# COMPLETE STREETS EVALUATION

## Understanding Complete Streets in the Greater Golden Horseshoe

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Figure 1 (p. 3): York Region Rapid Transit Corporation, 2015
Figure 2 (p. 3): City of Barrie, Public Information Centre, Information Boards, 2014
Evaluating Complete Streets (p. 6): Yes We Cannon!

Clean Air Partnership (CAP) is a registered charity dedicated to improving air quality, minimizing greenhouse gas emissions and reducing the impacts of air pollution and climate change. The Toronto Centre for Active Transportation (TCAT), a project of CAP, advances knowledge and evidence to build support for safe and inclusive streets for walking and cycling, and believes that active transportation plays a critical role in creating environmentally and economically sustainable cities.

Ontario

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# BACKGROUND

Communities in the Greater Golden Horseshoe (GGH) region continue to become denser and more diverse, potentially creating more opportunities to walk, cycle or take transit for everyday travel[1]. Consequently, providing enabling infrastructure for pedestrians, cyclists and transit users has become a more important policy challenge than ever. Within this context, the concept of Complete Streets, i.e., streets that are designed for all ages, abilities and modes of travel including pedestrians, cyclists and transit users, has received widespread attention.

Many Complete Streets projects are being planned and implemented across Ontario. Between 2014-2015, The Toronto Centre for Active Transportation (TCAT), Ryerson University and the University of Toronto worked together on a research project to develop multiple tools aimed at improving the capacity of the GGH municipalities in planning and evaluating these Complete Streets projects.

As part of this research project, TCAT released a *Complete Streets Catalogue*[2] in December 2014 that includes information on examples of Complete Streets projects across the GGH. The goal was to produce an easy-to-navigate summary of what is being built on the ground, so that municipalities seeking to implement their own projects can refer to existing examples and tailor approaches to their own needs.

In this report, we turn our attention to the state of the practice, challenges and opportunities related to the evaluation of Complete Streets projects and initiatives. In Ontario, the current Provincial Policy Statement (PPS) Performance Monitoring Framework emphasizes the need for indicators to evaluate public policy and impacts of the initiatives[3]. In relation to Complete Streets projects, collecting data on project performances can further our understanding of the true benefits of these initiatives. This evidence will also help municipalities in justifying future active transportation programs and projects in terms of their cost-benefit trade-offs[4].

# WHAT TO EVALUATE?

An integration of project evaluation in Complete Streets planning and implementation practices is critical for ensuring a wider adaptation of the Complete Streets concept into communities[5]. Identifying a set of performance indicators is a key element in this process. To this end, we adopted the evaluation framework proposed by McCann and Rynne (2010)[6], and conceptualized the results/ performances of a Complete Street in terms of ***outputs*** and ***outcomes.***

The ***outputs*** of Complete Street project are the key measures of the enhancements that get built and are expected to have positive impacts. Project outputs could include the number of kilometres of bicycle lanes, the distance of sidewalk improvements, intersection improvements (e.g. bike boxes, sidewalk bulb-outs, pedestrian scramble), and the number of trees planted. Collecting and maintaining this information is critical in documenting the advancement of Complete Streets planning practice. This data can also be used to attract political support and public awareness for ongoing projects. TCAT's *Complete Streets Catalogue* provides summaries of some Complete Street project outputs across the GGH.

However, the key goal of a project performance evaluation is to establish a cause-effect relationship between what is being built (i.e., the outputs) and the desired ***outcomes***. The ***outcomes*** of a project are the effects or the impacts that we observe resulting from a Complete Street project's outputs (i.e., causes) as experienced by citizens, and road users on the surrounding environment.

In order to produce a comprehensive list of measureable outcomes or performance indicators, a total of 26 (22 USA and 4 Canadian) Complete Streets Policies, Active Transportation Plans and other relevant documents were reviewed (see Appendix A), and the project-level outcome performance indicators identified in these documents were classified into four broad groups:

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[1] Ewing, R. and Cervero, R. (2010) Travel and the built environment: a meta analysis. Journal of the American Planning Association 76 (3): 1-30.

[2] Toronto Centre for Active Transportation- TCAT (2014) Understanding Complete Streets in the Greater Golden Horseshoe: The Complete Streets Catalogue. Clear Air Partnership. http://www.tcat.ca/project/understand-complete-streets-in-the-greater-golden-horseshoe/

[3] Ministry of Municipal Affairs and Housing (2014) *Provincial Policy Statement 2005 Performance Monitoring Indicators*. Government of Ontario. http://www.mah.gov.on.ca/Page10679.aspx

[4] Center for Inclusive Design and Environmental Access and GoBike Buffalo (2014) Evaluating the Impacts of Complete Streets Initiatives. http://gobikebuffalo.org/wp-content/uploads/2014/06/Evaluating_ImpactsofCompleteStreets.pdf

[5] McCann, B. (2013) Completing Our Streets: The Transition to Safe and Inclusive Transportation Networks. Washington DC: Island Press.

[6] McCann, B. and Rynne, S. (2010) Complete Streets: Best Policy and Implementation Practices. American Planning Association.

Table 1: Complete Streets Performance Indicators, as Identified in Existing Policies and Planning Documents.

| Complete Street Goal | Outcome Performance Indicator (with desired effects) |
|---|---|
| 1. Active Transportation | Changes in pedestrian counts (increase)<br>Changes in cycling counts (increase)<br>Changes in transit ridership (increase)<br>Changes in motor vehicle counts (decrease) |
| 2. Level of Safety | Changes in collision severity (decrease)<br>Changes in collision frequency (decrease)<br>Changes in all collision types (pedestrian/bike vs. car) (decrease)<br>Changes in traffic speeds (decrease) |
| 3. Level of Service | Changes in transit travel time (decrease)<br>Changes in motor vehicle travel times (and wait times) (decrease)<br>Changes in average delay for a motor vehicle to clear a intersection (decrease)<br>Multi-modal level of service (improve)<br>Perceived safety and comfort (increase) |
| 4. Surrounding Environment | Changes in local property values (increase)<br>Changes in retail sales (increase)<br>Changes in air quality (improve)<br>Changes in physical activity (duration and frequency) (increase) |

The impacts that are outlined in Table 1 are potentially observable at a street and/or neighbourhood level. However, when Complete Streets principles are adopted at a municipal or regional level, there may be other benefits across an entire transportation network or an entire city/community. Examples of such benefits are improved environmental sustainability (i.e., observable through a reduction in motor vehicle kms travelled - VKT, low automobile ownership, and low emission rates) and improved population health (i.e., reduction in the prevalence of chronic diseases such as asthma, type 2 diabetes and cardio-vascular diseases). Connecting these benefits to a specific Complete Street project may be difficult.

# CONTEXT INFLUENCES COMPLETE STREETS

The concept of Complete Streets is widely understood and recognized among urban planning and transportation professionals. However, defining the term at the project level remains a challenge. To further explore this topic, we organized a focus group discussion in February, 2015. The participants, who are local experts in the transportation engineering and planning identified Complete Streets as a set of principles that are meant to provide safe, accessible, efficient, and sustainable roadways. However, the facilities and infrastructure that are implemented "on the ground" vary greatly depending on the context of the project, including the roadway typology, geographic location and surrounding land uses. Examples of these variations are shown in Figures 1 and 2 on the following page.

The absence of rigour around the definition of Complete Streets was highlighted by the local experts. This flexibility, they pointed out, is perhaps necessary, as it has enabled a wider adaptation of this concept into political and popular discussions, as well as into current urban transportation planning practice. In addition, this flexibility has allowed the implementation of a diversity of projects that cater to local needs. With regard to evaluating a Complete Street project performance, however, it is important to recognize that the broad goals (i.e., expected impacts) of a project can vary depending on where a Complete Street project is being implemented, and to conceptualize the project performance indicators based on the context. For example, an increase in retail sales can be an important outcome of an urban Main Street redevelopment, but the same measure may not be as relevant with respect to a Complete Street project along a suburban collector road.

### UNDERSTANDING COMPLETE STREETS IN THE GGH FOCUS GROUP

In February 2015 a number of local experts in transportation planning and engineering came together during a focus group session to discuss the policies and practice of Complete Streets in the GGH. In addition to the five members of the research team, there were eleven participants: five urban planners and six transportation engineers, representing 11 cities, planning units or regional municipalities:

1. City of Burlington
2. City of Cambridge
3. City of Guelph
4. City of Kitchener
5. City of Oshawa
6. City of Toronto - Downtown
7. City of Toronto – North York
8. City of Vaughan
9. Town of Ajax
10. Town of Newmarket
11. York Region

In depth discussions focused on three key topics (1) what Complete Streets look like "on the ground" and how to know when a street is "complete", (2) how they are currently being measured, and (3) what are the needs, and barriers to a more effective evaluation.

## HIGHWAY 7 IN THE CITY OF MARKHAM

Figure 1: A rendering showing a portion of the Highway 7 redesign project located at the intersection of Chalmers Road. A rapid bus transit station and transit lanes reside in the middle of the roadway and are surrounded by travel and turning lanes as well as painted bicycle lanes. Pedestrian crosswalks have been enhanced to heighten visibility and awareness of drivers to improve the overall safety of the right of way.

## DUNLOP STREET EAST IN THE CITY OF BARRIE

Figure 2: A rendering of Dunlop Street East showing a street reconfiguration alternative in the Municipal Class Environmental Assessment (Class EA) that is underway. This alternative includes a pedestrian enhancing design to accommodate two-way traffic and on-street parking through the use of removable bollards. Installation of mountable, roll-over curbs would improve accessibility measures and allows for flexibility for on-street use. Neither transit services or bicycle lanes are not included in this design of this future Complete Street project. The final preferred alternative for the project will be determined at the conclusion of the Class EA process.

# CURRENT EFFORTS IN EVALUATING COMPLETE STREETS IN THE GGH

Despite some challenges around the definitions and perceived objectives of Complete Streets, efforts to evaluate them are not uncommon in the GGH region. An improved understanding of these current methods and available resources is important in order to develop a Complete Streets Evaluation Tool that is grounded and is useful for local governments in advancing the planning and practice around Complete Streets in the region. To this end, the focus group participants discussed any outcome-related performance measurements that are currently being used in their municipalities. These current efforts can be summarized under three key themes:

## 1. Increase in Active Transportation

Some, but not all, GGH municipalities conduct bicycle and pedestrian counts on roadways and multi-use trails. This is typically done for specific projects but not as a standing regular practice.

With regard to methods, the most common is the use of pneumatic tube system that automatically monitors the volume and number of users (motor vehicles and cyclists) passing through a roadway. Other methods to particularly measure active modes of travel include infrared technology, smaller pneumatic tubes (with the ability to detect bicycles) as well as through manual counters. While in most cases data is collected at street intersections, mid-block counts were conducted for some larger projects, particularly to monitor the presence and travel patterns of pedestrians on sidewalks.

There was no agreement between the participants about the most effective and appropriate method and/or technology among those that are currently being used. Inconsistency also remains between projects within a same municipality.

## 2. Increase in Level of Safety

Another set of commonly used measures are the frequency, severity and types of reported collisions occurring on a street or intersection(s). Traffic speed along a roadway is also evaluated by some municipalities.

Collision reports are obtained from local police records. While a great resource for longitudinal records, a limitation of this approach is that it only provides information on collisions that are actually reported to police; as a result, less severe incidents remain excluded from the evaluation. Traffic speed data is currently collected through the use of pneumatic tubes.

## 3. Improvements to Level of Service

Average automobile and transit travel times along a roadway is another measure that is currently being used in one GGH Municipality, particularly on larger arterial or corridor studies, with a goal of depicting the changes in traffic efficiency before and after a roadway improvement is implemented. Average travel times for motor vehicles can be collected manually, as well as through the Bluetooth detection devices that record the travel times of motor vehicles moving between two marked distances. Transit travel time data can be gathered from the local public transit authority as they typically keep track of transit travel time on various routes.

While currently used measures are important when evaluating roadway activity, more could be done to effectively measure the outcomes of Complete Streets projects. For example, none of the municipalities are using a multi-modal level of service that includes pedestrians or bicycles which, for the most part, would be at odds with the level of service as described above. In fact, the traditional level of service measures that GGH municipalities are using are "oriented toward designs that accommodate motor vehicle traffic, often to the exclusion of other modes" and as such are actually working against the goals of the Growth Plan[7]. It was noted that there are some active transportation LOS tools being developed elsewhere, but they are not yet in use in the GGH.

[7] Hess, P., Smith Lea, N., Bidordinova, A. and Klassen, J. (2014) Identifying and Overcoming the Barriers to the Active Transportation Implementation Policies. http://www.tcat.ca/wp-content/uploads/2014/06/IdentifyingOvercomingBarriers_Final_7July2014_Appendices.pdf.

# LOCAL CHALLENGES TO COMPLETE STREETS EVALUATION

Despite some efforts in collecting Complete Streets project performance data, a number of barriers exist. The local experts identified four key challenges to evaluating Complete Streets in the GGH:

## 1. Lack of understanding around the expected outcomes

The Complete Streets concept is still relatively new in the transportation planning and engineering practice. Not surprisingly, then, professionals are often unclear about the expected outcomes of the ongoing projects, and ways to measure them, particularly when local contexts (i.e., roadway types and neighbourhood environment) are taken into account.

> *"The majority of people will not know what they need to do.... [and] what indicators to look at."*

## 2. Scarcity of resources

Traffic counts remain the most commonly used, and for most municipalities in the GGH the only, measure of Complete Streets performance. While most GGH municipalities document their own variation of traffic/bicycle/pedestrian counts, these efforts are often constrained by funding and departmental budgets.

> *"Unfortunately, we have a limited budget, so you can only do so many locations - you may not come back to that [same] location again for another 5-10 years."*

## 3. Lack of communications between municipal departments

Although municipalities may already be collecting data that can potentially be used to measure Complete Streets, it is typically done through various municipal departments without much communication between them. For example, in some municipalities, the public health departments may collect public safety and comfort perception through surveys along different transportation corridors, but this information is rarely shared with the transportation divisions. The environmental offices (who may collect air quality data), employment divisions (who may conduct employment surveys) and even local Business Improvement Associations (who may gather various measurements on economic activity on streets) often collect useful data that can be useful in evaluating a Complete Street project. Although these data may exist, the local experts pointed out that currently there is no process to bring this information together, often leading to assumptions that data on these various indicators are not available.

## 4. Absence of mandate to evaluate roadway projects

Discussions with the local experts revealed that the current model of the active transportation planning practice may in fact pose as a challenge in itself. Often times planners, designers and engineers will implement projects based on the premise that they are the "right thing to do" without necessarily having direction or budget to demonstrate or prove that there are visible positive impacts affecting users and surrounding communities. It appears that in the current discourse of planning practice, emphasis is placed largely on project construction. In contrast, project evaluation receives much less attention.

> *"[professionals] don't have the time and ....the mandate to go back and measure after implementation."*

Despite these challenges, there was significant awareness of the importance of measuring the successes of Complete Streets projects. The local experts recognized that the ability to make the link between a Complete Street project and its measurable impacts on citizens, road users and the surrounding environment can significantly improve their professional capacity when making a case for new projects to the local politicians (i.e., City Councilors). While it is one challenge to know how to properly design a Complete Street project, it is quite another to understand how to effectively measure it. It was strongly agreed upon throughout the focus group that having a tool to reference when looking to measure a Complete Street, would be valuable.

# EVALUATING COMPLETE STREETS: A PRELIMINARY AUDIT TOOL

A lack of clarity exists around the expected measurable outcomes of Complete Streets. To improve the capacity in evaluating these projects within the GGH, a Complete Streets Evaluation Tool was developed and has been presented in Table 2 of this report. The Complete Streets Evaluation Tool is based on a review of Complete Streets documents from 26 municipalities across North America, and is informed by a focus group discussion with local experts. The Tools lists 21 key performance indicators focused on four broad goals that Complete Streets aim to achieve, namely: 1) increased active and sustainable transportation, 2) increased safety, 3) improved level of service, and 4) improvements to the surrounding neighbourhood environment.

Although we are unable to comment on the priority and relative importance of the listed indicators, the ones marked with asterisks are currently used by GGH municipalities for evaluating roadway performances, and we feel that implementing and applying such evaluative measures to current and future Complete Streets projects would be relatively simple to begin with. Interestingly, none of the municipalities are evaluating level of service for pedestrians or bicycles, measures of which can sometimes be at odds with those related to traditional level of service, and the cost-benefit trade-offs between motor vehicle and pedestrian/cyclist level of services is not well understood. This lack of knowledge is a major challenge for Complete Streets evaluation.

Local experts have pointed out that the objectives, forms and functions of a Complete Street project are highly dependent on surrounding context. As a result, the indicators of "success" may vary across projects. It is for these reasons a "one-size-fits-all" solution may not be effective, when it comes to evaluating of a Complete Streets project using measurable outcome indicators. We recognize that these listed performance indicators may not be applicable to all Complete Streets projects, which is reflected in our proposed evaluation tool.

The proposed tool is broad and preliminary in scope, as it only identifies the expected changes in a desired direction. The expected magnitudes of change remain a subject for further exploration with municipal planners and engineers, and would depend of the context of a Complete Street project. A potential "change" can be identified by comparing the post-implementation measures of each indicator with baseline data (preferably collected before the project implementation). We recommend that post-implementation data is collected to evaluate both short term (one to three years) and long term (>5 years) impacts.

A recommendation on specific methods and technologies of data collection was also beyond the scope of this project. Table 2 however, lists methods, instruments, and resources that can potentially be used for this purpose.

# TABLE 2: COMPLETE STREETS EVALUATION TOOL

This tool was developed based on a review of Complete Street documents from 26 municipalities across North America, and is informed by a focus group discussion with local experts.

Outcome performance indicators marked with an asterisk (*) are currently collected by at least one GGH municipality for roadway evaluation purposes.

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods/Instruments | Comments |
|---|---|---|---|---|---|
| 1. ACTIVE AND SUSTAINABLE TRANSPORTATION | | | | | |
| Increased number of pedestrians on street* | Average daily count | All street types (particularly where pedestrian infrastructure improvements are made) | Decrease ☐<br>No change ☐<br>Increase ☐ | • Field data collection<br>• Many GGH municipalities are already using various methods to collect data.<br>• Potential technologies include infrared sensors, manual counters, video imaging (manual or automated), seismic sensors, pressure sensors/pressure mats. | A key goal for Complete Streets is to observe an increase in pedestrian activity and therefore the level of pedestrian use should be monitored. With improved public realms and safety enhancements, come the expectations that the resulting outcome will be an increased presence of pedestrians. |
| Increased number of bicyclists on street* | Average daily count | All street types (particularly where cycling infrastructure improvements are made) | Decrease ☐<br>No change ☐<br>Increase ☐ | • Field data collection<br>• Many GGH municipalities are already using various methods to collect data.<br>• Potential technologies include infrared sensors, manual counters, inductive loops, video imaging (manual or automated), seismic sensors, pressure sensors/pressure mats. | Most Complete Streets include bicycling infrastructure, and a typical priority for Complete Streets is to observe an increase in cycling activity. The improvements in the rate of cycling on street should be monitored. |
| Increased transit ridership* | Average daily count | All street types (particularly where transit infrastructure improvements are made) | Decrease ☐<br>No change ☐<br>Increase ☐ | • Data from the local transit authority on transit ridership along the route | Public transit use is an important indicator to gauge the changes in travel behaviour. Ridership data may be available from local transit authorities.<br>At least one municipality in the GGH collects and analyzes ridership data from a public transit operator for street evaluation purposes. |

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods/Instruments | Comments |
|---|---|---|---|---|---|
| 1. ACTIVE AND SUSTAINABLE TRANSPORTATION (CONT'D) | | | | | |
| Unchanged/ decreased number of private automobiles (i.e. cars) | Average daily count | Urban Main Streets | Decrease ☐<br>No change ☐<br>Increase ☐ | • Many GGH municipalities are already using various methods to collect data.<br>• The most common technology is the use of pneumatic tube system | Increased active transportation and transit use may reduce the use of the private automobile, particularly on urban Main Streets. While a decrease in motor vehicle count may represent a shift toward healthier and more sustainable travel behavior, the cost-benefit trade-offs between decreased automobile counts and increased pedestrian/ cyclist/ transit ridership are not well understood. |
| Increased pedestrian modal share by residents | % of total trips on foot | All street types (particularly where pedestrian infrastructure improvements are made) | Decrease ☐<br>No change ☐<br>Increase ☐ | • Neighbourhood household survey<br>• Household members will self-report their daily travel mode | Household surveys can capture a number of desired indicators including pedestrian, cycling and transit modal shares. At least one municipality in the GGH conducts neighbourhood household surveys (although not in the context of a Complete Street project) to measure travel mode choice behaviour over time. |
| Increased cycling modal share by residents | % of total trips by cycle | All street types (particularly where cycling infrastructure improvements are made) | Decrease ☐<br>No change ☐<br>Increase ☐ | | |
| Increased transit modal share by residents | % of total trips by transit | All street types (particularly where transit infrastructure improvements are made) | Decrease ☐<br>No change ☐<br>Increase ☐ | | |

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods/Instruments | Comments |
|---|---|---|---|---|---|
| 2. LEVEL OF SAFETY | | | | | |
| Decrease in collision severity* | Injuries/ 1000 collisions;<br><br>Fatalities/ 1000 collisions | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | • Collision data from local police collision records.<br>• Motor vehicle/ bicycle/ pedestrian counts collected through field observation using methods outlined in #1 (Active and Sustainable Transportation). | Police Collision Reporting Centres maintain data on all reported collisions in the city. This data can be used to analyze the rates, severity and users involved (motor vehicle, pedestrian, cyclist) over time. Several municipalities in the GGH gather collision data from police records to analyze roadway activity and safety. |
| Decrease in collision frequency involving motor vehicles* | # of collisions/ 1000 drivers | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | | |
| Decrease in collision frequency involving bicycles* | # of collisions/ 1000 cyclists | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | | |
| Decrease in collision frequency involving pedestrians* | # of collisions/ 1000 pedestrians | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | | |
| Reduced traffic speeds* | Average daily traffic speed | Urban Main Street | Decrease ☐<br>No change ☐<br>Increase ☐ | • Field data collection<br>• Posted speed limit may be used as a proxy | Technologies used to collect motor vehicle count data may also be used to determine traffic speed.<br>Reduced traffic speed improves safety (e.g., those related to collision severity) for all users of the road. |

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods/Instruments | Comments |
|---|---|---|---|---|---|
| 3. LEVEL OF SERVICE | | | | | |
| Decreased transit travel time | Average point-to-point travel time along a street | All street types with transit | Decrease ☐<br>No change ☐<br>Increase ☐ | • Data from the local transit authority | Public transit travel time is an important indicator to gauge public transit's efficiency and level of service. Having an efficient transit service may help gain an increase in ridership.<br>Ridership data may be available from local transit authorities. |
| Unchanged/ decreased motor vehicle travel time | Average point-to-point travel time along a street | Major Arterial, Minor Arterial, Collector | Decrease ☐<br>No change ☐<br>Increase ☐ | • Field data collection<br>• Bluetooth technology has previously been used | Similar to efficient transit travel time, motor vehicle travel time shows roadway efficiency for drivers. In a context where decreased travel time is a Complete Streets goal, it should be achieved through measures such as improved intersection design and decreasing the number of single-occupancy motor vehicle trips, not through higher motor vehicle speeds on streets that are shared with pedestrians and cyclists. The Ministry of Ontario utilized *Bluetooth software* devices during a highway travel time study in 2010. |
| Decreased intersection clearance time | Average daily intersection clearance time | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | • Field data collection | Prolonged wait times through intersections increase the level of traffic congestion on the street leading to overall slower travel times for the private vehicle as well as public transit and cyclists. In a context where decreased travel time is a Complete Streets goal, it should be achieved through measures such as improved intersection design and decreasing the number of single-occupancy motor vehicle trips, not through higher motor vehicle speeds on streets that are shared with pedestrians and cyclists. |

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods/Instruments | Comments |
|---|---|---|---|---|---|
| 3. LEVEL OF SERVICE (CONT'D) | | | | | |
| Multi-modal level of service (LOS) | N/A | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | • Available external resources on multi-modal LOS measures | None of the GGH municipalities are evaluating level of service for pedestrians or bicycles. The cost-benefit trade-offs between vehicle and pedestrian/cyclist level of services is not well understood. Internationally, efforts are being made to improve upon the measurement for level of service to include multiple modes of transportation. Examples of such efforts can be found *here*.<br>The "*Multimodal Level of Service Analysis for Urban Streets*", published by National Cooperative Highway Research Program can also be an excellent resource to consult. |
| Increased perceived comfort and safety* | % of those who feel comfortable;<br><br>Average perception levels | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | • Neighbourhood household surveys<br>• Intercept surveys of road users | On-street intercept surveys can be conducted, or related questions may be included in neighbourhood household surveys.<br>An intercept survey can be used to understand user perceptions of comfort and safety. Either a before-after or a retrospective survey can be designed for this purpose.<br>At least one municipality in the GGH conducts neighbourhood household surveys (although not in the context of a Complete Street project) to measure travel mode choice behaviour, perceptions of streets as well as the changes in trip generation over time. |

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods | Comments |
|---|---|---|---|---|---|
| 4. THE SURROUNDING ENVIRONMENT | | | | | |
| Increased local property values | N/A | Urban Main Street, Minor Arterial, Collector | Decrease ☐<br>No change ☐<br>Increase ☐ | • Data from agencies such as the Municipal Property Assessment Corporation (MPAC) | As roadway projects improve travel patterns and accessibility to residential and commercial properties, the values of adjacent and surrounding properties are expected to increase. Assessing the values of these properties can provide an understanding of economic impact of Complete Streets projects. |
| Increased retail sales | Quarterly sales ($)/ square foot of retail space | Urban Main Street | Decrease ☐<br>No change ☐<br>Increase ☐ | • Data on sales tax receipts from local business owners<br>• Surveys of business owners | For urban Main Streets, Complete Streets may improve business.<br>Local Business Improvement Associations (BIA) and business owners can be valuable partners in evaluating the economic impacts of Complete Streets projects. |
| Improved air quality | N/A | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | • Portable outdoor air quality monitors<br>• Provincial Air Quality Health Index (AQHI) | A decrease in motor vehicle use, increases in active transportation, and introduction of street landscaping are expected to improve local air quality. However, existing air quality measurements from government-operated monitoring stations are spatially crude, providing no understanding of street level variation in air quality. Portable next-generation monitors are currently unreliable and inaccurate, although this is a rapidly developing field. The Ministry of Environment and Climate Change, Ministry of Health and Long Term Care, Health Canada and Environment Canada are currently working on a revised Air Quality Health Index (AQHI) for Ontario, although this will not contribute to our understanding of air quality variation within communities, only the variation between communities. |

| Outcome Performance Indicators | Unit | Applicable Street Typology | Change observed? (please check one) | Methods | Comments |
|---|---|---|---|---|---|
| 4. THE SURROUNDING ENVIRONMENT (CONT'D) | | | | | |
| Increased physical activity levels. | Average daily minutes of physical activity | All street types | Decrease ☐<br>No change ☐<br>Increase ☐ | • Neighbourhood household surveys (self-reported physical activity engagement)<br>• Can also be estimated using self-reported travel data | Complete Streets are safer and more comfortable for walking and biking and are associated with lower rates of obesity and higher rates of physical activity[8]. |

[8] Toronto Public Health. Healthy Streets: Evidence Review. October 2014. City of Toronto.

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# APPENDIX A: A JURISDICTIONAL ANALYSIS OF COMPLETE STREETS POLICY

A jurisdictional review of existing Complete Streets policies across North America was conducted. A total of 15 American Complete Streets policies were selected for this review, all of which were all identified as having the "Best Complete Streets Policies in 2013"[9] according to the National Complete Streets Coalition, a program of Smart Growth America . Four Canadian policies were also reviewed. Specific performance indicators listed within these 19 policies were noted.

In addition, transportation plans from three other North American cities, which have received attention for their efforts to develop performance indicators to measure and track sustainability were reviewed. Four more communities, each of whom were awarded the platinum status in the 2014 round of the League of American Bicyclists' annual Bicycle Friendly Communities program, were also examined for their roadway activity evaluation measures. Finally, "Evaluating the Impact of Complete Streets Initiatives"[10], a publication released in 2014 by the Center for Inclusive Design and Environmental Access at the University of Buffalo, was taken into consideration, as it is an important and directly applicable source.

Based on this research, we complied a list of indicators that specifically relate to the evaluation of the outcomes of a Complete Street project. The list indicators were categorized into four broad- based Complete Streets goals as shown in Table 3.

## JURISDICTIONS INCLUDED IN POLICY SCAN

| American Jurisdictions | Canadian Jurisdictions | League of American Bicyclists Platinum Award Cities, 2014 | Leaders in Complete Streets Evaluation Tools |
|---|---|---|---|
| 1. Littleton, MA<br>2. Peru, IN<br>3. Fort Lauderdale, FL<br>4. Auburn, ME<br>5. Lewiston, ME<br>6. Baltimore County, MD<br>7. Portsmouth, NH<br>8. Muscatine, IA<br>9. Piqua, OH<br>10. Oakland, CA<br>11. Hayward, CA<br>12. Livermore, CA<br>13. Massachusetts DOT<br>14. Cedar Falls, IA<br>15. Waterloo, IA | 1. Ajax, ON<br>2. Calgary, AB<br>3. Waterloo, ON<br>4. Ottawa, ON | 1. Portland, ORE<br>2. Davis, CA<br>3. Fort Collins, CO<br>4. Boulder, CO | 1. New York<br>2. San Francisco<br>3. Buffalo |

[9] National Complete Streets Coalition. (2014). The Best Complete Streets Policies of 2013. Smart Growth America. Retrieved September 2014, from: http://www.smartgrowthamerica.org/complete-streets-2013-analysis

[10] Center for Inclusive Design and Environmental Access and GoBike Buffalo (2014) Evaluating the Impacts of Complete Streets Initiatives. http://gobikebuffalo.org/wp-content/uploads/2014/06/Evaluating_ImpactsofCompleteStreets.pdf

# TABLE 3: A JURISDICTIONAL ANALYSIS OF COMPLETE STREETS

## As Identified through Municipal Plan and Policy Reviews

| | | | | | League of American Bicyclists - Platinum Status Communities (2014) | | | |
|---|---|---|---|---|---|---|---|---|
| | Policy Review | New York | San Francisco | Buffalo | Portland, ORE | Davis, CA | Fort Collins, CO | Boulder, CO |
| Outcome Performance Indicator (with desired effects) | "Best Complete Streets Policies in 2013" National Complete Streets Coalition | New York Sustainable Streets Index | Better Streets Plan | Evaluating the Impact of Complete Streets Initiatives | Pedestrian and Bicycling Chapter from the Portland Comprehensive Plan, Portland Transportation System Plan | Bicycle Action Plan | Fort Collins Pedestrian Plan and Transportation Master Plan | Boulder Transportation Master Plan |
| **Increases in Active Transportation** | | | | | | | | |
| Changes in Pedestrian Counts (increase) | X | X | X | X | X | | X | X |
| Changes in Cycling Counts (increase) | X | X | X | X | X | X | X | X |
| Changes in Transit Ridership (increase) | X | X | X | X | X | X | X | X |
| Changes in Motor Vehicle Counts (decrease) | X | X | X | X | X | X | | X |
| **Increases in Level of Safety** | | | | | | | | |
| Changes in Collision Severity (decrease) | X | X | X | X | X | | | X |
| Changes in Collision Frequency (decrease) | X | X | X | X | X | X | X | X |
| Changes in all Collision Types (pedestrian/bike vs. car) (decrease) | X | X | X | X | X | | X | |
| Changes in Traffic Speeds (decrease) | | X | X | | X | X | | |
| **Level of Service** | | | | | | | | |
| Changes in Transit Travel Time (decrease) | | X | | | X | | | |
| Changes in Motor Vehicle Travel Time (and wait times) (decrease) | | X | | | X | | X | X |
| Changes in Average delay for a motor vehicle to clear an intersection (decrease) | | X | | | | | | |
| Changes in Multi-modal LOS (improve) | | | | X | | | | |
| Changes in Perceived Safety and Comfort (increase) | X | | X | X | X | | X | |
| **Improvements to the Surrounding Environment** | | | | | | | | |
| Changes in Local Property Values (increase) | | | | X | | | | |
| Changes in Retail Sales (increase) | | | | X | | | | |
| Changes in Air Quality (improve) | | | | X | | | X | |
| Changes in Physical Activity (duration and frequency) (increase) | | | | X | | | | |
| **Evaluations beyond the Project Level** | | | | | | | | |
| Changes in Asthma Prevalence | | | | X | | | | |
| Changes in Transportation Emissions | | | | X | | | | |
| Changes in VMT per capita and per Household | | | | X | X | | X | |
| Changes in Average Persons per Vehicle | | | | | X | | | |
| Changes in Diabetes Type 2 (incidence and prevalence) | | | | X | | | | |
| Changes in Chronic Disease (incidence and prevalence | | | | X | | | | |
| Changes in Obesity (incidence and prevalence) | | | | X | | | | |