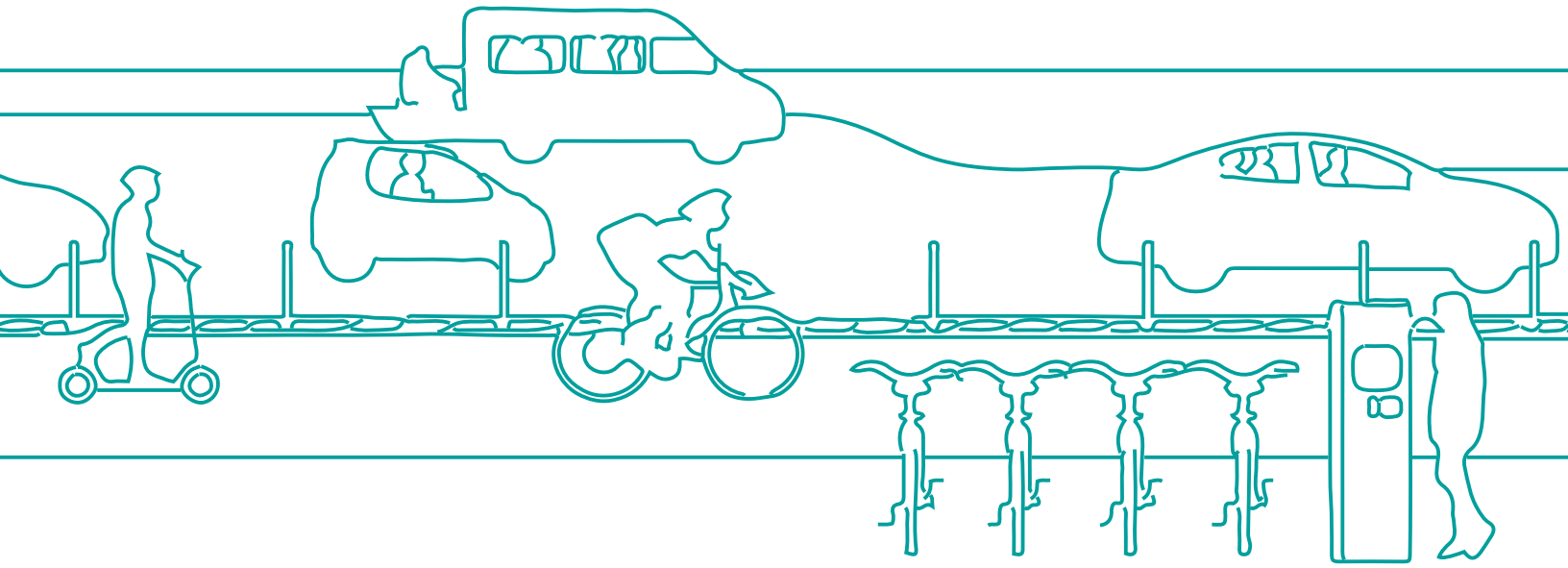

City of Burlington – Integrated Mobility Plan

Future State of Transportation White Paper

July 2022

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Introduction

The Future State of Transportation White Paper is intended to provide the City of Burlington staff, Council, and public with information on new and emerging forms of mobility. While the Integrated Mobility Plan (IMP) speaks to the growing role that transit will play in the city, transit is not the subject for this paper. The key topics in this paper are:

- E-Bicycles and Other Electric Micromobility Devices
- Shared Micromobility (Bike and Scooter Share)
- Car Share
- Ride Share and Ride Hailing

The paper includes a summary of each topic and relevant considerations and challenges, with a focus on how other cities have implemented or developed policies and other identified best practices. Finally, each topic includes recommendations and directions for the role that the City of Burlington can take related to each topic. The paper also considers other emerging subjects for the City to continue to monitor.

E-Bicycles and Other Electric Micromobility Devices

What it is and its purpose in the transportation system

Over the past few years, there has been many types of electrified personal mobility devices that have come to a widespread commercial market across the globe, including in Canada. Micromobility is an emerging umbrella term to capture all of these types of personal mobility devices that includes non-motorized devices such as bicycles, skateboards, and kick scooters. Companies are continuing to create new types and permutations of micromobility devices that include electric motors. There are focused efforts to help categorize these types of vehicles which include considering their features, weight, width, top speed, and power source. Some popular examples of electric mobility devices are:

- E-bike – two or three wheeled bicycles that have a motor that either fully powers or compliments (electric-assist) someone pedalling. E-bikes must comply with Provincial regulations to be used on public roadways
- E-scooter – two wheeled device that users stand on that has an electric motor that powers the device. E-scooters must comply with Provincial regulations
- Electric skateboards, one wheels, and balance boards are common examples of low speed electric micromobility devices
- Mobility scooters – electric powered devices that travel at a speed equivalent to that of people walking

These devices are intended to provide mobility options to help people get around their community. They are sized to transport individuals and one to two other passengers in a smaller form than a motor vehicle. Some devices such as electric-assist bicycles have become very popular with families, seniors and people with disabilities as the motor helps to power the device and can help to make cycling up hills and longer distances more accessible. They are accessible to use as they do not require a license to operate and are much more affordable than car ownership.

All about e-scooters

E-scooters have quickly become one of the most common electric micromobility devices. This is due to the rise of e-scooter share systems that have become common in cities globally in recent years. As of January 1, 2020, e-scooters became legal to use on public roads in Ontario through a five-year pilot program in the Highway Traffic Act. The program allows municipalities to enable where and how e-scooters may be used. To allow e-scooters to legally be used in their communities, they must pass by-laws to permit their use. Municipalities are also encouraged to let the Ministry of Transportation (MTO) know they are participating by contacting them and providing semi-annual reports to the MTO. The MTO provides requirements for e-scooters and operational and safety requirements as part of the pilot.

Municipalities in Ontario that have passed by-laws to enable e-scooters include Hamilton, Mississauga, Ottawa, and Windsor. At the same time, Toronto has not approved the use of e-scooters, with focused concerns related to shared e-scooter systems (as discussed in the Shared Micromobility section below). Regardless of whether municipalities have passed by-laws regarding the use of e-scooters, they are widely available for the public to purchase at stores and online. As a result, personal e-scooter use is still possible, but may be illegal and the user subject to fines if enforced.

Considerations and challenges

Electric micromobility devices present many considerations and challenges to our current transportation system. A key question is where do these devices belong? A primary consideration is the top speed of the device. Mobility scooters and devices intended to replace walking are most appropriate on the sidewalk, where the devices would be travelling at walking speeds. E-scooters are regulated through the MTO pilot to a maximum speed of 24 km/h. E-bikes are able to travel up to 32 km/h under motor power as per their MTO regulations. Consensus is forming that **devices are most appropriately used where people are permitted to cycle** due to similar speed potential. This can result in conflict where pedestrians and people cycling are already sharing a facility, such as on multi-use trails, like the Centennial Trail. Many municipalities across Canada, including Waterloo, Mississauga, and Ottawa are permitting e-scooters to be used in bike lanes, multi-use paths, and on roads with a speed limit of 50 km/h or less. Devices that go significantly faster than 30 km/h, such as motorcycle-like e-bikes, should operate on the road rather than on pathways or in bike lanes.

A challenge with the growing popularity of these devices is that many cities do not have adequate networks where people feel comfortable using micromobility devices. Most commonly, painted bike lanes are directly next to high-speed car traffic, which provides insufficient separation for a user to feel comfortable. As a result, many people using e-scooters and other electric micromobility devices use the sidewalk, even if they are aware that they are not permitted to use the device on the sidewalk. Building facilities that are comfortable for users, such as physically separated bikeways will be integral for supporting use of micromobility devices.

While there are concerns about safety and injuries from use of e-scooters, including head injuries, studies have found that injuries most often occur on shared e-scooter systems for riders in their first few rides when they are less familiar with using the device, or when used under the influence of drugs or alcohol. Studies have also found that while there is commonly an initial negative reaction to e-scooters and complaints to the city, these decrease over time.

Role for the City

The City has a significant role to play in enabling electric micromobility devices to be used. The City's Cycling Plan recommended a city-wide network of facilities appropriate for their road contexts for people to feel more comfortable cycling. The build out of this network will be integral for people to feel comfortable using electric micromobility devices. The emergence of these devices has made it clear the need for complete networks of facilities for devices travelling between 15-30 km/h. The City should also prioritize projects to separate pedestrian and cycling/micromobility users where they currently share facilities. The City could play a further role by providing rebates or subsidizing the cost of e-bikes, joining other cities and jurisdictions.

The following is a summary list of actions:

- Pass a by-law enabling personal e-scooter use in Burlington in accordance with the MTO pilot regulations
- E-scooters be allowed to operate in bike lanes, multi-use paths, and on roads with speed limits of 50 km or less
- When designing new facilities, consider wider geometry to better support more users that are operating at different speeds (i.e., widths of devices and ability for users to pass each other comfortably)
- Await further guidance from the MTO on e-bike classification updates
- Implement the Cycling Plan, and consider separating popular multi-use trails and paths such as the Centennial Trail
- In the short-term, implement a share the trail campaign to remind people using multi-use facilities to be courteous of other users
- Engage with the public on how electric micromobility helps them travel around the city, and where people are experiencing conflicts with other people using these vehicles to identify where improved facilities may be necessary
- The City should consider size and location of bike parking, to accommodate a large spectrum of device types
- Promote electric micromobility use as a safe, sustainable mobility option

Shared Micromobility (Bike and Scooter Share)

What it is and its purpose in the transportation system

Shared micromobility is an umbrella term for fleets of shared bicycles and e-scooters, although there are examples of other shared micromobility devices. Shared micromobility has become a common mobility option in many cities around the world. They allow the public to have access to micromobility devices that are available for short-term rentals via memberships or as a casual, one-time user. Shared micromobility enables multimodal trips, allowing people to use devices for only part of a trip, such as accessing transit, and incorporate other modes. It also provides access to maintained devices, removing the need to own, maintain and store a device.

Modern bike share systems began being implemented in the late 2000s, with dock-based systems beginning in Canada in Montreal and Toronto. These systems started in focused downtown service areas of their respective cities, and through continued investment from government have expanded their service areas and bicycle fleets, including the introduction of electric-assist (e-bikes) bicycles. These systems have proven to be financially sustainable through a combination of user fees, corporate sponsorships, and public investments.

More recently, many other cities across Canada are looking to implement bike share programs, often combined with electric kick scooters (e-scooters), including in Windsor, Ontario. These systems are privately owned and operated and the cost to the City can vary. Some cities require operators pay administrative fees to operate in a city and provide security deposits. Other cities contribute funding to the operator in order to support program sustainability and support various programs from the operator such as an expanded service area into less market-driven areas or to provide discounted membership programs.

A key source for information on shared micromobility is the North American Bikeshare & Scootershare Association (NABSA), which provides resources and information on shared micromobility systems in North America and emerging topics.

Case Study: SoBi Hamilton

Hamilton Bike Share/SoBi Hamilton system launched in 2015, after Council approved implementation of a bike share system in December 2013. The system was originally contracted by the City of Hamilton and operated by private operator Social Bicycles who continued to operate the system after being purchased by Uber. In 2019, Uber notified the City it would be terminating their contract and ceasing operations in 2020. The non-profit organization overseeing the system with the City, Hamilton Bike Share Inc., sought sponsorship and funding to continue operating the system, which it successfully did in June 2020. Most recently, it was announced Hamilton Bike Share would be receiving 600 bikes from the City of Portland, Oregon, which recently bought a new electric bicycle fleet for their Biketown system. Hamilton Bike Share has received funding from different levels of government and Metrolinx, as well as private foundations, and recently secured a corporate sponsor. The system has funded equity-focused programs to provide discounted memberships for people with low-incomes, and adaptive cycle options, through the Everybody Rides Initiative.

Considerations and challenges

Shared micromobility systems can either be dock-based, dockless, or hybrid systems. This refers to where devices are parked. Dock-based systems have dedicated station docking infrastructure, like in Toronto and Montreal which requires using space in the public right-of-way or working with landowners to site stations. Dockless systems allow for users to park devices anywhere, though there are usually rules or guidance around where they are permitted to be parked, such as for e-scooters in Ottawa. Despite rules and guidance for where to park, there has been criticism of dockless systems for improperly parked devices blocking sidewalks and adding to accessibility concerns, although research has tried to further understand this issue. Hybrid systems, like the bike share system in Hamilton and e-scooter operators in Washington, DC require devices to be locked to fixed objects, while also including stations, which allows for flexibility on where devices can be parked.

As mentioned, there are currently different forms of ownership and roles that a city can take with shared micromobility systems, which have trade-offs. Publicly owned systems such as in Toronto, Montreal, and Hamilton require financial investment from the City public agency for both the upfront cost of purchasing the equipment, as well as ongoing costs for system operations, even while factoring revenue from users, advertisements and sponsorships. Private operators have had a growing role in implementing systems in cities. These are most commonly solicited through a partnership, request for proposal, or permit program. Some cities seek an exclusive, single operator, while others open up to multiple operators. There are pros and cons to each option, with a main argument for allowing multiple operators is that it encourages a competitive marketplace. Privately operated system costs are covered by the operator, with the city often requiring some funds to support municipal management of the program and to support responsible system operations. Private operators are currently more interested in fleets of e-scooters. With these systems, the city has less certainty on the sustainability of system and can only control the system through requirements in the agreement with the operator.

Cities also often have a challenge identifying the best department or agency to manage the system. There can often be strategic or operational benefits for considering the best group responsible for managing the system. For example, Bike Share Toronto is owned and managed through the Toronto Parking Authority, or other cities where the public transit agency takes a lead role in managing the system. Considering organizational structures and mandates can help to identify opportunities for improved management. Even with publicly owned systems, private or non-profit operators are brought in to do the day-to-day device relocation and maintenance.

Further Reading

ITDP Bike Share Planning Guide

NACTO Guidelines for Regulating Shared Micromobility

Better Bike Share Partnership

Role for the City

The City will have to decide whether it wants to pursue a publicly funded system or work with private operator(s). In the short-term the City could consider a privately operated system to implement a shared micromobility system at a low cost and with less staff involvement, and demonstrate the feasibility for a system in the city. This option will still require staff oversight to work with the program operators and to respond to public feedback. Alternatively, discussions with Hamilton may also be worthwhile to explore opportunities to expand their existing system. Bike Share Toronto is not currently considering expansion outside of Toronto. The City should consider releasing a procurement process for operators to respond to.

Similar to personal micromobility devices, it is integral that there is an appropriate network of facilities so that people are more likely to use shared micromobility. Implementing the Cycling Plan network will be key to enabling shared micromobility in Burlington.

The following is a list of private shared micromobility operators with systems in Canada (as of time of writing):

- Bird
- Drop Mobility
- Lime
- Neuron
- Roll
- Spin
- Zip

Car Share

What it is and purpose in the transportation system

Car share is another growing mobility option which is oriented to providing people with access to cars, with an emphasis on short trips. Car share systems are most often owned by a private company or non-profit operator who own and are responsible for managing a fleet of cars that are available to members of the system. Car share members most often just pay for the distance and temporal length of their trip, with gas, insurance, and other vehicle costs covered by the operator through that fee. Car share enables people to choose to not own a car but still have access to a car, or provides flexibility for families to reduce the number of cars they own, by having access to additional vehicles when needed. Car share offers more flexibility than car rentals as they can be rented for an hour, and do not require additional paper work or going to a central location to access the car.

Car share systems vary in their operation model, either operating with free-floating cars that can be parked in any authorized parking zone, such as the Modo system in Vancouver, BC. Other systems have fixed parking locations, most often in existing public and private parking lots, where cars can be picked up from, but must be returned to, such as the Communauto system which operates in Hamilton, Guelph, Waterloo, and Ottawa, as well as several other cities across Canada. Car share can also be used by businesses and public agencies to provide staff access to cars when they need it, instead of maintaining their own fleets. Peer-to-peer car sharing services have also emerged as options, such as Turo, where someone can post their personal vehicle to be "rented" by others when they are not using it.

The Car Sharing Association is an industry organization that supports and promotes car sharing, and may be a resource for more information.

Considerations and challenges

Car share has been proven to decrease people's vehicle kilometres travelled and lessen the need for parking spaces by decreasing the number of private vehicles owned in the community. One carsharing vehicle removes seven to eleven private cars, as car share members sell their vehicles, avoid buying a vehicle, or delay buying a vehicle because of their access to car share.

Car share has had mixed results in smaller cities and towns, with key considerations for a system's success being ability to live without a car, or with just one vehicle. University or college campuses are typically strong markets for carsharing.

As car share systems are most often owned and operated by private operators and cooperatives, the City does not have direct control over bringing a car share system to the city. Many carsharing systems in smaller communities originated as community initiatives. The City could look for ways to provide incentives and consider best practices to support car share systems setting up. For example, the City of Kelowna reviewed their policies and looked at best practices to strengthen existing car share partnerships. Increasingly, car share is being viewed as part of a mobility system that includes shared micromobility, and transit.

Role for the City

The City has taken steps to enable car share by requiring developers to provide reserved car share parking spots in developments and working with prospective operators by offering spaces in municipal parking lots or working with existing building owners. This policy has had limited impact as there is not currently a car share system present in the city. The City may also incentivize operators by providing on-street permits for car share vehicles. The City may consider either informally contacting existing car share operators to see if they are interested in operating in the city or by releasing a formal request for interest or proposal procurement process to see if there is interest from operators. Continuing to identify and create potential parking spaces for a car share service to use will also help to attract a service. The City should also consider how it could use a car share system for internal staff travel, replacing its own vehicle fleet. Other cities have found potential savings by replacing portions of their fleets with access to car share for staff travel. City commitment and staff use of the system could help to support use of the system and provide flexible access to a vehicle fleet.

Ride Hailing and Ride Sharing

What it is and purpose in the transportation system

Ride hailing and ride sharing are often thought of as interchangeable terms. Ride hailing services such as taxis have existed for a long time, with the basic definition being that someone hires a driver to take them to a destination. In recent years, ride hailing platforms such as Uber and Lyft have also begun to operate ride hailing services that operate outside the traditional and often regulated taxi industry. Uber, Lyft and other ride hailing services enable people to use their personal vehicles to in effect operate a taxi, where the driver can choose the hours they work. An element of these new ride hailing platforms is that pricing is tied more to demand which means that prices can be cheaper at certain times, or more expensive at peak demand, compared to a traditional taxi which has regulated rates for distance and temporal length of trip. They also have applications on phones removing the need to either hail a passing taxi or call for a taxi to be dispatched. Many traditional taxi services have now developed phone apps to replicate the experience of using Uber or Lyft. Ride hailing provides people with a fast, personal transportation option to get directly to their destination.

Ride sharing is a way for multiple riders to reach their destinations by sharing a single vehicle that is going that direction. It is the evolution of carpooling or vanpooling, where people would have arranged rides with someone to a shared destination or somewhere along the way, but ride sharing is focused on being a more on-demand transportation option. Similar to ride hailing, passengers on a ride share pay a fee, but it is often more affordable than ride hailing, as it is contributing towards a trip that the driver was already planning on taking. Uber and Lyft have started providing options for people to share rides with others at a reduced cost, but this still considered a ride hailing service. Ride sharing can provide people with an affordable transportation option, but is currently often dependent on having a shared destination or association, such as going to the same workplace. Some apps have been developed to provide more on-demand trips, but these are dependent on available willing users and do not currently have the same reliability as ride hailing.

Considerations and challenges

The City of Burlington regulates the traditional taxi industry through the Public Vehicle By-law, including regulating the number of taxi companies and licenses that can operate in the city. These regulations can burden the industry and make it less competitive with other ride hailing options such as Uber and Lyft. There is still a place for the traditional taxi industry, particularly for people that do not have a smartphone or are not comfortable using newer ride hailing platforms. The City should also consider how it can “even the playing field” in regards to how it regulates traditional taxis and new ride hailing platforms so that one form does not have a competitive advantage over another. The Competition Bureau released this paper on modernizing regulation in the Canadian taxi industry.

While ride hailing provides a convenient way for people to travel, it can be expensive compared to other modes depending on the type of trip. Ride hailing has also been found to significantly increase the vehicle kilometres travelled, stemming from the additional unregulated vehicles from ride hailing platforms, increasing the number of cars on the road. One research paper found that when accounting for the distance travelled by drivers between jobs and to get to pick ups, ride hailing adds between 40-83% more vehicle kilometres travelled then the person taking the direct trip.

Ride share has generally been limited to traditional carpooling or rooted through employment travel demand management programs such as Smart Commute or dedicated vanpool programs. Some new applications have tried to create on-demand ride sharing options, but these have had limited adoption. Emerging technologies such as automated vehicles and shuttles and on-demand micro-transit could all be considered as types of ride sharing services, blurring the line between ride hailing and public transit. However, given how recent these technologies are, there is not yet sufficient research to understand their impacts.

Role for the City

The City should review and update its Public Vehicle By-law to modernize it with consideration for ride hailing platforms. Ride sharing should be encouraged, including employer ride share programs. The City should review curbside management policies and could work proactively with ride hailing and ride sharing operator to locate preferred pick up and drop off areas.

Other Emerging Subjects

The following are summaries of some emerging mobility subjects for the City to be aware of.

Shared Autonomous Vehicles

Autonomous vehicle (AV) technology has developed significantly over the past decade, to now having vehicles operating at full levels of automation on public roads, including both personal and shared AVs. Current shared AVs are operating as pilot projects for testing, such as the West Rouge Automated Shuttle Trial or the Whitby Autonomous Vehicle Electric Shuttle Project. Shared AVs are an attractive future transportation option as they would be electric vehicles without operators, reducing environmental and operation costs. A shared AV could operate on a fixed route similar to a bus service, or on-demand creating a route based on who is requesting a ride. Shared AVs could benefit the transportation system as they would remove personal vehicle trips. Shared AV technology has a ways to go before being a mainstream mobility option as technology, manufacturers, and economic feasibility develops. Future considerations for the City could include regulating operations in light of public transit, including where they travel, data sharing, and where they can pick up passengers as part of curb management.

Neighbourhood Electric Vehicles

Neighbourhood Electric Vehicles (NEVs) are low-speed electric vehicles that are smaller and lighter than a regular car, similar to a golf cart. In 2017, Ontario began a 10 year pilot allowing NEVs to operate on public roads through the Low-speed vehicle pilot program. The vehicles have a maximum speed of 40 km/h and must include standard safety features. Municipalities must pass by-laws to allow the vehicles to operate on roads. Currently Haldimand and Norfolk Counties and the Municipality of Lambton Shores have passed by-laws enabling the vehicles. These vehicles are attractive because they are cheaper to operate than a car, the smaller size can improve parking storage, and they can be practical for everyday travel around a community. Through the pilot these vehicles are only permitted on roads with speed limits 50 km/h or less. A challenge to grow of use of NEVs is the limitation on where they can operate, as there are safety concerns for their operations with regular vehicle traffic.

Micro-Utility Devices

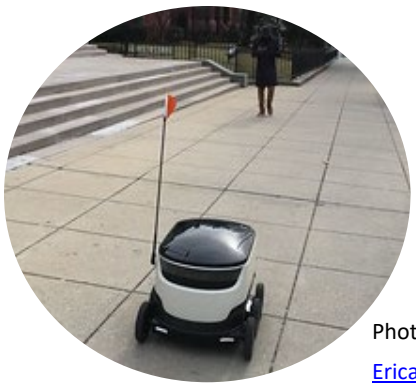

Photo: Erica Fischer

While flying autonomous drones aren't yet delivering goods to us, four-wheeled delivery robots have begun to emerge due to lack of regulations in cities around the world, including in Toronto. Micro-Utility Devices (MUDs) are low-speed, electric, autonomous devices that are task-oriented, such as to deliver goods the "last-mile". Other task-oriented uses could include personal and service-oriented uses such as automated snow clearing devices or other maintenance tasks. There could also be uses for surveillance and monitoring. MTO is considering adding legislation to enable MUDs to operate through an existing pilot program, which would include operating at 10 km/h on sidewalks, and 20 km/h in bike lanes and road shoulders. In Toronto, the devices were delivering food from restaurants, which is loaded into the robot, and the devices storage is unlocked and picked up by the recipient. The City of Toronto has since prohibited the operation of MUDs until the MTO pilot project is implemented, and the Council decides whether to opt-in. Toronto's decision was based on concerns around the potential impacts of the devices for people with disabilities. At the same time, the City of Toronto is moving ahead with studying their potential uses and to allow their use in certain locations to facilitate continued research and testing. Due to their lower operating speeds and smaller size, it is more likely to expect autonomous MUDs to become widely used before other autonomous vehicles. The City should be prepared to consider whether these devices will be permitted to operate in Burlington. This includes understanding the potential impacts such as higher demand for space on sidewalks and bike lanes.

Curbside Management

Curbside management is an overarching theme for the City to address to enable the mobility options discussed in this report, as they all have demands for space within the road right-of-way, particularly along curbs. Curbside management seeks to inventory, optimize, allocate, and manage curb space to maximize mobility, safety, and access. A coordinated strategy, such as Toronto's, can help to make decisions on how and where to prioritize different curbside uses. An example could include designing pick up and drop off spaces along a corridor for people to access ride hailing and ride sharing vehicles, or for delivery vehicles to stop to make a delivery. Another example is repurposing on-street parking spaces for other uses such as a bike share station, bike parking, green infrastructure or streetscaping, a reserved car share space, or as a designated space for electric vehicle charging.

The City of Burlington has installed sensors at on- and off-street parking stalls throughout the downtown, providing important data to understand the utilization and turnover of parking in the area. Looking at parking throughout the downtown area as a system could enable the City to consider parking management as a tool to use valuable curbside space more strategically, achieving space for moving people, pick up and drop off, deliveries, patio spaces or other uses. The City's Official Plan recognizes parking management as a tool "to influence mode choice… and shape the public realm" (6.2.1(1)l). A curbside management strategy would include parking management, refocusing the conversation from parking to a wider range of curbside uses. The Institute of Transportation Engineers (ITE) developed a practitioners guide and tool to help cities develop management strategies for their curbside space.

Summary

Today's mobility options are not static, and have been shaped through decision-making and incentives that developed a built environment that was designed for cars. This paper looks to established and emerging mobility options to provide guidance on what they are, key considerations and concerns, and roles that the City can undertake to help enable them in Burlington. As the City makes decisions about which mobility options to prioritize and incentivize, it should return to the vision and goals from the IMP for guidance, and evaluate how much these mobility options accomplish the established goals. This exercise has been completed below for the main options reviewed in this paper. Using this type of method helps to illustrate how certain mobility options are more important for achieving the City's vision and goals. As shown in the table below, non-car based mobility options better align and are more likely to accomplish the City's goals, especially when aligned with land use planning and the anticipated future demands on the City's transportation system.

IMP Goals	E-bicycles and Electric Mobility Devices	Shared Micromobility	Car Share	Ride Share / Ride Hailing
Burlington will eliminate transportation-related deaths and serious injuries	●	●	◐	◐/◔
Burlington's transportation system will be accessible and reliable for users regardless of factors like age, ability, income, or familiarity with the city	●	●	◐	◕/◐
Burlington will provide high-quality transportation options to move people and goods wherever and whenever, while maintaining a high quality of life for residents	●	●	◕	◐/◔
Burlington will eliminate transportation-related carbon emissions	●	●	◐	◐/◔
Burlington's streets will support the intended roles of the communities they run through and help these communities be vibrant and prosperous	●	●	◐	◔/◔
Burlington will actively plan for the transportation changes of tomorrow while continuing to deliver great service today	●	●	◕	◐/◐

○ does not contribute to goal
◔ poorly contributes to goal
◐ somewhat contributes to goal
◕ mostly contributes to goal
● strongly contributes to goal

The City has a key role to play in the implementation of these mobility options, but the type of role or strategy for the City can vary. Some actions require the City to take a leading role such as implementing the Cycling Plan network, where as there are options for how the City proceeds with enabling and implementing shared micromobility. The City isn't alone in figuring out what role it should play, and cities around the world are developing and testing approaches to enable and manage these new mobility options. An example is Pittsburgh's Move PGH project which is an attempt to implement a combined system of mobility options including shared micromobility, carsharing, and ride sharing focused around transit-oriented mobility hubs. The City of Pittsburgh released a request for proposals in 2019 for a consortium of private sector operators to partner together to deliver the product, which aligns with the principles of mobility-as-a-service (MaaS) which is intended to provide integrated access to mobility options as services instead of personally-owned options. This would streamline how we make decisions by simplifying how we pay for mobility services and enable people to make different mobility choices throughout the day based on the trip they are taking.

A key point of the mobility options reviewed in this paper is that our transportation system needs to provide options for people to move around their community without having to rely on owning a car. The future mobility options respond to this by creating more flexible options, such as shared vehicles. The future mobility options also "right-size" transportation to design a transportation system based on person-capacity, which includes options that are appropriate for everyday travel and tasks, while accommodating other uses. This is particularly significant for trips under 7.5 km which the IMP seeks to shift towards cycling modes. Electric micromobility devices will be very attractive for this distance when direct, quality routes are available to be used. Shifting towards right-sized mobility options can contribute to improving road safety and how space in road rights-of-way are utilized.