New Campus Development for The Ottawa Hospital

Hospital and Central Utility Plant

Neighbourhood Traffic Management Strategy

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1.0 INTRODUCTION

The Ottawa Hospital (TOH) has initiated the development approvals process with the City of Ottawa and the federal government to establish a New Campus Development (NCD) to replace the existing Civic Hospital Campus and become the major referral centre for Eastern Ontario, Western Quebec, and parts of Nunavut. It will be the home of the Eastern Ontario Trauma Centre with a range of specialized services, research, and education facilities, along with related ancillary uses such as resident care stay facilities, and retail service uses. The existing Civic Hospital Campus is located at 1053 Carling Avenue and the NCD will be located approximately 1km to the east on lands leased to The Ottawa Hospital from Public Services and Procurement Canada (PSPC) adjacent to the Dow's Lake Pavilion and Central Experimental Farm (CEF). The NCD site is bound by Carling Avenue to the north, Preston Street to the east, Prince of Wales Drive to the south and Maple Drive to the west as shown in Map 1. An overview of approvals and Council motions to date are provided below:

- Master Site Plan Approval (lifting of the "Holding Zone") – October 2021
- Parking Garage Site Plan endorsed by Planning Committee - February 2022

The Master Site Plan approved by City Council stipulated the completion of the following supporting transportation studies – in addition to the overarching Transportation Impact Assessment (TIA) that is typically required to accompany a Site Plan Control (SPC) application - before the registration of the Site Plan Agreement for the future Hospital Building:

1. Off-Site Parking Strategy (OPS)
2. Neighbourhood Traffic Management Strategy (NTMS)
3. Transportation Demand Management Strategy (TDM)
4. Transportation Monitoring Strategy (TMS)

This study represents "Neighbourhood Traffic Management Strategy," and its main purpose is to develop a Strategic Plan that identifies a series of potential interventions to respond to adverse changes in traffic conditions and driver behaviour on neighbourhood community streets should it occur in the future.

1.1 Overview of the TOH Neighbourhood Traffic Management Strategy

1.1.1 What is the Neighbourhood Traffic Management Strategy? Why is it Important?

The NCD will be a new world-class healthcare facility that nearly doubles in size of the existing Civic Campus, generating more activity and pressures on the municipal transportation network. The sheer size, scale, and complexity of the NCD makes predicting these future traffic implications challenging, which is the reason for Council's direction to prepare the NTMS. The NTMS is a supporting technical document accompanying the NCD Site Plan Control application. The NTMS represents a comprehensive area traffic management assessment of the established study area that not only includes future traffic implications triggered by the NCD, but those potentially triggered by other developments or systemic issues in the street network that are prevalent today and generally unrelated to the NCD.

The NTMS is intended to be a living document, with the understanding that opening day of the NCD is currently expected in 2028, and local traffic conditions and behaviour may very well change over this time period. The data collected in the NTMS represents an existing baseline that must be revisited closer to 2028 to confirm whether certain elements of the strategy are still required, may be deferred, in need of refinement, or if different measures are needed. In this regard, the NTMS represents a unified area-wide strategy to help to inform and guide area traffic management decisions leading up to opening day of the NCD (2028), but is still subject to refinements, additional municipal review, and processes by individual departments prior to implementation.

LEGEND

- Study Boundary
- Confederation Line / Trillium Line

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Neighbourhood Traffic Management Strategy

Map 1: Area Context

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Metres

1.1.2 What are the objectives of the Neighbourhood Traffic Management Strategy?

The main objectives of the NTMS are as follows:

- To identify existing and potential vulnerabilities in the municipal street network to traffic implications related to the NCD, with a focus on the communities neighbouring the site.
- To provide TOH and the City of Ottawa the tools and guidance on how to mitigate the various forms of traffic implications.
- To develop a Strategic Plan that may be used to help mitigate/address the identified vulnerabilities when the NCD is in operation, and identifies locations to include in the Transportation Monitoring Strategy that will enable TOH to evaluate the effectiveness of interventions and make appropriate course corrections in the fullness of time.

1.1.3 Who is involved in the Neighbourhood Traffic Management Strategy?

The motions to complete the NTMS (and other supporting transportation studies) was introduced by the four principal Councillors representing the neighbouring Wards (Somerset – Ward 14; Kitchissippi – Ward 15; River – Ward 16; Capital – Ward 17), which set the requirements for the upcoming Site Plan Control application for the main Hospital building. Also among the motions was the requirement to form a Community Advisory Council that includes various community associations and representatives from the TOH network of hospitals and affiliates. A Community Advisory Council Transportation Subcommittee (CACTS) was created that included one representative from the five neighbouring community associations within the study area, who would directly engage with the project team to inform the supporting transportation studies:

- Carlington Community Association (CCA)
- Civic Hospital Neighbourhood Association (CHNA)
- Dalhousie Community Association (DCA)
- Dow's Lake Residents Association (DLRA)
- Glebe Annex Community Association (GACA)

Finally, City of Ottawa technical staff from various departments were consulted throughout this project to further inform and guide the NTMS, including but not limited to:

- Neighbourhood Traffic Calming Branch
- Traffic Investigations & Surveys Branch

It is important to note that the early stakeholder consultation completed for the NTMS (as well as for the other supporting transportation studies) was undertaken in advance of the Site Plan Control process, to ensure each study included public/stakeholder input from its inception and that these parties were an integral part of the planning process.

1.1.4 What is not covered in the Neighbourhood Traffic Management Strategy?

The NTMS is just one of four technical supporting studies to the SPC application, as discussed in Section 1.1. Therefore, any issues related to the other studies have not been included in the scope of the NTMS.

This document represents a long-term strategy; it does not include details regarding implementation, such as the precise number and location of measures, functional design and costs for proposed works/measures, or potential funding for proposed works/measures. Some of details are expected to evolve over the course of the SPC application approvals process, where all stakeholders will be able to provide input on the Strategic Plan. Others will only be confirmed closer to the time of implementation when the required validation of various elements of the Strategic Plan can be completed in concert with city policies and procedures.

1.1.5 What happens after the Neighbourhood Traffic Management Strategy?

This document will accompany the SPC application submission for the main Hospital building (Phase 4 of the Master Site Plan) for City of Ottawa staff review and refinement, which will include public consultation feedback as dictated by the City of Ottawa planning approvals process.

In the time preceding opening day of the main Hospital building (currently scheduled for 2028), TOH will work with the City of Ottawa and other relevant agency stakeholders to reach consensus on which elements of the Strategic Plan should be implemented and when, at which time funding agreements will be established.

It is important to note that the NTMS presents potential traffic implications related to the NCD based on current information, thus providing a long-term perspective. The elements outlined in the Strategic Plan will be subject to City of Ottawa standard processes and procedures for neighbourhood traffic calming. As such, additional effort will be required to confirm the feasibility/appropriateness of the measures contained herein, and to obtain consensus amongst the community and Ward Councillor approval where needed. Additional details on the procedural pathway to implementation are included in Section 2.0.

The NTMS will define a Strategic Plan to help mitigate potential traffic implications on neighbouring streets near the NCD, but each element is still subject to city processes/procedures outlined in the governing policies/guidelines prior to implementation.

There will be additional public consultation opportunities as well as a technical circulation of the NTMS among City of Ottawa staff as part of the Site Plan Control process supporting the main Hospital building.

1.2 Scope

The proposed scope of work was developed in consultation with City of Ottawa staff and the CACTS. The proposed study area for the NTMS is defined by Holland Avenue and Fisher Avenue to the west, Hwy 417 to the north, Bronson Avenue to the east, and Central Experimental Farm (the Scenic Driveway) to the south, as shown in Map 2.

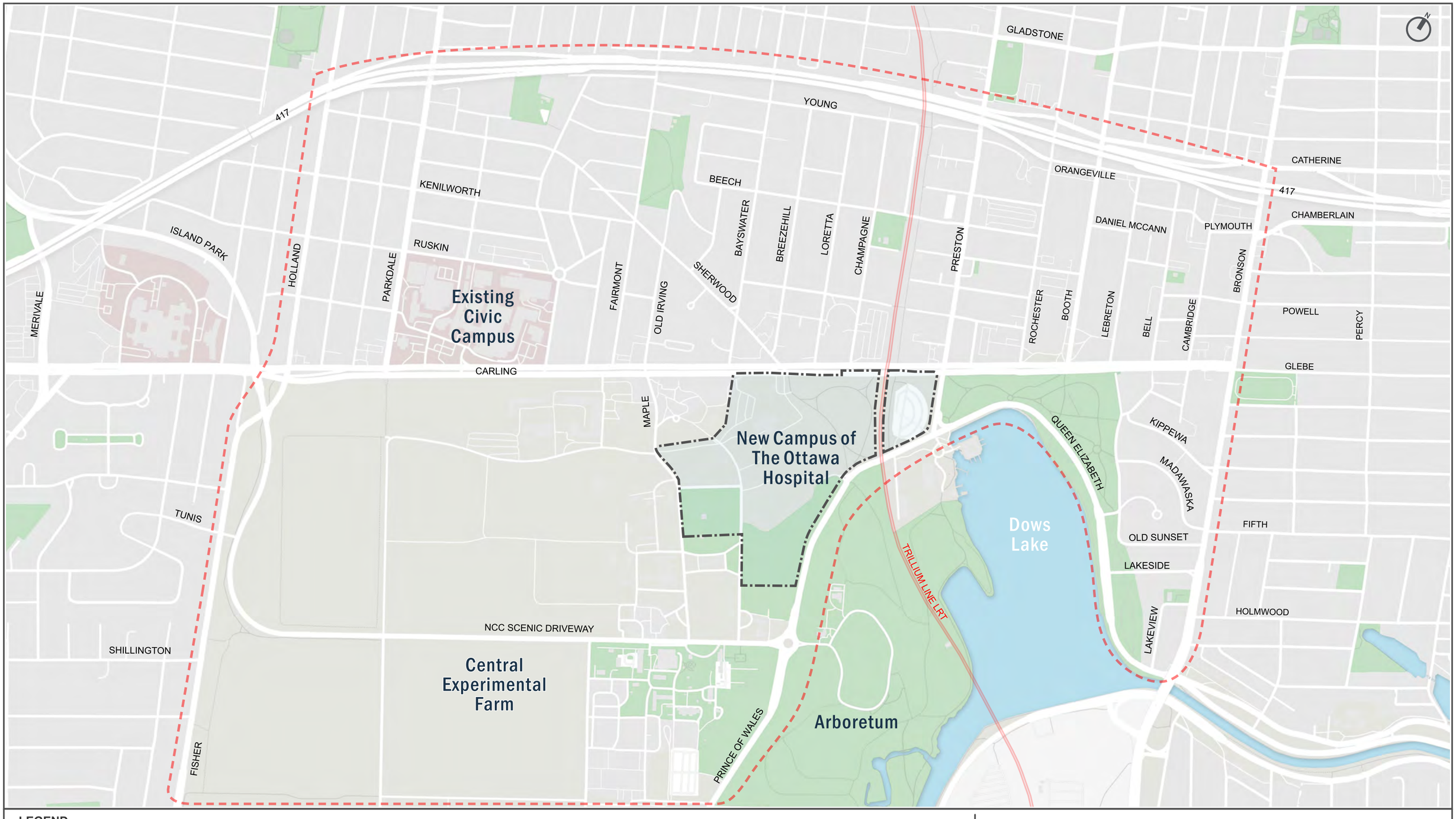
1.2.1 Study Area Characteristics

The NCD is located at the interface of four different City of Ottawa Wards: Somerset, Kitchissippi, Capital and River; and is adjacent to four Community Associations: Carlington, Civic Hospital, Dow's Lake, and Dalhousie, and within 1-km of Glebe Annex, Glebe, and Hintonburg, which are illustrated in Map 3. The NCD will be centrally located in the City of Ottawa, contributing to the variety of destinations and amenities in the area, including the Dow's Lake Pavilion, the Central Experimental Farm, the Arboretum, Little Italy, Carleton University, Tunney's Pasture, among others.

The NCD site abuts three arterial roadways: Carling Avenue, Preston Street, and Prince of Wales Drive. The urban truck route within the study area is limited to arterial and major collector streets, including Bronson Avenue, Carling Avenue, Fisher Avenue, Preston Street, Prince of Wales Drive, Holland Avenue, Rochester Street, and Booth Street.

A notable difference in the surroundings of the NCD site, compared to the existing Civic campus, is the variety of high-quality facilities accommodating several alternative modes of transportation, such as the future Dow's Lake LRT station at the corner of the Preston Street/Carling Avenue intersection, the Trillium Pathway, the Rideau Canal Eastern and Western Pathways, the Central Experimental Farm Pathway, in addition to sidewalks and other cycling supporting facilities provided on several municipal streets within the study area. The importance of these active transportation and transit options cannot be understated in reducing long-term single occupant vehicle use at the NCD.

Map 4 highlights the existing active transportation, transit, and urban truck route networks within the study area.



LEGEND

Study Boundary

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Neighbourhood Traffic Management Strategy

Map 2: Study Area

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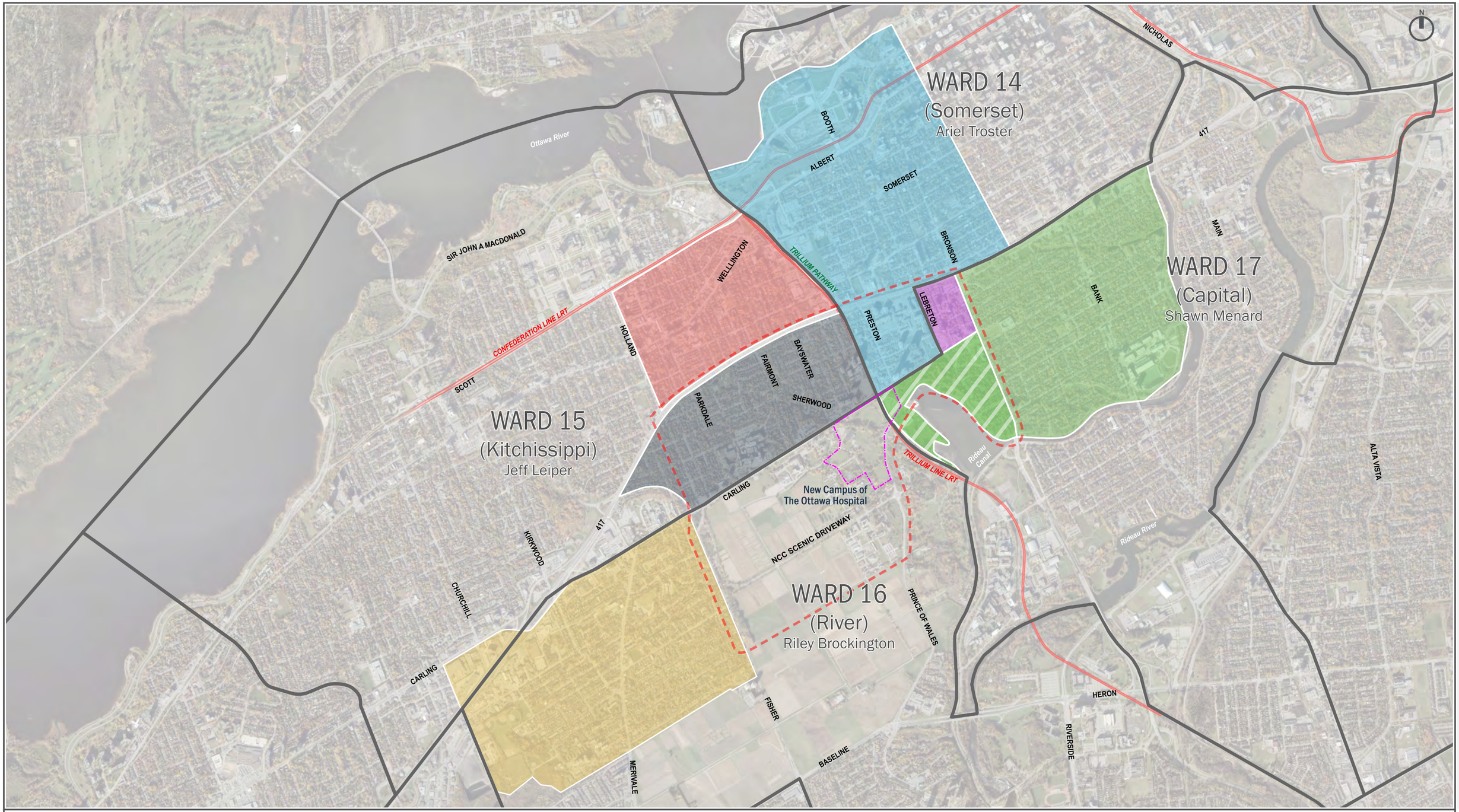

LEGEND

- Study Boundary
- Ward Boundaries
- The Glebe Community Association (GCA)
- Dow's Lake Residents Association (DLRA)
- The Glebe Annex Community Association (GACA)
- Carlington Community Association (CCA)
- Civic Hospital Neighbourhood Association (CHNA)
- Dalhousie Community Association (DCA)
- Hintonburg Community Association (HCA)

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Neighbourhood Traffic Management Strategy

Map 3: Adjacent Community Associations

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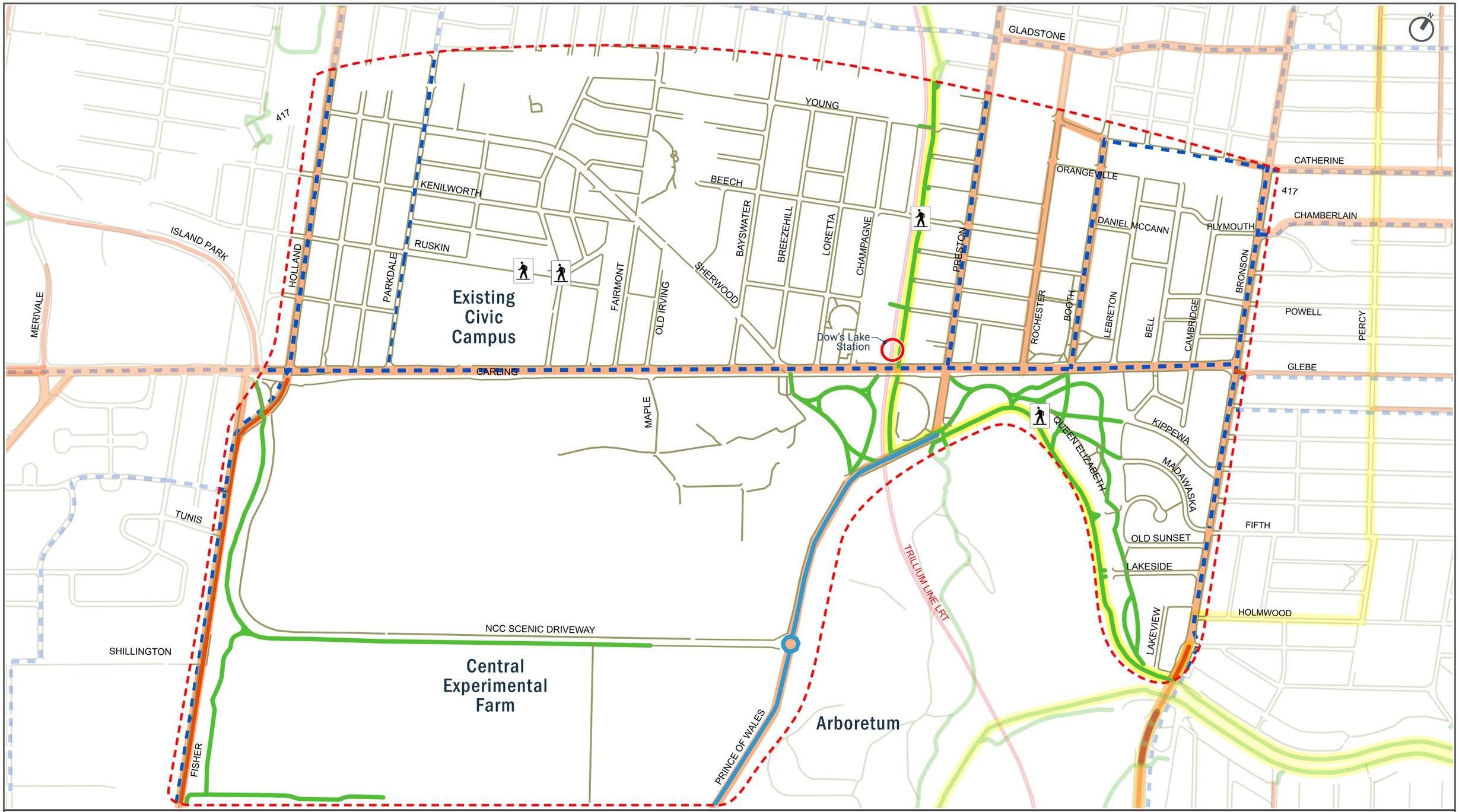

LEGEND

- Study Boundary

Existing Active Transportation Network

- Sidewalks/Paths
- Multi-Use Pathway
- Bike Lane
- Winter-Maintained Cycling Network
- Paved Shoulder
- Cycle Track
- Pedestrian Crossover

Existing Transit Routes

- Frequent or Local

Truck Routes

- Full or Restricted Load

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Neighbourhood Traffic Management Strategy

Map 4: Existing Active Transportation, Transit and Urban Truck Route Networks

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1.2.2 How was the NTMS Developed?

The project team established the following five (5) key stages in order to accomplish the noted objectives in Section 1.1.2:

Stage 1: Stakeholder Engagement
Public consultation was a foundational element to the NTMS. It helped the project team better understand the values, priorities, needs and concerns from each community/neighbourhood within the study area. Engagement with key stakeholders began early in the process and included multiple touchpoints throughout the study to ensure the project stayed "on-course" with its objectives. In addition, the outreach efforts allowed the project team to test and shape the potential strategies and Strategic Plan.

Stage 2: Data Collection
Data collection was integral to the NTMS as it helped validate and provide context to the issues and concerns noted during the engagement process, and ensured objectivity in the identification of vulnerabilities in the street network. It also was essential to developing a baseline of data for future monitoring/evaluation activities.

Stage 3: Identifying the Impacted Streets
This stage represents the analytical portion of the NTMS, where the project team interpreted the information gathered in Stages 1 and 2, which helped identify which streets are currently being "impacted" by traffic implications (whether perceived or validated by data), the degree of the impact, and which streets are expected to be impacted in the future when the NCD is in operation.

Stage 4: Developing the Toolkit
The project team has made every effort to provide TOH with the tools to adjust or refine the Strategic Plan in the future should the need arise. The toolkit is a tailored set of traffic management measures, representing industry best practices, ensuring TOH is able to adapt and respond to changes in the local environment and regional travel behaviour.

Stage 5: Developing the Strategic Plan
The Strategic Plan outlines various interventions to help mitigate existing and anticipated vulnerabilities within the study area. Some interventions may be implemented immediately or leading up to opening day of the NCD, while others may be deferred until the future monitoring process confirms the need. There is also a risk that travel behaviour in the study area will change leading up to opening day of the NCD (2028). This is the reason why the NTMS is a living document, and the Strategic Plan should be viewed as a roadmap based on current data.

1.3 Stakeholder Engagement

The outcome of the NTMS study had to consider the wants and desires of the public and stakeholders, specifically the surrounding communities as they will be directly impacted by the NCD over the coming decades. Consultation efforts for the NTMS focused on two streams: local community associations and technical stakeholders.

1.3.1 Engaging Local Community Associations

Reaching out to the local community associations was essential to the NTMS in determining community values, and it helped the project team identify issues and opportunities from varying perspectives, specific to each

neighbourhood. As previously discussed in Section 1.1.3, the Community Advisory Council Transportation Subcommittee was formed to enable a representative from the adjacent community associations to be directly engaged by the project team in the form of "1-on-1" workshops to solicit feedback on behalf of its membership. The key events and milestones in the public consultation process for the NTMS is described below.

1. **Two Community Advisory Council Transportation Sub-Committee Meetings**:
    a. **Kick-off Meeting [May 16, 2022]**: This meeting introduced the CACTS, TOH representatives and the project team, who collectively reviewed the terms of reference prepared by the project team for each of the supporting transportation studies for the NCD main Hospital building Site Plan Control application.
    b. **Meeting #2 [June 23, 2022]**: This meeting had TOH and the project team update the CACTS on the status of the supporting transportation studies, including a summary of the first round of 1-on-1 workshops with the Transportation Subcommittee members (discussed below).
    c. Meeting #3 [October 3, 2022]: This meeting had TOH and the project team update the CACTS on the status of ongoing work at the NCD, the main Hospital building Site Plan Control application, and a summary of progress to date on the additional transportation studies.
2. **Four Rounds of 1-on-1 Workshops** were held, where the project team met with individual representatives from the Transportation Subcommittee.
    a. **Round #1 [Week of June 6, 2022]**: This workshop provided the Transportation Subcommittee members the opportunity to express their thoughts on the draft terms of reference for the NTMS. The project team also asked the representatives to share any knowledge of past traffic management efforts and planned works, as well as their priorities and concerns related to neighbourhood traffic management in their respective communities.
    b. **Round #2 [Week of August 8, 2022]**: This workshop had the project team share initial findings of the NTMS existing conditions analysis, including historical traffic speeds, traffic volumes, and general traffic behaviour within the study area. The Transportation Subcommittee representatives were given the opportunity to identify potential mitigation measures that would be supported by their membership as well as approaches that may be met with resistance. An information slide deck with preliminary results was provided to all CACTS representatives to review.
    c. **Round #3 [September 2022]**: A follow up workshop was granted to any representatives that had questions or additional comments for the project team regarding the information slide deck distributed during Round #2. The DLRA and CHNA both took this opportunity to provide additional comments.
    d. Round #4 [February, 2023]: A follow up workshop was granted to any representatives that had questions or comments on the first draft of the NTMS Report. The DLRA and CHNA both took this opportunity to provide additional comments.

1.3.2 What We Heard from Local Community Associations

Over the course of the study's engagement program, several themes were identified by members of the public, such as:

- Speeding is a concern on many residential streets.
- There are unsafe levels of vehicular traffic on many residential streets.
- Reducing posted speed limits alone has been ineffective in managing speeds.
- Certain road classifications do not align with community priorities.
- Speed control and turn restriction measures are welcomed.
- Sensitivity to Central Experimental Farm streets and NCC Driveway.
- Desire to relocate the 'H' Signs on Highway 417 at the Parkdale Avenue interchange.

A more detailed recounting of the issues and priorities heard from the CACTS is provided in Section 3.1.

1.3.3 Engaging Technical Stakeholders

The City of Ottawa will be the ultimate approving authority for the NTMS, making it the primary stakeholder. The project team communicated regularly with City technical staff over the course of this study to obtain data and ensure the scope and direction was properly vetted.

The project team also acknowledges other stakeholders that will be important voices during the approvals process when the SPC application is submitted to the City of Ottawa for review, including the National Capital Commission (NCC) and Agriculture and Agri-Food Canada (AAFC; headquartered at the Central Experimental Farm).

A summary of the key events and milestones in the stakeholder consultation process for the NTMS is described below.

1. **City of Ottawa Introduction Meeting [March 10, 2022]:** This meeting allowed the project team to introduce the NTMS project and the impetus for the study. The project team asked city staff key questions that would help formulate the terms of reference for the NTMS Report, such as what an appropriate study area limit is, what are the key issues and concerns, and what are the ongoing or planned work/studies by the city related to area traffic management within the study area.
2. **City of Ottawa NTMS Report Review [January 25, 2023]:** The project team met with City staff in Traffic Investigations and Traffic Calming to discuss the first draft of the NTMS Report. City staff provided comments and suggestions that help shape the document herein.

3. **Email Communication [Throughout]:** The project team had regular email exchanges with key city staff from various departments to collect data, studies and receive input on the approach, methodology, and general direction of the NTMS.

2.0 FOUNDATIONAL ELEMENTS

2.1 Existing Policies, Procedures, and Best Practices

The NTMS has been developed within the context of previous and ongoing transportation planning initiatives governing the study area, undertaken by the City of Ottawa in collaboration with local community associations. The following sections detail the relevant policies and plans that have informed the NTMS.

2.1.1 Guiding Policy Documents

2.1.1.1 City of Ottawa Official Plan

The City of Ottawa Official Plan (OP) provides a vision for future growth of the city and a policy framework to guide its physical development through 2046. An updated OP was passed by City Council in fall, 2021, and received Provincial approval in fall, 2022. The OP divides the city into concentric policy areas called "transects", which help determine broad categories of built form and urban design. The NCD site and its surrounding neighbourhoods fall into the Downtown Core and Inner Urban Transects.

As well as these policy areas, the Official Plan outlines a hierarchy of land use designations based on the intended urban function of lands therein. The NCD site falls into the Major Transit Station Area (MTSA) of the Dow's Lake O-Train Station and is adjacent to the Rideau Canal Special District. The surrounding neighbourhoods - outside of the Dow's Lake Station MTSA and the Preston Corridor - are designated "neighbourhoods" with an "evolving neighbourhood" overlay.

There are several relevant policies within the new OP that guided the NTMS process. First, the NTMS considered the street hierarchy outlined in Policy 4.1.1. This policy makes the distinction between "access" streets and "flow" streets. Access streets are those which interface with local, especially residential, land uses, exhibit high vehicular friction and slower speeds, and which prioritize sustainable modes of transportation. "Flow" streets play a major structural role in the transportation network, and the movement of people is of high importance on these roads. All minor collectors and local roads in the Downtown Core and Inner Urban Area Transects, which contain the hospital site and its surrounding neighbourhoods, are considered access streets. All Federally owned roads, arterials, and major collectors are designated a combination "access/flow", acknowledging their dual role in terms of land uses and vehicle movement.

The NCD site sits at the intersection of two roads designated "Mainstreet Corridors", Carling Avenue and Preston Street. The site is within an area designated as a "Hub", centred on the Dow's Lake O-Train Station. As per Policy 6.1.1(6), where Corridors intersect or overlap with Hubs, **"vehicular traffic along the corridor shall be managed with street design (including traffic calming) so as not to undermine the pedestrian-, cyclist-, and transit user-focused environment of the Hub."** Traffic management interventions that contribute to a "high-quality, comfortable public realm throughout the Hub" are encouraged.

Surrounding areas fall under the "Neighbourhood" designation, with an "Evolving Neighbourhood" overlay. Neighbourhoods are the contiguous urban areas filling the space between hubs and corridors. The primary goal for

these areas in the OP is to reinforce the elements of "15-minute neighbourhoods" - places where all day-to-day needs can be accessed within a 15-minute walk - of which walkability and traffic management are important parts.

The NCD site is directly adjacent to the Rideau Canal Special District. Of particular relevance in the policy directives for this District is Policy 6.6.2.2(f), which directs that Queen Elizabeth Driveway and Colonel By Drive be re-imagined to **"…reduce the roads' importance as a commuter route in favour of pedestrian activity and greenspace connections with consideration of Canal crossings."** Suggested interventions include limiting vehicular access and reducing traffic speed on these roadways.

Other potentially relevant, specific policies include the following:

Policy 4.1.4(6) states that ***"parts of the street and road network may be repurposed and dedicated, on a permanent or temporary basis, to…traffic calming measures"***, in support of the overall shift towards sustainable modes of transportation.

Policy 4.1.2(8) provides the directive that ***"traffic calming measures shall be required or upgraded as part of development where identified in the TMP and associated plans, the road safety action plan or other approved city documents."***

Policy 4.10.1 addresses development in the vicinity of schools, and directs that safe, sustainable, active transportation mobility choices be prioritized as the primary means of travel to and from school. This includes the ***"implementation of traffic calming measures along walking routes to school to reduce traffic speeds without the need for enforcement, increasing the visibility of children and youth at intersections and providing safe intersection crossings that prioritize pedestrians."*** Opportunities should be explored to reduce traffic speed within 400m walking distance of school sites.

Policy 4.1.2 states that ***"safe, direct, and convenient pedestrian and cycling networks and crossings [should be provided] including along desire lines where needed and appropriate."***

And, that ***"where public pedestrian and cycling routes or facilities intersect with roads, appropriate traffic control devices shall be provided to accommodate pedestrian and cycling movements."***

2.1.1.2 City of Ottawa Transportation Master Plan

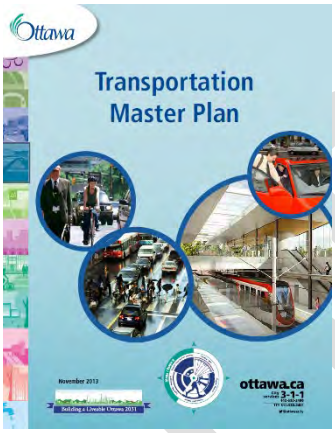
The City of Ottawa is in the ongoing process of updating its Transportation Master Plan (TMP), which supports the mobility objectives of the Official Plan through a detailed blueprint for the development of the City's transportation network. Part 1 of the updated TMP, containing draft transportation policies, was released in December 2021. The full TMP Update, which will identify the planned transit and road network, is scheduled to be completed/approved by Fall 2024.

Particularly relevant to the development of this NTMS is ***Policy Theme 9: Provide Safe, Multimodal Streets***. This policy reinforces the OP concept of "access" and "flow" streets, as discussed in the section above, and specifically emphasizes that operating speeds should be reduced on "access" streets (Policy 9-8).

Under the updated TMP, there are various streets that meet the criteria to be designed with a 30km/h operating speed, including local residential streets. All "access" streets should be design to 50km/h or less, according to context.

All local residential streets, some streets within Special Districts and near schools, and some main streets shall be designed for a 30km/h operating speed.

Policy 9-6 directs to "**continue efforts to minimize traffic impacts on neighbourhoods**" through the Neighbourhood Traffic Calming Program and other ongoing initiatives, in order to maintain a high quality of life in existing neighbourhoods by addressing "undesirable traffic impacts". Policy 9-7 references the City's "vision zero" commitment, the goal of zero road fatalities and major injuries. All transportation design decisions should prioritize human life and health, and vehicle speeds should be reduced around vulnerable road users.



The previous TMP, supported by the accompanying Cycling Master Plan, identified a network of cycling "spine routes", which were roads that were intended to be prioritized for upgraded cycling infrastructure, building towards a safe and complete cycling network. The new Official Plan however supersedes this designation by stating that "**all urban area collectors, major collectors and arterials are cycling routes that, over time, are to include cycling facilities**". It is expected that the next phase of the ongoing TMP update will identify priority cycling infrastructure projects and timelines, however this policy direction was considered while developing the NTMS.

2.1.1.3 City of Ottawa Council Directives on Traffic Calming

City of Ottawa Council approves speed limit reductions on major roads on a case-by-case basis. However, there are several specific Council decisions which are relevant to determining appropriate speed limits and traffic calming measures on other roads in the study area.

In 2009, the Council Transportation Committee brought forth a recommended Speed Zoning Policy for Urban and Rural Roads, which outlined the following speed limit guidelines for each road class: Local Roads (40km/h), Minor Collector Roads (40km/h), and Major Collector/Arterial Roads (signed speed limits to be determined using the 85th percentile operating speed as a starting point, and considering other contextual information). The default speed limit under this Policy was to be 40km/h on residential streets *in new subdivisions*, although at the time this was contingent on changes to the 50km/h default set by the Provincial Highway Traffic Act.

In August 2018, Council approved the application of residential "gateway zones"[1] speed-limit signage, to be gradually installed at the entrances and exits of certain residential areas in Ottawa. This signage brings the speed limit for all un-posted streets in that neighbourhood down from the Provincial default 50km/h to 40km/h, or to 30km/h in applicable cases. Several neighbourhoods within the study area are included in this 'gateway' program, which is discussed in more detail in Section 3.2.1. The signed speed limit on streets outside of these gateway zones is still to be determined using the 85th percentile operating speed (as well as considering other contextual information).

Most recently, in October 2021, the Council Transportation Committee recommended an expansion to the City's automated speed enforcement program, which would add 15 to 25 cameras every year to community safety zones near schools, as well as near playgrounds as the program expands. The main purpose of speed camera enforcement is to reduce the speed of vehicles, and thus the risk of serious injury if a collision were to occur. Sites are thus selected using a data-driven approach that looked at factors that contribute to the risk of collision. Roadways within the study area may or may not be included in the expanded program, to be confirmed closer to implementation.

2.1.1.4 Other Guidelines

The following additional City of Ottawa documents were consulted in the development of the NTMS for the areas surrounding the NCD site:

2020-2024 Strategic Road Safety Action Plan	The current City of Ottawa Road Safety Action Plan (RSAP) is a four-year strategy for improving road safety and advancing the City's 'vision zero' commitment. The plan includes both broad traffic safety initiatives and specific capital interventions aimed at achieving a 20% reduction in the annual rate of fatal and major injury collisions by 2024. The RSAP Implementation Plan is the guiding, Council-approved framework for traffic calming in Ottawa, and is reviewed annually.
Local Residential Streets 30km/h Design Toolbox (2021)	Document stemming from the Council approved 2020-2024 Strategic Road Safety Action Plan Update, which establishes a 30km/h design-speed requirement for new or reconstructed local residential streets. It provides a "design toolbox" to help street designers meet this target, pursuant of the City's overall road safety goals and "Vision Zero" commitment. The Toolbox builds on information from the 2019 Traffic Calming Design Guidelines and helped inform the preliminary recommended traffic calming toolkit presented in Section 4.0.
Traffic Calming Design Guidelines (2019)	Ottawa's Traffic Calming Design Guidelines were approved by Council in April 2019, with the purpose of establishing consistency in the consideration, design, and application of traffic calming measures in the city. Information in these guidelines helped inform the preliminary recommended traffic calming toolkit presented in Section 4.0.
Designing Neighbourhood Collector Streets (2019)	The Council approved Designing Neighbourhood Collector Streets document provides guidance for balancing the competing 'access' and 'flow' objectives neighbourhood collector streets, including through the application of traffic calming measures.

[1] "Gateway Zones" is a short form term for Gateway Speed Limit Signs, which can be 40km/h or 30km/h. Signs are typically erected at entry and exit points to the neighbourhood or defined zone, which informs drivers entering the area that the reduced speed limit applies to every street. This sign supersedes the default 50km/h speed limit for unposted streets based on the Highway Traffic Act.

TAC Canadian Guide to Traffic Calming 2nd Ed. (2018)	The Transportation Association of Canada (TAC) Canadian Guide to Traffic Calming is a detailed reference document for roadway traffic calming measures, aiming to reinforce consistency in traffic calming principles/application. Elements within the NTMS should be broadly consistent with these guidelines.
TAC Geometric Design Guide for Canadian Roads (2017)	The Transportation Association of Canada (TAC) Geometric Design Guide is the ubiquitous Canadian road design reference document, containing detailed guidance for the geometric design of a variety of road types/contexts. Although the recommendations of the NTMS will not approach detailed geometric design, they should be broadly compatible with TAC guidance.
Transportation Impact Assessment Guidelines (2017)	Ottawa's TIA Guidelines assist land developers and transportation consultants in the preparation of TIA studies, which are a sub-requisite of the City's development approvals process aimed at ensuring consistency of the development with the City's planned transportation network. The guidelines include intersection performance criteria as well as recommended peak hour traffic volume thresholds for different class streets in the municipal network.
Policies on Parkways and Driveways (1984)	The Federal Parkway network is subject to its own vision and guiding principles, as outlined by the 1984 Policies on Parkways and Driveways. The NCC is in the process of developing an update to this policy in the form of their *Parkways Planning and Design Guidelines (2024)*, which is expected to have some effect on the use or even geometry of study area parkways.

2.1.2 City of Ottawa Traffic Calming Process

Traffic calming in the City of Ottawa can occur on an ongoing basis through the regular road renewal or development process, pursuant of City policy objectives relating to "complete streets", the reduction of negative traffic impacts, and road safety. However, there are numerous localized traffic calming concerns across the City that cannot (or will not, in a timely manner) be addressed through a full-scale road renewal. A separate process is needed to manage these concerns.

Traffic Investigations and Surveys (in the Public Works Dept.) manage reviews of traffic operational/safety issues and escalate locations to the *Neighbourhood Traffic Calming Branch in Transportation Planning* that could benefit from permanent traffic calming measures if they meet the minimum Council approved qualification criteria. They also manage the *Temporary Traffic Calming Program*, which sometimes funds small straight-forward permanent traffic calming measures that don't require extensive studies.

The **Traffic Management Branch** manage reviews of traffic operational/safety issues during special events, construction activities etc.

Neighbourhood Traffic Calming (NTC) Program

The main pathway for addressing requests for permanent, engineered traffic calming in the City of Ottawa is the Neighbourhood Traffic Calming program. This program specifically focuses on concerns relating to local and collector streets within neighbourhoods, which cannot be addressed through other City programs.[2] Measures implemented through the NTC program include vertical deflection measures, horizontal deflection measures, and sometimes (but more rarely) traffic management measures.

[2] https://ottawa.ca/en/parking-roads-and-travel/traffic-services/traffic-calming/neighbourhood-traffic-calming-program#. Accessed Aug. 2023.

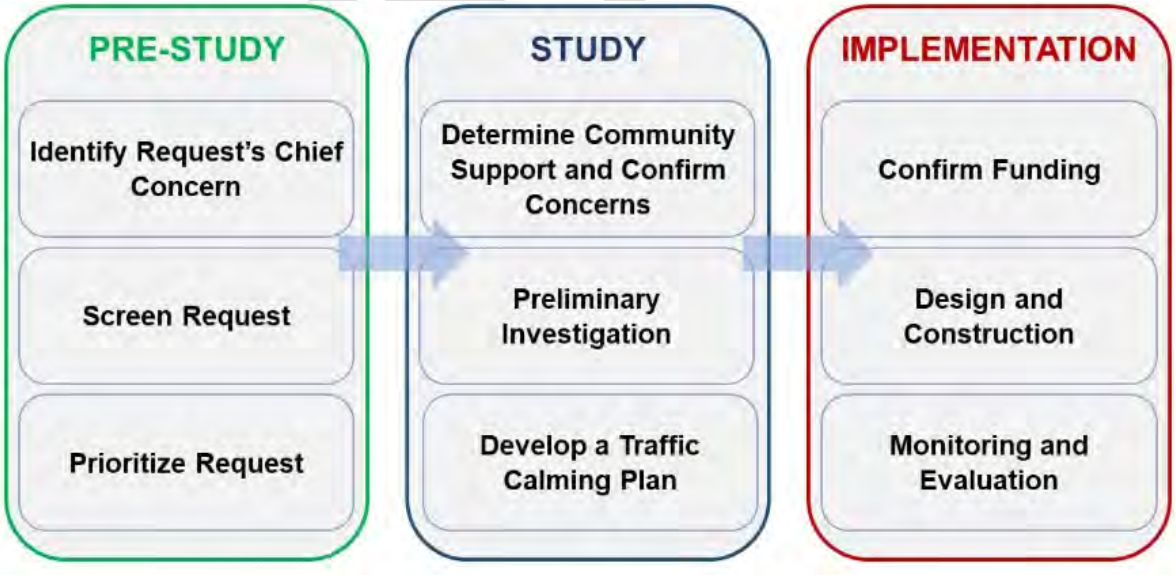
The NTC process is summarized in Figure 1 and is split into three main phases: Pre-Study, Study, and Implementation. It is typically initiated by a resident, community association, or Ward Councillor through a request to Ottawa 3-1-1. Once the details of this request have been received/confirmed, the following steps may take place:

- The request is screened using a Council-approved qualification process. A technical evaluation helps to identify the severity of the identified concern, and the potential for engineered traffic calming solutions to address it. The Ward Councillor is engaged to solicit support before proceeding. It is important to emphasize that the City's screening for NTC projects was devised to manage resources of a city-wide program and not an explicit warrant procedure for traffic calming. It's intended to be a fair process to address requests for traffic calming given limited resources.
- Should the request qualify, it will be prioritized relative to other city-wide requests, so that the most severe issues can be addressed first. Prioritization considers a number of criteria including street context and purpose, traffic behaviour, equity, etc.
- Qualified requests are assigned to an NTC project manager, as resources permit, to undertake a traffic calming study to determine community support, develop an appropriate plan.
- Once funding is confirmed, the City's Infrastructure Services group can conduct preliminary and detailed design, which will be followed by construction of the planned engineering measures.
- Following implementation, monitoring and evaluation requirements are developed as needed.

Depending on available resources and levels of public participation, the NTC process for a top-priority request may take anywhere from 2.5 to 4 years (from planning to construction).

The NTC screening process is not intended to imply that unqualified requests do not merit traffic calming[3]. However, there are inadequate resources to address every request received, and the program is required to prioritize requests accordingly. Non-qualifying requests may be addressed through a future street reconstruction project, or NTC staff may forward the request to the Temporary Traffic Calming Measures (TTCM) Program for consideration.

Figure 1: City of Ottawa Model Traffic Calming Process



[3] https://documents.ottawa.ca/sites/documents/files/ntc_study_process_en.pdf. Accessed Aug 2022.

Temporary Traffic Calming Measures (TTCM) Program

The TTCM Program facilitates the installation of low cost, temporary and/or seasonal measures in cases where a permanent roadway modification may not be warranted, or in advance of permanent measures being implemented. TTCM are funded through a limited budget ascribed to the designated authority of the relevant Ward Councillor, and as such, the Councillor will have the final say on which measures will be implemented under the TTCM Program. Measures implemented through the TTCM Program include seasonal flex-posts, speed display devices, pavement markings, etc.

2.1.3 The NTMS Process

The NTMS process mirrors many of the elements of the City NTC process with subtle adaptations, but it does not reach the same level of detail as is present in the preliminary NTC screening process. Firstly, the NTMS focuses primarily on the first two stages of the city NTC process: Pre-Study and Study that culminates with a Strategic Plan that identifies locations (e.g., intersections, segments, or corridors) that may benefit from area traffic management and describes the type of measures that may be considered at each location. The NTMS process also included extensive community and stakeholder engagement combined with a distinctive qualification process based on metrics and criteria suited to the local area and context.

The NTMS toolkit of alternatives is not restricted to permanent measures but also includes temporary traffic calming measures that provides flexibility and short-term cost-effective measures that can respond quickly to future concerns in an ever-evolving study area. However, any temporary measures will still be subject to the City's TTCM process.

Table 1 below gives a summary overview of the various area traffic management interventions relevant to this study, and notes on the City processes/requirements for each. Information in the table is sourced from the *City of Ottawa Traffic Services Catalogues (October 2022)*[4], which can be referred to for additional information. A more in-depth description of the NTC process can be found in the 2019 NTC Study Process report from the City of Ottawa.[5] Additional information on the TTCM Program can be found on the City of Ottawa website[6].

An implementation plan has not been defined in the NTMS. There are numerous City processes and validation of the Strategic Plan that need to be completed closer to opening day of the NCD (currently expected by 2028 at the earliest). Leading up to this date, an implementation strategy that includes the precise number and location of each measure, funding sources and potential timing of certain measures, will be reviewed with city staff and other relevant stakeholders. Measures within the Strategic Plan will still be required to gain majority community approval prior to implementation, as per city requirements. Furthermore, the final say on temporary measures will be given to the Ward Councillor, who has delegated authority over the TTCM process. Any potential roadway modifications would also be subject to the City's roadway modification approvals process, either through delegated authority (i.e., Ward Councillor approval) or full City Council approval.

The NTMS process is intended to flow into the City's own NTC practices and procedures. Details as to how the various elements of the Strategic Plans can be used to initiate these processes will be established through further consultation with city staff subsequent to approval of the SPC application.

[4] https://documents.ottawa.ca/sites/documents/files/tscatalogue_en.pdf. Accessed Jan. 2023.

[5] https://documents.ottawa.ca/sites/documents/files/ntc_study_process_en.pdf. Accessed Aug 2022.

[6] https://ottawa.ca/en/parking-roads-and-travel/traffic-services/traffic-calming/temporary-traffic-calming-measures-program. Accessed Aug 2022.

Table 1: Summary of Relevant City of Ottawa Traffic Services Processes

Intervention	Process Summary
Signed Parking Regulation Change	- Preliminary safety review required. - Resident led petition requires 66% resident support. - Installation contingent on Councillor approval. - Refer to the NCD Off-Sit Parking Strategy for additional details.
Gateway Zone	- Preliminary safety review required. - Installation contingent on Councillor approval.
TTCM	- Preliminary safety review required, as well as Staff-led feasibility study. - TTCM locations are developed in consultation with Ward Councillors; Councillor approval required to proceed to a feasibility study. - Each Ward is allotted an annual budget for installation, modification of temporary and/or seasonal traffic calming measures ($50,000 as of 2022).
Speed Display Boards	- Purchased through Ward Councillor's TTCM budget. - Installation contingent on Councillor approval.
Permanent Traffic Control Measures (speed humps, curb extensions, etc.)	- Requests screened through NTC Program (or through other projects/programs related to roadway modification, reconstruction). - Locations that do not meet the screening criteria or are not technically feasible may be forwarded to Councillor's office for possible implementation through the TTCM program.
Turning Restrictions / Access Closures	- Requests screened through NTC Program. - Turn restrictions subject to OD survey, volume assignment survey.
Pedestrian Crossover (PXOs)	- Regulations for PXOs determined by the Ontario Highway Traffic Act – Book 15 - If requested location meets traffic volume, safety criteria, it can be prioritized for implementation in consultation with Ward Councillor.

2.2 Data Collection

2.2.1 NTMS Qualification Criteria

The city screening criteria is tailored specifically for the NTC Program and was not considered applicable nor appropriate for the size, scale, and scope of the NTMS. The NTMS differs from the the City and TAC processes in a few kay ways:

- The study area is large, including neighbourhoods and road segments of varying characteristics and needs, all with their own potential vulnerabilities and solutions.
- One of the objectives of the NTMS is to identify and mitigate future problems triggered by the NCD, which is impossible to validate at this time.
- Whereas the NTC Program is *reactive*, responding to specific resident requests, the NTMS is a *proactive* attempt to identify future vulnerabilities across the expected NCD area of influence.

Therefore, it was important that the NTMS develop a robust data collection program and appropriate set of qualification criteria to identify "impacted" study area streets that can be carried forward and easily revisited to inform the future Transportation Monitoring Strategy.

The qualification criteria were fundamentally based on four sets of inputs:

1. Community feedback of perceived risks
2. Travel behaviour metrics obtained through primary data collection/site investigations, and through third party sources
3. Traffic forecasts from supporting transportation impact assessments (TIAs) or community studies
4. Engineering judgment

> *"Some benefits of traffic calming may not be quantifiable. It may not always be possible therefore, to completely technically 'justify' some traffic calming measures which nevertheless are considered desirable to the community. In these cases, it may be appropriate to consider the **intangible benefits** which are related to the perception of an improvement in safety and quality of life along with the measurable, predicted improvements."*
>
> **TAC CGTC 2nd Ed, Pg 4**

Any one of these inputs, if triggered, may qualify a location, segment, or corridor as an impacted street – including engineering judgment. This latter inclusion was important to ensure future traffic implications could be properly represented with the lack of validating data.

The following indicators/metrics were used to support the qualification process at a high level, and screen network components for further analysis:

- 85th percentile speed [Industry standard]
- Two-way peak hour traffic volumes [city TIA Guidelines]
  - 120vph – local street
  - 300vph – collector street
  - 600vph – major collector street
- Two-way average annual daily traffic (AADT) volumes [TAC]
  - <1,000 to <3,000 – residential vs industrial/commercial local streets
  - <8,000 to <12,000 – residential vs industrial/commercial collector streets
  - 5,000 to 30,000 – arterial streets
- Intersection capacity analysis that helps quantify level of congestion [City TIA Guidelines]
  - LOS E or F are considered congested conditions in most cases (the City accepts that arterial street intersections may operate at a LOS E)

2.2.2 Data Collection Approach and Methodology

One of the foundational elements of the NTMS is the underlying data collection. It was critical that the project team attempt to quantify the noted issues and concerns and properly diagnose the trigger(s), but also provide context as to the severity of the issues that would lead to the most appropriate solution/mitigation measure(s). In some cases, public perception of certain issues was interpreted incorrectly and providing data may help ease public concerns without direct mitigation. The following section will document the data collection program prepared for the NTMS.

2.2.2.1 Data Sources

Data supporting the NTMS was primarily sourced from the *Streetlight* transportation analytics platform, which provides a wide array of benefits over traditional data sources. It permits historical traffic data to be accessed across a large study area, and permits customizable analysis periods, month(s), day(s), and hour(s) within a given year dating back as far as 2016. Data collection otherwise would have been impractical and cost-prohibitive to complete using traditional surveying or traffic counting techniques. There are also synergistic advantages in preparing the existing baseline data in a platform that can be easily duplicated in the future, which is advantageous for TOH to support the Transportation Monitoring Strategy. A more detailed discussion about *Streetlight* is provided in the following section.

TOH retained a limited subscription of *Streetlight* to inform the supporting transportation studies and was used to generate travel behaviour metrics to inform the NTMS, including:

- Origin-Destination of Trips
- Proportional Vehicle Routing
- Segment Travel Speed

The NTMS also leveraged other data sources to either calibrate the *Streetlight* results or to further inform the NTMS needs assessment, including:

- Intersection turning movement counts from the City of Ottawa.
- Automated traffic recorder (ATR) data from the City of Ottawa, which includes "spot-speed" and corridor volume data.
- Site Visit and Inventory: The project team completed multiple site visits in the summer of 2022 to develop an existing inventory of area traffic management related infrastructure as well as observe travel behaviour within the study area. The inventory was supported by information provided by the City of Ottawa.
- Historical data from previous or ongoing studies by the City of Ottawa.

One of the challenges of the NTMS was the relatively large size of the study area. However, certain streets were ruled out immediately from the data collection program that were considered to have little to no risk of traffic implications in the future based on their location, length, and area context. In doing so enabled a more focused data collection program that emphasized streets identified as impacted based on the CACTS and City of Ottawa staff feedback and a review of existing conditions.

2.2.2.2 *Streetlight*

Streetlight is a transportation analytics platform which processes large volumes of real-time geodata from location-based service (LBS) enabled devices – such as cellphones or in-vehicle GPS devices – into detailed transportation analytics. It is a powerful tool for analyzing and summarizing travel patterns at a variety of geographic and temporal scales.

The platform uses raw data comprised of time-stamped, locational "pings" from LBS devices, at an average approximate interval of every 60 seconds per device. Each ping corresponds to a vehicle's location in space at a specific time, and can be assigned a position on a digital representation of the road network. A series of sequential pings from the same device represents a 'trip'. *Streetlight* uses a series of algorithms to fill the gaps between pings, giving a complete (though partially extrapolated) image of each device trip. This trip data can then be expanded and aggregated in a variety of ways to provide valuable micro and macro-behavioural transportation data.

Streetlight informed the direction and elements within the NTMS by helping to determine the degree of vulnerability of links in the road network surrounding the NCD. Analysis "zones" were created corresponding to a long-list of road segments which were previously identified as being exposed to potential traffic impacts related to the NCD. Transportation metrics - such as vehicle speeds, volumes, and route decisions - were generated using *Streetlight* and reviewed to establish how existing traffic in the study area is behaving, under the assumption that future increases in traffic would exacerbate any issues.

Limitations

There are some methodological limitations inherent to the *Streetlight* traffic analysis platform, which should be considered when discussing any analysis results.

First, it is acknowledged that the *Streetlight* average segment speed metric may not fully capture driver behaviour and is likely a slight underestimation of the top speeds which are achieved by traffic on a road segment. The speed metric presented by *Streetlight* is not a precise measurement of a vehicles speed at any given point but is a time-over-distance average calculated using the average travel time of vehicles traversing a segment. *Streetlight* cannot capture the highest speed achieved on a segment, and so cannot reliably be used to assess driver compliance with posted speed limits. Despite this, *Streetlight* speed metrics provide a useful starting point for examining aggregate speeding patterns and can be used to identify impacted streets for further investigation as has been done here. As well, to account for this limitation, it was assumed that *Streetlight* was at least slightly underestimating average segment speeds in most cases, although the precise degree of underestimation was difficult to measure and may vary from street to street. "Spot-speed" surveys or Automated Traffic Recorders (ATRs) may be considered to supplement and calibrate the *Streetlight* observations in the future.

The project team has considered ATR data to help calibrate the Streetlight observations.

Second, *Streetlight* segment analysis is limited by a minimum recommended segment length, which may be difficult or impossible to meet in some cases. This could influence the results of the segment speed evaluation. This minimum is determined by the estimated frequency of the "pings" which make up *Streetlight* data, estimated to be ~60 seconds on average, as well as the speed of the road. Analysis segments should be long enough to have a travel time of at least 60 seconds, to ensure that one or more data point can be captured for every traversing vehicle. So, the minimum length of a 30km/h street is 30km/h divided by 60 seconds, or 0.5 km. The short roads such as Lakeside Avenue in the Dow's Lake neighbourhood, for example, are particularly vulnerable to this limitation. This limitation was accounted for in the analysis by considering the surrounding street network context for every analysis segment alongside segment speed outputs, and by trialing several different segment configurations to assess the degree to which average speed outputs would be influenced. Only one analysis segment, Lakeside Drive, was found to have an average segment travel time consistently below 60 seconds, indicating that in most cases the effect of this limitation should be minimal.

Finally, regarding the *Streetlight* 'Top Routes' analysis, *Streetlight* may insufficiently capture "short-cutting" traffic because of the probabilistic method it uses to determine vehicle routing. *Streetlight* Top Routes are calculated using a combination of shortest path as well as travel times. The platform infers which path between two pings a vehicle is most likely to take based on the relative expected travel time of each alternative path. For example, if two pings are recorded 55 seconds apart, and there are two possible paths of travel between them. The first path has an expected travel time of ~50 seconds, and the second ~120 seconds. The probable path of travel would then be the first path. When multiple paths between two pings have equal or similar travel times, Streetlight may not be able to determine an exact path with high certainty. In these cases, the trip will be locked to the shortest possible path. This may become more of an issue the higher the analysis resolution, or the denser the road network being analyzed, and may result in some 'shortcutting' behaviour being missed. The project team examined *Streetlight* outputs in parallel with ATR, "spot-speed" data and community input, acknowledging that the ATR data and community observations may have captured behaviour which was too granular to be captured in the *Streetlight* data because of this limitation.

The study team engaged with the *Streetlight* platform with an awareness of these limitations and their potential impacts on study outcomes, and were careful to account for them when considering analysis outputs. It is acknowledged that although it is a powerful tool for transportation analysis, it is not an infallible one, and the

Strategic Plan was not solely based on *Streetlight* results. As outlined in Section 2.2.1, public input, additional data sources, and a degree of engineering judgement were all factored into the evaluation process.

Streetlight provides a wide-range of data to help inform the NTMS, but it does have notable limitations, particularly when estimating vehicular speeds and/or volume in a dense urban environment. Ultimately, it represented only one facet of the impacted street evaluation, and was never the lone decision-making factor.

3.0 IDENTIFYING NEEDS AND OPPORTUNITIES

Many strategies are available to address area traffic management problems. In some cases, multiple strategies may be used to tackle a single problem, or a single strategy may be applied to multiple problems. It is imperative that the problems are identified correctly, since improper use of area traffic management measures may not adequately address the problem, exacerbate a secondary problem, or create new problems. The following section outlines the process to identify the potential problems or "vulnerabilities" within the existing and future study area street network, which will be essential in devising the appropriate mitigation measure(s).

3.1 Public Stakeholder Input

The project team held extensive consultation with the CACTS, to ensure all priorities and concerns were documented and acknowledged in the NTMS. This was a critical step to inform the study process, guide decision-making, and focus efforts to areas of greatest importance. Ultimately, the public were directly involved in the planning process of the NTMS. The project team attempted to validate all perceived concerns based on a review of existing and future conditions within the study area. That said, **a lack of corroborating data or empirical evidence did not mean that concerns would not be considered or responded to in the Strategic Plan**.

The priorities, perceived issues and concerns from each of the community association representatives in the CACTS have been summarized below.

3.1.1 Carlington Community Association (CCA)

Overall, the CCA had few concerns with long-term traffic implications related to the NCD within their community.

- The CCA shared their support for restoring the 'H' sign at the Carling Avenue/Hwy 417 eastbound off-ramp to increase use of Carling Avenue for NCD vehicular traffic.
- The CCA noted they have observed periods of high congestion on Fisher Avenue, though acknowledge it is not likely contributing to downstream area traffic management issues.
- The CCA expressed the importance of the NCC Scenic Driveway as a future connection to the NCD for both vehicles and active transportation users, particularly from residents within their community where many of the existing Civic Hospital employees currently reside. They anticipate there will be a strong preference to walk and cycling to the NCD via the Driveway rather than Carling Avenue. Therefore, they stress the need for a safe and seamless driving/cycling/walking environment to the New Civic Development via the NCC Scenic Driveway year-round.

QUICK HITS

- Supports relocation of 'H' Sign to Carling Avenue interchange
- Notable congestion on Fisher Avenue
- NCC Scenic Driveway alternative active transportation corridor to Carling Avenue

3.1.2 Civic Hospital Neighbourhood Association (CHNA)

The CHNA represents a unique neighbourhood in that it will have two notable medical campuses along or within its borders. There is an extensive history of engagement between the CHNA and the City of Ottawa to address local traffic concerns related to the existing Civic Campus, which is embodied by the various area traffic management

measures currently seen throughout the neighbourhood. Concerns continue to persist despite these historical efforts, and the NCD represents the latest trigger that the CHNA believe will create substantial traffic impacts on their local streets. The key concerns and priorities expressed by the CHNA have been summarized below:

- The CHNA believe several streets within the association limits are vulnerable to traffic implications today and in the future, with Holland Avenue, Parkdale Avenue, Sherwood Drive, Bayswater Avenue, and Fairmont Avenue being most prominent. The CHNA were concerned that the NCD will increase the reliance on these already impacted streets and recommended the NTMS look for avenues to discourage hospital traffic from traversing their neighbourhoods.
- Among the proposals was changing the location of the "H" signs from the Parkdale/Hwy 417 interchange to the Carling Avenue/Hwy 417 and Bronson Avenue/Hwy 417 interchanges, to direct traffic away from Parkdale Avenue and help reduce potential traffic infiltration along Sherwood Avenue and other local streets, and direct future NCD traffic to the more appropriately suited arterial street: Carling Avenue.
- The CHNA are particularly protective of Sherwood Avenue, which is a collector street connection between Parkdale Avenue and Carling Avenue. It provides an attractive route option for any vehicle travelling to/from the Parkdale Avenue/Hwy 417 interchange and any destination to the southeast, avoiding the arterial roads Parkdale Avenue and Carling Avenue. Therefore, locating the main access to the NCD at Sherwood Drive is highly undesirable.
- The CHNA acknowledges the City's efforts to convert the neighbourhoods east of Parkdale Avenue to the Trillium Line as a 30km/h community, which was recently implemented in 2022. However, they are concerned that inclusion area did not extend to Holland Avenue and is uncertain of when that will occur.
- The CHNA also expressed concerns with the 30km/h community speed implementation, which lacks supportive measures. All 30km/h streets should be designed as per the City's 30km/h Residential Street Toolbox, as required for any new streets being built. Wide intersections promote faster speeds and creates fundamental design issues contrary to the intent of lowering the speed limit. The CHNA questioned how these aspects will be 'married' once the hospital is built.
- Finally, CHNA expressed concerns with the current design of Parkdale Avenue; the designation as an arterial street is inappropriate for the perceived "local" context. The level of vehicular traffic is considered high and creates a barrier for active transportation users, and increases the potential for short-cutting through the community.

QUICK HITS

- The segment of Parkdale Avenue within the CHNA possesses unique characteristics and is highly sensitive to impacts related to the NCD
- Holland Avenue, Sherwood Drive, Fairmont Avenue, and Bayswater Avenue were also expected to be highly impacted by NCD traffic
- Supports relocation of 'H' Signs away from Parkdale Avenue interchange
- There needs to be design support for 30km/h signage
- Parkdale Avenue traffic volumes of greater concern over speeding

3.1.3 Dalhousie Community Association (DCA)

Overall, the DCA had few concerns with long-term traffic implications related to the NCD within their community. The key concerns and priorities expressed by the DCA have been summarized below:

- A key priority for the DCA is ensuring the Carling Avenue/Rochester Street intersection is maintained as a right-in right-out intersection (RIRO) to prevent corridor congestion along Carling Avenue between Preston Street and Booth Street.
- The DCA expressed support for community gateway 30km/h speed reductions in adjacent communities, but agreed that it may not be appropriate for the section between Preston Street and Booth Street due to the land-use and local context.
- The DCA expressed concerns with increased traffic on Lakeside Avenue with the NCD, and importance of Madawaska Drive/Fifth Avenue corridor as a popular cycling link as a reason to lower volumes and speeds on that route.
- The DCA noted that local context is important when weighing volume of traffic infiltration – perceived low volumes may still be unacceptable in a local context.
- The DCA reinforced the importance in recognizing and targeting locations with high-speed differentials (between observed speed and posted speed limit), even if highly infrequent or average speeds align with the posted speed limit.

QUICK HITS

- Maintain Carling Avenue/Rochester Street intersection as a RIRO in the future
- Supports DLRA perceived street impacts
- Be sensitive to traffic speeds and infiltration within the local context

3.1.4 Dow's Lake Residents' Association (DLRA)

Similar to the CHNA, the DLRA also have a long history of engagement with the City of Ottawa over area traffic management concerns within their community. The DLRA is a relatively small association that borders three major roads: Bronson Avenue, Carling Avenue and Queen Elizabeth Drive. Therefore, the risk of traffic infiltration is high, which is evidenced by the number of existing traffic calming measures already in the community such as road closures, turn restrictions, one-way designations, and speed humps. Streets in the neighbourhood are also heavily used by pedestrians and cyclists because of the proximity of Commissioners Park and other recreational uses surrounding Dow's Lake.

The DLRA expressed several concerns with traffic implications related to the NCD and also offered comments and input on the overall approach and methodology for the NTMS, which provided the project team with useful insights on previous efforts within the community. The key concerns and priorities expressed by the DLRA have been summarized below:

- The DLRA expressed concerns with the amount of intensification and associated traffic implications occurring within Little Italy, and greater the Preston-Carling District Secondary Plan area, combined with the NCD and the anticipated traffic impacts on the community.
- The DLRA supports maximal traffic calming and wants all possible proactive traffic calming measures, in order that the safety of active users be prioritized over vehicle traffic.
- The DLRA believe Lakeside Avenue, Kippewa Drive, Madawaska Drive, Old Sunset Blvd, and Dow's Lake Road should all be considered impacted streets.
- The DLRA noted their concern pertains not only to the potential for increased traffic infiltration on local streets, particularly Madawaska Drive and Kippewa Drive, but also the high speed of this traffic.

- The DLRA shared that Cambridge Street experiences some traffic infiltration from users that do not realize it does not connect directly to Bronson Avenue and end up filtering through the community.
- The DLRA believe signage within the community is inadequate or inappropriate within the context, e.g. some street missing signage such as 'STOP' or 'YIELD' signs.
- The DLRA expressed concerns with inconsistent speed regulations within the community, but acknowledged the City's has responded and expects the community to be a 30km/h community in the near future.
- The DLRA suggested the project team expand the study area to include additional Bronson Avenue intersections.
- The DLRA expressed concerns with the limitations of Streetlight to evaluate speeds over traditional manual 'spot-speed' surveys.
- The DLRA suggested the majority of the community agree that more turning restrictions is positive, in spite of the increased inconvenience for local residents.
- The DLRA shared the permanent turn restrictions on Lakeview Terrace to/from Queen Elizabeth Driveway has been effective.

QUICK HITS

- All local streets with a connection to Bronson Avenue or Carling Avenue are impacted, to varying degrees
- Lakeside Avenue, Madawaska Drive and Kippewa Drive were considered highly impacted
- Speeding is of greater concern than traffic infiltration
- Internal intersection design concerns at Dow's Lake Road/Kippewa Drive
- Concerns with *Streetlight* limitations in measuring speed data
- Supportive of additional turn restrictions

3.1.5 Glebe Annex Community Association (GACA)

Overall, the GACA had few concerns with traffic infiltration through their community. The key concerns and priorities expressed by the GACA have been summarized below:

- The GACA shared that potential traffic infiltration may occur at Rochester Street or through the Central Experimental Farm (e.g. NCC Scenic Driveway or Maple Drive) with the NCD.
- The GACA acknowledged that ongoing development, such as the two Canada Lands sites, represent a significant shift in land-use and urban context, and presents an opportunity for long-term planning on how the adjacent streets (e.g. Booth Street, Rochester Street and Lebreton Street) will be designed and function in the future, e.g. from wider commercial oriented streets to streets more conducive to residential contexts and greater active transportation use.
- The GACA highlighted the existing congestion at the Bronson Avenue/Carling Avenue intersection, which may exacerbate traffic infiltration on local streets, and the barriers to pedestrians and cyclists.
- The GACA did not express significant concerns with traffic infiltration on local streets in the future, e.g. Plymouth Street, Powell Street and Bell Street.

The project team also acknowledges comments from the Glebe Community Association (GCA) related to traffic infiltration on local streets near Bronson Avenue and Queen Elizabeth Drive. These concerns were not addressed in

the NTMS since the locations reside outside the agreed upon project study limits. That said, the project team is aware of existing traffic calming measures in the noted areas, which suggests the City is aware of the local concerns. If these issues persist or worsen over time, the GCA should relay their concerns directly to the City so they can evaluate and respond accordingly.

QUICK HITS

- Bronson Avenue/Carling Avenue intersection congestion
- Noted Rochester Street and CEF are likely to be impacted in the future
- Planned developments represent opportunities to redesign streetscape on key streets

3.2 Existing Conditions Review

Both the city Traffic Calming Design Guidelines (TCDG) and TAC Canadian Guide to Traffic Calming (CCTG) emphasize the importance of context when deciding where and when to use traffic calming. The city has taken a broad approach to traffic calming, where "traffic calming concepts should be considered as part of new street designs as well as on existing streets to ensure they operate as intended." [7]

However, the TAC CGTC notes that the majority of experiences and interest in traffic calming is found on local and collector residential streets, while outside of speed management, traffic calming is less common on major collector or arterial streets. It also acknowledges and recommends solutions to arterial road network issues should be pursued first before traffic calming is considered.[8]

The need for traffic calming may also be driven by traffic conditions and driver behaviour that are considered inappropriate for the adjacent land use context, active transportation users, and other activities that occur on the street. Thus, for arterial streets where no optimal design or regulatory solutions exist, traffic calming is typically not recommended.[9]

Therefore, it is critical to understand the existing conditions where traffic calming is being considered. For existing streets, this includes the area land-use, street/transportation network contexts as well as surrounding transportation network operations and driver behaviour.

3.2.1 Existing Street Characteristics

Understanding the street characteristics and general street hierarchy is important to framing the opportunities and constraints for area traffic management within the study area.

3.2.1.1 Street Classifications

Street classifications help define the intended form and function of the street. Some streets are designed to accommodate higher levels of vehicular traffic and vehicular speeds, and to accommodate regional or cross-town traffic, while others are not. The City of Ottawa TMP (2013) provides a road classification framework for the city, which has been summarized in Table 2.

[7] City of Ottawa -Transportation Services Department -Area Traffic Management Branch, *Traffic Calming Design Guidelines*, 2018, Ottawa, ON, pg.2

[8] Transportation Association of Canada, *Canadian Guide to Traffic Calming* - 2nd Edition, 2018, Ottawa, ON, pg.4

[9] Ibid

Table 2: City of Ottawa Road Classification System[10]

CITY ROAD CLASSIFICATION FRAMEWORK		
Classification	Primary Function	Secondary Function
City Freeway	Serve "through" travel between points not accessed directly from the road itself	None – direct access to adjacent lands is prohibited
Arterial	Serve travel through the city in conjunction with other roads	Provide access to adjacent lands, subject to restrictions
Major Collector	Serve travel between collector and arterial roads	Provide direct access to adjacent lands
Collector	Serve neighbourhood travel between local and major collector or arterial roads	
Local	Provide direct access to adjacent lands	Serve neighbourhood travel to and from collector or arterial roads
Lane	Provide secondary access from public road to abutting lot	None

All arterial and collector streets within the study area have been listed below and identified in Map 5. All other streets within the study area are classified as local streets.

- Arterial Streets – Carling Avenue, Parkdale Avenue, Preston Street, Bronson Avenue, Prince of Wales Drive, and Fisher Avenue
- Major Collector Streets – Holland Avenue, Rochester Street, Booth Street
- Collector Streets – Sherwood Avenue

These streets are expected to accommodate more traffic and higher vehicle speeds compared to local residential streets, which are important considerations when deciding whether a street is impacted and qualifies for mitigation.

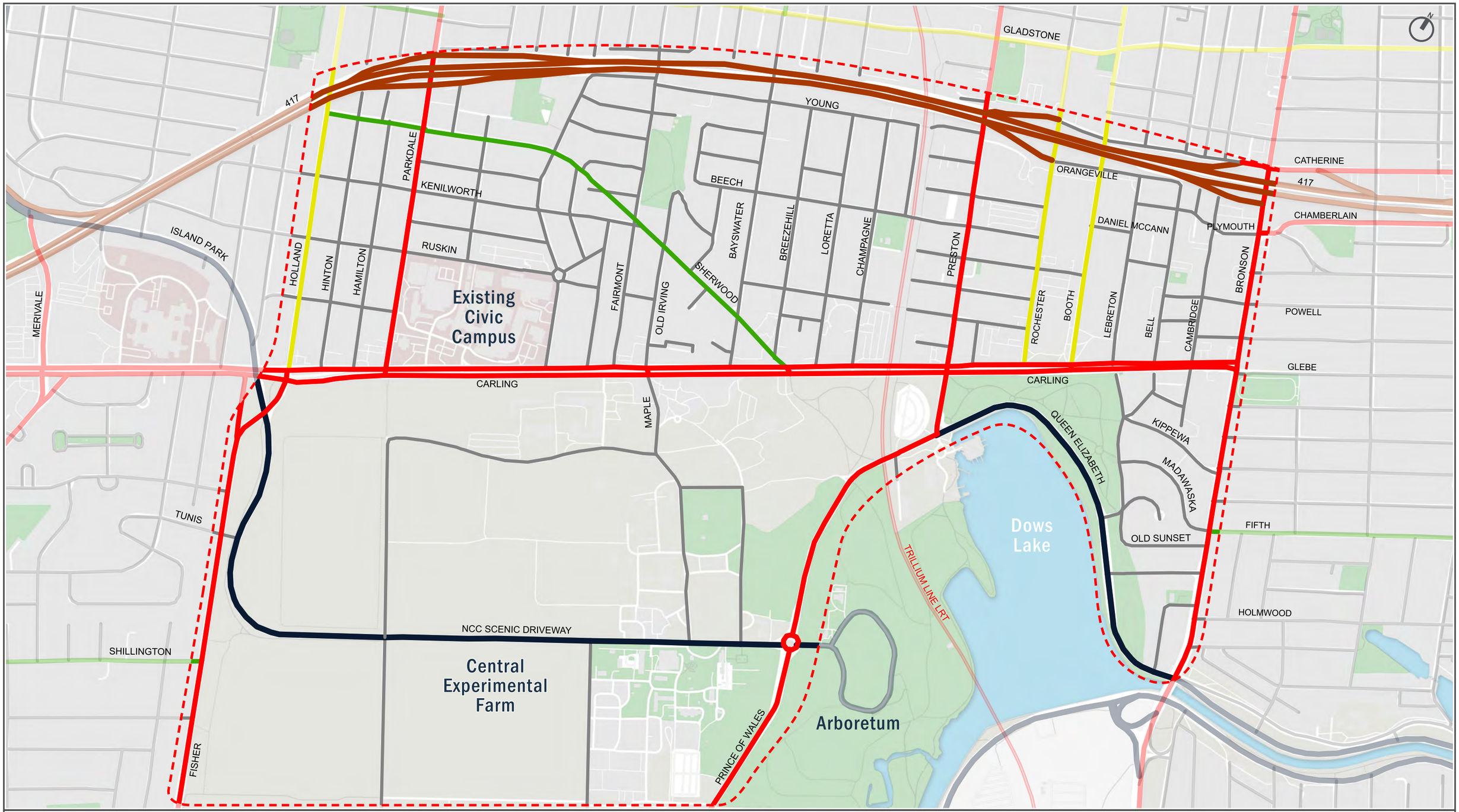
Additionally, Queen Elizabeth Drive (QED) and the NCC Scenic Driveway are under federal jurisdiction and need to be classified somewhat separately from the City's Road hierarchy because of the unique role they play in the national capital region transportation network. This study acknowledges the NCC's position is that these roads may have commonalities to municipal arterial or major collector roads, but they are not intended to act as high-volume or high-speed thoroughfares. The NCC is currently in the process of updating their vision for the sustainable future use of the "Parkways" within the *Parkways Planning and Design Guidelines (2024)*.

3.2.1.2 Street Context

Delving deeper than the policy framework for the street classification, the street context takes into consideration the adjoining land-uses, access management, and proximity of sensitive or active destinations. Neighbourhood streets that accommodate direct residential frontage are more sensitive to vehicle speeds and volumes.

Likewise, schools and parks that attract walking and cycling traffic from a wide range of users with varying physical abilities are commonly targeted for area traffic management interventions since they are synonymous with community well-being and safety, which is consistent with the direction in the new OP.

[10] City of Ottawa - *Transportation Master Plan* – 2013, Ottawa, ON, pg.68



LEGEND

- Study Boundary
- Federally Owned Street
- Provincial Highway
- Arterial Street
- Major Collector Street
- Collector Street
- Local Street

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Map 5: Existing Road Classifications

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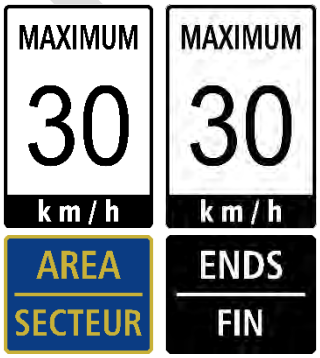
Map 6 illustrates the street context related to parks, schools, and residential frontage within the study area, which are strong indicators of a potentially impacted street to traffic.

Additional context regarding a street's intended function can be found in Appendix D of the City's Traffic Calming Design Guidelines, which outlines key emergency vehicle response streets for both fire and paramedic services. These streets are shown together in Map 7. This designation may be important when considering different traffic calming measures along a designated corridor, as vertical deflection or measures which could increase emergency response times may not be appropriate. Note that the key response streets shown in Map 7 were established specifically for the Traffic Calming Design Guidelines "**…in consultation with City of Ottawa Fire Services and Paramedic Services. [They] are for the sole purpose of the development of traffic calming plans for City of Ottawa streets and do not reflect any other city policy or objective.**"

3.2.1.3 Speed Regulations

At one point in time speed regulation signage on local residential streets were generally overlooked and it was not uncommon to have unposted speed limits on all residential streets within a community. Over time, the City of Ottawa has made great strides in lowering speed limits within residential communities (as discussed in Section 2.1.1), recognizing the importance of equitable and safe use of streets for all users, not just vehicles, regardless of age and physical ability.



Speed regulations within the study area have historically been varied, reflecting the gradual shift towards lower speed limits over the years. Recently, the city has introduced community "gateway zones" signs within several neighbourhoods, specifically in the CHNA between Parkdale Avenue and the Trillium Line corridor, and in the Glebe Annex, as shown in Map 8. The City's long-term intent is that all local streets be governed by gateway zones. By default, these zones will be posted at 40km/h, but in cases where it is supported by observed traffic speed data, the posted limit will be 30km/h.

The decision to reduce speed limits in the City of Ottawa requires approval from the Ward Councillor, who will typically request a feasibility review. Locations are required to meet the criteria/warrants identified in the 30km/h policy. The project team was informed that there are expectations from the local community to expand the gateway zones in the CHNA west to Holland Avenue and into the DLRA community. The timing to implement these future gateway zones has yet to be confirmed and is subject to budget availability.

The NCC also recently (as of September 2022) reduced the speed limit of the entire Queen Elizabeth Drive corridor to 40km/h from 60km/h, in alignment for their overall vision for Federal Parkways which prioritizes active users and a quality public realm.

3.2.1.4 Existing Area Traffic Management Inventory

The project team completed multiple site visits in August 2022 to inventory existing study area traffic management measures, which was supported by data provided by the City of Ottawa. This inventory establishes a strong foundation to build upon through the NTMS.

Existing measures comprise permanent traffic calming measures implemented through the city's NTC Program (or any other relevant city programs or projects, such as corridor renewal projects, active transportation improvement projects, etc.), temporary traffic calming measures administered through the TTCM Program, and other area traffic management measures (such as speed reductions, turn restrictions etc.) spearheaded by the other city departments and/or the local Ward Councillor. An inventory of existing permanent area traffic management measures is shown in Map 9, while temporary traffic calming measures are shown in Map 10.

LEGEND

- Study Boundary
- Direct Residential, School, or Park Frontage (one or both sides)
- Park
- School
- Attraction

Notes:

1) Direct frontage refers to driveway access to low density residential uses, e.g. detached, semi-detached, and/or townhomes.

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Map 6: Existing Street Context

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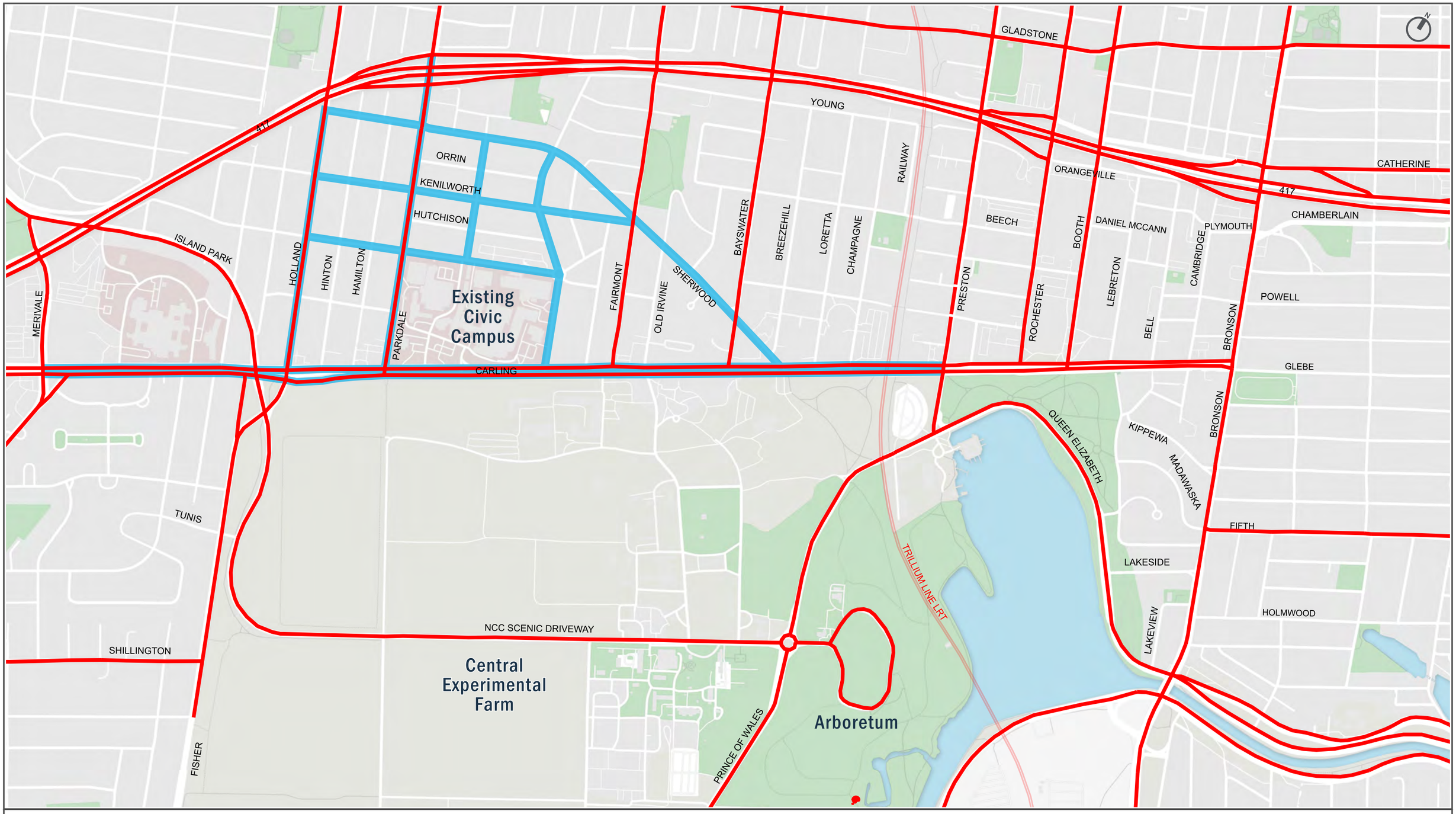

LEGEND

- Study Boundary
- Identified by Fire Services
- Identified by Paramedic Services

Notes:

1) The intent of this designation is only to inform decisions on the application of traffic calming measures on these streets. It does not reflect any other City policy or objective.

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Map 7: Existing Key Emergency Response Streets

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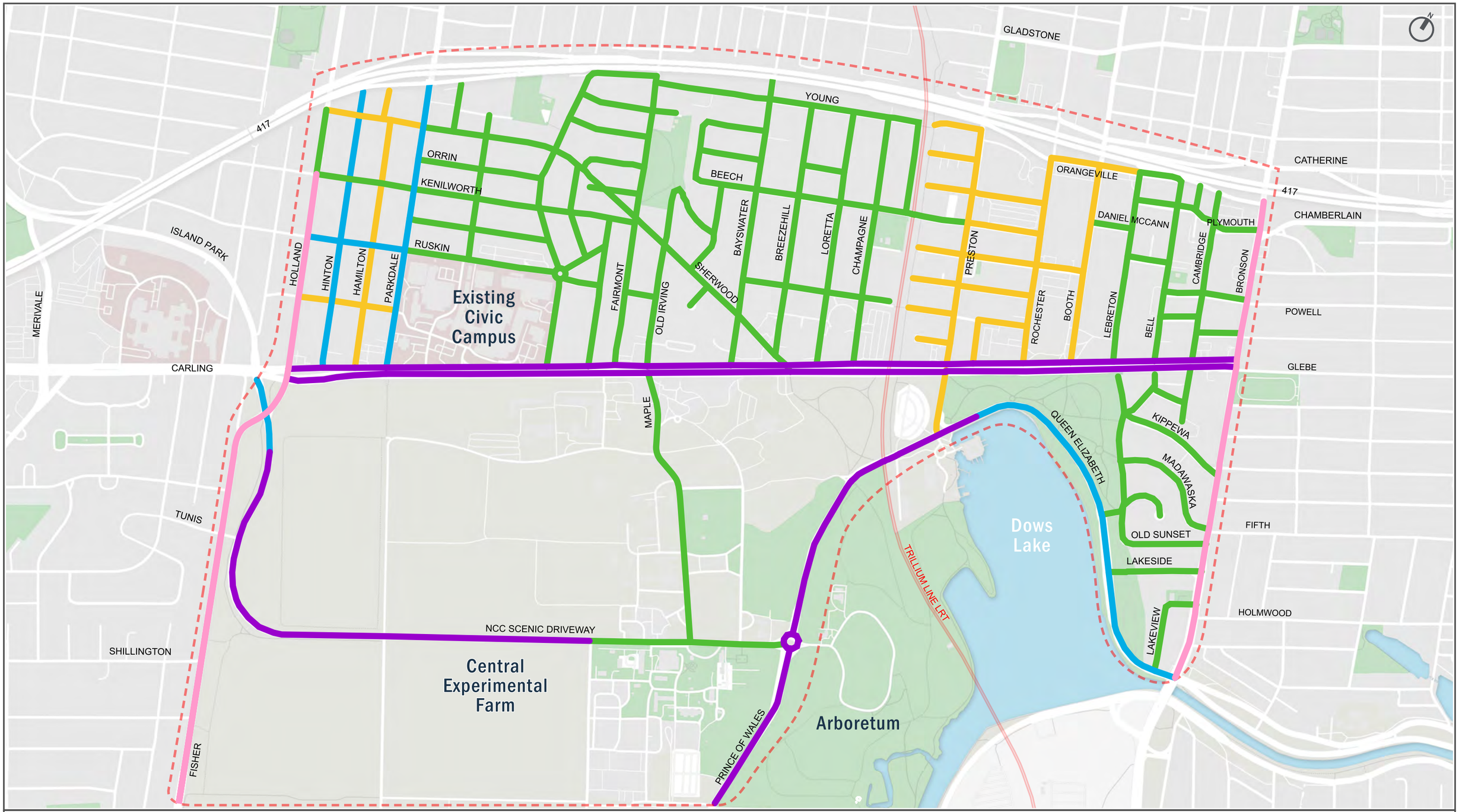

LEGEND

- Study Boundary

Posted Speed Limits

- 30 km/h
- 40 km/h
- 50 km/h
- 60 km/h
- No Posted Speed Limit (50 km/h limit as per Highway Traffic Act)

Notes:

1) Speed regulations as of September 2022.

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Map 8: Existing Speed Regulations

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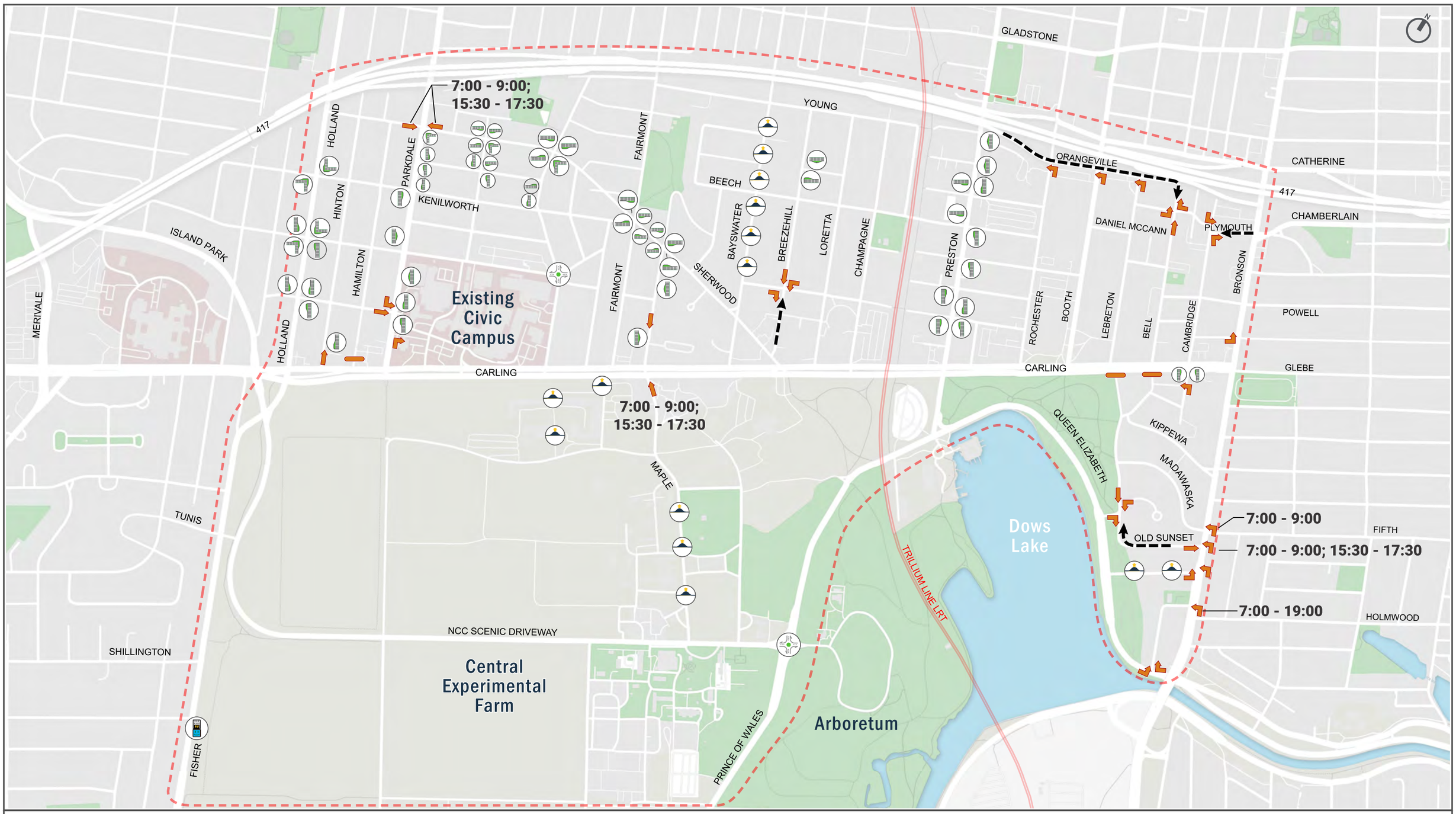

LEGEND

- Study Boundary
- Speed Hump
- Roundabout
- Bulb-out
- Movement Restrictions
- One-Way

Notes:

1) Area Traffic Management Measures as of August 2022.
2) Inventory does not include pavement markings, signage, or temporary/special event measures.

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Map 9: Existing Area Traffic Management Measures - Permanent

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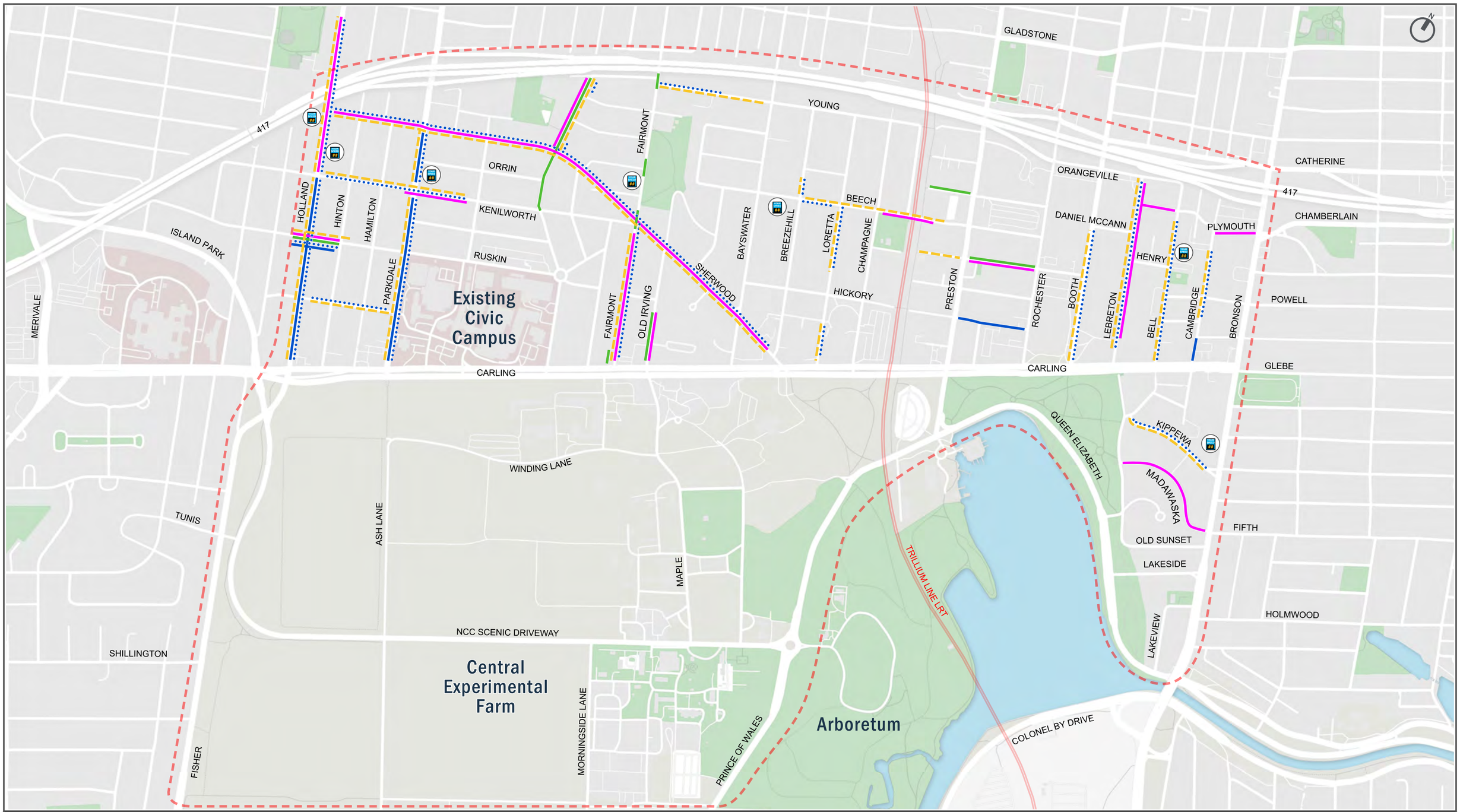

LEGEND

- Study Boundary
- Centreline Flex-posts
- Edge Delineators
- Painted Bulb-outs
- Pavement Markings
- Information Signage
- Speed Display Device

Notes:

1) Centreline Flex-posts and Edgeline Delineators typically accompanied by informational signage (i.e. Traffic Calmed Neighbourhood)

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Map 10: Existing Temporary Traffic Calming Measures

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3.2.2 Existing Intersection Capacity

Congestion is a common trigger for traffic infiltration or short-cutting that puts pressure on streets that are not designed to accommodate higher traffic volumes. It also may induce speeding as drivers try to navigate bottlenecks in order to reduce their overall travel time. If there is consistent congestion in the higher-order streets, e.g. arterial and collector streets, it increases the risk of traffic infiltration onto local residential streets. Understanding the locations of bottlenecks may help validate traffic concerns in the adjacent neighbourhood streets and thereby, improving corridor or intersection capacity on the higher-order streets may help resolve neighbourhood traffic infiltration.

The City of Ottawa measures congestion based on a Level-of-Service (LoS) criterion, which is based on the Highway Capacity Manual 2010 (HCM). As described in Section 2.2.1, an intersection is expected to experience periodic congestion if it reaches a LoS 'E' and is expected to be more consistently congested at a LoS 'F'. The TIA and Mobility Study (July 2021) identified the following intersections that met the congested criterion within the study area during the peak hour periods.

EXISTING INTERSECTION PERFORMANCE WITHIN STUDY AREA (AM or PM Peak Hour) [11]	
LoS 'E'	LoS 'F'
• Parkdale/Carling (Traffic Signal) • Parkdale/EB and WB on/off ramp (Traffic Signal)	• Carling/Preston (Traffic Signal) • Carling/Bronson (Traffic Signal) • Preston/Prince of Wales (Traffic Signal) • Bronson/Catherine/Raymond (Traffic Signal) • Carling/Melrose (Stop Control on Melrose) • Carling/Rochester (Stop Control on Rochester; Right-in Right-out) • Prince of Wales/Navy (Stop Control on Navy)

Map 11 illustrates the location of intersections within the study area that are currently experiencing poor performance during peak hours. Existing congestion is apparent at several major intersections along Carling Avenue, which may cause drivers to short-cut onto parallel streets to avoid these bottlenecks.[12] The likely locations of vulnerability include:

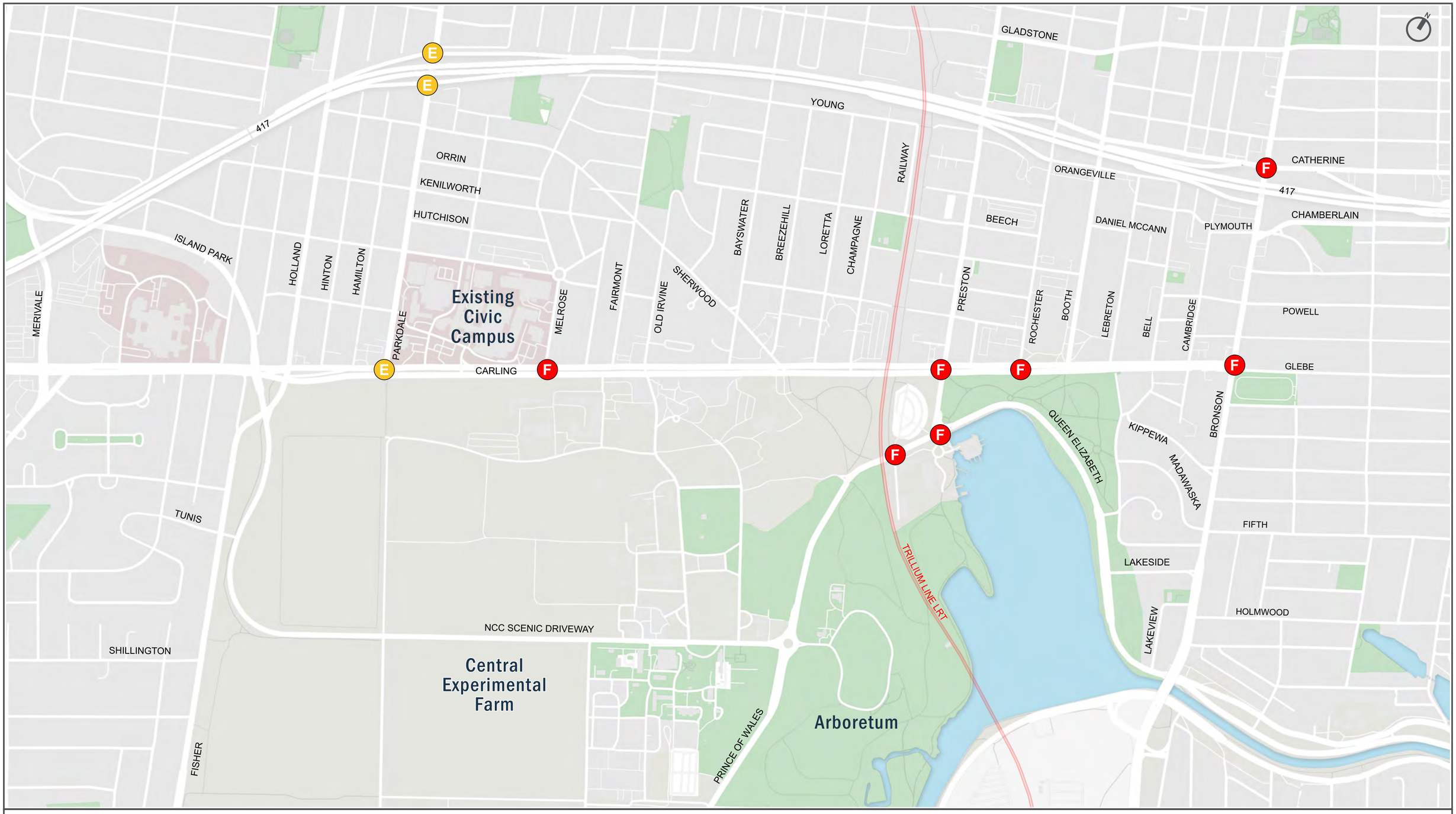
- Local streets near the Carling Avenue/Bronson Avenue intersection, e.g. within the DLRA and GACA, which is supported by feedback heard from the DLRA.
- Sherwood Drive and surrounding neighbourhood streets to avoid congestion at Parkdale Avenue/Carling Avenue, which is supported by feedback heard from the CHNA.

3.2.3 Existing Travel Behaviour and Metrics

Streetlight is a powerful traffic data analytics tool that was used to record historic traffic conditions and general travel behaviour within the study area. The outputs were used to help inform and provide a quantitative lens on the concerns heard during the public engagement process. It is acknowledged that there are limitations in the *Streetlight* analysis platform, as described in Section 2.2.2, where it may not fully capture certain driver behaviour. It is important to stress that Streetlight results were never considered in isolation, even if contrary to public feedback of a reported concern. It was only one factor among several used to identify the impacted streets.

[11] LoS results are based on traffic analysis completed in 2021 using traffic data spanning 2017 to 2019; results may vary based on current traffic conditions.

[12] 'Major' intersections in this context are considered intersections between an arterial street and another street with collector classification or higher.



LEGEND

- Study Boundary
- E — Level of Service E - Anticipated Periodic Congestion
- F — Level of Service F - Anticipated Consistent Congestion

Notes:

1) Results reflect the Level of Service thresholds outlined in the City of Ottawa TIA Guidelines (2016)
2) Level of Service result represents the worst single movement at the intersection in either the morning or afternoon peak hour.

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Map 11: Existing Intersection Congestion based on Level of Service

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3.2.3.1 Segment Speed Analysis

Streetlight Estimate

Linear *Streetlight* analysis zones were created along key roadway segments within the study area, from which the project team gathered historical travel speed and traffic volume data. A *Streetlight* segment analysis was run using 2017, 2018, 2019, and 2021 weekday (Tuesday/Wednesday/Thursday) data for three distinct time periods: all day (24-hour), combined peak periods (6am-9am; 3pm-6pm), and overnight (9pm-6am). Relevant outputs have been provided in **Appendix A**. The 2019 speed distributions for each road segment can be found in Figure 2, for the weekday all-day, combined peak, and overnight periods.

As previously discussed in Section 2.2.2.2, the "speed" metric produced by *Streetlight* is not a "spot-speed" (i.e., the speed of a vehicle at a specific moment in time). The *Streetlight* metric utilizes a "speed-over-distance" average inferred from the time it takes a vehicle to traverse a road segment of a given length. This makes it difficult to evaluate *Streetlight* average speeds using conventional traffic analysis techniques (such as 85th percentile speed), or even to compare them to segment speed limits (which governs a vehicles maximum speed, not captured by *Streetlight*). Instead, *Streetlight* segments speeds are best used in comparison to one another to understand trends. Table 3 summarizes the results, providing the proportion of vehicles observed by *Streetlight* as having averaged over 40km/h along the corridor.

ATR Validation

Following the completion of the *StreetLight* segment analysis, Automatic Traffic Recorder (ATR) data was acquired from the City of Ottawa for all available road segments, providing one-day 'spot-speeds,' which were used to validate the *StreetLight* results. ATR data captures the actual instantaneous speed of a vehicle at a point along the road segment, which are difficult to directly compare to *StreetLight* segment speeds as they are a representation of a vehicles average speed-over-distance. However, this additional dataset was useful in validating the outcomes and conclusions of the *StreetLight* based analysis. One-day ATR speeds have been included alongside the *StreetLight* results in Table 3.

In general, the daily average 85th percentile speed provided by the ATR data were between 20% - 50% higher than the 85th percentile speeds estimated in *StreetLight*. This supports a more conservative approach in flagging road segments when examining the *StreetLight* results, so the conclusions drawn from the data were largely unchanged.

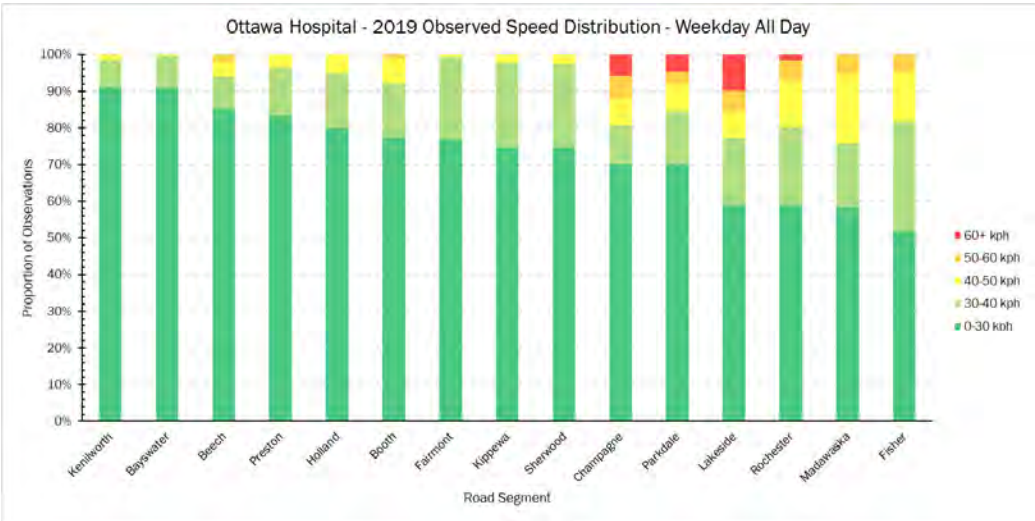
In only two cases did the ATR data show 85th percentile speeds lower than those shown by *StreetLight*: Kenilworth Street and Lakeside Avenue. In the case of Kenilworth Street, the difference was insubstantial and the 85th percentile ATR speed (18km/h) was still well below the posted limit. In the case of Lakeside Avenue, the 85th percentile ATR speed for the eastbound direction (37km/h) was significantly lower than shown by *StreetLight*, so it may not need to be flagged for speeding concerns (although as discussed in the following section, this street is still at risk of cut-through traffic in the eastbound direction related to the NCD).

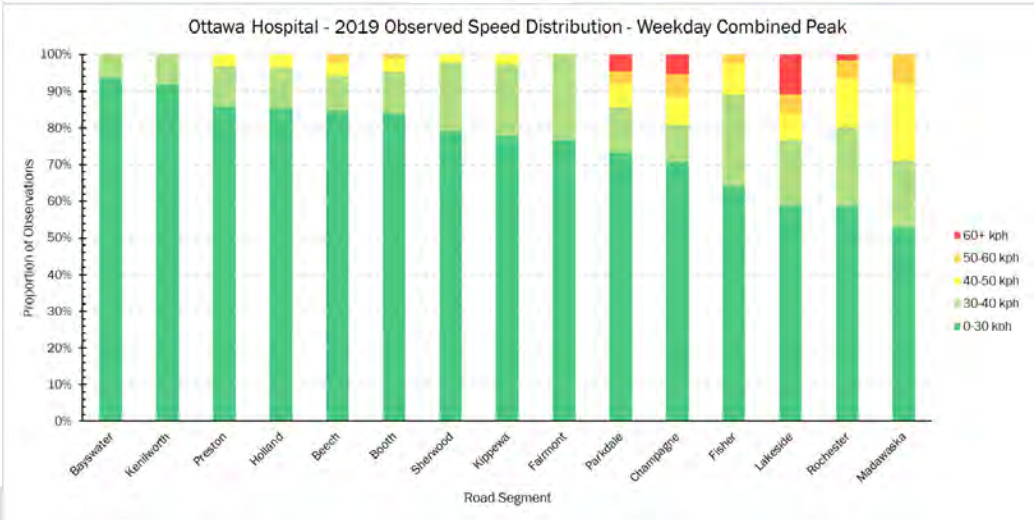
In few cases, the ATR data showed 85th percentile speeds to significantly exceed the posted speed limit whereas the *StreetLight* data did not raise a similar concern; these were Parkdale (58km/h observed, posted 40km/h limit) and Booth (57km/h observed, unposted 50km/h limit), both arterial roads where higher vehicle travel speeds are generally more acceptable, and the potential for traffic calming measures are more limited. Nevertheless, both streets will be flagged as impacted streets in the NTMS.

QUICK HITS

- The majority of Streetlight speed estimates were lower than City ATR speed data.
- The overall conclusions drawn from the data did not change.
- Only Kenilworth Street and Lakeside Avenue had lower ATR speed results compared to Streetlight.

Figure 2: Summary of Weekday Vehicle Speed Distributions by Time of Day for Key Study Area Road Segments





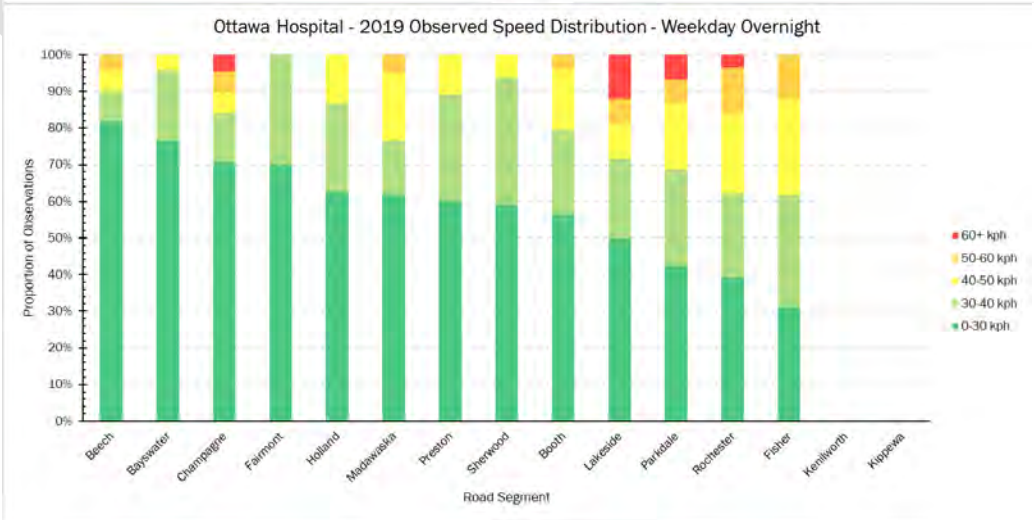


Table 3: Summary of Segment Speed Results in Streetlight (24h Weekday) and One-Day ATR Speed

Segment	% Vehicles >40km/h (*StreetLight*)				One-Day 85th % ATR Speed	Flagged Concern?	Notes
	2017	2018	2019	2021			
Kenilworth Street	1.5%	0.0%	1.6%	0.0%	18 km/h (07/2020)	No	- Speed distribution appropriate of a local road
Kippewa Drive	4.8%	0.0%	2.2%	0.5%	43 km/h (05/2022)	No	- Speed distribution appropriate of a local road
Beech Street	8.6%	0.5%	6.0%	0.0%	38 km/h (10/2022)	No	- Speed distribution appropriate of a local road
Fairmont Avenue	5.2%	1.0%	0.7%	4.2%	No Data	Yes	- Higher speeds observed on segment between Carling Avenue and Sherwood Drive
Bayswater Avenue	7.9%	0.0%	0.5%	0.0%	39 km/h (10/2021)	No	- Speed distribution appropriate of a local road
Champagne Avenue	27.1%	3.5%	19.5%	3.5%	44 km/h (08/2021)	Yes	- Notable number of vehicles averaging >60km/h on weekdays in 2017 and 2019
Madawaska Drive	1.4%	4.2%	24.2%	3.8%	42 km/h (05/2022)	Yes	- High average speed for 2019 is an outlier compared to other analysis years
Lakeside Avenue	30.7%	25.9%	22.8%	1.0%	37 km/h (05/2022)	Yes	- Higher eastbound than westbound speeds observed - ATR data shows considerably lower speeds than *StreetLight* results, in both directions
Sherwood Drive	4.7%	9.6%	2.6%	9.6%	41 km/h (08/2021)	No	- Speed distribution appropriate of a collector road; speeds are constrained by frequency of stop-controlled intersections
Holland Avenue	4.1%	12.8%	5.1%	14.2%	54 km/h (07/2020)	Yes	- Higher speeds for the segment north of Kenilworth Street; posted speed of 30km/h at the time of data collection (though the limit has since been revised to 40km/h, which may better reflect operating speeds).
Booth Street	7.0%	14.3%	7.8%	25.9%	57 km/h (04/2021)	No	- Speed distribution appropriate of an arterial road
Rochester Street	18.9%	27.3%	19.9%	14.3%	52 km/h (10/2019)	No	- Speed distribution appropriate of an arterial road
Fisher Avenue	14.3%	37.0%	18.3%	12.8%	No Data	No	- Speed distribution appropriate of an arterial road
Parkdale Avenue	15.0%	14.2%	15.6%	27.3%	57 km/h (04/2022)	Yes	- Some vehicles shown to average >60km/h for the segment, but overall speeding behaviour reflects roadways arterial designation - High speeds relative to 40km/h posted limit
Preston Street	10.2%	3.8%	3.5%	37.0%	No Data		- Speed distribution appropriate of an arterial road
NCC Scenic Driveway – East of Morningside	-	-	50.4%	-	No Data	Yes	- High average speeds given 30km/h posted limit on this road segment; suggests vulnerability to speeding
NCC Scenic Driveway – West of Morningside	-	-	78.6%	-	No Data	No	- Higher average speeds reflect posted speed and local design context

3.2.3.2 Top-Routes for Select "Gates"

Pass-through analysis zones, or "gates", were created at key locations around the study area road network, as shown in Map 12, and a *Streetlight* "Top-Routes" analysis was used to identify the which road segments drivers preferred to access these gates. Similar to the segment speed analysis, Top-Routes data was retrieved from 2017, 2018, 2019, and 2021 weekday (Tuesday, Wednesday, and Thursday) data, for the all-day (24-hour), AM peak period (6am-9am), PM peak period (3pm-6pm), and combined peak periods. Relevant outputs have also been provided in **Appendix A**.

Notable results included the following:

- Some short-cutting through the Dow's Lake neighbourhood was observed for vehicles accessing the westbound Queen Elizabeth Driveway from Bronson Avenue, via Old Sunset Blvd, Lakeview Terrace, Dow's Lake Road, and Lakeside Avenue. The reverse was also observed, with significant numbers of vehicles appearing to use eastbound Lakeside to access Bronson from the Queen Elizabeth Driveway, before proceeding south.
- Some shortcutting through the Glebe Annex neighbourhood (especially using Powell Avenue, Cambridge Street, and Bell Street) observed by southbound traffic on Bronson Avenue seeking to avoid the intersection at Carling Avenue, although it was noted that recent changes to this intersection to increase capacity may decrease the risk of shortcutting, which would not be captured by the time period of this analysis.
- Sherwood Drive was shown to be subject to traffic infiltration between Carling Avenue and the Hwy 417/Parkdale interchange. However, observed traffic patterns do indicate that the majority of traffic that entered Sherwood Drive from either end was distributed into the surrounding neighbourhood rather than traversing the full length of the corridor, indicating that the road is fulfilling its role as a neighbourhood collector rather than acting primarily as route for cut-through traffic.
- The majority of traffic currently utilizing the Parkdale Avenue interchange appears to be destined for (or approach from) north of the highway, a trend which might be expected to be compounded by the relocation of the Civic campus. Additionally, most of the traffic travelling on Carling Avenue to/from Hwy 417 appears to use the Carling Avenue interchange; Parkdale Avenue is not a popular route for highway-bound traffic on Carling Avenue relative to overall volumes.

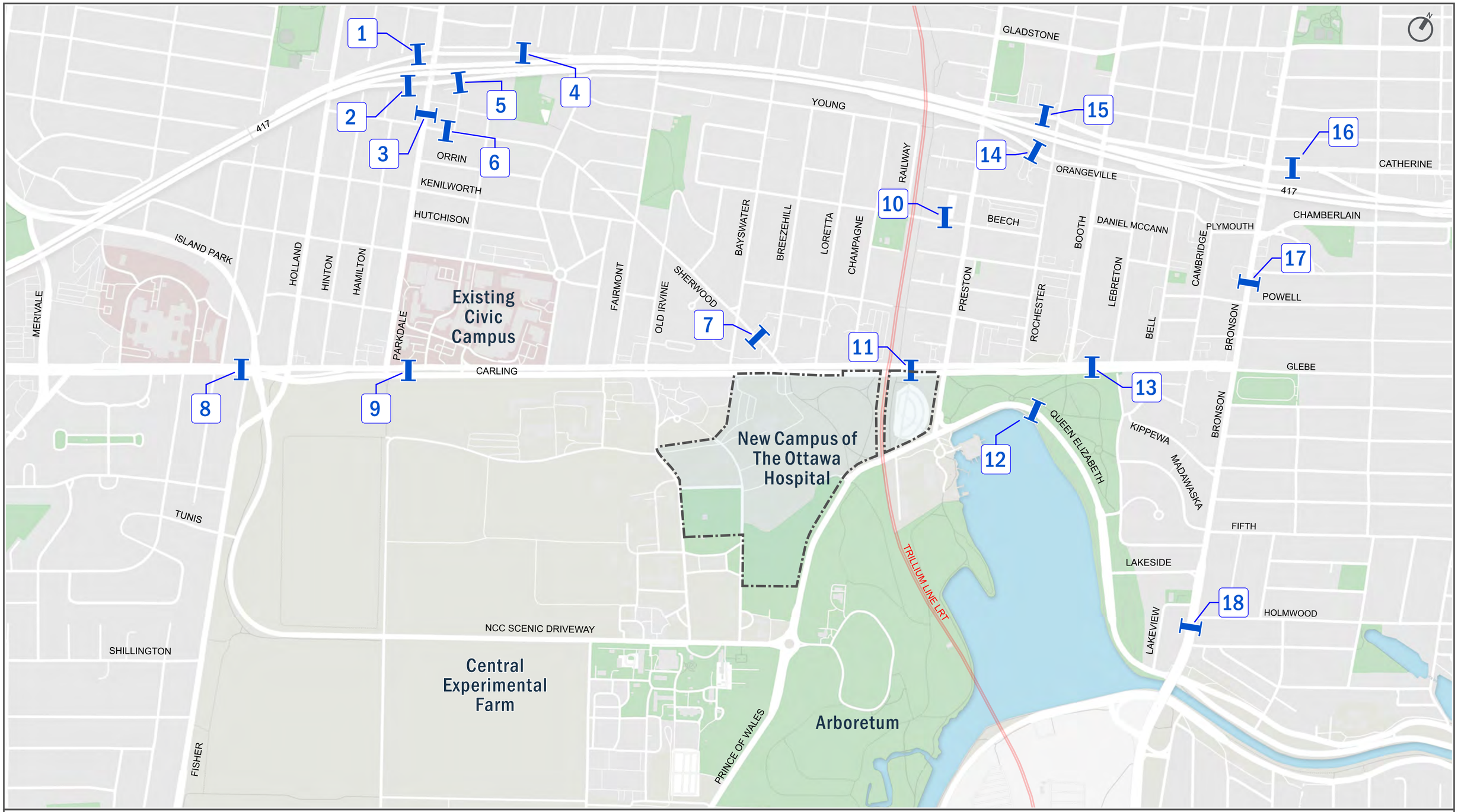
In summary, it appears that the majority of traffic under the existing network arrangement is using the 'desired' roadways (either arterials or major collectors) to traverse the study area, based on *Streetlight* data from the past five years.

It is expected that the NCD will exacerbate traffic infiltration in some of these areas and possibly trigger new areas of concern, but also potentially reducing it in others as future travel patterns change. Implications related to anticipated future traffic patterns are discussed in more detail in Section 3.3.4.

QUICK HITS

- Pockets of traffic infiltration is occurring within the CHNA, DLRA and DCA areas.
- Some of these trends may be exacerbated by the future NCD, while others may be reduced.
- Overall, the majority of traffic adheres to the intended road hierarchy when traversing the study area.

Subsequent sections of the NTMS will examine potential strategies for mitigating these effects, with consideration given to the magnitude of traffic infiltration in the local context and not just relative to the observed volumes on the arterial and collector system.



LEGEND

Study Boundary

1 Hwy 417/Parkdale WB On-Ramp
2 Hwy 417/Parkdale EB Off-Ramp
3 Parkdale North of Sherwood
4 Hwy 417/Parkdale WB Off-Ramp
5 Hwy 417/Parkdale EB On-Ramp
6 Sherwood East of Parkdale
7 Sherwood West of Breezehill
8 Carling West of Island Park
9 Carling East of Parkdale
10 Beech West of Preston
11 Carling West of Preston
12 Queen Elizabeth Drive East of Preston
13 Carling East of Booth
14 Hwy 417/Rochester EB Off-Ramp
15 Hwy 417/Rochester WB Off-Ramp
16 Catherine East of Bronson
17 Bronson North of Powell
18 Bronson South of Holmwood

New Campus Development for The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 12: Existing Location of Streetlight Zones for Top Routes Analysis

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PARSONS

0 100 200 400
Metres

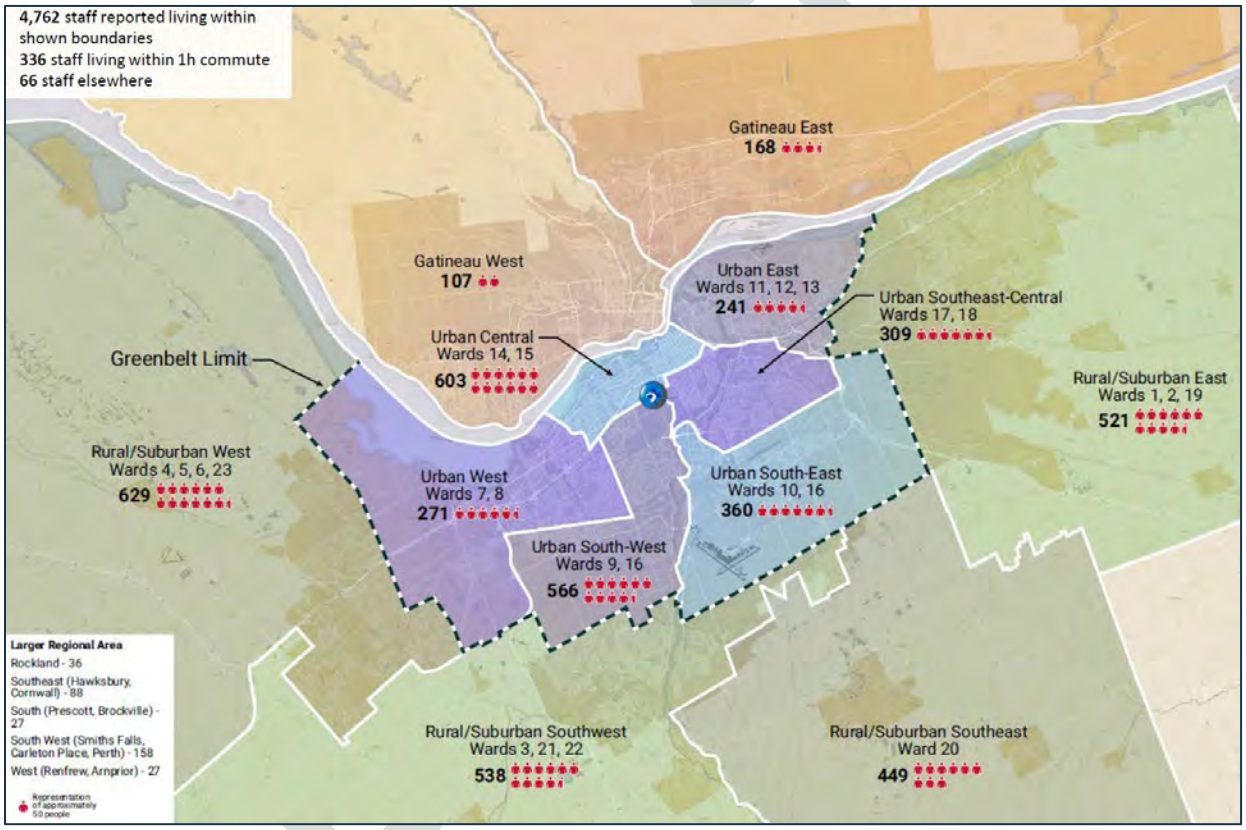
3.2.4 Existing Civic Campus Trends

The NCD and the existing Civic Campus are located only 1-km apart. Therefore, there is great value in better understanding the current challenges, travel trends, and general traffic conditions at the existing Civic Campus to help inform what we may expect at the future site.

3.2.4.1 Origin-Destination Analysis

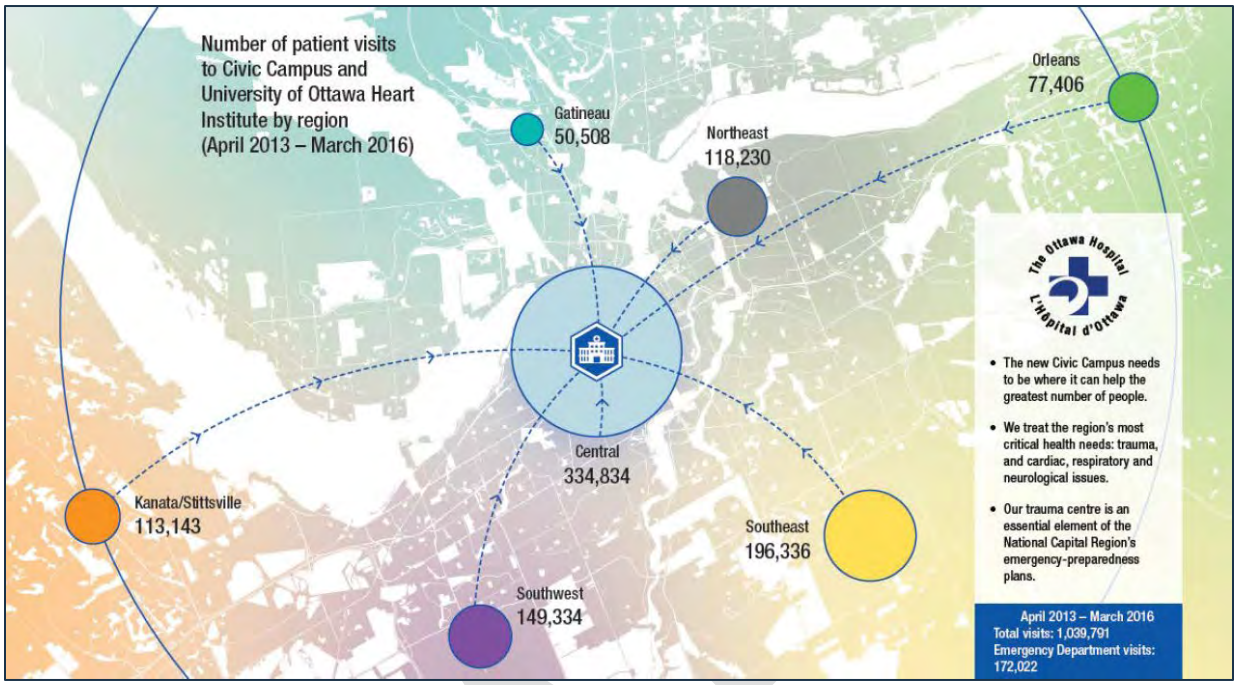
The origin-destination analysis provides insights on trip characteristics generated by the existing Civic Campus (including the Heart Institute), such as route choice and length of trip. TOH provided the postal code data (the first three digits) of existing employees at the Civic Campus in 2018/2019, as shown in Figure 3. A notable trend was how evenly distributed employees' place of residence was across the city, which suggests there will be a greater number of medium- to long-distance trips at the NCD among staff.

Figure 3: Existing Civic Campus Employee Residence Distribution Map



TOH also provided patient origin-destination information aggregated between 2013 and 2016, graphically represented in Figure 4, which showed notable patient demand historically within the Downtown Core and Inner Urban Transects, but still a greater proportion coming from outside the Greenbelt.

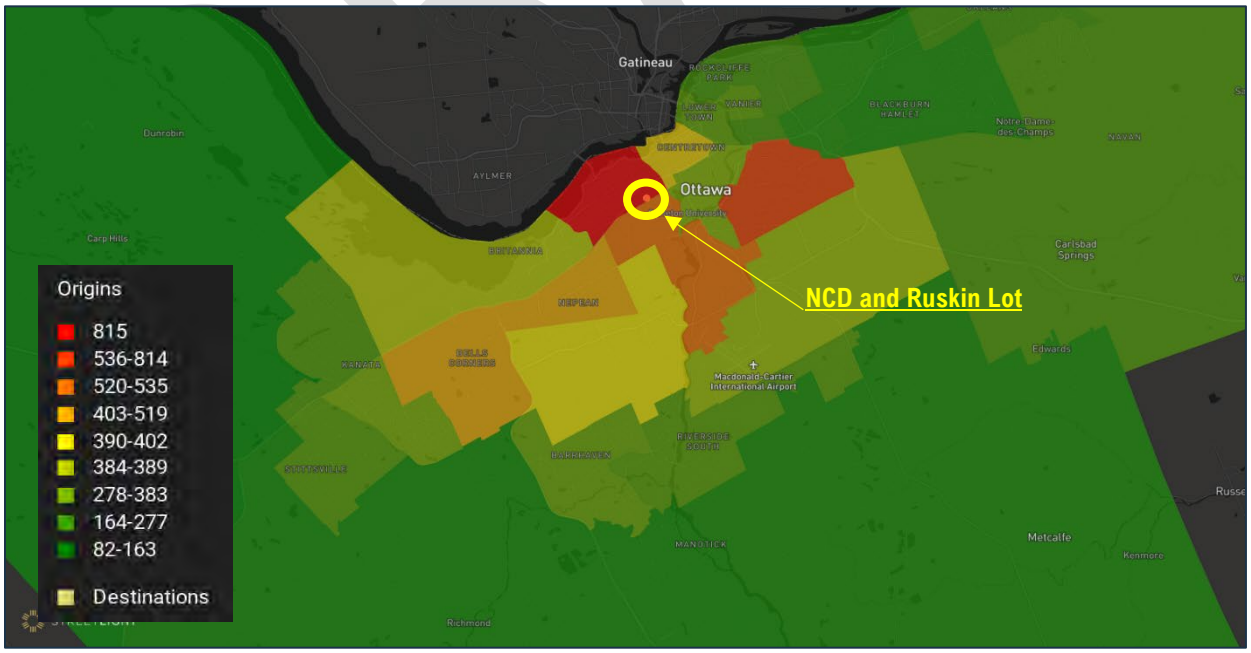
Figure 4: Civic Campus Patient Residence Distribution Map



Finally, an origin-destination analysis was also undertaken in *Streetlight* for the existing Civic Campus using 2019 data to gather an impression of broad regional travel patterns for the Civic Campus prior to the COVID-19 pandemic.

A non-pass-through analysis zone was created covering the Civic Campus (as well as it's auxiliary Ruskin Street parking lot) to act as the destination zone. City of Ottawa Wards were used for aggregate origin geographies. Figure 5 below summarizes the typical weekday (Tuesday, Wednesday, and Thursday) results of the analysis.

Figure 5: Average Weekday Vehicle Trips to the Ottawa Hospital - Civic Campus by Ward (2019)



Overall, the majority of vehicle trips destined for the existing Civic Campus originated in centrally located wards. Traffic originating in the suburban and rural wards was low in comparison. The discrepancy between this result and the staff postal code data is likely explained by the limited employee parking space availability at the existing Civic Campus, and many employees park at satellite parking areas off-campus.

QUICK HITS

- Staff and patient origins are generally evenly distributed across the entire City.
- Daily traffic to the existing Civic Campus on a typical weekday (not including satellite parking locations) originate primarily from within the Greenbelt.

The analysis was repeated using 2021 data to assess more recent travel patterns. A similar distribution was observed, but with overall lower average daily travel (~2000 fewer daily weekday trips in 2021 compared to 2019), which was attributed to COVID-19.

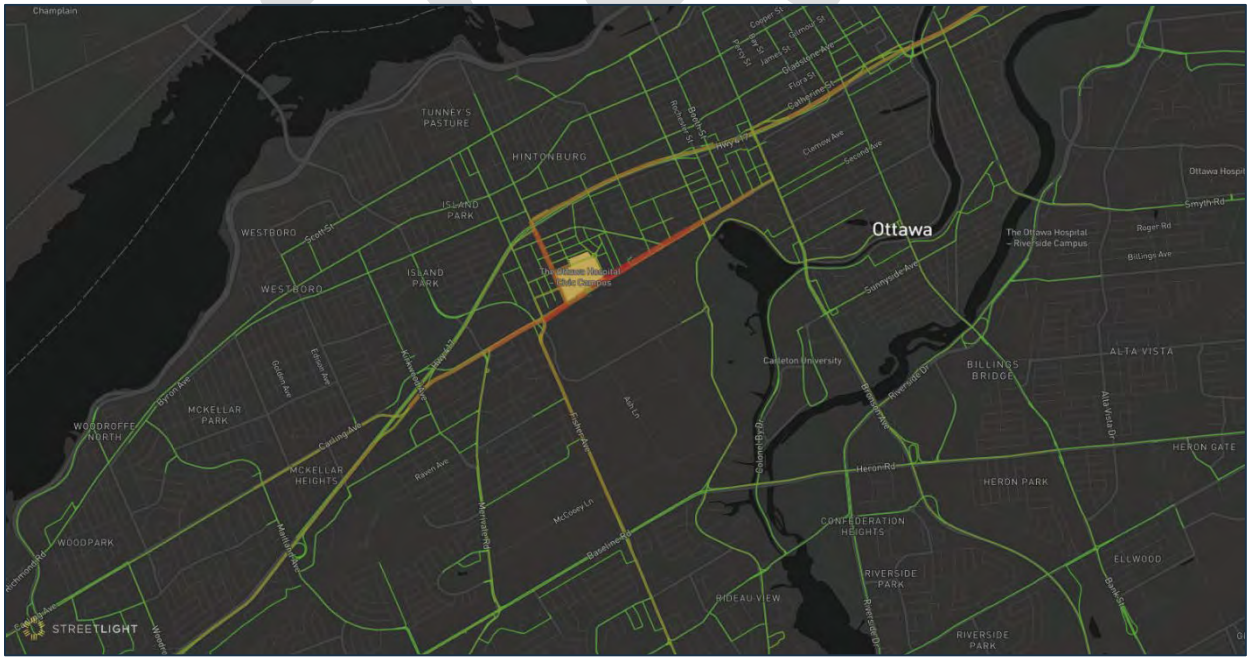
3.2.4.2 Top-Routes Analysis

Top-Routes for the Existing Civic Campus

A *Streetlight* "Top-Routes" analysis was also undertaken for the existing Civic Campus, using the destination zone described in the previous section. Results presented in Figure 6 are for weekdays (Tuesday, Wednesday, and Thursday) and represent the full 24-hour day.

The Top-Routes analysis 2017 data is shown below, since it had a higher sample of trips available compared to 2019 and 2021, but the observed relative distribution of trips across the local road network was similar in all three years. Streets are symbolized on a scale from green (indicating low relative traffic volumes) to red (indicating high relative traffic volumes); streets which are not colourized on this scale were not observed to carry any traffic relating to the existing Civic Campus.

Figure 6: Routes for Vehicle Trips to the Ottawa Hospital - Civic Campus (2017)



As would be expected, the majority of trips to the existing Civic Campus follow the arterial road network, i.e. Carling Avenue, Parkdale Avenue, Fisher Avenue, Bronson Avenue and Merivale Road. It is noteworthy that many drivers coming from the west on Hwy 417 elected to exit at the Carling Avenue interchange rather than Parkdale Avenue,

possibly due to the additional capacity afforded with six travel lanes on Carling Avenue compared to two-lanes on Parkdale Avenue. The Parkdale Avenue interchange is the preferred access point from the east via Hwy 417 compared to the Bronson Avenue interchange. These results correspond with the employee and patient O-D data, where traffic demand is relatively balanced in all directions.

QUICK HITS

- Existing Civic Campus traffic have tended to follow the arterial street network.
- Relatively low levels of traffic were observed on local streets within the CHNA, DCA, GACA and DLRA areas, which may comprise local residents as well as some traffic infiltration.

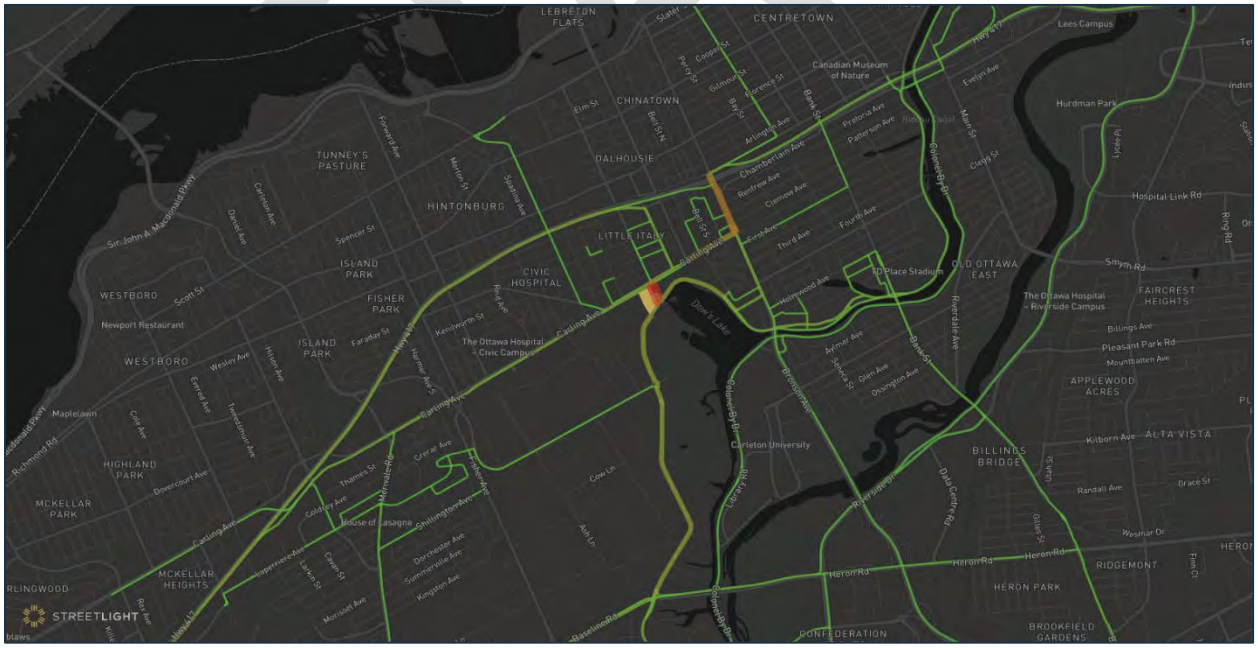
Other notable results included:

- Short-cutting between Bronson Avenue and Carling Avenue to the existing Civic Campus appears to be limited, but was observed in the Glebe Annex Community and local roads surrounding Preston Street.
- A small number of vehicles were observed infiltrating the DLRA community.
- Some traffic infiltration was observed on the local streets surrounding the existing Civic Campus, but volumes were relatively low.
- Some northbound traffic from Fisher Avenue appears to proceed north onto Holland Avenue, before filtering on to local streets such as Inglewood Place or Ruskin Street to access the existing Civic Campus.

Top-Routes for the Existing Dow's Lake Parking Lot

A second top-routes analysis was conducted for the existing Dow's Lake parking lot, which is currently located on the NCD site and may be considered a good approximator of preferred travel routes to the future site. It is acknowledged that the sample sizes, particularly in 2017 and 2019 were very low. Results for 2021, which provided the highest sample size, are shown below in Figure 7.

Figure 7: Routes for Trips to the Existing Dow's Lake Parking Lot (2021)



The primary routes utilized to access the existing Dow's Lake parking lot were the Bronson Avenue interchange, the Rochester Street interchange, the Carling Avenue interchange, Prince of Wales Drive and Queen Elizabeth Driveway.

3.2.4.3 Hospital ('H') Sign Locations

As part of the planning and implementation of the NCD, decisions will have to be made on the blue 'H' markers along the approaches to the NCD, including Hwy 417. These decisions will be made independent of the NTMS; however, the study can provide useful information to help inform the decision. The existing locations of 'H' signs are shown in Map 13. Currently, markers on Hwy 417 direct all existing Civic Campus traffic to the Parkdale Avenue interchange. The repositioning of the 'H' sign is subject to an application lead by TOH and is subject to MTO approval.

3.3 Future Conditions Review

3.3.1 City of Ottawa Capital Renewal Program

The City of Ottawa has a capital infrastructure renewal program that identifies funding for municipal construction projects, such as water/sewer renewals, traffic signals installations, Transitway renewals, among others. Some renewal projects present an opportunity for the city to enhance the street environment to meet contemporary municipal design standards. Typical enhancements include the addition of active transportation and transit facilities, landscaping treatments, as well as area traffic management measures. The City of Ottawa provided a list of capital infrastructure projects within the study area over the next five years (as of August 10, 2022. The projects relevant to the NTMS have been defined with the anticipated date of implementation below, and illustrated in Map 14.

- **Champagne Avenue/Hickory Street Intersection**:
  - Pedestrian Cross-Over (PXO) Implementation (2023/24)
- **Parkdale Avenue Intersection Road Surface Renewals**:
  - The removal of the faulty pavers, asphalt repaving and ladder crossing painted demarcation from Carling Avenue to Sherwood Drive (2023)
- **Sherwood Avenue Traffic Calming Study** (2024/2025):
  - The City of Ottawa Neighbourhood Traffic Calming Branch are currently undergoing an updated Traffic Calming Study of Sherwood Drive. The purpose of the study is to help with overall speed management along the corridor, improve the pedestrian and cycling environments and potentially to address some existing safety concerns. The study is not intended to reduce cut-through traffic or address concerns related to future development, including the NCD.
- **Prince of Wales Road Surface Renewal**:
  - Asphalt repaving and pavement markings from Baseline Road to Preston Street (2024)
- **Bronson Avenue Renewals (two sections)**:
  - Road/Sewer/Water Infrastructure Renewal: South of Carling Avenue to Rideau Canal (3-5 years)
  - Road/Sewer/Water Infrastructure Renewals: North of Carling Avenue to Imperial Avenue (5-7 years)

In addition to the information provided above, the project team is also aware of the following plans/studies by the City:

- The **Carling Avenue BRT** project is expected within the next ten years and includes augmentations to the active transportation facilities along the corridor (MUPs and/or cycle-tracks), which have been accounted for in the Master Site Plan for the NCD. More details about this project have been provided in the TIA Addendum #2 supporting the main Hospital building.
- The **Parkdale Avenue and Sherwood Drive** intersection will have a functional design/feasibility study conducted in 2023 (subject to budget approval process) to evaluate the potential for conversion from Intersection Pedestrian Signal to full traffic control signals.

Av. Parkdale Ave.

Av. Parkdale Ave. 2 km

417

CHURCHILL

ISLAND PARK

MERIVALE

KIRKWOOD

HOLLAND

PARKDALE

SHERWOOD

CARLING

The Ottawa Hospital Civic Campus

GLADSTONE

PRESTON

ROCHESTER

BOOTH

BRONSON

CATHERINE

CHAMBERLAIN

QUEEN ELIZABETH

Dows Lake

TRILLIUM LINE

Arboretum

PRINCE OF WALES

SHILLINGTON

FISHER

Experimental Farm

Carleton University

BANK

Rideau Canal

MAIN

Lansdowne Park

Rideau River

RIVERSIDE

The Ottawa Hospital Riverside Campus

TRANSITWAY

BASELINE

HERON

N

LEGEND

- Study Boundary
- Municipal Street Hospital Sign
- Highway 417 Hospital Signs

New Campus Development of The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 13: Existing 'H' Sign Locations

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PARSONS

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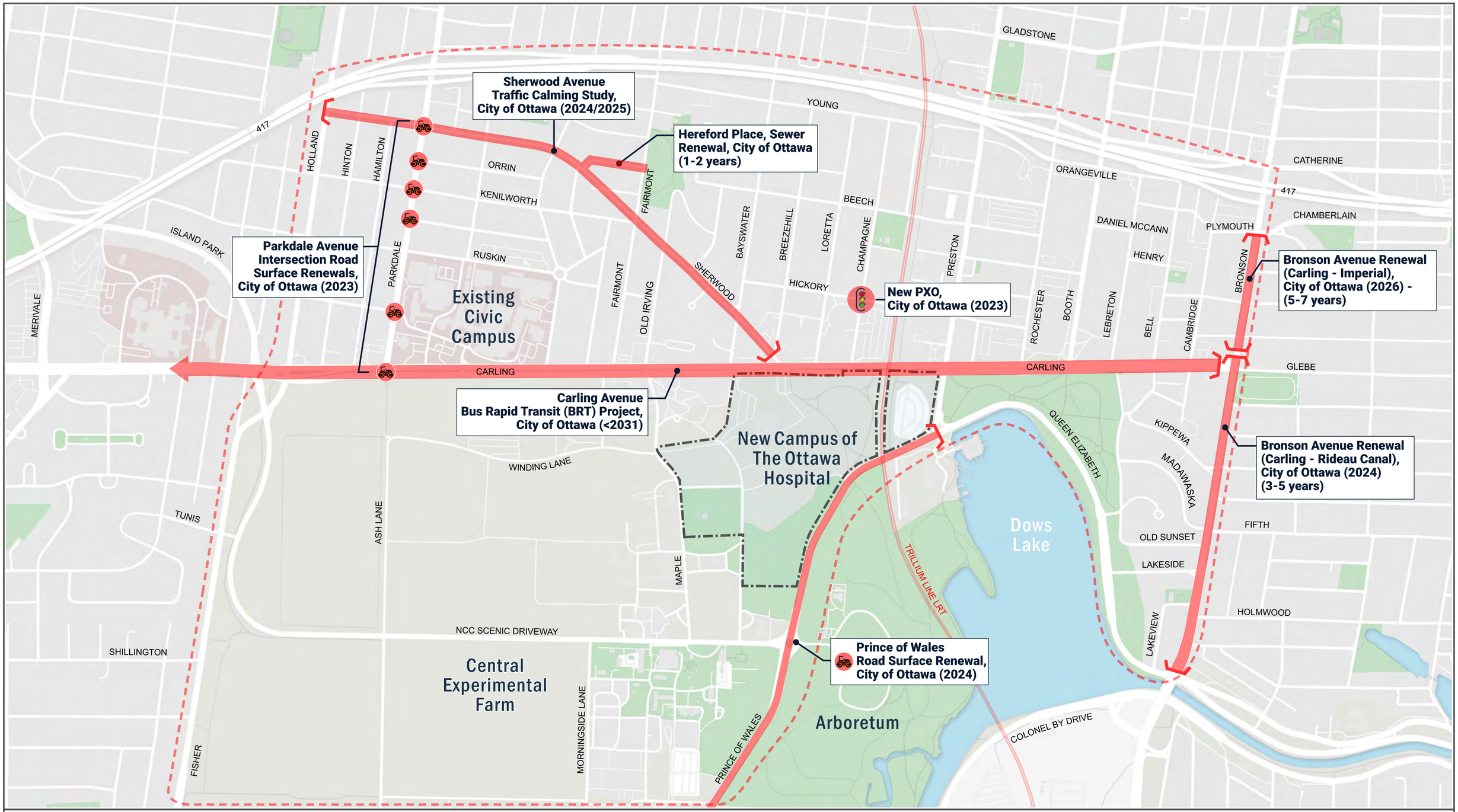

LEGEND

- Study Boundary
- Planned Projects with Anticipated Implementation Date
- Road Surface Renewal
- New PXO

Notes:

1) Project date estimates as of February 2023; dates reflect the anticipated **start** of project implementation.

New Campus Development for The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 14: City of Ottawa Planned Capital Renewal Projects

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PARSONS

0 100 200 400 Metres

3.3.2 Future Speed Limit Changes

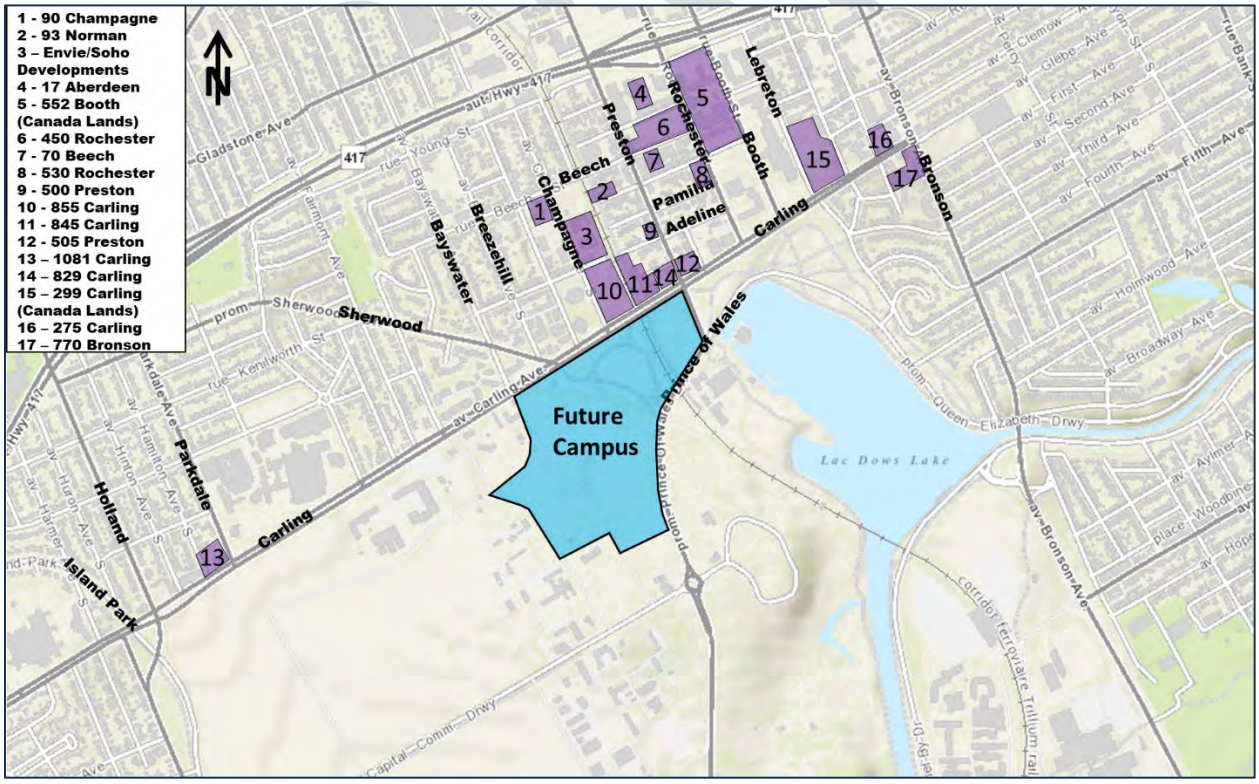
The City of Ottawa is expected to continue reducing posted speed limits within the study area. In discussions with the CACTS, there are expectations that new community gateway zones will be introduced in Kitchissippi and Capital Wards, i.e. CHNA between Parkdale Avenue to Holland Avenue, and the DLRA community, prior to opening day of the NCD – subject to the City process, budgetary considerations, and Ward Councillor approval. The existing speed limit signs will be replaced with gateway zone signs. The default posted speed for gateway zones is 40kph, however they may be posted at 30kph if supported by observed speed data. Should a 30kph zone be desired, but not supported by observed speed data, the Ward Councillor may bring the proposed change before Council; in this case, additional temporary traffic calming measures may be requested to help reinforce the reduced speed limit.

As previously noted, over the course of completing the draft NTMS report, the NCC adopted a speed limit change from 60km/h to 40km/h over the entire length of Queen Elizabeth Drive, implemented on September 19, 2022. In both cases noted, there are no indications that additional supporting measures would be implemented beyond updating speed limit signs, although the NCC updated *Parkways Planning and Design Guidelines (2024)* may recommend changes to the parkways function or design in support of overall traffic reduction objectives.

3.3.3 Future Adjacent Development

Changes in the future transportation network are not always triggered by the City of Ottawa, in many cases, private development spurs off-site roadway modifications that benefit not only the proposed development but the surrounding community. Figure 8 shows all active development applications at the City of Ottawa within the study area.

Figure 8: Active Development Applications within the Study Area



Planned off-site roadway modifications noted in supporting TIAs as well as potential opportunities for local area enhancements as part of the noted development applications in support of development have been listed in Table 4. It is important to note that the majority of these development applications are on-going and any item in the list does not indicate committed or approved works.

Table 4: Anticipated Local Area Transportation Network Enhancements from Private Development

LOCAL AREA TRANSPORTATION NETWORK ENHANCEMENTS		
Development	**Planned Infrastructure Modifications**	**Potential Opportunities**
552 Booth Street **450 Rochester Street** **530 Rochester Street**	• Pedestrian and cycling enhancements Rochester Street and Booth Street frontages (in accordance with the West Downtown Core Secondary Plan)	• Potential opportunities for corridor/intersection traffic calming measures along Rochester Street and Booth Street (e.g. reduced speed limits, bulbouts, raised crossings/intersections, etc.) • Potential intersection enhancements to support active transportation (e.g. PXO) • A TIA noted providing boulevard separation between sidewalks and roads to help achieve MMLOS targets.
299 Carling Avenue (Canada Lands)	• No Traffic Impact Assessment completed as yet; however it is expected that this site will also include pedestrian enhancements along Lebreton Street and Bell Street frontages.	• Potential opportunities for corridor/ intersection traffic calming measures along Lebreton Street and Bell Street (e.g. reduced speed limits, bulbouts, raised crossings/intersections, etc.)
SOHO and Envy Developments **101-115 Champagne Avenue**	• The applicant and the City of Ottawa are collaborating to design an improved ROW (broad sidewalk, tree planting, seating areas, fire route) along Hickory Avenue between Champagne Avenue and the Pedestrian Bridge over the LRT guideway. This work will incorporate the planned PXO by the City of Ottawa. Implementation would not happen until the proposed building to the north is built.	• None

3.3.4 The New Campus Development Traffic Implications

The TIA Addendum #2 that will accompany the main Hospital building SPC application describes in detail the ultimate development plan for the NCD. There is expected to be a notable increase in size and anticipated number of employees compared to the existing Civic Campus, which will translate into an increase in the number of 'people' trips to and from the site.

It is important to acknowledge and recognize that despite the significant increase in size and staffing, it is not expected to equate to a proportional increase in the number of vehicular trips at the NCD in the future, according to the TIA Addendum #2 conclusions. While driving is the dominant mode choice at the existing Civic Campus, TOH is expending significant effort to minimize auto-use at the future NCD through the development of a comprehensive TDM Strategy, which includes a broad framework for the entire TOH network and affiliates. The TDM Strategy will leverage the proximity of high-quality transit and active transportation facilities surrounding the NCD in combination with in-house policies and initiatives to encourage the use of sustainable modes of travel.

The TIA Addendum #2 discusses in detail the planned NCD development statistics, estimated trip generation results, and anticipated peak hour traffic volumes on the adjacent road network. Analysis is conducted for the opening day scenario (2028), and for the full buildout scenario (2048). Using this information, the project team forecasted where congestion may occur and how local traffic patterns may change in the future, which will factor into identifying the impacted streets within the study area.

3.3.4.1 Future Intersection Capacity

The TIA Addendum #2 (November 2022) identified intersections that met the congested criterion (established in Section 2.2.2) within the study area[13] and have been listed in Table 5 and also depicted in Map 15.

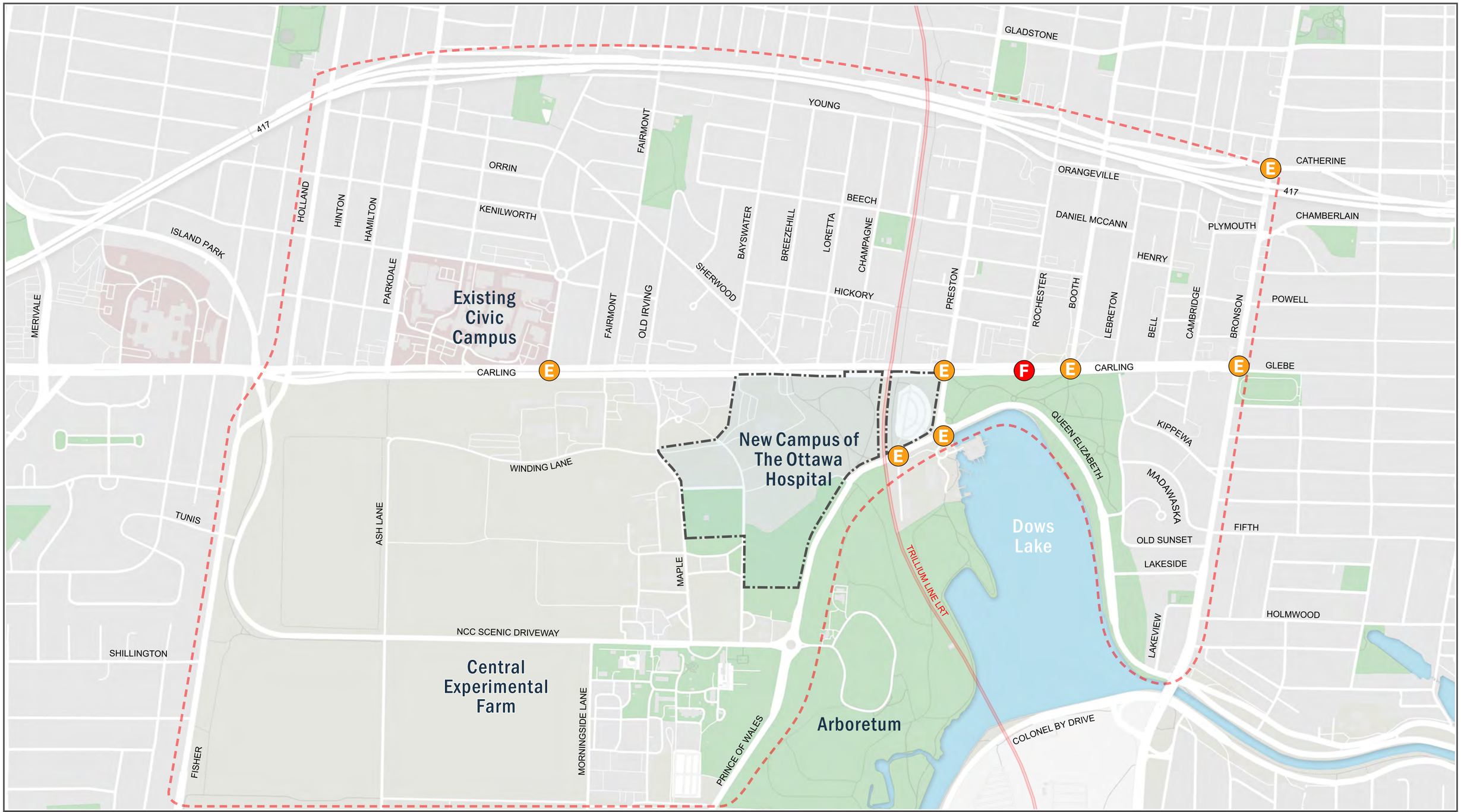
Table 5: Summary of Intersection Performance within the Study Area (Existing, 2028 and 2048)[14]

INTERSECTION PERFORMANCE WITHIN STUDY AREA (AM or PM Peak Hour)		
Horizon	LoS 'E'	LoS 'F'
Existing	• Parkdale/Carling (Traffic Signal) • Parkdale/EB and WB On/Off ramp (Traffic Signals)	• Carling/Preston (Traffic Signal) • Carling/Bronson (Traffic Signal) • Preston/Prince of Wales (Traffic Signal) • Bronson/Catherine/Raymond (Traffic Signal) • Carling/Melrose (Stop Control on Melrose) • Carling/Rochester (Stop Control on Rochester; Right-in Right-out) • Prince of Wales/Navy (Stop Control on Navy)
2028	• Carling/Preston (Traffic Signal) • Carling/Booth (Traffic Signal) • Carling/Bronson (Traffic Signal) • Preston/Prince of Wales (Traffic Signal) • Bronson/Catherine/Raymond (Traffic Signal) • Carling/Melrose (Stop Control on Melrose)	• Carling/Rochester (Stop Control on Rochester; Right-in Right-out)
2048	Same results as 2028, with the addition of: • Prince of Wales/Navy (Stop Control on Navy)	Same results as 2028.

Generally, traffic conditions within the study area are expected to remain the same or improve slightly in the future if planned city capital roadway projects and recommended off-site roadway modifications by TOH are implemented. However, even with these enhancements there is still expected to be periodic congestion along Carling Avenue and Bronson Avenue, particularly in the peak hour periods, which will continue to create incentives for traffic to 'cut-through' adjacent neighbourhoods.

[13] LoS results account for recommended off-site roadway modifications to the adjacent transportation network required by TOH as well as anticipated capital roadway projects by the City of Ottawa (e.g. Carling Avenue BRT).

[14] LoS results reflect the worst movement at the intersection in either the morning or afternoon peak hour.



LEGEND

- Study Boundary
- E — Level of Service E - Anticipated Periodic Congestion
- F — Level of Service F - Anticipated Consistent Congestion

Notes:

1) Results reflect the Level of Service thresholds outlined in the City of Ottawa TIA Guidelines (2016)
2) Level of Service result represents the worst single movement at the intersection in either the morning or afternoon peak hour.
3) Results reflect 2028 and 2048 Horizon, with the exception of Prince of Wales/Navy intersection which only applies to 2048
4) Level of Service results account for recommended off-site roadway modifications to the adjacent transportation network required by TOH as well as anticipated capital roadway projects by the City of Ottawa (e.g. Carling Avenue BRT)

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Map 15: Anticipated Intersection Congestion based on Level of Service

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PARSONS

0 100 200 400 Metres

3.3.4.2 Identify Future Traffic Patterns

Identifying locations of potential intersection congestion paints only part of the picture when trying to predict future street network vulnerabilities. There may be situations where the most efficient route to and from the NCD under normal or less-congested conditions ends up being through a local community. Without the benefit of a sophisticated predictive model, these potential vulnerabilities were estimated using engineering judgement combined with the information collected in the preceding sections (including feedback from the CACTS).

Despite relocating only 1-km to the east of the existing Civic Campus, the new campus location is expected alter the current route drivers take based on the nearest interchanges and major streets. Highway 417 is approximately 700m from Carling Avenue and includes interchanges to and from Parkdale Avenue, Kirkwood Avenue, Carling Avenue, Rochester Street, Bronson Avenue, Metcalfe Street, and O'Connor Street. Table 6 list the distance of the interchanges to the existing and future campuses.

Table 6: Interchange Distances to the Existing Civic Campus and the Future NCD

INTERCHANGE	DISTANCE TO EXISTING CIVIC CAMPUS	DISTANCE TO FUTURE NCD
Parkdale Avenue	0.7km	1.8km
Kirkwood Avenue and Carling Avenue	1.6km	2.6km
Rochester Street	2.0km	1.2km
Bronson Avenue	2.4km	1.6km
Metcalfe Street and O'Connor Street	3.7km	2.3km

For drivers coming from the west on Hwy 417, exiting the highway at the Rochester Street interchange is expected to result in a shorter travel time to the NCD on a typical day, while exiting the highway at the Carling Avenue interchange is expected to result in the shortest overall distance travelled to the NCD. For drivers coming from the east on Hwy 417, the shortest travel time and distance travelled to the NCD would be achieved by exiting the highway at the Bronson Avenue interchange. These results are supported by previously discussed Top Routes analysis for the Dow's Lake parking lot (Section 3.2.4.2), which also suggested the preferred interchange to access the future NCD site may shift to Rochester Street and/or Bronson Avenue.

At Opening Day of the NCD, the Parkdale Avenue interchange is expected to have less hospital related traffic in favour of the Rochester Street and Bronson Avenue interchanges.

These new interchange routes represent the optimal choice for drivers travelling to the NCD under normal traffic conditions over the Parkdale interchange. **TOH should endeavor to relocate the 'H' Sign/Marker prior to opening day (2028) to better reflect these new interchange route options**, although it is acknowledged that 'H' markers inform mostly drivers who are completely unfamiliar with the transportation network. If selected, the routes would follow the City's arterial and major collector road system, and corresponding decisions would need approval by the Ontario Ministry of Transportation (MTO) via an application for Hospital Markers and the City of Ottawa for the installation of all required trailblazing on municipal roads.

A summary of anticipated changes in the street network traffic patterns at the NCD are as follows:

- Parkdale Avenue Interchange:
  - The Parkdale Avenue interchange will no longer be the closest nor most efficient interchange to reach the NCD. Use of this interchange by NCD traffic is expected to decrease at opening day. It is

noteworthy that TOH intends to investigate opportunities to relocate the current 'H' signs at the Parkdale Avenue interchange to other interchanges that will reinforce new routing options.

- Parkdale Avenue:
  - Parkdale Avenue remains a viable option for visitors and employees living in the Inner Urban Transect, but will no longer be a frontage street that is expected to accommodate a large proportion of hospital traffic. There are currently no plans for the existing Civic Campus site to be redeveloped, so the character of the street is expected to remain largely unchanged. Overall, traffic activity on Parkdale Avenue is expected to decrease when the NCD opens. Any future land-use amendments at the existing Civic location will be subject to a Site Plan Control application process and supporting traffic studies by the applicant(s).
- Bronson Avenue Westbound Off-Ramp, Catherine Street and Chamberlain Avenue:
  - Increased use of the Bronson Avenue westbound off-ramp, the Bronson Avenue/Catherine Street intersection, and Chamberlain Avenue to access the NCD for drivers travelling to/from the east.
  - Previously noted 'H' Sign relocation will encourage greater use of this off-ramp instead of the Parkdale Avenue interchange coming from the east.
- Rochester Street Interchange:
  - Increased use of the Rochester Street westbound on-ramp and eastbound off-ramp to access the NCD for drivers travelling to/from the west.
  - Previously noted 'H' Sign relocation will encourage greater use of this off-ramp instead of the Parkdale Avenue interchange coming from the west.
- Bronson Avenue and Prince of Wales Drive:
  - The NCD location will be directly fronting Prince of Wales Drive, and will be within 1-km of Bronson Avenue. These streets are expected to experience an increase in traffic resulting from the NCD, since they are arterial streets and optimal routes for NCD traffic travelling to/from the south.
- Queen Elizabeth Drive:
  - Queen Elizabeth Drive represents a plausible alternative route for traffic between the NCD and downtown Ottawa, and as such may experience some increase in traffic. However, initial forecasting has predicted a relatively minor increase in traffic volumes from the NCD over time, which may be further mitigated by NCC-driven changes to the road's form/function to be outlined in the *Parkways Planning and Design Guidelines (2024)*.
- Carling Avenue:
  - Traffic related to the NCD is expected to increase towards the east end of Carling Avenue, reflecting the future site's proximity to Bronson Avenue.
  - Towards the west end of Carling Avenue, near Hwy 417, it was not unreasonable to expect traffic related to the NCD will not change significantly from existing volumes despite the campus moving 1-km farther east from the current location. While some drivers that currently use the Hwy 417 EB Off-Ramp may divert to a closer interchange (e.g. Rochester Street), those that currently use the Parkdale Avenue interchange may elect to use Carling Avenue.
  - The previously noted 'H' Sign relocation will also encourage greater use of this off-ramp instead of the Parkdale Avenue interchange for drivers coming from the west.
- Preston Street, Rochester Street and Booth Street within Dalhousie Community Association:
  - Each street is expected to experience an increase in traffic when the NCD opens.

    - These are higher-class streets (either collector or arterial) that provide connectivity to the Rochester Street partial interchange and neighbourhoods to the north within the Downtown Core and Inner Urban Transects as well as the City of Gatineau.

- Champagne Avenue and Beech Street within Civic Hospital Neighbourhood Association:
    - The main access to the NCD off Carling Avenue will be opposing Champagne Avenue, which will increase traffic on the corridor. The project team identified this risk early on and made the conscious choice to design the new Carling Avenue/Champagne Avenue/Road A intersection to prohibit access onto Champagne Avenue from Road A (e.g. barring the northbound through movement at the intersection). The design will still permit the northbound left- and right-turns, as well as left- and right-turn movements from Carling.
    - Even with the noted design choice, there is still expected to be an increase in inbound traffic using Beech Street and Champagne Avenue from the Rochester eastbound off-ramp.
- Sherwood Avenue within Civic Hospital Neighbourhood Association:
    - Over the course of the Master Site Plan process, the project team engaged with the CHNA and acknowledged their concerns with placing the main NCD access at the Carling Avenue/Sherwood Drive intersection. The NCD design concept purposefully placed the main Carling Avenue access intersection at Champagne Avenue to reduce the risk of traffic infiltration on Sherwood Drive.
    - In spite of this design change, Sherwood Drive still represents a viable and attractive route option for drivers that use the Parkdale Avenue interchange or any of the main north-south connections that cross under Highway 417, such as Parkdale Avenue, Fairmont Avenue, and Bayswater Avenue.
    - As previously noted, the City of Ottawa is currently undertaking a Sherwood Traffic Calming Study that will introduce new measures to enhance the corridor for all road users, and may help mitigate traffic infiltration over time. However, it is acknowledged that this study's mandate did not include the potential traffic implications related to the NCD.
- Civic Hospital Neighbourhood Association Local Streets:
    - There is a risk that certain segments on Bayswater Avenue and Fairmont Avenue will experience an increase in vehicle traffic long-term. While both corridors connect across Hwy 417, serving the Inner Urban Transect that may lead to an increase in hospital related traffic; several segments are heavily traffic calmed compared to parallel routes and both intersections at Carling Avenue do no permit left-turns, which may limit their appeal.
- Dow's Lake Resident's Association Local Streets:
    - Local streets within the DLRA (e.g. Cambridge Street, Madawaska Drive, Kippewa Drive and Lakeside Avenue) are at increased risk of traffic infiltration, due to the noted congestion potential along Carling Avenue and Bronson Avenue.
- Glebe Annex Community Association Local Streets
    - The various streets within the Glebe Annex are at increased risk of traffic infiltration due to the NCD, since they present attractive alternative routes to avoid congestion along Bronson Avenue and Carling Avenue when travelling to/from the east or north, most notably Powell Avenue, Bell Street, Cambridge Street, and Plymouth Street.
- NCC Scenic Driveway:
    - The NCC Scenic Driveway presents an attractive alternative route to/from the west and the NCD that avoids potential congestion on Carling Avenue.

The anticipated changes in traffic patterns within the study area when the NCD is open, as described above, has been illustrated in Map 16.

LEGEND

- Study Boundary
- Anticipated Decrease in Peak Hour Traffic
- Anticipated Increase in Peak Hour Traffic

New Campus Development for The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 16: Anticipated Changes in Traffic Patterns with the NCD

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PARSONS

0 100 200 300 Metres

3.4 Where are the Potentially "Impacted" Streets?

Potentially "impacted" study area streets reflect the level of risk that they will experience adverse traffic impacts related to the NCD, based on the breadth of analysis presented in the preceding sections. This can be used as a framework for prioritizing area traffic management measures based on need, instead of making sweeping recommendations which may not be appropriate for all streets.

A street might be considered "impacted" if either it exhibits, or is perceived to exhibit, problematic traffic characteristics, which could be expected to be exacerbated by the projected increase in demand associated with the NCD; or, if it does not exhibit problematic characteristics under existing conditions, there is a possibility that the changes in travel patterns will create them.

3.4.1 Level of Impact Criteria

The anticipated level of impact to study area streets will be placed in one of two Tiers. The chosen Tier was based on the anticipated severity and general validity of issues defined in the needs and opportunities analysis. The project team also applied a measure of discretion when establishing the impacted streets, based on the level of perceived community concern at a particular location that may augment its anticipated level of impact or tier.

Tier 1 **Highly Impacted**: locations of utmost concern to local residents and/or data collected suggests there is considerable risk of traffic implications either today or related to the NCD in the future. Pre-emptive interventions should be considered at these locations in the Strategic Plan to address the potential traffic implications.

Tier 2 **Low to Moderately Impacted**: locations of low or moderate concern to local residents and/or data collected suggests there is some risk of traffic implications either today or related to the NCD in the future, but of uncertain severity. Pre-emptive interventions may be considered with discretion, depending on the local context and potential severity of long-term traffic implications.

Any impacted street, whether Tier 1 or 2 would be included in the future Transportation Monitoring Strategy to confirm whether anticipated risks persist in the fullness of time and to evaluate the effectiveness of any interventions applied.

All remaining streets within the study area had low or no perceived concern to local residents and were not deemed a risk for traffic implications in the future related to the NCD. No interventions or monitoring of these locations would be required unless new concerns are raised by the public in the future, at which time they may be assessed accordingly for inclusion in the Strategic Plan.

3.4.2 Level of Impact on Study Area Streets

A critical aspect when applying the level of impact criteria is understanding that they are fluid and not "set in stone." The impact risk assigned to any street may change without direct intervention due to changes in local or even regional travel behaviour or conditions. Course corrections are likely to occur over time and the baseline road network conditions will need to be reassessed at key milestones for the NCD, such as opening day and as future phases of the NCD proceed. The future Transportation Monitoring Strategy will outline this process in more detail.

The level of impact on study area streets have been listed in Table 7 with the corresponding justification; their locations have also been illustrated in **Error! Not a valid bookmark self-reference.**.

Table 7: Level of Impact Justification Summary

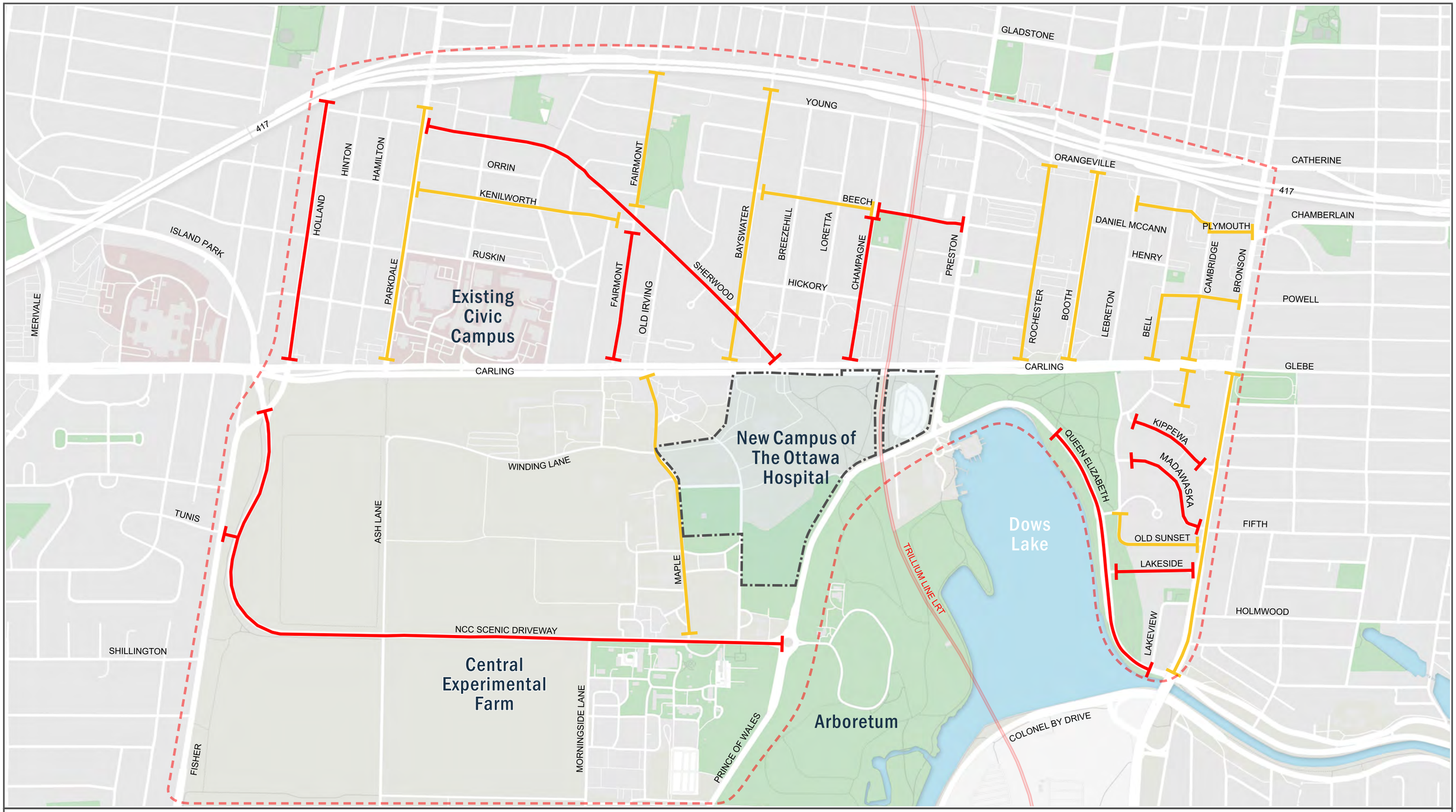
Street (Segment)	Existing							Future				General Comments	Level of Impact/ Tier [3]
	ROAD CLASS	POSTED SPEED LIMIT (AS OF 2019)	AREA CONTEXT	TRAFFIC CALMED	OTHER ROUTE DESIGNATIONS [1]	85TH %-ILE > POSTED SPEED LIMIT	INFILTRATION RISK [2]	PLANNED INFRASTRUCTURE / STUDIES	NEARBY BOTTLENECK (LOS)	ANTICIPATED TRAFFIC CHANGE W/ NCD	LEVEL OF PUBLIC CONCERN		
Notes: 1- "Other Route Designations" considered included Key Emergency Response Streets (Fire), Key Emergency Response Streets (Paramedic), Urban Truck Routes, and OC Transpo 'Frequent' bus routes. 2- Traffic infiltration risk was considered "Not Applicable" (N/A) to arterial and major collector roads, whose primary is facilitating vehicle movement in the transportation network. 3- Tier 1 = High; Tier 2 = Low to Moderate; Segments that are neither Tier 1 nor Tier 2 were not considered impacted enough to warrant inclusion in the recommended plan at this time. These designations may change in the future as new concerns emerge or local conditions evolve in the fullness of time. NCD – New Campus Development; Permanent vs Temporary relates to the general type of traffic calming measures applied within the corridor (as previously discussed in Section 3.2.1.4).												
Civic Hospital Neighbourhood Association													
BAYSWATER AVENUE (CARLING TO YOUNG)	Local	30km/h	Direct residential frontage, school	Yes (Permanent)	Fire	No	Moderate	-	Parkdale/ Hwy 417 (E)	-	Low	- There is the potential risk of additional traffic on Bayswater Avenue via the new Carling/Champagne/Road A intersection at the NCD. - Potential future NCD paramedic route.	2
BEECH STREET (FAIRMONT TO CHAMPAGNE)	Local	50km/h	Direct residential frontage	Yes (Temporary)	-	No	Low	-	-	-	Low	- Traffic related to the NCD expected to be limited to Beech Street, east of Champagne Avenue, but possible risk of an increase in inbound traffic via Bayswater Avenue. - Potential future NCD paramedic route.	2
BEECH STREET (CHAMPAGNE TO PRESTON)	Local	50km/h	Direct residential frontage, park	Yes (Temporary)	-	No	High	-	Carling/ Preston (E)	Increase	Low	- This section of Beech Street forms one part of an expected attractive route between the NCD and the Hwy 417/Rochester interchange or areas to the north of Hwy 417 along Rochester Street and Booth Street. - This alternative route would avoid congestion along Carling and Prince of Wales. - Potential future NCD paramedic route.	1
CHAMPAGNE AVENUE (CARLING TO BEECH)	Local	40km/h	High-rise, institutional lane uses, park	No	-	No	High	*New PXO at Hickory (2023)*	Carling/ Preston (E)	Increase	Low	- This section of Champagne Avenue forms the second part of the expected attractive route option to/from the north. - Champagne Avenue aligns with the future NCD *Road A* intersection at Carling Avenue, creating a tempting alternative route to the NCD avoiding Preston Street and Carling Avenue congestion. - The 85th percentile speeds don't exceed existing posted limit, but there were vehicles observed travelling faster than 60km/h. - Potential future NCD paramedic route.	1
FAIRMONT AVENUE (CARLING TO SHERWOOD)	Local	30km/h	Direct residential frontage	Yes (Temporary)	Fire	Yes	Moderate	-	Parkdale/ Hwy 417 (E); Carling/ Melrose (E)	-	Moderate	- Southern portion of Fairmont Avenue found to have typically higher average speeds than north. - Several recently introduced measures, effects should be monitored. - Potential future NCD paramedic route.	1
FAIRMONT AVENUE (SHERWOOD TO YOUNG)	Local	30km/h	Direct residential frontage, school	Yes (Temporary)	Fire	No	Moderate	-	Parkdale/ Hwy 417 (E)	Decrease	Moderate	- Traffic analysis indicated possible vulnerability to future increases in traffic demand between Carling Avenue and north of Hwy 417. - Potential future NCD paramedic route.	2
KENILWORTH STREET (PARKDALE TO FAIRMONT)	Local	40km/h	Direct residential frontage	Yes (Temporary)	Paramedic	No	Low	-	Parkdale/ Carling (E)	-	Moderate	- Relocation of Civic Campus expected to alleviate some existing traffic pressure. - Potential changes in traffic conditions after implementation of Sherwood Drive traffic calming study recommendations.	2
SHERWOOD DRIVE (PARKDALE TO CARLING)	Minor Collector	40km/h	Direct residential frontage, school, nearby parks	Yes (Temporary + Permanent)	Paramedic	No	High	*NTCP Traffic Calming Study (2024 at the earliest)*	Parkdale/ Carling (E)	Decrease	High	- Direct link between Parkdale Avenue interchange and the NCD site, creating high risk of cut-through traffic. - Street is subject to ongoing traffic calming study. - Potential future NCD paramedic route.	1
HOLLAND AVENUE (CARLING TO KENILWORTH)	Major Collector	50km/h	Direct residential frontage	Yes (Temporary + Permanent)	Fire, Paramedic, Truck, Transit	No	N/A	-	Parkdale/ Carling €	-	Low	- Valuable cycling link between communities north of Hwy 417 and the NCD, via the NCC Scenic Driveway. - Need to reduce speeds in advance of 30km/h zone north of Kenilworth Street.	1
HOLLAND AVENUE (KENILWORTH TO TYNDALL)	Major Collector	30km/h	Direct residential frontage, school	Yes (Temporary + Permanent)	Fire, Paramedic, Truck, Transit	Yes	N/A	-	Parkdale/ Hwy 417 (E)	-	Low	- Previously posted 30km/h limit was not reflected in road arrangement, and existing measures seemed to be insufficient; however, the limit has since been raised to 40km/h (as of Winter, 2023), which may be more appropriate of road character/observed driver behaviour. - Community input identified low compliance with 30km/h limit north of Kenilworth Street.	1

Table 7: Level of Impact Justification Summary

Street (Segment)	Existing							Future				General Comments	Level of Impact/ Tier [3]
	ROAD CLASS	POSTED SPEED LIMIT (AS OF 2019)	AREA CONTEXT	TRAFFIC CALMED	OTHER ROUTE DESIGNATIONS [1]	85TH %-ILE > POSTED SPEED LIMIT	INFILTRATION RISK [2]	PLANNED INFRASTRUCTURE / STUDIES	NEARBY BOTTLENECK (LOS)	ANTICIPATED TRAFFIC CHANGE W/ NCD	LEVEL OF PUBLIC CONCERN		
PARKDALE AVENUE (CARLING TO HWY 417)	Arterial	50km/h	Direct residential frontage	Yes (Temporary + Permanent)	Fire, Paramedic, Truck	No	N/A	*Parkdale Avenue Intersection Road Surface Renewals (2023)*	Parkdale/ Carling (E); Parkdale/ Hwy 417 (E)	Decrease	High	- Not found to have speed or volume characteristics out of line with its role as an arterial. - 'Arterial' designation makes it difficult to recommend measures beyond existing programs.	2
Dalhousie Community Association and Glebe Annex Community Association													
BELL STREET (CARLING TO POWELL)	Local	30km/h	Direct residential frontage, nearby park	Yes (Temporary)	-	No	High	-	Carling/ Bronson (E)	-	Low	- Potentially impacted by cut-through traffic between Bronson Avenue and Carling Avenue (via Powell Avenue).	2
CAMBRIDGE STREET (CARLING TO POWELL)	Local	30km/h	Direct residential frontage	Yes (Temporary)	-	No	High	-	Carling/ Bronson (E)	-	Low	- Potentially impacted by cut-through traffic between Bronson Avenue and Carling Avenue (via Powell Avenue).	2
PLYMOUTH STREET (BRONSON TO LEBRETON)	Local	30km/h	Direct residential frontage	Yes (Temporary)	-	No	High	-	Carling/ Bronson (E)	-	Low	- Found to be a relatively popular cut-through route for southbound traffic on Bronson, either to access Carling or continue through the neighbourhood to Preston Street. - This phenomenon may intensify with the NCD to avoid Bronson Avenue congestion.	2
POWELL STREET (BRONSON TO BELL)	Local	30km/h	Direct residential frontage, nearby park	No	-	No	High	-	Carling/ Bronson (E)	-	Low	- Powell may be impacted by cut-through traffic between Bronson Avenue and Carling Avenue (via one of Cambridge Street or Bell Street), particularly when Bronson Avenue is experiencing congestion.	2
BOOTH STREET	Major Collector	50km/h	No direct residential frontage, institutional land uses	Yes (Temporary)	Fire, Truck	No	N/A	-	Carling/ Rochester (F)	Increase	Low	- Additional traffic pressure related to the NCD is expected, however existing conditions not found to warrant additional pre-emptive measures. - Potential future NCD paramedic route.	2
ROCHESTER STREET	Major Collector	50km/h	Limited direct residential frontage, institutional land uses	No	Fire, Truck	No	N/A	-	Carling/ Rochester (F)	Increase	Low	- High speeds observed during uncongested overnight period, however overall traffic conditions not out of character with a Major Collector designation. - Potential risks related to additional demand triggered by the NCD to/from the Rochester/Hwy 417 interchange - Potential future NCD paramedic route.	2
PRESTON STREET	Arterial	50km/h	Commercial or Mixed land uses	No	Fire, Truck, Transit	No	N/A	-	Carling/ Preston (F)	Increase	Low	- Additional traffic pressure related to the NCD is expected, however existing conditions not found to warrant additional pre-emptive measures. - Potential future NCD paramedic route.	-
Dow's Lake Residents Association													
CAMBRIDGE STREET (CARLING TO FREDERICK)	Local	50km/h	Direct residential frontage, nearby park	No	-	-	Moderate	-	Carling/ Bronson (E)	-	High	- Community input suggests drivers on Carling enter the Dow's Lake community via Cambridge unaware there is no direct connection to Bronson, which results in traffic infiltration on several local residential streets. - Existing intersection capacity analysis and on-site observations support this theory, Bronson/Carling is a congested intersection - The frequency of this occurrence is unknown, but expected to be limited to peak congestion periods.	2
DOW'S LAKE ROAD	Local	40km/h	Direct residential frontage, nearby park	No	-	No	Moderate	-	Carling/ Bronson (E)	-	Moderate	- In the project team's judgement, the route between the Queen Elizabeth Driveway and Carling Avenue using Dow's Lake Road, Charles Jackson Avenue, Frederick Place, and Cambridge Street is too circuitous to be regularly used as a short-cutting route by traffic related to the NCD - Recommended measures on adjacent streets are expected to have a calming effect that should carry over to Dow's Lake Road.	-
KIPPEWA DRIVE	Local	40km/h	Direct residential frontage, nearby park	Yes (Temporary)	-	No	Moderate	-	Carling/ Bronson (E)	-	High	- Community input singled out Kippewa Drive as potentially impacted by future NCD cut-through traffic between Bronson and Queen Elizabeth, to avoid congestion on Bronson and Carling. - Uncontrolled intersection at Kippewa Drive/Dow's Lake Road features wide paved area, may contribute to high traffic speeds.	1
LAKESIDE AVENUE	Local	30km/h	Direct residential frontage, nearby park	Yes (Permanent)	-	Yes	High	-	Carling/ Bronson (E)	-	High	- Some anticipated impact related to cut-through traffic from Queen Elizabeth Drive to Bronson Avenue by NCD users.	1

Table 7: Level of Impact Justification Summary

Street (Segment)	Existing							Future				General Comments	Level of Impact/ Tier [3]
	ROAD CLASS	POSTED SPEED LIMIT (AS OF 2019)	AREA CONTEXT	TRAFFIC CALMED	OTHER ROUTE DESIGNATIONS [1]	85TH %-ILE > POSTED SPEED LIMIT	INFILTRATION RISK [2]	PLANNED INFRASTRUCTURE / STUDIES	NEARBY BOTTLENECK (LOS)	ANTICIPATED TRAFFIC CHANGE W/ NCD	LEVEL OF PUBLIC CONCERN		
MADAWASKA DRIVE	Local	40km/h	Direct residential frontage, nearby park	Yes (Temporary)	-	Yes	Moderate	-	Carling/ Bronson (E)	-	High	- Higher speeds in 2019 were found to be an outlier compared to other years analyzed. - Notable cycling connection extending along Fifth Avenue, connecting Glebe to Dow's Lake Road. - Potential risk of increased traffic related to the NCD, to avoid congestion on Bronson and Carling.	1
OLD SUNSET BLVD	Local	50km/h	Direct residential frontage, nearby park	No	-	No	Moderate	-	Carling/ Bronson (E)	-	Moderate	- Community input indicated that driver compliance with the existing speed limit and one-way restriction on Old Sunset Blvd may be poor, but overall the existing measures have been effective in limiting traffic infiltration.	2
BRONSON AVENUE	Arterial	50km/h	Some direct residential frontages	No	Fire, Truck, Transit	No	N/A	*Bronson Ave. Renewal (2024-2026)*	Carling/ Bronson (E), Bronson/ Catherine (E)	Increase	Moderate	- Difficult to recommend pro-active, affordable traffic calming measures given Bronson Avenue's role as a major arterial. - Planned reconstruction provides opportunity for substantial future integrated speed management measures. - Potential future NCD paramedic route.	2
QUEEN ELIZABETH DRIVE (FROM EXISTING TO LAKEVIEW)	Federally Owned	60km/h	No direct residential frontage, park	No	Fire	No	N/A	-	Preston/ Queen Elizabeth (E)	Increase	Moderate	- Insufficient existing traffic calming measures to enforce it's 40 km/h limit. - Highly active park spaces/recreational uses on both sides of the road create high demand for pedestrian and cyclist crossings, and a distinct need for traffic calming. - Potential future NCD paramedic route. - "Arterial" character does not align with NCC's vision for Federal Parkways; anticipated future changes to roadway form/function to reinforce aesthetic qualities, active uses. - Relatively minor forecasted increase to traffic volumes over existing conditions (5%-10%).	1
Central Experimental Farm													
MAPLE DRIVE	Local	30km/h	No direct residential frontage, institutional land uses, nearby attractions	No	-	-	High	-	Preston/ Queen Elizabeth (E)	-	Moderate	- Valuable as a low traffic recreational driveway for accessing amenities related to the Central Experimental Farm, and thus at risk of increased traffic demand given its location relative to the NCD. - Potential future NCD paramedic route; intended for use as an emergency vehicle access via Road D.	2
NCC SCENIC DRIVEWAY (WEST OF MORNINGSIDE)	Federally Owned	60km/h	No direct residential frontage, nearby attractions	No	Fire	No	N/A	-	-	Increase	Low	- Exhibits existing traffic speeds well exceeding the posted limit, contrary to the streets intended scenic character. - Forms a valuable active transportation link between the NCD and the communities to the east of the Central Experimental Farm. - Potential future NCD paramedic route.	1
NCC SCENIC DRIVEWAY (EAST OF MORNINGSIDE)	Federally Owned	30km/h	No direct residential frontage, nearby attractions	No	Fire	Yes	N/A	-	-	Increase	Low	- See above.	1
Other Study Area Roads													
CARLING AVENUE	Arterial	60km/h	No direct residential frontage	No	Fire, Paramedic, Truck, Transit	-	N/A	*Carling Ave. BRT Project (<2031)*	Multiple Major Intersections	-	Low	- Primary arterial road serving the NCD, to which the large majority of associated traffic is to be directed. Significant traffic calming measures are considered inappropriate. - The future reconstruction of Carling related to planned at-grade bus rapid transit (BRT) by the City of Ottawa will be entering detailed design, which is an opportune time to evaluate and incorporate specific interventions along the corridor. - Potential future NCD paramedic route.	-
OTHER LOCAL STREETS	Local	-	Primarily direct residential frontage	-	-	-	-	-	-	-	-	- Most local roads within the study area that have yet to be recognized are characterized by low traffic speeds and volumes; local roads not discussed above were neither flagged through community and stakeholder consultation, nor otherwise identified as being adversely impacted or influenced by future traffic conditions related to the NCD.	-



LEGEND

- Study Boundary
- **Tier 1:** Potentially Highly Impacted
- **Tier 2:** Potentially Low to Moderately Impacted

Notes:

1) All other streets without a designation within the study area were not identified as areas for concern during public and stakeholder consultation, and were not expected to be impacted in the future based on current data.

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Map 17:Anticipated Level of Impact on Study Area Streets

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4.0 TRAFFIC MANAGEMENT TOOLKIT

4.1 The NTMS Toolkit

The following section provides a summary reference for the set of traffic management interventions which were considered when developing the Strategic Plan. Not all measures listed here may ultimately be found to be feasible for implementation anywhere in the NTMS study area; this section is only intended as a reference for discussing possible traffic management interventions through the remainder of this report.

As well as providing notes on and examples of implementation of each measure, they are summarized using the following categories:

- **Policy related**: whether the intervention is accomplished fully or partially through a policy change, application.
- **Type**: the generalized classification of the intervention (e.g. signage, horizontal deflection, vertical deflection, etc.; for additional details refer to the City of Ottawa Traffic Calming Design Guidelines [2019]).
- **Effort**: a broad, low-medium-high summation of the "effort" (direct capital cost, labour requirements, design complexity, procedural considerations, etc.) associated with each intervention.
- **Effectiveness**: a broad, low-medium-high summation of the "effectiveness" of each intervention (based on relevant City design guidelines, general best practice) in terms of accomplishing study area traffic management objectives.

4.1.1 Low Impact Measures

A set of low impact neighbourhood traffic management interventions have been summarized below. These interventions could be implemented to address neighbourhood traffic calming concerns within a reasonably short timeframe and with limited intrusion on the existing form and function of streets, which generally reduces their upfront costs. Many of these interventions fall within the jurisdiction of the City's Temporary Traffic Calming Measures (TTCM) Program, meaning the implementation of these measures would still be subject to the policies and procedures specified by this program, as discussed in Section 2.0.

4.1.1.1 Limited/Temporary Interventions

These are limited traffic calming measures that require no permanent roadway modifications. They may be installed relatively quickly, typically on a temporary or seasonal basis. While temporary traffic calming measures may sometimes be more cost-effective than permanent measures, they may also be less effective, and will typically include a nominal annual operating cost related to seasonal labour, maintenance, materials etc.

Intervention	Notes	Examples
Vertical Centreline / Edgeline Treatments *See: 30km/h Design Toolbox, Section 4.6.1*	• Reduces traffic speed by visually narrowing travel lanes, adding "frictional" elements to the centreline of the road. • Flex stakes/flexible post-mounted delineators placed along the road centreline, offset from the curb edge, or both (which may provide the strongest calming effect). • May be implemented temporarily or seasonally; however, frequent removal/re-installation may result in increased costs. • Cannot interfere with transit operations; sufficient standard lane width must be maintained according to OC Transpo requirements. • Can be used to create temporary "bulb-outs" or "chicanes". **Policy related**: No **Type:** Horizontal Deflection **Effort:** Low **Effectiveness:** Medium	 *Image: Sherwood Drive and Breezehill Avenue, Ottawa, ON (Google Earth, 2022)*
Pavement Markings	• On-Road messaging can reinforce other signage, interventions; could include: ▪ Speed limits ▪ "School/École" ▪ "Slow/Lent" **Policy related**: No **Type:** Signage **Effort:** Low **Effectiveness:** Low	  *Images: Fifth Street, Ottawa, ON (Google Earth, 2022) ; Glen Avenue, Old Ottawa South Community Association (2017)*

On-Street Parking

See: 30km/h Design Toolbox, Section 4.7.1

- Provides friction, narrows the travelled portion of the roadway, reducing speed.
- Can alternate sides to create a gentle chicaning effect, provide horizontal deflection.
- Should be coordinated in consideration of neighbourhood parking strategies, needs.
- Can be combined with other measures, such as centreline flex-posts (as pictured to the right) to increase efficacy.
- Changes to parking regulations must be done through the City's resident-led petition process and achieve 66% community support. See OPS report for additional details on the parking regulation change process.

Policy related: No
Type: Pavement Marking/Signage
Effort: Low
Effectiveness: Low to Medium (depending on one or both sides, and utilization)

Image: Fairmont Avenue, Ottawa, ON (Google Earth, 2022)

Informational / Warning Signage

See: 30km/h Design Toolbox, Section 4.9.4

- Signage drawing attention to traffic calming measures, speed reduction goals.
- Should be used to support other interventions; may not be effective unless used to supplement physical roadway modifications.
- Note that the immoderate installation of informational signage may lead to a general disregard for the signs by the travelling public. Signage should be installed where it is the most relevant, most credible.
- Some signage is installed as per/subject to Ontario Traffic Manual requirements.

- Informational signage options include:
  - "Traffic-Calmed Neighbourhood" signage
  - "Slow Down for Us" campaign signage
  - 'Pedestrians Ahead' warning signs
  - 'Bicycles Crossing Ahead' warning signs
  - 'School Area' warning sign

Policy related: Yes
Type: Signage
Effort: Low
Effectiveness: Low

Speed Display Devices

See: 30km/h Design Toolbox, Section 4.9.1

- Gives drivers awareness of their speed, encourages compliance with speed limit.
- Can be used to reinforce other speed reduction initiatives but may be ineffective in isolation.
- Should be prioritized in locations with vulnerable pedestrians, such as near schools, parks, pedestrian crossings, etc.
- Implementation is subject to Councillor approval.

Policy related: No
Type: Signage
Effort: Low
Effectiveness: Low to Medium (typically decreases over time)

Images: Holland Avenue at Sherwood Drive, Ottawa, ON (Google Earth, 2021)

Signed Turning Prohibitions

- When a higher-classification roadway experiences congestion, adjacent local streets become more attractive as "short-cutting" routes. Where local roadways intersect arterials, turning prohibitions can discourage cut-through traffic.
- As per City policy, intersection must meet City warrants for a turning restriction, be subject to a traffic study, be operationally feasible, have consensus community support and are ultimately subject to Ward Councillor approval.
- Are typically less effective than physical roadway closures/movement restrictions, but have the advantage of exempting emergency vehicles and cyclists; may encounter low driver-compliance, reducing effectiveness.

Image: Bronson Avenue at Madawaska Drive, Ottawa, ON (Google Earth, 2022)

Policy related: Yes
Type: Signage
Effort: Medium (notable city approval process)
Effectiveness: Low

Planters

- Have multiple potential uses:
  - Installed on local streets to create "chicanes", adding friction, and slowing traffic speeds.
  - Used to create temporary full or partial closures of local streets.
- Can provide the additional benefits of roadway beautification, placemaking by creating temporary landscaping opportunities; however, require community volunteer agreement for planter maintenance.

- Require agreement from Emergency Services, other City departments, and may create winter maintenance challenges.

Policy related: No
Type: Signage
Effort: Low to Medium
(depends on the number and quality of planters)
Effectiveness: Medium

Image: Queen Mary Street, Ottawa, ON (Google Earth, 2022)

Painted Bulb-Outs

- Narrowing of the roadway travel width using painted curb extensions.
- Creates street-edge friction, reduces vehicle speed through horizontal deflection.
- Can be combined with on-street parking bays, vertical centreline treatments, or other interventions.
- Can be implemented at intersections (potential to shorten the pedestrian crossing distance) or mid-block (providing street-edge friction at the point on the roadway where vehicles are likely to be at their highest speed).
- May be less effective than physical curb extensions, but can increase compliance by combining with vertical edgeline delineators.
- Unlike conventional (non-cyclist friendly) physical curb extensions, cyclists are able to ride-over, preventing dangerous interactions with traffic.

Image: Fairmont Avenue. and Hereford Drive, Ottawa, ON (City of Ottawa, 2022)

Policy related: No
Type: Horizontal Deflection
Effort: Low

Effectiveness: Low

Image: Aberdeen Street , Ottawa, ON (City of Ottawa, 2021)

4.1.1.2 Permanent Interventions

Many permanent traffic calming measures and roadway alteration measures affect the drainage of a roadway, making them subject to a detailed design process that generally result in a higher upfront capital cost to implement them. However, some permanent measures have fewer of these impacts and could be installed at a lower cost, subject to a case-by-case evaluation. The following measures fall within this category.

Intervention	Notes	Examples
Speed Humps / Speed Tables / Speed Cushions *See: 30km/h Design Toolbox, Section 4.6.3*	• Motor vehicles must reduce speed to avoid discomfort. May decrease traffic demand on certain demand lines by increasing vehicle travel times. • Use should be avoided on frequent bus routes or key emergency response routes. Where necessary, consider "speed tables" or "speed cushions" as an alternative, the former provides a gentler ramp, whereas the latter feature gaps that allow buses to pass with limited obstruction.[15] • May cause discomfort to cyclists; consideration should be given to providing a flat, obstruction-free surface at the curb edge. • Where the speed-hump does not extend to the curb-edge, additional interventions (such as vertical edgeline treatments) should be considered to prevent vehicles from driving around speed-humps. **Policy related**: No **Type:** Vertical Deflection **Effort:** Medium **Effectiveness:** High	 *Image: Stewart St., Ottawa, ON (Google Earth, 2021)*

[15] The City of Ottawa TCDG does not permit speed humps on transit routes. They may consider speed tables, speed cushions, raised intersections and raised crosswalks on low volume transit routes (6 or fewer buses per hour), and only speed cushions and raised intersections where there are greater than 6 buses an hour if all other traffic calming measures are insufficient or not feasible.

4.1.2 High Impact Measures

The following area traffic management interventions would likely require significant engineering work both in terms of supporting traffic studies and functional designs, which result in much higher unit costs and require a longer implementation window. These measures should only be considered as longer-term interventions.

Intervention	Notes	Examples
Bulb-Outs/ Curb Extensions/ Neckdowns/ Narrowings *See: 30km/h Design Toolbox, Section 4.4.1/4.4.4*	• Narrowing of the throat-width of intersecting roadways using barriers/raised curb extensions. • Creates street-edge friction, reduces vehicle speed. • Can be combined with on-street parking bays, vertical centreline treatments, or other interventions. • Can be implemented at intersections (shortening the pedestrian crossing distance) or mid-block (providing street-edge friction at the point on the roadway where vehicles are likely to be at their highest speed). • Design should consider measures for protecting cyclists at narrowings, prevent dangerous interactions with motor vehicles, such as “ride-over” or “ride-behind” curb extensions. • Consider OC-Transpo needs and potential for combination with bus-stops to provide high quality waiting areas and eliminate “lay-bys” **Policy related**: No **Type:** Horizontal Deflection **Effort:** Medium **Effectiveness:** Medium	 *Image: Sherwood Dr. at Reid Ave., Ottawa, ON (Google Earth, 2021)*  *Image: O’Connor St. at Third Ave., Ottawa, ON (Google Earth, 2021)*

Raised Intersections / Raised Crossings

See: 30km/h Design Toolbox, Section 4.4.2/ 4.4.3/ 4.4.7

- Reduces vehicle speed while also providing a safe, level crossing for vulnerable road users.
- Can be implemented at signalized or unsignalized intersections.
- Not appropriate for high-speed, high-volume arterials, or roads with frequent bus service because of additional wear imposed on transit vehicles.
- Combine with surface treatments such as coloured or textured concrete to further slow traffic by signaling a context change to drivers. (Note that surface treatments are only appropriate in Design Priority Areas, as per City policy).
- Can be costly if not constructed as part of a larger roadway reconstruction.

Policy related: No
Type: Vertical Deflection
Effort: Medium-High
Effectiveness: High

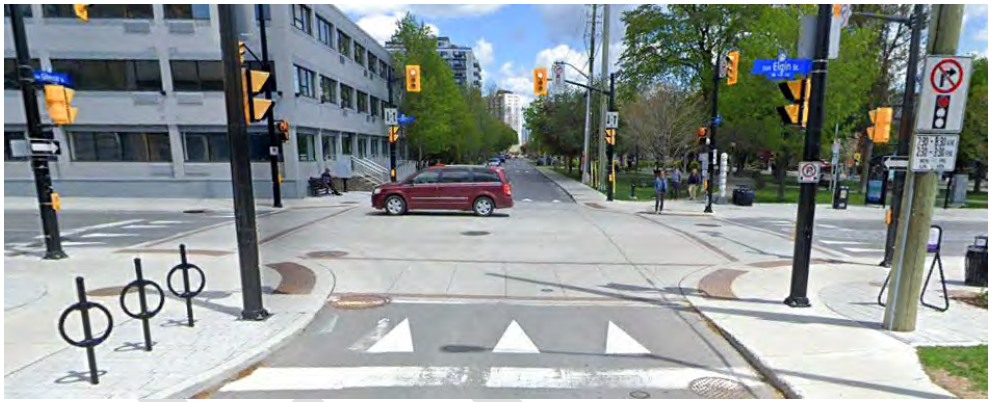


Image: Elgin St. at Gilmour St., Ottawa, ON (Google Earth, 2021)

Image: Byron Ave, Ottawa, ON (Google Earth, 2021)

Mini Roundabouts/ Traffic Buttons

See: 30km/h Design Toolbox, Section 4.4.6/ 4.8.1

- Applicable at lower volume intersecting local or minor collector roads.
- Vehicles must take curvilinear path through the intersection, using a lower speed.
- Opportunity for enhanced landscaping and neighbourhood beautification.
- Approaches can be stop-controlled or free-flow depending on context.
- Landscaping requires proper maintenance so as not to hinder road sightlines.

Policy related: No
Type: Horizontal Deflection
Effort: Medium
Effectiveness: Medium to High (depends on local street and land-use context)

Image: Bridgestone/Foxhall, Ottawa, ON (Google Earth, 2021)

Centre Island Narrowings

See: 30km/h Design Toolbox, Section 4.6.5

- Elevated medians constructed on the roadway centreline can reduce the overall width of adjacent travel lanes, provide traffic friction and slow traffic speeds.
- Can be used to provide a median pedestrian refuge, reducing the overall crossing distance.
- Provide street beautification opportunity through additional landscaping space; consider the use of decorative materials, such as granite cobbles, where appropriate.
- Provisions for cyclists should be considered to prevent them from being “squeezed” at the narrowing.
- Lengthy medians - which give drivers a sense of protection from oncoming traffic, encouraging higher speeds – are not recommended.
- May be implemented as a flush, ‘mountable’ design to provide friction while still meeting

Image: Glebe Ave., Ottawa, ON (Google Earth, 2021)

minimum travel way width requirements, where the overall road width is narrow.

Policy related: No
Type: Horizontal Deflection
Effort: Medium
- **Effectiveness:** High

Image: Hemmingwood near Covington, Ottawa, ON (Google Earth, 2022)

Channelization's / Physical Turning Movement Restrictions

See: 30km/h Design Toolbox, Section 4.4.8

- Reduces or eliminates traffic on specific desire lines
- Traffic study may be required to confirm network impacts; public consultation is required.
- Impact on emergency response routes, navigability for large vehicles should be considered.
- Combine with medians through intersections to further discourage undesired turning movements.
- Variety of possible configurations, such as "right-in-right-out" or "left-in-right-out" approaches, depending on desired outcome.
- May be used to shorten the pedestrian crossing distance using a median island.

Image: Lakeside Avenue at Bronson Avenue, Ottawa, ON (Google Earth, 2021)

Policy related: No
Type: Traffic Management
Effort: High

Effectiveness: Medium

Vehicle Access Closures

See: 30km/h Design Toolbox, Section 4.5.2

- Prevents through-traffic in one or both directions, reducing overall non-local vehicle traffic and eliminating traffic along certain desire lines.
- Traffic study may be required to ensure that local traffic demands are being met.
- Can be achieved at a low-cost using signage, however physical interventions will lead to higher compliance.
- Most appropriate where a local road intersects a higher-order major collector or arterial.
- May shorten crossing distances and improve active transportation conditions; can be arranged to allow cyclists as an exception.

Policy related: No
Type: Traffic Management
Effort: High
Effectiveness: High

Image: Queen Elizabeth Driveway at Third Ave., Ottawa, ON (Google Earth, 2021)

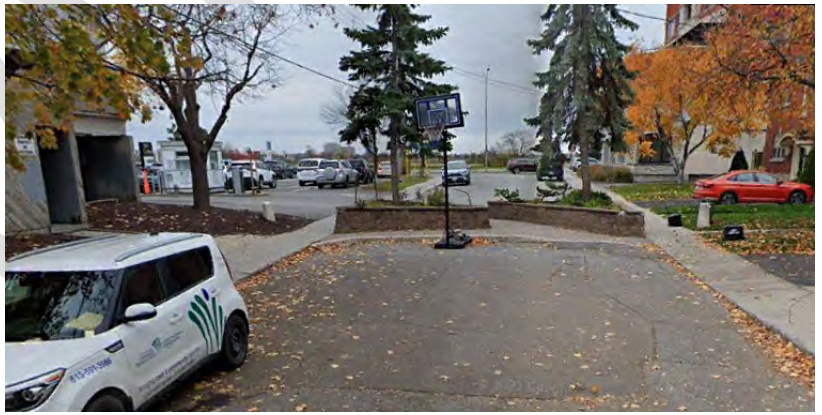


Image: Hamilton Ave. South, Ottawa, ON (Google Earth, 2021)

4.2 Design Considerations

General design considerations for the traffic calming measures described in the previous section include:

- General, city-wide planning objectives (such as design priority areas, Special Districts, mainstreet corridors, or other Official Plan designations) and urban context.
- Pedestrian and cyclist desire lines, roadway crossing demand, and cyclist routes.
- Transit routes, especially frequent transit routes with headways below 15 minutes during peak periods, and Para Transpo routes in the vicinity of hospitals or other key medical facilities.
- Maintenance and seasonal-maintenance requirements, including minimum roadway widths required for winter maintenance equipment.
- Emergency response routes, including emergency vehicle turning radii, minimum roadway widths, and potential impacts on emergency response times.
- Minimum allowable turning radii for all vehicles.
- Aesthetic value of temporary traffic calming materials, as well as the lifecycle costs of frequent replacement.

Refer to City of Ottawa documents for additional design guidance and details regarding traffic management and design considerations, including the *Traffic Calming Design Guidelines* (2019), *Local Residential Streets 30km/h Design Toolbox* (2021), and *Designing Neighbourhood Collector Streets* (2019).

A summary of the applicability of traffic calming interventions outlined in the section above, and according to the information provided by Table 1 in Part II of the *Traffic Calming Design Guidelines,* is provided by Table 8.

Table 8: Applicability of Different Traffic Calming Interventions

MEASURE	LOCAL/COLLECTOR STREETS	MAJOR COLLECTOR/ URBAN ARTERIAL STREET
Vertical Centreline/Edgeline Treatments	Generally Applicable	Low Applicability
Pavement Markings	Generally Applicable	Use With Care
On-Street Parking	Generally Applicable	Use With Care
Informational Signage	Generally Applicable	Generally Applicable
Speed Display Devices	Generally Applicable	Generally Applicable
Signed Turning Prohibitions	Generally Applicable	Use With Care
Planters	Generally Applicable	Low Applicability
Median Narrowing Islands	Generally Applicable	Use With Care
Speed Humps/Speed Tables	Generally Applicable	Low Applicability
Bulb-Outs/Curb Extensions	Generally Applicable	Use With Care, depending on context
Raised Intersections	Generally Applicable	Low Applicability
Raised Crossings	Generally Applicable	Low Applicability
Mini-Roundabouts	Generally Applicable	Low Applicability, depending on context
Channelizations	Generally Applicable	Use With Care
Vehicle Access Closures	Generally Applicable	Low Applicability

4.3 Traffic Control and Speed Regulations

The choice of traffic control configuration along a corridor plays an important role in traffic calming, despite not being traffic calming measures themselves. Beyond the traditional traffic signal and stop control, emerging options such as mini-roundabouts, protected intersections, or raised intersections can help reinforce and augment traffic

calming measures within the corridor. As well, although they are also not directly considered traffic calming measures, candidate study area locations for mid-block PXOs were identified based on pedestrian and cyclists desire lines and expected crossing volumes. The installation of warranted PXOs can be funded through the TTCM program if budget is available.

Full or partial reconstruction of signalized intersections are not within the purview of neighbourhood traffic calming, locations of interest were identified to help inform future capital projects, and opportunities to update traffic control at study area intersections according to contemporary City of Ottawa standards. Work such as the upcoming Bronson Street or Parkdale Street renewals provide the opportunity to reimagine the form and function of intersections in the area surrounding the NCD.

It is also important to emphasize that **"all-way stop" intersection treatments have not been included in the NTMS toolkit**. Although it may seem counterintuitive, stop signs are intended to inform drivers of which direction has the right-of-way at an intersection, and are not speed control devices. Careful consideration needs to be given to the appropriate installation of all-way stop control. Inappropriately placed stop-signs will typically have a low compliance rate, creating unsafe interactions where crossing pedestrians make the reasonable but incorrect assumption that a vehicle will stop. Additionally, the average speed of vehicles between intersections may increase as drivers try to make up for the time lost at the stop-sign. The City of Ottawa has a standard procedure for identifying and evaluating candidates for intersection control - such as traffic signals, PXO's, all-way stops, etc. - and all-way stop treatments are required to be approached through this pipeline.

Finally, the City of Ottawa TCDG notes specifically that speed limit signage in isolation "**may have limited real impacts on driver behaviour without regular enforcement and/or other features to support their intention**."[16] In most instances, driver speeds will be highly dictated by the physical street design and "friction" generated by the presence of other street users.

ALL-WAY STOPS AND ISOLATED SPEED LIMIT SIGNS

"Use of these features, need to be considered in the context of an overall traffic calming concept that carefully considers mitigation of unintended potential consequences."

CITY OF OTTAWA TCDG, 2018, P36

[16] City of Ottawa -Transportation Services Department - Area Traffic Management Branch, *Traffic Calming Design Guidelines*, 2018, Ottawa, ON, pg.36

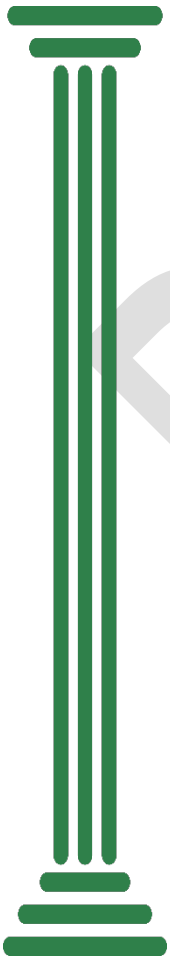
5.0 THE STRATEGIC PLAN

Following from the analysis contained in the previous sections of this report, the Strategic Plan provides a set of proactive measures that may be used to help mitigate/address potential traffic implications within the established study area surrounding the NCD site. It is intended that Strategic Plan should act as a 'roadmap' for neighbourhood traffic calming as it relates to the NCD, understanding that there are city policies and processes to be finalized prior to implementation (such as validation of the issue, Councillor approval, and the identification/confirmation of a funding source). The sections below summarize the Strategic Plan and provides a framework for its successful application.

5.1 Identify the Framework for Success

The short- and long-term approach to the NTMS must be ambitious while focused to avoid unintended consequences with the overuse or inappropriate use of certain measures. The Strategic Plan builds off the historical work established by the combined efforts of the City of Ottawa and the local community associations, but pushes even further with forward-thinking solutions.

Solving the future challenges in the face of the significant development plans within the study area (beyond just the NCD) requires a multifaceted set of solutions. In the end, the NTMS will achieve success if each of the key stakeholder groups, TOH, the City of Ottawa and the neighbouring communities, can emphasize and adhere to the following key concepts:



There is no "magic bullet." The recommendations herein represent a mixed package of short-term and long-term solutions that we believe will have notable community benefit. Implementation of all required measures will not necessarily guarantee success, but greatly increases its chances; likewise only partial or piece-meal implementation of recommended interventions will greatly reduce these chances.

Change is difficult, but necessary. The recommended plan offers bold and innovative approaches to ensure neighbourhood streets are inclusive and treat all users equitably. However, not every community's concerns can be mitigated. TOH and City of Ottawa must remain steadfast in responding to future vulnerabilities, while the local community associations must be equally aware of the complexity of certain issues, the realities of traffic in urban growth areas, and that not all concerns can be tackled immediately or are able to be resolved to their ultimate satisfaction.

Collaboration and Communication are vital. There must be a unified collaborative approach between the primary stakeholder groups (TOH, City of Ottawa, NCC and the surrounding community associations) in addressing future vulnerabilities. Regular communication will be critical leading up to opening day of the NCD and initial implementation of required interventions, and in the months and years after opening day of operation to assess their effectiveness and be ready to adjust course if necessary.

The Plan is a "living" document. The Strategic Plan provides a roadmap and framework for moving forward. It is based on extensive consultation, detailed analysis, and best practices today, but like many long-term planning documents, the NTMS is not expected to get it all right the first time. The community associations must be understanding; there may be challenges or course corrections as the plan moves forward. TOH must be equally vigilant by continuing to monitor and evaluate the plan's performance over time in order to respond effectively as local and regional conditions change when the NCD opens and beyond.

5.2 Summary of the Strategic Plan

The **Strategic Plan** was developed as part of a collaborative process between the project team and key stakeholders. Informed by the existing conditions analysis, identification of issues and opportunities, and industry best practices, the project team held interactive workshops with the CACTS representatives to brainstorm a set of strategies and measures that they felt would enhance their perception of safety and overall community quality of life. The initial large set of ideas were then refined, screened, and grouped based on how they fit within guiding policies and procedures, cost-effectiveness, and level of impact. The relevant City of Ottawa departments were also consulted; their general input and expertise on the required processes and procedures inspired many elements of this strategy.

The three Strategic Plan groupings were:

"Quick Wins" are a proposed first step towards addressing existing and/or potential future vulnerabilities in the study area road network. These are intended to represent a measured approach to addressing the local concerns in order to reduce the risk of unintended traffic implications elsewhere in the road network. The chosen interventions are predominantly low-impact measures that may be implemented relatively easily and cost-effectively, relative to full-scale permanent roadway modifications. These include temporary/seasonal traffic calming measures, which are contingent on Councillor support, but which are less likely to be subject to a lengthy City of Ottawa design approval process. Any higher impact measures (i.e., speed humps) were included in this grouping where they were considered appropriate or necessary.

Additional Strengthening interventions generally include higher impact measures that may be considered if the desired compliance is not being achieved with the "Quick Wins" approach. These measures are predominantly permanent solutions that have a higher capital cost and may require additional City of Ottawa design approvals prior to implementation. There is the option to proceed directly with the additional strengthening approach (in lieu of or in combination with the "Quick Wins" measures) should there be consensus among the key stakeholders to do so, but there is a need to be mindful of the significant additional effort that will be required to study these proposed measures and ensure that no unintended traffic impacts will result.

Community Improvement Measures may not be directly related to area traffic management or the NCD, but these opportunities were based on suggestions that were of great importance to the local community associations. The NTMS acknowledges that these items possess intrinsic value towards traffic safety and improving the overall community experience for local residents. The key intent for their inclusion in the recommended plan was for information purposes in hopes of spurring discussion between the appropriate approving authorities and local community associations.

A Strategic Plan Matrix has been provided in Table 9 that summarizes all interventions within the study area based on the impacted streets identified in Section 3.4. Maps for each of the three groupings of interventions are provided in Map 18 – **"Quick Win" Measures**, Map 19 – **Additional Strengthening Measures** and Map 20 – **Community Improvement Measures**.

Table 9: Strategic Plan Matrix

Street (Segment)	Tier	Key Issues, Opportunities And Constraints	Strategic Plan Elements		
			"QUICK WINS"	ADDITIONAL STRENGTHENING	COMMUNITY IMPROVEMENT MEASURES
Notes: TTCM – Temporary Traffic Calming Measures; OPS = Off-Site Parking Strategy (by TOH)					
Civic Hospital Neighbourhood Association					
BEECH STREET (CHAMPAGNE TO PRESTON)	1	New TTCM are expected in 2022/2023. Anticipate an increase in inbound NCD traffic from the Rochester/Hwy 417 EB Off-Ramp to avoid congestion at Preston/Carling intersection. Existing conditions at the Trillium Line Pathway crossing do not result in vehicles reliably stopping for pathway users because of obstructed sightlines between the path and oncoming traffic. Traffic calming measures on Beech Street will also improve safety at this crossing, reinforcing a critical active connection to the future Hospital campus.	Let planned TTCM by City of Ottawa take effect.	If future monitoring results support the need, consider **speed humps** in addition to city planned TTCM, positioned on either side of the Trillium Line Pathway crossing.	Consider the feasibility of upgrading the Trillium Line Pathway crossing to a **PXO Type B** or **Type C** (based on OTM Book 15 warrant) using rapid flashing beacons or other signage measures.
CHAMPAGNE AVENUE (CARLING TO BEECH)	1	Anticipate an increase in inbound NCD traffic from the Rochester/Hwy 417 interchange to avoid congestion at Preston/Carling intersection. TOH has already accounted for this issue in the NCD site plan by designing the Carling/Champagne/Road A intersection to prohibit the northbound through movement for general traffic, limiting outbound traffic infiltration onto Champagne. On-street parking utilization on Champagne is high (~60%-80%), providing a good opportunity to further leverage parking as a traffic calming tool. Existing parking bays could be expanded, where appropriate, and 'formalized' to reinforce the effect of the parking.	Consider reinforcing existing **on-street parking** bays using **painted bulb-outs** (with **edgeline delineators** or **planters**), where appropriate. Consider the additional use of **centreline flex-posts** to narrow the travel lanes in between parking bays, as well as the addition of **speed humps** at regular intervals.	If future monitoring results support the need, consider converting the proposed painted bulb-outs to **physical curb extensions** where appropriate, keeping in mind a cyclist-friendly design approach.	The City of Ottawa is collaborating with a local developer to renew the portion of Hickory Street east of Champagne Avenue, to provide active transportation facilities that tie into the future Trillium Line Pathway and Carling LRT Station, including a new PXO crossing at the Champagne/Hickory intersection. This work should consider the feasibility of physical curb extensions at the intersection to reinforce the 30km/h posted speed limit on both roads. The existing design of the driveway/traffic loop for 865 Carling - which fronts on to Champagne - features an extended depressed curb (~40m) that does not appear to adhere to the private approach bylaw. As well as limiting the availability of certain traffic calming measures for this portion of Champagne Avenue, this overlong driveway also places pedestrians' level with the road surface, contributing to an overall unsafe pedestrian realm. Future work should consider options for reconfiguring this private approach.
FAIRMONT AVENUE (CARLING TO SHERWOOD)	1	Existing TTCM coverage on this segment is limited to between Laurentian and Sherwood. Vehicles turning off Carling do not encounter traffic calming measures before continuing north on a downhill slope, where their speeds could be expected to increase. Potential for Fairmont to be classified as a "key emergency response route" at the time of the opening of the NCD; vertical deflection measures subject to future confirmation with regards to reconfigured response routes.	Consider extending the coverage of TTCM, including **centreline flex-posts** and **edgeline delineators** to Carling. Consider the addition of a **speed hump** north of Carling, to mitigate the effects of the 'hill' on vehicle speeds	If future monitoring results support the need and there is sufficient community support, consider a **partial vehicle access closure** north of Carling Avenue to prohibit traffic in one direction (either north or southbound) to further reduce traffic infiltration, subject to a future traffic study.	None
SHERWOOD DRIVE (PARKDALE TO CARLING)	1	Sherwood has extensive TTCM along the corridor. The City of Ottawa is currently conducting a traffic calming study, with construction of recommended plan anticipated to start by the end of 2024 (subject to design/approval/tender process timeline) . The study is expected to enhance traffic calming measures and active transportation facilities along the corridor. These measures alone may be sufficient to mitigate long-term traffic implications related to the NCD. Traffic conditions and driver behaviour along the corridor should be monitored after opening day of the NCD to determine if additional traffic calming measures are warranted.	Revisit potential measures after *Sherwood Drive Traffic Calming Study* recommendations by City of Ottawa take effect.	If future monitoring results support the need, review possible interventions to augment recommendations from the City of Ottawa *Sherwood Drive Traffic Calming Study.*	The City of Ottawa should consider measures to improve the safety and reliability of crossings for active users at the Sherwood/Parkdale intersection, reinforcing Sherwood's potential role as an active transportation connection to the NCD, as part of the planned functional design review in 2023.
HOLLAND AVENUE (CARLING TO KENILWORTH)	1	Existing on-street parking and TTCM help to provide some friction, however parking utilization is low (between 40%-50% on weekdays based on the OPS), so the effect is not being maximized. There is an opportunity to replace some parking with formalized calming measures without restricting parking supply. The relocation of the existing Civic Campus is also expected to reduce parking demand in the surrounding neighbourhood streets, which may support this initiative. Holland Avenue is a designated urban truck route, and the frequency of bus service makes vertical deflection measures undesirable (>6 buses per hour). There is also a need to maintain sufficient travel lane width, as per OC Transpo requirements, when implementing horizontal deflection measures. To maintain a sufficient standard of bus service, a 30km/h speed limit may not be appropriate for the full length of the street.	Consider mid-block **painted bulb-outs** supplemented by **edgeline delineators** if parking supply is not required, to provide more pronounced and consistent friction. Note that changes to parking provisions must be initiated through a resident-led petition process.	If future monitoring results support the need, consider permanent physical measures to replace temporary measures, e.g. mid-block **physical curb extensions** to replace the proposed painted bulb-outs *(see: Quick Wins).*	The City of Ottawa may consider decreasing the posted speed limit between Carling Avenue and Kenilworth Street to **40km/h** in tandem with recommended measures to support a safer traveling environment for all road users, and provide consistency with the currently posted 40km/h limit north of Kenilworth Street. Encourage the extension of **separated cycling facilities** to Carling Avenue, if space permits, as part of a future road renewal project by the City of Ottawa.

Table 9: Strategic Plan Matrix

Street (Segment)	Tier	Key Issues, Opportunities And Constraints	Strategic Plan Elements		
			"QUICK WINS"	ADDITIONAL STRENGTHENING	COMMUNITY IMPROVEMENT MEASURES
HOLLAND AVENUE (KENILWORTH TO SHERWOOD)	1	Driver speeds are generally not adhering to the 30km/h posted speed limit, which is exacerbated by the lack of a notable transition from the 50km/h zone to the south. Existing TTCM and cycling facilities along this section of Holland installed in 2018/2019. Holland is an urban truck and frequent bus route (>6 buses per hour), which makes vertical deflection measures undesirable and concerns with travel lane width. On-street parking is limited to the east side, but is buffered by a bike lane, which reduces the friction effect. Space on this segment of Holland is constrained by the Hwy 417 underpass, making it difficult to recommend additional traffic calming measures that will not interfere with existing cycling facilities. Falls under the influence of new Official Plan Policy 4.10.1, which encourages the implementation of traffic calming measures within 400m walking distance of school sites.	Consider the addition of a **painted bulb-out** (supplemented by edgeline delineators) on the east side of Holland, replacing one or more existing parking spaces but narrowing the northbound travel width and providing more consistent traffic friction. Note that changes to parking provisions must be initiated through a resident-led petition process.	If future monitoring supports the need, the proposed painted bulb-out (*see: Quick Wins*) on the east side of Holland could be formalized as a ride-over **physical curb extension**. If future monitoring confirms that compliance with the posted 30km/h limit remains consistently low, more impactful measures could be considered. If it is supported by city staff and the surrounding community, ride-over **physical curb-extensions** could be installed on the west side of Holland, and the roadway centreline shifted accordingly to create a high-friction chicaning effect. This option would require the removal of the majority of the existing east-side parking bays, although some of this loss could be offset with new west-side parking bays in the space between the curb-extensions.	None
BAYSWATER AVENUE (CARLING TO YOUNG)	2	Existing traffic calming measures appear to be effective in mitigating speeds. There were no significant community concerns with traffic volumes. There is potential for an increase in future traffic volumes related to the NCD. Generally, this segment was included as an impacted street due to its proximity to NCD main access at Champagne, its connection underneath Hwy 417, and area context (direct residential frontage and a school).	None	Additional strengthening to be determined through the future transportation monitoring program.	None
BEECH STREET (FAIRMONT TO CHAMPAGNE)	2	This segment forms part of a route to the NCD via Bayswater Avenue and Champagne Avenue. There is potential for an increase in inbound traffic, albeit a relatively low risk. There are existing TTCM along Beech Street between Champagne Avenue and Breezehill Avenue.	None	Additional strengthening to be determined through the future transportation monitoring program.	None
FAIRMONT AVENUE (SHERWOOD TO YOUNG)	2	No significant changes in traffic conditions anticipated in the future. There are limited area traffic management measures today, but historical traffic conditions do not suggest additional measures are needed. Has been included as an impacted street due to its proximity to NCD main access at Champagne Avenue, the connection it provides underneath Hwy 417, and area context (direct residential frontage and school).	None	Additional strengthening to be determined through the future transportation monitoring program.	None
KENILWORTH STREET (PARKDALE TO FAIRMONT)	2	Kenilworth Street between Holland Avenue and MacFarlane Avenue has existing TTCM. City of Ottawa staff noted this is a sensitive road link based on feedback heard in the *Sherwood Drive Traffic Calming Study*. The community did not support the recent pilot closure of Kenilworth Street at Sherwood Drive, due to the concerns over spillover traffic impacts on a number of surrounding side streets. Restraint is advisable in further applying area traffic management measures on Kenilworth Street unless safety concerns are identified, to avoid pushing more traffic onto Sherwood Drive.	None	Additional strengthening to be determined through the future transportation monitoring program.	None

Table 9: Strategic Plan Matrix

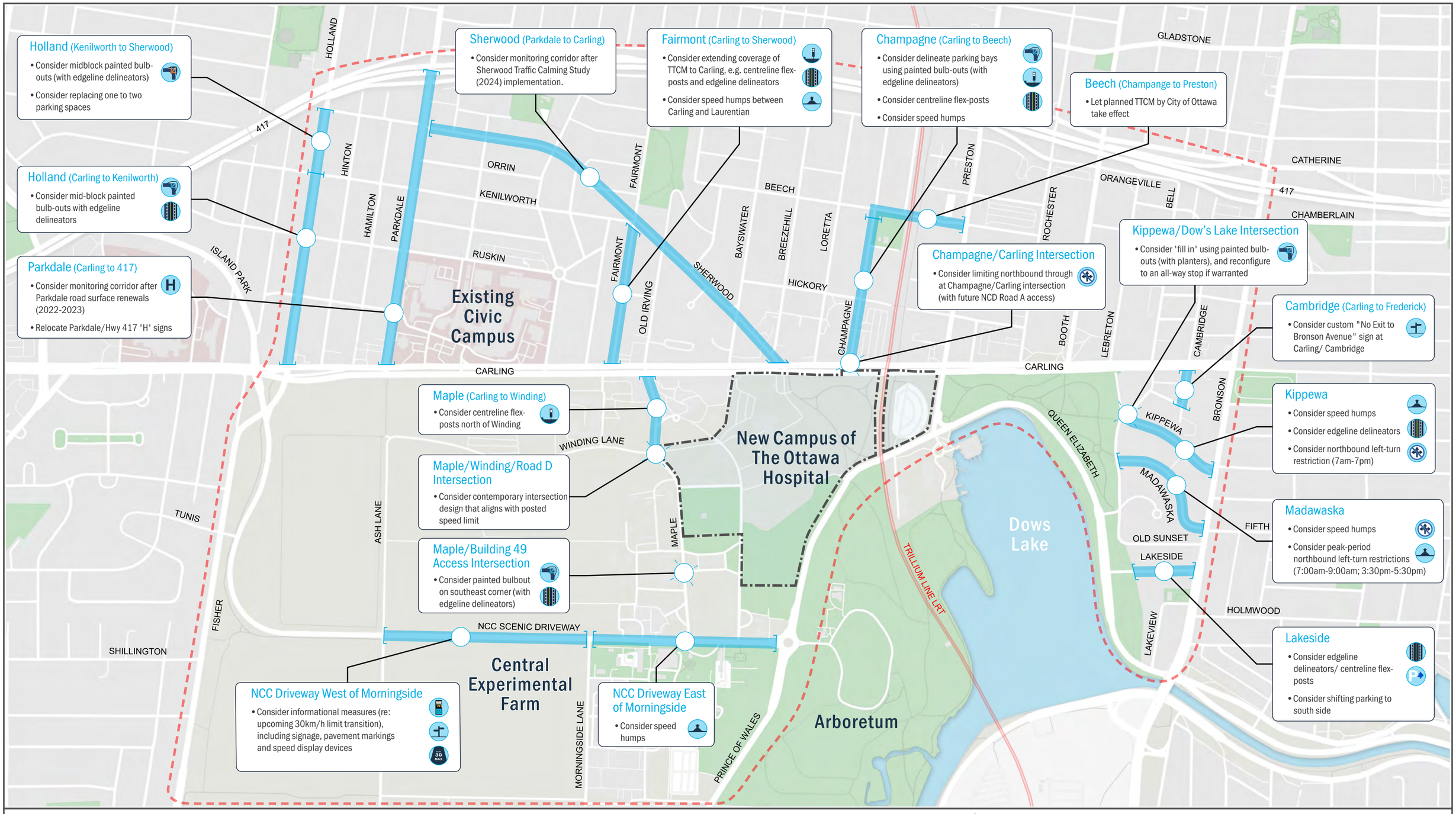
Street (Segment)	Tier	Key Issues, Opportunities And Constraints	Strategic Plan Elements		
			"QUICK WINS"	ADDITIONAL STRENGTHENING	COMMUNITY IMPROVEMENT MEASURES
PARKDALE AVENUE (CARLING TO HWY 417)	2	This section of Parkdale Avenue is already subject to a breadth of TTCM. The relocation of the Civic Campus is anticipated to shift demand away from the Parkdale Avenue interchange to the Rochester Street and Bronson, which should help to alleviate some traffic demand on Parkdale south of Hwy 417. This may be reinforced by relocating the 'H' Signs on Hwy 417 away from Parkdale Avenue once the NCD is in operation. Parkdale Avenue is not a frequent transit route (<6 buses per hour), nor a designated urban truck or fire route, so it may be possible to justify vertical deflection measures despite its arterial designation (subject to City of Ottawa approval). However, there are other factors to considering vertical deflection, and it is likely that only certain types of vertical deflection measures – such as raised intersections – would be considered. Existing vehicle traffic volumes are in the 10k to 20k range daily, which is not atypical for an arterial roadway providing direct access to a Hwy 417 interchange. There are limited options in the NTMS toolkit which would be appropriate given Parkdale's arterial designation. Re-designation of the street is outside this studies scope, and any redesign suggestions would be subject to City of Ottawa and MTO approval. Arterial streets in the inner urban area, including Parkdale Avenue, are considered "access/flow" streets under the new Official Plan, acknowledging their importance to the overall network in terms of traffic movement; recommendations should not compromise this element of the streets characters. Potential for Parkdale Avenue to be classified as a "key emergency response route" at the time of the opening of the NCD; vertical deflection measures subject to future confirmation with regards to reconfigured response routes.	Revisit potential measures after the planned Parkdale Avenue road surface renewals take effect. TOH should consider beginning the process of coordinating with MTO to relocate the Parkdale Avenue/Hwy 417 'H' Signs/Markers to other interchanges as well as the corresponding municipal hospital markers, so they are ready for deployment by opening day of the main Hospital Building (2028). This change will better represent the optimal routes to the NCD. It is recommended that the existing Civic Campus Hwy 417 'H' Signs/Markers be relocated to: • Carling Avenue EB Off-Ramp and/or Rochester Street EB Off-Ramp • Bronson Avenue WB Off-Ramp	None	The City of Ottawa may consider exploring the feasibility of **raised intersections**, or as an alternative, **raised crossings** at key locations and on intersecting local roads.
Dalhousie Community Association and Glebe Annex Community Association					
ROCHESTER STREET	2	Anticipate an increase in inbound NCD traffic from Rochester Street/Hwy 417 EB Off-Ramp. No area traffic management measures present. On-street parking permitted, with wider pavement width and employment context align with speed regulations. Development plans along Rochester present opportunities for redesign of corridor, e.g. with cycling facilities.	None	Additional strengthening to be determined through the future transportation monitoring program.	The City of Ottawa should continue to explore area traffic management measures and active transportation opportunities as part of ongoing and future development applications (e.g. Canada Lands) along the corridor to ensure the street context and corridor design align with the vision established in the Preston-Carling District Secondary Plan.
BOOTH STREET	2	Anticipate increase in NCD traffic on Rochester Street/Hwy 417 WB On-Ramp. Limited area traffic management measures present. On-street parking permitted, with wider pavement width and employment context aligned with speed regulations. Community feedback noted occasional speeding through the Booth/Norman and Carling/Booth intersections. They were not in favour of losing parking, which has implications on potential use and effectiveness of interventions. Development plans along Booth Street present opportunities for redesign of corridor to include area traffic management measures and other elements to improve corridor inclusivity, e.g. cycling facilities.	None	Additional strengthening to be determined through the future transportation monitoring program.	See *Community Improvement Measures* for Rochester Street.
PLYMOUTH STREET (BRONSON TO LEBRETON)	2	Potential risk of inbound traffic infiltration to NCD due to congestion on Bronson Avenue. Existing turn restrictions and one-way designation in effect.	None	Additional strengthening to be determined through the future transportation monitoring program.	City of Ottawa Bronson Avenue Renewal Project should consider reviewing access management and intersection designs along Bronson Avenue between Carling Avenue and Chamberlain Avenue, including potential area traffic management measures to minimize the risk of traffic infiltration on local side streets and active transportation enhancements for overall community benefit.
POWELL, BELL, AND CAMBRIDGE (NORTHWEST OF CARLING/BRONSON)	2	Potential risk of inbound traffic infiltration to NCD due to congestion at the Bronson/Carling intersection. Limited TTCM on each street.	None	Additional strengthening to be determined through the future transportation monitoring program.	See *Community Improvement Measures* for Plymouth. The City of Ottawa should also consider area traffic management measures and active transportation enhancements as part of ongoing and future development applications along Bell Street (e.g. Canada Lands) to ensure the street context and design align with the surrounding land uses and public realm.

Table 9: Strategic Plan Matrix

Street (Segment)	Tier	Key Issues, Opportunities And Constraints	Strategic Plan Elements		
			"QUICK WINS"	ADDITIONAL STRENGTHENING	COMMUNITY IMPROVEMENT MEASURES
Dow's Lake Residents Association					
KIPPEWA DRIVE	1	According to community feedback, the Kippewa Drive/Bronson Avenue intersection is unsafe in its existing configuration, e.g perceived wide corner radius that permits high speeds entering street, onstreet parking blocks visibility etc. Kippewa Drive is at risk for traffic infiltration by future NCD traffic to avoid congestion on Bronson Avenue and Carling Avenue. Although a full intersection reconstruction is outside the scope of these recommendations, additional turning restrictions to eliminate uncontrolled left-turns may be considered to reduce future traffic implications related to the NCD. The existing Kippewa Drive/Dow's Lake Road intersection features an abnormally wide paved area and an overall geometry which encourages high vehicle speeds. Options should be explored to "tighten" the geometry without a full reconstruction, which would be out of scope for these recommendations.	Consider a new **signed left-turn restriction** at the Kippewa/Bronson intersection restricting the northbound left-turn between 7:00am – 7:00pm, subject to a future traffic study. Consider replacing existing TTCM with **speed humps**. Consider using **painted bulb-outs,** reinforced with **edgeline delineators** and/or **planters** to reduce the pavement footprint at the Kippewa/Dow's Lake intersection and reconfigure the intersection to an **all-way stop**, if warranted.	None	The City may consider redesign options at Kippewa/Dow's Lake if safety issues persist, such as a **mini-roundabout** or a properly designed **all-way stop** controlled intersection**.** Further considerations noted under *Community Improvement Measures* for Bronson Avenue. Particular consideration should be given to redesigning the Kippewa/Bronson intersection to remove channelization's on the west leg, reduce the pedestrian crossing distance.
LAKESIDE AVENUE	1	Anticipate an increase in outbound NCD traffic on Lakeside Avenue, to Bronson Avenue, thus avoiding the bottleneck at the Carling/Bronson intersection. Reinforcing traffic management measures on Lakeside may help direct traffic to intended arterial routes (Carling, Bronson), and mitigate traffic increase on Queen Elizabeth Drive. Community feedback expressed concerns with the number of tour buses and larger trucks that use Lakeside Avenue.	Consider placing **edgeline delineators** paired with **centreline flex-posts** at intervals in between existing speed-humps (maintaining appropriate width to accommodate observed vehicle types), to create a more consistent traffic calming 'rhythm' along the street.	If future monitoring results support the need and there is sufficient community support, peak-hour **signed left-turn restrictions** may be considered for the southbound left from Queen Elizabeth Drive onto Lakeside Avenue, to be in effect between 7:00am – 9:00am and 3:30pm – 5:30pm on weekdays.	See *Community Improvement Measures* for Queen Elizabeth Drive and Bronson Avenue.
MADAWASKA DRIVE	1	According to community feedback, the Madawaska Drive/Bronson Avenue intersection is unsafe under its existing arrangement and timing plan. This is a notable cycling connection between Fifth Avenue and Queen Elizabeth Drive and is classified as a pathway link by the city. Madawaska Drive is at risk for traffic infiltration by future NCD traffic to avoid congestion on Bronson Avenue and Carling Avenue. Although a full intersection reconstruction is outside the scope of these recommendations, additional turning restrictions to eliminate uncontrolled left-turns can be implemented to reduce the risk of future traffic implications related to the NCD.	Consider existing **signed left-turn restrictions** at the Madawaska/Bronson intersection should be extended to prohibit northbound left turns during peak periods between 7:00am – 9:00am and 3:30pm – 5:30pm, subject to future traffic study. Consider using **speed humps** to replace existing TTCM.	Additional strengthening to be determined through the future transportation monitoring program.	See *Community Improvement Measures* for Bronson Avenue. Consideration could be given to a pedestrian crossing treatment at Madawaska/Dow's Lake, to provide continuity of active transportation routes.
QUEEN ELIZABETH DRIVE (FROM EXISTING PXO TO LAKEVIEW)	1	Parks and pathway system on both sides of Queen Elizabeth Drive creates high demand for pedestrian/cyclist crossings. The existing road arrangement provides limited safe crossing opportunities. Community feedback has indicated that there is also a strong desire line following the Commissioners Park pathway, but that the lack of existing traffic control measures on intersecting streets creates somewhat dangerous conditions for pathway users. The NCC recently announced (September 2022) that the posted speed limit on Queen Elizabeth Drive will be dropped to 40km/h, which is in line with this study's objectives. Forthcoming updates to NCC *Parkways Planning and Design Guidelines (2024)* may result in changes to the overall form/function of the roadway to better align with the NCC's vision, objectives. Recommendations should support the Official Plan direction for Queen Elizabeth Drive which includes a reimagining of the road to "...reduce its importance as a commuter route" in favour of an improved pedestrian experience.	Revisit potential measures after the recent 40km/h speed reduction take effect.	Additional strengthening to be determined through the future transportation monitoring program. Future interventions may be guided by the recommendations of the updated *Parkways Planning and Design Guidelines (2024).*	The NCC should consider **PXOs** across Queen Elizabeth Drive, possibly to be located at Crescent Heights, Lakeside Avenue, and/or Lakeview Terrace depending on the results of future evaluation, improving active transportation connectivity across QED for active users. The evaluation must consider the proximity between PXOs to ensure they meet minimum separation requirements. They should also explore **enhanced crossing treatments** along the Commissioners Park pathway crossing Crescent Heights and Lakeside Avenue. The NCC should consider the feasibility of **raised crossings** at the noted locations, which would synergize well with the recent 40km/h speed limit reduction along Queen Elizabeth Drive .
BRONSON AVENUE	2	Although it is out of scope of this NTMS, a functional design review of all Bronson Avenue intersection designs accessing the Dow's Lake neighbourhood is expected to be completed as part of the Bronson Avenue Renewal Project, and should have a strong focus placed on improving traffic safety, enhancing priority and safety for active users, and traffic management to discourage traffic infiltration through the DLRA community.	None	None	The City of Ottawa should consult with the DLRA during the Bronson Avenue Renewal Project to explore redesign options at the Kippewa, Madawaska, Old Sunset, Lakeside, and Lakeview intersections that include area traffic management measures such as **channelization, curb extensions,** and **vehicle access closures** etc. to reinforce or replace the recommended turn restrictions and address existing safety concerns.

Table 9: Strategic Plan Matrix

Street (Segment)	Tier	Key Issues, Opportunities And Constraints	Strategic Plan Elements		
			"QUICK WINS"	ADDITIONAL STRENGTHENING	COMMUNITY IMPROVEMENT MEASURES
CAMBRIDGE STREET (CARLING TO FREDERICK)	2	Community input included concerns about traffic attempting to bypass the Bronson/Carling intersection via Cambridge, although there is no direct connection to Bronson cut-through traffic would be forced to traverse local community streets to find an exit.	Consider implementing a custom **"No Exit to Bronson Avenue"** sign at Carling Avenue/Cambridge Street to help discourage short-cutting.	If future monitoring results support the need and there is sufficient community support, consider a **partial vehicle access closure** of the southbound lane at the Carling Avenue/Cambridge Street intersection that would prevent inbound traffic infiltration. This intervention could begin as a trial closure using **planters**, then upgraded to a **physical curb extension** if found to be effective.	None
OLD SUNSET BLVD	2	According to community feedback, Old Sunset is generally well insulated by existing area traffic management measures, but there are concerns with traffic infiltration related to the NCD. The possibility exists if traffic using Lakeside is targeted with stronger interventions, there may be spillover onto Old Sunset.	None	If the existing northbound signed left-turn restriction at Old Sunset is found not to be effective, it could be supplemented with **enhanced signage** such as or including LED 'blank-out' signs signaling to drivers when the restriction is active, which could increase compliance.	See *Community Improvement Measures* for Bronson Avenue
Carlington Community Association and Central Experimental Farm					
NCC SCENIC DRIVEWAY (EAST OF MORNINGSIDE)	1	The existing 30km/h posted speed limit is not currently supplemented by any physical traffic calming measures, which provides strong grounds for measures to be added. Recreational uses on both sides of the road are not currently connected by safe crossings. Anticipated increased active transportation activity related to the NCD. Potential for the Scenic Driveway to be reclassified as a "key emergency response route" at the time of the opening of the NCD; vertical deflection measures subject to future confirmation with regards to reconfigured response routes.	**Speed humps** should be investigated to ensure the 30km/h posted speed limit is achieved. Speed humps could be augmented into raised crossings if combined with pedestrian crossing treatments – see *Community Improvement Measures*.	If future monitoring results support the need, the NCC may consider mountable **centre-island narrowings** at regular intervals between Morningside Lane and Prince of Wales Drive to further reinforce the 30km/h posted speed limit. These could make use of a granite cobble material to respect the scenic nature of the Driveway and its surroundings.	Consider the addition of **PXOs** at either Birch Drive and/or west of Maple Drive (in front of the Canadian Agricultural Museum) with **raised crossings**. Consider extending the existing NCC Experimental Farm Pathway from its current terminus ~150m east of Morningside Lane, to Prince of Wales Drive. The extended pathway can link with future cycling facilities on Prince of Wales Drive, and supports a potential future easterly pathway connection through the Arboretum to the NCC Western Canal Pathway. The NCC should consider widening this MUP to a minimum 3.0m (4.0m if possible) to meet OTM Book 18 standards and provide the highest quality experience for the user.
NCC SCENIC DRIVEWAY (WEST OF MORNINGSIDE)	1	Community feedback expressed a strong desire for an alternative cycling route to the NCD that avoids using Carling Avenue. There are notable pedestrian desire lines off the NCC Scenic Driveway that may be formalized to support anticipated demand generated by the NCD. Area context (limited intersecting roads, no fronting uses, well separated active facilities) does not suggest a strong need to reduce the posted speed limit along this section. However, high speeds by vehicles on the west portion of the NCC Driveway may contribute to the excess speeds observed on the 30km/h portion east of Morningside. Drivers should be given ample additional warning to encourage a speed reduction in advance of the posted speed change. There are limited traffic calming measures that could be appropriately applied to lower speeds on the west portion of the NCC Driveway, without committing to a lower speed limit than the currently posted 60km/h.	Informational measures should be considered to give additional warning in the eastbound direction of the upcoming 30 km/h reduced speed zone after Morningside, encouraging drivers to reduce their speed even before the limit drops. These could include **pavement markings** ("30km/h Zone Ahead"), **informational signage** ("Reduce Speed", "30km/h Zone Ahead", etc.), and **speed display devices**.	If future monitoring results support the need, consider the NCC may consider one or more mountable **centre-island narrowing's** at. leading up to Morningside Lane will provide additional friction in advance of the 30km/h section. These could make use of a granite cobble material to respect the scenic nature of the Driveway and its surroundings	The existing NCC Experimental Farm Pathway is 2.5m wide and in need of resurfacing. The NCC should consider widening this MUP to a minimum 3.0m (4.0m if possible) to meet OTM Book 18 standards and provide the highest quality experience for the user. NCC should consider adding a new MUP connection to the Fisher/Tunis intersection pedestrian signal, replacing the informal dirt path. NCC should consider formalizing/paving the existing MUP connection to contemporary design standards between the Central Experimental Farm Pathway and the Fisher/Shillington traffic signal.
MAPLE DRIVE	2	Maple Drive is currently signed a 30km/h street. South of Winding to the Scenic Driveway, the existing pavement width is relatively narrow at certain sections and there are periodic speed humps throughout. TOH has already considered the sensitivity of Maple Drive to traffic at the NCD, and has designed the site plan such that the internal NCD road off Maple Drive will be restricted to emergency vehicles and select maintenance activities only, which will all but eliminate traffic implications related to the majority of general users (public and staff) at the NCD. Options for additional traffic calming measures on Maple are limited between Carling Avenue and Winding Lane by the intent to use this section of the street as one of two ambulance access points for the NCD. It is important to note that TOH is expected to develop a wayfinding system that includes signage and other information mediums to ensure their employees and the public are as informed as possible of the proper access/egress points to/from the NCD.	Let the design and implementation of the Maple Drive emergency vehicle connection to the NCD (Road D) take effect. TOH should ensure the design of the Maple Drive/Winding Lane/Road D intersection incorporates contemporary pedestrian crossing treatments, and considers measures to reinforce the lower speed limit along Maple Drive. North of Winding Lane, where vertical deflection measures are not appropriate, consider adding **centreline flex-posts.** The radius of the northbound right-turn at the Building 49 south parking lot access road is very wide that may contribute to high vehicle turning speeds; consider adding a **painted bulb-out** (reinforced with edgeline delineators) to the south-east corner of this intersection, to 'fill in' the intersection geometry.	If future monitoring results support the need, consider additional **speed humps**, to be placed at appropriate intervals between existing speed humps south of Winding Lane. If future monitoring results support the need, also consider formalizing the proposed painted bulb-out (*see: 'Quick* Wins') as a **physical curb-extension**.	As development of the NCD site progresses, the NCC may consider analyzing pedestrian desire lines and providing upgraded **pedestrian crossing treatments** across Maple Drive, where appropriate (as per OTM Book 15). For example, the existing crossing north of the Building 49 parking road could be relocated to the front of the NCC Tropical Greenhouse, to better align with the existing sidewalk network. This crossing could be provided as a **raised crossing** in place of a speed hump in this location. Additionally, the NCC may consider extending the coverage of the existing, fragmented sidewalk network. Improvements could also be made to upgrade existing sidewalks to contemporary accessible standards.



LEGEND

- Study Boundary
- Speed Display Devices
- Speed Humps
- Movement Restrictions
- Parking Shifts
- Centreline Flex-Posts
- Signage
- Curb Extensions
- Painted Bulb-outs
- Pavement Markings
- Edgeline Delineators
- Relocate 'H' Sign

New Campus Development for The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 18: Strategic Plan ("Quick Wins" Measures)

Draft - March 2023

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PARSONS

0 100 200 400 Metres

Holland (Kenilworth to Sherwood)

- Consider moving some midblock parking to west side, shift centreline to create "chicane"
- Consider reinforcing chicane using raised 'ride-over' concrete curb extensions

Holland (Carling to Kenilworth)

- Consider upgrading proposed midblock painted bulb-outs to physical curb extenions

Fairmont (Carling to Sherwood)

- Consider partial vehicle access closure at Carling

Champagne (Carling to Beech)

- Consider upgrading proposed painted bulb-outs to physical curb extensions

Beech (Champange to Preston)

- Consider speed humps

Maple (Carling to Scenic Driveway)

- Consider centreline flex-posts north of Winding
- Consider additional speed humps south of Winding
- Consider upgrading painted bulbouts to physical curb extensions

NCC Driveway West of Morningside

- Consider flush/mountable centre island narrowings

NCC Driveway East of Morningside

- Consider flush/mountable centre island narrowings

Cambridge (Carling to Frederick)

- Consider partial vehicle access closure (southbound lane at Carling/Cambridge)

Old Sunset/Bronson Intersection

- Consider enhancing existing signage (e.g. LED signed turn restriction)

Lakeside/QED Intersection

- Consider peak-period southbound left-turn restrictions (7:00am-9:00am; 3:30pm-5:30pm)

Existing Civic Campus

New Campus of The Ottawa Hospital

Central Experimental Farm

Arboretum

Dows Lake

GLADSTONE
YOUNG
CARLING
417
HINTON
HOLLAND
HAMILTON
ORRIN
KENILWORTH
ISLAND PARK
MERIVALE
PARKDALE
RUSKIN
FAIRMONT
OLD IRVING
SHERWOOD
BAYSWATER
BREEZEHILL
LORETTA
BEECH
HICKORY
CHAMPAGNE
PRESTON
ORANGEVILLE
CATHERINE
DANIEL MCCANN
HENRY
PLYMOUTH
CHAMBERLAIN
POWELL
BRONSON
ROCHESTER
BOOTH
LEBRETON
BELL
CAMBRIDGE
WINDING LANE
MAPLE
MORNINGSIDE LANE
NCC SCENIC DRIVEWAY
TUNIS
FISHER
SHILLINGTON
PRINCE OF WALES
TRILLIUM LINE LRT
QUEEN ELIZABETH
MADAWASKA
OLD SUNSET
FIFTH
LAKESIDE
LAKEVIEW
HOLMWOOD
COLONEL BY DRIVE

LEGEND

- Study Boundary
- Planters
- Centre-Island Narrowings
- Access Closures
- Centreline Flex-Posts
- Curb Extensions
- Speed Humps
- Movement Restrictions
- Edgeline Delineators
- Alternating On-Street Parking

New Campus Development for The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 19: Strategic Plan (Additional Strengthening Measures)

Draft - March 2023

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PARSONS

0 100 200 400 Metres

Sherwood/Parkdale Intersection

- City should consider active transportation improvements as part of the planned functional design review (2023)

Holland (Carling to Kenilworth)

- Consider decreasing posted speed limit to 40km/h
- Consider extending cycling facilities as part of future renewal

Parkdale (Carling to Hwy 417)

- Consider feasibility of raised intersections

Champagne and Hickory

- Consider curb extensions at the Hickory/Champagne intersection as part of planned Hickory renewal
- City should review private approach design along 865 Carling frontage to enhance pedestrian realm.

Beech and Trillium Path Crossing

- Consider Trillium Line Pathway emhancements

Rochester/Booth (Carling to Orangeville)

- Consider continuing to explore area traffic management opportunities as part of ongoing area developments (e.g. Canada Lands)

Pymouth, Powell, Bell, and Cambridge (north of Carling)

- Consider area traffic management implications along these corridors as part of Bronson Renewal Project

Kippewa / Dow's Lake Intersection

- Consider mini-roundabout or redesigned all-way stop if warranted and appropriate

Bronson /Dow's Lake Neighbourhood Intersections

- Consider reviewing intersection designs and access management as part of Bronson Renewal Project

Tunis/Fisher and Shillington / Fisher Intersections

- Consider formalizing pathway connections between Experimental Farm Pathway and the Shillington and Tunis intersections at Fisher

Maple (Carling to Scenic Driveway)

- Consider upgrading existing sidewalks to AODA standards and extending coverage of the sidewalk network
- Consider contemporary pedestrian crossing treatments at future pedestrian desirelines, e.g. PXOs and raised crossings.

NCC Driveway West of Morningside

- Consider widening Experimental Farm Pathway to 4.0m

NCC Driveway East of Morningside

- Consider extending Experimental Farm Pathway further east to Prince of Wales
- Consider PXOs with raised crossings at Birch and/or Maple (replacing some speed humps)
- Consider widening the Pathway to 4.0m

Queen Elizabeth Drive (from Existing PXO to Lakeview)

- Concider PXOs across Queen Elizabeth at Crescent Heights, Lakeside / Lakeview
- Consider enhancing Commissioners Park pathway crossings at Crescent Heights and Lakeside

Existing Civic Campus

New Campus of The Ottawa Hospital

Central Experimental Farm

Dows Lake

Arboretum

417

GLADSTONE

CATHERINE

CHAMBERLAIN

ORANGEVILLE

PLYMOUTH

DANIEL MCCANN

HENRY

CAMBRIDGE

BRONSON

BELL

LEBRETON

BOOTH

ROCHESTER

PRESTON

CHAMPAGNE

HICKORY

BEECH

BREEZEHILL

BAYSWATER

SHERWOOD

LORETTA

OLD IRVING

FAIRMONT

RUSKIN

KENILWORTH

ORRIN

HOLLAND

HINTON

HAMILTON

PARKDALE

ISLAND PARK

MERIVALE

CARLING

QUEEN ELIZABETH

KIPPEWA

MADAWASKA

OLD SUNSET

FIFTH

LAKESIDE

HOLMWOOD

LAKEVIEW

TRILLIUM LINE LRT

PRINCE OF WALES

MAPLE

MORNINGSIDE LANE

NCC SCENIC DRIVEWAY

ASH LANE

FISHER

TUNIS

SHILLINGTON

LEGEND

- Study Boundary
- Roundabouts
- Pedestrian Facilities / PXO
- Cycling Facilities
- Raised Crossing/Intersection
- Speed Limits
- Improved Sightlines
- Curb Extensions

New Campus Development for The Ottawa Hospital

Neighbourhood Traffic Management Strategy

Map 20: Strategic Plan (Community Improvement Measures)

Draft - March 2023

The Ottawa Hospital | L'Hôpital d'Ottawa

PARSONS

0 100 200 400 Metres

5.3 Next Steps

5.3.1 Site Plan Control Application

The NTMS is one of four supporting transportation studies to the Transportation Impact Assessment (Addendum #2) that will accompany the SPC for the main Hospital building at the NCD. Once submitted, an extensive approvals process will begin with the City of Ottawa that will include a detailed review of all technical studies accompanying the SPC. The studies will be made publicly available on the City of Ottawa Development Application website for comment from any member of the public. There will be additional public consultation requirements associated with the SPC process, at which time additional engagement opportunities between the CACTS and the project team will be available (i.e. 1-on-1 workshops). It is fully expected that the Strategic Plan will be refined, with elements potentially added and/or removed, and more details about specific process and funding requirements will emerge as the SPC approval process unfolds.

5.3.2 Implementation Strategy

The Strategic Plan represents a starting point for addressing existing and potential future area traffic management issues relating to the NCD, with the understanding that travel trends and driver behaviour are expected to evolve over the years. Taken together, these measures represent a long-term area-wide strategy for where and how to focus area traffic management efforts and resources leading up to the opening of the NCD main Hospital building in 2028 and beyond. The project team anticipates many subsequent discussions between the various stakeholders (potentially including various City of Ottawa departments, NCC, AAFC and local community associations) will be required to come to consensus on the specifics of the Strategic Plan, at which time a detailed implementation strategy can be formulated that would include:

- The precise number and location of measures.
- Functional designs of all physical measures.
- Cost estimates of the various elements of the plan.
- Potential funding sources and cost sharing agreements between relevant stakeholders.
- A schedule for construction.

As discussed in Section 2.1.3, the NTMS process is still bound by the existing processes outlined in the City of Ottawa traffic calming policies and guidelines. This means the Strategic Plan must still flow into these existing pathways before these measures can be implemented. Specifics of how the NTMS will synergize with these processes will be confirmed with relevant City departments over the course of SPC approvals for the NCD.

5.3.3 Monitoring

Monitoring is a crucial aspect of the main three supporting transportation studies (i.e. OPS, NTMS and TDM) since it is the means to assess the effectiveness of the Strategic Plan and informs TOH on whether adjustments need to be made to any elements within the plan to achieve success. The Monitoring Strategy will be a separate transportation study that will detail the monitoring requirements to support each of the transportation supporting studies, which will be submitted when the other transportation studies have been reviewed by City of Ottawa staff. It will define a comprehensive data collection program specifying the location, duration, frequency, and preferred technology to deploy to properly assess the current state of the study area road network (such as the *Streetlight* platform, and other data sources, e.g. automated traffic recorder surveys). It will outline reporting techniques, with particular emphasis placed on how the data collected as well as public concerns will inform future decision making and/or further interventions. It will be critical that any monitoring efforts by TOH, the City of Ottawa and NCC within the established study area is collaborative – sharing of information and public feedback will help ensure issues are responded to promptly and efficiently.

6.0 GLOSSARY

Accessibility - Refers to the design of products, devices, services, or environments for people who experience disabilities. (Accessibility Ontario)

Active Transportation - Any form of human-powered transportation is considered active transportation, including walking and cycling.

Capacity - The capacity of a facility is the maximum hourly rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions. (Highway Capacity Manual)

Deflection - A vertical and / or horizontal change in the course or path of a vehicle as the result of a physical feature of a roadway. For example, a speed hump deflects the wheels, suspension, and chassis of a vehicle in a vertical direction. A bulb-out requires that the vehicle be steered or deflected horizontally from its straight path to maneuver past the bulb-out. (Canadian Guide to Traffic Calming)

Equity - Treating everyone fairly by acknowledging their unique situation and addressing systemic barriers. The aim of equity is to ensure that everyone has access to equal results and benefits. (Equity and Inclusion Lens Handbook)

Inclusion - Acknowledging and valuing people's differences so as to enrich social planning, decision making and quality of life for everyone. In an inclusive city, we all have a sense of belonging, acceptance, and recognition as valued and contributing members of society. (Equity and Inclusion Lens Handbook)

Measure - A physical device, regulation, or action which affects the movement of motor vehicles, bicycles and / or pedestrians. (Canadian Guide to Traffic Calming)

Road - "Road" generally refers to the shared road surface intended for use by vehicles and bicycles and any features that fall within that surface (e.g. general-purpose travel lanes, on-street parking, on-road bike lanes, median islands, etc.). (City of Ottawa, Traffic Calming Design Guidelines)

Sensitive Land Use - Describes buildings, amenity areas, or outdoor spaces where routine or normal activities occurring at reasonably expected times would experience one or more adverse effects from contaminant discharges generated by a nearby major facility. Sensitive land uses may be a part of the natural or built environment. Examples may include, but are not limited to: residences, day care centres, and educational and health facilities. (Provincial Policy Statement).

Speed - The 85th percentile speed of all vehicles passing along a roadway during a specified time period is typically regarded as the representative speed of traffic. The 85th percentile speed is the speed exceeded by the fastest 15% of vehicles. When the 85th percentile speed exceeds the maximum legal vehicle speed, this is generally considered as indicating a speeding problem. (Canadian Guide to Traffic Calming)

Street - Refers to the elements in the corridor right-of-way including the road. This could include boulevards, sidewalks, segregated cycling facilities, property frontage, etc. (City of Ottawa, Traffic Calming Design Guidelines)

Streetscaping - A means of enhancing the environment for all users of the right-of-way, and a means of modifying motorists behaviour, through the use of physical features which provide protection, coherence, security, convenience, community identity, wayfinding and orientation, aesthetic quality and interest along an urban street. (Canadian Guide to Traffic Calming)

TIA and Mobility Study - The Transportation Impact Assessment approved by the City of Ottawa (2021) in support of the Master Site Plan Application and lifting of the holding provision.

TIA Addendum #1 - The Transportation Impact Assessment addendum report that was approved by the City of Ottawa (2022) in support of the Parking Garage Site Plan Control Application.

TIA Addendum #2 - The Transportation Impact Assessment addendum report that has been prepared in support of the main Hospital building Site Plan Control Application (2022).

Through Traffic -Traffic which travels through a neighbourhood, and does not originate from, nor is destined to, a location within the neighbourhood. (Canadian Guide to Traffic Calming)

Traffic Calming -The combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behaviour, and improve conditions for non-motorized street users. (Canadian Guide to Traffic Calming)

Traffic Calming Plan - Includes all the elements that lead to a recommended traffic calming concept for implementation. (City of Ottawa, Traffic Calming Design Guidelines)

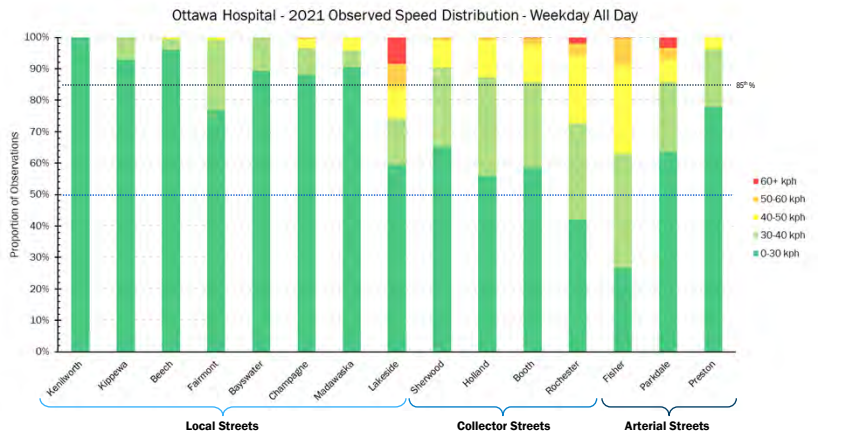
Traffic Management - The change in traffic routing or flow within a neighbourhood street system through a combination of measures which alter route options and driver behaviour. (Canadian Guide to Traffic Calming)

Volume - When referring to traffic, volume is a measure of the number of vehicles which travel along a section of roadway or made a particular movement during a specific time period. Most often, traffic volumes are indicated as vehicles per hour during the peak hour, or vehicles per 24-hour period. (Canadian Guide to Traffic Calming)

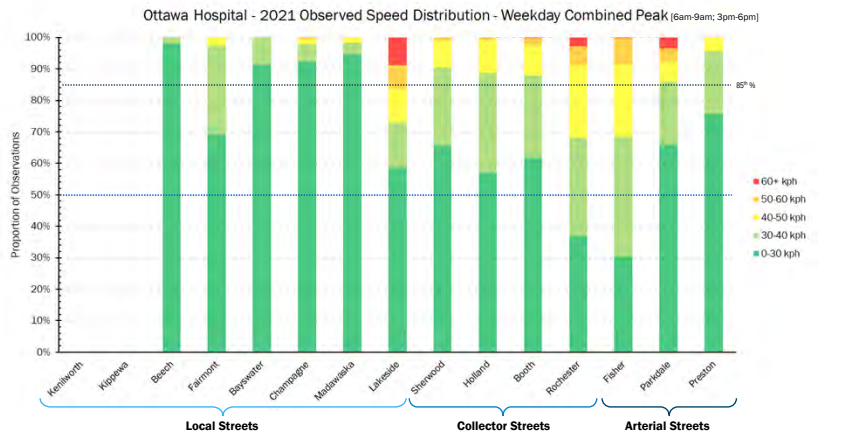
Vulnerable Road User - A term applied to those most at risk in traffic (i.e. those not protected by an outside shield) including pedestrians, cyclists, and motorcyclists. Vulnerable road users may also include children, the elderly, and persons with disabilities. (City of Ottawa, Traffic Calming Design Guidelines)

APPENDIX A

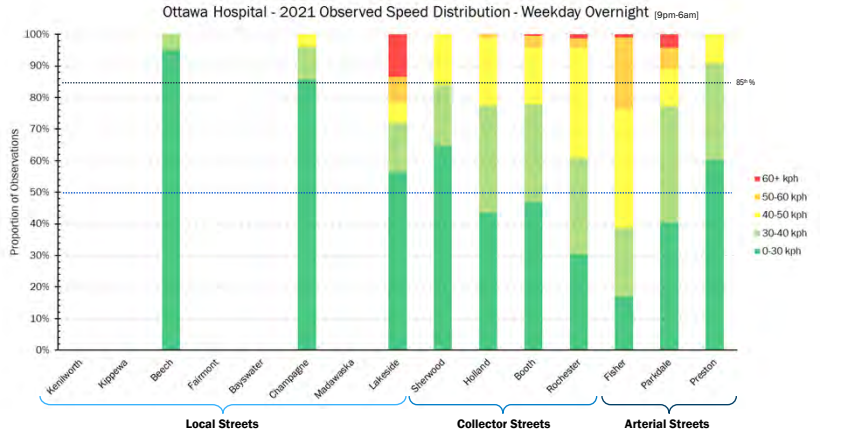
Streetlight Speed Distribution and Top Routes Output


Ottawa Hospital - 2021 Observed Speed Distribution - Weekday All Day
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

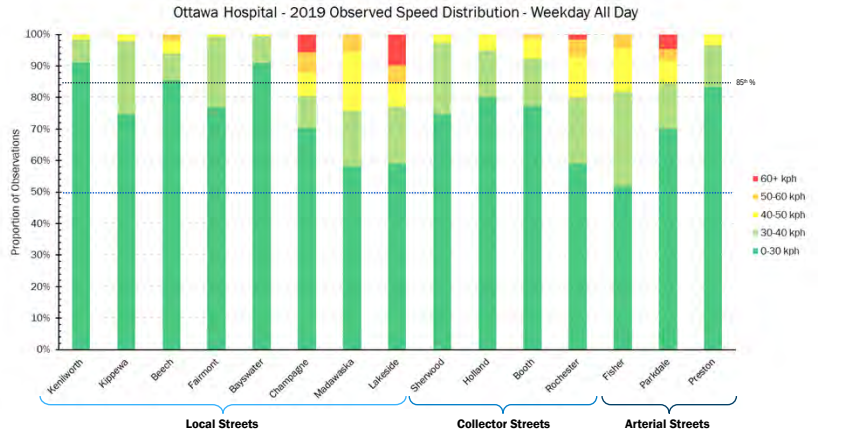
1


Ottawa Hospital - 2021 Observed Speed Distribution - Weekday Combined Peak (6am-9am; 3pm-6pm)
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

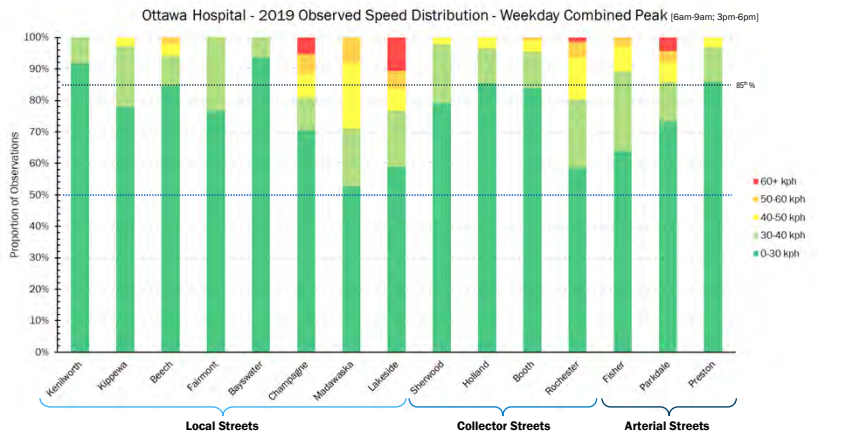
2


Ottawa Hospital - 2021 Observed Speed Distribution - Weekday Overnight (9pm-6am)
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

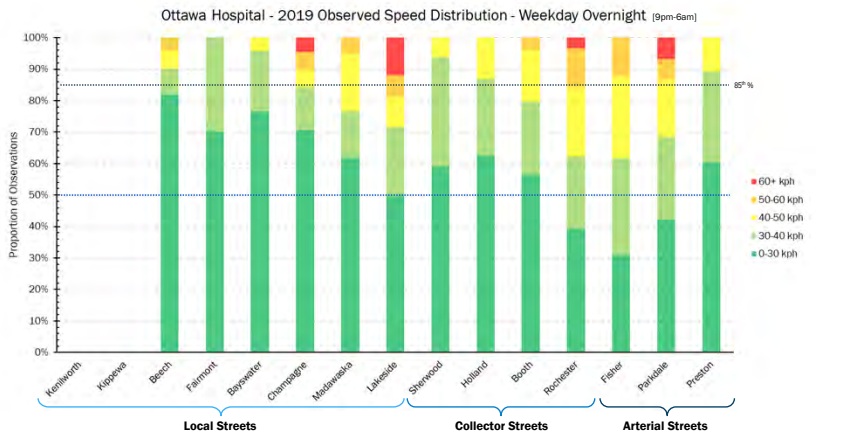
3


Ottawa Hospital - 2019 Observed Speed Distribution - Weekday All Day
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

4


Ottawa Hospital - 2019 Observed Speed Distribution - Weekday Combined Peak (6am-9am; 3pm-6pm)
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

5


Ottawa Hospital - 2019 Observed Speed Distribution - Weekday Overnight (9pm-6am)
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
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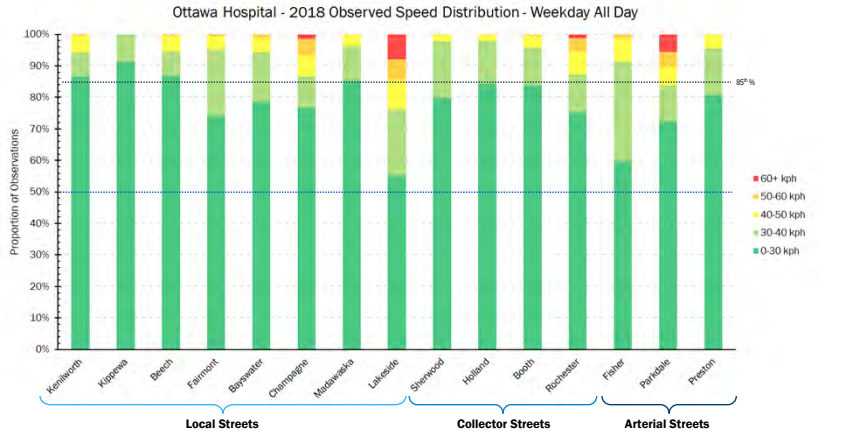
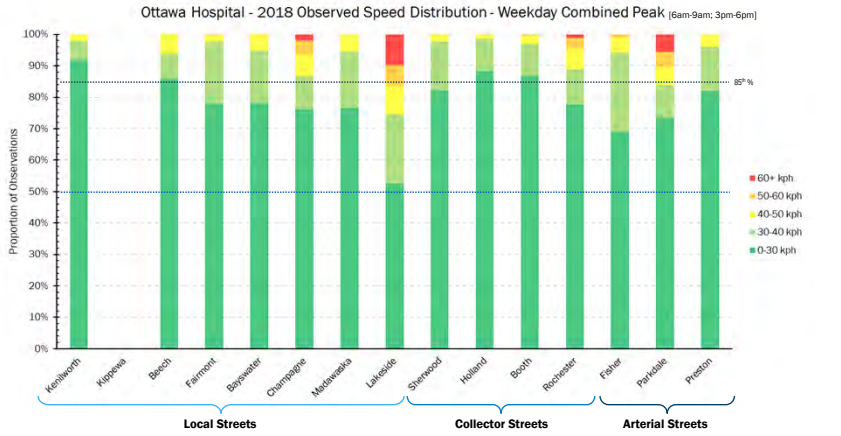
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

6


Ottawa Hospital - 2018 Observed Speed Distribution - Weekday All Day
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
Lakeside
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

7


Ottawa Hospital - 2018 Observed Speed Distribution - Weekday Combined Peak (6am-9am; 3pm-6pm)
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
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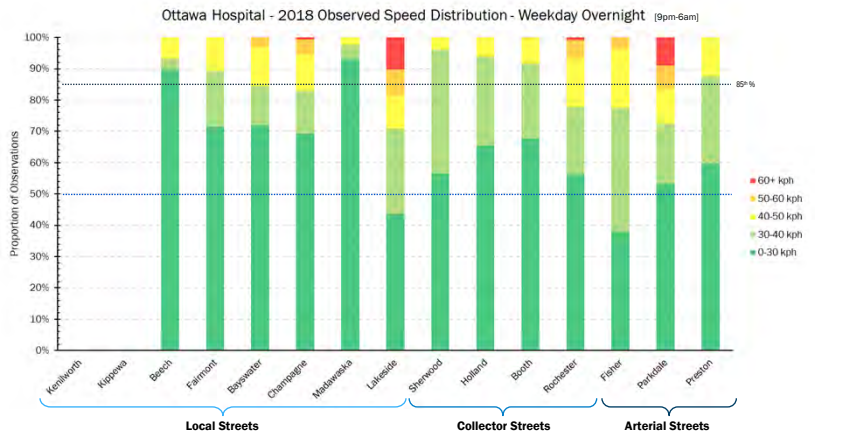
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

8


Ottawa Hospital - 2018 Observed Speed Distribution - Weekday Overnight [9pm-6am]
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
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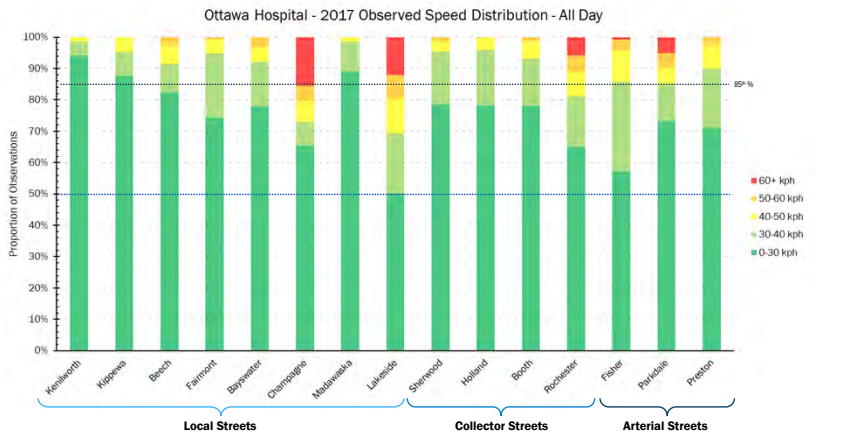
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

9


Ottawa Hospital - 2017 Observed Speed Distribution - All Day
Proportion of Observations
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
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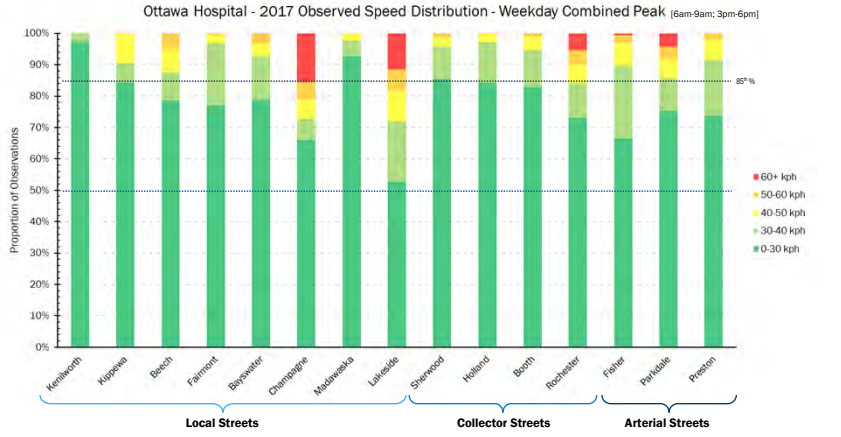
Sherwood
Holland
Booth
Rochester
Fisher
Parkdale
Preston
Local Streets
Collector Streets
Arterial Streets

10


Ottawa Hospital - 2017 Observed Speed Distribution - Weekday Combined Peak [6am-9am; 3pm-6pm]
Proportion of Observations
100%
90%
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70%
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85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
0-30 kph
Kenilworth
Kippewa
Beech
Fairmont
Bayswater
Champagne
Madawaska
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Sherwood
Holland
Booth
Rochester
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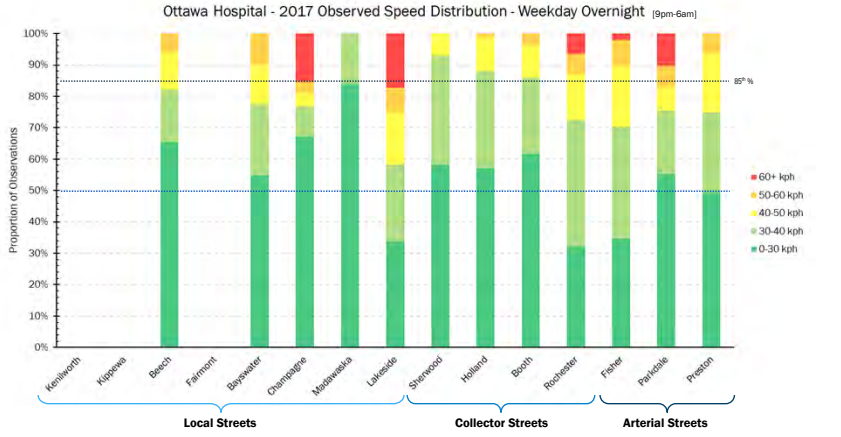
Preston
Local Streets
Collector Streets
Arterial Streets

11


Ottawa Hospital - 2017 Observed Speed Distribution - Weekday Overnight [9pm-6am]
Proportion of Observations
100%
90%
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50%
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0%
85th %
60+ kph
50-60 kph
40-50 kph
30-40 kph
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Kenilworth
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Preston
Local Streets
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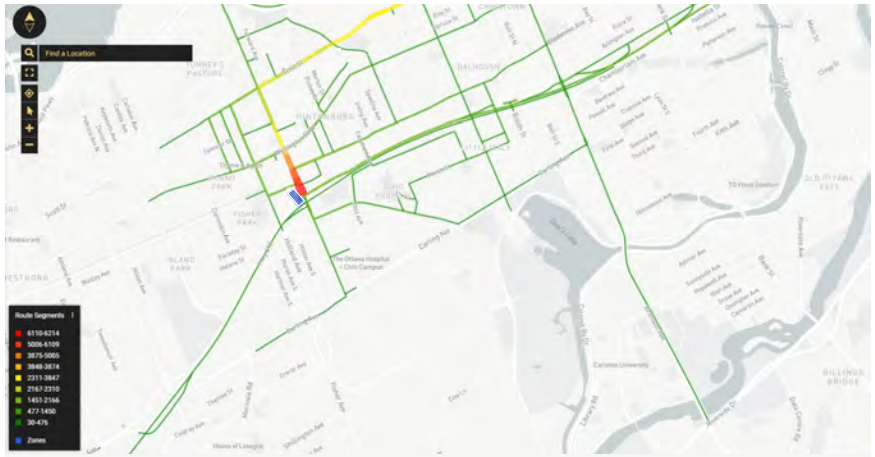
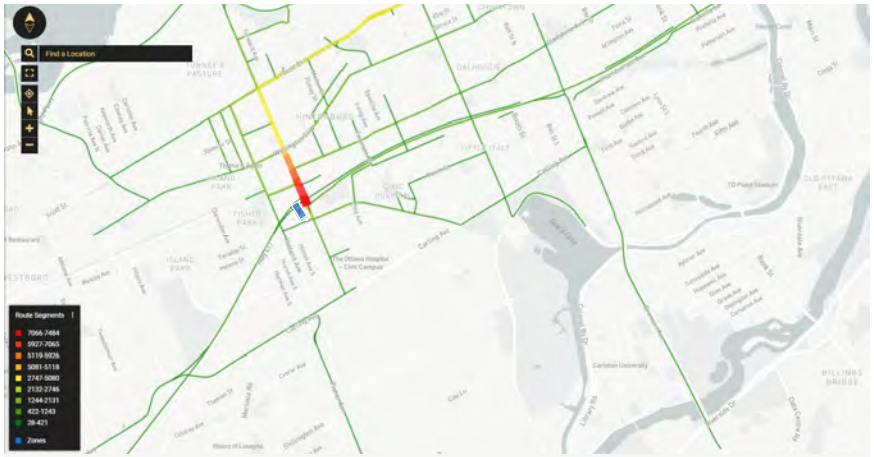
Arterial Streets

12



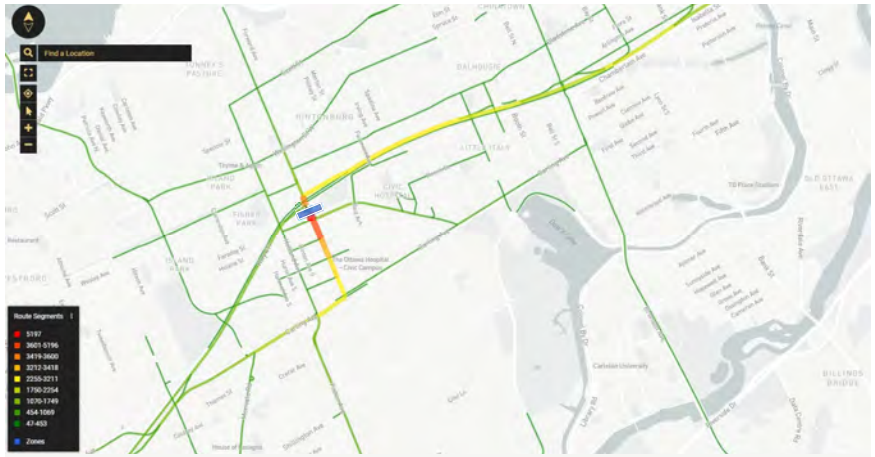
TO Gate — **1. Parkdale** – *Westbound On-Ramp*

13



FROM Gate — **2. Parkdale** – *Eastbound Off-Ramp*

14

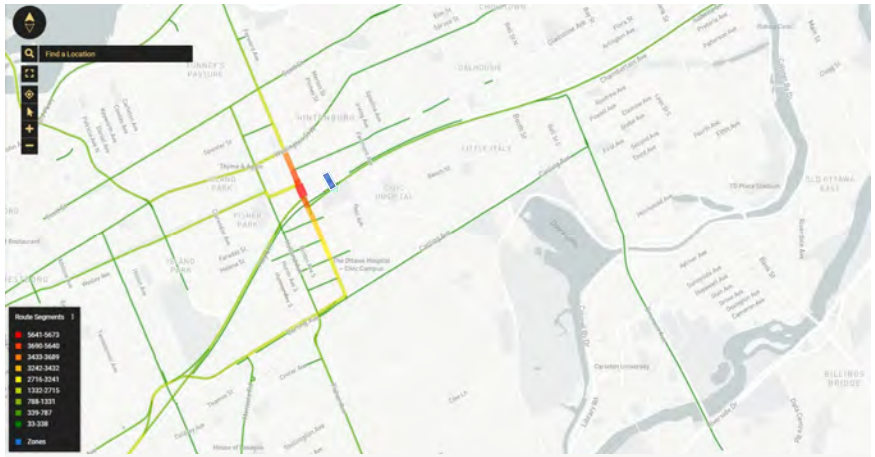


TO Gate — **3. Parkdale** – *South of 417 Ramps*

15

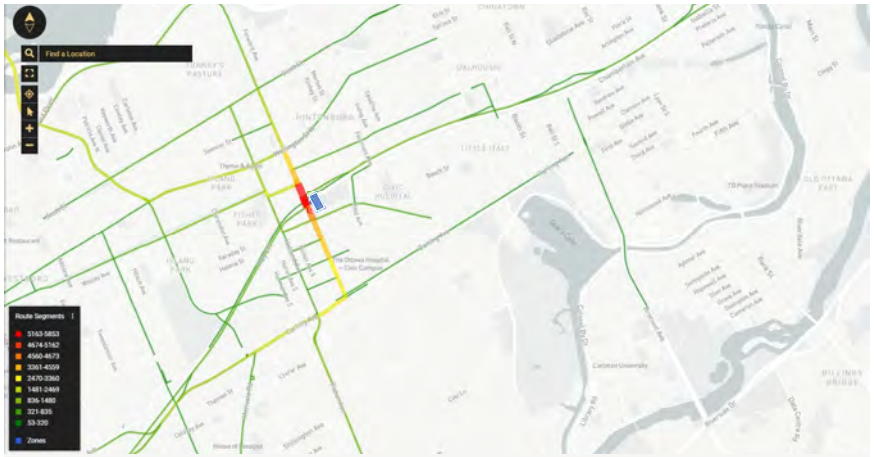
FROM Gate — **3. Parkdale** – *South of 417 Ramps*

16



FROM Gate — **4. Parkdale** – *Westbound Off-Ramp*

17

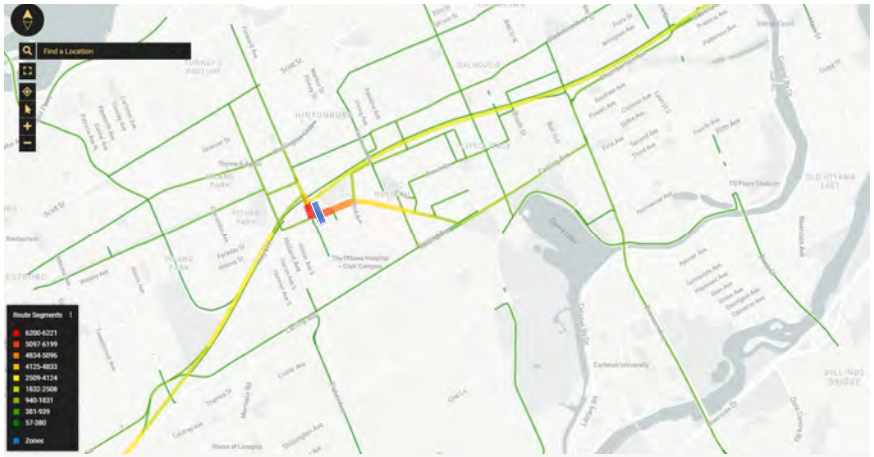


TO Gate — **5. Parkdale** – *Eastbound On-Ramp*

18

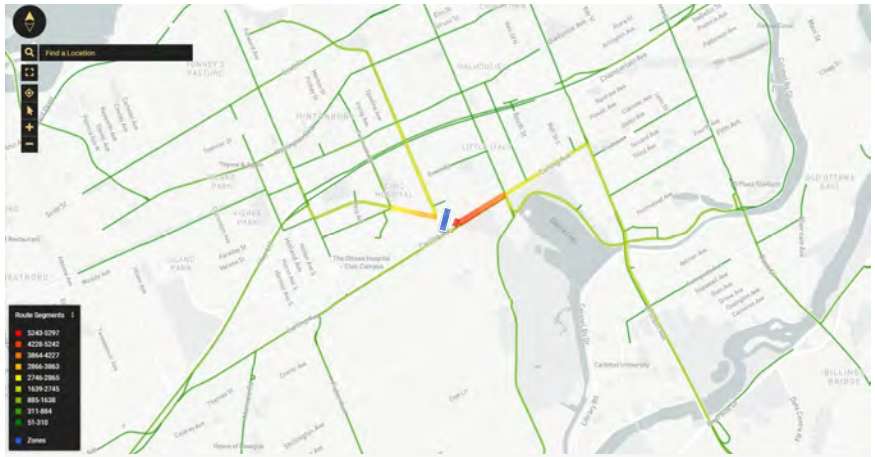
TO Gate — **6. Sherwood** – *East of Parkdale*

19



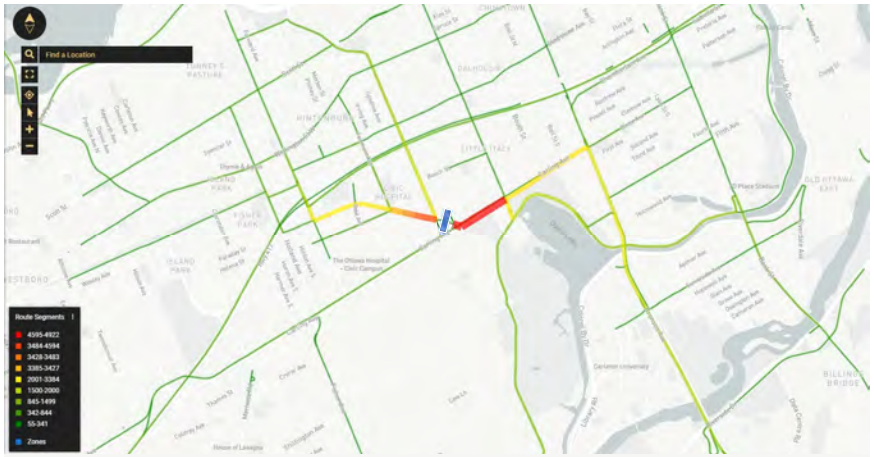
FROM Gate — **6. Sherwood** – *East of Parkdale*

20



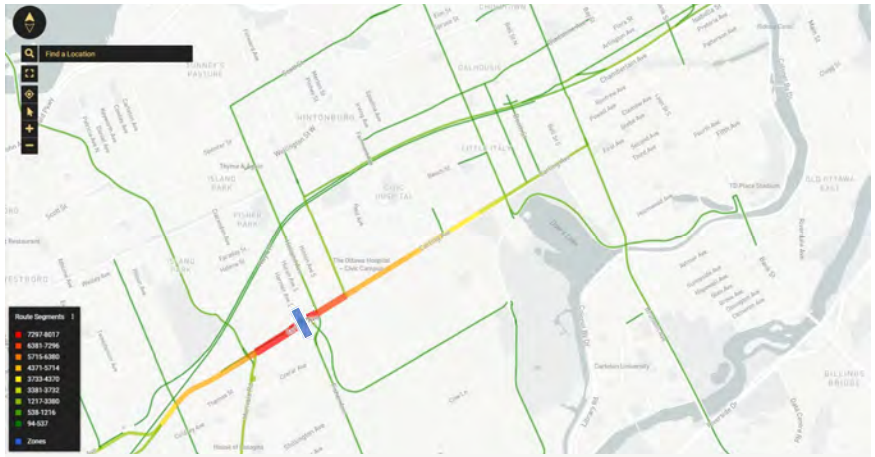
TO Gate — **7. Sherwood** – *East of Bayswater*

21



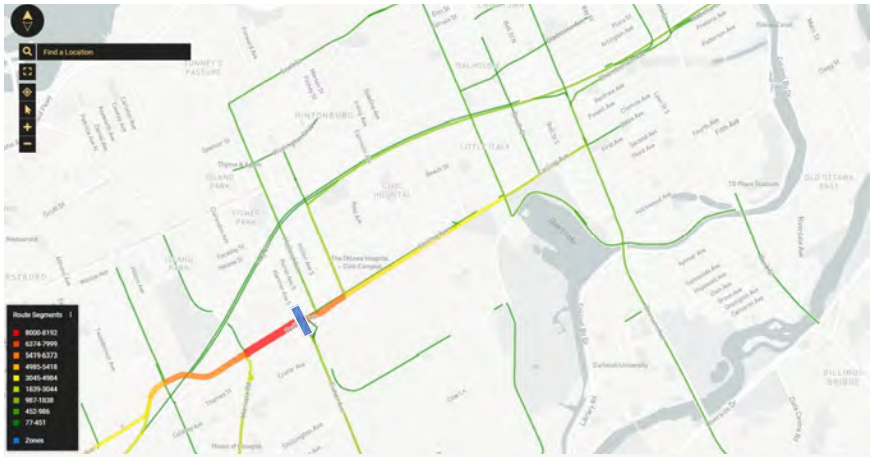
FROM Gate — **7. Sherwood** – *East of Bayswater*

22



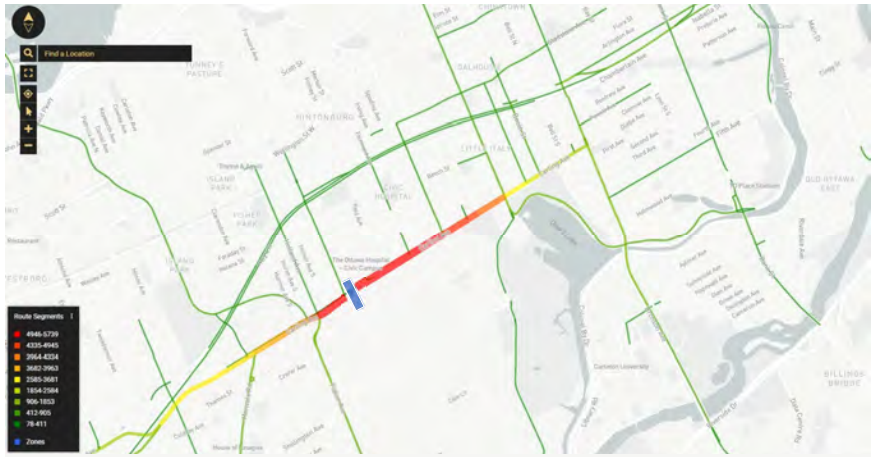
TO Gate — **8. Carling** – *West of Fisher*

23



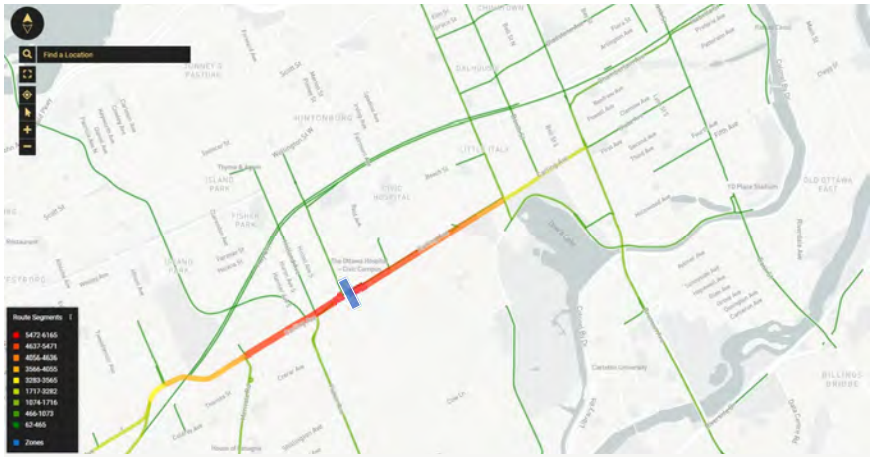
FROM Gate — **8. Carling** – *West of Fisher*

24



TO Gate — **9. Carling** – *East of Parkdale*

25



FROM Gate — **9. Carling** – *East of Parkdale*

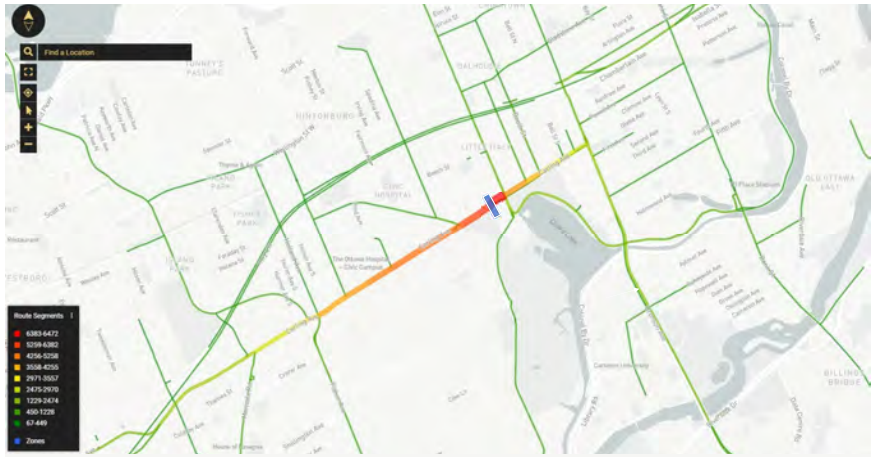
26

TO Gate — **10. Beech** – *West of Preston*

27

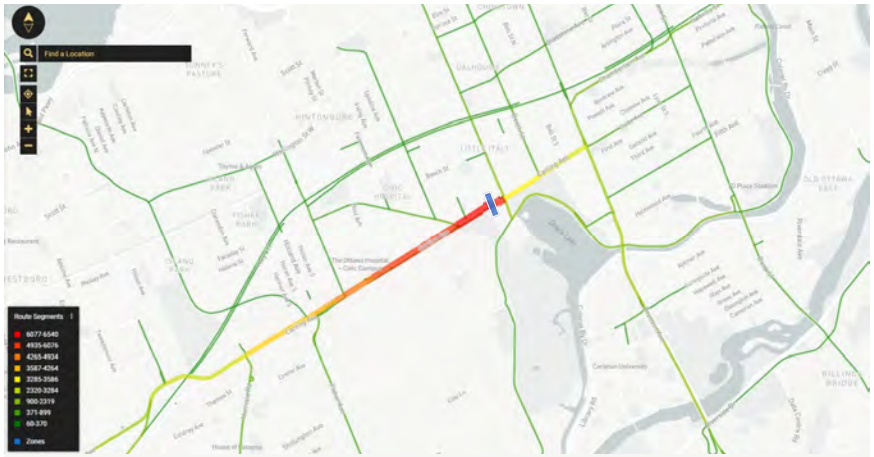
FROM Gate — **10. Beech** – *West of Preston*

28



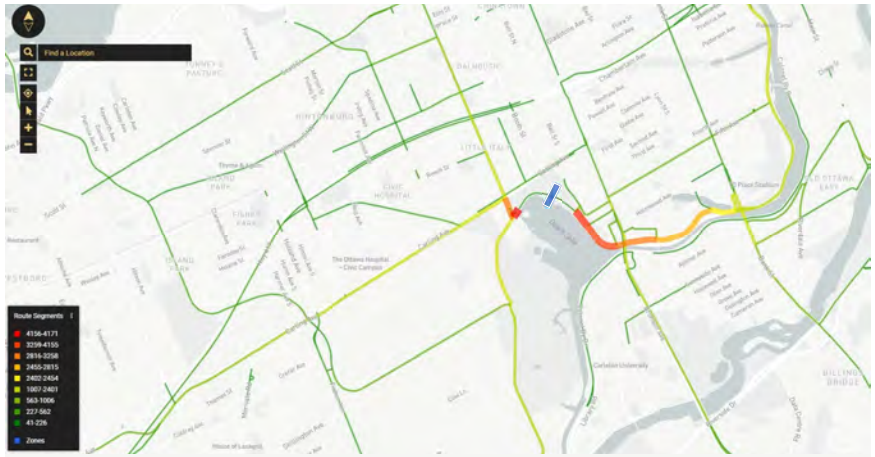
TO Gate — **11. Carling** – *West of Preston*

29



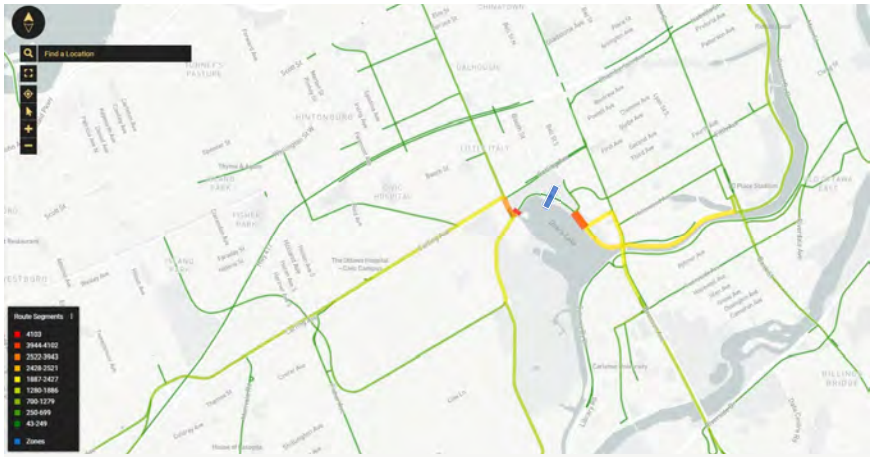
FROM Gate — **11. Carling** – *West of Preston*

30



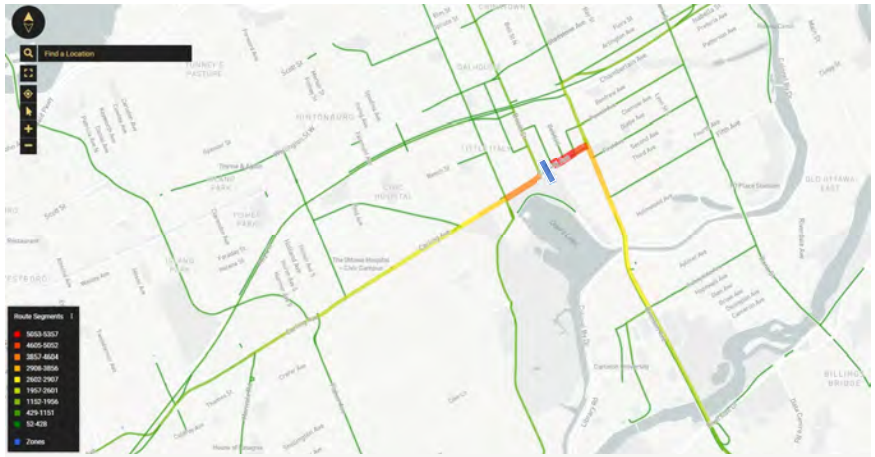
TO Gate — **12. Queen Elizabeth** – *East of Preston*

31



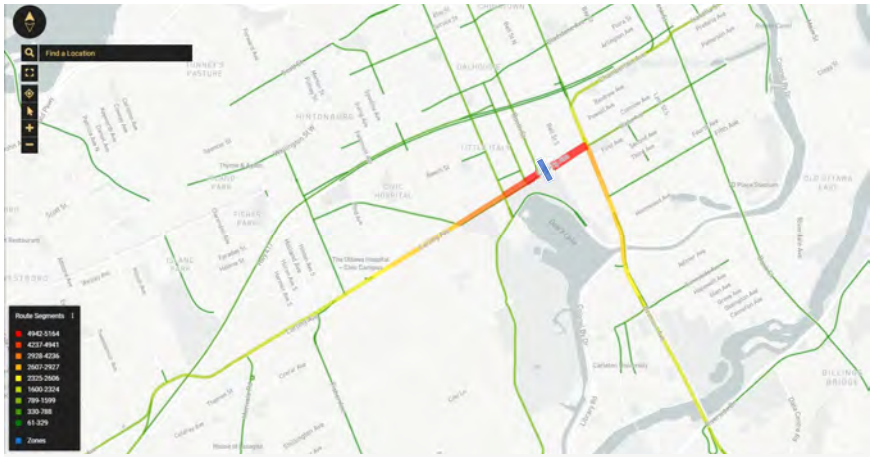
FROM Gate — **12. Queen Elizabeth** – *East of Preston*

32



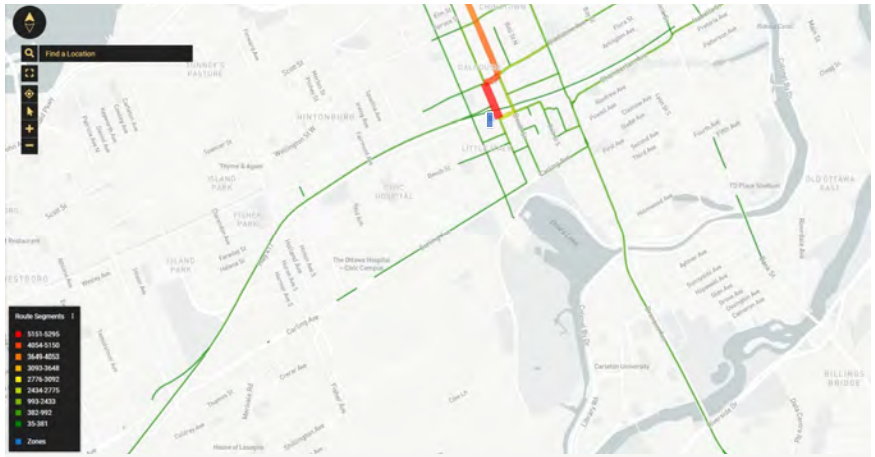
TO Gate — **13. Carling** – *East of Booth*

33



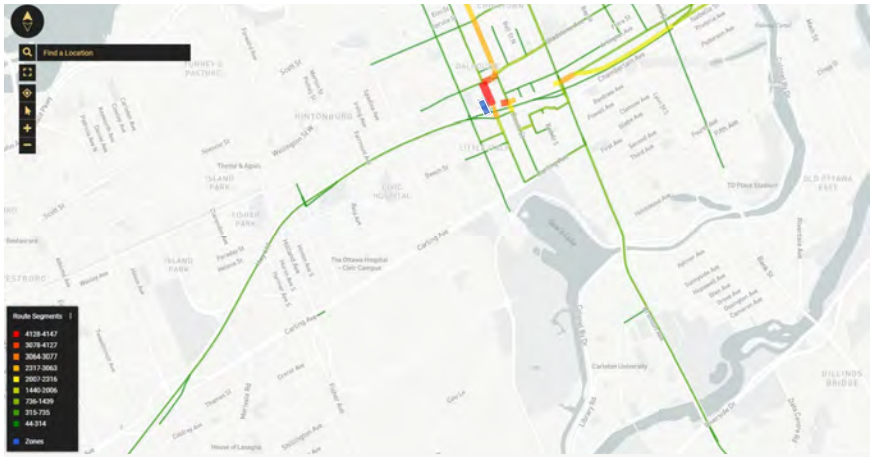
FROM Gate — **13. Carling** – *East of Booth*

34



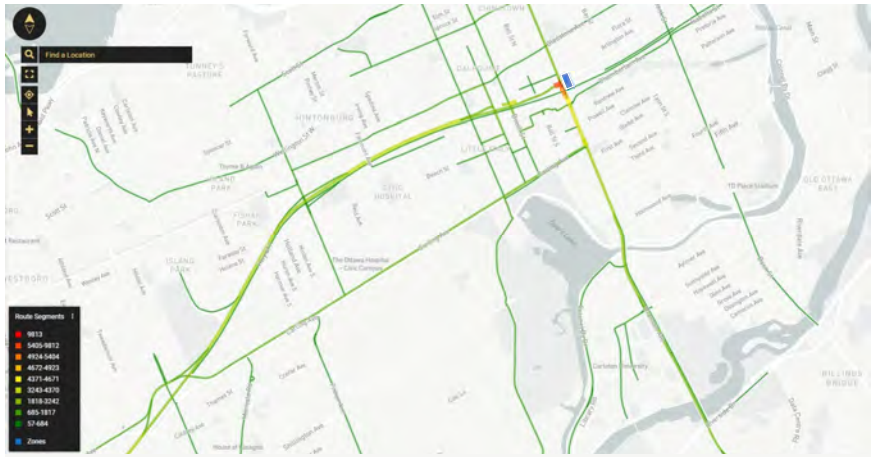
FROM Gate — **14. Rochester** – *Eastbound Off-Ramp*

35



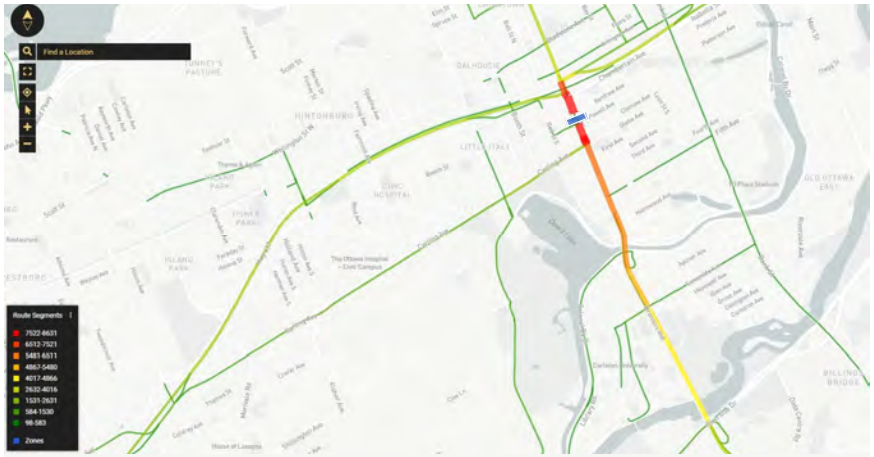
TO Gate — **15. Rochester** – *Westbound On-Ramp*

36



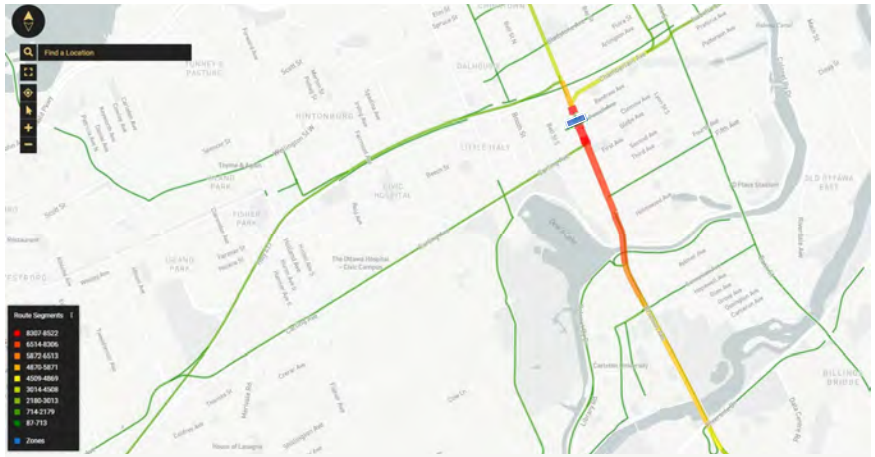
FROM Gate — **16. Raymond – East of Bronson**

37



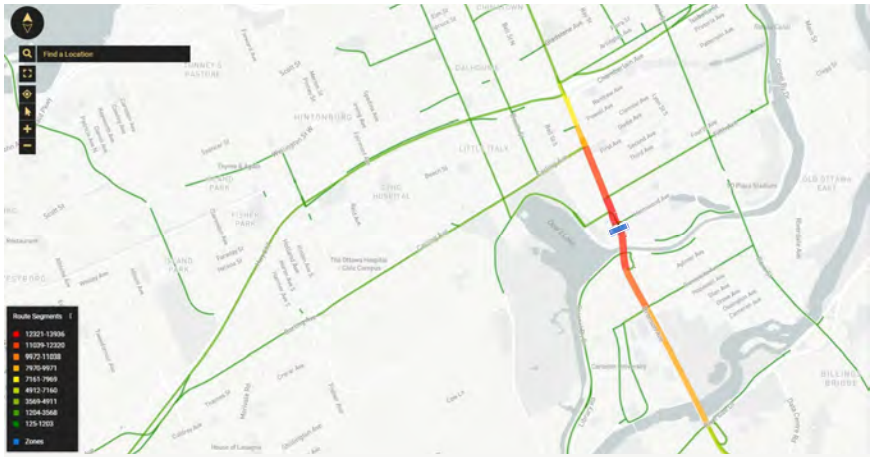
TO Gate — **17. Bronson –** *North of Powell*

38



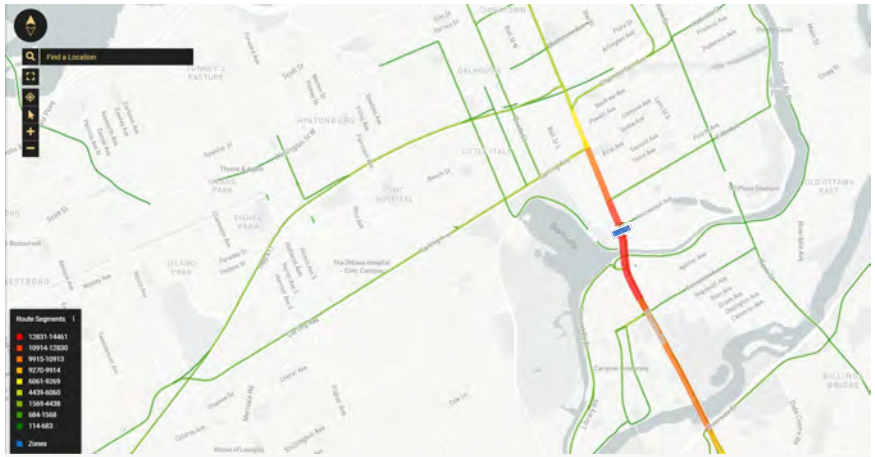
FROM Gate — **17. Bronson –** *North of Powell*

39



TO Gate — **18. Bronson –** *South of Holmwood*

40



FROM Gate **18. Bronson** – *South of Holmwood*

41