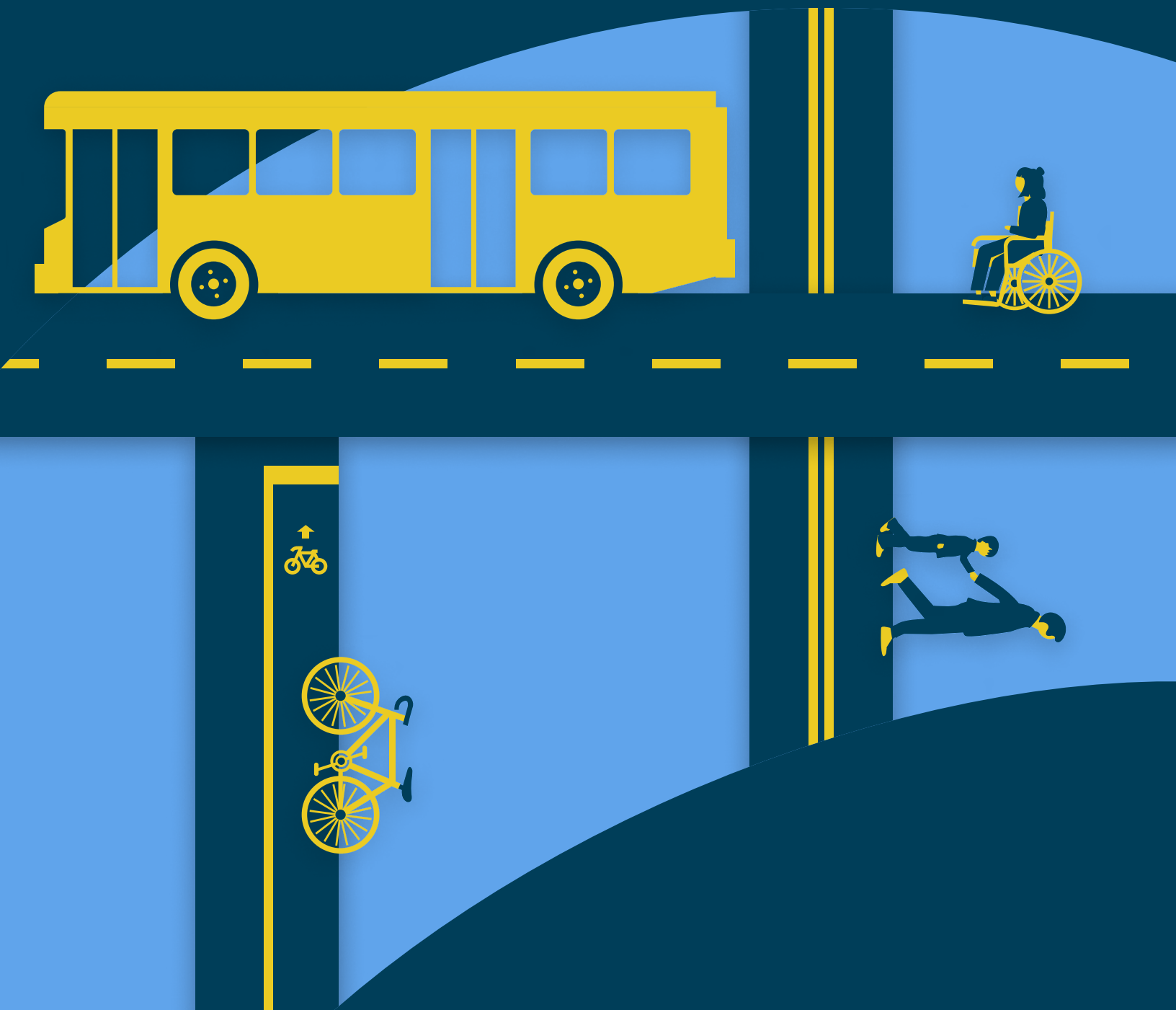
BACC Bay Area Climate Change Council

Options for Travel

Giving Residents a Real Choice



Bay Area Climate Change Council

bayareaclimate.ca

Author: Bianca Caramento (2022)

We recognize that our work, and the work of our member organizations, takes place on traditional Indigenous territories, of the Haudenosaunee, Anishinaabe, Six Nations of the Grand River and the Mississauga's of the Credit, First Nation. This territory is part of the Dish with One Spoon Treaty, an agreement between the Anishinaabe, Haudenosaunee and allied nations to peaceably share and care for the resources around the Great Lakes.

BACCC recognizes and actively works to ensure Indigenous rights to data sovereignty by ensuring consent before, during, and after input is provided by our Indigenous partners, as is outlined in Article 19 of the UN Declaration on the Rights of Indigenous Peoples (UNDRIP).

Acknowledgements

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Executive Summary

Low carbon forms of transportation, like walking, using mobility devices, biking, and public transit require improvements to be considered a real choice for most residents of Hamilton and Burlington. If low carbon forms of transportation are not perceived as safe, convenient, reliable, and equitable, we cannot reasonably expect residents to select those options to get around.

“If low carbon forms of transportation are not perceived as safe, convenient, reliable, and equitable, we cannot reasonably expect residents to select those options to get around.”

This report aims to improve the choices available to Bay Area residents, ensuring they can opt for low carbon transportation, should they want to.

At present, about 17% of the Bay Area’s greenhouse gas emissions come from transportation. By improving the low carbon options available to residents, the cities of Hamilton and Burlington can reduce their respective transportation emissions, thereby pursuing their emission reduction targets and improving the everyday lives of citizens.

The analysis and recommendations included in this report are a product of extensive qualitative and quantitative research, in addition to comparative policy analysis (described in detail in the Methodology section).

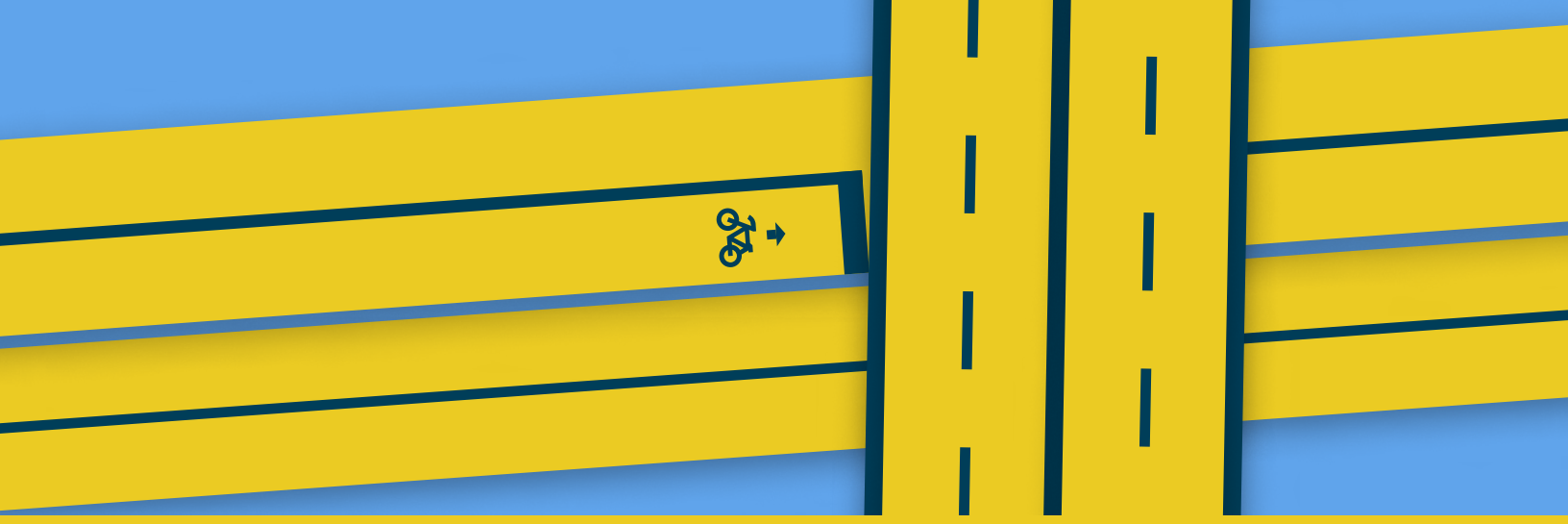
Below, readers will find a summary of all recommendations listed herein. Each of the recommendations are tangible and specific, in order to aid city staff with implementation. Annual follow ups on the status of each cities' progress will be made public through BACCC, to ensure accountability and give due credit to the hard work of those involved.

Recommendations Summary

TRANSIT RECOMMENDATIONS	HAMILTON	BURLINGTON
Improve the frequency of public transit routes, with more consistently timed service.	X	X
Review arrival schedules for public transit buses for better alignment with GO train services.	X	X
Complete a feasibility analysis for express routes or improved public transit service to business parks.	X	X
Complete audits of all city bus stops to determine safety improvements for transit riders, particularly women. Track the number of improvements flagged and completed over time.	X	X
Ensure all public transit staff complete diversity and anti-bias training.	X	X
Collect data on snow removal for bus stops and release it in real time on an open data platform.	X	X
Collect data on the number of bus stops with seating and strive to increase the percentage of stops with seating for users to rest, particularly pregnant women and the elderly.	X	X
Provide clarity to post-secondary institutions on whether student bus passes will be accepted on the new light rail transit (LRT) line.	X	
Meaningfully and respectfully consult Six Nations on their views and preferences regarding a public transit connection between Six Nations and Hamilton.	X	
Review the feasibility of offering free public transit during the Holiday Season, to complement the existing program for free parking downtown to encourage local shopping.	X	
CYCLING RECOMMENDATIONS	**HAMILTON**	**BURLINGTON**
Improve cycling infrastructure to improve connectivity	X	X

and safety for residents.		
Determine intersections that have poor safety records for protection upgrades. Implement enhanced safety features at the identified locations, complimented by an education campaign for travelers.	X	
Collect data on snow removal for bike lanes and release them in real time on an open data platform, like the City of Ottawa.	X	X
Create a priority cycling network to be plowed, de-iced, and cleared in winter months.	X	
Develop a marketing campaign to encourage and normalize winter cycling.	X	X
Complete a comprehensive update to the Cycling Master Plan, utilizing a gap analysis and the recommendations listed herein.	X	
Fund promotional campaigns to encourage cycling generally.	X	X
Expand secure bike parking infrastructure by developing detailed secure bike parking guidelines for developers and employers, similar to other cities.	X	X
Consider expanding bikeshare infrastructure across Hamilton, to better serve residents.	X	
Create a Burlington bikeshare program, similar to the program offered in Hamilton.		X
Improve access to free publicly accessible bike repair stations.	X	X
Prevent bike theft by bolstering existing bike registry programs.	X	X
Seek the Bike Friendly Community Gold designation, operated by the Share the Road Cycling Coalition.	X	X
Enlist TransLAB, under the supervision of Dr. Darren Scott at McMaster University to analyze cycling data to prioritize network improvements and expansion.	X	X

WALKING AND MOBILITY DEVICE RECOMMENDATIONS	HAMILTON	BURLINGTON
Complete walk audits surrounding all schools to determine safety improvements for pedestrians, particularly children. Track the number of improvements flagged and completed over time.	X	X
Assess and improve the 'sidewalk to road ratio' across the city, aiming for 1:1, where feasible.	X	X
Improve safety by completing city-wide lighting studies for pedestrians.	X	X
OVERALL NETWORK RECOMMENDATIONS	**Hamilton**	**Burlington**
Commit to open data, wherever possible. Update these data sets regularly.	X	X
Develop data sharing agreements with local school boards to optimize public transit routes for schools.	X	X
Invite CityLab and MacChangers to work on the low carbon mobility initiatives listed herein, to find innovative solutions and reduce the burden on city staff.	X	
Invite the MacData Institute to host a hackathon competition with collected transportation data, to find innovative solutions and reduce the burden on city staff.	X	X
Commit to including a standing item on all Greater Bay Area Sub-Committee meetings to review each city's respective transportation data trends and allow for discussions of collaboration and shared learnings.	X	X



. 01

Introduction.

.01 Introduction.

The Bay Area Climate Change Council (BACCC) is a social impact initiative made up of community leaders across Hamilton and Burlington. BACCC's vision is for the Bay Area (Hamilton and Burlington) to be a thriving and resilient net-zero carbon community by 2050. In order to reach net-zero, BACCC is collaborating with partners to cut carbon emissions in the big three emitting sectors: buildings, transportation and industry.

At present, about 17% of our region's greenhouse gas emissions come from transportation. In Spring 2020, BACCC commissioned a research report to understand barriers to and opportunities for integrated mobility in the Bay Area. A key recommendation of the report was to further the use of data to improve decision-making and support emissions reductions through greater uptake of low-carbon transportation options (View the Recommendations Report [click to download the PDF]).

Following this work, BACCC convened its Implementation Team to research and analyze transportation systems in the Bay Area to offer specific, tangible recommendations to improve low carbon transportation for residents. This report reflects that work.

Methodology

The analysis and recommendations included in this report are a product of extensive qualitative and quantitative research, in addition to comparative policy analysis.

In winter of 2021, BACCC engaged LURA Consulting to support a consultation process that would reach individuals in the following groups:

- The CIO and CDOs of Hamilton and Burlington
- Experts in data policy
- Experts in transportation policy
- Representatives from Burlington Transit, HSR, and Metrolinx
- Owners of existing local and regional transportation data
- Students, academics and community-based researchers
- Representatives of equity-seeking groups
- Open data advocates
- Active transportation and transit advocates
- Youth and active school travel advocates
- Business representatives
- Economic Development staff of Hamilton and Burlington
- Representatives of local post-secondary school students

The aim of the consultation process was to understand the perspectives of community and technical experts on the current and potential uses of data to improve low-carbon transportation options and increase uptake among the diverse populations in our region. Consultations ran from February through April 2021 and consisted of two surveys (community and technical), two workshops (community and technical), and a series of one-on-one interviews, reaching a total of over 40 groups and perspectives.

Participants were asked about:

- What kinds of data are currently available in Hamilton and Burlington and how to make the best use of what is available
- How can data collection or analysis improve low carbon transportation options (including walking, transit, biking, using mobility devices, etc.) for a diverse population
- What are the most important opportunities in using data to help create a shift away from personal vehicle trips within Hamilton and Burlington
- What perspectives and experiences might be overlooked in transportation planning
- Concerns about “big data” and “smart transportation”, including privacy concerns
- Challenges collecting, sharing and managing data across organizations

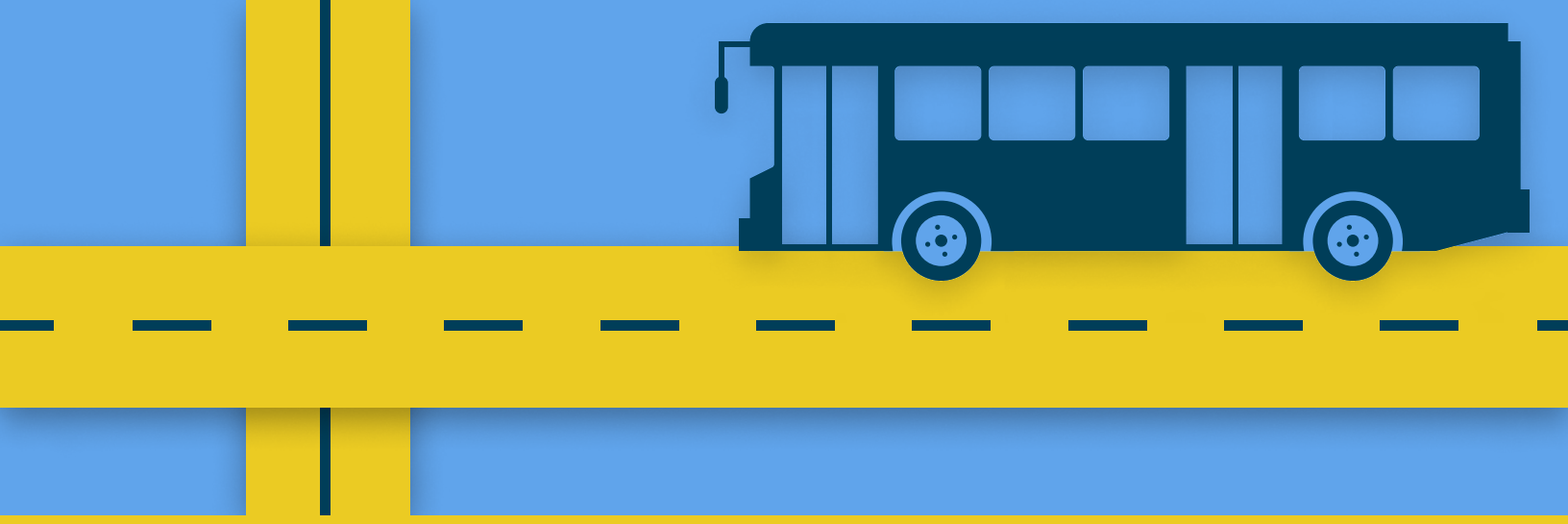
This report also involved quantitative analysis of transit routes in Hamilton and Burlington. As a first step, we created a list of key travel destinations within each city

and compared the time it takes for residents to reach the destinations by bus, versus using a personal vehicle. Inherently, bus travel takes longer than travelling in a personal vehicle, on account of the frequent stops public transit operators must make. Despite this barrier to perfect parity, comparing the difference in travel times for public transit versus personal vehicle allowed us to direct our search towards clear anomalies and significant disparities between modes. The basis for this step was the understanding that significantly longer travel times for public transit make that option less attractive and therefore less likely for residents to consider for travel within and between Hamilton and Burlington.

The key destinations used for this initial analysis and the methodology for this comparison can be found in Appendix 1. Those interested in viewing BACCC's Interactive Travel Tool comparing public transit to personal vehicle travel time can access the tool here.

As a next step, we selected key routes between and among the two cities, completed what is known as 'headway analysis' and reviewed bus schedule alignment with local GO trains alignment. BACCC has also sought data requests from Hamilton Street Railway (HSR) and Burlington Transit to extrapolate necessary insights related to demographics, travel time, and boarding and alighting. From there, we offer recommendations to improve public transit in the City of Hamilton and City of Burlington.

In addition to this form of quantitative analysis, qualitative analysis included a review of existing literature, a review of planning documents for both cities, and comparative policy analysis from other municipalities. This data has been used to provide specific, tangible recommendations that would improve walking, biking, and taking public transit in the Hamilton-Burlington Bay Area.



. 02

Improving Public Transit.

.02 Improving Public Transit.

Using public transit contributes to lower greenhouse gas emissions. The use of public transit lowers per person emissions, particularly if there is a shift from commutes in a personal vehicle to commutes in public transit. A bus or train can carry a large number of travellers while emitting lower amounts of greenhouse gasses as compared to the number of vehicles which would be required to transport the same number of travellers.

As part of the quantitative analysis utilized in this report, a list of key travel destinations within each city was created to compare the time it takes for residents to reach the destinations by bus, versus using a personal vehicle. Details can be found in Appendix 1.

The basis for this step was the understanding that significantly longer travel times for public transit make that option less attractive and therefore less likely for residents to consider for travel within and between Hamilton and Burlington.

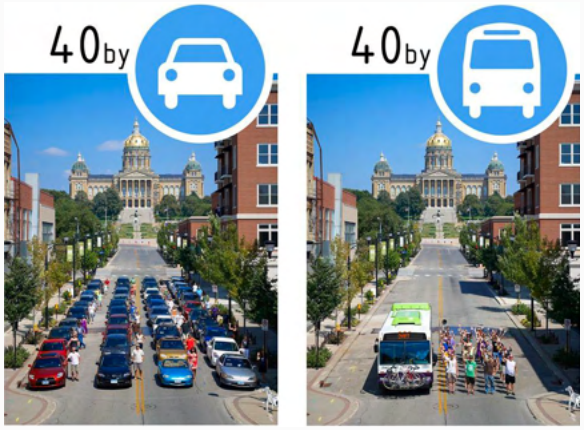


Image Source

As a next step in this report's quantitative analysis, we selected key routes that service major travel destinations between and among the two cities, completed what is known as 'headway analysis', boarding and alignment analysis, and schedule alignment with local GO trains. We describe each in detail below.

HEAD WAY ANALYSIS

BACCC conducted a review of wait times (headway) for several key bus routes in Hamilton and Burlington. This was achieved by viewing the schedule of each selected route and recording the time that it took between buses arriving at the same stop. This analysis allows us to compare different routes to each other in an effort to illustrate the length of time one must wait at a stop if they miss a scheduled bus and determine service levels.

Methodology on this headway analysis can be found in Appendix 2. The full headway analysis can be found here.

BOARDING AND ALIGHTING DATA ANALYSIS

BACCC sent a data request to HSR and Burlington Transit to acquire data on boarding and alighting for several key bus routes. The data request involved boarding and alighting data for each route on a typical weekday and a typical weekend during hours of operation. HSR data specifically contains average dwell times for riders, distance between stops along the route, population density within 400m of the stops along route, percentage of transit to work within 400 metres of stops (employment data for riders using census data), and low income ridership (using census data). This data was then used to assess each route and substantiate rationale for headway recommendations. Full details on the data requests can be found in Appendix 2.

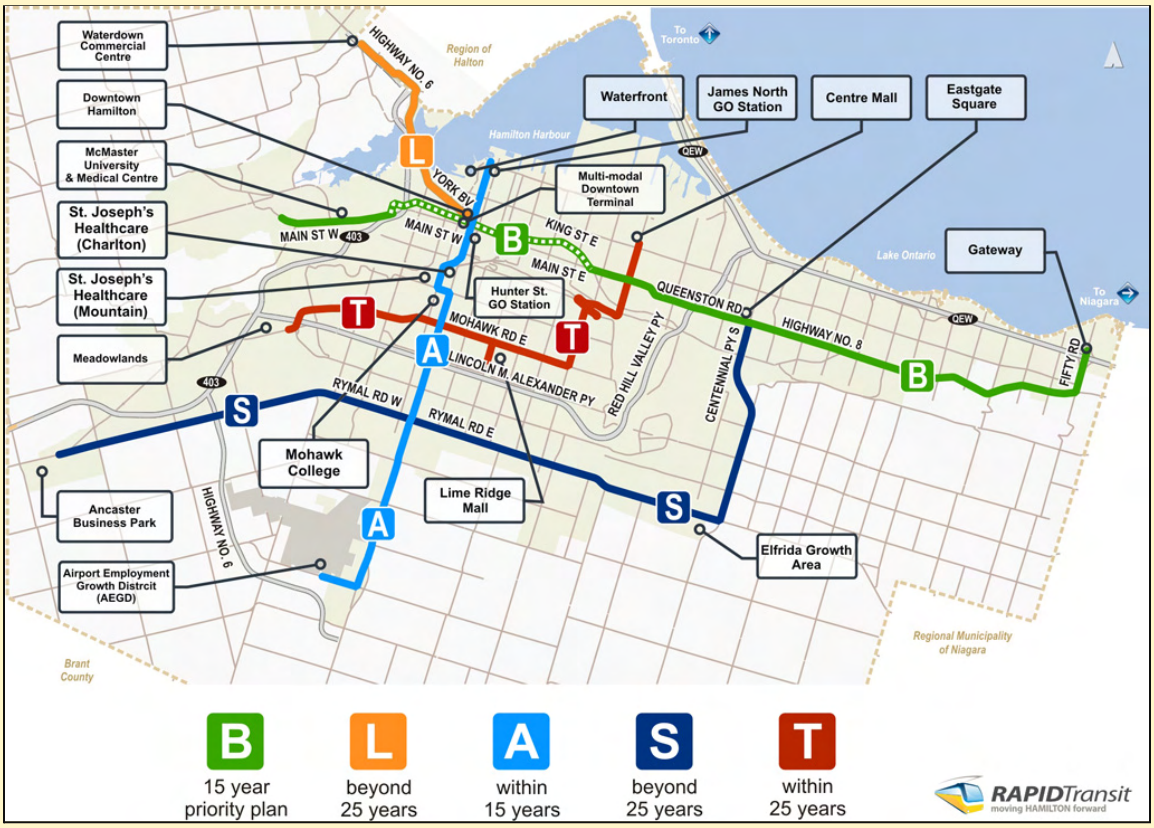
GO TRAIN ALIGNMENT

BACCC staff reviewed the HSR and Burlington Transit's respective bus schedules for their alignment with local GO trains at key stations. This analysis was conducted by comparing the schedules of GO trains at West Harbour GO and Burlington GO with the schedules of municipal bus transit routes that connect to each station. This was done in an effort to illustrate the average amount of time a commuter must wait if they choose to utilize both the municipal bus network, and the Lakeshore West GO line. This measure can be used to gain more insight as to how long a commuter must wait for their connection at the station in the event that they miss the optimal connection. Two measurements were taken, one with the shortest possible connection time, and another with the shortest possible connection time that allows at least six minutes to get to the train from the bus or vice versa. Details of our GO train alignment methodology can be found in Appendix 3.

ASPIRATIONAL TRANSIT GOALS BY EACH CITY

Hamilton, ON

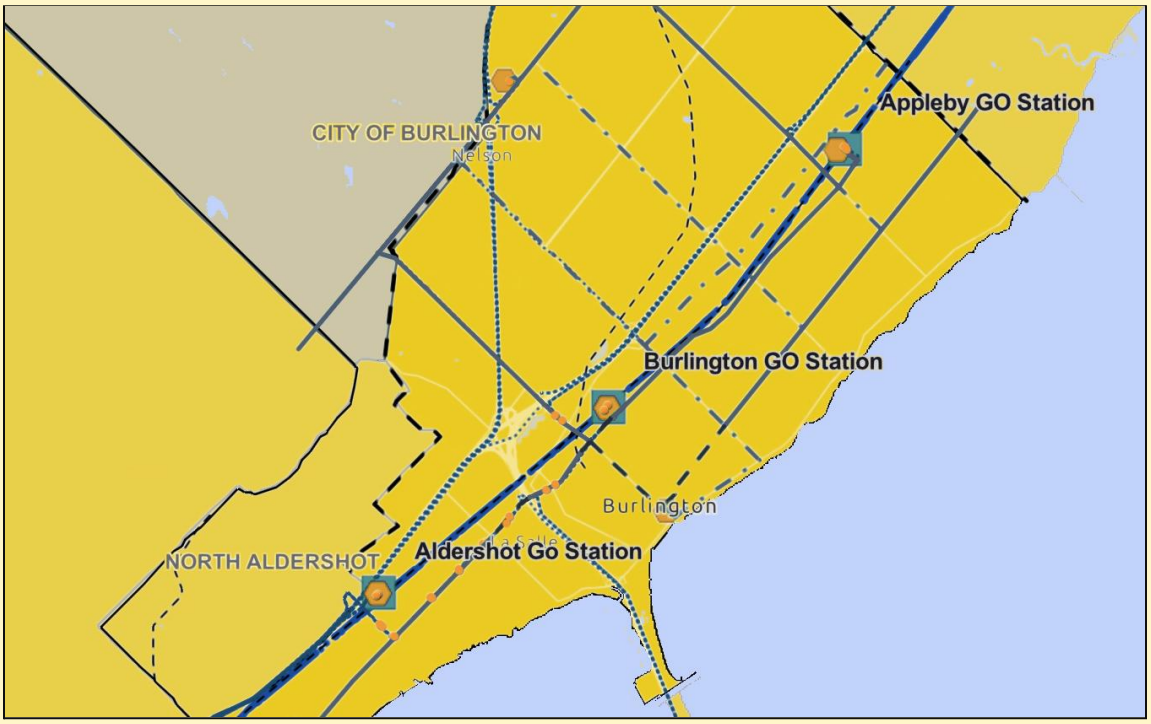
Hamilton has plans for what is referred to as the BLAST network (shown below). To meet the goals stated in the 10 year strategy released by HSR in 2015, the introduction of additional express bus service on the BLAST corridors. HSR has already completed a frequency gaps analysis for several routes corresponding to proposed BLAST corridors. Included in the 10 year strategy is the goal of bringing headway down to 10 minutes for express buses to denote a differentiated level of service, with connecting routes down to approximately 30 minutes including on the weekends.



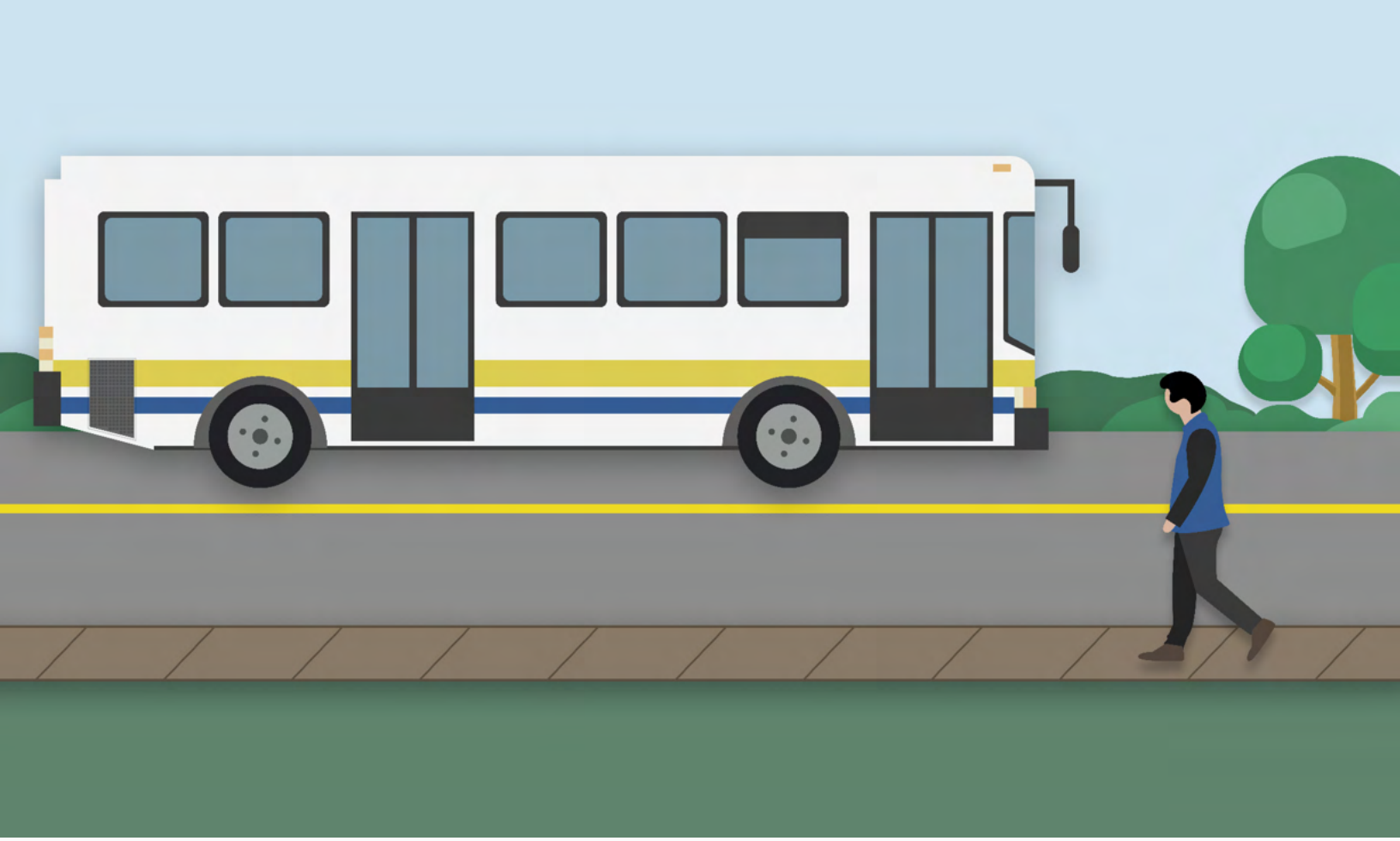
ASPIRATIONAL TRANSIT GOALS BY EACH CITY (CONT'D)

Burlington, ON

Burlington Transit has released a 5 Year Plan for 2020-2024. They intend to move toward a grid-based system (shown below), resulting in quicker trips with more riders by making better use of arterial roads. As part of Burlington's Integrated Mobility Plan, the City has shared their preferred network solution for transit, reflecting a grid system.



Based on these existing goals and our analysis, we offer specific tangible recommendations to improve public transit in the cities of Hamilton and Burlington Recommendations found below.



Transit Recommendations

RECOMMENDATION 1

City of Hamilton could benefit from improved frequency, with larger fleets assigned to several routes.

The Hamilton Street Railway (HSR) operates a fleet comprised of approximately 267 buses and is scheduled to grow by 85 buses by 2025, according to the 2022 Preliminary Tax Supported Capital Budget. Infrastructure Canada has also recently announced that they will commit $29,333,600 of funding to purchase up to 85 forty-foot Compressed Natural Gas (CNG) buses, expanding the City of Hamilton's fleet and adding 300,000 service hours. This funding can be used to make strategic improvements to the current state of headway for the following HSR routes. Securing additional funding from senior levels of government may also be necessary.

HSR ROUTE 41: MOHAWK

Current Headway	Recommendation	Rationale
Weekdays: 40 minutes; Weekends: 60 minutes	15 minute headway weekdays and weekends	This is the proposed T-Line in the BLAST Network, requiring a differentiated level of service

HSR ROUTE 20: A LINE

Current Headway	Recommendation	Rationale
Weekdays: 15 minutes on peak is planned No service on weekends	Improve headway to 10 minutes on weekdays Commence service on weekends	This is the proposed A-Line in the BLAST Network, requiring a differentiated level of service

HSR ROUTE 44: RYMAL

Current Headway	Recommendation	Rationale
Weekdays: 15 minutes planned Weekend: 60 minutes eastbound, 30 minutes westbound	10 minute head way on weekdays 15 minute headway on weekends Ensure consistency in headway for travel in both directions	This is the proposed S-Line in the BLAST Network, requiring a differentiated level of service Route 44 services Elfrida, which is projected to have 80,000 new residents by 2031 The route also services 3 separate business parks

HSR ROUTE 11: PARKDALE		
Current Headway	**Recommendation**	**Rationale**
Weekdays and weekends: 30 minutes	Improve headway to 15 minutes	Connects Hamilton to Burlington Significant demand on this route on weekdays and weekends

HSR ROUTE 55: STONEY CREEK		
Current Headway	**Recommendation**	**Rationale**
West bound: 30 minutes East bound: 15 minutes	Ensure consistent headway in both directions	Consistent and reliable travel times encourage use

RECOMMENDATION 2

City of Burlington could benefit from improved headway, with larger fleets assigned to several routes.

As part of the Canada Community-Building Fund, for which public transit is an eligible project, Burlington will receive $6.1 million for the 2021–22 fiscal year, with nearly $6 million in top up funds. In 2021, Burlington Transit also received $1.5 million in additional provincial funding, added onto $2 billion previously committed by Ontario and the federal government through the Safe Restart Agreement. We recommend utilizing funding to improve transit headways and securing additional funding from senior levels of government as necessary for the following routes.

BT ROUTE 101: PLAINS EXPRESS

Past Headway	Recommendation	Rationale
Cancelled recently Past headway while it was in service was 15 minutes	Reinstate this route, as it was.	Connects Burlington to Hamilton. Services the most demanded route.

BT ROUTE 4: CENTRAL

Current Headway	Recommendation	Rationale
60 minute headway	Improve headway to less than 30 minutes	60 minutes headway is unnecessarily long for riders. Boarding and alighting reaches ~800 on weekdays and is therefore demanded.

BT ROUTE 80: HARVESTER

Current Headway	Recommendation	Rationale
30 minute headway This route only operates on weekdays. No service on the weekends	Improve headway to 15 minutes or less Extend Service on Weekends	This route services the Harvester Business Area and is included in the grid-based improvements for 2024

RECOMMENDATION 3

City of Hamilton: review arrival schedules for HSR Routes 4 and 20, to better serve West Harbour GO and ensure smooth connections.

Aligning rail and bus transit services provides Hamilton residents the option of realistically and conveniently using both modes of transportation without the inconvenience of waiting at the station for a prohibitive amount of time.

As of August 2021, GO Transit began offering daily, hourly passenger rail service from West Harbour Station to Toronto Union Station. In 2019, prior to pandemic lockdowns, the city's service totalled 40 trains a week. This shift has expanded service substantially to 250 trains a week (Source).

BACCC staff reviewed the HSR bus schedule's alignment with the increased local GO trains at West Harbour station. Route 4 eastbound and westbound, in addition to Route 20 northbound and southbound were analyzed to uncover the average time a commuter has to wait when connecting to or from West Harbour GO station. We found that when utilizing optimal scheduled times, one must wait at West Harbour GO for approximately 9 minutes during the week, and approximately 11 minutes on the weekend. Using the six minute minimum measurement these figures grow to approximately 18 minutes each.

Mean Wait Time in Minutes	Measurement 1 (no minimum)	Measurement 2 (6 minute minimum)
Weekdays arriving at West Harbour GO	9	19
Weekdays departing from West Harbour GO	9	17
Weekends arriving at West Harbour GO	14	20
Weekends departing from West Harbour GO	9	16

It was found that in a large number of cases, the train and bus schedules are spaced too closely together, resulting in missing one's connection. See full alignment analysis here on the *Alignment Analysis* tab.

> "In a large number of cases, the train and bus schedules are spaced too closely together, resulting in missing one's connection."

The City of Hamilton should therefore review arrival schedules for HSR routes 4 and 20, to better serve West Harbour GO and ensure smooth connections.

RECOMMENDATION 4

City of Burlington: review arrival schedules for Burlington Transit Route 1, to better serve Burlington GO and ensure smooth connections.

BACCC staff reviewed the Burlington Transit bus schedule's alignment with local GO trains at Burlington GO. Route 1 eastbound and westbound were analyzed to uncover the average time a commuter has to wait when connecting to or from Burlington GO station using this route. See full alignment analysis here on the *Alignment Analysis* tab.

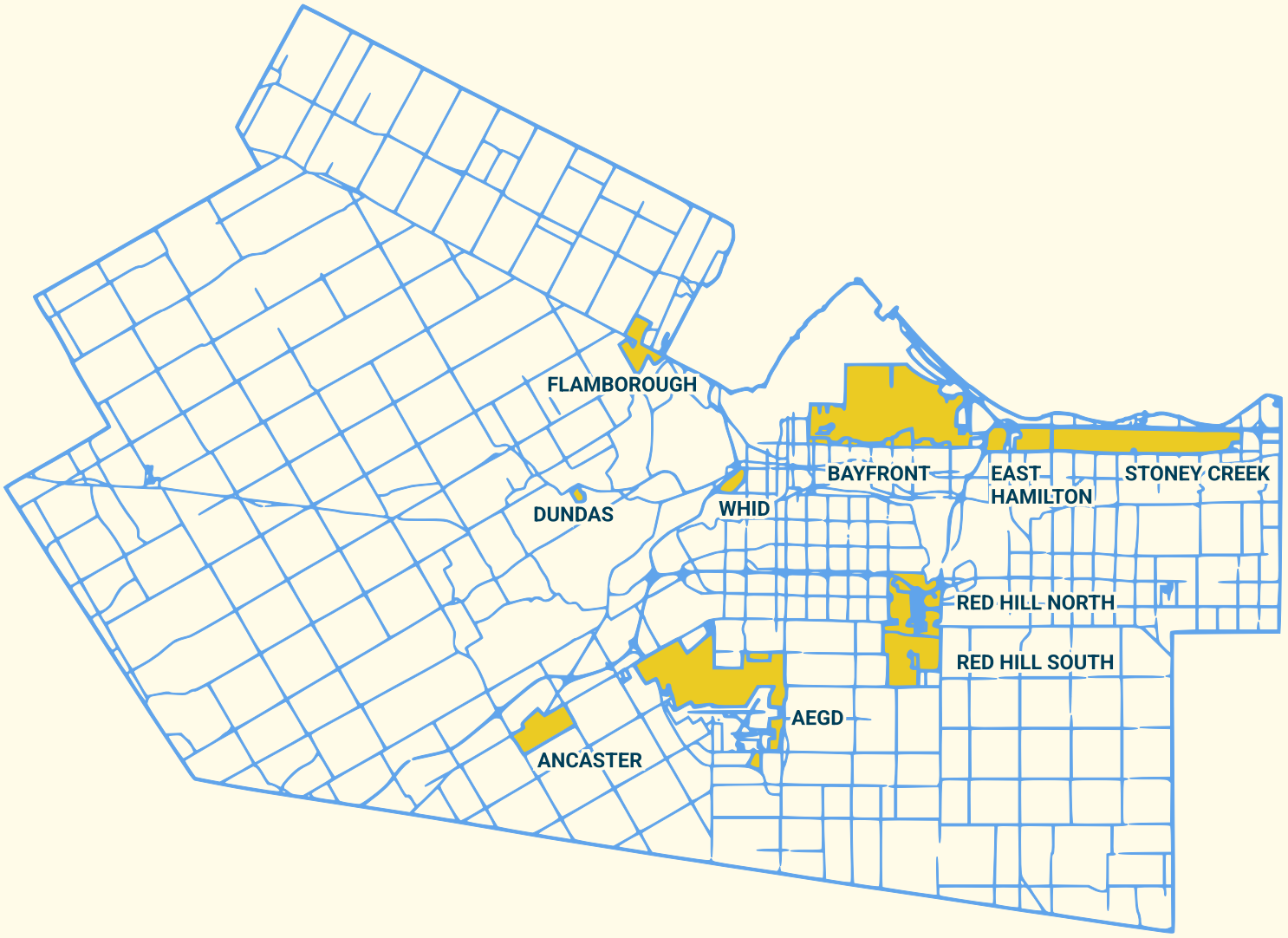
Mean Wait Time in Minutes	Measurement 1 (no minimum)	Measurement 2 (6 minute minimum)
Weekdays arriving at Burlington GO	8	14
Weekdays departing from Burlington GO	4	17
Weekends arriving at Burlington GO	7	15
Weekends departing from Burlington GO	14	14

While the above figures display mean times using Route 1 (Plains-Fairview) there are 11 total routes that service Burlington GO.

It was discovered that when connecting to Route 1 from Burlington GO (westbound arrival) on the weekend, the Lakeshore West GO train arrives at the same time as the bus throughout the day. As such, passengers must wait a full 15 minutes for the next bus. It is recommended that these arrivals be slightly adjusted to better align with the GO train and allow passengers to more quickly connect into the municipal system. However, in all other situations, municipal scheduling is well aligned with GO train arrivals at Burlington GO.

RECOMMENDATION 5

Both cities should complete feasibility analysis for express routes or improved service to business parks. Consider shifts of major employers when conducting the analysis. Employees, particularly shift workers, rely on predictable and dependable bus schedules to get to work. Failing to provide public transit as a real option for getting to work can result in economic repercussions for both cities, as employers struggle to attract and retain talent.



"Nearly one third of Hamilton's overall employment comes from business park employment lands."

Business parks are extremely valuable to the economy of the region. In Hamilton, business park employment lands take up about 4% of the city's land area, and yet, they contain 27% of overall employment (Source). In Burlington, business parks are similarly crucial to Burlington's economy. Halton Region Employment Areas accommodate about 129,000 jobs, representing approximately 54% of the Region's employment base (Source). Nearly all industrial development and the majority of "905" office development is provided by employment lands such as business parks.

It is therefore critical for economic development in Hamilton and Burlington that business parks are well serviced by public transit.

RECOMMENDATION 6

Complete audits of all city bus stops to determine safety improvements for transit riders, particularly women. Track the number of improvements flagged and completed over time.

It is important to ensure that all transit riders feel safe when using transit in the Bay Area, not only to encourage transit ridership but also to maintain perceptions of safety in the community. It is unreasonable to expect residents to utilize public transit if they do not perceive it to be safe.

"It is unreasonable to expect residents to utilize public transit if they do not perceive it to be safe."

Perception of safety is often just as important as safety itself. Ceccato et al. (2021) find that safety perceptions of young riders are affected by previous experience of crimes but not affected by actual victimization. High crime environments co-located with transit stops unsurprisingly reduce people's perceptions of safety. (Source).

Design principles can be utilized to improve safety perception. Sanchez and Julita (2010) present in their study several design considerations for bus stops. For example, designers may consider providing adequate illumination at bus stops, adding an emergency call box to stops and trimming bushes and trees which may otherwise obstruct visibility within bus stops (Source). Relocating bus stops even a few feet away from empty spaces or vacant lots can improve overall security. Where it is not possible to make these changes, heightened security measures can improve the perception of safety among bus riders (Source).

In a 2020 study, 50% of female participants cite not feeling safe while waiting in a bus stop at night. Chowdury finds that women are particularly sensitive to waiting times at stops. Real-time information such as audio announcements can help soothe anxieties with transfers and displays showing arrival and departures times ease the burden of waiting for a bus (Source).

RECOMMENDATION 7

Both cities should ensure all public transit staff complete diversity and anti-bias training.

An unwelcoming environment can negatively affect riders' willingness to utilize transit. The value of diversity training is to ensure that Burlington and Hamilton are welcoming places for everyone.

> "The value of diversity training is to ensure that Burlington and Hamilton are welcoming places for everyone."

Riders raised suggestions in 2017 that drivers should undergo specific diversity training in addition to their regular training. Specific diversity training for bus drivers will ensure that they are trained with the appropriate cultural competency to better deal with these situations should they arise, and that they avoid involving the police, when unnecessary.

RECOMMENDATION 8

Collect data on snow removal for bus stops and release it in real time on an open data platform.

A common theme heard throughout consultations was the need for increased accessibility, particularly with respect to snow removal for bus stops. Collecting data at the level of bus stops will ensure snow is properly cleared to make way for riders, particularly seniors and individuals using mobility devices.

Through consultation carried out by the City of Burlington, snow at bus stops has been identified as a barrier to seniors and bus shelters do not accommodate wheelchairs. The City of Hamilton has also made its commitments to aging populations clear through its vision: "To be the best place to raise a child and age successfully".

The population in the Bay Area is increasing, with seniors (65+) representing Burlington's fastest growing population. Burlington's percentage (19.3%) of seniors is higher than the provincial average, almost one in five residents is aged 65 and over in 2018.

In Hamilton, individuals 55+ represent about 30% of the total population (as of 2019). Seniors (65+) represent 17% of the population. The percentage of older adults using a bus pass increases with age; 12% of older adults report having a local bus or transit pass, with 26% of individuals aged 85 or older reporting to utilize a bus pass.

To properly accommodate these individuals, it is important to make paths as clear and walkable as possible as to allow for mobility devices and the elderly to pass through unencumbered. The City of Hamilton is planning to begin clearing sidewalks on transit routes as of 2022, relieving property owners on these routes from having sole responsibility for snow and ice removal. The City of Burlington clears 850 km of sidewalks, including residential streets, and primary routes (arterial routes and transit) are given highest priority.

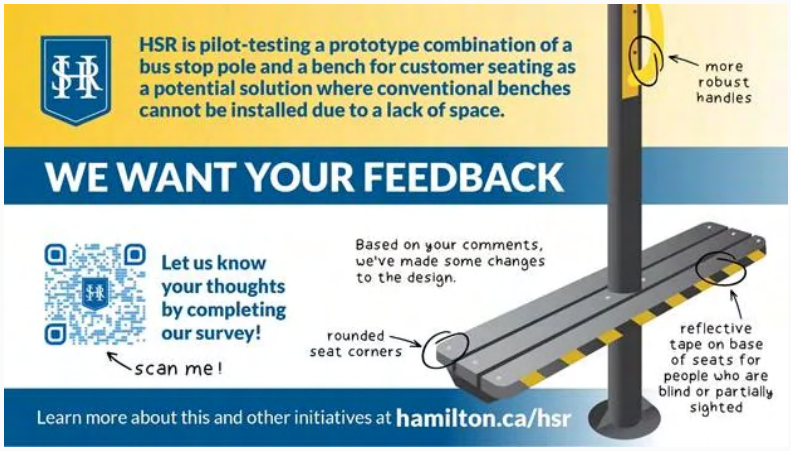
An open data platform allows for residents to view plowing information in real time. The City of Hamilton is already utilizing an official plow tracker at the street level and there is an unofficial tracker for the City of Burlington which uses GPS data.

By uploading these existing efforts to open data platforms, it allows for residents to view plowing information in real time and make transportation choices that suit their needs and ability.

RECOMMENDATION 9

Both cities should collect data on the number of bus stops with seating and strive to increase the percentage of stops with seating for users to rest, particularly pregnant women and the elderly.

A common theme heard throughout consultations is the need for accessibility. Pregnant women and the elderly, in particular, may find it difficult to stand while waiting for the bus. Providing riders with seating allows them to wait comfortably and accommodates the diversity of bus users. Seating also enables users to consider using transit to do groceries, for example, as they can refrain from holding their groceries while they wait for the bus.



The City of Hamilton pilot tested a prototype bench and pole combination in 2021 for customer seating. The original prototype was installed at Upper James and Rymal but has since been expanded to other stops in Hamilton. Not only does this demonstrate the demand for seating at stops, but the feedback from this pilot can help to design seating for bus stops across the region (Source).

BACCC recommends reviewing the percentage of stops with seating for users to rest and to ensure that every bus stop contains seating for riders.This makes public transit an easier choice to make by accommodating a variety of users and trip purposes.

RECOMMENDATION 10

City of Hamilton should provide clarity to post-secondary institutions on whether student bus passes will be accepted on the new light rail transit (LRT) line.
McMaster students hold a 12-month, unlimited ride bus pass administered by HSR. The City of Burlington also offers students of McMaster, Redeemer, and Mohawk a U-Pass for unlimited access to Burlington Transit. Mohawk College Students also have unlimited access to HSR transit through the HSR U-Pass.

University/College Transit Pass Agreements (UCTP) with Mohawk, McMaster and Redeemer University account for $8,691,702 in HSR revenues in 2019 and account for approximately 23 per cent of total ridership, according to a report prepared by the public works department.

At present, it is unclear if student bus passes will be accepted on the forthcoming Hamilton B-line LRT. Considering the revenue contribution that the passes offer the HSR, it is imperative that the City of Hamilton provides clarity on the use of bus passes on the LRT.

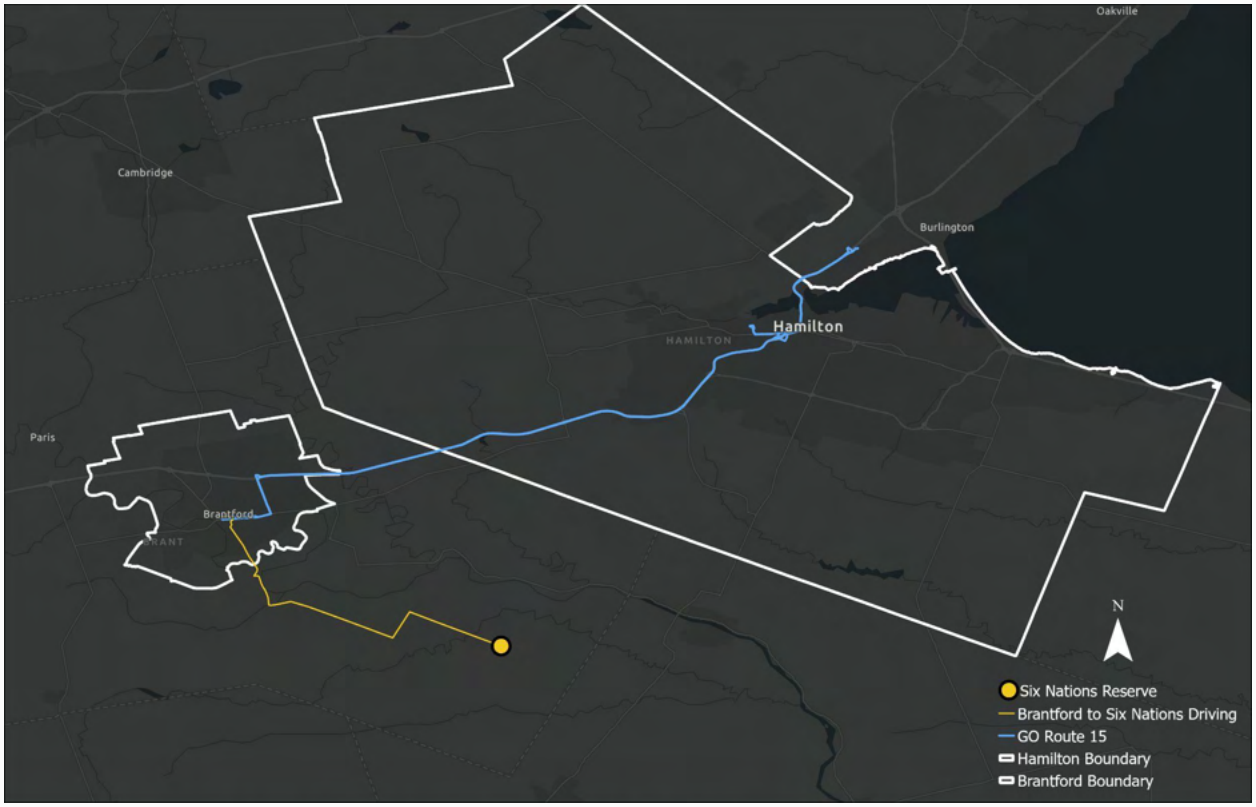
RECOMMENDATION 11

City of Hamilton should meaningfully and respectfully consult Six Nations on their views and preferences regarding a public transit connection between Six Nations and Hamilton. As part of this work, collaborate with Six Nations in consultations, brainstorming, and assessment of different options for consideration.
The Six Nations of the Grand River are about 30km outside of the City of Hamilton. These nations are the Mohawk, Cayuga, Onondaga, Oneida, Seneca, and Tuscarora. At the end of 2017, Six Nations had 27,276 members with 12,848 living on reserve.

A lack of transportation has been cited as a problem for the residents of the Six Nations reserve. Lack of transportation to the reserve has impacted quality of life, compromising residents' ability to get to jobs, go to school and medical appointments. The first-ever transportation survey to investigate transportation needs on Six Nations reserve was launched in 2010. A more general survey of Grand Eerie's six communities was carried out in 2020.

At the moment, there is one GO bus (Route 15) that connects Hamilton to Brantford, which is a 25 minute drive from the reserve. Brantford does not currently offer a public transit route that goes towards the reserve. One must use a vehicle to travel to the reserve from this point.

Given the proximity of the Six Nations to Hamilton, there is a responsibility to meaningfully consult on whether to connect Six Nations and Hamilton. Working with other transit providers, including Metrolinx, may be required in this process.



Current Connection: Hamilton - Brantford - Six Nations Reserve

RECOMMENDATION 12

City of Hamilton should review the feasibility of offering free public transit during the Holiday Season, to complement its existing program for free parking downtown to encourage local shopping.

The City of Hamilton offers free 2 hour parking from November 24th and December 24th in the various Business Improvement Areas (BIA) across the city. A similar program for free public transit would contribute to the goal of encouraging traffic into local businesses while offering residents more choice for travel. By offering free transit, public transportation becomes a legitimate choice to get to local shops and allows individuals who do not have a car to also benefit from holiday shopping in BIAs. The City of Hamilton should therefore review the feasibility of complimenting its free parking initiative with public transit offerings to incentivize local shopping.

. 03

Improving Cycling in the Bay Area.

.03 Improving Cycling in the Bay Area.

Bike ridership contributes to lower greenhouse gas emissions. As previously mentioned, shifting mode share away from individual vehicles towards more sustainable mode of transportation will help the Bay Area reach net zero by 2050, and bikes are one said mode of transportation. This means that municipalities should be focused on empowering all interested residents to choose to ride their bike for a trip that they would have otherwise used a vehicle for.

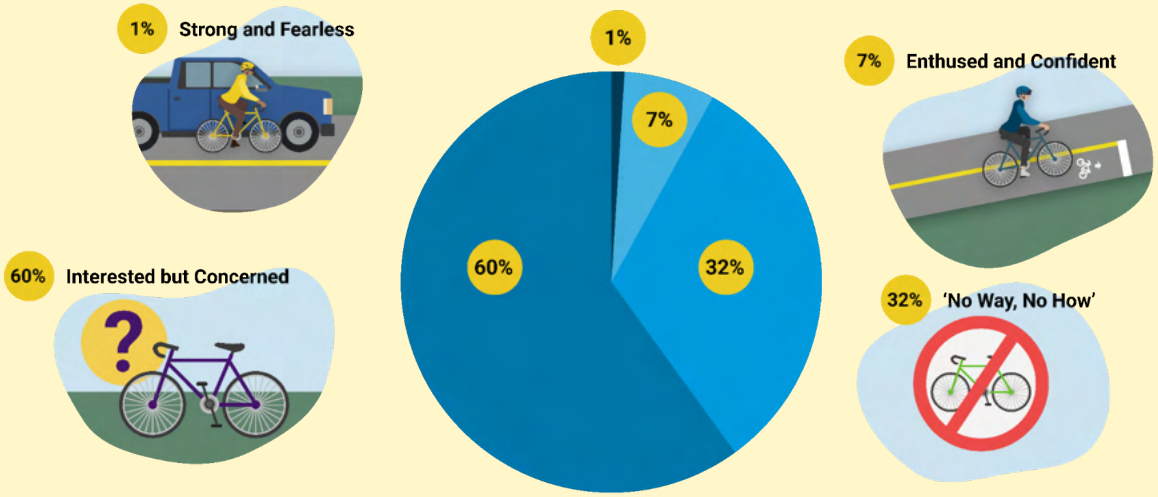
Within this section of the report, we provide tangible recommendations to increase cycling in the Bay Area, drawing from extensive qualitative and quantitative research, in addition to comparative policy analysis.

The considerations herein draw from the understanding that different people approach cycling differently. Some folks are willing to cycle under some conditions, while others are not. Consideration of this reality ought to inform cycling policy decisions.

THE DIVERSITY OF CYCLISTS

Cyclists vary in significant ways. A well planned cycling network should consider the needs of all potential users. One common description of cyclists is the Geller Typology, which divides cyclists into four categories (Source). See the diagram below for details.

GELLER TYPOLOGY



Strong and fearless

- Have advanced cycling skills and are comfortable riding alongside motorized traffic
- Will cycle regardless of roadway conditions, although users in this group may prefer to use on-street bike lanes.

Enthused and confident

- Comfortable sharing the roadway with vehicular traffic
- Prefer to do so within their own designated area with pavement markings and signage for the preferential or exclusive use of cyclists.

Interested but concerned

- Avoid cycling in areas with medium to high volumes of motor vehicle traffic;
- Become discouraged by high-speed traffic, extreme topographic conditions and inconsistent bicycle facilities;
- May be attracted to cycling by the implementation of designated facilities, particularly separated and in-boulevard bicycle facilities which provide more space between cyclists and motorists.

No way, no how

- Represents people who are not, and may never be, interested in cycling as a main means of transportation

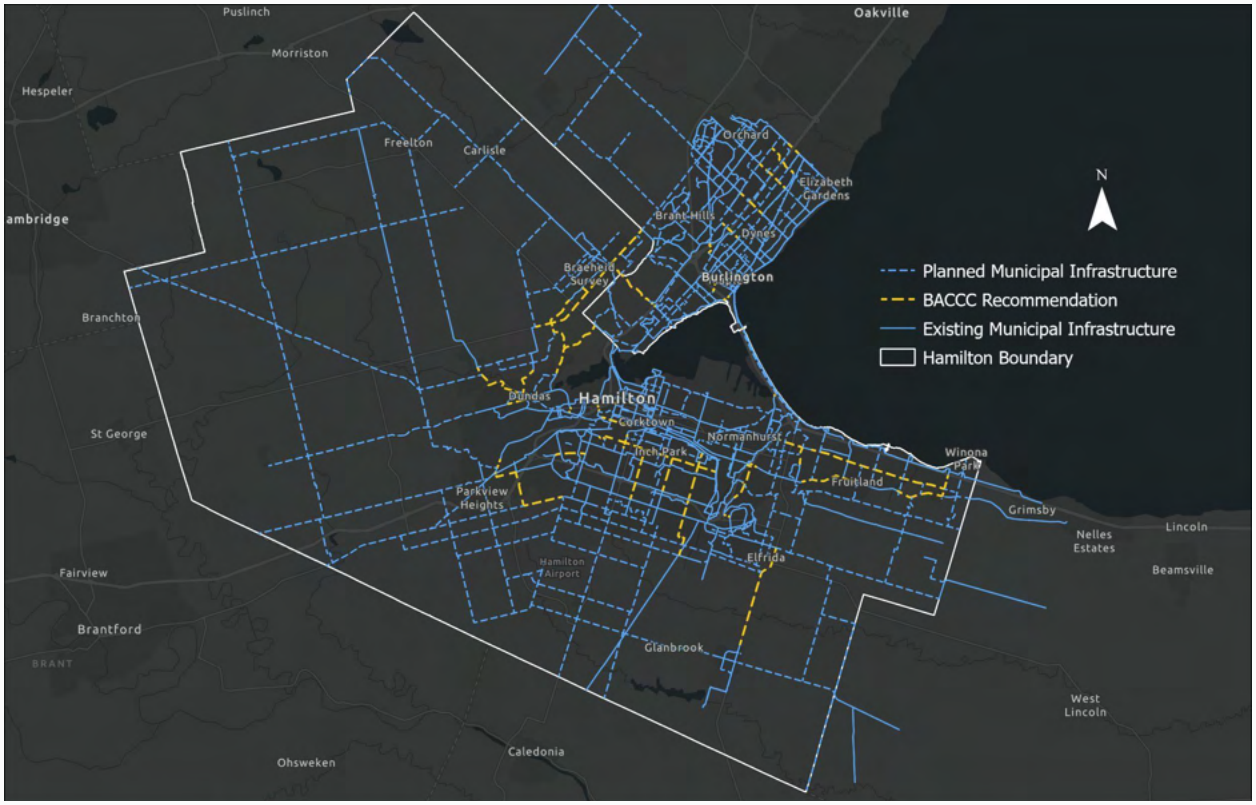
This typography suggests that the average municipality in Ontario stands to persuade the majority of residents to consider cycling for some of their trips, with the 'interested but concerned' group accounting for about 60% of the population.

Given that the current cycling rates in Hamilton and Burlington are just shy of 1% in both cities, this analysis suggests there is plenty of room to increase cycling and have a significant impact on transportation emissions. The recommendations presented below aim to consider the needs of all potential users.

Cycling Recommendations

RECOMMENDATION 1

City of Hamilton should improve cycling infrastructure at the following key locations, to improve connectivity and safety for residents. See explained suggestions here.



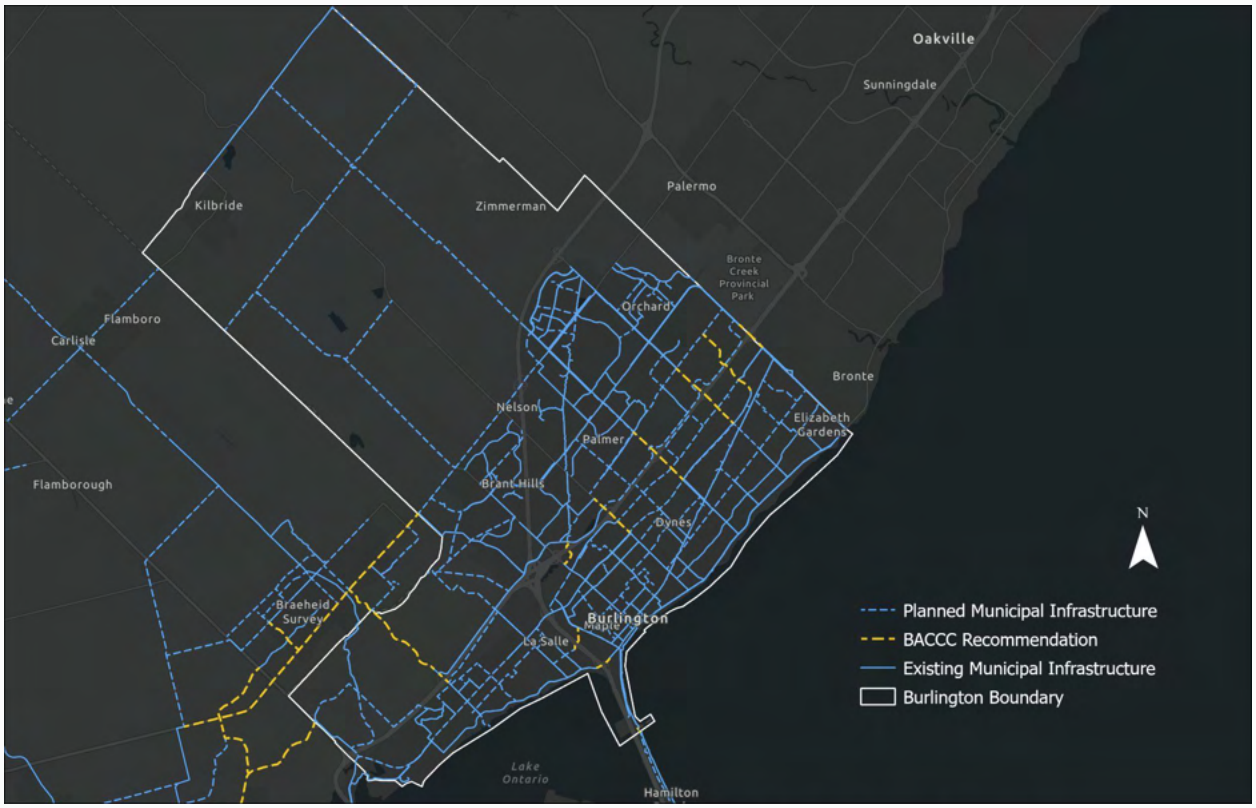
Hamilton recommended cycling infrastructure.

Across the city, all bike lane infrastructure should be protected, wherever feasible, to ensure the safety of residents. Myths surrounding the feasibility of protected bike lanes in the winter are debunked in Recommendation #5 and Appendix 4.

RECOMMENDATION 2

City of Burlington should improve cycling infrastructure at the following key locations, to improve connectivity and safety for residents.

In March 2021, City of Burlington approved their updated Cycling Plan, which includes a number of excellent plans to improve cycling infrastructure throughout the city. There remain a few areas for the city to consider further. These recommendations serve to identify gaps in the plan and prioritize implementation. See explained suggestions here.



Burlington recommended cycling infrastructure.

Across the city, all bike lane infrastructure should be protected, wherever feasible, to ensure the safety of residents. Myths surrounding the feasibility of protected bike lanes in the winter are debunked in Recommendation #5 and Appendix 4.

RECOMMENDATION 3

The City of Hamilton should determine any intersections within the city that have poor safety records for protection upgrades. Implement enhanced safety features at the identified locations, complimented by an education campaign for travelers.

A protected intersection is designed to better protect cyclists and pedestrians from motor vehicles by increasing their visibility, installing physical barriers where permitted, and enhancing the flow of movement. Protected intersections provide a more complete approach to intersection design, including broad aspects that allow for physical separation between all modes of transportation and increased visibility. Utilizing protected intersection design principles improves safety and ease of passage for everyone: motorists, cyclists, and pedestrians.

> "Utilizing protected intersection design principles improves safety for everyone: motorists, cyclists, and pedestrians."

The National Association of City Transportation Officials (NATCO) explains in their 2019 report that protected intersections have led to quantifiable improvements in safety.

In San Francisco's monitored protected intersection:

- 96% of drivers approaching a bicyclist yielded and 100% of drivers approaching a pedestrian yielded
- 98% of vehicles turned at speeds at or below the speed limit
- 85% of bicyclists and 55% of pedestrians reported their level of comfort and feeling of safety increased (Source)

In New York's monitored protected intersections:

- 93% of bicyclists surveyed felt safe riding through
- 30% reduction of intersection crashes per bicyclist (Source)

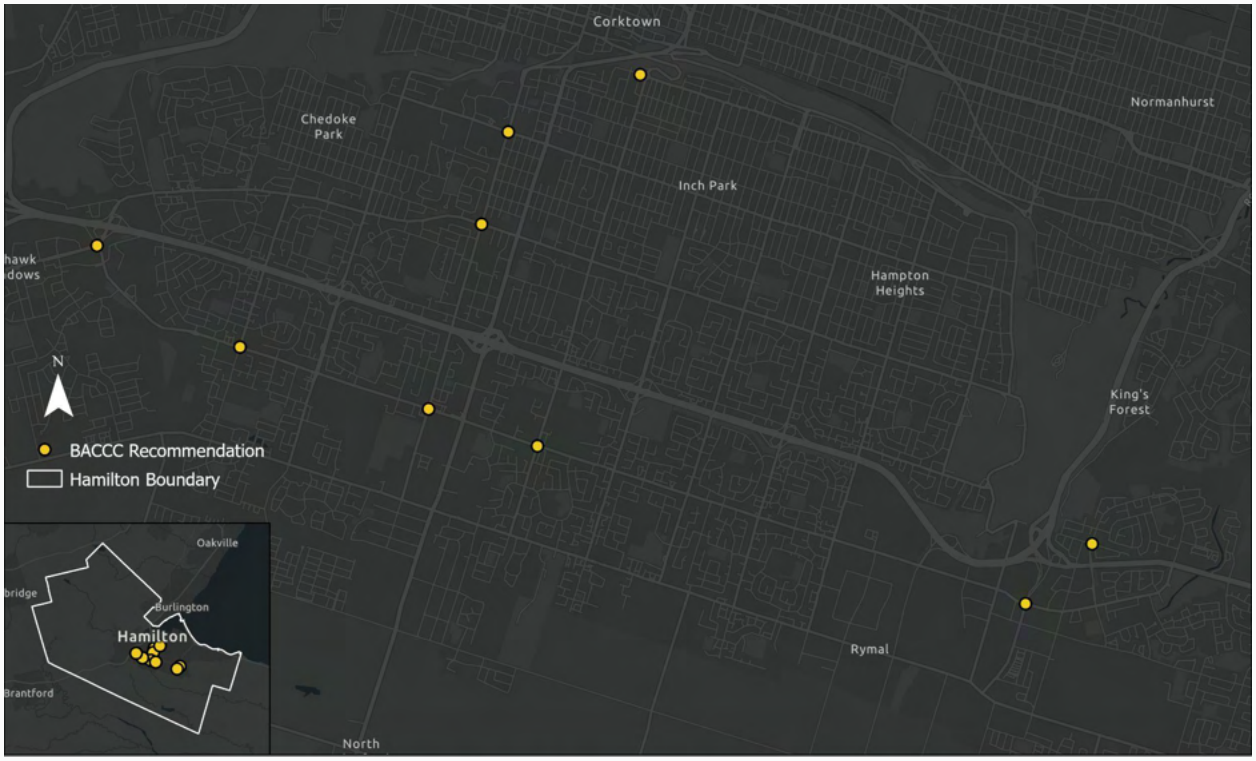
The City of Ottawa is a regional leader in protected intersections, already redesigning a number of intersections across the city. In 2021, the City of Ottawa released a Protected

Intersection Design Guide, with extensive details for optimal design and considerations for universal accessibility. This guide could serve city staff well in Hamilton and Burlington.

This report recommends that city staff determine, through traffic data and public process, any intersections within Hamilton that have poor pedestrian and cyclist safety records and that would be feasible for protected intersection upgrades. Considering intersections listed in the City's annual Vision Zero collision report is encouraged.

Some intersections BACCC staff heard through stakeholder consultations include:

- Fennel Avenue and West 5th Street
- Mohawk and West 5th Street
- West 5th and Stone Church
- Jolley Cut onto Concession Street
- Upper Wellington at Stone Church
- Upper Paradise at Stone Church
- Upper Red Hill and Stone church
- Stone Church and Golf Links



Hamilton recommended protected intersections.

Following the identification of key intersections, we recommend that the City of Hamilton implement enhanced safety features at the identified locations, complimented by an education campaign for travelers. A campaign would educate the public to allow for easier transition and reduce accidents.

The City of Burlington's updated Cycling Plan includes a strong commitment to intersection improvements, including physical separation. BACCC awaits the installation of Burlington's extensive intersection improvement program.

RECOMMENDATION 4

Collect data on snow removal for bike lanes and release them in real time on an open data platform, like the City of Ottawa.

A common theme heard throughout BACCC consultations with stakeholder groups was a desire to increase accessibility to data in real-time. One of the major challenges to year-round adoption of cycling is the winter season. One of the ways to mitigate this challenge is swift snow removal for bike lanes, reflected in real-time online. This complements existing efforts by the City of Hamilton to provide live data for road plowing. The City of Burlington also has an unofficial tool which uses GPS data. Having the ability to determine whether bike lanes have been plowed will contribute substantially to adoption of cycling during the winter.

A concern that was learned through BACCC consultations was the problem of closing the Keddy Access Trail for snow plowing. Understandably, plowing the trail with cyclists on it would be dangerous. Instead, a real time data platform would provide a much needed service for winter cyclists. They will be able to reliably determine when the Keddy Access Trail is closed for plowing and when it is fully clear for use before embarking on their journey. This platform, combined with priority plowing status for the Keddy Access Trail, should ameliorate frustrations and improve safety.

Bike Ottawa has produced a very detailed and user-friendly map of the region's cycling network, allowing users to toggle between city's plowing routes, unplowed bike routes, plowed bike routes, and routes with unknown status.

RECOMMENDATION 5

Create a priority cycling network in Hamilton to be plowed, de-iced, and cleared.
Priority cycling networks may also be known as “spine routes” or “spine network” which follow major roadways and have dedicated space for cyclists. (Source)

Ensuring clean bike routes will promote safety and contribute to uptake of cycling during colder seasons. Burlington’s “spine network” designation indicates that the route should be a priority for operations (snow plowing, street cleaning, etc.).

Questions have been raised as to whether snow clearing is possible for one-way protected cycle tracks that utilize physical barriers; this question has been answered and solved by cities around the world. It is possible. Readers can find a detailed list of examples and solutions for clearing one-way protected cycle tracks in Appendix 4.

CASE STUDY CITIES - SNOW REMOVAL

City of Toronto adopted winter maintenance improvements in 2014 to promote winter cycling. Prioritized cycle tracks are plowed within 6-8 hours of snowfall stopping.

Oulu, Finland is considered the winter cycling capital of the world. It is not uncommon for commuters to travel long distances in cold, icy, and snowy weather to get to work. Oulu plows lanes within 3 hours of a 2cm snowfall and will be plowed multiple times a day if necessary.

Linköping, Sweden clears its expansive network of prioritized lanes after 1cm of snow accumulates

The City of Edmonton has created a Downtown Bike Network which has 7.8 km of protected bike lanes, shared roadways, and paths with priority snow plowing within 24 hours.

MINIMUM MAINTENANCE STANDARDS

Minimum Maintenance Standards outline the level of responsibility that municipalities have in caring and maintaining roads and bridges, providing a defense against liability. Our recommendations herein consider Minimum Maintenance Standards.

The City of Toronto has outlined for themselves a timeframe of 6-8 hours to begin plowing cycling tracks when there is 5cm of snow. This timeframe is lower than the Minimum Maintenance Standard, which outlines 12 hours for 5cm of snow. Readers who would like to learn more about Minimum Maintenance Standards, as they pertain to bike lanes, can refer to Appendix 6.

RECOMMENDATION 6

Develop a marketing campaign to encourage and normalize winter cycling.
As per recommendations by the Centre for Active Transportation, implementing a campaign to encourage winter cycling may help with adoption. The campaign should involve partnerships with local advocacy groups and local employers to help promote

cycling. For example, Montreal has their Two Wheels, Four Season campaign called "2 roues, 4 saisons" , facilitated by Velo Quebec, which encourages year-round cycling and offers helpful information on winter cycling. Montreal has seen an increase in winter cycling. Calgary also has a campaign by the City of Calgary Bicycle Program called "Who bikes in the winter?" featuring testimonials from winter cycling.

City of Hamilton currently celebrates Winter Bike Day every February and adopted Winter Commute Month, encouraging various forms of active travel during winter.

RECOMMENDATION 7

In Hamilton, complete a comprehensive update to the Cycling Master Plan, utilizing a gap analysis and the recommendations listed herein.

A point raised throughout BACCC consultations was that it is time for an update to Hamilton's Cycling Master Plan, which was last completed in 2018. The changing demographic, economic, sociological circumstances of the city, as well as evolving knowledge around sustainability make it so that updates are crucial when building infrastructure to improve low carbon choices for residents. Moreover, given the progress that has been made since 2018 in cycling infrastructure, Hamilton can benefit from a comprehensive update.

The Cycling Master Plan is set to be updated in 2023. The next master plan ought to include a network gap analysis to identify gaps, connectivity issues, and infrastructure challenges. BACCC recommends the city of Hamilton consider the recommendations and considerations listed within this report when updating its plan.

The Hamilton Cycling Plan would benefit from the data driven approach done in the Burlington Plan. Traffic levels and demand heat maps would be beneficial for implementation of future facilities. This type of data would also help justify the choice and priority of the individual facilities.

RECOMMENDATION 8

Continue funding promotional campaigns to encourage cycling generally.
Utilizing soft approaches and campaigns can lead to tremendous uptake in cycling. For example, Chicago utilized a combination of approaches to promote cycling along with new investment in bicycle infrastructure. Compared with Salt Lake City, which also invested in bike infrastructure but saw no promotional activities, Chicago saw bicycle mode share nearly double from 0.28% to 0.50%. Salt Lake City, on the other hand, saw mode share remain relatively flat (Source).

Additionally, the City of York combined their cycling infrastructure with a promotional strategy under the UK Cycling City and Towns Program (2008–2011). Between 40%–50% of the total project budget was earmarked for promotional programs. York saw cycling mode share double from 10% to 20% over the course of the program. The City of York now holds the distinction of having the 3rd highest cycling rates in the UK (Source).

The City of Burlington promotes cycling at its events, including education seminars and Bike to Work/School Week. The City of Hamilton promotes cycling during Smart Commute Week, Winter Commute Month, Bike Day, and Bike to Work Day. Continued and expanded funding for promotions is recommended.

RECOMMENDATION 9

Expand secure bike parking infrastructure by developing detailed secure bike parking guidelines for developers and employers, similar to other cities.
Secure bike parking, or the lack thereof, is regarded as a major barrier to cycling. In a survey of cyclists and non-cyclists in Auckland, New Zealand, Clement et al. (2016) found that secure bike parking was among the most important factors to both groups (third out of 23 for cyclists and fourth out of 23 for non-cyclists). The only factors deemed more important were travel time, and distance to destination, with the addition of weather for non-cyclists (Source).

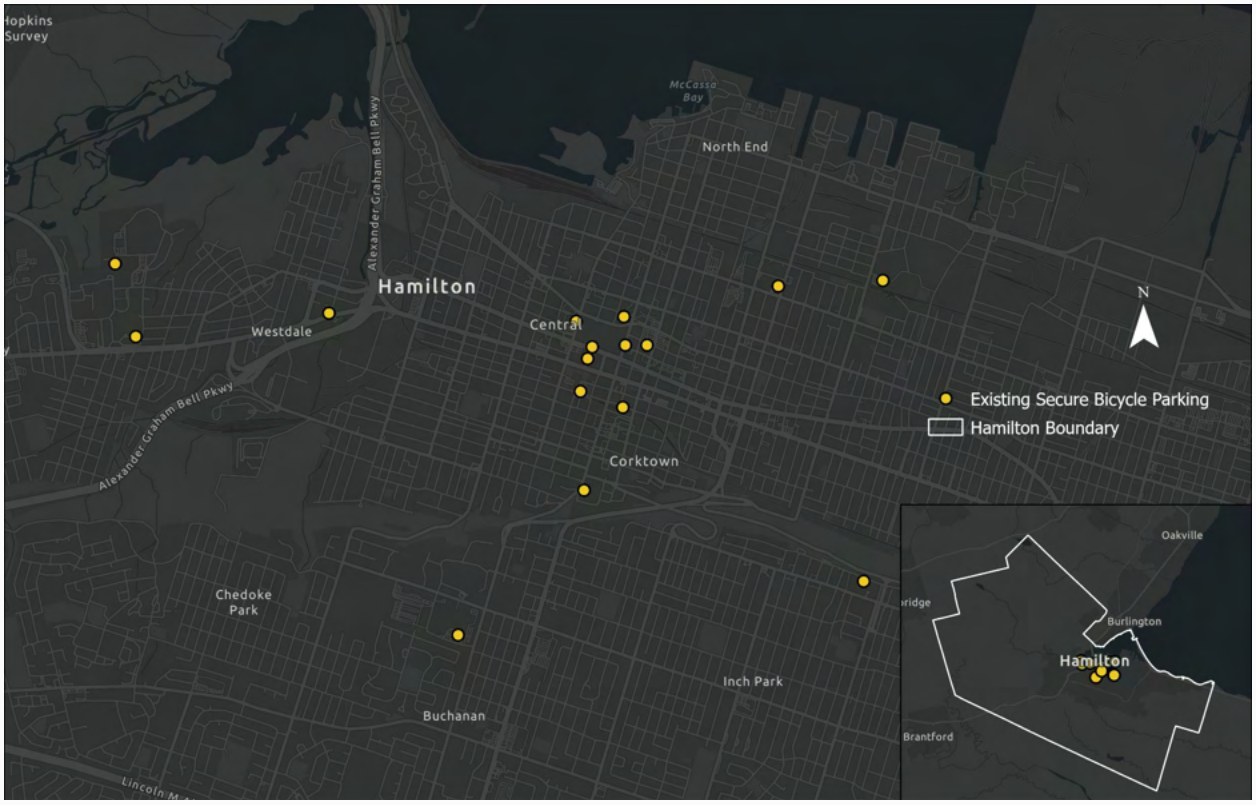
Downtown Hamilton houses over 50 secure bike parking spots. Employers throughout the city also offer secure bike parking, though this is for staff use only (City of Hamilton, Government of Canada, Hamilton Health Sciences, Alectra Utilities, McMaster

University, Mohawk College, St. Joseph's Healthcare). An increase in secure bike parking infrastructure may help encourage cycling among those who own a bicycle and opt not to use it due to security concerns.

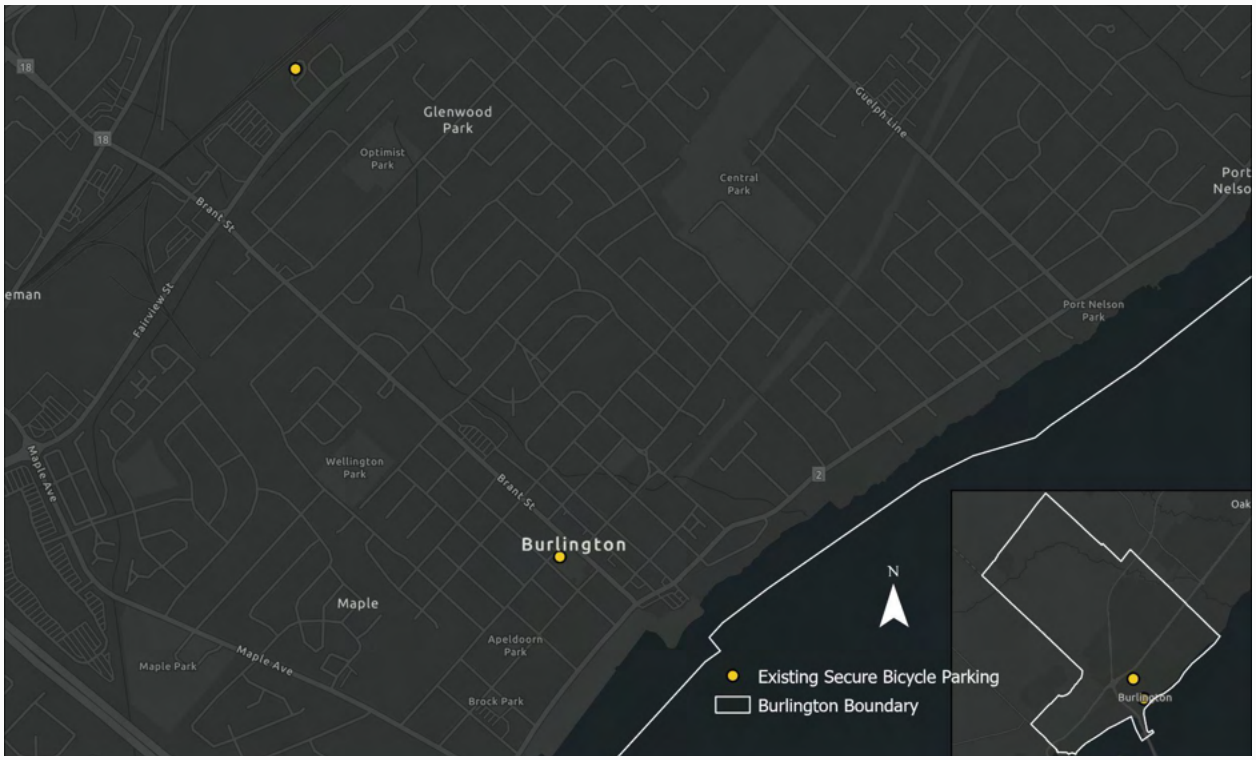
Secure parking in Burlington is limited compared to Hamilton. The city does offer bike lockers at City Hall. The Burlington Cycling Plan does address the need for more bike parking going forward. While specific locations and infrastructure are not suggested, it does mention that zoning by-laws can be used to ensure minimum amounts of bicycle parking on new developments.

GO Transit also offers secure bike storage at some of their stations in Hamilton and Burlington for $50 per year, with a 1 year minimum.

Diagrams of existing secure bike parking, across the Bay Area, can be found on the following page.



Hamilton secure bicycle parking.



Burlington secure bicycle parking.

"Secure bike parking, or the lack thereof, is regarded as a major barrier to cycling."

As part of their Bicycle Parking Strategy, the City of Toronto has included guidelines for the Design and Management of Bicycle Parking Facilities. While the cities of Hamilton and Burlington, as well as private landowners and businesses, provide secure bike parking, there are no documents like the City of Toronto's guidelines for landowners on the installation process. A similar document from both Hamilton and Burlington could provide direction and justification for employers to install secure bike parking as well as helping employees to advocate for these types of facilities.

The installation of secure bicycle parking facilities is supported by the Official Plans of both Cities (Burlington S. 3.5.2(f), Hamilton S. 4.5.16). The City of Hamilton currently encourages secure bike parking in new builds through the 2015 Traffic Demand Management Guide for Development.

RECOMMENDATION 10

In Hamilton, review the analysis included in the existing feasibility study and Shared-Micro Mobility Report to consider expanding bikeshare infrastructure across Hamilton, to better serve residents.

In 2016, City of Hamilton staff completed a feasibility study to analyze the capital and maintenance costs of expanding the bikeshare program on Hamilton Mountain for both a 5 square kilometer system and a 13.5 square kilometer system. According to the Shared Micro-Mobility Report, the capital cost to establish a Mountain system would be between $577,000 and $1.4 M, depending on the extent of the service area (small or large). Annual operations would cost between $148,000 and $263,000. The cost estimate did not take into consideration user fees (revenue).

There are a number of reasons to review and reassess the feasibility of bike share on Hamilton mountain.

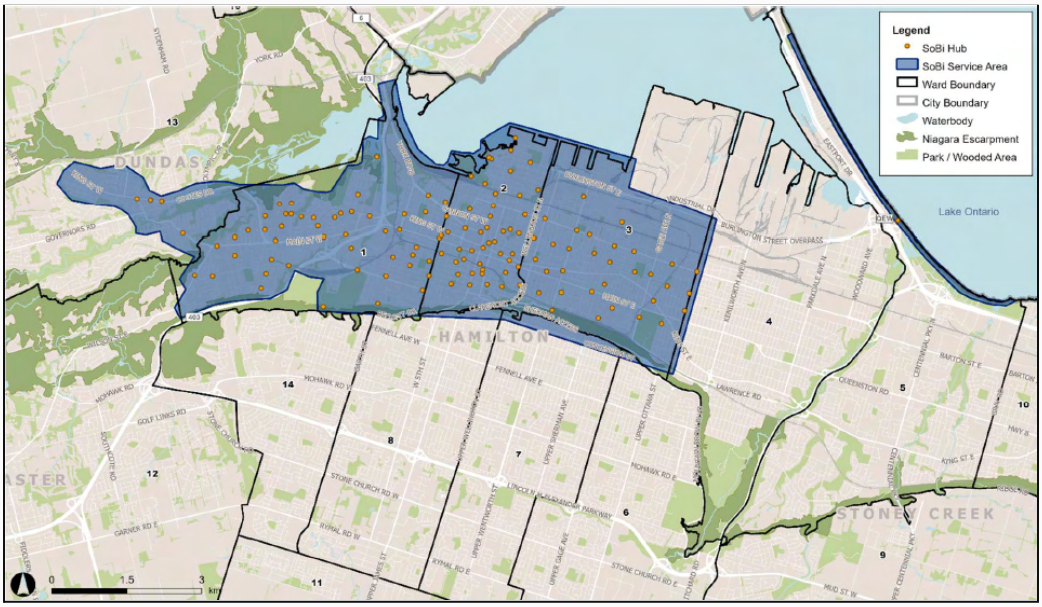
DEMAND & READY USERS

According to Scott and Ciuro (2019) many of the most frequently used bikeshare hubs in Hamilton, in terms of daily mean trip departures and daily mean trip arrivals, are located in and around McMaster University. McMaster University and Mohawk College each educate roughly 30,000 full time and part time students (McMaster University, 2021; Mohawk College; 2020).

It can be reasonably inferred that expanding the Hamilton Bike Share network to the top of the mountain will see similar or larger student driven usage for the new hubs, provided they are placed in desirable places for departure and arrival.

EXISTING INVESTMENT

With the recent $6 million Keddy Access Trail investment in 2020, there is now a concrete barrier separating cars and cyclists up and down Hamilton mountain. The bidirectional path has several access points along the way, including sidewalks, bike lanes, stairs and trails. This recent investment combined with the Mountain Climber program investment - which works to integrate public transit and cycling by offering free HSR access to cyclists up and down the escarpment - would perfectly complement a bikeshare.



Existing bike share service area (Source)

In addition to the feasibility study of 2016, a 2020 Shared-Micro Mobility Report found that Wards 4, 5, 6, 7, 8, and 14 show the highest propensity for micro-mobility. Total capital cost estimate for this expansion would be approximately $2.3 million for 120 additional stations and 557 bikes; The total operating cost estimate for this expansion per year would be approximately $435,000.

Hamilton is also receiving about 650 bikes from Portland's bike share program, which may be used for the expansion even if they are used for parts.

BACCC's consultations confirm the need and community interest in bikeshare expansion.

RECOMMENDATION 11

Create a Burlington bikeshare program, similar to the program offered in Hamilton.
There is no bikeshare in Burlington similar to Hamilton Bikeshare, formerly known as Sobi. There is an existing program running out of the Burlington Senior Centre that provides free access to bikes during regular business hours. The senior centre program is insufficient, largely because there is only one location for pick-up and drop-off. This is more analogous to a bike rental than a bikeshare. Moreover, the bikeshare can only be used during the hours of service for the seniors centre and there are a limited number of bikes available.

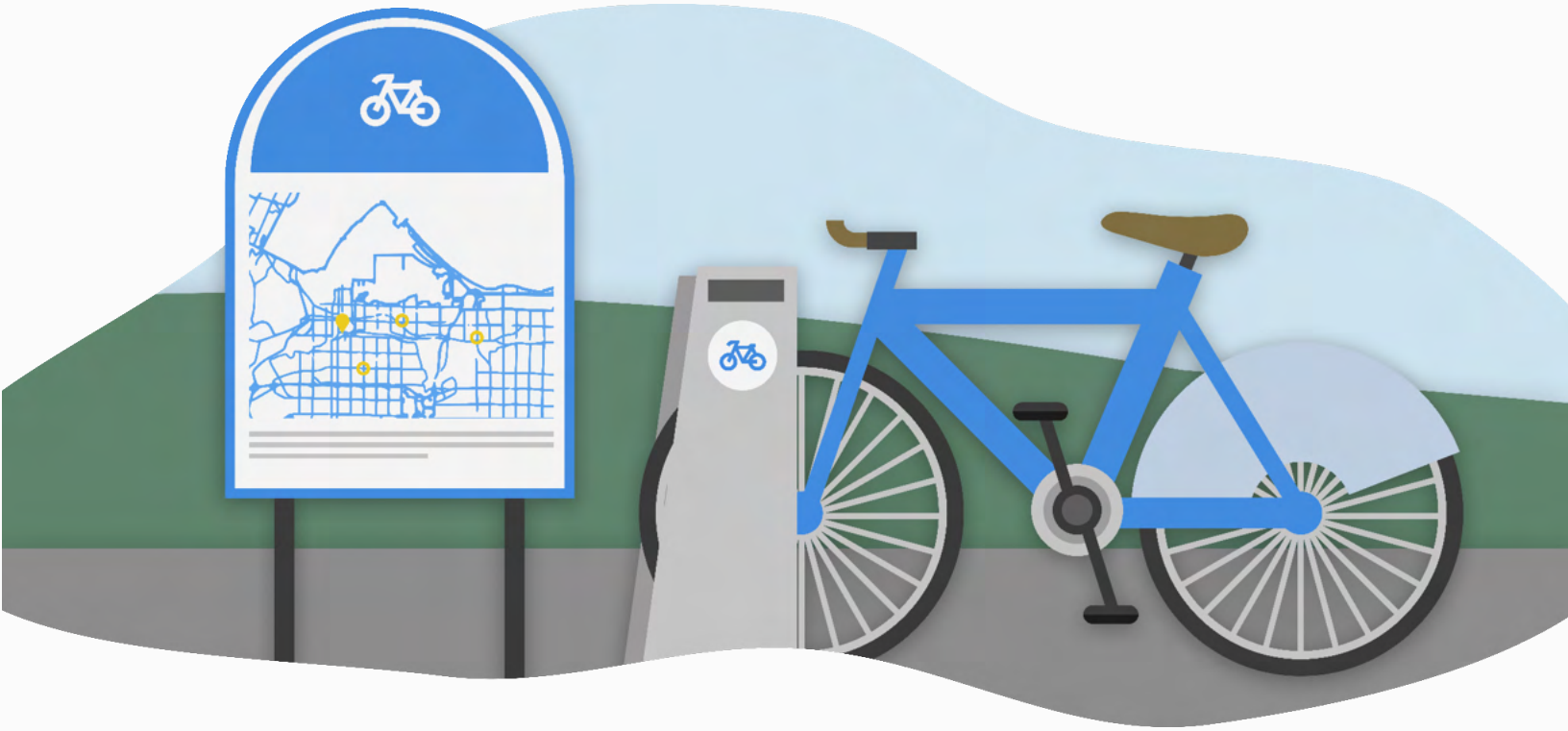
As the City of Burlington creates an expansive bikeshare program for its residents, staff ought to consider:

Accessibility: Providing E-bikes for seniors would help ensure that a Burlington bikeshare is equitable.

Low Income Support: Bike shares are helpful for providing a mobility option to low income individuals, particularly if designed with lessons from Hamilton Bikeshare. Hamilton Bikeshare should be looked at for its achievements in serving disadvantaged groups. Hamilton Bikeshare is uniquely designed to serve lower income groups through the “Everyone Rides Initiative”. The Everyone Rides initiative aims to lessen barriers to using the network by providing subsidized memberships, riding lessons, training on the bike share system, and translation for newcomers. (Verlinden et al., 2019, p.20)

Minimizing the Walking Threshold: Recommended station density of 300m between stations or 10 stations per square km.

Partnership: Consider working with Hamilton BikeShare to expand into Burlington, perhaps under different branding.



RECOMMENDATION 12

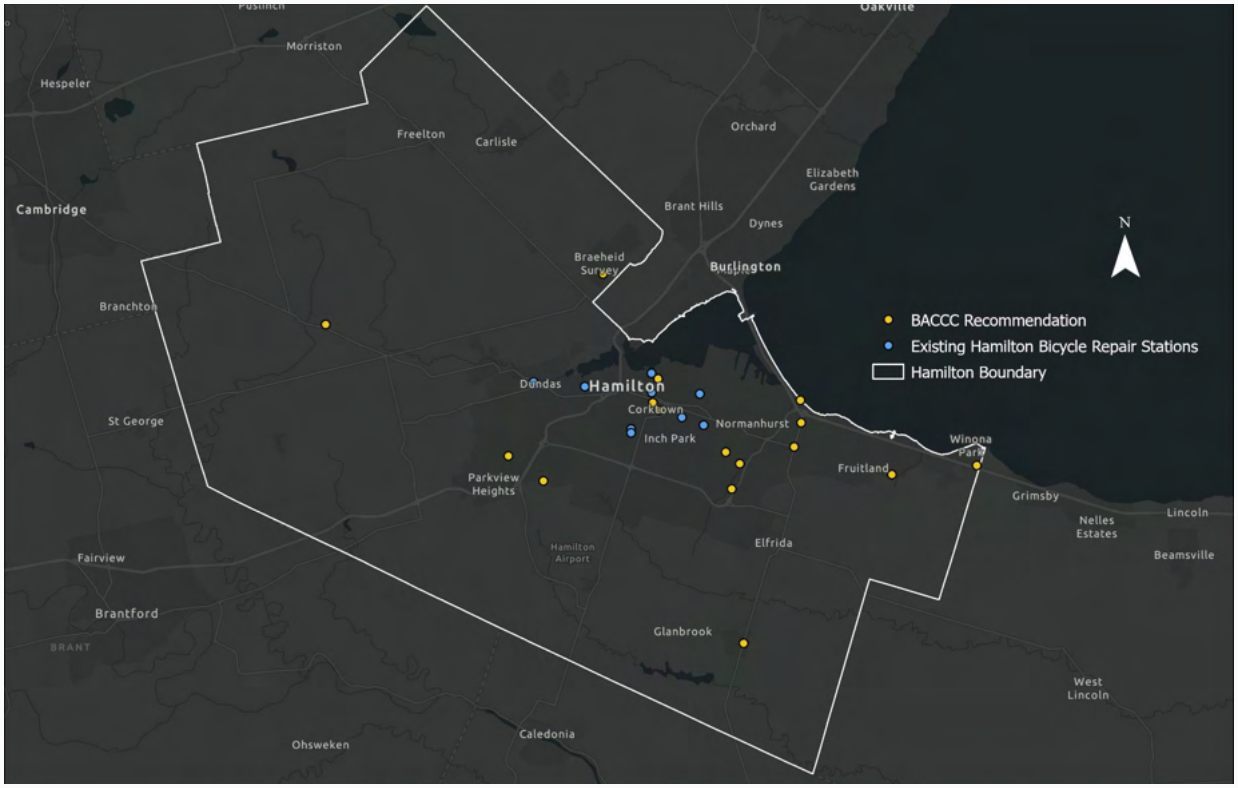
Improve access to free publicly accessible bike repair stations across Hamilton and Burlington.

Repair stations are an important part of the municipal cycling infrastructure as they allow for cyclists to make minor repairs without purchasing equipment. New fixit stations in Windsor were installed with the mindset that they are there for the cyclist's peace of mind and to show cyclists that safety is being taken seriously.

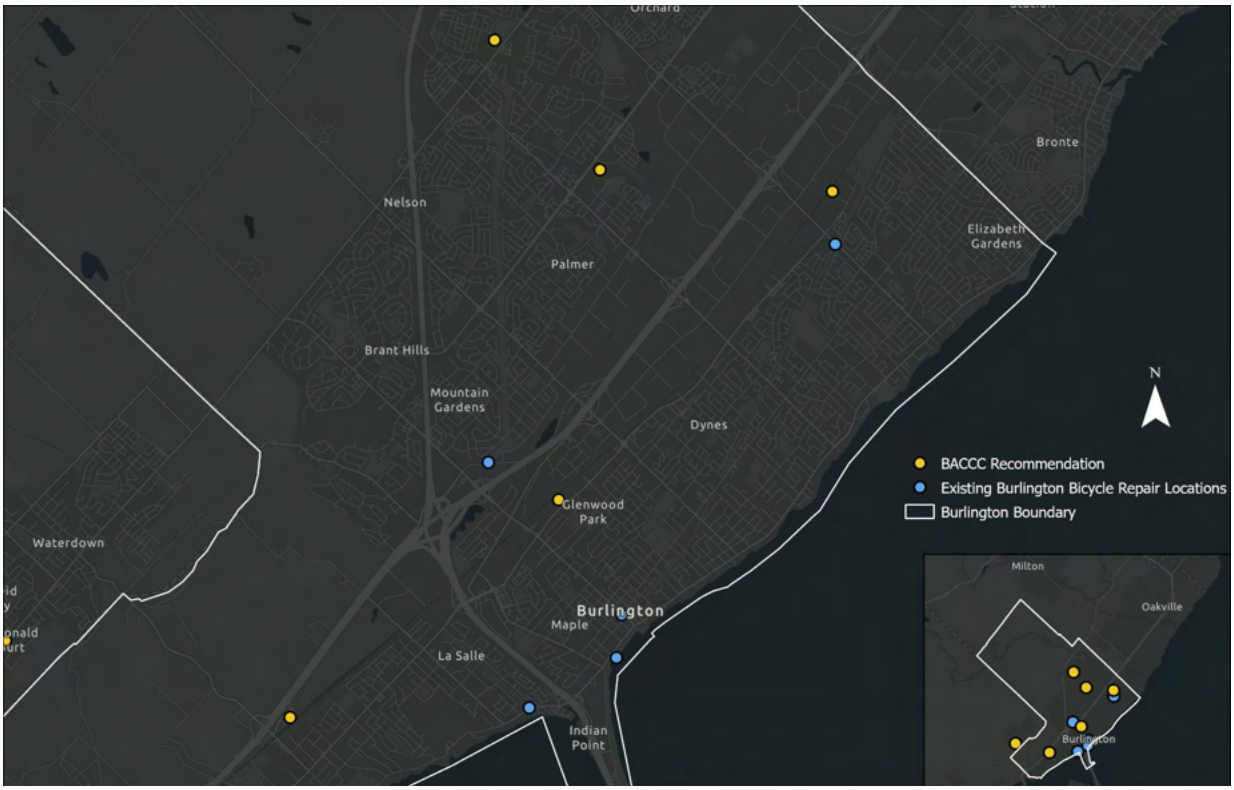
Minor repairs on Dero fixit stations (currently in use in Hamilton) can be made with the provided Philips and flathead screwdrivers, Allen wrenches, box wrenches, tire levers and the optional tire pumps.

Evaluating the trends in other municipalities, bicycle repair stations are generally located at key cycling facilities such as the start of trails, as well as residential and populated areas such as downtown cores, destinations such as schools and libraries. The most consistent locations in larger cities are higher order transit facilities such as subway (Toronto) and LRT (Ottawa) stations.

For Hamilton and Burlington to offer free bike repair stations for residents across the two cities, we recommend the following locations be considered for repair stations. We provide a fulsome explanation for each location recommendation in Appendix 5.



Hamilton recommended bicycle repair stations.



Burlington recommended bicycle repair stations.

RECOMMENDATION 13

Both cities should prevent bike theft by bolstering their existing bike registry programs.

Since residents cannot ride their bikes if they have been stolen, bike theft should be considered when removing barriers to cycling. Guelph Police Services and Halton Regional Police have their own bike registry systems, partnering with 529 Garage where individuals can fill in details on their bikes, such as serial numbers, manufacturer, and model, so that police can contact them should they recover their bike if it is stolen. Police recover bikes frequently, but have no information to deliver stolen bikes to their rightful owners. This system also goes a long way in making potential cyclists feel safer with locking up their bikes or storing them, further promoting adoption of cycling as a whole. Cyclists can also receive shields/decals that can be applied to their bikes which act as a deterrent for thieves. If bikes are stolen, users can alert the cycling community (other registrants).

According to Hamilton Police, about 600 bikes are stolen in Hamilton per year and only 4% of stolen bikes in Hamilton are recovered. When police find stolen items, they also struggle to return these items to their rightful owners. Hamilton Police has their own bike registry system (found here), though it should consider adopting a registry similar to Project 529, incorporating the shield and community alerts, which will not only help to make recovering bikes more efficient but also promote a feeling of safety and security among the cycling community.

Burlington should promote their existing theft prevention service to ensure there is adoption as cycling is promoted throughout the city.

RECOMMENDATION 14

Both cities should seek the Bike Friendly Community Gold designation, operated by the Share the Road Cycling Coalition.

Bike Friendly Communities Award designates communities which have been evaluated on the basis of physical infrastructure and hardware to support cycling, program and campaigns that educate people on bikes and road safety, incentives to get people to ride, and measure results and planning for future cycling promotion.

A Gold designation is something to aspire towards when recommendations are adopted; Hamilton and Burlington currently have a Silver designation. Right now only 3 cities have a Gold designation: Ottawa, Toronto, Waterloo. The criteria involved in judging bike friendly communities include providing educational opportunities, infrastructure, statistics that support cycling adoption and safety, and advocacy.

RECOMMENDATION 15

Both cities should enlist TransLAB, under the supervision of Dr. Darren Scott at McMaster University, to analyze cycling data to prioritize network improvements and expansion.

Dr. Darren Scott established the Transportation Research Lab (TransLAB) in the School of Earth, Environment & Society at McMaster University in 2008. TransLAB enlists the expertise of Dr. Scott and his team to produce advanced transportation research. TransLAB has produced in-depth research on urban planning, spatial analysis, and geomatics. Dr. Scott's team has a proven record on research projects such as understanding factors that influence ridership at bike share stations, identifying dominant (preferred) routes of bike share users between stations, developing predictive models of bike share ridership for road segments that can be used to predict the impact of new cycling infrastructure on ridership, to name a few.

. 04

Improving Walking and Mobility Devices.

.04 Improving Walking and Mobility Devices.

Increased walking or use of mobility devices contribute to lower greenhouse gas emissions. Increased pedestrianization can help residents choose walking for short distance trips. Adequate walking infrastructure also bolsters adoption of public transit. When combined with biking, it can also provide travelers with suitable last mile options. These three modes of transportation create robust alternatives to individual vehicle transportation.

Within this section of the report, we provide tangible recommendations to increase walking or the use of mobility devices in the Bay Area.

Walking and Mobility Device Recommendations

RECOMMENDATION 1

Both cities should complete walk audits surrounding all schools to determine safety improvements for pedestrians, particularly children. Track the number of improvements flagged and completed over time.

Audits that review the safety of pedestrians are particularly important for schools, where children and their guardians might consider walking as a form of transportation. School travel planning (STP) is an approach to auditing that aims to increase the number of residents choosing active transportation to get to school.

As of 2021, 110 schools in Hamilton have school travel plans or are in progress. The City of Hamilton has a goal of every elementary school in Hamilton completing an STP. It is incumbent on the City of Hamilton to complete and publicly track these audits in the near future.

Currently, City of Burlington representatives take part in the Every Metre Counts initiative to encourage families to walk and roll to school. That said, the City of Burlington does

not currently have an audit program or goal in place. This can be included as an action item for the upcoming Integrated Mobility Plan.

RECOMMENDATION 2

Both cities should assess and improve their 'sidewalk to road ratio', aiming for 1:1, where feasible.

Sidewalk to road ratios refer to the amount of sidewalk available relative to the amount of road. In simple terms, a 1:1 ratio suggests that for as long as there is road, there is sidewalk. See diagram below.

Ensuring pedestrian infrastructure will encourage walking. Based on community consultations for this report, a number of stakeholders pointed to the lack of sidewalk infrastructure causing major barriers to walking and mobility devices, in both Hamilton and Burlington. This has major implications on safety and accessibility.

> A lack of sidewalk infrastructure forces residents to walk and use mobility devices on the road alongside live traffic.

In Hamilton, the Pedestrian Mobility Plan has a routine accommodation policy to address and fill in gaps in sidewalk infrastructure, with annual funding. The City of Burlington is planning to update its sidewalk warrant policy for future developments to include sidewalks, but existing infrastructure requires improvement.

To address this problem, the City of Burlington and City of Hamilton should both complete 'sidewalk to road ratio' measurements, followed by action plans to equalize the ratio, where feasible.

RECOMMENDATION 3

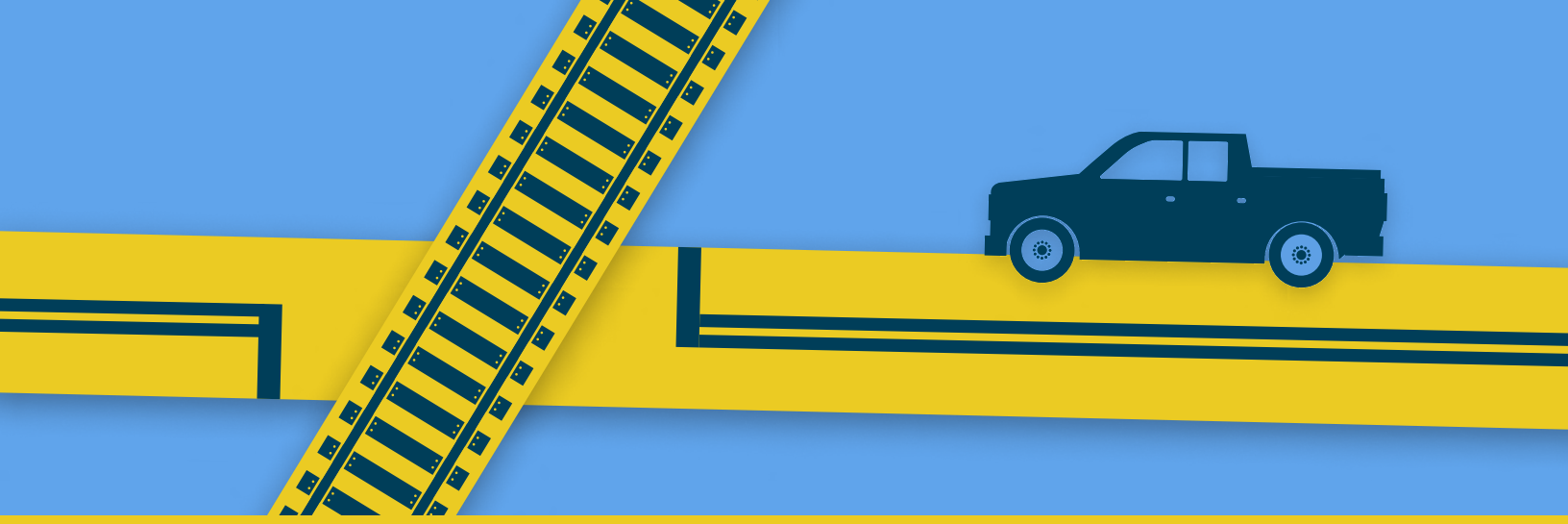
Improve safety by completing city-wide lighting studies for pedestrians in both Hamilton and Burlington.

Lighting on streets can help provide pedestrians an improved perception of safety. Wherever possible, heightened security measures can improve the perception of safety among bus riders (Loukaitous-Sideris, 2001). Perception of safety is often as important than safety itself. Lighting is one important design principle that can improve perceptions of safety. Illumination of streets creates better pedestrian visibility, enhances sidewalks and crossing safety, and discourages criminality.

Beyond perceptions of safety, literal risk of injury and harm have been associated with lighting. In 2017, there were 6,000 pedestrian fatalities in the United States, representing 16% of all traffic fatalities; 75% of these occurred in the dark.

City of Hamilton completed an Outdoor Lighting Study in 2010 and created Hamilton's Sidewalk and Roadway Lighting Policy thereafter. An update to review outdoor lighting is overdue.

The City of Burlington has begun a study to review the potential for lighting along two major trails in the City: the Centennial trail and Crosstown Trail In Burlington, outdoor lighting beyond multi-use trails, including urban settings, should be considered to encourage pedestrians to feel safe in their own city.



. 05

Overall Network Improvements.

.05 Overall Network Improvements.

In a general sense, there are improvements that can be made to bolster low carbon transportation, now and into the futures of Hamilton and Burlington. Within this section of the report, we provide tangible recommendations to improve low carbon forms of transportation overall in the Bay Area.

Improving Overall Network Recommendations

RECOMMENDATION 1

Commit to open data, wherever possible, for each data set listed herein, in addition to other data sets collected by the municipality. Update these data sets regularly.
The City of Hamilton and City of Burlington have both committed to open and transparent government. Both cities have launched open data platforms, which enable the public to explore and access City data using visualisations, including interactive mapping. During consultations, stakeholders flagged the need for regularly updated data sets.

Municipalities that release as much data as possible to the public increase the chances for innovative uses. Streamlining platform between the two cities also allows for complementary data applications.

RECOMMENDATION 2

Both cities should develop data sharing agreements with local school boards to optimize public transit routes for schools.

School boards have a great deal of data on where students live and demographic information. This information can be used to inform transportation needs for students and school travel, while maintaining the privacy of students.

A common theme that came out of consultations was that cities should work more closely with school boards to optimize public transit routes for students. This could be achieved through data sharing agreements between school boards and local transit authorities.

RECOMMENDATION 3

City of Hamilton should invite CityLAB and MacChangers to work on the initiatives listed herein, to find innovative solutions and reduce the burden on city staff.
CityLAB Hamilton is an innovation hub that brings together Hamilton's post-secondary schools (Mohawk, Redeemer, and MacMaster) and civic leaders to co-create solutions for a more sustainable and livable Hamilton.

MacChangers is a co-curricular experiential program operated out of MacMaster University. It pairs multidisciplinary teams with community members to co-create innovative solutions that address major challenges in the City of Hamilton.

Leveraging CityLAB and MacChangers to address the challenges of improving low carbon transportation choices for Bay Area residents, particularly the challenges outlined herein, will not only aid policymakers but also encourage community-centred solutions.

Allowing solutions to be incubated in existing organizations was a common theme in consultations. This is also compatible with the theme of open data. Until data can be freely accessed, it will not be easy to answer the question of how to make the best use of it.

RECOMMENDATION 4

Invite the MacData Institute to host a hackathon competition with collected transportation data, to find innovative solutions and reduce the burden on city staff.
The MacData Institute engages researchers and students within McMaster to manage and utilize data so that they can foster innovation and collaboration. The Institute works to improve efficiencies related to data creation, collection and management.

During consultations, MacData expressed interest in working with municipal partners on projects utilizing data. This could include allowing MacData to utilize transportation data and find innovative solutions for improvement, using the hackathon model.

A hackathon is an event during which individuals seek to creatively solve problems with technology. Hackathons could consist of using design thinking through programming, engineering, or data science to solve real world problems.

RECOMMENDATION 5

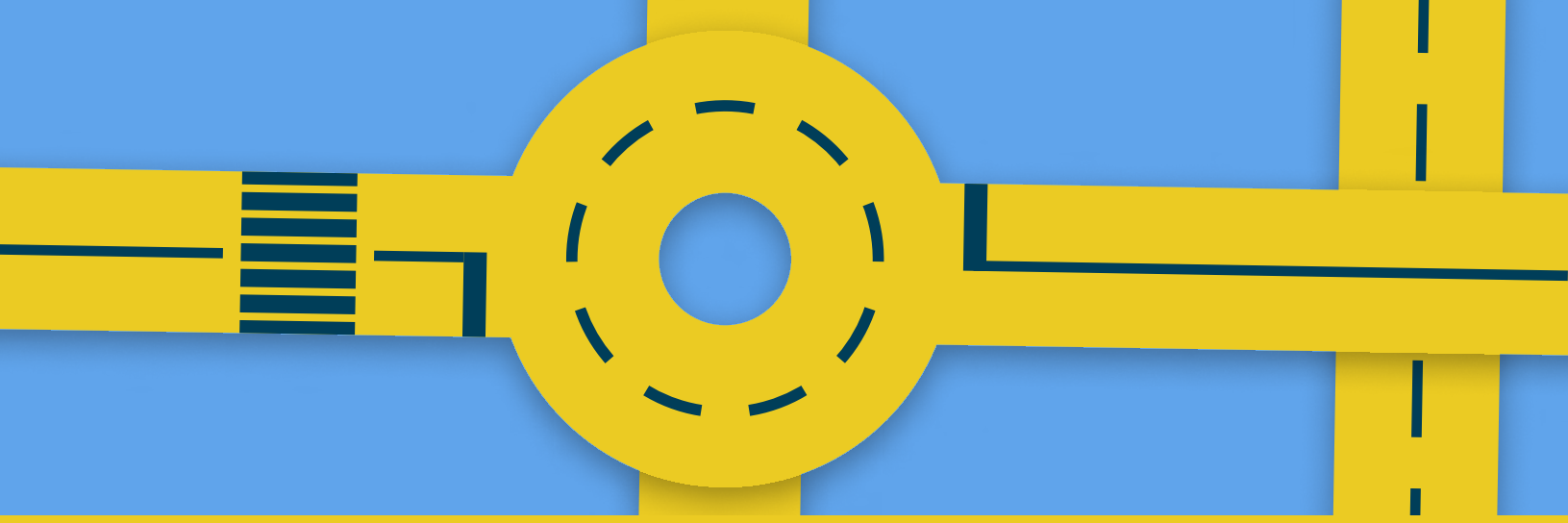
Commit to including a standing item on all Greater Bay Area Sub-Committee meetings to review each city's respective transportation data trends and allow for discussions of collaboration and shared learnings.
The Greater Bay Area Sub-Committee is a joint committee shared between the two neighbouring municipalities of Hamilton and Burlington on topics relevant to both cities, including the environment, transportation corridors, Burlington Bay, and economic development.

Intra-regional transportation is a reality between Hamilton and Burlington, with many workers using public transportation to commute to destinations in a different city. This sub-committee provides an opportunity for collaboration and synergy and avoids duplication of work on the future of transportation in the Bay Area. In particular, many Hamiltonians travel to Burlington for work and utilize Route 1 or former Route 101. In fact, over 25% of all passengers on Burlington Route 101 were Hamilton transfer riders in the month reviewed prior to service cancellation.

> “More than 1 in every 4 passengers on Burlington Route 101 were Hamilton transfer riders prior to service cancellation.”

For context, in the month of September 2019 alone, Burlington Transit serviced 23,290 HSR transfers. In September 2019, HSR serviced 12,728 Burlington Transfers.

It is important that both cities work together on their decisions about the future of transportation networks in each city, as they will have an effect on residents of both cities.



. 06

Conclusion.

.05 Conclusion.

Low carbon forms of transportation, like walking, using mobility devices, biking, and public transit require improvements to be considered a real choice for most residents of Hamilton and Burlington. If low carbon forms of transportation are not perceived as safe, convenient, reliable, and equitable, we cannot reasonably expect residents to select those options to get around.

This report aims to improve the choices available to Bay Area residents, ensuring they can get around in any way they prefer.

At present, about 17% of the Bay Area's greenhouse gas emissions come from transportation. By improving the low carbon options available to residents, the cities of Hamilton and Burlington can reduce their respective transportation emissions, thereby pursuing their emission reduction targets and improving the everyday lives of citizens.

"By improving the low carbon options available to residents, the cities of Hamilton and Burlington can reduce their respective transportation emissions."

The analysis and recommendations included in this report are a product of extensive qualitative and quantitative research, in addition to comparative policy analysis.

Below, readers will find a final summary of all recommendations listed herein. Each of the recommendations are tangible and specific, in order to aid city staff with implementation. Annual follow ups on the status of each cities' progress will be made

public through BACCC, to ensure accountability and give due credit to the hard work of those involved.

Recommendations Summary

TRANSIT RECOMMENDATIONS	HAMILTON	BURLINGTON
Improve the frequency of public transit routes, with more consistently timed service.	X	X
Review arrival schedules for public transit buses for better alignment with GO train services.	X	X
Complete a feasibility analysis for express routes or improved public transit service to business parks.	X	X
Complete audits of all city bus stops to determine safety improvements for transit riders, particularly women. Track the number of improvements flagged and completed over time.	X	X
Ensure all public transit staff complete diversity and anti-bias training.	X	X
Collect data on snow removal for bus stops and release it in real time on an open data platform.	X	X
Collect data on the number of bus stops with seating and strive to increase the percentage of stops with seating for users to rest, particularly pregnant women and the elderly.	X	X
Provide clarity to post-secondary institutions on whether student bus passes will be accepted on the new light rail transit (LRT) line.	X	
Meaningfully and respectfully consult Six Nations on their views and preferences regarding a public transit connection between Six Nations and Hamilton.	X	
Review the feasibility of offering free public transit during the Holiday Season, to complement the existing program for free parking downtown to encourage local shopping.	X	

CYCLING RECOMMENDATIONS	HAMILTON	BURLINGTON
Improve cycling infrastructure to improve connectivity and safety for residents.	X	X
Determine intersections that have poor safety records for protection upgrades. Implement enhanced safety features at the identified locations, complimented by an education campaign for travelers.	X	
Collect data on snow removal for bike lanes and release them in real time on an open data platform, like the City of Ottawa.	X	X
Create a priority cycling network to be plowed, de-iced, and cleared in winter months.	X	
Develop a marketing campaign to encourage and normalize winter cycling.	X	X
Complete a comprehensive update to the Cycling Master Plan, utilizing a gap analysis and the recommendations listed herein.	X	
Fund promotional campaigns to encourage cycling generally.	X	X
Expand secure bike parking infrastructure by developing detailed secure bike parking guidelines for developers and employers, similar to other cities.	X	X
Consider expanding bike share infrastructure across Hamilton, to better serve residents.	X	
Create a Burlington bikeshare program, similar to the program offered in Hamilton.		X
Improve access to free publicly accessible bike repair stations.	X	X
Prevent bike theft by bolstering existing bike registry programs.	X	X
Seek the Bike Friendly Community Gold designation, operated by the Share the Road Cycling Coalition.	X	X
Enlist TransLAB, under the supervision of Dr. Darren	X	X

Scott at McMaster University to analyze cycling data to prioritize network improvements and expansion.		
WALKING AND MOBILITY DEVICE RECOMMENDATIONS	**HAMILTON**	**BURLINGTON**
Complete walk audits surrounding all schools to determine safety improvements for pedestrians, particularly children. Track the number of improvements flagged and completed over time.	X	X
Assess and improve the 'sidewalk to road ratio' across the city, aiming for 1:1, where feasible.	X	X
Improve safety by completing city-wide lighting studies for pedestrians.	X	X
OVERALL NETWORK RECOMMENDATIONS	**Hamilton**	**Burlington**
Commit to open data, wherever possible. Update these data sets regularly.	X	X
Develop data sharing agreements with local school boards to optimize public transit routes for schools.	X	X
Invite CityLab and MacChangers to work on the low carbon mobility initiatives listed herein, to find innovative solutions and reduce the burden on city staff.	X	
Invite the MacData Institute to host a hackathon competition with collected transportation data, to find innovative solutions and reduce the burden on city staff.	X	X
Commit to including a standing item on all Greater Bay Area Sub-Committee meetings to review each city's respective transportation data trends and allow for discussions of collaboration and shared learnings.	X	X

. 07

Appendix.

.07 Appendix.

APPENDIX 1 - TRAVEL TOOL METHODOLOGY AND ORIGIN POINTS

Origin Points	
Hamilton	**Burlington**
1. Hamilton GO 2. MacNab Terminal 3. McMaster University 4. Mohawk College 5. West Harbour GO	1. Aldershot GO 2. Burlington GO 3. Dundas 407 Carpool Lot 4. John Street Terminal
Destination Points	
Hamilton	**Burlington**
1. Airport Business Park 2. Ancaster Business Park 3. Bayfront Industrial Area 4. Binbrook (Glanbrook) 5. Columbia International College 6. East Hamilton Industrial Area 7. Flamborough Business Park 8. Hamilton General Hospital 9. Hamilton GO 10. Juravinski Hospital 11. Limeridge Mall 12. MacNab Terminal 13. McMaster Innovation Park 14. McMaster University 15. Mohawk College 16. Red Hill Business Park 17. Redeemer University	1. Aldershot GO 2. Burlington GO 3. Dundas 407 Carpool Lot 4. Harvester Business Area 5. John Street Terminal 6. Joseph Brant Hospital 7. North Service Road Burlington 8. Mapleview Mall 9. South Service Road Burlington

18. Stoney Creek Business Park 19. West Harbour GO	

Destinations and Origins for Vehicle/Transit Comparison

To record the travel times between the selected origin and destination points in Burlington and Hamilton, specific steps were followed in order to obtain accurate and reliable data. Data for four variables were collected from Google Maps. These variables include: travel time by car between origin and destination, travel time by transit between origin and destination, distance between origin and destination, and transit routes utilized. A fifth variable titled *difference* was calculated in Excel, and displays for each origin and destination the time difference between using transit and driving, with smaller figures indicating greater efficiency due to their indication that transit travel time more closely follows driving time. A value of zero indicates that it takes the same amount of time to drive as it does to take transit, while a negative value indicates that it is faster to take transit.This variable is the basis for which route efficiency is determined. All time variables are measured in minutes, and all distance variables are measured in kilometres.

In total, this data was collected for eight points of origin, and twenty-one destination points (166 total combinations). The peak times of 8:00am and 5:00pm were used as the time points at which the data is measured. Though both are peak times, they represent unique traffic flows, and are analyzed separately as a result. The data are analyzed separately as a result, save for when determining overall route efficiency, in which the times are aggregated to better represent the route as a whole regardless of peak time.

Travel times for cars were obtained by navigating to the directions option in Google Maps, and setting the selected origin and destination in the corresponding fields. It was also ensured that the correct departure time was selected. Afterward, travel routes by car were selected on the basis of shortest time, rather than shortest distance. Travel times for transit however are more difficult to consistently measure, as not all transit stops have vehicles departing at the specific peak times of 8:00am and 5:00pm.

Transit routes were thus chosen according to the following principles:

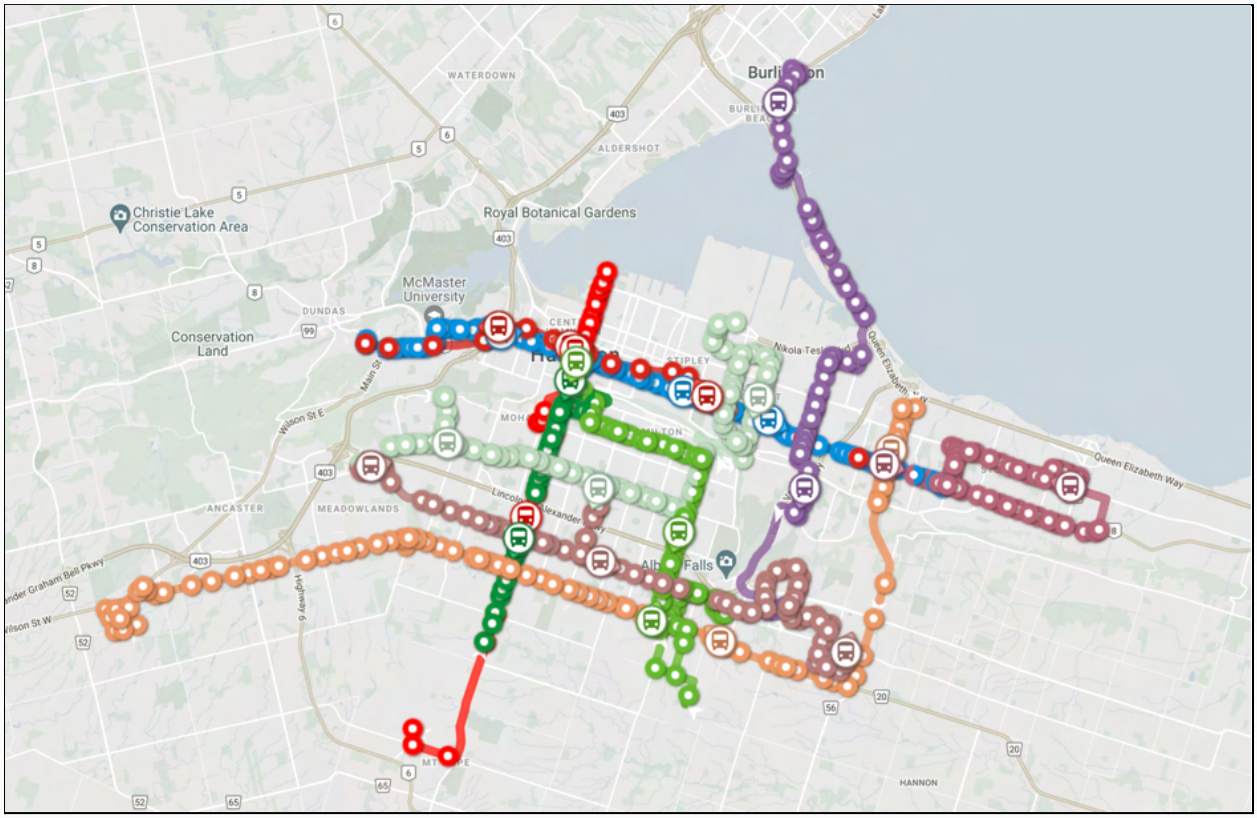
1. Selecting Departure time: Transit departures closest to the peak time (8:00am or 5:00pm) were selected. If a vehicle departs further from peak time, but arrives at the destination before a vehicle that left closer to peak time, the former vehicle is selected for the purpose of determining travel time and route.
    a. Example: Bus A leaves at 8:00am and arrives at 8:40am, but Bus B on a different route leaves at 8:05am and arrives at 8:30am. We may reasonably assume that commuters are more likely to take Bus B, despite the fact that it is technically not as close to peak time.
    b. As such, arrival time is also taken into account. If multiple routes are available, this logic always applies (which route is the commuter more reasonably likely to take? This was determined by viewing all possible options close to peak time, and making a determination based on what was deemed most favourable regarding trip duration and transfers.)

2. This same rationale applies to transfers. Vehicle transfers are included if a commuter cannot otherwise arrive at the destination, OR if they save a significant amount of time by transferring.
    a. Transfers versus No Transfers: As a caveat, it is not assumed that commuters will transfer if an insignificant amount of time is saved. For example, it is assumed that commuters will not take a 30 minute route in which they transfer three times over a 35 minute route in which they do not have to transfer. A transfer was deemed to be significantly time saving if at least ten minutes per transfer were saved, compared to the route bereft of transfers. The inclusion of this caveat is based on previous data collected in the Canadian context that has illustrated the typical commuter's aversion to transfers when more direct routes are available (Manaugh & El-Geneidy, 2015).

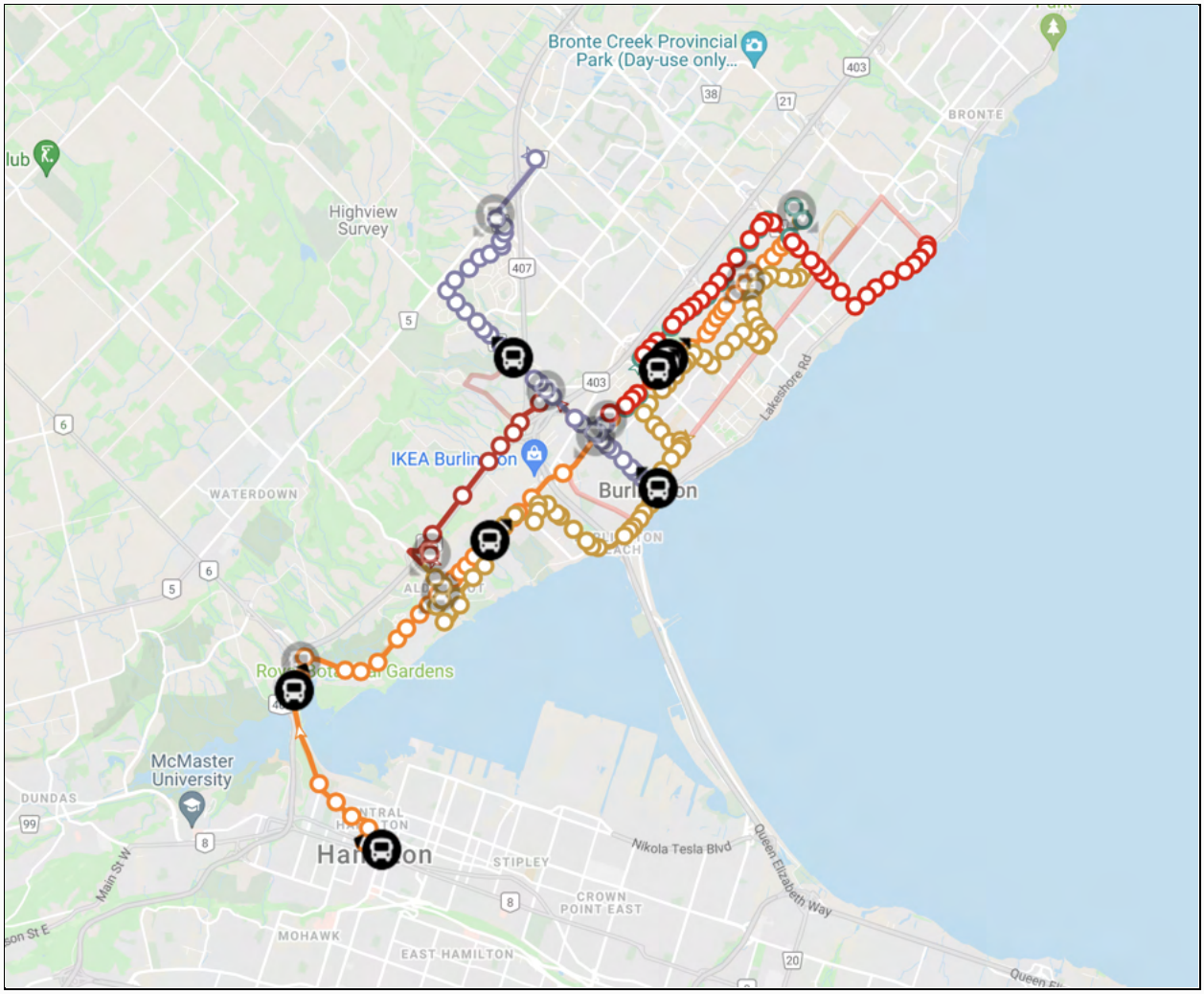
3. Exclusion of Transit Data: Some locations (Airport Business Park, Binbrook) do not have access to public transportation at present. As such, only driving data are available for these destinations.

A separate variable called *Weighted Mean Time Difference* is used to measure the overall efficiency of a route. At least 2 separate observations are needed for a route to be evaluated for efficiency using this metric. In specific, a route must be utilized in at least 2 different instances to get from any of the six origin points to any of the

twenty-one destination points, across the 8:00am and 5:00pm transportation peaks. It must also be noted that the strength of these observations improves with a larger sample size of the route being used. Routes are evaluated for efficiency on the basis of the weighted average travel time difference between driving and taking transit (travel time difference is explained in point 1 above). For instance, if the route is used 3 times, and the travel time differences are 5 minutes, 10 minutes, and 20 minutes, the average travel time difference is ~11.67 minutes, or the mean of the three observations. This route would be more efficient than a route with a mean difference of 15 minutes. The weighted average takes into account the portion of the sample size from each peak time. For example, if a route with a sample size of 10, has 7 morning observations and 3 evening observations, then 70% of the morning average will be added to 30% of the evening average to get the weighted average. Routes can be compared to one another on the basis of efficiency using this metric, with lower values indicating more efficient routes.



Analyzed Hamilton Routes: 1 - King (Blue), 10 - B Line Express (Red East/West), 11 - Parkdale (Purple), 20 - A Line Express (Red North/South), 22 - Upper Ottawa (Kelly Green), 27 - Upper James (Forest Green), 41 - Mohawk (Mint Green), 43 - Stone Church (Rust), 44 - Rymal (Peach), 55 - Stoney Creek Central (Magenta)



Analyzed Burlington Routes: 1 - Plains Fairview (Orange), 2 - Brant (Purple), 4 - Central (Yellow), 50 - Burlington South (Red), 80 - Harvester (Green), 87 - North Service Aldershot (Burgundy)

APPENDIX 2 - HEADWAY ANALYSIS METHODOLOGY

BACCC conducted a review of wait times (headway) between several key bus routes in Hamilton and Burlington. This was achieved by viewing the schedule of each selected route, and recording the time that it took between buses arriving at the same stop. For the purpose of analysis, the last stop along each route was used for this measurement. This was done for both directions that each route travels in, (westbound eastbound or northbound southbound) for both weekday and weekend schedules. Further, the days were split up into three unequal parts, namely the morning peak, off peak time, and the afternoon peak. The peak times are demarcated according to the frequency at which buses arrive at a particular stop along the route, and are based on weekday peaks. The

frequency is greater during the peak times, and is lesser during the off peak time. Each route has slightly different peak and off peak times as a result. The scheduled time for each of these time periods that a bus is to arrive was recorded in the analysis. As such, we are able to compare different routes to each other in an effort to illustrate the length of time one must wait at a stop if they miss a scheduled bus.

It must be noted that some routes have mutually exclusive legs to them that not all buses traverse. In such cases, the leg that most closely follows the BLAST rapid transit plan is used. If the route is not close to the proposed BLAST network, headway is determined according to departures from the first stop rather than the last stop along the route. It must also be noted that some routes stagger headway times in an alternating pattern (e.g. the bus arrives every 18 minutes, the next every 22, and alternates in this pattern). In such cases the mean headway time is used instead to avoid confusion. Further, when the morning peak is transitioning into off peak time or when off peak time is transitioning into the afternoon peak, the prevailing arrival pattern may be disturbed. A bus arriving every hour at :05 and :35 may for instance arrive at :05 and :42 during the transition. In such cases, the analysis still follows the prevailing pattern nonetheless, as the time difference is due to schedule shift rather than following a patterned interval.

Boarding and Alighting

Boarding and Alighting Data was acquired from HSR and Burlington Transit for several key bus routes. HSR data included boarding and alighting data at each stop along the route, hourly ridership for the entire day, distance between stops along the route, population density with 400m of the stops along route, percentage of transit to work within 400 metres of stops (employment data for riders using census data), and low income ridership (using census data). Boarding and alighting data was presented for routes in both directions (i.e. eastbound and westbound as well as northbound and southbound). Additionally, this data was presented as an average for typical weekday/weekend travel as opposed to snapshots of specific dates. Data was presented in an excel file with sheets separating boarding, alighting, each direction, weekday, and weekend as well as sheets providing distance between stops and demographic data.

Data for Burlington routes, acquired from Burlington Transit, provided boarding and alighting specifically. The data were presented in an Excel file with sheets separating

each route. The data aggregate directional travel (i.e. did not distinguish westbound/eastbound and northbound/southbound). Unlike HSR, this data presented snapshots of representative weekdays and weekends and did not present average boarding and alighting. Specific data for Wednesday, September 18th, 2019, Wednesday October 9th, 2019, and Wednesday November 13th, 2019 were provided to capture typical weekday travel. To capture typical weekend travel, specific data for Saturday, September 14th, 2019, Saturday, October 19th, 2019, and Saturday, November 9th, 2019 were provided. Data from 2019 were selected to account for the changes in ridership as a result of the 2020-2021 period of the COVID-19 pandemic.

APPENDIX 3 - GO TRAIN ALIGNMENT

This analysis was conducted by comparing the schedules of GO trains at West Harbour GO and Burlington GO with the schedules of municipal bus transit routes that connect to each station. This was done in an effort to illustrate the average amount of time a commuter must wait if they choose to utilize both the municipal bus network, and the Lakeshore West GO line. Two basic measurements were taken for each station, for both weekday and weekend schedules:

1. The mean time one must wait when arriving at West Harbour GO/Burlington GO via GO train, and subsequently using the municipal bus transit network
2. The mean time one must wait when arriving at West Harbour GO/Burlington GO via municipal bus, and subsequently using the GO train upon arrival at the station

These measurements were taken by finding the difference in time between the arrival of the GO train and the next departing bus for the first measurement, and the difference in time between the arrival of the bus, and the next departing GO train for the second. It must be noted however that there is little guarantee that GO trains and municipal buses will always arrive at the station at the scheduled time, for several reasons. As such, another measurement was made with a 6 minute minimum amount of time between bus and train. As such, this calculation displays the mean time one must wait between using each vessel, but excludes wait times shorter than six minutes, and instead uses the next available train/bus. This measure can be used to gain more insight as to how long a commuter must wait for their connection at the station in the event that they

miss the optimal connection.

APPENDIX 4 - SNOW CLEARING ONE-WAY PROTECTED CYCLE TRACKS

Many cities such as New York, Chicago, Toronto, and Salt Lake City use bollard protected bike lanes, between a lane of parked cars and the travel lanes. The bollards or barriers and parked cars make it impossible to plow with the same vehicles that plow the main road. Smaller, more compact vehicles are needed in these situations, and some of these vehicles are:

- Truck mounted plow blade - can clear and salt conventional bike lanes
- Pick up truck mounted plow blade - can be used for protected bike lanes if the lane has been built to accommodate the width of a pick up truck for snow clearing purposes.
- Small snow removal vehicles - tractors, ATV's, bombardiers and skid steers can all be equipped with snow removal equipment. Snow brushes are used for lighter snow, snow plows for heavier snow and snow blowers for relocating snow. De-icing equipment can and should be installed on these vehicles to plow and de-ice all at once.
- (Source)

Small snow removal vehicle clearing a buffered bike lane in Vienna, Austria. Photo Credit: http://www.ibikeoulu.com/presentations/ presentation_oulu_szeiler_130213.pdf

Other articles specify the exact models utilized to accommodate protected single bike lanes:

> *"In Boulder, Colorado, the city clears its widest protected lanes with a Ranger and plow, too. On narrower facilities it uses a Gator brand all-terrain vehicle made by John Deere. For other jobs, it uses a Caterpillar mini-loader with a power broom; for a few, staff just haul out a snowblower.*
>
> *Washington D.C. uses a 60-inch-wide Toolcat 5600 but has been in the market for something smaller, to make turns while clearing a five-foot protected bike lane.*
>
> *In 2015, Salt Lake City started using a 65.5-inch-wide Kubota RTV1100 to sweep and plow its protected bike lanes. For narrower spaces in its downtown, SLC uses a 44.9-inch-wide Kubota F3060. The widest part of that tiny tractor, not currently manufactured by Kubota, is its 51.1-inch wheelbase."* (Source)

APPENDIX 5 - BIKE REPAIR STATION RATIONALE

Burlington	
Location	**Justification**
Alton Public Library	Provides a repair station along Dundas St, a route which connects Oakville (and further) to Hamilton, through Burlington. The Region of Halton is investing in upgraded facilities along the section of Dundas St in Burlington. Adding a repair station at the Alton Library would provide added safety for longer intercity cycling trips.

Aldershot GO Station	A cycling repair station here would help encourage cycling as a first/last kilometer portion of the trip. A station here, coupled with the Waterdown public library and infrastructure along Waterdown Rd, would hopefully encourage GO usage by cycling from Aldershot.
Appleby GO Station	A cycling repair station here would help encourage cycling as a first/last kilometer portion of the trip.
Tansley Woods Community Center	City bike racks/shelters installed here, so this could compliment the infrastructure. Close to Upper Middle Road cycling facilities, Tansley Woods cycling facilities and Walker's Line, which will be developed into a highway crossing.
Hamilton	
Location	**Justification**
Waterdown Public Library	A cycling repair station here would help encourage cycling at a central community location.
Ancaster Public Library	Proximity to Wilson St and Golf Links Rd cycling facilities and the Temp Trail, all leading into Hamilton Center. Proximity to cycling facilities would help users feel safe incase of a bike malfunction as well as possibly encourage new cyclists to bike into the city center.

Binbrook Public Library	Provides a community repair station as well as connecting to cycling lanes within the community and a proposed multiuse path (21r) along highway 56 into Hamilton center. The Binbrook conservation area is just south of the proposed facility, with bike trails leading from Binbrook to the conservation area. A repair facility would be a good resource for cyclists traveling from Binbrook or Hamilton center to the conservation area.
Stoney Creek Public Library	Provides a community repair station and is accessible by bike lane.
Rosedale Park	Intersects 3 cycling facilities - the Red Hill Valley Trail, the Cochrane Rd signed bike route and the Greenhill Ave bike lane. This is a center city location, providing repairs to those traveling north - south and east - west routes across the city.
Winona Park	Follows existing bike lanes. This could serve people looking to bike to Grimsby and beyond as well as those whose destination is the park or the Lakeshore route.
Corktown Park	Located at the beginning of the Trans Canada trail, and situated in the park. This would be where people get on the trail from surrounding on road facilities, so it would be a good spot for minor repairs.

Red Hill Valley and Mount Albion Trail Intersection	The intersection of two popular cycling routes. A service station at the intersection would service patrons traveling north or south along the trail as well as those merging on or off Mount Albion, which leads to a residential area.
Mountain Brow Blvd Trail/Trans Canada Trail	Intersection of two cycling facilities converge at the Kenilworth stairs. The stairs are built to transport bicycles up and down from the MB Blvd trail to the Trans Canada Trail. The MB Trail is also situated adjacent to a residential area, so this service station could also service the neighbourhood.
Redeemer University	There are no services like this on campus, unlike Mohawk and McMaster. The university is also surrounded by residential areas so a station could serve the university population but should also be open to the surrounding public.
Hamilton GO Station	Recently added secure bike parking, so cycling infrastructure is being invested in. A cycling repair station here would help encourage cycling as a first/last kilometer portion of the trip.
West Harbour GO Station	A cycling repair station here would help encourage cycling as a first/last kilometer portion of the trip. Metrolinx has identified this station to receive the secure storage, same as the Hamilton and Burlington GO station bicycle storage.
Confederation GO Station	A cycling repair station here would help encourage cycling as a first/last kilometer portion of the trip. According to Metrolinx, this station is in the process of being upgraded, a Fixit station could be part of those upgrades.

East Gate Square/LRT Station	Good for first/last kilometer trip incentive. The mall is also a large commercial area and cycling destination. Seeing as the area is commercial with surrounding residential and is in a central location, the repair station could also serve local residents.
Beverly Community Center	As the City of Hamilton looks to add cycling infrastructure to the rural areas, adding user repair stations at key rural locations could help facilitate more trips as cyclists are able to perform minor repairs along the way. Located at Highway 8 and Concessions Rd 4, the Beverly Community center is roughly halfway between Dundas and Cambridge, two cycling destinations and the City is proposing a multi-use trail along Hwy 8 to Cambridge.

APPENDIX 6 - MINIMUM MAINTENANCE STANDARDS

- 4.2 (1) Subject to section 4.3, the standard for addressing snow accumulation on bicycle lanes is,
  - (a) after becoming aware of the fact that the snow accumulation on a bicycle lane is greater than the depth set out in the Table to this section, to deploy resources as soon as practicable to address the snow accumulation; and
  - (b) after the snow accumulation has ended, to address the snow accumulation so as to reduce the snow to a depth less than or equal to the depth set out in the Table to this section to provide a minimum bicycle lane width of the lesser of 1 metre or the actual bicycle lane width. O. Reg. 366/18, s. 7.
- (2) If the depth of snow accumulation on a bicycle lane is less than or equal to the depth set out in the Table to this section, the bicycle lane is deemed to be in a state of repair in respect of snow accumulation. O. Reg. 366/18, s. 7.
  - City cannot be sued for state of repair, only a state of non-repair

        - State of non-repair: i.e. if ruts which form on a sidewalk as a result of snowfall and poses a risk to users
    - (3) For the purposes of this section, the depth of snow accumulation on a bicycle lane and, if applicable, lane width under clause (1) (b), may be determined in the same manner as set out in subsection 4 (4) and by the persons mentioned in subsection 4 (3), with necessary modifications. O. Reg. 366/18, s. 7.
    - (4) For the purposes of this section, addressing snow accumulation on a bicycle lane includes,
        - (a) plowing the bicycle lane;
        - (b) salting the bicycle lane;
        - (c) applying abrasive materials to the bicycle lane;
        - (d) applying other chemical or organic agents to the bicycle lane;
        - (e) sweeping the bicycle lane; or
        - (f) any combination of the methods described in clauses (a) to (e). O. Reg. 366/18, s. 7.
    - Table:

Snow Accumulation – Bicycle Lanes

Class of Highway or Adjacent Highway	Depth	Time
1	2.5 cm	8 hrs
2	5 cm	12 hrs
3	8 cm	24 hrs
4	8 cm	24 hrs
5	10 cm	24 hrs

    - “If practicable” is not defined, it is a question of judgement and available resources
    - For roadways:

Snow Accumulation – Roadways

Class of Highway or Adjacent Highway	Depth	Time
1	2.5 cm	4 hrs
2	5 cm	6 hrs
3	8 cm	12 hrs
4	8 cm	16 hrs
5	10 cm	24 hrs

O. Reg. 47/13, s. 4; O. Reg 366/18, s. 5 (5).