PARKING IN BIKE LANES: STRATEGIES FOR SAFETY AND PREVENTION

BOSTON REGION MPO
METROPOLITAN PLANNING ORGANIZATION

PARKING IN BIKE LANES: STRATEGIES FOR SAFETY AND PREVENTION

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TABLE OF CONTENTS

ABSTRACT

With this study, the staff of the Boston Region Metropolitan Planning Organization (MPO) sought to address the problems caused when automobiles impede on-street bicycle facilities. We assessed the problem through a literature review of the sources of bicycle lane obstructions and their impacts on people bicycling. We then identified interventions by researching successful strategies and practices that municipalities across the nation have employed to prevent people from parking motor vehicles in bike lanes. These interventions fall into three categories: design, enforcement, and policy.

We supplemented this research with direct outreach to both people who ride bicycles and those who work in commercial delivery, which the research indicates is a disproportionate source of obstructions. Our analysis of this combined data informed our recommendations that can be implemented in the Boston metropolitan region to reduce the frequency of people using on-street bicycle facilities for vehicle parking. In an effort to address this challenging issue that frustrates both people bicycling and driving, this study provides valuable information about best practices and successful interventions that can be implemented to address this issue and improve safety for people bicycling.

1 BACKGROUND

Biking activity in Metro Boston has witnessed a major increase in recent years. Mobility data firm Streetlight reported that the number of average daily bike trips per 1,000 people in the Boston metro area rose by almost 35 percent—from 26 to 35—between 2019 and 2022 (Lewis, O'Higgins, Adler 2023). The increasing adoption and expansion of bikesharing in the Boston metropolitan region (through Bluebikes) has played a large role in influencing this increase in biking activity. Local municipalities have also tried to support safer biking environments by building bike lanes. For example, the City of Boston has approximately 76 miles of on- and off-street bike lanes and paths, with ambitious plans to grow both the bike lane network and expand the public bikeshare program (City of Boston 2022a; 2022b). Other municipalities in the inner core are adopting similar measures in increasing recognition of the need to create better and safer environments for people who bike. This also contributes to the climate action goal of inducing a mode shift away from trips made by people using single-occupancy vehicles.

While bike lanes have become more common across the Boston region, the problem of people parking motor vehicles in these lanes has also become more widespread. These incidents present safety hazards for both people cycling and people driving. Blocked bike lanes force people bicycling to merge unexpectedly into mixed traffic. Many bike lanes are not wide enough to accommodate a parked vehicle, creating an obstruction to the adjacent travel lane as well as the bike lane. Addressing this safety issue is critical to achieving the MPO's Vision Zero goals and creating a more sustainable, multimodal transportation system in the Boston Region.

This study originated through the Boston Region MPO's Unified Planning Work Program (UPWP), which funds discrete studies such as this to enhance staff's and the MPO's knowledge of transportation planning practices, augment analytical methods, and evaluate transportation planning strategies.

2 PREVIOUS RESEARCH AND CASE STUDIES

To support the development of recommendations for the Boston metropolitan region, we conducted a literature review of recent studies related to bike lane obstructions and their prevention. Research in this space seems comparatively limited and is primarily focused on the sources and impacts of obstructed bike lanes. As cities continue to expand their bicycle networks, it is critical that research continues to measure the efficacy of approaches taken to keep these bicycle networks free from obstruction.

2.1 Causes of Obstructed Bike Lanes

The literature on the sources of bike lane obstructions is definitive. In standard bike lanes, ones which are not grade separated or otherwise protected by a physical barrier, people parking their motor vehicles were found to be the most common source of obstructions (Basch, Ethan, and Basch 2019). People creating these obstructions were found to typically be doing so for short-term commercial reasons such as delivery. A study that examined scooter, bicycle, and motor vehicle parking habits in five major US cities found that ride-hail, taxi, delivery, and other commercial vehicles accounted for just under one-quarter (23.8 percent) of all observed motor vehicles on the road but accounted for more than one-half (63.6 percent) of observed parking violations, with violations typically less than five minutes in length (Brown, Klein, Thigpen, and Williams 2020).

A 2014 study of commercial vehicles in Toronto, Canada, found that drivers of commercial vehicles only consider a small area for legal parking before opting to park illegally. The authors did not find a relationship between the number of loading zone spaces, loading bay doors, aggregate number of on-street parking spaces, density of on-street parking spaces, or number of surface lot spaces with the number of citations for illegal parking recorded for commercial vehicles in an area. The only factor found to have a conclusive relationship was the density of freight trip generators, which had a positive correlation with citations.

The specific type of vehicle a person uses to obstruct a bike lane can be predicated based on the land use in a given area. A study in Manhattan and Brooklyn, New York City, observed that freight vehicles were more likely to be the obstruction found in commercial areas with primarily retail development, while taxi cabs were more likely in commercial areas with primarily restaurant and nightlife destinations (Conway, Cheng, Peters, and Lownes 2013).

Another common source of bicycle lane obstructions are the doors of adjacent parked motor vehicles. While many state and federal databases do not include a bicycle-door collision, a 2018 survey of emergency medical services and police report records in nine cities, including Boston and Cambridge, Massachusetts, found that these types of collisions account for 12–27 percent of all bicycle-motor vehicle collisions (Schimek 2018). This study also surveyed bike lane design guidelines across North America and found that while all surveyed guidelines include a buffer to account for the door zone when the bike lane is placed between on-street parallel parking and the curb, only the Ontario, Canada, design guide has a similar requirement for standard bike lanes placed between the travel lane and curb-adjacent on-street parking (Schimek 2018).

Although people parking personal and commercial vehicles are the most common sources of bike lane obstructions, another regular source of obstructions originates from municipal governments and utility companies. Road and utility work require accommodation or signed detours for obstructed pedestrian facilities and roads closed to vehicular traffic. No such requirement exists for bicycle facilities, where the detour is generally unsigned and implied to require that bicyclists merge into the general travel lane. In practice, this is no different than an obstruction caused by someone parking their personal vehicle in the lane (Pearson, Reeder, Gabbe, and Beck 2024).

Physically protected bike lanes are less likely to be used for vehicle parking than standard bike lanes, but they are not immune to obstruction. A study on protected bike lanes in Manhattan found that protected bike lanes had slightly more than one-quarter (27 percent) of the number of motor vehicle obstructions as standard bike lanes, and that they were more likely to be obstructed by objects or pedestrians than by motor vehicles (Basch, Ethan, and Basch 2019; Tuckel and Pok-Carabalona 2019).

2.2 Impacts of Obstructed Bike Lanes

Bike lane obstruction discourages people from choosing to bike for transportation. Most people find cycling as a means of transportation to be dangerous without the presence of significant and, critically, connected infrastructure (Mekuria, Furth, and Nixon 2012). An obstructed bike lane breaks that connectivity and forces the person cycling to make a dangerous merge into the travel lane. The expectation of encountering obstructions in bike lanes at a given location discourages people in the area from making trips via bicycle (Pearson, Reeder, Gabbe, and Beck 2024). People commuting by bicycle are willing to add 12–17 minutes to their commute to utilize continuous bicycle facilities, further highlighting the significant role that quality infrastructure plays for transportation mode choice (Torrance, et al. 2008).

People who encounter an obstruction while using bicycle facilities experience a risk to their safety when they must merge into general traffic, the choice taken by almost nine out of 10 (88 percent) people when encountering an obstruction (Basch, Ethan, Fera, et al. 2023). The other option is to merge into the pedestrian space, but this is less common as bicycle and pedestrian zones are typically grade separated. When they do occur, however, such instances may lead to pedestrian-bicyclist collisions. Data on these collisions are much less robust than those on collisions involving motor vehicles as they are not typically tracked by local or state governments. However, a study focused on pedestrian and bicycle behavior in and around college campuses found that an obstructed bike lane was the primary environmental contributor for one-third (33 percent) of all bicycle-pedestrian collisions and for one in 10 (10 percent) bicycle-motor vehicle collisions (Loukaitou-Sideris, et al. 2014). This figure does not include bike lane obstructions caused by the open door of a parked vehicle, which is itself a significant source of bicycle-vehicle collisions.

It is ironic that, while people driving commercial vehicles make up a disproportionate share of bike lane parking obstructions, people bicycling for commercial delivery also make up a disproportionate share of those injured on bicycles (Basch, Ethan, Fera, et al. 2023). This is despite the fact that people delivering via bicycle are less likely to be distracted or impaired while cycling than other bicyclists (Heyer, et al. 2015).

2.3 Interventions to Prevent Lane Obstructions

Preventing people from obstructing bike lanes with motor vehicles is a pressing challenge for cities across North America as both rates of cycling and usage of delivery services have increased since 2020 (Younes, Noland, Hagen, and Sinclair 2023; Routific 2023).

There is no singular silver bullet to prevent people from parking motor vehicles in bike lanes; not a single city examined in this study was able to successfully eliminate this issue. Cities across the continent have, however, experimented with numerous interventions over enough time that some literature has emerged on their efficacy. These interventions can be categorized into three groups: design, enforcement, and policy.

All of these interventions require robust data to inform where they are needed, which are most appropriate, and how to prioritize scarce resources. Due to their geographic coverage and uniformity of equipment, bike-sharing programs may be a good source for not only plotting travel patterns, but also identifying where obstructions are encountered. Researchers in Beijing, China, were able to use equipment installed in the local bike-share program rentals to detect unexpected

swerves, indicating an obstruction. Many cities in possession of this type of data are trying new, algorithmic approaches to prioritization, with the emerging research suggesting caution in the extent to which cities should rely on automated prioritization methods.

It is also important to note that there are myriad reasons that cities have chosen most of the interventions that have been or are currently being tested, and that preventing people parking in the bike lane may not be the primary consideration. Many of these interventions are also implemented in combination with other strategies. Thus, it is difficult to distinguish the impact of any one strategy, and very little literature exists on the impacts of preventing people from parking in bike lanes specifically. Some interventions are assessed for their impact on illegal parking in general, from which inferences can be made, while most approaches for reducing bike lane obstruction have no empirical research associated with them at all. In the absence of such, we present a diverse selection of interventions from across North America.

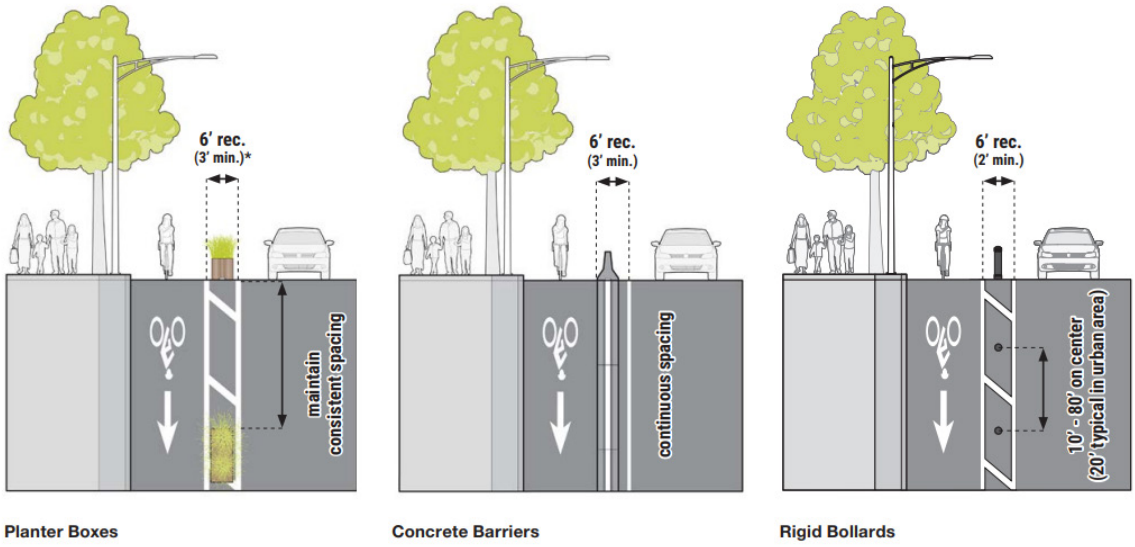
Design Interventions

Design-based interventions rely on physical infrastructure to prevent people from parking in bike lanes by making them inaccessible or uninviting.

Bike lanes that are protected by a physical barrier were found to be obstructed by people parking motor vehicles only approximately a quarter (27 percent) as frequently as conventional bike lanes (Tuckel and Pok-Carabalona 2019). While vehicle obstructions were significantly lower for physically protected bike lanes, this same study found that pedestrians were then four times more likely to obstruct the barrier-separated bike lane with their presence.

Any type of buffer is associated with increases in self-reported levels of comfort by people cycling, including those who are "interested but concerned," or individuals who report a willingness to travel by bicycle but express apprehension about traveling near vehicles or in mixed traffic. Bike lanes protected with physical infrastructure such as plastic flex-posts, planters, or raised concrete curbs generated higher levels of comfort than paint-only buffers or buffers created by parked vehicles (McNeil, Monsere, and Dill 2015). Bike lanes with a physical barrier also have a stronger impact on reducing collisions between people biking and people driving compared to paint-only buffered lanes or conventional bike lanes (Schultheiss, et al. 2018).

Figure 1
Examples of Different Bike Lane Buffers



Source: Massachuetts Department of Transportation Separated Bike Lane Planning & Design Guide, 2015

There is a gap in the literature regarding the efficacy of various types of physical buffers at preventing people from parking vehicles in bike lanes. Addressing this gap will help municipalities make more informed decisions when planning multimodal transportation networks.

A unique type of bike lane is proposed by the authors of a 2016 study on the relationship between bike lanes and on-street parking: designating a portion of the right-of-way as a bike lane during peak periods and as a parking lane during off-peak hours (Chen, Li, Wang, and Jiang 2016). There is precedent for this type of operation in the Boston metropolitan region. The city of Everett, Massachusetts, operates a bus/bike only lane on Broadway from 4:00 AM to 9:00 AM before it reverts to parking for the remainder of the day (Metropolitan Area Planning Council 2021). However, although the lane has been a transportation success, there is little to indicate that its temporal status prevents people from parking vehicles there.

Figure 2
Temporal Bus/Bike Lane in Everett, Massachusetts

Source: City of Everett

While physical barriers significantly reduce obstructions, many vehicles can go over a concrete barrier or curb and all lanes have entrances that may be accessible to someone looking to park. Many rights-of-way, particularly in urban areas, may be too constrained to provide for buffers. As a result of this, design-based interventions need to be deployed in combination with enforcement and policy interventions to maximize their effectiveness and to protect people cycling outside of physically separated lanes.

Enforcement Interventions

One reason for the ubiquity of bike lane obstruction is that the chance of penalty is incredibly small. An analysis of New York City enforcement found that fewer than 2 percent of all complaints of an obstructed bike lane reported to 311 resulted in a ticket, the lowest enforcement rate of any complaint (Arnav 2023). This rate of enforcement was similar to a non-scientific investigation by a news agency in Rochester, New York (Dahlberg 2019). It is quite likely that many blocked bike lanes are not reported to the authorities in the first place, which would suggest that the actual rate of enforcement for such violations is considerably lower than the New York analyses suggest.

Enforcement agencies may also have policies that make issuing tickets difficult. The Philadelphia Parking Authority, for example, gives someone obstructing a bike lane with posted "No Parking" signage a 25-minute grace period before issuing a ticket and will never issue a ticket if the person is in the vehicle and agrees to move (Santoro 2024). As most people parking in the bike lane remain for five minutes or fewer, very few people would qualify for enforcement action even if the parking authority were to find them while parked (Brown, Klein, Thigpen, and Williams

2020). These enforcement policies are not forceful enough to act as a deterrent to the behavior, and municipalities would be well served by reviewing whether their departmental enforcement policies align with the nature of the violation. Even with stricter enforcement, however, the challenge of having sufficient eyes on the street for an effective amount of enforcement to deter bike lane obstruction remains.

Figure 3
Bellingham, Washington, Police Officers on Bicycles

Source: WikiMedia Commons

To overcome this challenge, some cities are reconsidering how they manage parking enforcement. One simple intervention that shows anecdotal promise is putting parking enforcement authorities on bicycles. The Philadelphia Parking Authority launched a bicycle unit in May 2023 and found that the number of tickets issued for obstructing a bike lane increased tenfold year over year (Santoro 2024). Putting enforcement officers on bicycles results in them using the infrastructure they are responsible for maintaining. When enforcement agents are not driving, they are also moving through the area more slowly and are better able to observe conditions. To quote one officer from a bicycle unit in a small Oregon town, "It's like being a [motor vehicle] passenger when you're training somebody, you see more than when you're driving," (The New Era 2009). While the increase in enforcement is encouraging, the program is still too young to determine whether it is sufficient to make a lasting impact on obstruction frequency. We could not find analyses that assessed whether the rates of bike lane obstruction are lower in cities with bicycle enforcement units compared to those without.

In addition to changing how enforcement is conducted, some cities are expanding who is involved in enforcement. This is most commonly done by creating a portal or other platform, such as New York City's 311, that the public can use to report when people obstruct bike lanes, at which point an officer will investigate. As previously

stated, this unfortunately results in very few repercussions for offenders because the amount of time it takes an officer to arrive at the scene often allows the offender time to leave before they can be ticketed. In spite of this, empowering citizens to report bike lane obstructions can still be valuable for municipalities. Collecting and geo-locating these instances can help planners identify hot spots and peak times for bike lane obstructions, which then helps municipalities prioritize interventions to stop the behavior, as San Francisco has done since the launch of its "Safe Lanes" app (Moran 2020).

Many cities have considered or are considering involving the public in direct enforcement of bike lane obstruction and other parking violations. There is strong evidence that this would lead to an increase in enforcement. New York City's Department of Environmental Protection has allowed citizens to submit reports of idling heavy vehicles since 2020. By 2021, the number of tickets issued by the department more than doubled compared to 2019 (Siff and Pavlovic 2022). Their program rewards those whose report results in a ticket with a 25 percent bounty, though other programs indicate a bounty may not be necessary to attract participation. The City of Houston's Parking Management Division has had a disabled parking volunteer program since 1995, in which volunteers are trained and allowed to issue citations for parking in disabled parking spaces without a placard. This program has more than 400 volunteers who issued more than 9,800 tickets in 2019 (Gonzále 2020).

Figure 4
Citizen Parking Enforcement in New York City

Source: Grid Magazine

While deputizing citizens to enforce laws can raise rates of enforcement significantly, it also raises significant concerns that have prevented the approach from becoming a more widely used strategy. Very few people are brave enough to try to avoid a ticket by intimidating or bribing a police officer or other government official, but standards may be lower when interacting with fellow citizens. It is difficult to maintain oversight of individuals who are not employees. Houston's manual for disabled parking volunteers lists strategies for dealing with angry citizens, and in one case someone allegedly backed their car into a volunteer (Willey 2019). However, as the program approaches its thirtieth anniversary and hundreds of volunteers have collectively issued tens of thousands of tickets during its lifetime, it appears the incident rate is very low.

One solution that more cities are turning to is automated enforcement. Automated camera enforcement has been consistently shown to be effective in shaping people's behavior behind the wheel. Speed cameras reduce both speeds and accidents (Federal Highway Administration 2023). Bus lane camera enforcement has been effective at reducing obstructed bus lanes in every city in which it has been implemented (Liu 2023). New York City has had such success with automated bus mounted cameras that they are expanding the jurisdiction of the cameras to cover bike lanes this year (Brachfeld 2023). The state of California recently legalized the policy as well (California State Legislature 2023). Automated camera enforcement of parking violations has shown to be successful in cities in the New England region, such as Bridgeport, Connecticut, and Somerville, Massachusetts, which use camera-mounted bollards known as "Safety Sticks" to monitor the curb. This has led other Boston region municipalities such as Everett and Lynn to adopt the tactic as well (Matthews R 2021; Buell 2023).

Figure 5
Example of Safety Stick Automated Enforcement

Source: Municipal Parking Systems Inc.

Automated enforcement has numerous benefits. Regarding the obstruction of bike lanes, a camera's greatest value is that it can catch scofflaws even when the violation is only for a few minutes. Automated cameras also are not subject to the concerns around corruption, inconsistency, and potential for escalation that human enforcement can be. They are not, however, without their own concerns. Any camera-based intervention must make provisions for privacy and handling of data. Cameras must also be implemented in an equitable manner, with oversight to ensure that certain neighborhoods are not subjected to greater levels of enforcement than others. If implemented in a consistent manner, cameras also alleviate the risks of inequitable enforcement due to ingrained biases related to race, class, gender, and other personal characteristics.

Enforcement interventions are, by their nature, reactive in nature. As a result of this, while they can be an excellent tool for discouraging repeat offenses, they work best in combination with other interventions that are more proactive.

Policy Interventions

Management of limited curb space is one of the most complex issues in modern urban planning. Demand for curb space in cities across the United States has surged as multimodal transportation considerations compete with increases in delivery, ride-share, outdoor dining, parklets, and more. The policies that cities are implementing in response have been as varied as the challenges.

A straightforward economic approach to freeing up more curbside parking is to make it more expensive. As Dr. Donald Shoup explains in *The High Cost of Free Parking*, free and underpriced parking encourages people to make transportation choices that crowd curbs (Shoup 2011). Cities that have raised parking costs and reduced parking requirements have not experienced a parking catastrophe as some anticipated, and in fact have successfully made parking available on-demand to those who need it most, as determined by their willingness to pay for it (Grabar 2023). The impact of raised prices will disproportionately fall upon lower-income drivers, who will be forced to choose between parking farther away from their destination or paying higher prices on strained budgets. However, it is important to note that people who own cars are typically higher income than those who do not (King, Smart, and Manville 2019). The benefits derived from market-based pricing will also mean parking will be available when the need is highest, and reduced illegal parking will benefit all road users, particularly vulnerable users such as people bicycling (Grabar 2023).

One solution draws on one of the oldest known transportation planning interventions. In the year 44 BCE, the streets of ancient Rome suffered from chronic traffic congestion caused in large part by vehicles delivering people and goods across the city. The vehicles were chariots and carts rather than motor vehicles, but the impacts were recognizable to modern eyes. Julius Caesar's response was to ban the use of all private vehicles on city streets for the first 10 hours of the day, thus forcing all deliveries to be made at twilight or overnight. This policy was effective enough that it lasted, if occasionally modified, for centuries through the imperial period (Matthews K 1960).

Two thousand years later, shifting commercial delivery traffic to overnight hours is an increasingly popular intervention with myriad benefits, including reduced conflict with people biking. New York City, which has had an incentive program to encourage overnight delivery for over a decade, has found that it decreases illegal parking, saves fuel and time for carriers, and is a very popular program with people driving commercial vehicles (Wojtowicz, et al. 2023). While popular with both drivers and delivery companies, delivery times are typically dictated by the receiving company who may not be familiar with the impacts of delivery during standard business hours

and the benefits of off-hour delivery. To address this, New York City is rolling out new incentives for businesses that receive their deliveries during off-peak hours (New York City Department of Transportation 2024).

Figure 6
Overnight Freight Delivery

Source: Corlett Express Trucking Inc.

Shifting commercial vehicle trips to off-hours is a valuable intervention but only addresses one category of people driving. Another opportunity for policy intervention requires working with taxi, ride-share, and food delivery services to designate neighborhood pick-up and drop-off zones. These zones, when executed properly, create predictability for drivers and customers while steering them towards legal parking. Such zones are common in airports across North America for this reason, but they are less common in congested business districts that have more complex sources of trip demand.

The City of Boston conducted a pick-up and drop-off zone pilot in the Fenway neighborhood in 2019. The pilot was effective, and Boston Transportation Department Parking Management reported that "generally drivers appeared to be using the zone correctly." However, food delivery was still reported to cause traffic issues. Drivers and the public experienced confusion during the pilot, but increased exposure and wayfinding signage can address these concerns. Collaboration with service providers is critical to the success of these programs. Working with companies such as Uber, Doordash, and others to communicate zone locations and their expected use will make them both easier to use and increase the city and companies' perspective that pick-up and drop-off zone use is mandatory.

Figure 7
Pick-Up and Drop-Off Zone Signage

Source: City of Boston

For more traditional commercial carriers, many cities are experimenting with changes to loading zones. In Seattle, Washington, an analysis of loading zone impacts on bicyclist safety recommended situating loading zones at the beginning of blocks in order to make them easily accessible to commercial trucks, thus reducing the instances of bike lane obstruction found at mid-block loading zones. The study also recommended that loading zones should not be placed on hills with high bicycle traffic volumes (Butrina, McCormack, Goodchild, and Drescher 2016). Another study examined how 20 North American cities have managed off-street loading zone requirements and found that cities with stricter requirements experience less illegal commercial vehicle parking. Unfortunately, to achieve the strict loading zone requirements, many cities increased curb cuts, which increased the exposure of people walking and biking to more conflict points with people driving motor vehicles (McDonald and Yuan 2021)

A strategy that was not found to reduce commercial vehicle dwell times on its own but that may be effective in combination with other interventions is the installation of consolidated, common-carrier parcel delivery lockers. One study on these lockers in Seattle found that although they significantly reduce the time that a carrier spends inside of a building, they were still spending a similar amount of time parked on the curb (Ranjbari, Diehl, Chiara, and Goodchild 2023).

Management of existing loading zones is also changing. Smart loading zones, which allow carriers and/or drivers to reserve a timeslot in a loading zone ahead of time, achieve an effect similar to the designated pick-up and drop-off zones for ride-share companies. The Public Parking Authority of Pittsburgh, Pennsylvania, launched a smart loading zone pilot program in 2021 with 20 zones and recently expanded the program to 200 zones for 2024. Zone reservations are free for the first 15 minutes, after which point smart loading zone users are charged in 15-minute increments (Kroll 2023).

Shifting deliveries so that they are completed using less obstructive vehicles is another strategy with the potential to increase curb space. This approach can be applied up and down the hierarchy of delivery vehicles, such as turning a tractor trailer into a box truck or a box truck into a van. A smaller vehicle simply takes up less room. The most spatially effective change is shifting deliveries to bicycles when possible. The introduction of electric-assisted cargo bikes in recent years has made such a transition feasible for far more deliveries than previously viable. Cities can promote this transformation with many of the same interventions described above that promote cycling in general, but there are specific interventions for bicycle freight that can be made as well.

Starting in 2020, cities such as New York City and Miami, Florida, have partnered with legacy carriers such as UPS, FedEx, and DHL to launch e-cargo bike programs and have found the programs successful enough to continue expansion (Fletcher 2023). Key to the success of these are "micro-hub staging areas" where the companies can break up large deliveries because their existing logistics are built around large hubs from which box trucks and vans are dispatched. Santa Monica, California, has taken the additional step of creating electric vehicle only smart loading zones, which both electric vehicles and e-cargo bikes will be allowed to use (Kroll 2023). For the smallest deliveries, such as food and small grocery errands, Santa Monica has also partnered with the private company Kiwibot to deploy small sidewalk robots after its successful deployment in a handful of college campuses (Bergman 2021). Locally in Boston, a 2023 partnership between the City and Net Zero Logistics launched a pilot for e-cargo bike delivery in the Allston-Brighton neighborhood called "Boston Delivers" (Boston Transportation Department 2024).

Figure 8
UPS E-Cargo Bike

Source: UPS

3 STAKEHOLDER ENGAGEMENT

MPO staff developed an engagement strategy to inform our assessment of the impact of blocked bike lanes and explain why people park motor vehicles in bike lanes. This engagement strategy primarily focused on two groups–people who use bike lanes and delivery drivers. The latter group was selected due to ease of access and a presupposition based on anecdotal evidence that this group was disproportionately responsible for bike lane obstructions compared to the average person driving (Robertson 2019).

3.1 Bike Lane Users

People who use bike lanes were determined by MPO staff to be a critical constituency for this survey to assess the impacts caused by obstructions to bike lanes.

Online Survey

The primary method for assessing the impacts of bike lane obstruction on people who use them was an online survey developed by MPO staff, which was distributed by cycling advocate partners, municipal partners, and social media outreach. Full survey results can be found in Appendix 1.

The survey was conducted from March 20 to April 30, 2024, and received 1,298 responses. Of those surveyed, 80 percent reported using a bike lane at least once a week.

One of the most notable takeaways from the survey was the perception of unbuffered versus buffered bike lanes. Three-quarters (76 percent) of those surveyed reported encountering a parked vehicle obstruction either "frequently" or "almost always" in an unbuffered bike lane compared to only one-quarter (24 percent) in a bike lane with a physical buffer such as flex posts, parking, or concrete. This is demonstrative of how pervasive the problem is, while also pointing to the power of design in mitigating the impacts.

The most serious impacts of blocked bike lanes relate to the safety of people using the lane. Of those surveyed, 87 percent indicated that when they encounter an obstruction in a bike lane, they avoid it by deviating into the travel lane. These maneuvers are often sudden, with little opportunity for the person using the bike lane to safely check their surroundings and little warning for someone driving in the travel lane to react to the merge. The frequency with which these obstructions are encountered, forcing a dangerous merging maneuver, may contribute to recent

research indicating that unbuffered bike lanes may increase the rate of vehicle-cyclist collisions (Garber et al. 2023).

In addition to the danger presented by sudden merging maneuvers, convenience and travel time are also affected by the high rate of obstruction. Eighty-five percent of respondents indicated that they deviate from their planned route due to expected obstructions at least "sometimes." Massachusetts Avenue in Boston, which had concrete buffers for the bike lane removed in 2020, was the most cited bike lane that respondents avoided due to frequent obstructions (Vaccaro 2020).

Most cyclists who responded to the survey indicated that when they encounter someone blocking a bike lane with a motor vehicle, they are unlikely to confront them, with 44 percent of respondents stating that they never do so and 43 percent reporting that they only do so sometimes. Those that do confront drivers at least some of the time reported that the most common response from drivers is hostility. "Anger," "aggression," "vulgarity," and "hostility" were all commonly cited responses. Descriptions such as "apathy," "indifference," and "ignoring" make up the next most common category of responses. The expected response may explain the relative infrequency of people trying to address the issue directly with the person blocking the lane.

Direct Engagement

MPO Communications and Engagement staff participated in tabling at the Bay State Bike Month Kickoff Celebration on April 28, 2024. At this event, participants were invited to complete the survey described above and share their experiences using bike lanes in the Boston metropolitan region.

About 75 people visited the table, approximately 15 of whom engaged in lengthy, in-depth conversation with MPO staff. Many people were eager to share their stories about blocked bike lanes and specific problem locations. One participant said they regularly confront the person when they encounter an obstruction and reported that the most frequent response they receive is a dismissive "I'm only here for a minute."

Several people wanted to share their ideas for interventions to prevent people from obstructing the bike lane. The most common was implementing fully separated or bollard-protected bike lanes.

Many people expressed concern about the rising frequency of motorized scooters in bike lanes and on separated bike paths. A few people mentioned that this problem applies not only to bike lanes but to bus lanes and other areas that are not meant to accommodate people parking personal motor vehicles.

3.2 Driver Communities

MPO staff identified organized groups of professional drivers as the most efficient way to learn why people park vehicles in bike lanes. Using the social media website *Reddit*, 15 "subreddits"—the name for groups focused on a particular topic—were identified. These included a mix of gig-work driver communities as well as more institutional delivery drivers.

Table 1
Reddit Driver Communities

Subreddit Name	Affiliation	Membership
r/uberdrivers	Uber	374,000
r/doordash_drivers	DoorDash	272,000
r/truckers	Trucking Industry	248,000
r/instacartshoppers	Instacart	165,000
r/usps	U.S. Postal Service	114,000
r/amazonflexdrivers	Amazon	93,000
r/couriersofreddit	Gig Delivery Industry	73,000
r/amazondsprivers	Amazon	68,000
r/grubhubdrivers	Grubhub	57,000
r/lyftdrivers	Lyft	53,000
r/sparkdriver	Walmart	35,000
r/shiptshoppers	Shipt	34,000
r/ubereatsdrivers	Uber	32,000
r/upsers	UPS	29,000
r/fedexers	FedEX	29,000
Total		**1,676,000**

Note: Users may be subscribed to multiple subreddits, and the numbers in this table do not reflect unique users.

Direct Community Outreach

Using an official Boston Region MPO *Reddit* account, a thread was created in each community with the following prompt:

"Hello! We represent an organization that conducts transportation research and planning activities and are currently studying the challenges posed by delivery in parking constrained urban areas. We are looking for perspectives and experiences from those who work in these types of environments. Your input is vital for making urban delivery less stressful and ensuring transportation systems work for all users.

1. When operating in urban areas, how often do you find a legal parking space/loading zone available at your immediate destination?
2. When operating in urban areas, if there is not a legal parking/loading zone at your immediate destination, will you seek one nearby? What is your threshold time and/or distance to find a legal parking space?
3. In instances where you park illegally to make a pickup or delivery, how often does someone confront you about the issue?
4. How does your company/supervisor respond to parking tickets/complaints of illegal parking while conducting your work?"

These questions were framed around illegal parking generally instead of bike lanes specifically due to concerns that the often-charged opinions surrounding bike lanes would encourage insincere responses.

Unfortunately, this direct approach was unsuccessful in generating useful feedback from delivery drivers. Most threads were deleted by community moderators due to rules about only drivers being allowed to create threads or rules prohibiting question solicitation in the case of UPS and USPS. Where the threads were allowed, the questions received either negative responses or no responses at all. Of the 15 communities to which we reached out, we received one sincere response, from *r/uberdrives*. This person reported finding legal parking very rarely, if ever. They shared that there is a lot of pressure to avoid searching for legal parking due to customer and company expectations of fast delivery. They reported being frequently confronted in instances where their illegal parking inconvenienced someone but having never been subject to enforcement actions from law enforcement.

Indirect Community Outreach

We conducted indirect community outreach by using a staff personal *Reddit* account in *r/instacartshoppers* and *r/doordash_drivers* categories by creating threads with invented scenarios related to bike lanes, parking, and bike delivery.

Common responses included frustration with the lack of loading zones in areas where pickup is common, the struggle of needing to bring deliveries directly to a customer's door within a large multiunit building, and shared the perception that bike lanes dedicate curb space to a form of transportation that is only viable a few months of the year in Boston and cities with similar climates, especially in the New England region. The viability of delivery via bicycles or cargo bicycles was dismissed for all but the smallest and most urban deliveries.

Archival Community Research

Our Communications and Engagement staff reviewed the archives of the identified driver communities to find previous discussions related to bike lanes and parking in urban environments. Staff found relevant threads across the communities where members discussed issues related to bike lanes. The full threads can be found in Appendix B of this memorandum.

Common themes were found across these threads regardless of the community in which it was posted:

- All threads included posts expressing frustration over insufficient loading zones and availability of legal parking for making deliveries and/or conducting passenger pick-up/drop-off.
- Use of the bike lane as an acceptable space to park for deliveries and pick-up/drop-off was nearly universally considered acceptable by posters in these threads. Complaints about parking in the bike lane were disregarded as frivolous.
- Despite the view that parking in the bike lane was acceptable, little to no sympathy was expressed towards threads created to complain about tickets received for doing so.
- Views towards people who use bike lanes were deeply negative, with frequent use of insults, explicit language, and whataboutism.
- All communities expressed that their affiliated company did not care about them parking in bike lanes.

Author's Personal Experience

Between December 2022 and June 2024, I made 796 deliveries for the grocery-focused delivery service 'Instacart' in the Boston metropolitan region. This time spent delivering was not done in preparation for this memorandum and much of it predates my employment with the Boston Region MPO. The following observations reflect my personal experiences and may not be representative of drivers for other services or even those of other Instacart full-service shoppers. It should also be noted that these deliveries occurred almost exclusively between the hours of 6:00 AM and 12:00 PM on Saturdays and Sundays and that pressures on my performance were limited by having concurrent full-time employment throughout my time working as a full-service shopper for Instacart.

Instacart orders, unlike meal delivery and rideshare services, are primarily full-service grocery orders from large supermarkets such as Stop & Shop and wholesalers such as Costco. The delivery of these orders typically requires multiple trips between the car and the customer's door. In instances where the delivery address is an apartment in a multifamily building, it is also required that the order be brought directly to the apartment door inside of the building.

Finding legal and close parking in the dense areas of Boston, Cambridge, and Somerville was consistently difficult. I rarely encountered difficulty outside of the dense core, even in the centers of inner suburbs such as Quincy and Newton. I found I had an instinctual threshold of about 50 meters from my delivery destination within which I would consider parking. If I could not find legal parking within this threshold, I would attempt to find the least disruptive non-legal spot in which I could station my vehicle. My subjective, on-the-spot analyses typically led me to believe that blocking the traffic lane on a side street was my least disruptive option.

Given the width of most bike lanes, I rarely found that option to be less disruptive, as I would also be impeding the traffic lane. It is, however, often the closest option at hand. At no point in my experience have I been penalized by traffic enforcement or confronted by a bystander about my parking location. Instacart believes it is the responsibility of individual contractors to comply with all local traffic laws and does not compensate for tickets received in the performance of delivery. Conversely, it does not punish parking infractions or make note of traffic laws after an individual first registers to deliver via the app. More severe violations such as operating under the influence or reckless driving will appear on the annual background checks that the company runs on all shoppers, which can result in deactivation.

Earnings for drivers are precarious and driven primarily by tips. Tips accounted for approximately two-thirds of all the income I made in my time with Instacart. My average income ranged between $22–$25 an hour, before vehicle expenses, but this could be significantly higher or lower on a given day. Time is not factored into the pay structure. A shopper is paid by the order and knows the "bid" for the order before they accept it, assuming the customer does not modify the tip after delivery. This, combined with the percentage of the income that tips comprise, heavily incentivizes the driver to complete the order as quickly as possible so that they can rapidly move to their next order and so that they can impress the customer in the hope of a larger tip.

All of this led me to develop a strong bias against deliveries in dense environments and an increase in the tip required for me to consider accepting such deliveries. Instacart allows shoppers to choose the orders that they accept, allowing me to filter in this way, but it was clear from the number of orders available that demand for inner-city delivery is significant. Nationally, demand for Instacart's services continues to grow (Instacart 2024). Much of this growing demand will continue to be in dense areas. While many drivers such as I may prefer to avoid these orders, as long as the demand for the delivery exists there will be those willing to meet it.

4 RECOMMENDATIONS AND CONCLUSION

Through the research and outreach described above, we have identified numerous short- and longer-term recommendations that municipalities across the Boston metropolitan region can consider to limit the instances of people obstructing bike lanes with motor vehicles. Municipal contexts are diverse across the region, and different interventions may be more or less effective in certain situations than others. All interventions should be implemented with an understanding of the specific reasons people are parking vehicles in bike lanes in a location, along with whether and what the most effective treatment is for the given problem. It is our strong belief that a blend of strategies must be undertaken to effectively address bike lane obstructions and improve the safety of bicycle facilities.

4.1 Short-term Recommendations

Our short-term recommendations require little physical construction or coordination with private entities and can be implemented in less than one year.

- Develop a tool to collect citizen reports of bike lane obstructions and create a database to document these occurrences. This would be most effective if it were a universal tool that could be utilized by people biking in any municipality in the region. As such it is recommended to be developed as part of the Boston Region MPO Bicycle and Pedestrian Program or in a public-private partnership with an entity such as Bike Lane Uprising, which already solicits obstruction reports in the Boston metropolitan region.
- Conduct an inventory of loading zones within the municipality and identify where the zones can be shifted to block ends to better facilitate vehicle entry and exit.
- Review parking enforcement policies to ensure alignment with the nature of the blocked bike lane problem.
- Develop a bicycle unit within the agency or department responsible for parking enforcement.
- Identify areas in which on-street parking occupancy consistently exceeds 85 percent and implement (or, if already existing, raise) parking meter rates as needed to achieve 85 percent occupancy.
- Encourage state-level legislation to legalize bus and bike lane enforcement via camera.

- Develop educational outreach on the impacts of business-hour deliveries and the benefits of overnight deliveries for local businesses, as well as incentives for business delivery receivers to switch to overnight deliveries. The Boston Region MPO should develop template materials under the Freight Program that municipalities may customize.
- Encourage new development to use common carrier parcel lockers for delivery.

4.2 Longer-term Recommendations

Our longer-term recommendations involve either physical construction, lengthy planning efforts, or coordination with several private entities. These interventions may take more than one year to implement.

- Develop a training program, guidebook, and submission and appeals process for a volunteer citizen enforcement program.
- Develop a comprehensive bicycle plan that identifies hotspots for people obstructing the bike lane (or likely hotspots where lanes are planned but do not presently exist) and strategies to mitigate lane blockage. This can be done by individual municipalities or as a regional plan with representative case studies conducted by the Boston Region MPO.
- Implement physical separation via either a buffer- or grade-separated bike lane where space allows.
- When authorized by the state, implement bus-mounted cameras for bus and bike lane automated enforcement in cooperation with the MBTA and regional transit authorities.
- Implement neighborhood-level pick-up and drop-off zones for taxi and ride-share operators that give in-app instructions, locations, and wayfinding assistance to facilitate navigation to the zones.
- Implement smart loading zones in high-demand commercial areas using automated enforcement.
- Coordinate with carriers on their needs to facilitate delivery via incrementally smaller vehicles. Assist in the procurement and development of staging hubs to facilitate e-cargo bike delivery.

4.3 Conclusion

Obstructed bike lanes pose significant safety hazards for people cycling, disrupt the flow of traffic, and undermine efforts to promote sustainable and active transportation. People parking motor vehicles in bike lanes force those using the bike lanes into mixed traffic, increasing the risk of crashes and discouraging the use of bicycles as a mode of transportation. This not only endangers the well-being of people cycling but also affects drivers and pedestrians, creating an urban environment that is overall less safe and efficient.

Taking action to prevent people from parking vehicles in bike lanes brings numerous benefits to cities. It fosters safer, more accessible cycling infrastructure, which encourages more people to choose cycling for their daily trips. This shift can lead to reduced traffic congestion, lower greenhouse gas emissions, and improved public health through increased physical activity. Moreover, a clear, connected, and well-maintained network of bike lanes can enhance the overall quality of urban life, making cities more livable and attractive to residents, businesses, and visitors alike.

By implementing best practices and effective strategies, cities can not only protect people cycling but also promote a more equitable and sustainable transportation system. Investing in a robust mix of design, enforcement, and policy interventions are essential steps toward achieving these goals. In doing so, cities can create a safer and more welcoming environment for all road users, ensuring that bike lanes serve their intended purpose as safe havens for people moving around the built environment.

Appendices available at the Project Webpage

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