



Time, Safety, Accessibility:

The Cost of Blocking the Bus

October 2023



Executive Summary

The Southeastern Pennsylvania Transportation Authority (SEPTA) provides transit service that is essential for the mobility of people in Philadelphia and throughout the region. SEPTA connects people to jobs, schools, healthcare, recreation, family, and friends – and it does so sustainably, safely, and affordably.

Improving bus service is a critical goal for SEPTA, especially as bus riders represent approximately half of all ridership.¹ SEPTA is dedicated to providing safe, reliable, and convenient transit service to its riders. However, cars and trucks illegally parking in transit zones obstruct bus service and create dangers for our riders.

Illegally parked vehicles obstructing transit throw buses off schedule, slow down service, and create unnecessary dangers to riders and pedestrians. Blocked bus stops and curb ramps create serious safety and accessibility issues – especially for seniors and riders with disabilities – as bus operators cannot safely deploy the wheelchair access ramp when the bus stop is blocked.

In order to understand the extent of illegal parking and evaluate technologies currently deployed in other cities to address these issues, SEPTA conducted a 70-day, camera-assisted bus lane and bus stop enforcement pilot. Data resulting from the pilot indicated severe levels of illegal parking in both bus stops and bus lanes along SEPTA routes.

Utilizing technology installed on seven buses operating on Routes 21 and 42, from April 20 to June 28, 2023, the study documented 36,392 total parking obstructions in the pilot zone, which included bus lane obstructions in Center City and bus stop obstructions in West Philadelphia and a portion of Upper Darby. In Center City, the study detected 4,174 obstructions in bus lanes. The number of illegal parking events at bus stops in West Philadelphia and Upper Darby was significantly higher: 32,218 instances of cars and trucks blocking accessible and safe boarding for transit riders.

For this proof-of-concept pilot and study, SEPTA utilized camera-assisted bus lane and bus stop enforcement technology developed by Hayden AI. In New York City, where this type of technology has been deployed since 2019, bus speeds have increased by as much as 40 percent on enforced routes². Bus collisions have also decreased significantly – by as much as 34 percent on certain routes³.

This study revealed that illegal parking is chronic on Routes 21 and 42 and likely along most major transit routes in Philadelphia, creating obstructions that cause significant safety hazards and service delays on our system. As demonstrated in this proof-of-concept pilot, the technology tested was extremely effective at locating potential violations that could be reviewed by parking enforcement authorities. Due to the significant number of transit-blocking parking obstructions detected in this pilot, SEPTA believes that citywide, camera-assisted transit zone enforcement is necessary to ensure that SEPTA can deliver on-time, reliable, fast, safe, and accessible public transportation to Philadelphians.

Pilot Background

The purpose of this proof-of-concept pilot was to study the effectiveness of technology to detect and identify parking violations in bus lanes and bus stop zones, and based on that data, evaluate the severity of illegal parking that obstructs transit operations.

The pilot lasted 70 days, with the data collection period beginning on April 20, 2023, and concluding on June 28, 2023. SEPTA chose to conduct the pilot with seven buses operating on Routes 21 and 42. These routes were selected because they utilize the Chestnut Street and Walnut Street bus lanes in Center City. On the West Philadelphia and Upper Darby portions of these routes, where there are no bus lanes, the bus stop obstruction detection technology was enabled.

Figure 1 - Route 21 Route Map

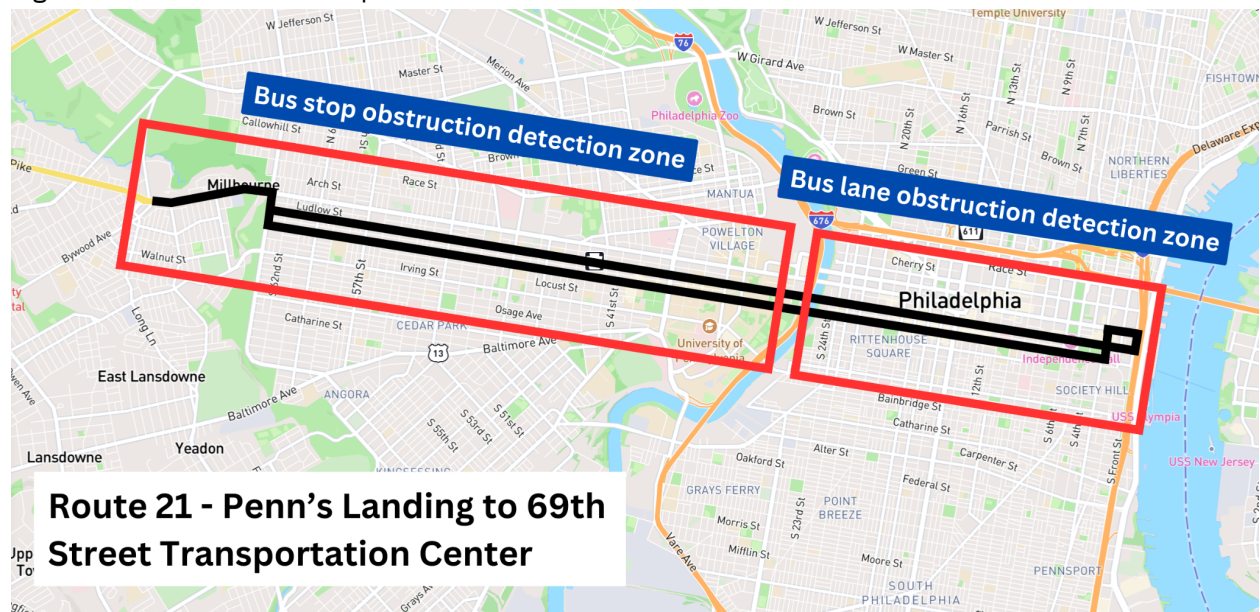
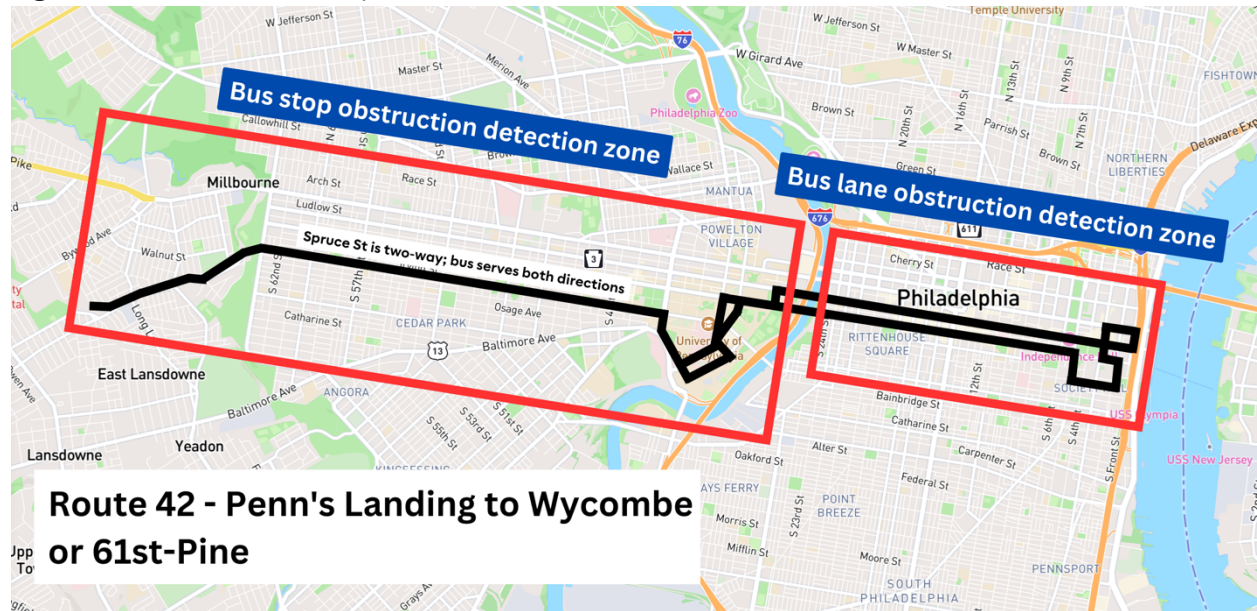


Figure 2 - Route 42 Route Map



Routes 21 and 42 are two of the 10 highest-ridership bus routes in the SEPTA system – but also two of the slowest routes. In 2022, the average speeds of the 21 and 42 routes were 8.5 mph and 8.7 mph respectively, making these routes the fourth and fifth slowest of SEPTA’s high ridership routes¹. Slow speeds and poor reliability impact the over 10,000 riders these routes carry on an average weekday⁸. This study allowed SEPTA to assess the number of obstructions along these routes.

For the purposes of this report, we will utilize the term “obstruction” to refer to individual detections of vehicles parked or standing in a bus lane or in a bus stop zone. No parking citations were issued as a part of this proof-of-concept pilot.

SEPTA partnered on this proof-of-concept pilot with technology firm Hayden AI, which provides camera-assisted bus-mounted enforcement technology to MTA New York City Transit and the Washington Metropolitan Area Transportation Authority (WMATA) in Washington, DC.

The camera-assisted enforcement technology system tested in this study utilized a camera system installed behind the windshield of each of the seven buses participating in this pilot. The system utilized computer vision technology to recognize and capture images of vehicles obstructing bus lanes and bus stops.

Figure 3 – Camera-assisted enforcement technology system



Pilot Results

Overview

An alarming amount of parking obstructions were detected during this study at both bus lanes and especially at bus stops that are clearly undermining SEPTA operations and creating safety hazards for our riders.

Figure 4 - Heat Map of All Detected Bus Lane and Bus Stop Obstructions on Routes 21 and 42

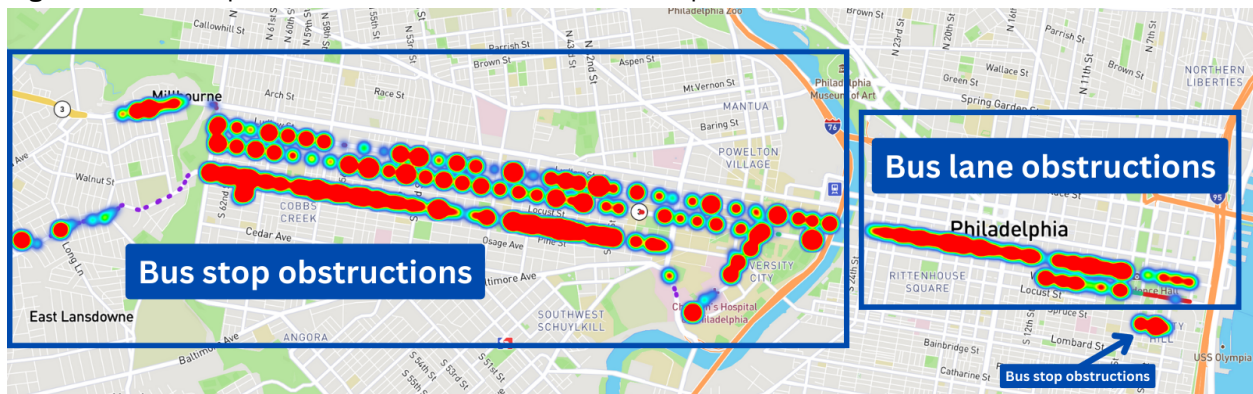
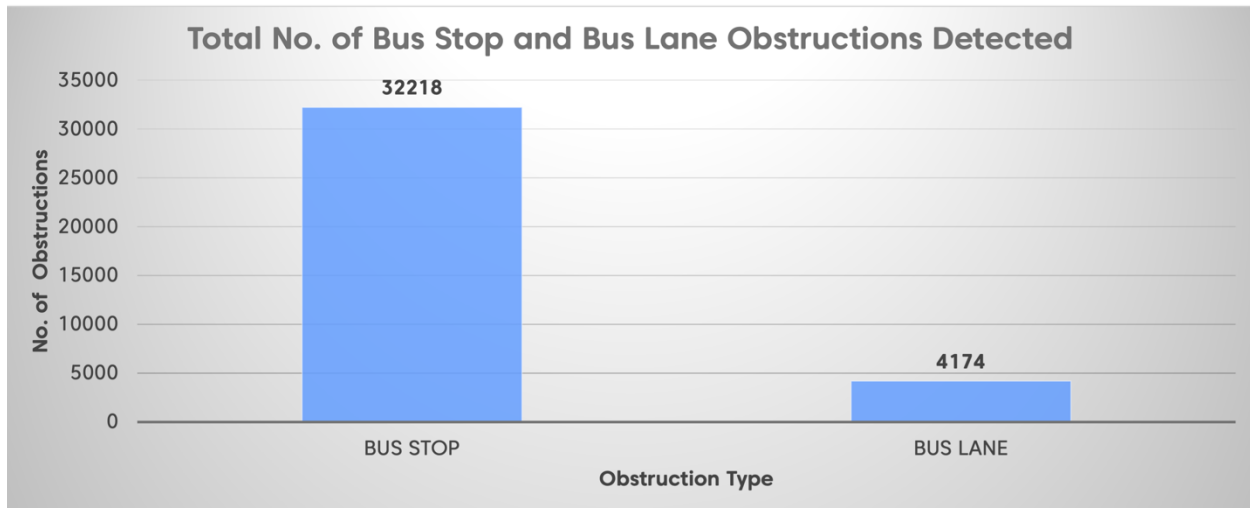


Figure 5 - Total Number of Bus Stop and Bus Lane Obstructions Detected*



* The numbers in Figures 5 -12 reflect total obstructions detected by buses participating in the study. Some of the obstructions were detected more than once per day. Parking citation rules vary by jurisdiction regarding how many parking tickets may be issued to the same vehicle within a certain time period. However, if one ticket per calendar day were applied to the entire study, a total of 18,141 potential violations would result.

In total, the seven equipped buses detected 36,392 obstructions during the pilot. Instances of obstructed bus stop zones were more frequent than detection of obstructed bus lanes. The study focused on bus stop obstructions through the West Philadelphia and Upper Darby portions of Routes 21 and 42, and bus lane obstructions in Center City. In Center City, when a vehicle was obstructing both a bus lane and also a bus stop in the bus lane, it was counted as only a bus lane obstruction.

Figures 6 and 7 below show the distribution of obstructions detected by day of the week and time of day. While the variations in the data are likely in part the result of the frequency of bus runs at a given time or on a certain day rather than volume of obstructions, it is indicative of individual instances of a bus encountering an obstruction during the course of this study. The data also indicated a slight decline in obstructions over the study period after the summer transit schedule adjustments occurred in June. This could in part be the result of expected reductions in business, student, and travel activity during the summer months.

Figure 6 - Obstructions by Type and by Day of Week

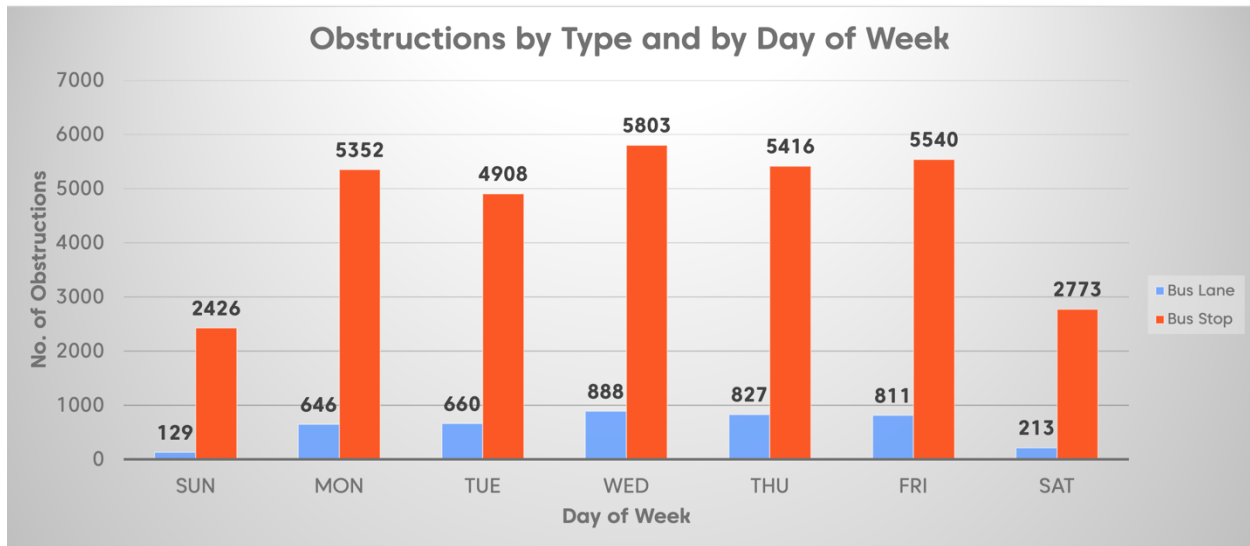
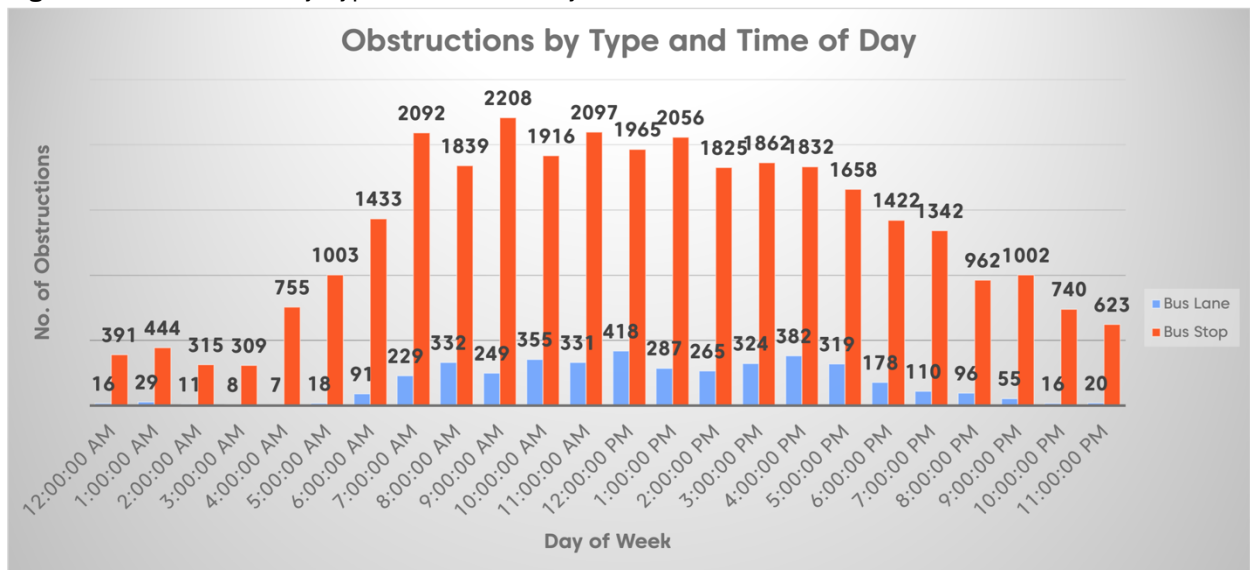


Figure 7 - Obstructions by Type and Time of Day



Bus Lane Obstructions

The study revealed that there are several blocks on Chestnut Street in Center City that are chronically obstructed, preventing the efficient and safe use of the bus lane. These blocks are obstructed to such an extent that SEPTA buses are often required to move into the general traffic lane, undercutting the purpose of the bus lanes, delaying riders and creating risks to safety.

Figure 8 - Top 5 Locations for Bus Lane Obstructions

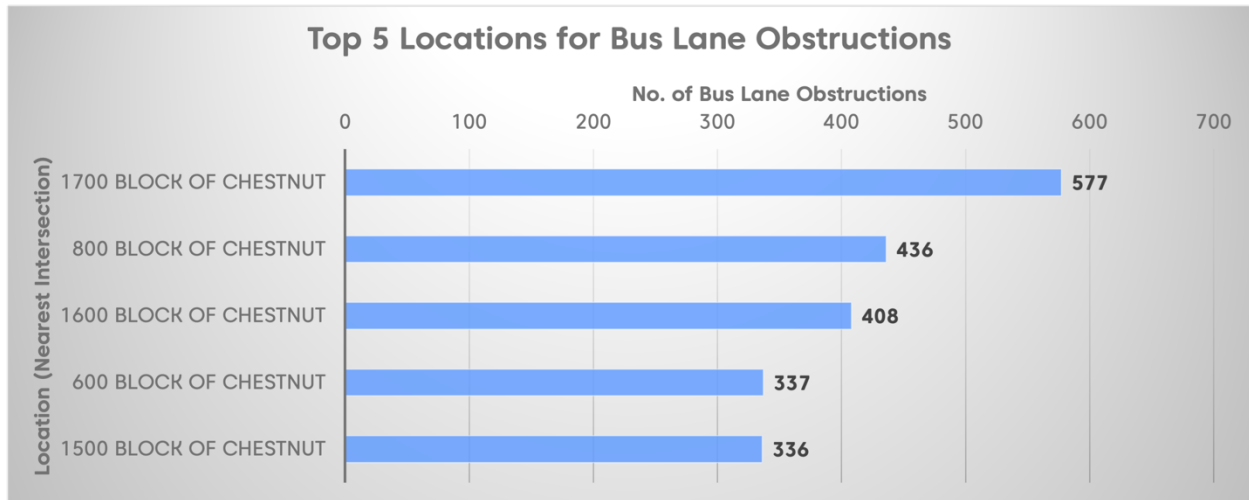


Figure 9 - Mapped Top 5 Locations for Bus Lane Obstructions

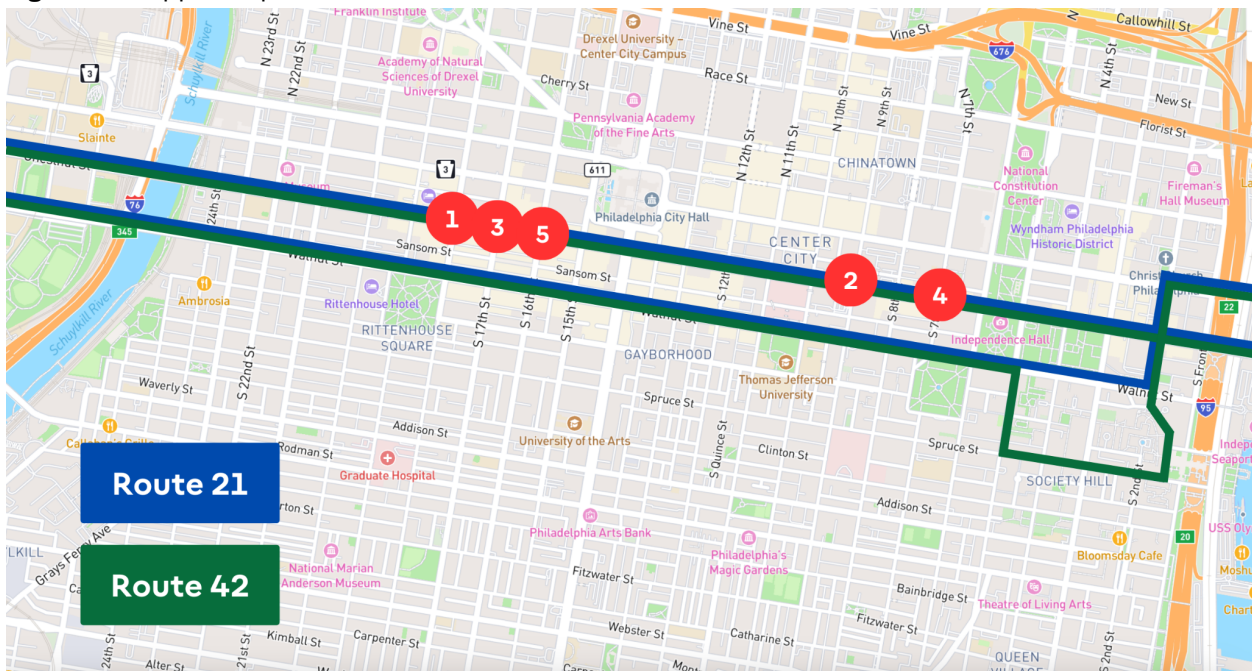
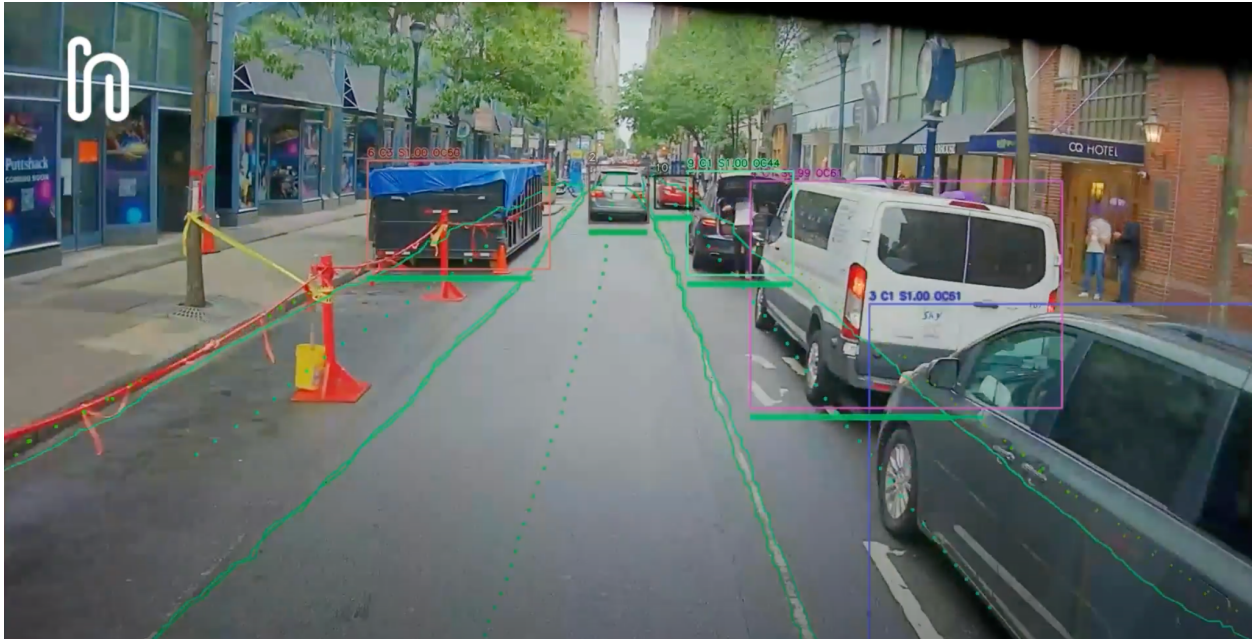


Image 1 shows multiple vehicles blocking nearly the entire bus lane on the 1600 block of Chestnut Street in Center City, which is the third most frequently obstructed bus lane location. The Chestnut Street bus lane between 16th to 18th Streets was so frequently blocked during this study that this corridor was often unusable as a functional bus lane.

Image 1



Bus Stop Obstructions

The pilot documented near-constant and pervasive parking obstructions at bus stops along Routes 21 and 42. As seen in the heat map in Figure 10 visualizing detected obstructions, parking obstructions were consistently dense across both routes. Spruce Street appears to have a denser concentration of obstructions, but this is due to it being a two-way street served by Route 42 in both directions. Route 21 is eastbound only on Chestnut Street and westbound only on Walnut Street.

Figure 10 - Heat Map of Bus Stop Obstructions

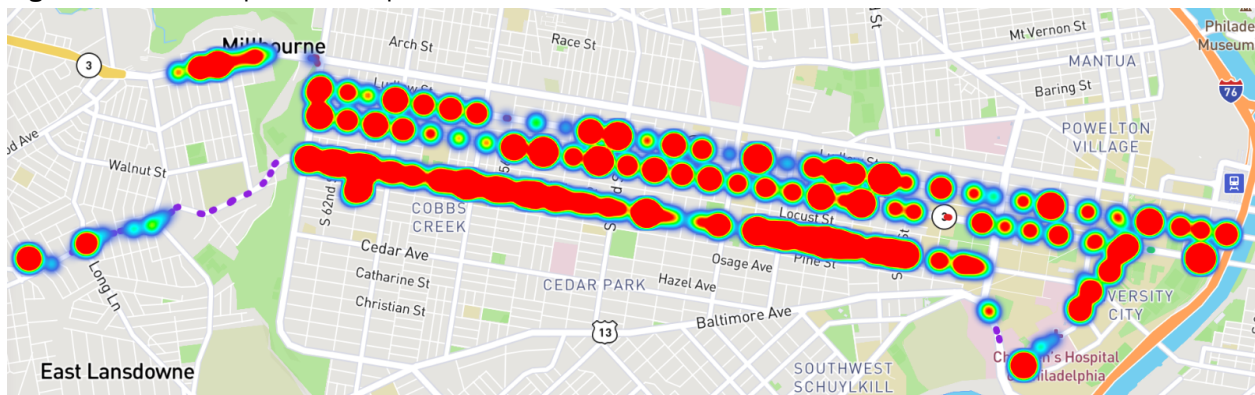


Figure 11 - Top 5 Locations for Bus Stop Obstructions

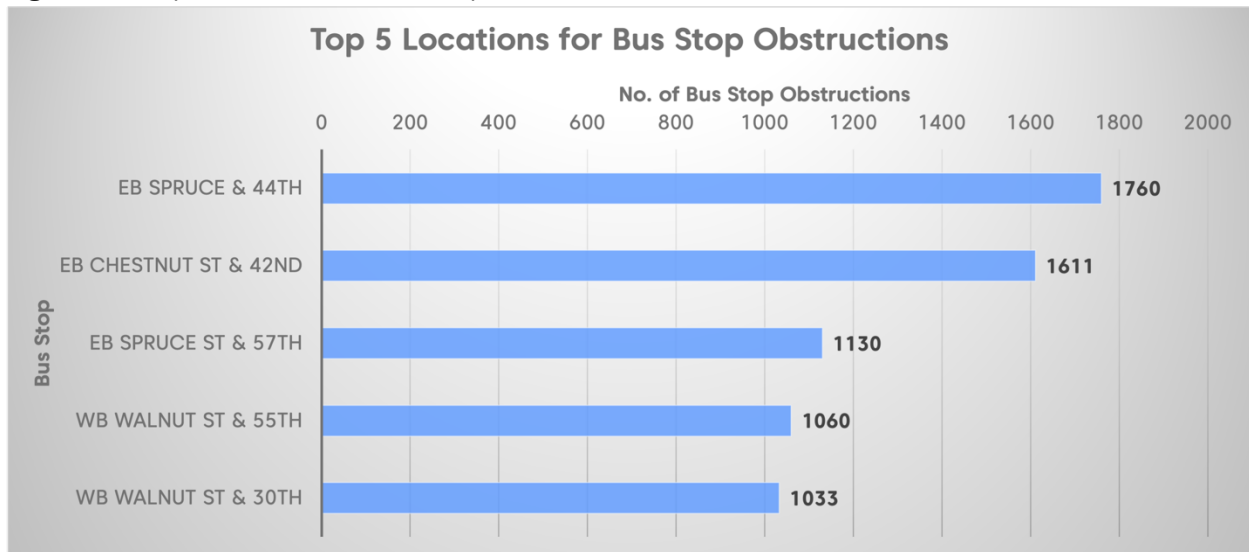


Figure 12 - Mapped Top 5 Locations for Bus Stop Obstructions

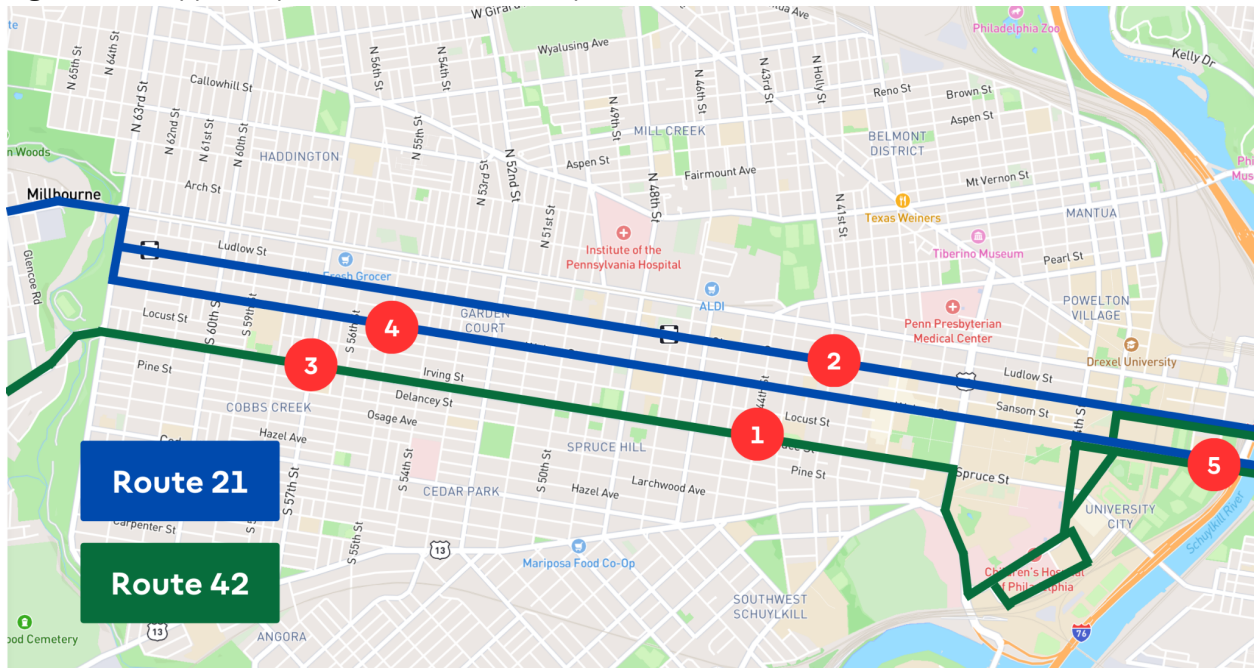
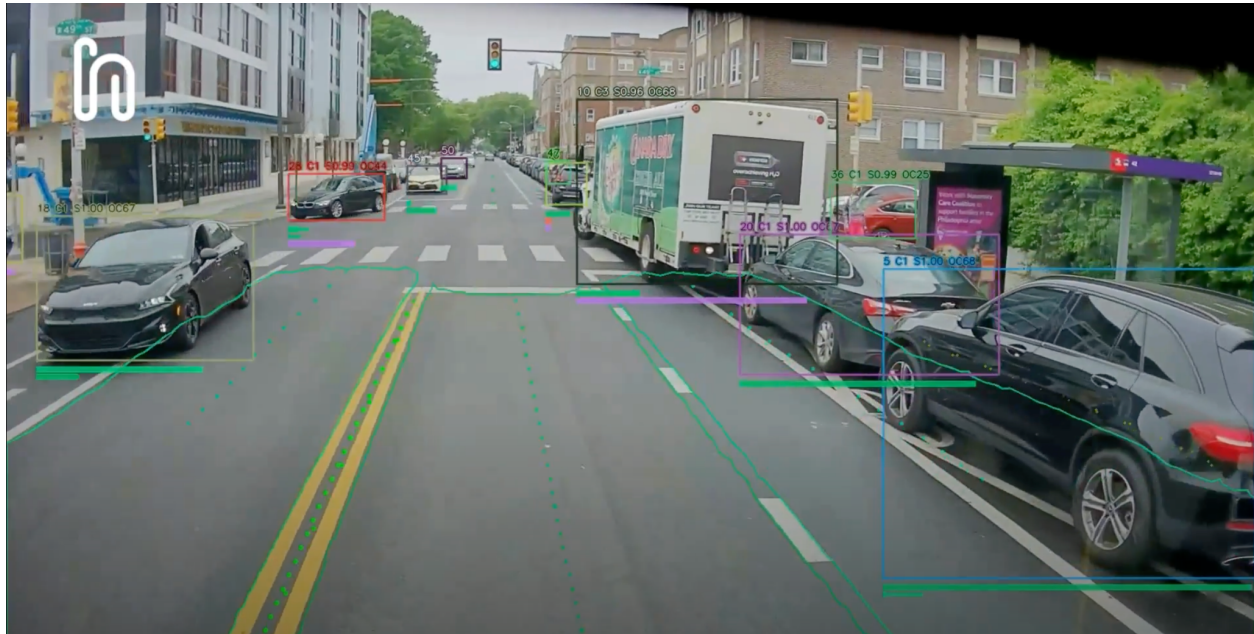


Image 2 below shows the westbound bus stop at Spruce Street and 49th Street, served by Route 42, obstructed by multiple illegally parked vehicles. In addition, the image indicates that both the bus stop **and the pedestrian curb ramp** are obstructed. In this case, it is impossible

for riders boarding or exiting to avoid walking in the street or for a wheelchair or other mobility-assistive devices to safely access the curb.

Image 2



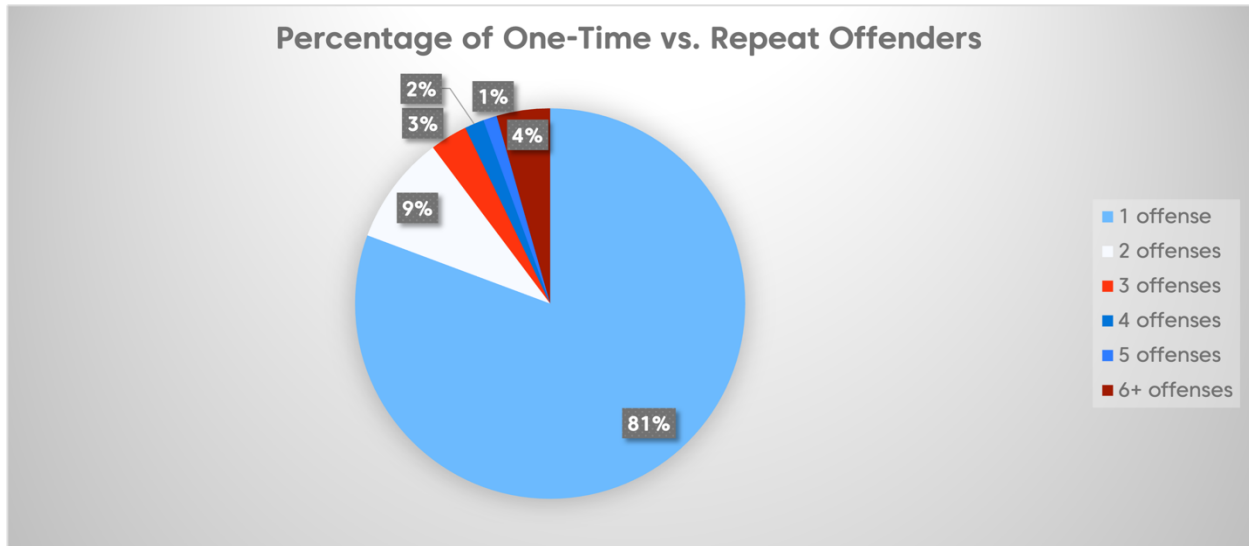
Analysis of the data reveals that for both the 21 and 42, on a typical weekday **over half** of bus stops are obstructed at some point during the day. On an average weekday, 46 of Route 42's 85 stops are blocked (54 percent) and on Route 21, 38 of its 73 stops are obstructed (52 percent) at some point during the day.

Certain individual bus stops in West Philadelphia are obstructed over 20 or even 30 percent of the time, presenting consistent dangers for riders boarding and exiting the bus in those neighborhoods. As further detailed later in this report, when bus stop zones are illegally blocked, buses can be prevented from pulling up parallel to the curb, which forces riders into the street and makes it difficult – or sometimes impossible – for wheelchair ramps to be deployed properly.

Repeat Offenders and Vehicle Origin

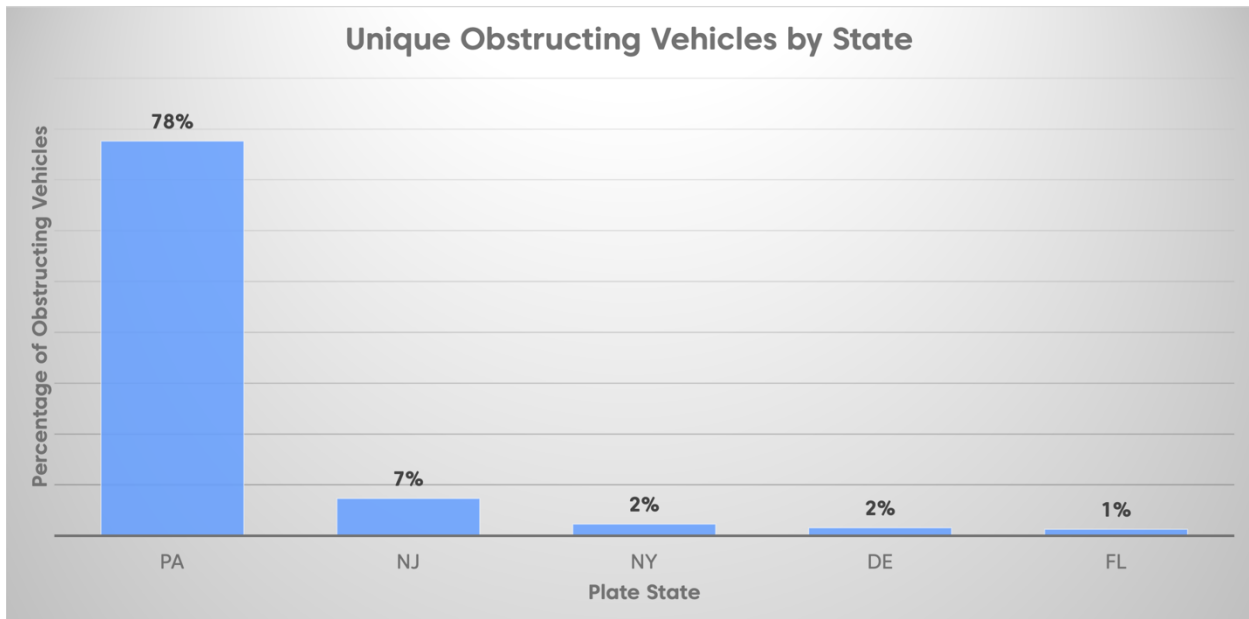
The study also found a significant number of vehicles causing obstructions on different days during the period of this study. As indicated below in Figure 13, 21 percent of vehicles committing obstructions did so on multiple days.

Figure 13 - Percentage of One-Time vs. Repeat Offenders



Of the total list of vehicles that obstructed a bus lane or bus stop during this pilot, Figure 14 shows the percentage of Pennsylvania registered vehicles compared to other states. During the course of this study, one in five of all vehicles obstructing transit had out-of-state license plates, with New Jersey at 7 percent.

Figure 14 - Unique Obstructing Vehicles by State



Impact of Illegal Parking on Transit

Illegal parking on transit routes impairs SEPTA's ability to deliver convenient and reliable all-day service to people across the region. When even one car or truck illegally uses road or curb space dedicated for transit service, it creates an obstruction that may cause hundreds of riders to be delayed. Most importantly, it also endangers the safety of riders and pedestrians in our Philadelphia community.

Blocked bus stops present serious hazards for people with disabilities and seniors. For a disabled person, a blocked bus stop can mean the difference between reaching their destination on time or late – or not reaching it at all. Illegal parking at bus stops makes boarding dangerous and often impossible for wheelchair users because bus operators are unable to properly deploy wheelchair access ramps to the curb if the bus cannot pull up to the curb. A University of Louisville study found that the majority of transit bus wheelchair incidents occurred when buses were stopped (73 percent), and most of these incidents took place on the lift/ramp (59 percent) or outside the bus before or after boarding or exiting (27 percent).⁴

“For people with disabilities, just one car blocking a bus stop creates a serious hazard,” said Latoya Maddox, Senior Independent Living Specialist of Liberty Resources and Chairperson of the SEPTA Advisory Committee for Accessible Transportation (SAC). “This is a problem that has been tolerated for far too long, and we hope that action will be taken to change driver behavior and make the streets of Philadelphia safer for our community.”

Bus stop parking is not the only obstruction that impacts accessibility and safety for transit riders. When a bus stop is obstructed, the problem is compounded by illegal parking at pedestrian curb ramps. Blocked curb ramps make access to the crosswalk hazardous or impossible for people using wheelchairs, mobility-assistive devices, strollers or personal shopping carts. If a bus cannot board properly because of an obstructed bus stop, it is forced to load and unload in the street, where an obstructed curb cut only compounds the danger.

While the study found fewer bus lane obstructions than bus stop obstructions, the number of bus lane obstructions were significant and demonstrably slow down the system. The purpose of bus lanes is to move transit buses quickly and reliably, especially when general traffic lanes are congested. Even one car parked in the bus lane can cause significant delays to service. On Center City's narrow streets, these obstructions create numerous safety hazards for riders and

pedestrians, as buses are required to continuously enter general traffic lanes to get around obstructions.

"How is it fair that one driver parking illegally can keep 50 people on a bus from getting where they need to go, or keep a rider with a mobility aid from safely and accessibly boarding? This happens everyday across Philadelphia, and riders are fed up," said Connor Descheemaker, Coalition Manager, Transit Forward Philadelphia. "Philadelphia has few bus lanes and incessantly blocked bus stops, and keeping these spaces clear means greater accessibility, and buses will be able to speed up and run on-time."

Obstructed bus lanes also significantly slow down bus service for riders on the bus and make buses miss scheduled arrival times. SEPTA builds the speed savings from dedicated bus lanes into the schedules for routes utilizing these lanes. When parked cars and trucks illegally use these lanes, it disrupts SEPTA's service schedule, making routes unreliable. This means that riders who expect to wait no more than five to ten minutes for a bus to arrive during rush hour may be stuck waiting much longer.

Another illegal parking behavior that slows down transit service is double parking. Double parking shuts down safe access to a general lane of traffic and could cause a bus to maneuver into the opposite lane of traffic, creating service delays and serious safety risks. For this reason, the state of New York recently expanded its camera-assisted bus-mounted enforcement program in New York City to include double parking to help reduce this serious hazard.

"When there is illegal parking in the bus lane it can cause me to be late for my appointments – I thought the bus lanes were supposed to prevent these delays." said Margaret Livingston, a West Philadelphia transit rider.

Equity is also undermined by these obstructions to safe and reliable transit service, which impacts access to jobs, schools, healthcare, and other essential services, especially for people of color. Almost half (47 percent) of SEPTA bus riders are Black, although the Black community makes up only 26 percent of the region's population.⁵ For comparison, 70 percent of Regional Rail riders are white, and only 30 percent are Black and people of color.⁶

Reliable transit service is essential to increasing access to economic opportunities. This is especially important for SEPTA bus riders, as they are disproportionately low-income – in fact, 28 percent of SEPTA bus riders are below the poverty line.⁵

Public transportation is one of the most sustainable modes of transportation, but blocked bus lanes completely undermine these benefits. Blocked bus lanes increase greenhouse gas emissions by increasing the length of time it takes a bus to complete its route. Slow bus service also dissuades people from using transit, potentially increasing emissions as people who would otherwise use transit choose private vehicles or single passenger ride-hail services.

Keeping bus lanes and bus stops clear for buses is essential to ensuring that everyone can use public transportation – and that riders reach their destinations more quickly and safely. With citywide coverage, SEPTA believes that camera-assisted transit zone enforcement will be a powerful tool to improve transit service and safety.

Camera-Assisted Transit Zone Enforcement

This study demonstrated that Philadelphia has a significant illegal parking problem on transit routes that is disrupting reliable, safe, and accessible service. This pilot also allowed SEPTA to test technology that is being utilized in other cities: bus-mounted, camera-assisted transit zone enforcement. Based on these pilot results, SEPTA believes that camera-assisted transit zone enforcement is necessary to make our service more reliable and accessible to our disabled and senior riders.

Camera-assisted bus-mounted enforcement has proven to be an effective solution to the problems posed by illegal parking in transit zones. This type of enforcement uses camera systems to detect instances of illegal parking on transit corridors. Once an obstruction is detected, an evidence package documenting the incident is created and sent securely to a parking enforcement officer for review. Only a parking officer has the power to determine if an actual parking violation occurred. Once the parking officer makes their evaluation, a citation is issued to the registered owner of the vehicle. Parking officers are critical to the success of these technology-assisted enforcement programs, as they are needed to review evidence packages generated by the technology.

The National Association of City Transportation Officials (NACTO) recommends automated bus lane enforcement as an equitable and effective way to keep bus lanes clear for buses, noting that “[d]edicated bus lanes only work if there are no cars in them.”⁷

According to MTA New York City Transit, camera-assisted bus lane enforcement has improved bus speeds in highly congested areas by as much as 40 percent.² These speed gains are especially significant as half of SEPTA's highest ridership routes have average speeds of less than 10 mph – so increasing speeds by just 10 percent can result in meaningful time savings for riders.¹

Another benefit of camera-assisted transit zone enforcement is that this technology has decreased the number of collisions along enforced bus routes in New York City. Bus collisions have been reduced by more than 30 percent on some routes since bus camera enforcement began on the route in 2019.³

Building off of New York City's successful program, WMATA in Washington, DC began its deployment of this technology in late July 2023 to enforce both illegal parking in bus lanes and bus stops.

Conclusion

This pilot captured compelling data indicating the enormous scale of the illegal parking problem in Philadelphia's transit zones. As bus-mounted camera-assisted enforcement becomes a best practice for keeping transit zones clear in cities, SEPTA believes that utilization of this type of technology will be highly effective in reducing illegal parking and improving the safety and quality of SEPTA bus service.

Illegal parking in transit zones has significant negative impacts on transit reliability, safety, and accessibility. Blocked bus lanes slow down bus service and make arrival times unpredictable for riders. Blocked bus stops can make it impossible for people using wheelchairs to board or exit the bus. These challenges put SEPTA's long-term goals for growing ridership, improving safety, and reducing greenhouse gas emissions in jeopardy.

SEPTA believes citywide, camera-assisted transit zone enforcement with bus-mounted cameras in Philadelphia will significantly reduce instances of illegal parking disrupting service for our bus riders. This technology is essential in enabling SEPTA to deliver more reliable, accessible, safe, and convenient service for all of our transit riders across our service area.

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