
- Very satisfied

Q6. To what extent do you agree or disagree with the following statements about your experience using NaviLens GO? (Strongly disagree, somewhat disagree, somewhat agree, strongly agree, N/A) *randomize*

- It was easy and comfortable for me to use NaviLens GO
- Using NaviLens GO helped me move through the station faster than I could without it
- Information provided by NaviLens Go is accurate
- There were enough codes around the station
- The “scan” feature provided useful train/bus arrival and service status information
- The accessible route function helped me navigate the station using elevators
- I would use NaviLens GO more often to navigate the subway/bus

- I would use NaviLens GO more often for train/bus arrival and service status information

Q7. How likely are you to recommend NaviLens GO?

- Very unlikely
- Somewhat unlikely
- Neither likely nor unlikely
- Somewhat likely
- Very likely

Q8. Would you like to have more NaviLens codes in more stations / on more bus routes?

- Yes
- No
- Not sure

Q9. Have you used any other wayfinding/how-to apps besides NaviLens GO?

- Yes
- No [skip to Q9]

[if Q8=1] Q8a. What other wayfinding/how-to apps have you used? (Select all that apply)

- Google Maps
- Apple Maps
- MTA app
- Transit App
- Other (specify)

[if Q8=1] Q8b. Which of these wayfinding/how-to apps do you most prefer?

- NaviLens GO
- [piped in all choices from Q8a]

Q9. Is there anything else about your experience using NaviLens GO you would like to tell us about? [open ended]

Demographics

Q1. In a typical week, how often do you use the subway or bus?

- Less than 1 day per week
- 1 or 2 days per week
- 3 or 4 days per week
- 5 days per week
- 6 or 7 days per week

Q2. Are you currently an Access-A-Ride (Paratransit) customer?

- Yes
- No

Q3. How old are you?

- Under 18
- 18-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65+
- Prefer not to respond

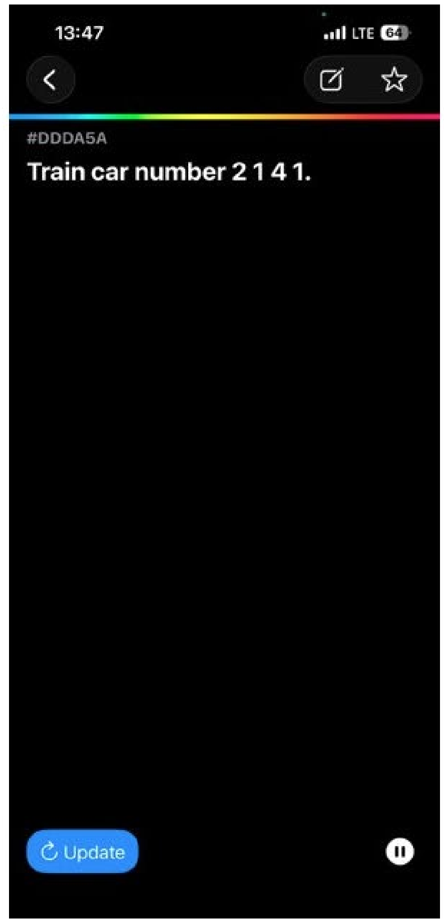
Q4. Do you identify as having one or more of the following disabilities? (Select all that apply)

- None
- A disability affecting my vision (blind or low vision)
- A disability affecting my hearing (deaf or hard of hearing)
- A disability affecting my mobility (difficulty walking or using stairs)
- A disability not listed above (specify)
- Prefer not to answer

Q5. Will you provide us with your email address in case we would like to follow up with you to discuss this feedback? If not, leave blank.

Below Images 3 to 6 are subway train car code placements with screenshots of both NaviLens and NaviLens GO app after scanning the code.

NaviLens app



NaviLens GO app

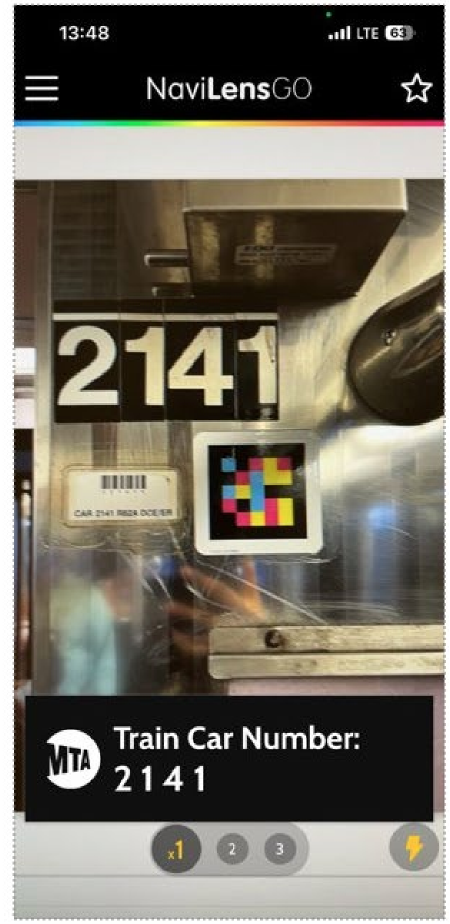


Image 3. Placement of a Car Number NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning

NaviLens app NaviLens GO app

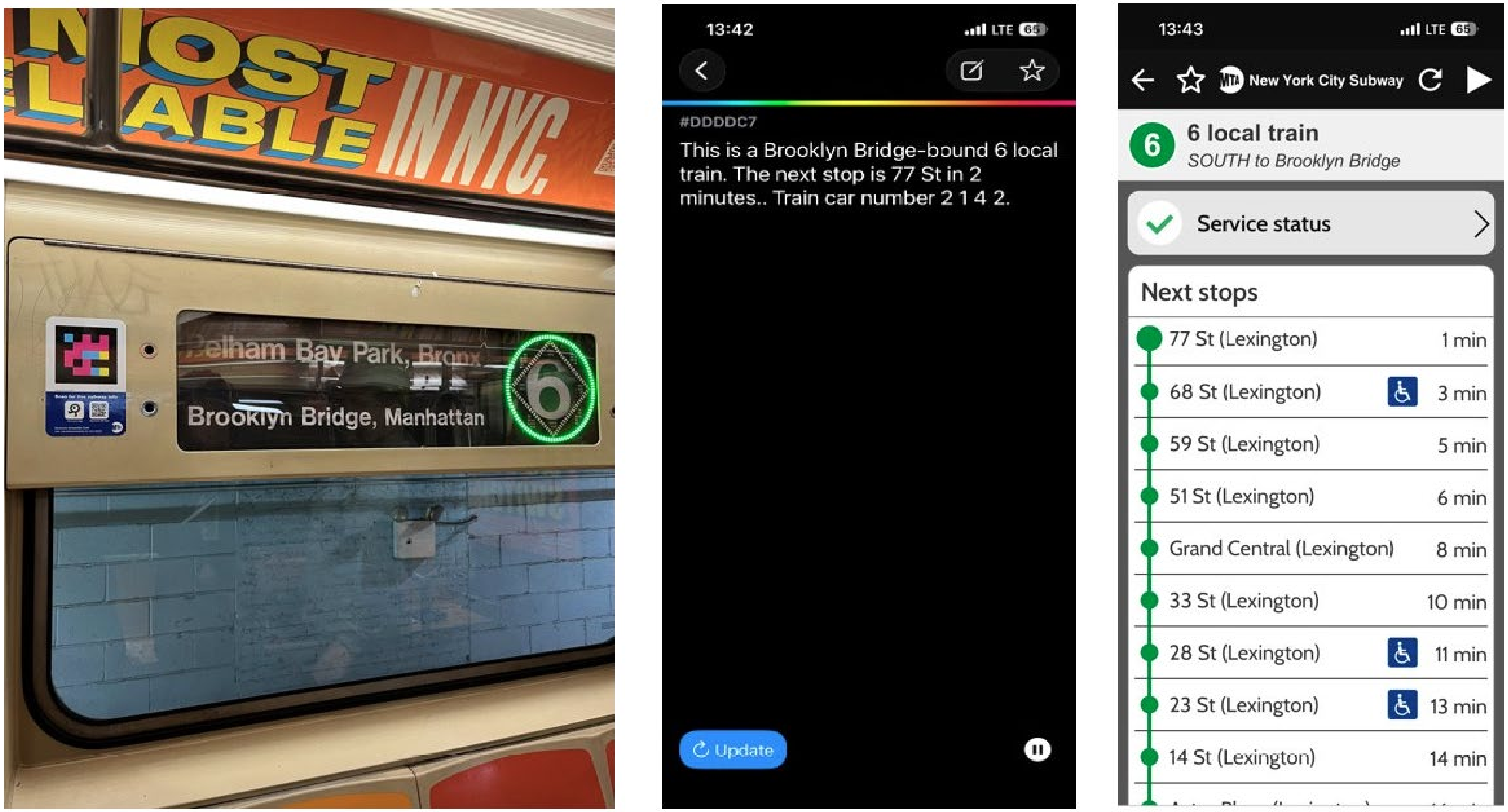


Image 4. Placement of a Destination Sign NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning.

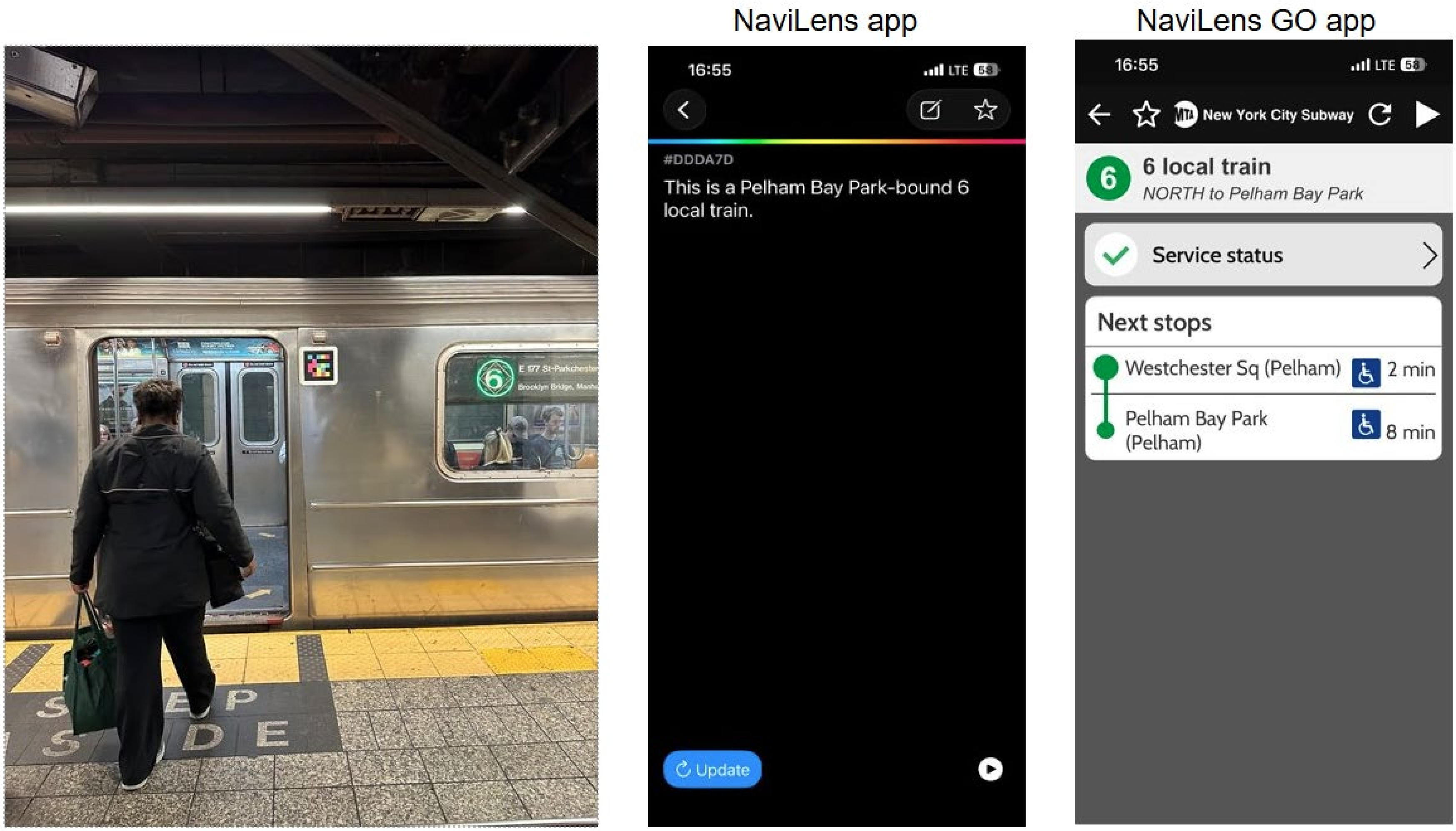


Image 5. Placement of an Exterior Car Identifier NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning.

NaviLens app NaviLens GO app

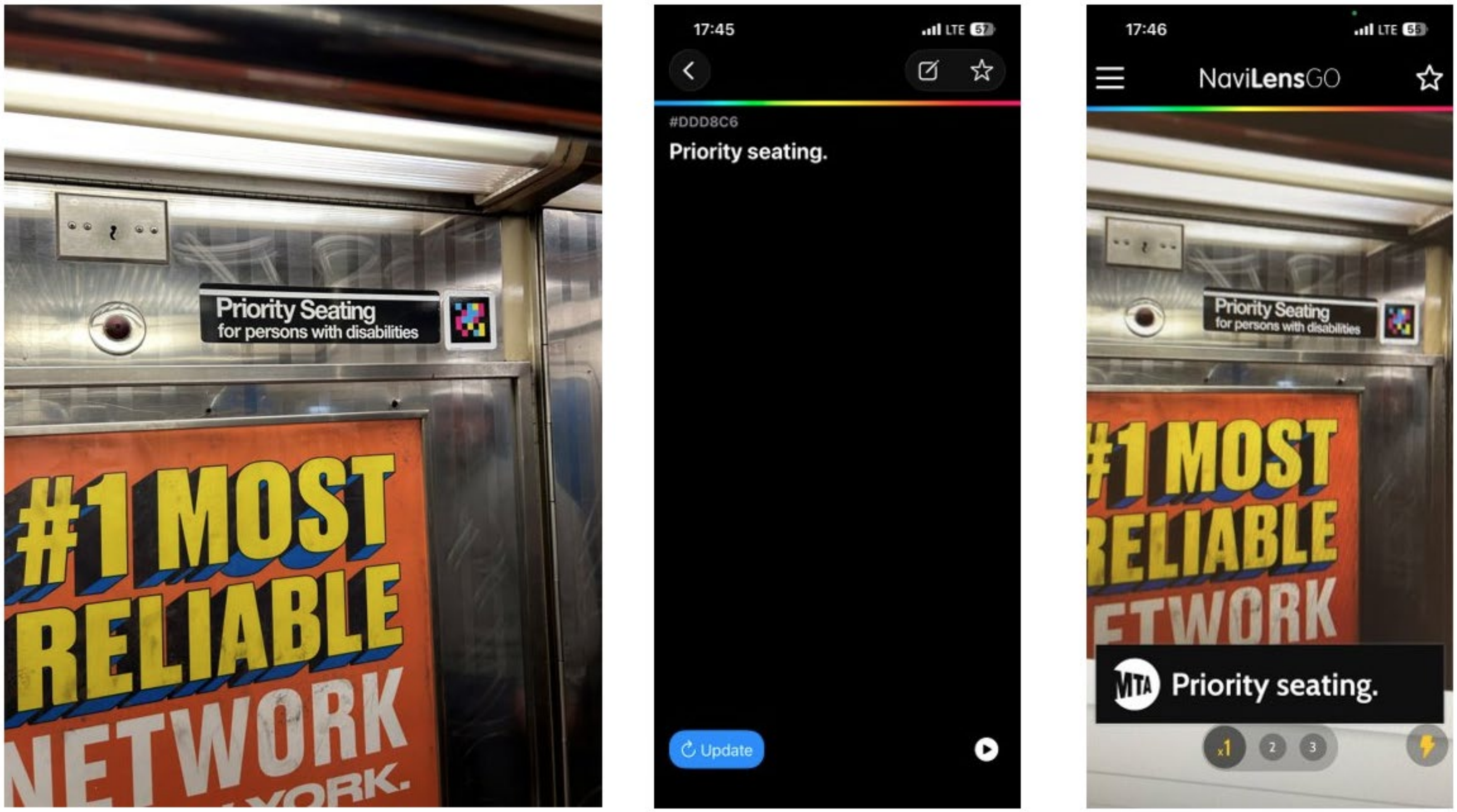
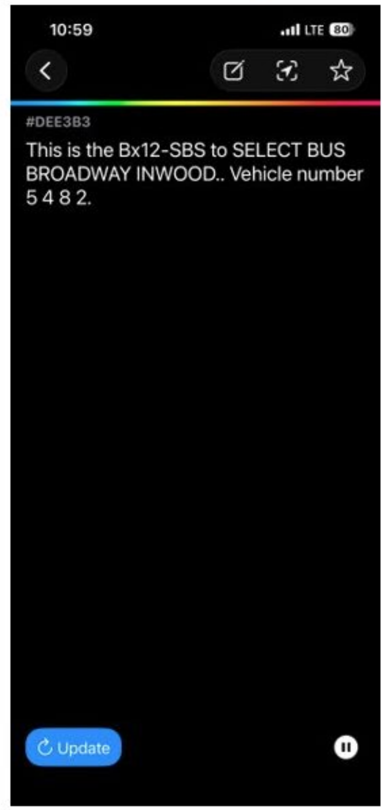


Image 6. Placement of a Priority Seating NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning.

Below Images 7 to 10 are bus vehicle code placements with screenshots of both NaviLens and NaviLens GO app after scanning the code.

NaviLens app



NaviLens GO app

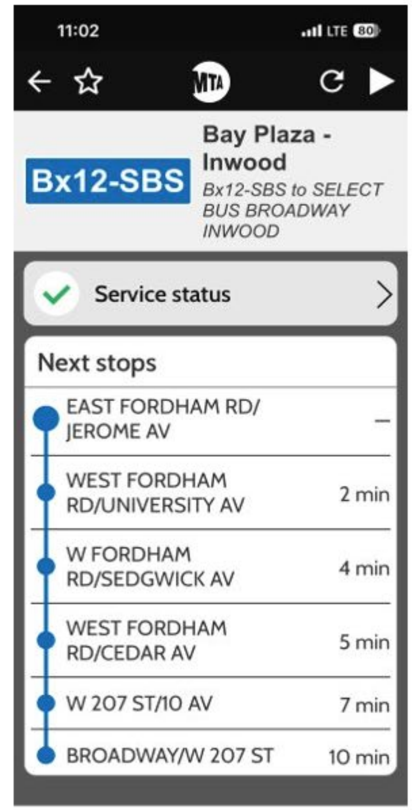
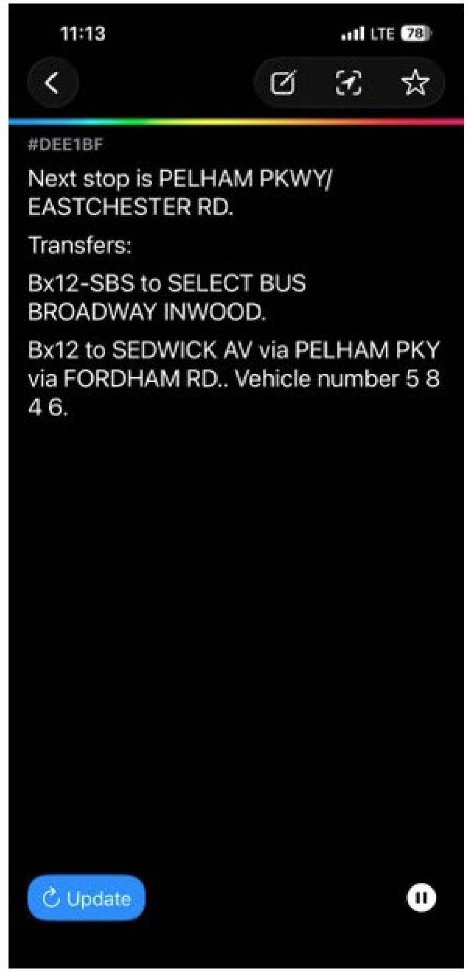


Image 7. Placement of an Exterior Front Door NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning.

NaviLens app



NaviLens GO app

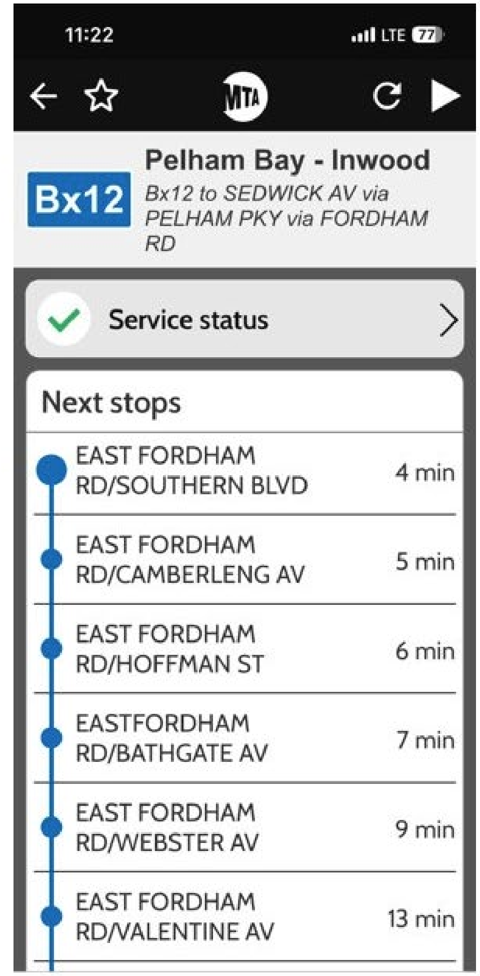
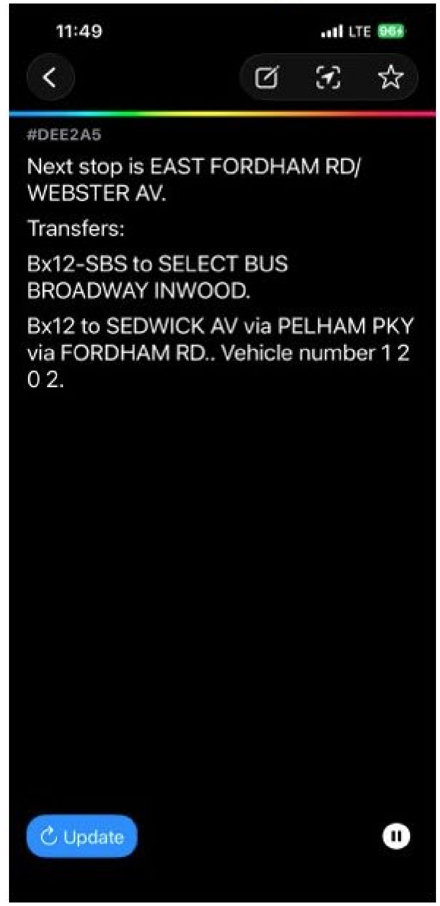


Image 8. Placement of a Bus Number NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning.

NaviLens app



NaviLens GO app

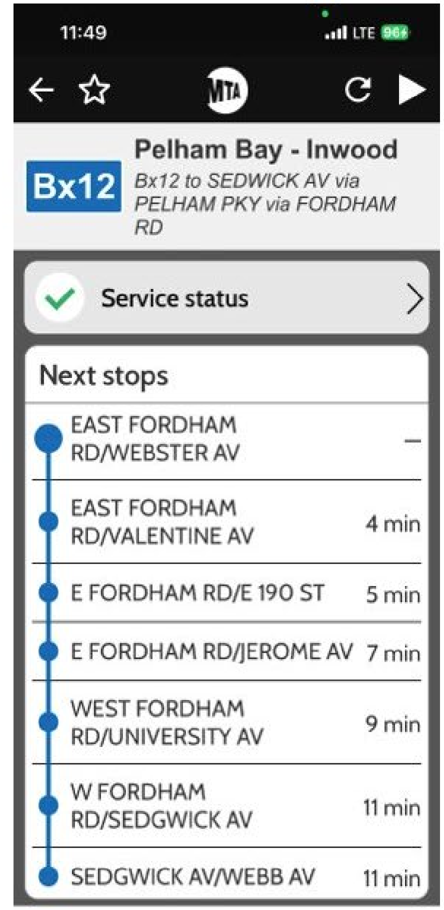
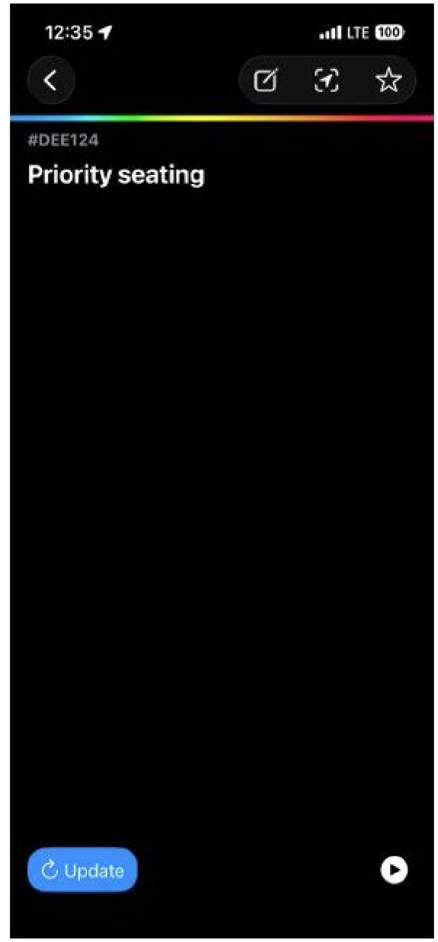


Image 9. Placement of an Interior Stop Requested Sign NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning

NaviLens app



NaviLens GO app

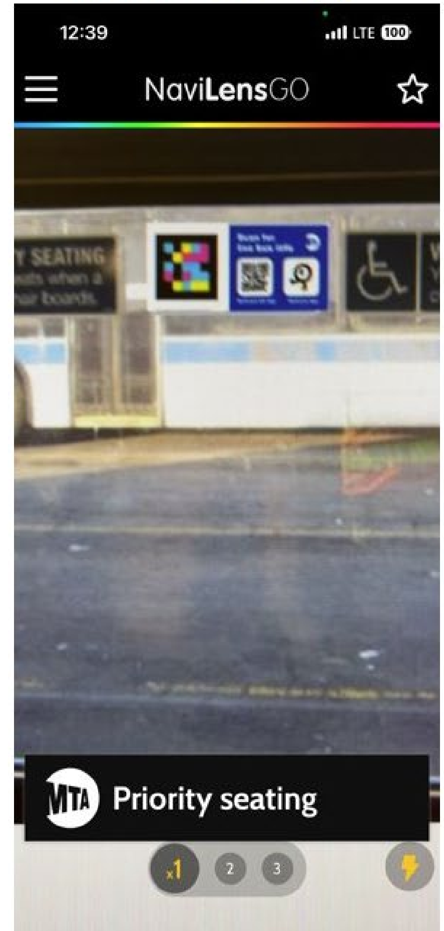


Image 10. Placement of a Priority Seating NaviLens code with screenshots of both the NaviLens and NaviLens GO apps after scanning.