
Central Transit Corridor Monitoring Program
Kitchener-Cambridge-Waterloo

BASELINE MONITORING REPORT

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1. Background

1.1 Introduction

In 2011, the Region of Waterloo announced its commitment to the largest single infrastructure project in its history: the ION rapid transit system. Connecting the cities of Kitchener, Cambridge and Waterloo, ION's key benefits are anticipated to include: shaping our community, moving people more efficiently, protecting our countryside through the preservation of farmland and protection of groundwater resources, limiting urban sprawl, bettering the environment, and managing growth. It is also anticipated that ION will further help local businesses attract new talent to Waterloo Region and stimulate the economy with new business and job growth.

The Region of Waterloo has recognized the importance of monitoring change in the Central Transit Corridor (CTC) over time in order to understand the changing nature of the social, economic and environmental characteristics of the corridor. This monitoring program is a multi-year project to monitor the CTC from the baseline year of 2011 until at least 2021, after ION has been constructed, opened for service, and is functioning within the community.

The initial component of the CTC monitoring program was the establishment of key indicators to measure the state of the CTC prior to the establishment of ION. A total of 16 indicators were chosen for their ability to comprehensively describe key aspects of the corridor. The indicators provide a lens for monitoring the achievement of the goals of growth, density and vibrancy in the corridor, as well as the protection of the community's valuable assets, such as heritage resources and affordable housing.

The data for each of the indicators has been collected, compiled and analyzed for the baseline year of 2011. For several of the indicators, data between 2011 and 2014 has also been included where it is available. The area being monitored is the corridor along the Light Rail Transit (LRT) route. For most indicators, data is provided separately for each stage of the LRT; stage 1, from Waterloo to Kitchener, and stage 2, from Kitchener to Cambridge.

Further, through a partnership with the University of Waterloo, the influence of rapid transit has been explored for each of these dimensions. The Region of Waterloo entered into a partnership with researchers from the University of Waterloo to engage in a three-year study to quantify and monitor the socio-economic impacts of ION on the CTC. The project, called "Light Rail Transit and Core Area Intensification: Unpacking Causal Relationships" is led by Dr. Dawn Parker as principal investigator and Dr. Jeff Casello and Dr. Markus Moos as co-investigators with aid from PhD, Masters, and undergraduate students from the University.

ION is being constructed to do more than just move people. A new rapid transit system creates many opportunities for development and redevelopment in neighbourhoods in proximity to

ION station areas along the CTC. Even areas away from the core expect to see benefits from ION; intensification within the core prevents sprawl in the townships, and the expansion and integration of Grand River Transit (GRT) services with ION will support convenient crosstown travel and improve service in neighbourhoods. Each of the 16 chosen indicators will help tell part of the story about how ION is further moving people and shaping our communities in new and different ways.

1.2 Shaping the future of Waterloo Region

Waterloo Region currently has a total population of over 550,000 making it the fourth largest community in Ontario and the 10th largest in Canada. The population of Waterloo Region is forecast to reach approximately 729,000 by the year 2031. Cambridge, Kitchener and Waterloo are forecast to have a combined population of 635,500 in 2031 indicating that 87.2 per cent of the Region's population would live in the three cities. Employment is forecast to be 366,000 for the whole Region in 2031, with 88.3 per cent of the employment in the cities of Kitchener, Cambridge and Waterloo. The Region is required to use the provincial forecast from the Places to Grow legislation as the basis for planning for growth.

Anticipating and managing growth has been a priority for the Region of Waterloo for over a decade. In June 2003, Regional Council unanimously adopted its own Regional Growth Management Strategy (RGMS), a long-term strategic framework designed to help determine where, when and how future residential and employment growth should occur. It provided a clear picture of how this community wanted to move forward. The RGMS was formed around the following six goals:

- Enhancing Our Natural Environment
- Building Vibrant Urban Places
- Providing Greater Transportation Choice
- Protecting Our Countryside
- Fostering a Strong Economy
- Ensuring Overall Coordination and Communication

Planning studies conducted during the development of the RGMS revealed that continuing with road expansions alone was not a realistic or affordable method of managing the Region's growth. If auto-centred planning in the Region continued, the Region's road network would need to expand by at least 500 additional lane-kilometres of traffic. This option of road expansion was estimated at that time to cost over \$1.4 billion dollars to implement. Instead, rapid transit was identified as a crucial component in providing greater transportation choice, moving people, managing growth, and facilitating re-urbanization in our urban areas.

To learn more about the RGMS, please see the Highlights Brochure located at:

<http://www.regionofwaterloo.ca/en/aboutTheEnvironment/resources/FINALRGMSBrochure2006.pdf>

The Province of Ontario's Growth Plan for the Greater Golden Horseshoe (Places to Grow), also identified rapid transit as a key catalyst to support downtown revitalization and manage urban sprawl. The Province delineated a built boundary for Waterloo Region that defined the limits of the developed area of the Region's cities and townships as of June 16, 2006. This is referred to

as the built-up area (BUA). Focusing more growth in the BUA will make better use of land, infrastructure and community services already available in the community. Having a light rail transit system in place encourages a more compact urban form, which helps to manage sprawl and protects sensitive environmental landscapes and high quality farmlands from urban encroachment.

The Region's new Regional Official Plan (ROP) implemented the growth management principles and frameworks set out in the RGMS and Places to Grow. Regional Council adopted the ROP on June 16, 2009 after a five-year technical review and extensive public consultation process. The new ROP is now in force and effect as a legal document approved under the Planning Act to guide growth in Waterloo Region to 2031. The key elements of the ROP include:

- More compact development
- Greater protection of the environment
- Improved integration of transit
- The creation of new strategic employment lands

The ROP has set a re-urbanization target to build a minimum of 45 per cent of all new residential development occurring annually within the Region as a whole within the BUA. This is a major shift from having approximately 15 per cent development in existing built up areas in 2003. This shift is already occurring: by 2011, more than 50 per cent of development was located in existing areas.

Focusing development and investment within existing built-up areas allows Waterloo Region to build up, instead of out, thereby limiting urban sprawl and protecting the environment. Building a more compact urban form, stimulating vibrancy and building neighbourhoods that are more walkable will help build a more liveable and sustainable community. Balancing growth this way will also make it more cost effective to provide services such as water and transit to residents, while protecting our valuable farmland and important groundwater recharge areas which contain 35,000 acres of environmentally significant lands, 225,000 acres of prime farmland and supply 80 per cent of the region's water.

More in-depth information about the Regional Official Plan can be found at:

<http://www.regionofwaterloo.ca/en/regionalgovernment/regionalofficialplan.asp>

1.3 About ION

The idea of a north-south transportation corridor linking the Region's three cities began as early as 1976 when it was identified in the first official plan for the newly formed Region of Waterloo. Since then, the rapid transit project has gone through an extensive environmental assessment and public consultation process (Table 2). The year 2011 marked a very exciting milestone in the project. In June 2011, Regional Council approved light rail transit (LRT) as the preferred rapid transit system with a staged approach allowing the Region to match transit technology with the current and projected ridership and development potential in a cost effective manner.

By 2012, transit ridership on the Grand River Transit (GRT) had already exceeded the 2016 ridership targets. In 2014, Regional Council entered into a formal agreement with GrandLinq to build, finance, operate and maintain (DBFOM) ION stage one system. Set to open in 2017, ION represents the biggest capital investment in the history of the Regional Municipality of Waterloo and is a regional rapid transit system that will connect the three major urban centres of the Cities of Cambridge, Kitchener and Waterloo.

The cost of establishment of the ION rapid transit system requires a two staged approach (stage one and stage two) consisting of Light Rail Transit (LRT) and adapted bus rapid transit (aBRT). ION aBRT is the first step towards bringing LRT to Cambridge. At the completion of stage one, the ION rapid transit system will consist of 19 km of LRT connecting Waterloo to Kitchener, 17 km of adapted bus rapid transit (aBRT) between Kitchener and Cambridge, and 23 stops along the 36 km transit corridor. After the completion of stage one, stage two will see the ION aBRT route converted to LRT, thereby creating a continuous 37 kilometre route of 23 transit station areas across Cambridge, Kitchener, and Waterloo.

Table 2. Rapid Transit Timeline in Waterloo Region	
1976	Creating a central transit corridor is presented in the <i>Regional Official Policies Plan</i>
2000	The Region of Waterloo assumes responsibility for public transit
2003	Council approves the <i>Regional Growth Management Strategy</i> , including a rapid transit system to help manage expected growth, protect the environment and limit sprawl
May 2004	The Government of Canada, the Government of Ontario and the Region of Waterloo jointly announced funding of up to \$2.5 million for the Region of Waterloo Growth Management Strategy, Transit Initiative Technical Studies and an Individual Environmental Assessment (EA) for the Rapid Transit Initiative.
2006	<i>Ontario's Places to Grow Plan</i> is released, including a rapid transit system in Waterloo Region
January 2006	The Rapid Transit Environmental Assessment begins
2008	The Governments of Canada and Ontario identify rapid transit in Waterloo Region a priority on which they will work together under Building Canada
2009	iXpress service sees a tripling in the number of weekday riders since 2003
June 2009	Regional Council approves light rail transit (LRT) as the preferred technology for

	the Region of Waterloo's rapid transit system, subject to funding from the Provincial and Federal government.
2010	The Provincial and Federal governments announce their funding commitments towards rapid transit in Waterloo Region (\$265M and \$300M respectively). Staffs begin a review of the financial implications of the rapid transit plan.
Fall 2010	Concerns are raised about the affordability of the rapid transit project, in terms of the Region's contribution. Staffs begin an objective review identifying a rapid transit project that is affordable to the Region and that provides best value to the community. Staffs consider 11 implementation options, as described in the Planning and Works Committee report.
March 1 to 10, 2010	Plans to share information and seek public input on the new rapid transit implementation options include a series of public consultation centres, booths at malls and a live, interactive webcast.
April 12, 2011	After considering public input, Regional staffs present a preliminary preferred option to the Planning and Works Committee.
April to May, 2011	The public has an opportunity to provide input through a second series of public consultation centres and information booths.
June 15, 2011	After further consideration of public input, staffs present the recommended rapid transit implementation option to Regional Council. Regional Council approve LRT as the preferred technology with a two-staged approach allowing the Region to match transit technology with current and projected ridership, and development potential in a cost effective manner.
November 22, 2011	The Transit Project Assessment Process Notice of Commencement is issued.
February 7, 2012	Regional Council approves the project procurement and delivery option and commits \$253 million.
March 16, 2012	The Transit Project Assessment Process Notice of Completion of Environmental Project Report is issued.
2013	The rapid transit system in Waterloo Region is officially named ION – meaning 'going' in Greek. The official logo is approved in September.
2013	The Region endorses the Community Building Strategy, providing a framework development along the CTC.
March 19, 2014	Regional Council entered into a formal agreement with GrandLinq to build, finance, operate and maintain (DBFOM) ION stage one system
July 2014	ION aBRT construction began
August 2014	ION LRT service construction began
August 2015	ION aBRT construction completed
September 2015	ION aBRT service began
Fall 2016	The first ION LRT vehicle scheduled to arrive in Waterloo Region
2017	ION LRT service scheduled to start

More information about ION can be found in the Region of Waterloo's ION Story report: http://rapidtransit.regionofwaterloo.ca/en/resources/ION_Story_revised_R_0315.pdf; at the project website: www.regionofwaterloo.ca/rapidtransit; and the construction website: www.rideION.ca

Along with ION, GRT will create an efficient, integrated, easy-to-use public transit system for all residents in Waterloo Region. New iXpress routes will be added for convenient crosstown travel, local bus service will be increased along with improved frequency in neighbourhoods, and there will be one fare for all GRT and ION services. An expanded network of trails and path for cycling and walking will also complement the ION and iXpress bus routes and allow for connections between transportation modes.

1.4 The Community Building Strategy

The Region's Community Building Strategy (CBS) is a flexible framework to inform and guide land use and infrastructure planning within the Central Transit Corridor. Developed collaboratively by the Region of Waterloo and the Cities of Cambridge, Kitchener and Waterloo, it is designed to guide public and private investment in the CTC. The CBS also describes the importance of protecting and promoting the Region's valuable community assets such as heritage properties and world-class institutions to ensure those unique assets are not lost when densities increase. The implementation of ION is expected to complement other initiatives that are all contributing to achieving the goals of the CBS.

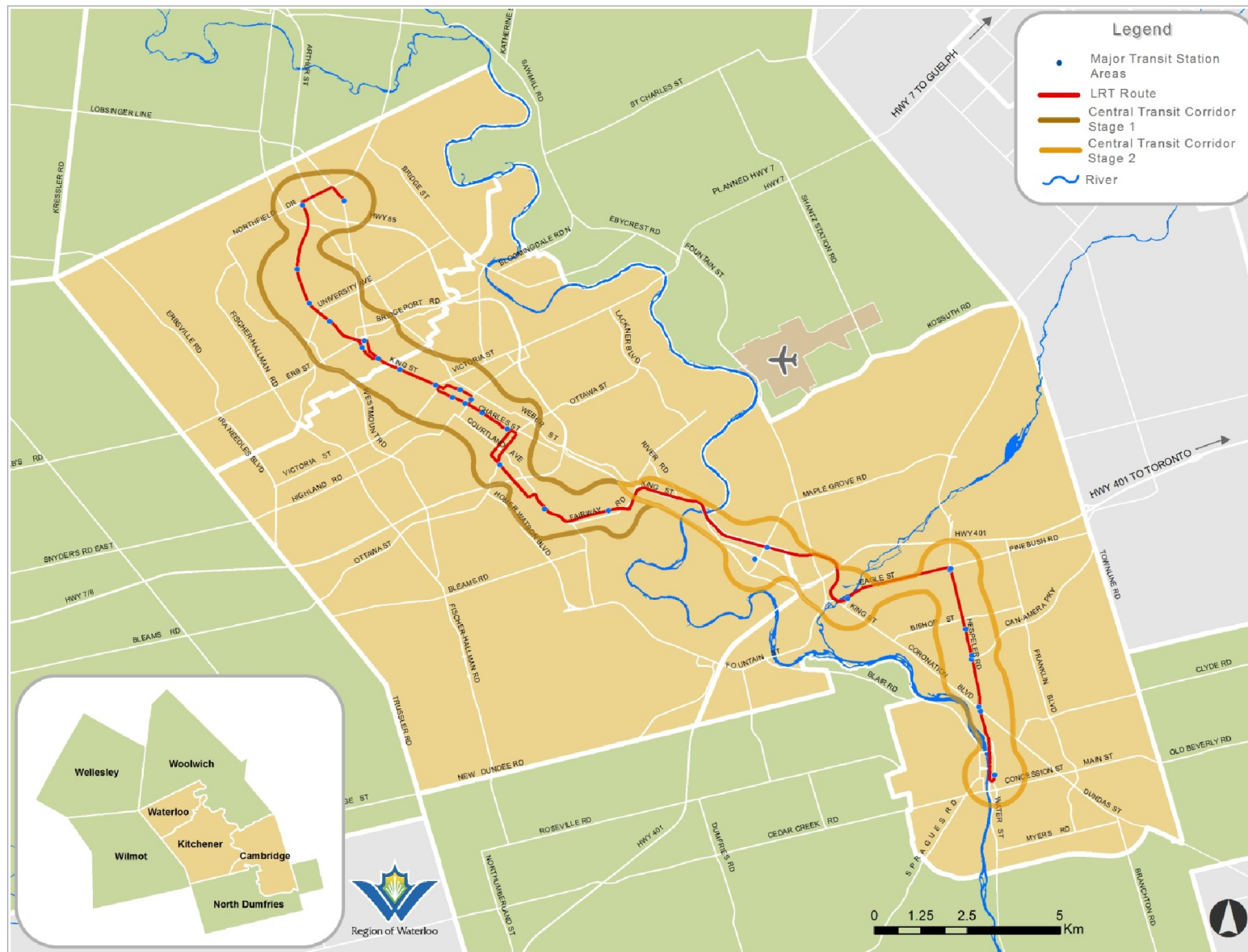
More information can be found on the Community Building Strategy at:

<http://www.regionofwaterloo.ca/en/aboutTheEnvironment/communitybuildingstrategy.asp>

1.5 The ION Central Transit Corridor

The Central Transit Corridor (CTC) is the area within approximately 800 metres of ION rapid transit stops, and the lands connecting these, to form a continuous corridor (Map 1). The 800-metre distance is generally accepted as the length people will walk (roughly 10 minutes) to access rapid transit. The geography of the CTC has also incorporated areas within the corridor that are expected to re-urbanize over time, as well as pre-established statistical boundaries already being used for monitoring. This is a revised boundary from the previous study area identified in the Rapid Transit Environmental Assessment and reflects the final routing of ION rapid transit. The CTC connects the three Urban Growth Centres (UGCs) of downtown Cambridge, downtown Kitchener and uptown Waterloo, as well as 23 rapid transit station areas. For the purpose of the CTC Monitoring Program, the CTC was divided into areas to represent stage one between Waterloo and Kitchener, and stage two, between Kitchener and Cambridge.

Map 1 – Central Transit Corridor



2. The Central Transit Corridor Monitoring Program

The Regional Municipality of Waterloo in conjunction with the University of Waterloo has developed a monitoring program to study the impacts and success of the ION rapid transit investment on the CTC using a series of indicators. The monitoring program is a collaborative multi-departmental effort which required in-house consultation with subject area experts. Staff from divisions including Community Planning, Cultural and Heritage Services, Finance, Housing Services, Public Health, Rapid Transit, and Transportation Planning helped to develop the final set of baseline indicators.

2.1 Purpose of the Monitoring Program

The Region of Waterloo has recognized the importance of monitoring change in the CTC over time in order to understand the nature of the social, economic and environmental characteristics of the corridor. The CTC monitoring program is a multi-year project to monitor the CTC from the baseline year of 2011 until at least 2021, after ION has been constructed, opened for service, and is functioning within the community.

The purpose of the program is to report on the development, growth and change occurring within and surrounding the urban corridor within Waterloo Region that will be served by future ION lines. The establishment of the baseline report provides an opportunity to examine the before and after effects of ION by comparing results from the baseline report to future monitoring reports. The aim of the program is to quantify ION's benefits in moving people and building community within the CTC.

2.2 Partnership with the University of Waterloo

The Region of Waterloo entered a partnership with researchers from the University of Waterloo to engage in a three-year study to quantify, monitor and measure the socio-economic, and core-area intensification impacts of ION on the CTC. The project, called 'Light Rail Transit and Core Area Intensification: Unpacking Causal Relationships' is led by Dr. Dawn Parker as principal investigator and Dr. Jeff Casello and Dr. Markus Moos as co-investigators with aid from PhD, Masters, and undergraduate students from the University.

The goal of the partnership is to explore and understand the causal dynamics between the anticipated developments of ION, intensification of the core area and socio-economic changes in the CTC. The research intends to link connections between indicators of economic success and social equity to socio-economic and urban infrastructure changes in the communities of Waterloo, Kitchener and Cambridge. This is an important opportunity to quantify the urban

growth and land use changes shaped by the pending opening of ION. The key outcome of the UW researchers' contribution to the project will be an improvement on traditional assessments of public interventions and quantified correlations amongst conditions before and after government actions. Through an examination of the temporal patterns of changes, accompanied by qualitative input and quantitative modelling, the team hopes to move beyond the simple correlations examined in previous research to identify critical feedbacks that affect the rate and process of urban intensification.

2.3 Program Scope

2011 is the baseline year for the monitoring study because this was the year ION light rail transit system was announced by Regional Council, which officially confirmed that ION would be built. For each year after the completion of the baseline report until at least 2021, the Region of Waterloo intends to measure key indicators summarizing results for particular dimensions of interest. This first report provides the results of the baseline key indicator analysis against which future results will be compared. The baseline report includes key reference data for 16 indicators used to monitor the CTC prior to the opening of ION. Subsequent reports will provide updates of indicators as well as focus on selected indicator themes.

Shaping the Program Indicators

Indicators were developed in collaboration with subject area staff and categorized into the dimensions. Staff were consulted on the following:

- **Data sources:** The availability of regional, in-house, and external data sources that are credible and would be used to measure the indicators
- **Indicator methodologies:** Approaches to using the data in a meaningful way to derive metrics and or an index that explains a particular indicator quantitatively and qualitatively
- **Reporting Timeline:** The recommended timeline moving forward for reporting a particular indicator

Indicators were chosen to reflect a broad range of dimensions most affected by transit improvements. The dimensions were developed using the CBS as guidance, and consist of:

- Mobility
- Sustainable Modes of Transportation
- Compact and Vibrant Communities
- Art and Culture
- Heritage

- Investment
- Environment
- Crime and Safety
- Inclusive Community

Monitoring indicators that are relevant to these dimensions can inform whether ION is functioning to move people and build communities effectively. Indicators were also developed based on framing questions asked during the beginning stages of choosing indicators (Appendix A – Framing Questions). In choosing and finalizing the indicators, the indicator and its corresponding metric had to meet the following criteria:

- Measurable repeatedly over time
- Clear linkage to the impacts from investment in ION
- Based on reliable and credible data sources that are updated regularly
- Limitations in data and methodology not likely to significantly impact results
- Is relevant to a confluence of interests at the Waterloo Region level
- Reflects the intended level of geography

2.4 Data Collection

The monitoring program primarily uses data already available to the Region of Waterloo, through administrative and program databases. The study also makes use of existing data obtained from partners and local and or federal data collection efforts. Existing data is used to ensure cost-effectiveness. In instances where data is not immediately available, primary data collection is performed. For instance, data for the mode share (motorized) indicator was not immediately available for the baseline indicator. To monitor the number of automobiles and buses coming into and leaving the CTC, motor vehicle counts were undertaken in early March 2015, before the construction of ION began.

Geographic Scales of Data Collection

Most indicators are measured at the CTC scale to represent as much of the effects arising from ION as possible. Since the benefits from ION are expected to reach areas outside of the CTC, to monitor the full effect of the ION system in the community, baseline data was also collected at the regional scale for analysis, where available. This also allows for comparison of the change in the CTC with change that is occurring elsewhere in Waterloo Region.

Data reported at the regional scale typically refers to the tri-city area of Waterloo Region, excluding the townships. The emissions indicator has a regional scope due to limits on data availability and preferred methodology. The ridership (total transit ridership) indicator is collected wherever there is transit service coverage in the Region, which includes the service

coverage area in Woolwich Township. The indicator is reported on a regional scale to provide a broader perspective for measuring overall transit user activity. A second ridership (total activity) indicator was developed to complement the first ridership (total transit ridership) indicator by providing a measure of the boardings and alightings within the CTC in proportion to the Region.

2.5 Baseline Indicators

Although staff proposed an extensive list of indicators and metrics during the beginning stages of developing the monitoring program, only the metrics that could be uniformly collected, readily available over the long term, regularly updated, and best answered the framing questions were chosen and finalized to measure the indicators. However, some of the indicators cannot be measured annually and can only be measured every few years due to data availability constraints. Thus, some baseline indicators selected to monitor the CTC from 2011 to 2014 are not annual indicators. For instance the Cultural Vibrancy indicator can only be measured every five years as the data comes from the Region of Waterloo's Workplace Count, which the Region completes every five years. Since measuring the Arts and Culture dimension annually was an important aspect in the monitoring program, an annual indicator looking at the number of restaurants in the Region was developed to complement the Great Places to Visit indicator as the data for the number of restaurants can be obtained from the Region of Waterloo Public Health unit annually.

Sixteen baseline indicators have been developed through the CTC Monitoring Program, which provides a measure of the base situation within the CTC prior to the development of ION (Table 3). Where available, data for 2012, 2013 and 2014 were also examined. This provided a sense of annual variability in the indicators, a four-year perspective on the pre-construction phase of LRT, and in some cases a sense of change occurring in the CTC immediately subsequent to ION's announcement.

Table 3. Baseline Key Indicators

Opportunity	Dimension	Indicator	Metric
Moving People	Mobility	Transit Ridership	Number of trips made using Grand River Transit (R)
		Daily Transit Activity	Per cent of daily average transit activity which occurred in the CTC
	Sustainable Modes of Transportation	Transit Mode Share	Per cent of mode of travel share which was on transit
		Active Transportation	Per cent of mode of travel share which was pedestrian and cyclist
		Walkability	Per cent of population living in "high" or "very high" walkable areas
Building Community	Compact and Vibrant Communities	Land Use Mix	Per cent of all regional land uses which were found in the CTC
		Population	Per cent of region's residents who lived in the CTC
	Art and Culture	Cultural Vibrancy	Number of arts and culture establishments
		Restaurants	Per cent of region's restaurants
	Heritage	Heritage Resource Retention	Number of demolition permits on pre-1920 and designated built heritage resources
	Investment	Building Activity	Dollar value of building permits
		Assessment Value	Assessed value of properties
	Environment	Emissions	Tonnes of net air emissions per capita (R)
	Crime/Safety	Perception of Safety	Per cent of people who perceive that their downtowns are safe at night
		Calls for Service	Per cent of police calls for service which were related to potential public perception
	Inclusive Community	Home Ownership Affordability	Per cent of housing transactions which were affordable to low and moderate income households
(R) – measured at a Regional scale			

2.6 Annual Indicators

During the development stage of the indicators, metrics were selected based on data availability that could be retrieved on an annual basis. Although the metrics may not fully describe the complexity of the indicator and theme, they are reliable metrics that can be tracked, monitored, and analyzed regularly with confidence. The monitoring program intends to continue to collect, store, and disseminate data and corresponding analysis in reports on an ongoing basis until at least 2021.

The annual indicators have been refined and developed for reporting purposes on an on-going basis. This means that:

- There is a linkage between the metric and rapid transit investment in the CTC
- The methodology has been developed and approved by subject area experts
- Useful and reliable data from credible sources have been collected and analyzed
- The indicator can be measured within the CTC on an annual basis

2.7 Themed Indicators

During the process of selecting indicators for monitoring the baseline, metrics and indicators that have not fully met the criteria for finalization were organized and grouped under themes for further scoping. In addition to the core annual indicators, the themed indicators are important for future monitoring purposes in the monitoring program. However, the potential metrics or data sources for the themed indicators have not been fully explored as much as the baseline and annual indicators. The development of the themed indicators adopts the same process of consultation that was used to develop and finalize the baseline and annual indicators for this report. Some of the themed indicators are more refined than others. Themed indicators are still undergoing development and finalization.

The Region of Waterloo proposes to focus on a selected dimension for more in depth review each year, by developing themed reports. The themed reports will provide detailed information and trends on a set of indicators that are contained in that dimension. The Region of Waterloo has outlined the proposed reporting schedule each year starting from 2016 and the indicators that are intended to be measured in those years. In 2021, a comprehensive 10 year review is proposed (Table 4).

Table 4. Proposed Reporting Schedule Themes and Related Indicators

Reporting Year	Dimension	Potential Indicator
2016	Environment	Public Greenspaces Energy use Protection of countryside Emissions
2017	Investment	Land values Investor Confidence Vacancy Public Sector Investment Revenues
2018	Mobility Sustainable Modes of Transportation	Way-finding Vehicular Miles Efficiency Mode Share Active Mobility Connectivity Walkability
2019	Vibrant Communities Art and Culture Heritage Architecture and Design	Density of Population and Employees Cultural Employment and Clustering Employment Density Great Places to Visit Creative Public Spaces Streetscapes High Quality Urban Places Surface parking lots
2020	Inclusive Community Crime and Safety	Social Support Agencies Rental Affordability Perception of Safety Traffic Accidents
2021	10 Year Review	

The scheduling of themed indicators in certain years is to accommodate the time lag between implementation of ION and changes occurring in the community. For instance, it is unlikely to see significant and meaningful changes in the mobility and sustainable modes of transportation indicators immediately after the opening of ION. Thus waiting until 2018 to measure those dimensions could provide enough time to capture the beginning of change in the community as residents become acquainted with ION and other improved transit options. Monitoring the changes in mobility patterns after ION is in operation offers a view into the benefits that rapid transit offers in the CTC and Region.

In addition, the reporting schedule was organized in a way that accounted for the time that data would be available for the indicators, such as the data which is available only after the 2016 census.

The themed indicators help to focus on particular dimensions of interests and provide an opportunity to present the dimension and relevant indicators in a more robust way. The annual indicators complement the themed indicators as they provide a general overview of how conditions compared to the baseline year.

Reporting

Baseline Report

This baseline report is the first report that provides a detailed analysis of the baseline status of the CTC against which to compare future analysis efforts. The data presented within this report is strictly collected prior to the operation of stage one of ION. Using the year that ION was approved by Regional Council (2011) as the base year, a set of 16 core indicators were developed to monitor the dual goals of moving people and building community in the CTC. In some cases where data was available and collected for 2012, 2013 and 2014, the report additionally includes these three years in the baseline.

Annual Reports

It is intended that the Region of Waterloo will annually produce results from the monitoring program for the set of annual indicators. The indicators that will be reported on each year will offer an insight into themed indicators. Reporting on the annual indicators every year will also provide a comparative picture measurable against the one established in this baseline report. While the first report on the baseline indicators are meant to track the state of the CTC before any effects from the ION system has taken place, the annual and themed indicators serve to demonstrate the early effects of the ION system.

Reporting for the annual indicators allow the development of trend lines for those indicators that are more easily measureable over time as ION is in operation. However, some measures can fluctuate from year to year due to external factors not relevant to rapid transit investment. It is important to address these factors when reporting indicators.

Reporting of the indicators requires ongoing communication and feedback across all key departments, subject area experts, and academic partners. This will ensure that needs and opportunities surrounding the development of the indicators are identified and addressed as soon as possible. A monitoring schedule for the indicators will help the Region refine and prioritize indicators for reporting each year.

3. Monitoring Results and Analysis

The 2011 baseline year results from the monitoring program are presented in Table 5.

The next sections of this report present the indicators in detail, including:

- the importance of the indicator
- data and methodology used to calculate the indicator
- results of the calculation
- analysis of the results, and discussion of influencing factors
- current literature on the indicator and discussion of its relationship to light rail transit

Since ION lines have not yet been open for service, these results do not reflect the direct effects of ION infrastructure, but may show indications of change in the CTC in anticipation of the infrastructure.

It is also recognized that there are many factors that influence each of these indicators. The economy, policies and political decisions at many levels of government are large influences on change in the Region, both inside the CTC and well as more broadly. On the negative side, a local school board decision which changed its use of GRT buses for students has caused a decline in total transit ridership in 2014. Conversely, large financial incentive programs such as Kitchener's Economic Development Investment Fund have greatly influenced development in Kitchener's core areas. Further, the growth of the tech sector with its propensity to locate in reimagined spaces has contributed to re-urbanization.

Table 5. Baseline 2011 Index for the CTC Monitoring Program				
Opportunities	Dimension	Indicator	Metric	Indicator Value (2011)
Moving People	Mobility	Transit Ridership	Number of trips made using Grand River Transit (R)	19.7 million
		Daily Transit Activity	Per cent of daily average transit activity which occurred in the CTC	67%
	Sustainable Modes of Transportation	Transit Mode Share	Per cent of mode of travel share which was on transit	5% (2015)
		Active Transportation	Per cent of mode of travel share which was pedestrian and cyclist	5%
		Walkability	Per cent of population living in "high" or "very high" walkable areas	55%
Building Community	Vibrant Communities	Land Use Mix	Per cent of all regional land uses which were found in the CTC	69%
		Population	Per cent of region's residents who lived in the CTC	17.5%
	Art and Culture	Cultural Vibrancy	Number of arts and culture establishments	722
		Restaurants	Per cent of region's restaurants	51%
	Heritage	Heritage Resource Retention	Number of demolition permits on pre-1920 and designated built heritage resources	13
	Investment	Building Activity	Dollar value of building permits	\$486 million
		Assessment Value	Assessed value of properties	\$10 billion
	Environment	Emissions	Tonnes of net air emissions per capita (R)	2.4
	Crime/Safety	Perception of Safety	Per cent of people who perceive that their downtowns are safe at night	65%
		Calls for Service	Per cent of police calls for service which were related to potential public perception	39%
	Inclusive Community	Home Ownership Affordability	Per cent of housing transactions which were affordable to low and moderate income households	62%
(R) – measured at a Regional scale				

3.1 Moving People

Moving people is the first overarching goal of ION. The implementation of ION, together with the reorientation of the current conventional system to a grid network, a new pattern of iXpress corridors to extend express bus transit service, and investments in active transportation networks to make it easier to walk and cycle are all expected to contribute to enhanced movement of people throughout the CTC.

3.1.1 Dimension: Mobility

3.1.1.1 Indicator: Total Transit Ridership

Baseline

19,721,966 trips were made across Waterloo Region using Grand River Transit in 2011.

Importance

Total transit ridership - measured as the annual number of trips taken on transit – is widely reported by the Canadian Urban Transit Association (CUTA) and is a familiar metric in transit planning. In Waterloo Region, trips are currently measured by the number of fare paying passengers that use Grand River Transit (GRT). It is anticipated that implementation of high frequency, reliable transit through ION will increase total system-wide ridership.

Methodology

Total transit ridership includes all trips for which the fare system applies, including those paying full fare, reduced fare, riding free or with passes/tickets purchased by other agencies (such as the school board). The GRT ridership indicator is calculated based on daily data obtained from the electronic fare boxes on buses, as well as the sales of various passes. All data is summarized annually for reporting to CUTA, and is consistent with ridership figures reported by municipalities across Canada. For more information on the methodology for calculating ridership, please refer to the Canadian Transit Fact Book (CUTA, 2012)

Results

Total transit ridership in 2011 was 19.7 million trips. As shown in Table 1, ridership grew 9.5 per cent over the three year period between 2011 and 2014, to over 21.5 million trips. In fact, it had increased to 22 million trips in 2013, but dipped slightly in 2014 when a change in school board busing services affected student ridership number on GRT. On a per capita basis, total transit ridership in the service area grew from 45.6 to 49.7 over the three years. The transit service area is defined as the number of people who live within 450 meters (approximately a five minute walk) of a transit route, and therefore changes as routes are added, removed or altered.

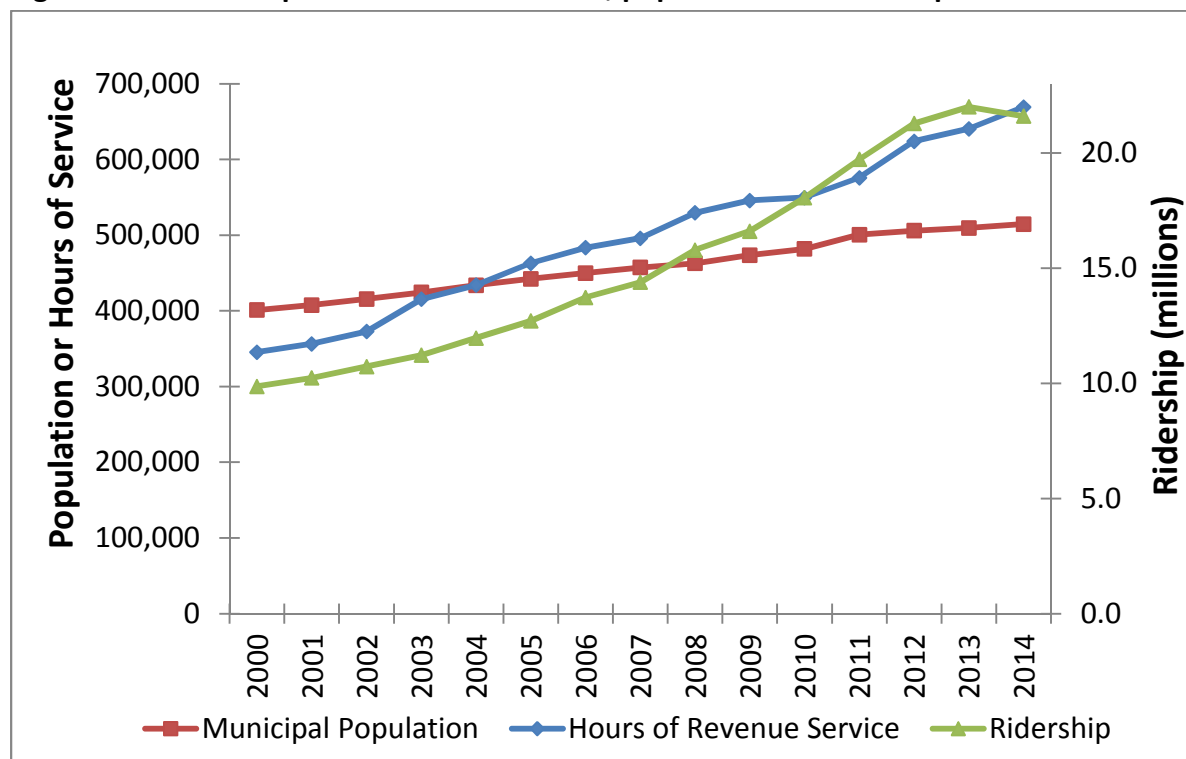
Table 1. Total Transit Ridership per capita within the Transit Service Area from 2011 to 2014

	2011	2012	2013	2014
Total Transit Ridership	19,721,966	21,274,042	22,000,737	21,596,989
Municipal Population (for settlements with bus service)	500,700	505,920	509,445	514,611
Transit Service Area Population	432,266	438,563	435,780	434,437
Total Transit Ridership per capita (Service Area)	45.6	48.5	50.5	49.7

Analysis

Over the long term, regular increases in transit service levels including implementation of the iXpress service strategy have resulted in steady ridership increases. Between 2000 and 2014, GRT's annual ridership rose from 9.9 million to 21.6 million annual trips. This significant ridership growth has been driven by major investments in new and improved transit service. With ridership growth considerably outpacing population growth in the municipalities where bus service is offered, as shown in in Figure 1, this suggests that, on top of population growth, transit service level is a key driver of ridership.

Figure 1. Relationship between service hours, population and ridership



It is anticipated that as population increases within the service areas (as reurbanization rates meet or exceed the target of 45 per cent of all growth), and service improvements are made (through ION implementation as well as new cross corridor routes which are being implemented as part of the GRT business plan in 2014-2018), that transit ridership will continue to increase. While service changes can produce some immediate effects on people's travel choices and commuting patterns, it may take a few years for people to get used to, and take advantage of, wider system changes that ION will bring.

What does the literature tell us?

Transit Ridership Authors: Yeung, K., Casello, J., Jin, X.

Transit ridership - measured as the annual number of trips taken on transit – is a common indicator that reflects the level of transit utilization in a city (Vuchic, 2005). This metric is often represented per capita (of population within the transit service area). Major world cities have transit ridership that reflects the availability of high quality transit service (Vuchic, 2005); for example in 2012, Toronto had a transit ridership of 184 trips per capita (CUTA 2012), Singapore had 182 trips per capita (on their rapid transit portion of their system), New York City had 422 trips per capita (National Transit Database, 2015). Small and medium sized North American cities have lower transit ridership than their European counterparts due to historic reliance on the automobile for transport (Vuchic, 2005); however, recent investments in transit in these cities show a positive trend in increasing ridership (Vuchic, 2005). Looking at all modes of transit in the city, between 1996 and 2012, Vancouver increased its transit ridership from 79 to 102 trips per capita, Ottawa from 100 to 120 trips per capita (CUTA, 1996 & 2012) Denver from 33 to 38 trips per capita and Minneapolis from 30 to 45 trips per capita (National Transit Database 2015).

A change in transit ridership could be the result of a number of factors including external, built environment, and transit service characteristics. External characteristics are those that are outside the direct control of the municipality and transit agency. In a cross-sectional study of 265 urbanized areas in the United States, Taylor et. al. (2009) found that higher transit ridership is largely associated with external factors such as larger population size, lower household income, and higher percentages of students or immigrants. Another study by Haire and Machemehl (2007) found an association between growth in fuel prices and growth in transit ridership.

The characteristics of a city's built environment that have been relevant to travel demand and mode choice are typically organized into the following categories: population or employment density, diversity of land use, and the design of streetscapes. The impact of each of these built environment variables on transit ridership has had mixed results. Some, like Newman and Kenworthy (2006), have shown in a study of Los Angeles that there is a strong and significant relationship between population density and transit ridership. Cervero and Kockelman (1997) found that areas with higher densities, diverse land uses, and grid patterned street networks were moderately associated with higher transit, cycling and walking trips. However, a meta-analysis of travel and built environment studies by Ewing and Cervero (2010) showed that, in general, built environment variables have very marginal impacts on overall travel behaviour, but suggested that there may be some positive associations between transit use and

combinations of built environment variables, such as proximity to transit, street network design and land use diversity.

While recognizing that both external and built environment factors have some influence over transit ridership, the provision of rapid transit services, such as light rail, has a role in increasing utilization of transit. Rapid transit systems that improve travel time reliability and increase frequency of service ultimately increase the attractiveness and ridership of public transit (Redman et. al., 2013). Hensher et. al. (2010) explored how reliability may be improved through the provision of exclusive transit lanes, which resulted in an increase in ridership. Moreover, in a study of 26 bus rapid transit systems, Levinson et al. (2003) found that improved service frequencies in those systems led to ridership increases.

The provision of light rail transit has been shown to significantly increase transit ridership within and beyond the rapid transit corridor. Cao and Schoner (2014) conducted a study of the new light rail line in Minneapolis and observed a significant (up to 80 per cent) increase in ridership along the new light rail corridor, compared to other corridors in Minneapolis with similar built environment and transit service characteristics. Cao and Schoner further acknowledged that their study did not account for transit riders that arrived to the corridor from feeder bus services, and suggested that their study may underestimate the regional impact of light rail services. This argument is further supported by Jaroszynski and Brown (2014) who studied eight American metropolitan areas with light rail transit systems, and found that light rail transit networks with integrated feeder bus networks have overall higher transit ridership.

These studies show that transit ridership is a function of a number of factors, some that are outside the Region of Waterloo's control, and others that are within the jurisdiction of Region's land use and transit planners. While it may be complex and difficult to attribute transit ridership to an isolated factor or characteristic, the measurement of transit ridership is an important indicator of the overall effect of the Region's policies and efforts for ION and the CTC.

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3.1.1.2 Indicator: Total Daily Transit Activity

The Baseline

67 per cent of the daily average transit activity occurred within the CTC in 2011.

Importance

Total transit activity within the CTC is defined by the total daily number of people who get on or off a Grand River Transit bus inside the CTC. People living outside of the CTC may commute into the CTC for work and other activities. Similarly, people who live within the CTC may use transit to take them to their destination away from the core.

Methodology

The month of November in 2011 was used for analysis as it is a representative month in the year for ridership. To get the total activity for the whole Region, all boardings and alightings values for all active stops was summed for the whole day and then averaged over the total number of days for which the data was collected. Then to get the total activity within the CTC, all stops that lie completely within the CTC boundary were selected and summed. This was then calculated as a percent value.

The data for the ridership information comes from MOBILEstatistics, which allows for Automatic Passenger Counter (APC) data queries to be made and downloaded. The procedures to create the final “total activity” data involve first querying and formatting ridership data by route, then further summarizing this data into a stop by stop ridership summary. The product of these procedures is a daily average ridership value or total activity. This is calculated by summing the number of boardings and alightings for every bus stop that is active for a conventional route. Boardings are the number of people who get on the bus and alightings are the number of people who get off the bus.

Results

In 2011, the number of people who got onto or off a bus on an average day (transit activity) within the CTC was 108,291, while the GRT’s total service area transit activity was 162,130. Therefore, approximately 67 per cent of all daily ridership activity for the month of November 2011 occurred within the CTC.

Analysis

Total daily transit activity within both Waterloo Region and the CTC has been increasing steadily between 2011 and 2014 (Table 1 and Figure 1). There was a three year growth of 10.1 per cent

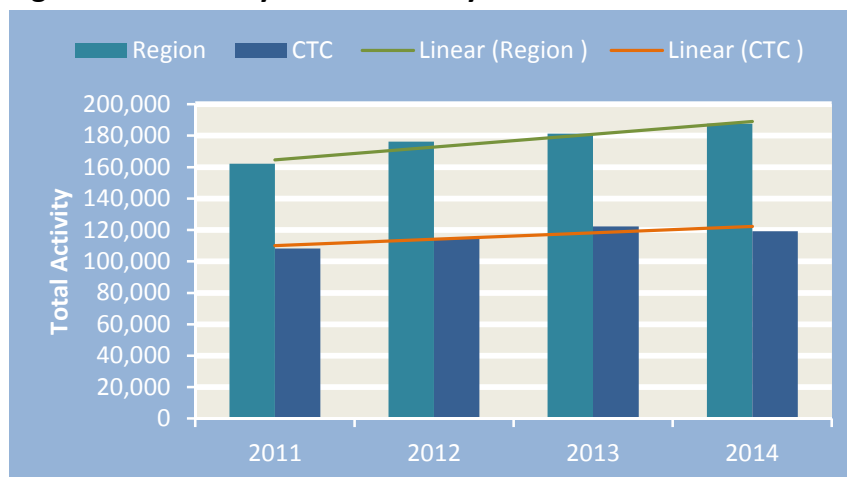
in total activity within the CTC from 2011 to 2014. Three year growth in Waterloo Region was 15.7 per cent.

The percentage of activity within the CTC is affected by several factors. For example, service cuts, new routes such as the 203 iXpress, and decreased student enrolment numbers of at the Universities have affected ridership numbers and patterns.

Table 1. Total Daily Activity within the CTC from 2011 to 2014

Year	2011	2012	2013	2014
Region Total Activity	162,130	176,160	181,332	187,619
CTC Total Activity	108,291	114,917	122,199	119,248
Per cent in CTC	67%	65%	67%	64%

Figure 1. Total Daily Transit Activity from 2011 to 2014



What does the literature tell us?

Transportation accessibility, a complement for land use diversity Authors: Fard, P. & Babin, R

Accessibility, as the ability of people to reach their destinations of choice to undertake day to day activities, is the critical interface between land use and transport system interactions (HiTrans, 2005).

Transportation accessibility influences the people's choice of location, where they reside, work, study, shop, and find entertainment, so accessibility provision as a public good has been a longstanding goal in the context of urban planning (Hodgart, 1978). However, it was just recently that integrated planning approaches like Smart Growth and Transit Oriented Development (TOD) have suggested frameworks to provide variety of transit choices in

conjunction with and as “equally important” as general accessibility provision (Curtis, Renne, & Bertolini, 2009; Handy & Niemeier, 1997).

In practice, transportation decisions often involve trade-offs between mobility and accessibility, where making decisions in favor of mobility will result in more car dependency, dispersion of activities over space, and a lower accessibility level (Litman, 2015). Although the adverse consequences of this approach are apparent and there is a great deal of interest in shifting to public transit development, there remain various zoning, taxation, parking and fuel pricing policies that support mobility and car dependency at the cost of depreciated public transit and a loss of opportunities for non-motorized transit development (Kenworthy, 2007; Litman & Burwell, 2006).

Overall, the notion of accessibility is a broad concept that can be interpreted through a variety of lenses (Bertolini, le Clercq, & Kapoen, 2005). Banister and Berechman (2003) provide a framework to understand the economic effects of accessibility and investment in transportation at different scales. Similarly Vickerman et al. (1999) try to assess economic effects of improved accessibility and transportation infrastructure by developing a time-space accessibility measure. Tsou et al. (2005) also employ an accessibility measure to investigate social equity and distribution of public facilities. Banister, Anable (2009) and Booth (2012) discuss environmental impacts, climate change and energy use issues associated with transportation infrastructure and suggest better accessibility provision as a potential solution.

At a micro scale, Stegman (1969) and Chen et al. (2008) describe housing consumers behavior by contrasting housing and neighborhood characteristics with accessibility attributes and the relative location. Further, Zondag and Pieters (2005) suggest that although accessibility has a significant role in residential location choices, however, relative to the demographic and neighborhood characteristics, it is less influential.

Van Wee et al. (2001) highlight that the attractiveness of residential locations is not only determined by accessibility to the potential job locations but also with the level of competition in the local job market. Moreover, Mejia-Dorantes et al. (2012) look at the impacts of transportation infrastructure on firm location and accessibility to jobs, and conclude that introduction of a new rail transit, can result in a more concentration of spatial clustering of economic activities towards station locations.

In terms of analytical approaches, while Geurs and van Wee (2004) explore main perspectives on accessibility analysis in literature and suggest nine specific accessibility measurement methods based on different spatial, temporal, social and economic components. Further and with a more operational view, Hull et al. (2012) discuss accessibility measures as planning instruments and introduce an inventory of 31 different dimensions from spatial and temporal

scales to information flow, travel route choice, fare prices, and schedules as characteristics of a functional accessibility measurement practice.

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3.1.2 Dimension: Sustainable Modes of Transportation

3.1.2.1 Indicator: Transit Mode Share

Baseline

5 per cent of mode of travel share was transit across the CTC in 2015.

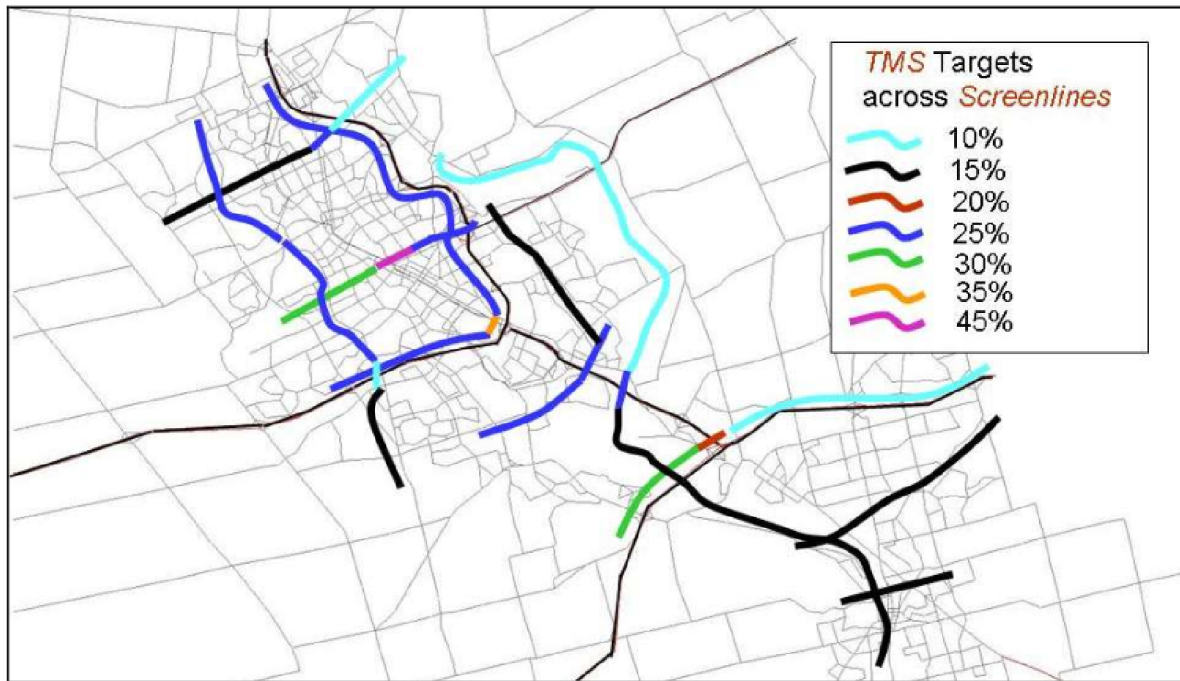
Importance

The Regional Transportation Master Plan (RTMP) provides a comprehensive planning framework for sustainable transportation in Waterloo Region, and presents an ambitious but realistic action plan. Rapid Transit within the CTC is the foundation of the RTMP, and the ION system will support the built-form objectives developed in the Provincial Growth Plan and in the ROP. An enhanced network of express and local bus routes integrated with the ION system and improvements to the active transportation network will further enhance transportation choice. It is anticipated that as transit choices are expanded, the share of those driving single-occupant vehicles will decrease proportionally as people shift to non-automobile, sustainable modes of transportation.

Methodology

The introduction of the ION and supportive conventional transit, as proposed in the RTMP, is projected to increase the overall transit mode share from 2011's Region-wide four per cent to about 17 per cent of peak period motorized trips in 2031, and will significantly increase the share of trips made by transit within the CTC. Motorized trips do not include walking and cycling. The 2031 PM peak period TMS mode share for the Region, considering all trips, is 14.8 per cent. Accordingly, the RTMP proposed the highest TMS targets in the CTC, and these targets decline towards the outer edges of the urban area (Figure 1)

Figure 1: Recommended PM Peak Hour Transit Mode Share Targets

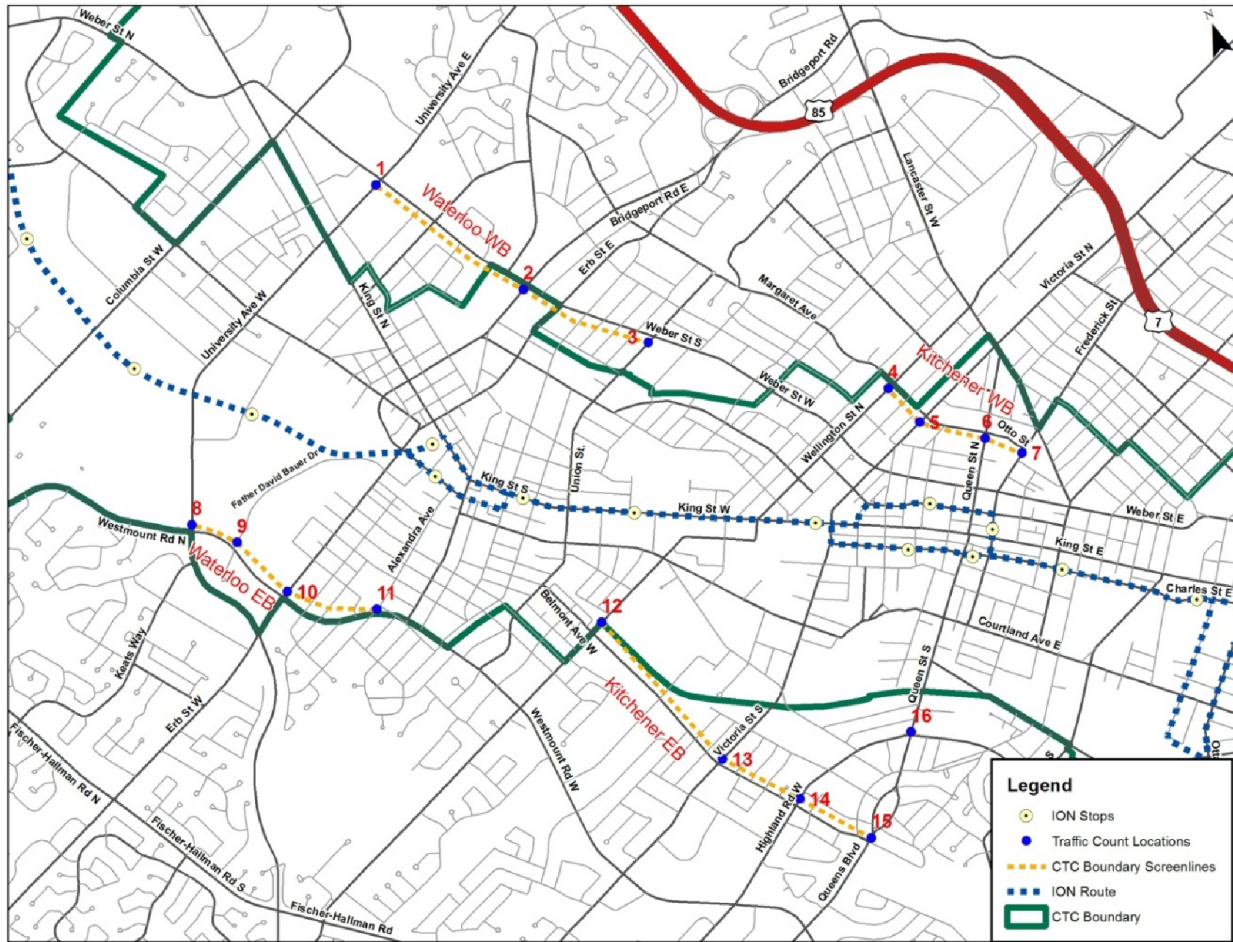


TMS targets are usually expressed as the desired percentage of travel on transit on all facilities crossing a line on the map known as a screenline. The screenline may be a barrier such as a river, railway line or freeway or simply an imaginary line on the map that separates different land uses or areas in a community. A screenline is crossed by a limited number of roadways and is therefore useful for determining current and future peak hour demands across a specific location on an aggregate basis.

In order to calculate the current share of trips made by transit inbound and outbound of the CTC, traffic counts were conducted in the beginning of March 2015 at 16 intersections that lie along the boundary of the CTC. The beginning of March was chosen to get an idea of the TMS crossing the CTC before the major start of spring and summer construction for ION, which would disrupt regular traffic patterns.

These traffic counts were used to establish a series of north/south screenlines that bound the CTC, which are shown in Figure 2. These north/south screenlines were used as a means to report the outbound and inbound east-west auto person and transit person trips crossing the screenlines, into and out of the CTC. The PM peak period is typically the more critical period for auto travel on the road system, and is thus used for determining the required future road network capacities. Therefore, to minimize the future road system expansion needs, the RTMP sets TMS targets for the PM peak period. For this reason, only the PM peak period was considered when calculating the transit mode shares across the screenlines presented in Figure 2.

Figure 2: Screenlines Bounding the CTC



Auto vehicle counts for the PM peak period were converted to auto person (driver and passenger) trips using average vehicle occupancies of 1.21 (persons per vehicle). Transit counts were developed by recording the number of bus movements through the intersections during the PM peak, and subsequently summing the actual passenger loads on the buses, as provided by the Region's AVL/APC system. These two numbers (i.e., auto person trips and transit person trips) were summed and used to calculate the motorized transit mode share at each intersection, which was then aggregated at the screenline level.

Results

The TMS at each intersection, and the overall TMS for the individual screenlines presented in Figure 2, are presented in Table 1. The TMS for each screenline is reported based on direction of travel, and the combined direction is an average of the eastbound and westbound transit mode share.

Table 1: Transit Mode Share Across Screenlines (By Direction) (2015 PM Peak Period)

Screenline	Count #	Count Location	PM Peak Hour Transit Mode share Per cent (TMS)		
			Eastbound	Westbound	Combined Directions
Waterloo WB	1	Weber @ University Ave E	9%	14%	11%
	2	Weber @ Bridgeport Rd E	0%	0.5%	0.5%
	3	Weber @ Union St E	3%	4%	3%
		Total	6%	5%	6%
Kitchener WB	4	Margaret @ Wellington St N	14%	16%	15%
	5	Margaret @ Victoria St N	0%	0%	0%
	6	Margaret @ Queen St N	8%	7%	8%
	7	Lancaster @ Frederick St	3%	3%	3%
		Total	4%	4%	4%
Waterloo EB	8	Westmount @ University Ave W	18%	8%	11%
	9	Westmount @ Father David Bauer Dr	0%	0%	0%
	10	Westmount @ Erb St W	4%	2%	3%
	11	Westmount @ Alexandra Ave	0%	0%	0%
		Total	11%	5%	7%
Kitchener EB	12	Belmont @ Glasgow St	8%	2%	4%
	13	Belmont @ Victoria St S	3%	1%	1%
	14	Belmont @ Highland Rd W	3%	1%	2%
	15	Belmont @ Queens Blvd	9%	5%	7%
		Total	5%	2%	3%
-	16	Highland @ Queen St S	16%	7%	10%

Based on the numbers presented in Table 1, the average eastbound, westbound and combined direction PM Peak Period Transit Mode Share across all screenlines in Figure 2 is reported in Table 2.

Table 2: Average Transit Mode share across all Screenlines (2015 PM Peak Period)

Direction	Transit Mode Share (Per cent)
Eastbound	6%
Westbound	4%
Combined Direction	5%

Analysis

Many different strategies to increase transit use have been identified and implemented with varying degrees of success across Canada. Where success has been achieved, there has often been a strong commitment to measurable targets in terms of peak period transit market share. By adopting a transportation strategy that focuses on the achievement of peak period transit

mode share (TMS) targets in critical corridors, a community can use its limited transit investment resources where they can be most effective.

TMS targets are the share of travel in the peak hours that must be made on transit in the future if the planned road system is to work in an acceptable manner. The higher the TMS target, the smaller the amount of new road capacity that will need to be added in the future for an acceptable level of transportation service. TMS targets provide a focus for short and medium term transportation and land use decisions and investments as well as a feedback mechanism with which to monitor and track progress and thus to adjust the transportation program to improve its effectiveness as circumstances change.

3.1.2.2 Indicator: Active Transportation

The Indicator

5 per cent of mode of travel share was pedestrian and cyclist in the CTC in 2011.

Importance

Creating a more walkable and bike-friendly environment fits with the vision of the Regional Official Plan for the community and transportation system to be inclusive, thriving, sustainable, integrated, accessible, safe and healthy. The Region has committed to ensuring that the health and social benefits of an active lifestyle direct transportation planning decisions. Trails and streets act as important transportation links while providing access to various businesses, public institutions, commercial and residential properties. Most ION stops are located within close proximity to the Region's active transportation network. The most walkable neighbourhoods are characterized with adequate cycling lanes and continuous sidewalks. An increase in available walking and cycling infrastructure over time promotes an increase in the number of people using the infrastructure, giving sustainable modes of transportation a higher likelihood of being chosen.

The RTMP plans for various transportation modes to be used in different proportions known as mode shares. Mode shares represent the percentage of people using that mode to get around in a typical afternoon. The Region aims to reach a nine per cent mode share for walking and three per cent mode share for cycling for PM peak period trips by 2031. This target is the driving goal of the Region's Active Transportation Master Plan (ATMP). This 12 per cent active transportation mode share target is based on complementing the transit mode share targets in the RTMP and minimizing the road expansion requirements over the next 20 years.

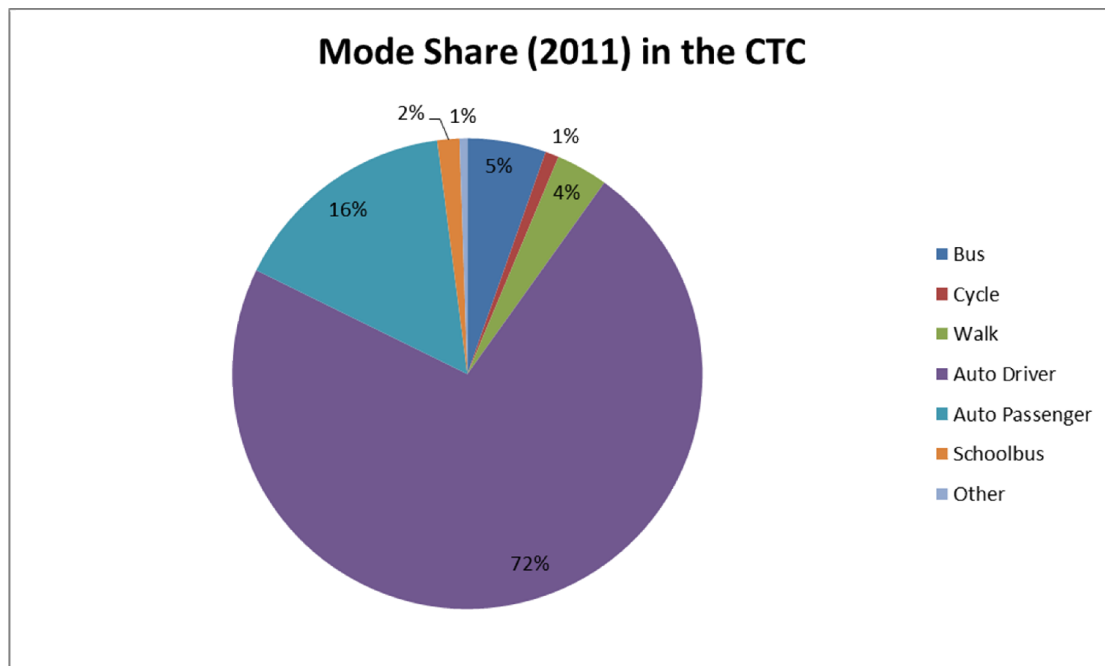
Methodology

For the purpose of this report, the 2011 Transportation Tomorrow Survey (TTS) was used to determine the mode share for cycling and walking in the CTC. The TTS is a household travel survey for which a sample of residents of the Greater Toronto and Hamilton Area (GTHA) are contacted and asked about the details of each trip taken by each member of their household during a selected twenty-four hour period. The cycling and walking mode share was computed for the CTC.

Results

The results indicate an active transportation mode share of five per cent in the CTC, for 2011 as illustrated in Figure 1.

Figure 1 – Mode Share in the CTC in 2011



Analysis

The TTS typically underestimates transit and active transportation mode shares because of the small sample size used in the survey. Currently, pedestrians and cyclists are mainly counted through intersection turning movement counts. However, these intersection turning movement counts are done on different days and times throughout the year, and a specific intersection is typically only counted once every three years. Furthermore, cyclist counts at intersections only include totals for the eight hour period of the count and lack directional information. This makes it challenging to derive a reliable indicator for walking and cycling in the CTC.

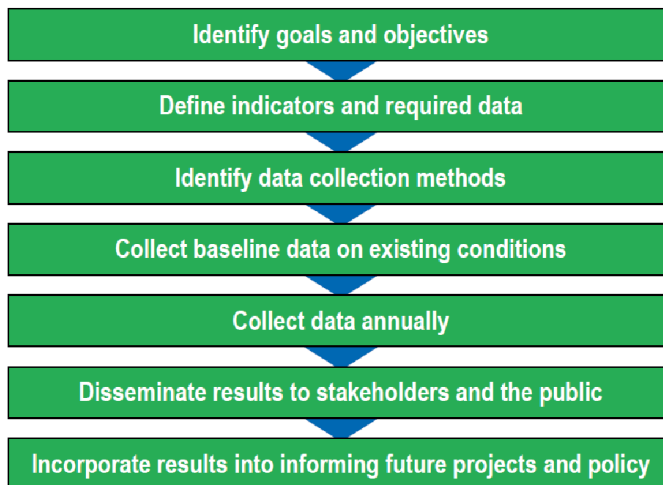
The ATMP makes recommendations to adjust the on-going data collection efforts in the Region so that they incorporate active transportation in a way that allows them to monitor the goals of the ATMP. The following are recommendations made in the ATMP for a strategy for monitoring and evaluating the impacts of the Region's active transportation initiatives:

- The Region of Waterloo should investigate the feasibility and costs of adding turning movement counts for cyclists in 15 minute intervals to standard regional counts as part of preparing the next count program terms of reference. Cyclist counts disaggregated into 15 minute increments would allow a better understanding of existing and changing cycling travel patterns relative to other modes.

- The Region of Waterloo should establish a set of screenlines on key corridors where all modes will be counted annually and investigate the feasibility and costs of adding pedestrian and cyclist characteristics to these screenline counts.
- The Region of Waterloo should install permanent bicycle or active mode counters in at least three locations.

The Region of Waterloo is committed to increasing transportation choice and promoting active living. The Region's Active Transportation Master Plan (2014) ensures transportation design choices will prioritize walking and cycling within future high density growth nodes and transit station areas.

The ATMP also presents a strategy for monitoring and evaluating the impacts of the Region's active transportation initiatives based on the goals of the ATMP. The recommended process for monitoring and evaluating follows the flow chart shown below:



A series of indicators to measure progress are also outlined in the ATMP. However, data-collection efforts to monitor these indicators would require additional resources in some cases.

It would be beneficial to co-ordinate data collection efforts between the Region and Area Municipalities to maximize the benefits of data collection investments and increase the prominence of cycling data collection as a whole. The City of Waterloo currently has Eco-counters installed at the following locations, for the purpose of counting cyclists and pedestrians:

- Iron Horse Trail south of John St.
- Waterloo Park Pedestrian Bridge
Laurel/TransCanada Trail:
- Directly north of Columbia St.

- Directly south of Bearinger Rd and east of Westmount Road
- At the bicycle signal at Erb St and Peppler St
- Between Bridgeport and Weber St.
- Through Hillside Park north of University Avenue
- Waterloo Trail west of AMCC.

This data is also readily available on their Open Data and City websites. Indicators reported include total number of cyclists and pedestrians counted since the Eco-counter was installed, and hourly, daily and monthly averages.

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Region of Waterloo. (2014). *Walk Cycle Waterloo Region*. Kitchener, ON. Retrieved from <http://www.regionofwaterloo.ca/en/gettingAround/resources/ATMPFebruary2014forweb.pdf>

What does the literature tell us?

Mode Share: transport options to travel to destinations in and around the CTC Authors: Yeung, K., Casello, J., Jin, X.

With the introduction of light rail transit in Waterloo Region, it is expected that residents will have additional transport options to travel to destinations in and around the CTC. These options include the new light rail transit, plus either walking, cycling, or driving to and from the corridor. It is anticipated that with the introduction of light rail transit, the non-auto mode shares should increase as automobile travel decreases. Based on the 2011 Transportation Tomorrow Survey, the Region of Waterloo currently has a six per cent transit mode share, and a seven per cent bicycle and pedestrian mode share (Data Management Group, 2011). By 2031, the Region would like to achieve a 15 per cent transit mode share and a 12 per cent bicycle and pedestrian mode share (Region of Waterloo, 2011). Regular monitoring of non-auto mode shares will help the Region to determine whether or not it will meet its 2031 targets.

In order to reduce dependence on the automobile, one of the primary objectives of transit oriented development is to increase the utilization of public transit as well as active modes of transportation—walking and cycling. Initial work by Cervero and Kockelman (1997) supported this idea that compact, diverse and pedestrian-oriented built environments can influence a reduction in automobile travel. Newman and Kenworthy (2006) also suggested that clusters of

people and activity near transit stations can reduce automobile dependence. There have been numerous other studies that explore the relationship between transit oriented developments and travel behaviour. Ewing and Cervero (2010) reviewed over 200 studies on this topic. The results of their meta-analysis were mixed: the change in built environment variables (such as density) had marginal impact on travel behaviour. Another study by Lee and Senior (2013) also challenged the notion that the provision of light rail transit reduces automobile dependence. In their study of four English cities, Lee and Senior determined that while transit ridership increased along the light rail corridors, automobile ownership did not decrease. However, both studies acknowledged that travel behaviour change from transit investments is more successful when integrated with a denser road network design (Ewing and Cervero, 2010) and investments in pedestrian and cycling infrastructure (Lee and Senior, 2013). Based on this literature, it is reasonable to anticipate that the transit mode share may increase with the introduction of the new rapid transit corridor, but further work needs to be undertaken to ensure that the Region attains their targets for all non-auto mode shares.

Several recent studies have explored this connection between the provision of infrastructure and the increase of mode share for pedestrians and bicycles. Taylor and Mahmassani (1996) found in a stated preference survey that the provision of bicycle lanes would encourage inexperienced cyclists to bike to their local transit station. Winters et al. (2011) determined that bicycle infrastructure that is physically separated from vehicle traffic is also an important motivator for cycling in the City of Vancouver. Monteiro and Campos (2012), in their study of metro stations in Rio de Janeiro, extended this idea to the relationship between pedestrian and bicycle infrastructure and transit. They concluded that the presence of sidewalks and bicycle lanes are both important indicators of pedestrian and cyclist access to transit stations.

From these studies, it is clear that the provision of pedestrian and bicycle infrastructure supports the increase of all non-automobile mode shares. Therefore, it is important that the Region of Waterloo also regularly monitor and evaluate the length of pedestrian and bicycle infrastructure that has been constructed within the CTC.

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3.1.2.3 Indicator: Walkability

The Indicator

55 per cent of the population living in the CTC lived in “high” or “very high” walkable areas in 2011.

Importance

Walkable neighborhoods are generally characterized by high residential density with a mixture of land uses and small block sizes that make it easy and pleasing to walk in. Having a variety of destinations to walk to encourages more active transportation and results in lower rates of vehicle ownership. Areas of the CTC that are considered high walkable neighborhoods have better transportation choice and see more people walking, cycling and taking transit. The higher rates of physical activity by people choosing active modes of transportation lead to lower rates of chronic disease and better overall health.

Methodology

The most walkable areas of the CTC were determined from the NEWPATH study that was performed in 2009, which assessed the walkability of Kitchener, Waterloo and Cambridge. There were five walkability categories created: very low, low, moderate, high, and very high. In this report, those areas categorized as high or very high will be considered together as the “most walkable” areas. Population was estimated in the most walkable areas to arrive at the percent of the population within the CTC that were living in most walkable areas from 2011 to 2014. The total population was estimated for year end 2011, and include students who live temporarily in the Region while studying at a post-secondary institution.

Results

In 2011, 55 per cent of the total population in the CTC was living in either very high or high walkable areas (Table 1). This is made up of 23 per cent living in very high walkable areas, and 32 per cent living in high walkable areas. Of the remaining 45 per cent of the population living in the CTC, 34 per cent resided in moderate walkable areas, while five per cent lived in low walkable areas, and six per cent lived in very low walkable areas. From 2011 to 2014, the proportion of people living in high or very high walkable areas grew slightly, from 55 per cent in 2011 to 57 per cent in 2014.

Table 1. Population in Very High or High Walkable Areas within the CTC

Walkability Rating	2011		2012		2013		2014	
	Population	Per cent	Population	Per cent	Population	Per cent	Population	Per cent
Very High Walkable	22,675	23%	22,512	23%	22,784	23%	23,517	23%
High Walkable	30,900	32%	32,318	33%	33,603	34%	34,354	34%
Very High & High	53,575	55%	54,831	56%	56,388	56%	57,871	57%
Moderate	33,152	34%	33,116	34%	33,961	34%	34,331	34%
Low	4,417	5%	4,159	4%	4,226	4%	4,093	4%
Very Low	5,563	6%	5,553	6%	5,757	6%	5,873	6%
Total Population in CTC	96,707		97,659		100,332		102,168	

Between 2011 and 2014, the population living in very high walkable areas within the CTC grew by 3.7 per cent, while the population living in high walkable areas within the CTC grew by 11.2 per cent; a combined growth of eight per cent (Table 2). This rate of growth outperformed the Region, which saw growth of population in very high and high walkable areas of 6.5 per cent. Stage one saw the highest growth of its high and very high population, at nine per cent. Conversely, stage one's population living in low walkable areas shrank by 20 per cent, compared to 1.4 per cent regional growth.

Table 2: Three Year Per cent Change in Population in Walkability Ratings from 2011 to 2014

Walkability Rating	CTC	Stage one	Stage two	Region
Very High	3.7%	4.4%	0.5%	3.7%
High	11.2%	12.5%	6.5%	7.5%
Very High & High	8.0%	9.0%	4.3%	6.5%
Moderate	3.6%	4.8%	1.2%	0.6%
Low	-7.4%	-20.0%	4.2%	1.4%
Very Low	5.6%	5.9%	0.0%	16.9%
Total Population	5.6%	6.6%	2.8%	3.2%

Analysis

The population living in very high or high walkable areas is expected to contribute to an increase in pedestrian activity on the streets. The Region is dedicated to ensuring good pedestrian access to and from ION transit stations. Walkable station areas and pedestrian accessibility to ION transit stations and facilities are essential to building communities that are transit oriented. People living in either very high or high walkable areas will benefit from being accessible to transit stations, especially for the aging population. Neighbourhoods that are already high walkable may become very high walkable in the future due to ION influencing greater mixed use and decreasing distances between trips. It is expected that the development of the low and very low walkable areas will focus on walkability as a main priority to provide for

pedestrian access to those areas. The decline in populations in the low walkable areas may be attributed to two student housing rental apartments with over 400 bedrooms each (280 Phillip and 256 Phillip) nearby the University of Waterloo that were torn down in 2014 and rebuilt – this decreased the number of occupants in 2014. The occupancy dates for those two restructured buildings are 2015 and 2016, so the population in low walkable areas will continue to be low until the students occupy the new buildings.

What does the literature tell us?

Walkability has been a focus of research linking land use policies and health outcomes in large cities across North America. Four factors regularly linked to walkability are: 1) street pattern, 2) residential density, 3) variety of potential walking destinations and 4) retail stores. More walkable neighborhoods tend to have a grid street pattern, with a mixture of housing including at least some townhomes, mid rise and/or high rise apartments or condominiums. There are many different types of places to walk to including, retail stores, services, parks, schools, and recreation centers. Many diverse organizations (Ontario Professional Planners Institute, Ontario Medical Association, Canadian Partnership Against Cancer, Heart and Stroke Foundation, Province of Ontario) have supported research, provided recommendations or advocated for making improvements in walkability as a way to improve; air quality, physical activity rates, mental health, community connectedness and health. The NEWPATH study used existing built environment indicators to assess the relative Walkability of neighborhoods in Cambridge, Kitchener and Waterloo. The survey results demonstrated that differences in walkability significantly affected the walking behaviour of people in Waterloo Region. Those that reside in highly walkable neighbourhoods were respectively 50 per cent more and 180 per cent more likely to walk than those in average walkable neighbourhoods and in low walkable neighbourhoods. Survey respondents preferred neighbourhoods that had the following: 1) more space for walking and cycling; 2) proximity to amenities; 3) ease of walking to at least some destinations; and 4) shorter commutes to work. Those that had planned to move in the next three years rated the following as the five most important factors of a desirable and walkable neighbourhood: 1) Ease of walking, 2) Low crime rates, 3) Living near public transit, 4) proximity to jobs, and 5) quality of schools. More walkable areas have attractive streetscapes and stores that are closer together with floor level retail store design rather than monotonous big box stores and expansive parking lots. People look for direct routes, shortcuts, good building to street connectivity, and cycling routes.

3.2 Building Community

Building community is the second overarching goal of ION. Transit investments are expected to favour the CTC for new development and investment. The amount of public and private investment projected to occur within the CTC due to the arrival of ION redefines the context and range of potential for community building. The eight Community Building Opportunities in the CBS define the ways to capitalize and direct investment, while conserving social and environmental assets to create a better Region for everyone.

3.2.1 Dimension: Vibrant Communities

3.2.1.1 Indicator: Land Use Mix

Baseline

69 per cent of Waterloo Region's land uses were found within the CTC in 2011.

Importance

The CTC has a variety of different land uses, such as residential, commercial, and open space, and the LRT will allow for access these land uses. For example, LRT could be used to travel from a residential land use to a commercial or industrial land use. A higher land use mix indicates that there is a greater variety of land uses within the CTC. If land use mix is 100 per cent, it would mean that for each land use that exists within the region, there is at least one example of it in the CTC.

Methodology

The Municipal Property Assessment Corporation (MPAC) provides data on each land parcel within the Region, including land use information. From this, the total number of unique land uses within the Region was derived. Further, parcels which were located within the CTC were extracted and the number of unique land uses within the CTC was determined. This process was conducted on 2011 through 2014 MPAC parcels.

Results

There were 191 unique land uses within Waterloo Region in 2011, and 132 of them were located within the CTC. The number of land uses within the CTC increased from 68.6 per cent in 2011 to 69.5 per cent in 2014. This number is not expected to significantly change as the Region of Waterloo foresees a possibility of only eight new land uses to be introduced in the CTC in the future (Appendix B).

Table 1. Percentage of Unique Land Use Codes Existing in the CTC

	2011	2012	2013	2014
CTC	131	132	131	132
Region	191	192	190	190
Per cent CTC	68.6%	68.8%	68.9%	69.5%

Analysis

There are many land uses which the Region would not expect to be in the CTC, for instance gravel pits, quarries and sand pits and therefore these land uses should not be counted in the denominator. If all but eight land uses that were not originally in the CTC are not expected to exist in the CTC in the future, then approximately 94.2 per cent of unique land uses that could be in the CTC are already present.

What does the literature tell us?

Land use diversity and its contribution to urban vibrancy Authors: Babin, R. & Fard, P.

The separation of land uses is most pronounced in North American cities. With a long history of zoning regulations that separated uses, primarily to protect residents from the negative externalities associated with industrial activity and other incompatible uses, homogeneous single-use zones became the North American development norm throughout the latter half of the 20th century (Fischel, 2004; Hirt, 2012). However, recent literature outlines how the manner in which we approach land use diversity is changing in response to both socioeconomic shifts and changes in urban development directives, notably the recent push towards more sustainable, compact forms of development. Prevailing modern planning paradigms that include New Urbanism, Smart Growth, and transit-oriented development (TOD) explicitly advocate for a greater mix of uses in their implementations. (Hirt, 2012; Daniels, 2001; Grant, 2002; Downs, 2001). While the bulk of literature that supports land use diversity does so through study of its transportation related benefits, it has been suggested that neighbourhoods boasting higher degrees of land use diversity often also accrue non-transportation benefits in terms of social well-being, human capital, and economic competitiveness (Kamruzzaman et al, 2014, Grant & Perrot, 2009)

Land use diversity can be defined as the degree to which various types of land uses and activities are closely located in a landscape. Land use diversity along with residential and employment densities are the most significant aspects of land use characteristics that influence travel patterns at different spatial scales (Ewing & Cervero, 2001). High levels of land use diversity provides multiple destinations within an easy access area, which makes non-motorized transportation feasible and supports efficient public transit performance (TRB, 2004). In a diverse urban environment average trip lengths are shorter which helps to combine multiple individual trips into a trip chain and to reduce per capita vehicle travel and energy consumption (Banister, 2011).

A measure of land use diversity is often included when establishing indices of TOD, walkability, and New Urbanism and Smart Growth (Kamruzzaman et al, 2014). Renne et al. reported that level of mixed use is the most highlighted benefit and at the same time reliable indicator of successful TOD (2005). In general, New Urbanism and Smart Growth support the idea that mixed-use environments, in combination with increased densities, transit provision, and public realm considerations, contribute to urban vibrancy (Carlton, 2009). Leyden (2003) explicitly found that mixed use environments were positively associated with social capital. Relatedly, a desire to provide complete communities is consistently expounded in modern planning literature—where complete communities offer environments that provide for the needs of the community to be met within the community itself and accessible by walking or other sustainable modes (Grant & Perrot, 2009; Leyden, 2003).

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3.2.1.2 Indicator: Population Growth

Baseline

17.5 per cent of the Region's residents were living in the CTC in 2011.

Importance

As the number of residents and employees in the CTC increases over time, the area is expected to become more vibrant during both the day and night. New development also creates the potential for integrating station facilities into the design of new buildings, especially in commercial and institutional settings. A healthy balance of land uses encourages walking and cycling, which assists in managing peak hour congestion and commuting costs.

Methodology

The total resident population of Waterloo Region is estimated annually, based on building activity, vacancy rates, and long-term changes in the average number persons per units for various dwelling types. The year-end estimates includes: usual residents in both private and collective dwellings, temporary postsecondary students not counted by the Census, other foreign and temporary residents, as well as an adjustment for the net undercount of the population. Collective dwellings include some student residences, nursing homes, hospitals, jails, larger lodging houses, etc. An adjustment is also made for postsecondary students who are counted by the Census, but who leave home to attend school. These students represent the reverse flow of the temporary students arriving in the Region from elsewhere.

The total employment population of Waterloo Region is derived from the census/national household survey every five years. Employment consists of both employment with a fixed place of work (usual) as well as 'work at home'. Employment with 'no fixed place of work' is excluded from this analysis. The employment estimates are available for years in which the Census of Canada is undertaken, with the next census to be held in 2016. It is difficult to estimate employee growth during interim years due to changing levels of employment through hirings and firings as well as changing levels of office occupancy.

Results

There were 96,700 people estimated to be living within the CTC in 2011, which represents 17.5 per cent of the Region's total population of 551,600. The number of residents within the CTC has been increasing at a faster rate (1.9 per cent annually) from 2011 to 2014 than across the Region as a whole (1 per cent annually) (Table 1). During this time, residents in the stage one

area of the CTC increased 6.6 per cent, or 4,763 people, whereas residents in the stage two area of the CTC saw an increase of 2.8 per cent through the addition of 698 people.

Table 1. Estimated Population Living within the CTC from 2011 to 2014

	2011	2012	2013	2014	Annual Per cent Growth
Stage one	71,700	72,300	74,800	76,500	2.2%
Stage two	25,000	25,400	25,600	25,700	1%
Total in CTC	96,700	97,700	100,300	102,200	1.9%
Total in Region	551,600	556,500	562,300	569,100	1%
Per cent Living in CTC	17.5%	17.5%	17.8%	18.0%	

Analysis

Population could be considered to be made up of two components: residents living in the CTC (nighttime population) and employees working in the CTC (daytime population). In 2011, in addition to the 96,700 people living in the CTC, there were 96,100 people who worked within the CTC, either at home or at a fixed-place-of-work. This represents 40 per cent of the Region's total of 241,400 employees with a regular place of work; this does not include employees with no-fixed-place-of-work, such as construction workers. Stage one accounts for 71 per cent of the employment within the CTC.

Table 2. Estimated Employment Working within the CTC, 2011

	2011
Stage one	68,500
Stage two	27,600
Total in CTC	96,100
Total in Region	241,400
Per cent Working in CTC	40%

Comparing residents and employment numbers within the CTC with their Region-wide equivalents provides a measure of the changing concentration around the rapid transit line. Recent increases in the population within the CTC may be an indication that development is already anticipating ION. When ION becomes operative, the service is expected to attract and support even more residential development as well as business growth.

Investment in ION is intended to meet the needs of an increasing population. This larger population will require new developments which, in turn, accommodate a greater range of activities. For instance, older employment areas will need to be redeveloped with higher-value; higher-density uses to accommodate the increase in residents living nearby. Similarly, pedestrian infrastructure will be needed to facilitate greater pedestrian activity around transit nodes.

3.2.2 Dimension: Art and Culture

3.2.2.1 Indicator: Cultural Vibrancy

Baseline

722 arts and culture related establishments were within the CTC in 2011.

Importance

The CTC includes five (5) distinct downtown centres, each with its own unique setting, cultural attractions and characteristics. From creative businesses to arts and culture amenities, the Region offers diverse places to work and many destinations to visit. Great places to visit are defined as creative establishments and businesses that add to the vibrancy of an area. These places attract people to the CTC and provide a stimulating social setting for work, study and play. Enhanced transit throughout the Region connects people to these places within and surrounding the CTC. For residents, the increased vitality of the region's centres and accessibility brought about by better connectivity of the transit network means that the community will be able to experience more of the Region than previously possible without an automobile.

Methodology

The identification of arts and culture establishments was based on the North American Industry Classification System (NAICS) codes used in the Canadian Framework for Culture Statistics and can be found in Appendix B. The Canadian Framework for Culture Statistics provides a systematic approach to culture statistics measurement that has been used by Statistics Canada and many other governments and research organizations. The purpose of the Canadian Framework for Culture Statistics is to provide standard concepts, definitions and categories to facilitate comprehensive, consistent, and comparable statistics on culture and support evidence based decision-making. For more information, visit [http://www5.statcan.gc.ca/olc-olc.action?objId=87-542-X&objType=2&lang=en&limit=0](http://www5.statcan.gc.ca/olc-olc/action?objId=87-542-X&objType=2&lang=en&limit=0)

The arts and culture establishments were counted from the Workplace Count database. Through May to August 2011, the Region of Waterloo, in collaboration with local municipalities, undertook the Workplace Count, a survey of places of employment in Waterloo Region. The survey provided key pieces of workplace information such as the different types of businesses that existed in the Region in 2011. Home-based and farm-based businesses were considered out of scope for this project. Attempts were made to gather information from all employers in Waterloo Region. However, there were employers whose data was unobtainable, or who declined to participate in this project. The 2011 Workplace Count surveyed 12,649 workplace

locations. Of all workplaces surveyed by staff and students in the 2011 Workplaces Count, 95 per cent of these businesses were considered active or seasonal businesses. The remaining five per cent of establishments identified were either closed or vacant. Some of the closed/vacant businesses identified were in newly constructed space that was yet to be occupied.

Approximately 250 workplace locations (2 per cent) declined to participate in this project. Of the active businesses, complete information was collected from 68 per cent. A business entry was considered complete if it contained a business name, a complete address, an industry classification code (NAICS), a floor space value and a value for the total number of employees.

Please visit <http://www.regionofwaterloo.ca/en/doingBusiness/workplacecount.asp> to learn more about the Workplace Count and to view the Workplace Count report.

Results

There were 1,483 arts and culture establishments within Waterloo Region and 722 of them, or about 49 per cent can be found within the CTC. Approximately 71 per cent of arts and culture establishments are located within stage one and 29 per cent are located within stage two.

A majority of the arts and culture establishments are accommodation and food, about 70 per cent. These include full-service restaurants, limited-service eating places, food service contractors, caterers and drinking places that sell alcoholic beverages. In general, these establishments are located nearby the future ION transit stations along the central spine of the transit corridor. As accommodation and food account for over 70 per cent of the arts and culture related establishments, a restaurants indicator has also been established to track change on an annual basis.

The remaining 30 per cent of the arts and culture related establishments are presented in Table 1.

Table 1 – Cultural Establishments by NAICS code

Type	# of Establishments	% of Total
Manufacturing		
311811 – Retail Bakeries	7	1%
312120 – Brewery	4	1%
312130 – Winery	1	0%
339910 – Jewellery Manufacturers	0	0%
339992 – Musical Instruments	0	0%
Total Manufacturing	12	2%
Retail		
45392 – Art Dealers	8	1%
Total Retail	8	1%
Information		
5111 – Publishers	4	1%
5112 – Software	21	3%
512 – Motion picture/music sound	10	1%
515 – Broadcasting (radio/television/cable)	6	1%
51912 – Library & Archives	6	1%
Total Information	47	7%
Professionals		
54131 – Architecture	11	2%
54132 – Landscape Arch	7	1%
5414 – Design (interior/industrial/graphic)	20	3%
541511 – Computer programing	0	0%
541512 – Computer design	0	0%
5418 – Advertising and Media	16	2%
54192 – Photography	7	1%
Professionals Total	61	8%
Admin & Support		
56151 – Travel agencies	25	3%
56152 – Tour operators	1	0%
Total Admin & Support	26	4%
Education		
61161 – Fine arts schools	19	3%
Total Education	19	3%
Arts, Entertainment, Recreation		
7111 – Performing Arts	6	1%
7113 – Promotions (not sports)	7	1%
7114 – Agent & Managers (not sports)	2	0%
7115 – Ind. Artists	5	1%
712 – Heritage	8	1%
Total Arts, Entertainment, Recreation	28	4%
Accommodation & Food		
721 – Accommodation	12	2%
722 – Food	509	70%
Total Accommodation & Food	521	72%
Total Cultural Establishments	722	100%

Analysis

Arts and culture establishments create vibrancy in the core. They provide creative work, and cultural amenities and products for the wider community and beyond. It is very positive that so many of these establishments already exist in the CTC. When creative businesses are clustered around future ION transit stations, they have the advantage of being easily accessible within walking or cycling distance after getting off at an ION transit station. It is anticipated that the improved transit access to these establishments will improve perceptions of easy access to the vibrant core areas, increase business, and lead to new development.

What does the literature tell us?

The arts and culture sector is a catalyst for economic vitality (American Planning Association, 2011). The terms “creative class” and “creative and cultural economy” are becoming more common for describing cities and are used by urban planners, economic developers, arts administrators, and business and municipal leaders (Landry, 2000). These terms refer to creative jobs, people and industries and includes sectors such as architecture, design, music, performance arts, technology, and marketing to name a few (American Planning Association, 2011). The use of this terminology indicates the links between the arts and culture sector and local economic vitality among the fields of planning, economic development, and arts and culture (American Planning Association, 2011). The existence of arts, culture, and creative industries can improve a community’s competitive edge. A vibrant cultural scene is important to attracting startups and encouraging them to stay and expand.

Complementary concentrations of both cultural and high-tech businesses are thought to increase numbers of highly educated creative workers, which can attract new innovations and breed more creativity. The creative generation, especially the younger workforce, prefer to work and live in locations with a flourishing arts and culture sector (Florida, 2009). Cultural and creative assets such as ethnic restaurants, multimedia studios and incubator hubs within the CTC is important for attracting and retaining workers because they provide economic and personal incentives to live and work in districts that centralize creative and cultural assets (American Planning Association, 2011). Rich arts and culture assets may include those related to entertainment, education, personal development and job creation. Examples of these assets can include theatres, museums, community centres, and design firms (American Planning Association, 2011). It is rewarding to work and live in locations that are rich with artistic talent and related amenities.

References

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Statistics Canada: Canadian Framework for Culture Statistics

3.2.2.2 Indicator: Restaurants

Baseline

51 per cent of restaurants in the Region were located within the CTC in 2011.

Importance

The downtown areas of the cities of Cambridge, Kitchener and Waterloo are rich in cultural resources. Venues like restaurants and cafes are important for downtowns because they provide spaces for people to be together and connect to the city (Creative Cities International, 2012). Restaurants are examples of places that create vibrancy and culture in cities. The number of restaurants and cafes in the CTC is an indicator of the attractiveness and cultural vibrancy of the CTC for residents and the local workforce.

Methodology

The number of restaurants within the CTC can be determined annually through the Region of Waterloo Public Health inspection results in Waterloo Region. The Public Health Unit inspects the food safety and infection prevention practise within businesses listed on the open data website: <http://checkit.regionofwaterloo.ca/>

For the purpose of the analysis, a restaurant was defined as a food establishment that offered prepared ready-to-eat food to the public on a regular basis. It did not include workplace cafeterias, or locations where food was prepared but not served. The following types of restaurant establishments were included:

- Baked Goods
- Full Service Restaurant
- Retail
- Cocktail Bar/ Nightclub
- Farmer's Market Vendor
- Flea Market Vendor
- Food Take Out
- Ice Cream/Yogurt Vendor.

Using the public health inspection database for food businesses the number of existing restaurants at a point in time when the data was extracted from the database was determined. Although the database shows multiple listings for higher risk establishments that are inspected

multiple times each year, duplicate entries were removed so that a business was not double counted.

Results

There were 725 restaurants in the CTC in 2011 (Table 1), representing 51 per cent of total restaurants in Waterloo Region. This percentage has stayed relatively constant though 2014 (Table 2). Between 2011 and 2014, the total number of restaurants has decreased both in the Region as well as the CTC. The rate of decrease in both the Region and CTC was relatively in proportion to each other due in part to reclassification of restaurants during this period.

Table 1. Number of Restaurants, 2011-2014

	2011	2012	2013	2014
Stage one	502	467	442	403
Stage two	223	206	162	172
CTC	725	673	604	575
Not In CTC	702	635	574	586
Region	1,427	1,308	1,178	1,161

Table 2. Distribution of Restaurants Within the Region, 2011-2014

	2011	2012	2013	2014
Stage one	35%	36%	38%	35%
Stage two	16%	16%	14%	15%
CTC	51%	51%	51%	50%
Not In CTC	49%	49%	49%	50%
Region	100%	100%	100%	100%

The density of restaurants per 1,000 people was 7.50 in the CTC compared to 1.54 outside of the CTC, as shown in table 3.

Table 3. Per cent of Restaurants per 1,000 people

	2011	2012	2013	2014
Stage one	9.79	8.78	7.67	7.66
Stage two	20.08	18.39	17.27	15.68
CTC	7.50	6.89	6.02	5.63
Not In CTC	1.54	1.38	1.24	1.26
Region	2.59	2.35	2.09	2.04

Analysis

Although the number of restaurants within the CTC in 2014 was less than in 2011, restaurants have been decreasing in Waterloo Region in general. Restaurants have been decreasing at the same rate within both the Region and CTC. Restaurants of all food category types decreased at similar rates, including baked goods, bars/nightclubs, farmer's market vendors, flea market vendors, food take out, ice cream/yogurt vendors, produce vendors, and restaurants.

The density of restaurants per 1,000 people is higher in the CTC than elsewhere in the Region. The data shows that the CTC is currently well populated with restaurants, an indication of the current vibrancy of the community core areas.

References

Creative Cities International. (2012). *The vitality index*. Creative Cities International.

3.2.3 Dimension: Heritage

3.2.3.1 Indicator: Heritage Resource Retention

Baseline

13 demolition permits were issued on pre-1920 and designated built heritage resources in the CTC in 2011.

Importance

Cultural heritage resources, defined by Waterloo Region as, “the inheritance of natural and cultural assets that give people a sense of place, community and personal identity,” are an integral part of a community’s fabric. For the purposes of this project, built heritage resources have been expanded to include all buildings built prior to 1920, as a general measurement of the community’s existing built heritage fabric, and including all buildings that are formally recognized under the Ontario Heritage Act (OHA).

Properties with cultural heritage value or interest are identified by the Area Municipality under the OHA through designation and/or listing on a Municipal Heritage Register (MHR). Heritage significance may be related to their: architectural and aesthetic merit, association with a historic event or person, importance to a broader landscape, or connection to a local community, neighbourhood or group of people. Built heritage resources could include many different kinds of places, such as a: house, church, school, barn, library, apartment building, commercial high-rise, or industrial building.

It is important to retain and conserve built heritage resources in the community as these physical remains of past human activities foster a positive sense of identity and place. Built heritage resources are unique and provide a more stimulating and walkable experience, contributing to the character of existing streetscapes and neighbourhoods. Many of these resources also have the potential to attract people from outside the local community, such as tourists or businesses wanting to locate in locations with authentic architectural character (i.e. post and beam structures).

The Region’s Arts, Culture and Heritage Master Plan (2002) states under section 6.1 Statement of Intent that:

“Arts, culture, and heritage initiatives make a significant contribution to the well-being and quality of life of the residents of Waterloo Region. They reflect and enhance the community’s unique identity and diversity, contribute to economic vitality, and shape future growth. Accordingly, the Region of Waterloo, alone or in partnership, will

identify, protect, promote, and invest in existing resources; implement strategies to support existing and additional arts, culture, and heritage initiatives; and ensure their long-term prosperity and sustainability.”

Determining the number of demolition permits on pre-1920 and recognized built heritage resources expresses to what degree the built heritage fabric is being impacted in the CTC and whether OHA protection measures are working to conserve the built heritage fabric that has been recognized as significant. It is important to retain our cultural heritage resources to ensure that when ION arrives the Region’s streetscapes do not lose their historical context, character, and cultural and economic value.

Methodology

An inventory of formally recognized (listed and/or designated) and pre-1920 built heritage resources was compared using demolition permits acquired from Area Municipalities. If a demolition permit was issued for a built heritage resource, it was investigated to determine if the demolition impacted the heritage component. For each confirmed built heritage demolition, the type of demolition (residential or non-residential), the location (stage 1 or stage 2) and year of demolition was recorded.

Results

Thirteen demolition permits occurred on pre-1920 and designated built heritage resources in the CTC in 2011. Five of these were formally recognized (i.e. listed on the Municipal Heritage Register or designated under the Ontario Heritage Act). This represents 17 per cent of the 75 demolitions that took place within the CTC in 2011. All 13 demolition permits in 2011 were located in the stage one area of the CTC.

Looking at heritage demolitions more broadly, between 2011 and 2014 there were 70 demolitions on pre-1920 and designated built heritage resources in the CTC. Of the 70 demolition permits, 58 (82.9 per cent) were for residential built heritage resources, eight were non-residential built heritage resources and three were mixed-use built heritage resources (Table 1). Non-residential built heritage resources include industrial, commercial and institutional uses, and mixed use built heritage resources include both residential and industrial, commercial and/or institutional uses.

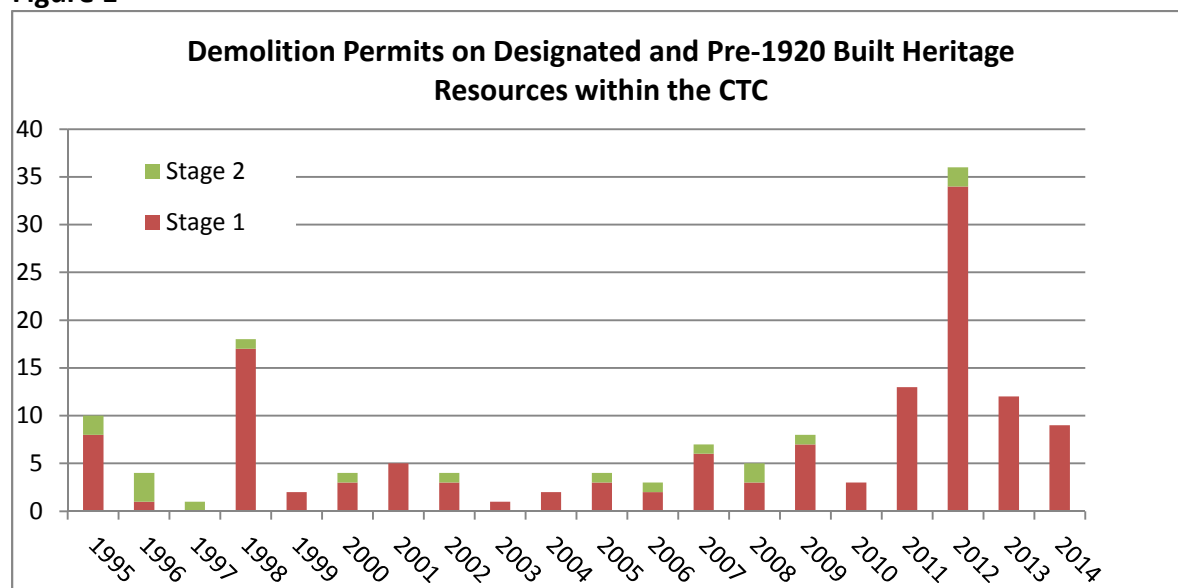
Table 1. Number of Demolition Permits on Residential and Non-residential Built Heritage Resources by Location and Building Type

	2011			2012			2013			2014		
	Res	Non-Res	Mixed-use	Res	Non-Res	Mixed-use	Res	Non-Res	Mixed-use	Res	Non-Res	Mixed-use
Stage one	11	1	1	27	5	2	10	1	0	9	0	0
Stage two	0	0	0	1	1	0	0	0	0	0	0	0
CTC	11	1	1	28	6	2	10	1	0	9	0	0

Analysis

From 1995 to 2014, there was a total of 151 demolition permits issued for pre-1920 and recognized built heritage resources within the CTC, representing 17.4 per cent of a total of 866 demolitions that took place during the same time period. Of the demolitions recorded for built heritage resources, 20.5 per cent were recognized built heritage resources.

Figure 1



Between 1995 and 2010, the number of demolitions permits each year stayed relatively consistent. However, between 2011 and 2014 there was a spike in demolition permits, which was partially due to the widening and reconstruction of Weber Street from College Street in Kitchener to Union Street in Waterloo. The widening of Weber Street West to four lanes and development of an underpass below the railway tracks removed 27 historic properties, mainly pre-1920 residences.

Between 1995 and 2011, approximately 88.7 per cent of the 151 demolition permits for heritage resources were for buildings located in stage one. Thirty-one (20.5 per cent) of the demolished buildings recorded were formally recognized, while the remainder were constructed pre-1920 as indicated in Table 2. For the most part, the demolished heritage resources were early 20th century Berlin vernacular residential. Demolitions recorded in 1998 were a result of Sun Life Financial expanding their parking lot.

Table 2. Number of demolition permits on designated and pre-1920 heritage buildings

Year	Stage one	Stage two	CTC	Recognized (Listed/Designated)
1995	8	2	10	3
1996	1	3	4	3
1997	0	1	1	1
1998	17	1	18	1
1999	2	0	2	1
2000	3	1	4	1
2001	5	0	5	0
2002	3	1	4	2
2003	1	0	1	0
2004	2	0	2	0
2005	3	1	4	2
2006	2	1	3	1
2007	6	1	7	1
2008	3	2	5	1
2009	7	1	8	3
2010	3	0	3	3
2011	13	0	13	5
2012	34	2	36	2
2013	12	0	12	0
2014	9	0	9	1
Total 1995-2014	134	17	151	31
Total 2011-2014	68	2	70	8

Increased re-urbanization and intensification pressures in the CTC, especially near future ION stops, put built heritage resources in a vulnerable position. Demolitions per year are typically 10 or less with several spikes in demolition permits issued for heritage resources connected to larger development projects. Larger development projects in areas with heritage resources require heritage impact assessments, which typically recommend the avoidance or mitigation of impacts to significant heritage resources.

Recognition of heritage resources as part of the station area planning processes will be very important to successful heritage conservation. Heritage resources acknowledged at early stages of the planning process are less at risk for demolition and more likely to be conserved intact and or adaptively re-used.

What does the literature tell us?

Recognized and pre-1920 heritage buildings have economic value (Licciardi & Amirtahmasebi, 2012). They can have an aesthetic, spiritual, social, symbolic, and historical value attached to them, which can also increase their monetary worth. These values should be maintained by retaining and preserving cultural heritage resources in the Region so that future generations may learn from and enjoy the legacy left behind by those in the Region that came before them. A preference for heritage buildings is reflected, in part, through real estate transactions. For instance, Perimeter Development Corp. is a local developer in Waterloo Region that has a niche for revitalizing old, underused buildings. A study conducted by the Architectural Conservancy of Ontario in partnership with Dr. Robert Shipley and the Heritage Resources Centre at the University of Waterloo, entitled “The Lazarus Effect: An exploration of the economics of heritage development in Ontario,” concluded, after looking at 132 heritage development projects in the province of Ontario, that even when the costs are greater, developers can generally achieve a high rate of return on their investment (Shipley, Parsons & Utz, 2006). This type of investment in the adaptive reuse of heritage buildings thus becomes more attractive to developers like Perimeter Development Corp., and aids in the conservation of historic structures in the CTC. The City of Kitchener, a former industrial town, is an example of a community in Waterloo Region that has significant built heritage resources, and is thought to have an advantage over other communities in attracting and retaining workers (Conference Board of Canada, 2008; Landry, 2008). The former industrial town was successful in preserving many of its distinctive heritage assets by revitalizing its historic core and reclaiming it as the commercial and social hub of the city, a portion of which is now known as the Innovation District (Ministry of Tourism Culture & Sport, 2005). This sort of downtown revitalization is essential to regenerating the economies of cities and building quality communities within the CTC (Kalman, 2014).

In downtown Kitchener, converted 19th-century industrial buildings that are known for their brick-and-beam appeal, high ceilings and natural light have been attracting tech start-ups and entrepreneurs to the Innovation District. At the intersection of King Street and Water Street, there is a 1964 office tower (now 305 King Street) listed by the City of Kitchener for its cultural heritage value stemming from its Mies van der Rohe-influenced Modern architectural style of geometric lines using concrete, glass and metal (Lewington, 2014). This built heritage resource is located within 600 metres of the Region's future multi-modal transit station at King Street and Victoria Street and sits on the future ION line (Pender, 2013).

Cultural heritage resources represent many different values to different people in the community, while also helping to maintain context and character for future development and growth. The rehabilitation of the former Lang Tanning Company factory (constructed between 1896 and 1917) at the corner of Victoria Street and Charles Street in Kitchener, now known as the Tannery District, is one example of how retaining built heritage resources can contribute to the stimulation of downtown revitalization. Heritage buildings can be successfully adapted into new and viable commercial or residential spaces and venues. Repairing and upgrading existing buildings, such as the former factory, can be less expensive than constructing a new building and represents more sustainable practice as the energy used to construct the existing heritage building is retained and its materials remain in place, not in a landfill. As new businesses move into these rehabilitated buildings, new jobs are created in the community and underutilized or vacant buildings are revived further contributing to the municipal property tax base (Ministry of Tourism Culture & Sport, 2005).

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3.2.4 Dimension: Investment

3.2.4.1 Indicator: Building Activity

Baseline

\$486,006,054 was the value of total annual building permit activity within the CTC in 2011.

Importance

Building permit activity is an indicator of the strength of the local economy and of investor confidence. The value of building permits within the CTC can indicate if investment growth is concentrated within the corridor around the ION transit route. The mobility structure of overlapping RT and iXpress bus services is expected to favour station areas in the CTC for higher density uses. Since 2011 to current, over \$1 billion in new construction value was focused within the CTC.

Concentrating new construction activity within the CTC is important not only for the local economy, it also helps alleviate sprawl. The Region promotes an inward growth model including infill development to mitigate new sprawling developments as developing within the BUA provides a focus for transit and infrastructure investments.

Methodology

This indicator summarizes building activity in both the residential and non-residential sectors for the CTC for 2011. Residential types include singles, semi-detached, townhouses and apartments, while non-residential types included commercial, industrial, and institutional. Residential types were measured with units and non-residential types were measured in square footage. Long term building activity data from 2003 to 2014 is provided for context. These figures are compiled annually by Regional staff, based on data supplied by the Area Municipalities. Only new construction is included (construction that adds new residential units, or new non-residential square footage).

To smooth out fluctuations, a four year moving average was applied to the range of values from 2003 to 2014. The Consumer Price Index (CPI) was used to adjust the annual building permit values using year 2011 dollars to account for the inflation of currency. Adjustment using the CPI allows for more realistic representation of building permit activity as it adjusts the values to represent the dollar of the value in 2011 in Ontario. The CPI was taken from Statistics Canada's key socioeconomic database, CANSIM. The geography of Ontario was used to apply the CPI.

Results

The total value of building permits issued for new construction across Waterloo Region was \$1.30 billion in 2011 and \$1.21 billion in 2014. In 2011, approximately 37 per cent (\$486 million) of the residential and non-residential value invested within the Region was within the CTC. In 2014, approximately 45 per cent (\$546 million) of the residential and non-residential value invested within the Region was within the CTC, an increase of eight per cent since 2011 (Appendix A).

The CTC is seeing many new residential and business investments. The total value of new building permits issued in 2011 within the CTC was \$486 million. Total new construction value was comprised of approximately 43 per cent in the residential sector, and 57 per cent non-residential.

Building permit activity is also a predictor of the population growth if looking at the building permit activity change for residential units within the CTC in 2011. For residential activity in 2011, permits were issued for 1,205 units, encompassing 34 per cent of the total 3,586 residential units issued building permits in the whole Region. In 2011, building permits were issued for 1,144 apartment units in the CTC which accounted for 61.5 per cent of the total 1,860 building permits issued for apartment units within the whole Region. The 1,144 apartment units comprised approximately 95 per cent (94.9 per cent) of the total number of residential units that were issued building permits just within the CTC (Table 1). Permits for 25 per cent of non-residential floor space were issued inside the CTC (415,277 square feet in the CTC and 1,661,301 square feet in the Region).

Table 1. 2011 Residential and Non-Residential building permits activity by type within the CTC

Structure Type	Value	Per cent in CTC	Units	Per cent in CTC
Singles	\$4,167,241	2%	13	1%
Semi-detached	\$103,000	0%	4	0%
Townhouses	\$6,192,614	3%	44	4%
Apartments	\$198,660,800	95%	1144	95%
Residential Total	\$209,123,655	100%	1205	100%
Commercial	\$41,302,500	15%	165,331	68%
Industrial	\$8,500,000	3%	3,600	1%
Institutional	\$227,079,899	82%	246,346	31%
Non-Residential Total	\$276,882,399	100%	415,277	100%
Total Value	\$486,006,054			

In 2014, the total value of new building permits issued within the CTC was \$546 million (Table 2). Total new construction value was comprised of approximately 60 per cent (increase of 17 per cent since 2011) in the residential sector, and 40 per cent non-residential (decrease of 17 per cent since 2011). There is greater growth in residential building permit activity than non-residential in 2014.

For residential activity in 2014, permits were issued for 1,731 units, encompassing 45 per cent of the total 3,805 residential units issued building permits in the whole Region. In 2014, building permits were issued for 1,604 apartment units in the CTC, which accounted for 79 per cent of the total 2,037 building permits issued for apartment units within the whole Region. The 1,604 apartment units were, comprising approximately 93 per cent of the total number of residential units that were issued building permits just within the CTC (Table 2).

Permits for 22 per cent of non-residential floor space were issued inside the CTC (475,053 square feet in the CTC and 2,148,858 square feet in the Region).

Table 2. 2014 Residential and Non-Residential building permits activity by type within the CTC (Adjusted 2011 dollars)*

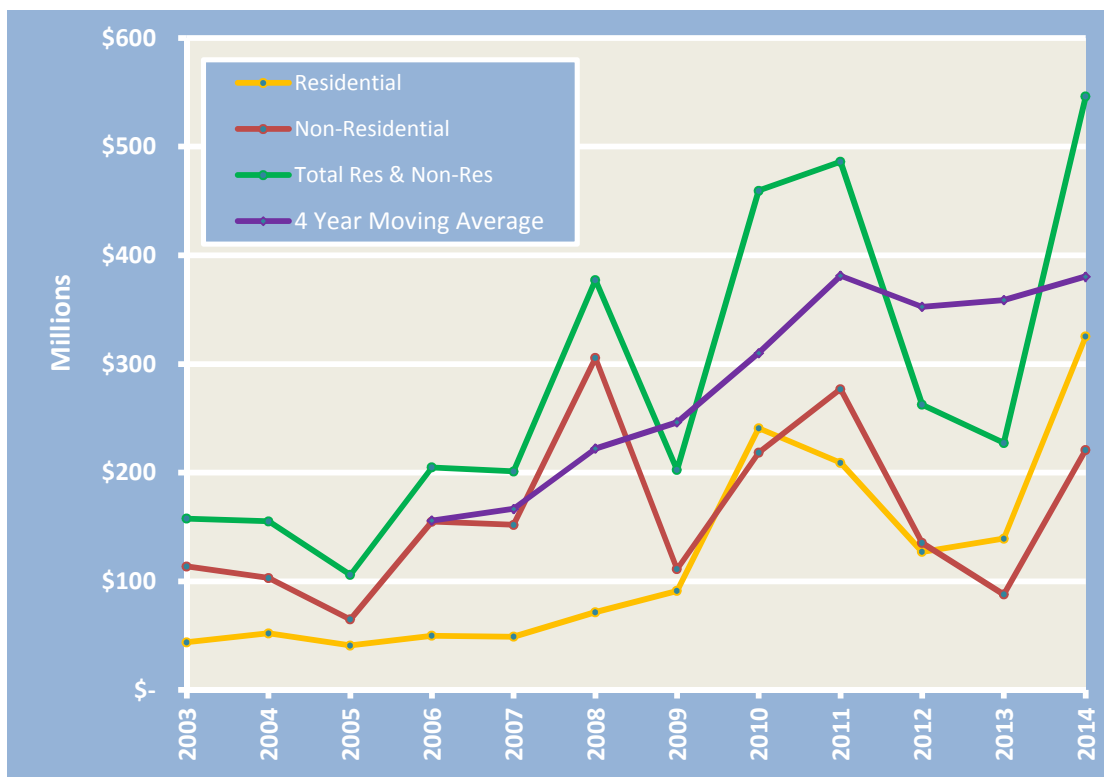
Structure Type	Value	Per cent in CTC	Units	Per cent in CTC
Singles	\$3,273,894	1%	10	1%
Semi-detached	\$2,182,596	1%	25	1%
Townhouses	\$14,645,713	5%	92	5%
Apartments	\$305,075,639	94%	1,604	93%
Residential Total	\$325,177,842		1,731	
Commercial	\$34,011,353	15%	144,132	30%
Industrial	\$14,404,554	7%	8,818	2%
Institutional	\$172,509,378	78%	322,103	68%
Non-Residential Total	\$220,925,285		475,053	
Total Value	\$546,103,126			

The number of residential units in the CTC saw a three year growth of 44 per cent from 2011 to 2014, while the Region saw a six per cent three year growth. Within the CTC, there was a three year growth of 14 per cent in non-residential square footage, while the Region had a 29 per cent increase.

Analysis

As presented in figure 1, the 4-year moving average of total building permit value (purple line) shows an uptrend as annual building permit value rises from 2003 to 2014. The uptrend reflects the community's desirability as a place to reside as well as a desired place for investors to develop. The numbers reflect the diversity of the local community and economy, in both residential and non-residential sectors. Growth in building permits indicate that there is a demand in the area for people to live and work. Construction can already be seen within the CTC and along the future ION rail lines, with new projects continuously being added, for instance, 1 Victoria and the Red Condos, which were sold out before completion. Communitech Hub, UW's VeloCity and Laurier's LaunchPad are generating media interest and investor awareness for downtown Kitchener and Uptown Waterloo. The shift in consumer demand for new central development supports higher density development. Investors are responding to this trend. Residential building activity stayed relatively stable until 2009, since then there has been a noticeable increase in residential building permit value. Data also shows that more apartments and townhouses are being built in Waterloo Region than single and semi detached houses (Appendix D).

Figure 1. Building Activity in the CTC (Adjusted 2011 dollars)* 2003-2014



Only new construction is captured in this indicator (construction that adds new residential units, or new non-residential square footage). Substantial additional investment has occurred in building renovations to older building stock in the downtown core areas, such as façade improvements, as well as interior finish work. For example, the renovation of 117 King Street in downtown Kitchener now houses the CBC Kitchener-Waterloo, Matter of Taste barista, and office space for a tech company, and was estimated at \$2 million.

The new investment and growth within the CTC is characteristic of transit oriented development (TOD) neighbourhoods. Projects developers openly attribute their investment decisions based on their project being near future ION rail transit lines. The long-term uptrend in residential and non-residential building permit activity indicates that there will be higher residential, institutional and commercial uses in closer proximity. The addition of these developments will also attract residents and employees to live and work within the CTC. Those living and working in those developments will be able to take advantage of high quality transit service as the CTC becomes more transit oriented with ION coming into operation.

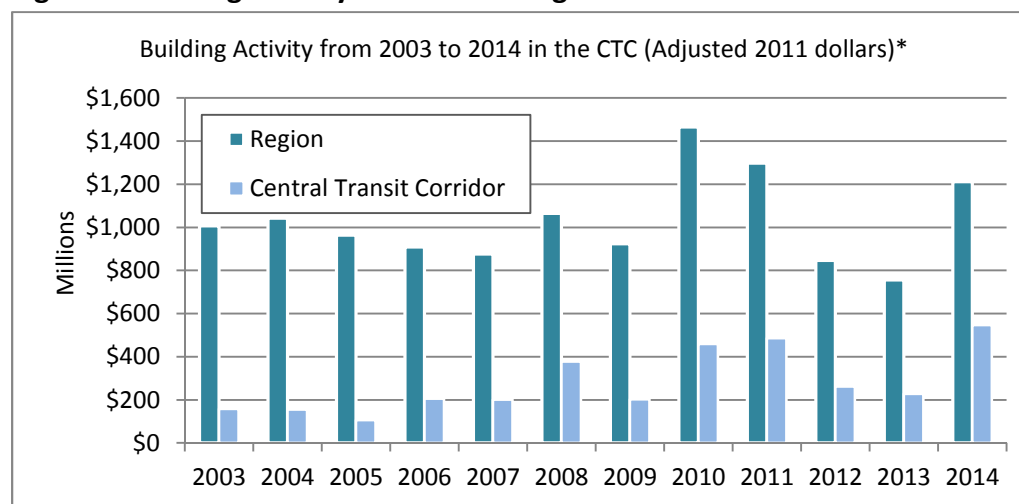
The City of Waterloo ceasing their development charge exemption is an example of how policy and other influences can contribute to fluctuations in the building permit activity. However, even with externalities, it is expected that the presence of ION will make property in the CTC more desirable for new development or redevelopment as ION generates ridership moving forward.

Table 3 . Building Activity from 2011 to 2014 in the CTC (Adjusted 2011 dollars)*

Structure Type	2011		2012		2013		2014	
	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.
Singles	\$4,167,241	13	\$3,211,428	12	\$3,097,176	11	\$3,273,894	10
Semi-detached	\$103,000	4	\$1,103,382	18	\$1,578,387	20	\$2,182,596	25
Townhouses	\$6,192,614	44	\$26,863,455	179	\$7,826,907	48	\$14,645,713	92
Apartments	\$198,660,800	1144	\$95,920,508	611	\$126,863,632	610	\$305,075,639	1604
Residential Total	\$209,123,655	1205	\$127,098,772	820	\$139,366,102	689	\$325,177,842	1731
Commercial	\$41,302,500	165,331	\$45,479,790	391,308	\$21,433,456	76,667	\$34,011,353	144,132
Industrial	\$ 8,500,000	3,600	\$2,435,525	20,909	\$3,705,524	28,196	\$14,404,554	8818
Institutional	\$227,079,899	246,346	\$87,451,140	269,053	\$62,822,306	236,186	\$172,509,378	322,103
Non-Residential Total	\$276,882,399	415,277	\$ 35,366,456	681,270	\$87,961,287	341,049	\$220,925,285	475,053
Total Value	\$486,006,054		\$262,465,229		\$227,327,389		\$546,103,126	

*Adjusted using CPI to 2011 dollars

Figure 2. Building Activity Annual Building Permit Value from 2003 to 2014



What does the literature tell us?

Investor confidence Authors: Yu Huang, Robert Babin, Xinyue Pi, Andre Antanaitis

Inspired by smart growth principals to promote compact urban forms, transport policies in western countries increasingly favor investment in public transport instead of highway expansion. Simultaneously, land use policies are focusing on redevelopment in core areas overwhelmingly instead of new development in greenfield land (Echenique, Hargreaves, Mitchell, & Namdeo, 2012). The Region of Waterloo's proposed light rail transit project is designed to predominantly trigger investment in previously developed areas in the form of brownfield redevelopment, infill development, and conversion from less economically competitive uses.

However, transit oriented land development is a complex process involving many stakeholders including developers, investors, transit agencies, urban planners and community members (Samsura, van der Krabben, & van Deemen, 2010). In particular, investment decisions highly rely on investors' confidence in the market, developers' preferences and business targets, governmental policies and other stakeholders' attitudes towards transit-oriented development (TOD).

Investor confidence refers to investors' expectations about returns in the future and their conviction about those expectations (Sturm, 2003). Interviews of developers and investors in the United States from a national study of contemporary TOD practice suggest that most developers and investors are enthusiastic for the prospects of TOD (Transportation Research Board, 2004). Many property developers believe that projects located near major transit stations outperform those located farther away due to the rent premiums they receive from transit success. A similar study in Canadian cities demonstrates that most projects around

transit lines can meet the profit expectations of developers (Canada Mortgage and Housing Corporation, 2009). Cervero (1984) also examined the land development potentials of light rail transit projects in 12 cases and found that they were moderately high under ideal pro-development policies and other forces. On the whole, investors tend to be confident in TOD investment especially with the expected decent price premiums from these projects. Locally, key developers interviewed by Antanaitis (2014) expressed strong investor confidence in response to the Region's rapid transit investment, which provided them with long-term certainty about the location of high volume transit service and the Region's commitment to core area development.

Besides investor confidence, what other factors influence developers or investors' decision-makings on TOD investment? The national surveys of developers across the United States listed 13 factors possibly affecting their willingness to invest in a given TOD project (Transportation Research Board, 2004). The survey results show that the most crucial factor is supportive land-use designations. This priority placed on land use designations is supported by Knight & Trygg (1977) who pointed out that zoning, joint development incentives, community planning and taxation were particularly significant for affecting investors' willingness to conduct TOD investment. The potential rent premium around transit corridor areas is the second most crucial factor, which primarily determines investors' potential benefits from such property investment in superior locations. A high growth rate of rents is considered to be sufficient for causing positive responses of investors (Capozza & Li, 2002). Proximity to transit station is viewed as the third most important concern by investors, as areas adjacent to transit stations have been proven to attract more residents and commercial activities. Other factors including tax incentive, current real estate market conditions around LRT, brownfield issues, public-sector participation, and developer experience exert some influence on investment decision makings with less importance than the above three crucial factors (Transportation Research Board, 2004). Locally, key interviews with developers by Antanaitis (2014) indicated that reductions to parking requirements with Rapid Transit Station Areas is a real relief for developers to capture more units and make projects more cost-competitive.

According to Anas's economic theory (1978), developers make decisions to supply housing for the households with highest bid. Accompanied by transit service and proximity to amenities, a group of households view TOD positively and are willing to pay more for housing with upgraded service. Consequently, investors and developers show much confidence in investment around rail corridors bearing expected profits in mind. However, decision making on final investment not solely rely on investor confidence, but a set of all stakeholders and pro-development conditions. Investors need to make exhaustive assessment of construction costs and profitability, reasonably analyze the real estate market, policy environment and potential locations, and recognize possible challenges to ultimately make their investment decisions.

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3.2.4.2 Indicator: Assessment Value

Baseline

\$10 billion dollars in assessed property value existed in the CTC in 2011.

Importance

The CTC is a place to further grow the Region's prosperity. An increase in property assessment values may indicate a relationship between the investment in ION and economic growth within areas surrounding rapid transit stations. There have been a number of new high value and high quality developments as well as renovations of existing buildings that provide community benefits such as increased property values, as evidenced by assessment growth.

Methodology

Land parcels within the CTC were examined to determine the total assessment value. Both residential and non-residential properties were considered to monitor change in assessment. The most updated parcels for the first quarter of 2011 and the fourth quarter of 2014 were sourced from MPAC (Municipal Property Assessment Corporation) and used to determine the total assessment of parcels within the CTC. Note that a component of assessment growth is the 4-year phase in periods of 2009-2012 and 2013-2016. Depending on the property type, MPAC uses different methods to determine the assessed value of properties. There are three common approaches to determine the current value of any property:

- The direct comparison approach: compares the property to the prices of recently sold similar properties, commonly used for assessing single family residential, condos, and vacant land
- The cost approach: estimates the cost of replacing the existing building, commonly used for estimating industrial manufacturing plants
- The income approach: values the property based on the income it can generate, commonly used for office buildings, apartment buildings, hotels, and retail stores

For the direct comparison approach, MPAC also looks at the key features that affect a property's market value. There are over 200 different factors to consider, but five major factors account for approximately 85 per cent of the value. These factors include:

- 1) location;
- 2) lot dimensions;
- 3) living area;
- 4) age of property (adjusted for any major renovations or additions); and
- 5) quality of construction

In order to see the tax implications of this increase in assessment, the regional and area municipal tax value for each property in the CTC was also calculated. To do so, tax records for each property were spatially overlaid with the CTC boundary, and the sum of taxes within the CTC was extracted. The property taxation system implemented by the provincial government divides properties into seven mandatory classifications and five optional classifications. Property classifications are defined by a Realty Tax Class (RTC) designation, and are sub-classified further by a Realty Tax Qualifier (RTQ) designation. These designations determine the tax to apply. For the purposes of this report, only municipal taxes are considered (region + area municipal); education taxes were not included.

Results

The assessment value within the CTC in 2011 was almost \$10 billion. This has subsequently grown by 20.7 per cent to \$12 billion in 2014 (Table 1), resulting in a yearly average rate of change of 5.2 per cent.

Parcels within stage one accounted for 69 per cent of all assessment growth within the CTC in 2011, and 70 per cent in 2014. Between 2011 and 2014, there was a 23 per cent increase in assessment in stage one and a 15.5 per cent change in stage two.

Table 1. Assessment in CTC and Outside the CTC for 2011 and 2014

	2011	2014	Four Year Change	Four Year per cent Change	Annual Average	Ave Annual per cent Change
Stage One	\$6,901,223,489	\$8,485,672,537	\$1,584,449,048	23%	\$396,112,262	6%
Stage Two	\$3,081,562,884	\$3,558,976,488	\$477,413,604	16%	\$119,353,401	4%
CTC	\$9,982,786,373	\$12,044,649,025	\$2,061,862,652	21%	\$515,465,663	5%
Outside CTC	\$44,330,752,867	\$53,601,648,569	\$9,270,895,702	21%	\$2,317,723,926	5%
Region	\$54,313,539,240	\$65,646,297,594	\$11,332,758,354	21%	\$2,833,189,589	5%

Analysis

Assessment value within the CTC has increased between 2011 and 2014. In fact, assessment growth within stage one outperformed the Region as a whole, which is an impressive feat given greenfield developments outside of the CTC. Contributing to this increase are several major projects in Kitchener including the Tannery, the Breithaupt Block, City Centre condominiums, and the 1 Victoria condominiums.

While assessment growth is a good indicator of the change in value of properties in an area, it should be noted that there are some challenges with using this data. Since the data is maintained by MPAC primarily for the purpose of issuing tax bills, it can under-represent the change in assessment for properties which are tax-exempt. Further changes in assessment are phased in over time; for example, assessment changes implemented in 2009 were phased in over the period of 2009-2012. Similarly, reassessments in 2013 will be phased in over the 2013-2016 time period.

In order to see the tax implications of this increase in assessment, the regional and area municipal tax value for each property in the CTC was also calculated. Between 2011 and 2014, the four year change in tax revenue was 4.2 per cent within the CTC (Table 2), resulting in a yearly average rate of change of 1.1 per cent. Taxes on parcels within stage one accounted for 67 per cent of all taxes collected in the CTC in 2011 and 68 per cent in 2014. There was a greater increase in tax revenue in stage one while change in tax revenue in stage two was relatively flat.

Table 2. Tax Revenues in CTC and Outside the CTC for 2011 and 2014

	2011	2014	Four Year Change	Four Year per cent Change	Annual Average	Ave Annual per cent Change
Stage One	\$88,850,429	\$94,566,956	\$5,716,527	6%	\$1,429,131	1.60%
Stage Two	\$44,696,003	\$44,632,647	-\$65,570.00	0%	-\$16,392.00	-0.04%
CTC	\$133,546,432	\$139,199,604	\$5,653,172	4%	\$1,412,739	1.10%
Outside CTC	\$489,058,774	\$547,958,665	\$58,899,892	12%	\$14,724,973	3.01%
Region	\$687,158,269	\$622,607,419	\$64,550,849	10%	\$16,137,712	2.60%

There were 13 properties in the CTC that experienced an assessment increase of greater than \$10,000,000 between 2011 and 2014 (Table 3). Besides a number of new student residences, properties that had large assessment increases include the Provincial Courthouse, the University of Waterloo School of Pharmacy, St. Mary's High School, and the Bauer Lofts.

Table 3. Top 13 Greatest Increase in Assessment Change from 2011 to 2014

Property	Location	City	2011 Assessment	2014 Assessment	Assessment Change
Provincial Courthouse	85 Frederick St	Kitchener	\$1,518,650	\$79,355,506	\$77,836,856
Student Housing	201 Lester St	Waterloo	\$567,500	\$26,351,500	\$25,784,000
Student Housing	315 King St N	Waterloo	\$261,750	\$23,417,602	\$23,155,852
Student Housing	339 King St N	Waterloo	\$216,000	\$22,154,186	\$21,938,186
School of Pharmacy	Victoria St	Kitchener	\$2,262,099	\$24,074,500	\$21,812,401
High School	1500 Block Line Rd	Kitchener	\$2,294,000	\$20,966,033	\$18,672,033
Retirement Home	208 Hespeler Rd	Cambridge	\$802,500	\$18,268,000	\$17,465,500
Student Housing	21-29 Columbia St W	Waterloo	\$557,750	\$15,800,500	\$15,242,750
Bauer Lofts and Retail	187 King St S	Waterloo	\$1,083,719	\$14,825,000	\$13,741,281
Student Housing	321 Lester St	Waterloo	\$176,526	\$13,171,500	\$12,994,974
Student Housing	167 King St N	Waterloo	\$756,250	\$13,343,500	\$12,587,250
Student Housing	168 King St N	Waterloo	\$478,000	\$11,958,711	\$11,480,711
Student Housing	110 University Ave W	Waterloo	\$263,750	\$10,922,500	\$10,658,750

There were 13 properties in the CTC that experienced tax revenue increase of over \$100,000 from 2011 to 2014. Nine of the properties that had a tax change of over \$100,000 are student housing developments located in the City of Waterloo. However, not all gains in assessment translate directly into relative tax revenue increases: several downtown properties that have significant assessment growth such as the University Of Waterloo School Of Pharmacy and Laurier University's Faculty of Social Work do not pay property taxes based on assessment. As a result, tax increase in the CTC increased at a lower rate than the Regional increase.

What does the literature tell us?

Light rail transit (LRT) and Property Values Authors: Yu Huang, Robert Babin, Xinyue Pi

LRT exerts a proven influence on real estate market and is recognized as an efficient planning tool to encourage sustainable urban land development (Thompson & Brown, 2012). The relationship between a transit system and property value is, in theory, fundamental to housing markets and urban structures (Hess & Almeida, 2007). Property value primarily varies in reaction to changes in housing demand and housing supply, which include the factor of aforementioned infrastructure investment such as transit project. A transit investment is generally constructed with expectations of housing appreciation within a certain proximity, due to the potential for transit to improve accessibility, increase desirability and attract corridor developments (Hess & Almeida, 2007). A considerable group of studies investigating the

impacts of LRT on the housing market have been carried out, focusing on whether LRT can contribute to a premium or depreciation in property value (Atkinson-Palombo, 2010; Cervero, 1984; Diaz, 1999; Dziauddin et al., 2014; Kim & Lahr, 2013; Ko, 2010; Pan, 2012; Thompson & Brown, 2012). Furthermore, property value change referring to appreciation or depreciation within impacted areas has become one of the key indicators for measuring a transit investment's benefits and success (Dueker & Bianco, 1999).

Transit impact studies are generally based on the hypothesis that improved accessibility will increase land/property value (Yan, Delmelle, & Duncan, 2012). Alonso (1965)'s bid-rent theory states that any location with a higher level of accessibility, such as areas near transit stations, tends to have higher land rents. In practice, a considerable amount of literature has been published arguing that the real-estate market has responded positively to LRT in close proximity to stations for most rail systems (Mohammad, Graham, Melo, & Anderson, 2013). Housing value premiums associated with proximity to LRT stations within a quarter to half mile have been studied extensively: 6.4% in Philadelphia, 6.7% in Boston, 10.6% in Portland, 17% in San Diego, and 20% in Chicago (Al-Mosaind, Dueker, & Strathman, 1993; Dittmar & Ohland, 2004). Evidently, the literature demonstrates that a great amount of variability in the estimated changes in values can be derived from rail investments (Mohammad et al., 2013). Type of rail services, impacting distance of stations, road networks, local housing market conditions and time periods from light rail planning and design to construction and operation, etc., will affect how the underlying property value will change due to the LRT (Mohammad et al., 2013). Despite the variations in the estimates, studies show an average of six to seven percent premium on residential property values due to improved accessibility with LRT (Vessali, 1996). Nonetheless, other studies have argued that, under specific contexts, the housing market has penalized proximity as a form of nuisance (Golub, 2012). Being located too close to a transit station or along a transit line can result in nuisances such as traffic noise, air pollution and vibration from trains, which may depreciate residential property values in station areas (Smith & Gihring, 2006). Whether LRT can contribute to a net positive impact on the housing market is generally determined by the difference between positive accessibility benefits and negative disamenities (Seo, Golub, & Kuby, 2014). For example, Pan (2012) identified the effects of the Houston METRORail on the Main Street Corridor, and suggested that the light rail has significant net positive effects on some residential property values. However, there were significant negative impacts on properties located within a quarter mile of rail stops. Overall, many cases exhibit typically slight changes or even negative changes in property values (Cervero, 2010; Sullivan, 1980). Buffalo's unsuccessful LRT strongly suggests that a healthy local

real estate market and existing and future demand for new development, irrespective of transit services, are necessary prerequisites for the success of real estate development along any rapid transit line (Hess & Almeida, 2007). Even the best designed transit and powerful intentions, property value will not rise if housing market does not value access to transit. Hence, supportive local land use policies, proactive planning, network improvement, and transit system maturation are required to facilitate property value growth and thus promote healthy urban development to accomplish the initial anticipation of LRT project (Litman, 2011).

LRT and real estate development Authors: Yu Huang, Robert Babin, Xinyue Pi

Urban land development in the wake of public transit is widely known as transit-oriented development (TOD), which is implemented as a mixed-use residential and commercial area aiming to maximize access to public transport (Cervero, 2007; Chatman, 2013). As mentioned previously, the accessibility benefits of LRT projects may increase public transit ridership and housing demand, especially in downtown areas and thus will incentivize transit-oriented development (Thompson & Brown, 2012). For example, the LRT implementation in Arlington County, Virginia has successfully stimulated local building activities, resulting in compact and mixed-use transit-oriented development in new urban core areas (Dittmar & Ohland, 2004). Portland, Oregon, USA Metropolitan Area, and Greater Vancouver Region, Canada have seen a modal shift from car to public transport with LRT systems, as well as successful examples of TOD implementation. In Burnaby, British Columbia, high-density real estate has been developed near the major SkyTrain Stations, creating regional town centers (Tan, Janssen-Jansen, & Bertolini, 2013). After the construction of LRT, the areas mentioned above have all witnessed considerable transit-oriented development, and experienced high housing value premiums accordingly.

Nevertheless, not all LRT systems can spawn successful transit-oriented development. The effectiveness of LRT projects depends on a variety of pre-conditions, encompassing external factors (e.g. planning and land-use strategies, institutional commitment and fiscal conditions) and internal factors (e.g. successful design and favorable environments) (Transportation Research Board, 2004). For instance, the Blue Line rail connecting downtown Los Angeles and Long Beach failed to bring the expected economic development to the poor neighborhoods due to a lack of appropriate station-area planning (Belzer & Autler, 2002). Other causes of its failure include high crime rates in that area and lack of political will and community involvement. Another less successful example is in Miami-Dade County, where they failed to generate successful transit-oriented development in the absence of proactive planning strategies

(Cervero, Ferrell, & Murphy, 2002). Since their pre-development agreement contained no timeframe, the developers implemented the project slowly, which led to lost income for long-term developments. Taking the aforementioned successes and failures into account, LRT projects could bring successful transit-oriented development to the area under a range of necessary pre-conditions.

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3.2.5 Dimension: Environment

3.2.5.1 Indicator: Emissions

Baseline

2.4 tonnes of net air emissions from local passenger transportation per person was seen in the Region in 2011.

Importance

ION and the rest of the GRT fleet of buses has the potential to reduce private vehicle usage, vehicle kilometres travelled (VKT), and various emissions from burning fossil fuels. ION is an LRT system that features electric trains running along tracks on a rapidway separate from regular traffic. ION can help mitigate the environmental impact from transportation by reducing per capita greenhouse gas (GHG) emissions in the Region and also decreasing local impacts to air quality by enabling users to ride transit instead of driving personal vehicles.

Methodology

This indicator is used to monitor GHG emissions related to global climate change along with another group of air pollutants commonly referred to as Criteria Air Contaminants (CAC) which are known precursors to smog and are associated with various health impacts. The emissions monitored in this indicator will include the following:

- i) total carbon dioxide equivalents (CO₂e) which includes the primary GHG emissions (Carbon Dioxide – CO₂, Nitrous Oxide - N₂O and, Methane (CH₄); and,
- ii) total other air emissions which include: carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxides (NO_x), sulphur dioxide (SO₂), and particulate matter (PM).

Both GHG and CAC use the same data inputs for estimating emissions. The GHG and CAC emissions can be measured annually and at different geographic scales (national, provincial, regional levels) based on an estimation formula as described below. The calculation for this indicator involves estimating fuel consumption based on the annual average distance travelled (AADT) of all the registered passenger vehicles in operation (VIO) within the tri-city area of Waterloo Region (Cities of Cambridge, Kitchener and Waterloo). All commercial freight trucks are excluded from this calculation as local transit would not displace this type of cargo transportation. Inter-regional buses (e.g. GO, Greyhound) are also excluded from these emission estimations.

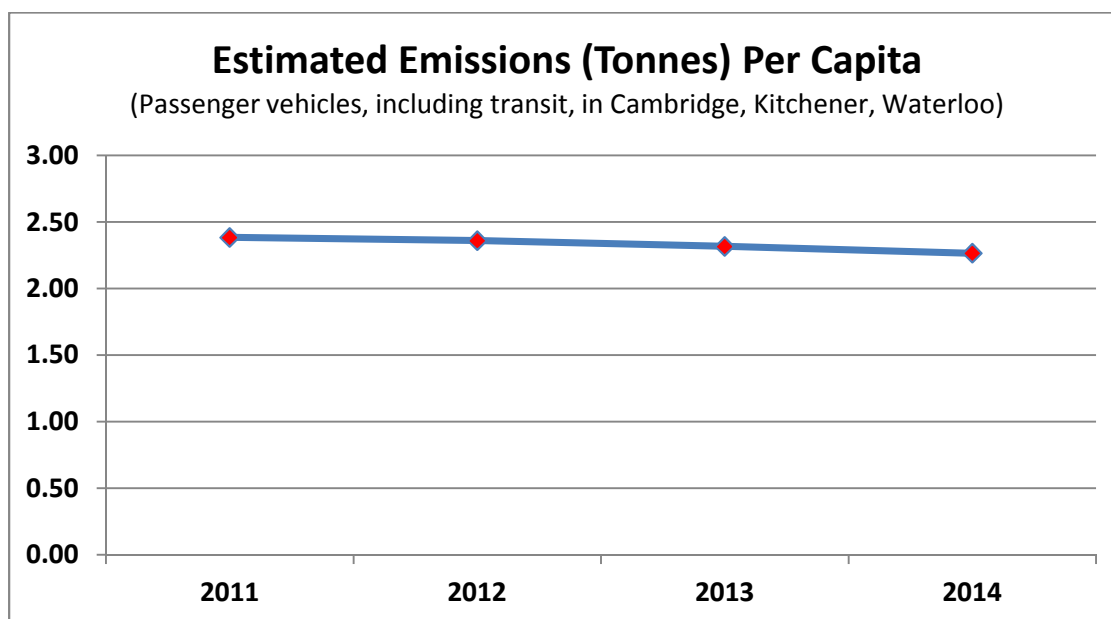
Fuel efficiency ratings are applied to the different vehicle classes to account for the varying rates of fuel consumption per kilometre travelled in light-duty cars for example versus pick-up trucks, SUVs and urban transit busses. Appropriate emission factors are then applied to the estimated fuel consumption of the passenger vehicles registered within the region to calculate the GHG and other air emissions in tonnes. The emissions values are then divided by the population of the three Cities within Waterloo Region to result in a per capita emissions value.

Formula:

Number of passenger VIO (by vehicle class, fuel type and fuel efficiency rating) x AADT = estimated fuel consumption x GHG and air emission factors = total passenger emissions in tri-city area divided by population = net emissions per capita

Once ION becomes operational, its electricity consumption will be included in this indicator via multiplying the annual consumption by the appropriate emission factors for Ontario's power grid. In addition, actual transit fleet fuel consumption is used as a comparator given that the Region operates the fleet exclusively and has direct access to this dataset. In future monitoring reports, periodic adjustments to the vehicle kilometers travelled portion of the emissions estimation formula may be made using the Regional Transportation Planning model which will be more locally representative versus the provincially averaged AADT values. Emission factors developed for this monitoring project are specific to the vehicles registered within Waterloo Region (Tri-Cities area) and are not applicable to other locations outside of the region. Other improvements may be made over time to this indicator to improve its accuracy and relevance.

Results



There was a slight decrease in net air emissions per capita within the tri-city area (Cambridge, Kitchener and Waterloo) from 2.4 tonnes in the year 2011 to 2.3 tonnes in 2014. Based on the emissions estimation formula used for this indicator, the decrease in net air emissions per capita results from a 2% decrease in net emissions and a 3% increase in population (within the tri-city area) during this time period. Further insight into these values is described below within the analysis section of this indicator.

Analysis

This indicator refers to net emissions per capita as it includes emissions from privately owned passenger vehicles as well as transit vehicles and considers growth in the local population. Over time, transit emissions are expected to increase as the bus fleet expands and ION becomes operational. However, this increase is expected to be offset by a reduction in overall passenger vehicle use as transit ridership continues to grow more rapidly than the population. Therefore net air emissions per capita from passenger transportation within the region are expected to decrease in the long-term as the investment in improved transit services reaches its full potential.

Passenger vehicles over time are also becoming more fuel efficient and cleaner in combusting fuel which will further decrease CAC emissions. GHG emissions are more directly related to the volume of fuel burned and therefore these emissions may increase with the continued rise in vehicle kilometers travelled. More use of hybrids and electric vehicles within the region can also lower fuel consumption and associated air emissions. Both of these factors may partially offset the expected increase in population and the number of vehicles within Waterloo Region.

The bulk of the anticipated reduction in air emissions are associated with an anticipated modal shift in terms of the vehicle kilometres travelled by local residents via private automobiles to transit modes, as well as the number of trips by auto versus non-auto modes (e.g. cycling, walking). The LRT meets the growing demand of the increasing population and helps to minimize the impact of transportation on the environment by decreasing the amount of vehicle kilometres travelled by cars, the number of trips by auto and the associated emissions.

Given the nature of the transit technology (electric LRT, diesel or hybrid-fuel buses), the potential for a reduction in GHG and other air emissions are reflected in the means of propulsion of the transit technologies and passenger kilometres travelled by this mode. ION LRT will release no tail pipe emissions and has very low overall emissions impact as it will derive its power from the provincial power grid which is becoming increasingly cleaner at approximately 75 per cent - 80 per cent emissions free since phasing out coal-electricity generation and is expected to be even cleaner in the future as more renewable energy supply is utilized.

What does the literature tell us?

Vehicular transportation contributes greatly to GHG and CAC emissions. Respiratory and cardiovascular impacts on human health have been studied extensively with a clear adverse impact identifiable from exposure to tail-pipe vehicular emissions (including CACs) particularly along heavily traveled urban corridors. Transportation emissions are also one of the largest sources of anthropogenic GHG emissions (from human activity) in Canada which contributes to climate change. Transportation accounts for approximately 28 per cent of GHG emissions in Canada, 34 per cent in Ontario and 40 per cent in Waterloo Region and is a significant source of other air emissions in southern Ontario. More than half of the increase in Canada's GHG emissions from 1990-2013 are associated with the transportation sector.

References:

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<http://www.climateactionwr.ca/our-carbon-footprint/>

3.2.6 Dimension: Crime and Safety

3.2.6.1 Indicator: Perception of Safety

Baseline

65 per cent of people in Cambridge, Kitchener and Waterloo perceive that their downtown communities are safe at night in 2011.

Importance

A person's perception of safety is influenced by multiple factors such as: gender, age, household income, having less than a high school education, victimization in the previous year, physical disorder and social disorder (Fitzgerald, 2008). The Broken Windows Theory identifies disorder as a cause of fear of crime. Heightened fear in turn may lead to increased criminal activity because fear causes individuals to spend less time in the community thus reducing the number of people keeping an eye on the streets (Jacobs, 1961, Wilson & Kelling, 1982, Kohm, 2009, Fitzgerald, 2008).

People are more likely to engage in social activities in places that are perceived to be safe. Downtowns with streets that have quality store front activity and attractive street frontages are more likely to attract pedestrians, cyclists and transit riders to that area. High pedestrian activity in an area is correlated with decreases in crimes such as graffiti due to the increased natural surveillance. A decreased sense of community and increased feelings of isolation can progress into social decay and threaten community vitality (Fredkin, 2004). For instance, deserted storefronts and children's playgrounds and public spaces that are littered with garbage suggest loss of social trust and engagement. Social disorders such as vandalism especially if left unattended, can progress into further social disorders and even crime (Wilson & Kelling, 1982). These disorders are less likely to occur if there is strong social cohesion (McPherson & Silloway, 1986). Positive social interactions in public places promote a sense of strength and unity.

Methodology

The 2011 Waterloo Region Area Survey was a phone survey conducted from May 26 to July 14, 2011. One of the questions asked was: *"In thinking about your feelings of safety in your downtown area at night, do you feel very safe, somewhat safe, somewhat unsafe or very unsafe?"* Responses from townships were omitted because the focus here is the downtowns within the CTC.

Results

In 2011, 19.2 per cent of respondents felt very safe in their downtown area at night, while 45.8

per cent felt somewhat safe. 24.6 per cent of the respondents felt somewhat unsafe and 10.4 per cent felt very unsafe. When those that find their downtowns very safe and somewhat safe are combined, a total of 65 per cent of people find that their downtowns are safe. This leaves 35 per cent of people that find their downtowns either somewhat unsafe or very unsafe. Generally then, residents find their downtowns safe.

A high percentage of people (82.6 per cent) perceive that Uptown Waterloo is safe while 17.4 per cent find that it is unsafe. Kitchener has the highest number of residents (44.9 per cent) that feel unsafe in their downtown. Just over sixty-two percent (62.9 per cent) of Cambridge residents see their downtown areas as safe while 37.2 per cent do not.

Generally, most people (65 per cent) feel some sense of safety in their downtown areas at night. Fewer people (35 per cent) believe their downtowns are either somewhat or very unsafe at night with the fewest number feeling very unsafe (10.4 per cent). Asking residents about their perception of safety in the downtown areas informs our understanding of how safe people feel in the area of the CTC.

Table1 Perceptions of Safety in People's Downtowns by City

City	Very safe	Somewhat safe	Somewhat unsafe	Very unsafe	Totals
Cambridge	14.2%	48.7%	26.6%	10.6%	62.9%
Kitchener	12.9%	42.2%	31.2%	13.7%	55.1%
Waterloo	32.9%	49.7%	12.4%	5.0%	82.6%

Table2 Perceptions of Safety in People's Downtowns

Very safe	Somewhat safe	Somewhat unsafe	Very unsafe
19.2%	45.8%	24.6%	10.4%

Analysis

In areas that are perceived as safe, residents tend to walk, bike, and use public transit, rather than private automobiles. People tend to feel unsafe when walking alone in their downtowns if there is little foot traffic especially after dark. For example, the high proportion of people that perceive Uptown Waterloo as safe may be due to the high number of pedestrians and activities occurring throughout the day including at night. Simply put, increases in the presence of others

create a more reassuring experience. The presence of a transit corridor that is widely used at all times of the day has the potential to significantly contribute to increases in perceptions of safety and decreases in crime.

For more information as to why some individuals experience fear of crime while others do not, please refer to the "Fear of Crime, Perceptions in Waterloo Region" document published by the Waterloo Region Crime Prevention Council (WRCPC, 2009).

To access the fully published 2011 Waterloo Region Area Survey report, please visit:

<http://preventingcrime.ca/wp-content/uploads/2014/08/2011PerceptionsOfCrime-REPORT.pdf>
or contact wrcpc@regionofwaterloo.ca for more information.

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3.2.6.2 Indicator: Police Calls for Service

Baseline

39 per cent of police calls for service related to potential public perception occurred within the CTC in 2011.

Importance

“These call for service statistics are useful indicators of the demand on police resources, but do not represent actual criminal activity. It is important to remember that police are required by the Ontario Police Services Act to not only to enforce laws but also to prevent crime, provide assistance to victims, respond to emergencies and conduct public order maintenance. The majority of calls for service that patrol officers respond to are not criminal in nature.” - (WRPS, 2015, p. 2)

Methodology

The annual Waterloo Regional Police Service (WRPS) occurrence data was obtained through open source data from the Waterloo Regional Police Service website (WRPS, 2015, <http://www.wrps.on.ca/inside-wrps/corporate-planning-systems>). Occurrence information is generated from calls coming into the WRPS Communications Centre from a non-emergency line, from a 9-1-1 phone line, or initiated by an officer. It is possible that a call may be cancelled, duplicated from multiple people reporting the same incident, or taken over the phone by the WRPS resource desk (WRPS, 2015). The data represents the full extent of police call information which has been publically made available within the limitations of the privacy legislation.

A subset consisting of the most relevant police calls for service were chosen to reflect the type of police activity that may affect a person’s perception of safety within their downtown area. The selected call types are grouped under three categories: Public Order Maintenance; Police Reported Violent Occurrences against a Person; and Police Reported Non Violent Occurrences as shown in Appendix E. A sum of the selected call types within each category was taken to arrive at the total percentage of police calls for service that occurred within the CTC.

Police calls for service do not represent criminal activity, however, using the percentage of police calls for service within CTC is a useful indicator of the demand on police services (criminal and non-criminal) within this specific area.

Results

There were a total of 41,636 in the subset of WRPS calls for service related to the maintenance of public order and violent and non-violent occurrences within Waterloo Region in 2011.

16,249 (39 per cent) of those calls took place within the CTC (Table 1). There were 17,701 public order maintenance police calls for service within Waterloo Region, in which 7,326 (41 per cent) of those calls were placed within the CTC. Calls for service that reported disorder made up 45 per cent out of the total calls for service in the three categories of public disorder, violent and non-violent occurrences, making public order maintenance the most common reason for calls for service within the CTC.

Out of all the 9,498 calls related to potential violence against a person, in the whole Region, 3,628 (38 per cent) of them were placed within the CTC. The number of the calls for service that were related to violence made up 22 per cent of the three types of calls in the CTC, making violence one of the least prominent occurrence types in the CTC.

Within Waterloo Region there were 14,437 non-violent calls where 5,295 (37 per cent) of the calls were made in the CTC. Non-violent occurrences made up 33 per cent of the total calls for service in the three categories.

Table 1. Percentage of Police Calls for Service related to potential public perception within CTC

Call Type		2011	2012	2013	2 Year Per cent Change
Public Order Maintenance Calls for Service	Calls Within CTC	7,326	8,053	8,227	12%
	Calls Within Waterloo Region	17,701	18,711	18,418	4%
	Percent within CTC	41%	43%	45%	
Violent Occurrences Against a Person	Calls Within CTC	3,628	3,706	3,580	-1%
	Calls Within Waterloo Region	9,498	9,821	9,337	-2%
	Percent within CTC	38%	38%	38%	
Non Violent Occurrences	Calls Within CTC	5,295	5,078	4,785	-10%
	Calls Within Waterloo Region	14,437	14,071	12,511	-13%
	Percent within CTC	37%	36%	38%	
All Calls	Calls Within CTC	16,249	16,836	16,591	2%
	Calls Within Waterloo Region	41,636	42,603	40,266	-3%
	Percent within CTC	39%	40%	41%	

There were 7.6 police calls for service related to potential public perception per 100 people in 2011. Police calls for service related to potential public perception decreased by 1.6 per cent between 2011 and 2013. Police calls related to public order maintenance increasing by 3.6 per cent on a per capita basis within the CTC between 2011 and 2013 (Table 2). Police calls for service calls related to potentially violent occurrences against a person and non-violent occurrences per capita decreased between 2011 and 2013. The largest decrease was in police reported violent occurrences against a person, where there was a 14.4 per cent decrease of police calls for service per 100 people from 2011 to 2013.

Table 2. Police Calls for Service per 100 People within the CTC

Call Type		2011	2012	2013	2 Year Per cent Change
Public Order Maintenance Calls for Service	Calls Within CTC	7,326	8,053	8,227	12%
	Population within the CTC	96,707	97,659	100,332	4%
	Calls per 100 People in CTC	7.58	8.25	8.2	4%
Violent Occurrences Against a Person	Calls Within CTC	3,628	3,706	3,580	-1%
	Population within the CTC	96,707	97,659	100,332	4%
	Calls per 100 People in CTC	3.75	3.79	3.57	-14%
Non Violent Occurrences	Calls Within CTC	5,295	5,078	4,785	-10%
	Population within the CTC	96,707	97,659	100,332	4%
	Calls per 100 People in CTC	5.48	5.2	4.77	-12%
All Calls	Calls Within CTC	16,249	16,836	16,591	2%
	Population within the CTC	96,707	97,659	100,332	4%
	Calls per 100 People in CTC	16.8	17.24	16.54	-2%

Analysis

This subset of police calls for service related to potential public perception increased annually by one per cent to two per cent from 2011 to 2013. Changes in calls for service may be due to a variety of influencing factors such as changing police procedures and priorities, targeted enforcement, and citizen engagement. Increase in calls for service may simply be present because of population increase within the Region and CTC along with more awareness of crime and safety (Anderson, 2006). When there is a high volume of people in a given area, the likelihood of someone reporting a crime is higher since a greater number of people imply a greater chance of somebody witnessing a crime, or becoming a potential victim (Anderson, 2006). The CTC consists of several central districts and downtowns where a great number of people exist.

Property crime has a significantly greater qualitative impact that affects a person's perception of safety. Billings, Leland and Swindell (2011) found that light rail transit does not lead to increased crime rate around stations. Their study found that property crimes decreased once the transit station locations were announced, remained stable when the light rail began operating, and did not return to preannouncement levels (Billings, Leland and Swindell, 2011). This may be due to substantial public investments surrounding station areas which make it safer along the light rail corridor (Billings, Leland and Swindell, 2011). These areas may have additional police patrolling, improved street-lighting or new cameras and security equipment, which would not have been installed if the transit stations did not exist in the area

Incorporating Crime Prevention Through Environmental Design (CPTED) principles in the built environment can also lead to a reduction in the fear and incidence of crime.

What does the literature tell us?

Since the majority of calls for service made within the CTC involved public order maintenance and not necessarily criminal behaviour, there is limited information about the relationship of land use and social control on serious crime (calls potentially involving violence contributed to just eight per cent of total calls within the CTC). Kurts, Koon and Taylor's (1998) research using calls for service data is telling that calls for service may be a better indicator of informal social control, or social disorder rather than crime itself.

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3.2.7 Dimension: Inclusive Communities

3.2.7.1 Indicator: Home Ownership Affordability

Baseline

62 per cent of housing transactions were affordable to low and moderate income households within the CTC in 2011.

Importance

The growing population requires a range of housing options that targets mixed-income housing developments that includes smaller homes for first time buyers, larger homes for families, smaller downsized homes for empty nesters and retirees, and multi-unit housing options for students and other renters. Different segments of the population, such as vulnerable populations, seniors, persons with disabilities, and new Canadians face challenges in locating and securing appropriate affordable housing.

One of the benefits of ION is that housing near fast and convenient public transit provides residents with an opportunity to decrease their household transportation costs.

Methodology

A housing transaction is considered affordable if the purchase price results in annual accommodation costs which do not exceed 30 per cent of gross annual household income for low and moderate income households. Based on the Province of Ontario's Provincial Policy Statement (PPS), the Region's Housing Action Plan defines an affordable housing target as the lower of two calculation approaches:

- a) Income Approach: housing for which the purchase price results in annual accommodation costs which do not exceed 30 percent of gross annual household income for low and moderate income households; or
- b) Market Approach: housing for which the purchase price is at least 10 percent below the average purchase price of a resale unit in the regional market area;

Income Approach: the 6th decile of household income as provided by Statistics Canada is used to represent low and moderate income households. Using the methodology outlined in the 'Affordable Housing Target' report, the maximum affordable house price which does not exceed 30 percent of gross annual household income for low and moderate income households in 2011 is \$387,137.

Market Approach: Canada Mortgage and Housing Corporation (CMHC)'s Q1 2011 Housing Now report shows that the average price of a resale unit in the Kitchener-Waterloo real estate board area was \$308,557, where 10 per cent below this value is \$277,701. This report also shows that the average house price of a resale unit in the Cambridge real estate board area was \$285,418, where 10 per cent below this value is \$256,876.

The Market Approach is the lesser of the two approaches. The maximum affordable house price is \$277,701 in Kitchener-Waterloo and \$285,418 in Cambridge. This process is repeated for subsequent years by using the average price of a resale unit from CMHC's Housing Now reports for 2012-2014.

Transactions that were between \$10,000 the affordable cut were counted as affordable in 2011, 2012, 2013 and 2014. Transactions that were below \$10,000 were ignored to present a realistic picture of the market. \$10,000 was chosen as a cut-off value as it was used in the Chatman, D. G., Tulach, N. K., & Kim, K. (2011) analysis of measuring the economic impacts of light rail.

Results

In 2011, there were 812 residential transactions over \$10,000 within the CTC, where 500 or 62 per cent of the transactions met the affordability cut-off (Table 1). Of the 500 affordable transactions, 286 (57 per cent) occurred within stage one and amounted to 36 per cent of all transactions within the CTC (Figure 1). Of the 500 affordable transactions, 214 or 43 per cent of the transactions occurred within stage two and amounted to 27 per cent of all transactions within the CTC (Figure 1).

Within stage one, there were a total of 474 transactions over \$10,000, of which 286 were between \$10,000 and the affordability cut-off, which accounts for 60 per cent of the affordable transactions in that portion of the CTC (Table 1; Figure 2). Within stage two, there were a total of 327 transactions over \$10,000, of which 214 were between \$10,000 and the affordability cut-off, which accounts for 65 per cent of the affordable transactions in that section of the CTC (Table 1; Figure 3).

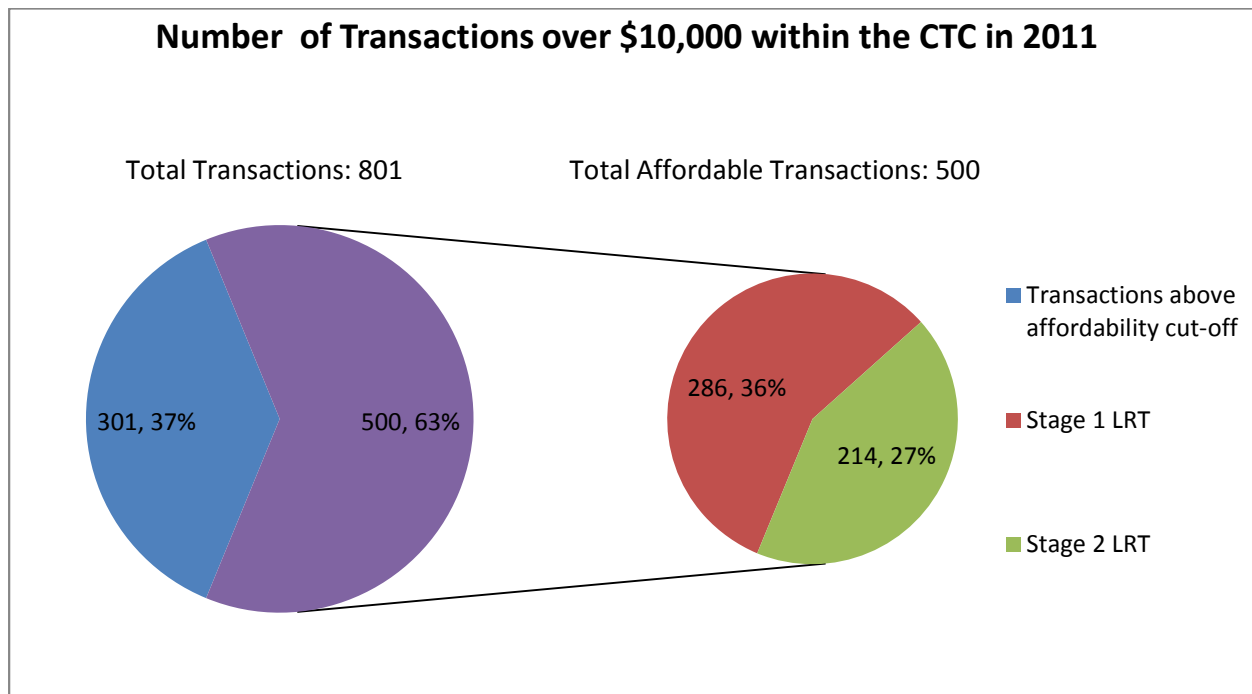
Table 1. Residential units under affordability cut off in CTC (transactions over \$10,000)

Year		2011	2012	2013	2014
Stage one Affordable Cut off*		\$277,701	\$281,176	\$292,144	\$304,025
Stage two Affordable Cut off**		\$256,876	\$264,421	\$267,889	\$289,394
# of Transactions Between \$10,000 and Cut Off	Stage one	286	325	346	302
	Stage two	214	167	167	196
	CTC	500	492	513	498
# of Transactions Over \$10,000	Stage one	474	557	597	516
	Stage two	327	277	300	317
	CTC	801	834	897	833
Per cent Affordable Transactions	Stage one	60%	58%	58%	59%
	Stage two	65%	60%	56%	62%
	CTC	62%	59%	57%	60%

* 10 per cent below the average sale price from the Kitchener-Waterloo Real Estate Board

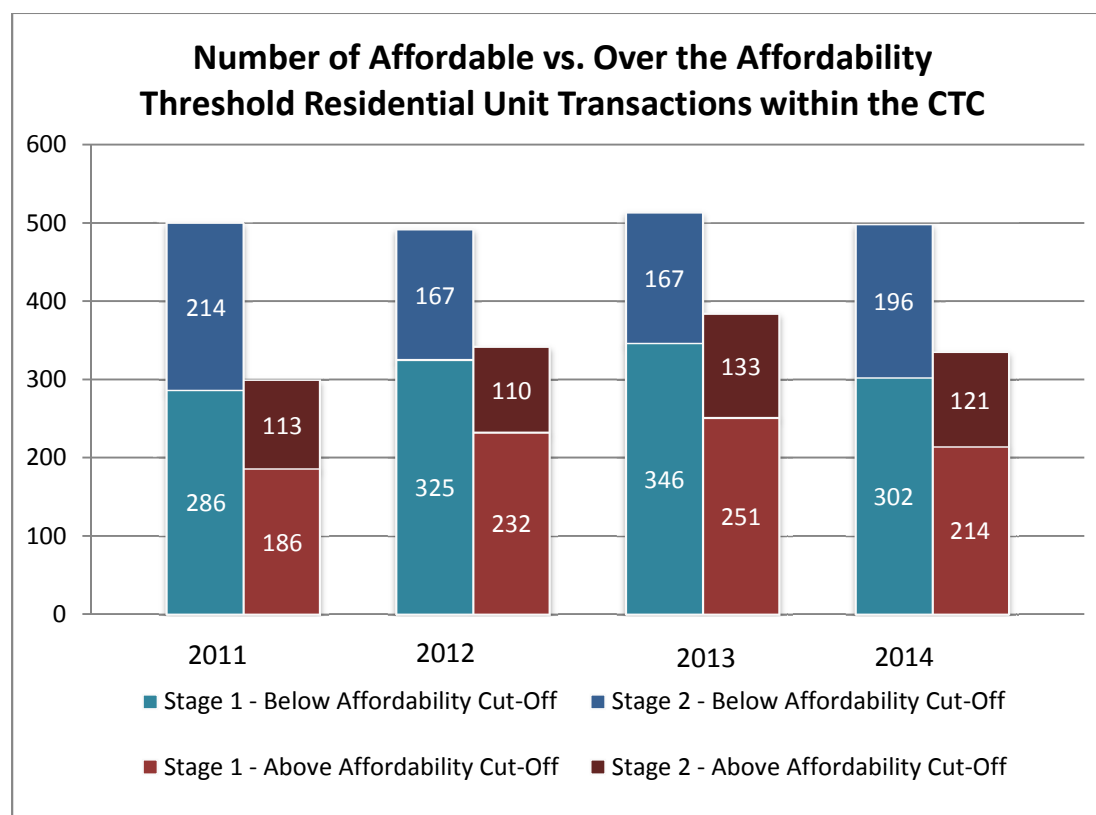
**10 per cent below the average sale price from the Cambridge Real Estate Board

Figure 1. Residential Unit Transactions under Affordability Cut-off within the CTC in 2011



From 2011 to 2014, there were a total of 2,003 affordable transactions, and 1,362 transactions which exceed the affordability cut-off (Figure 2). The number of affordable transactions have remained stable between 2011 and 2014 but transactions that are over the affordability threshold have increased between 2011 and 2013 and decreased between 2013 and 2014.

Figure 2. Number of Transactions above and below the affordability cut-off within the CTC



In 2011, 49 per cent of all residential unit transactions were under the affordability cut-off, in Waterloo Region, which is lower than the 62 per cent of affordable transactions within the CTC (Table 2). Although the percentage of affordable transactions within the CTC has decreased, it is not decreasing at a rate that is faster than the Regional rate.

Table 2. Residential Units under Affordability Cut-off in Region

Year	2011	2012	2013	2014
Affordable Cut off	\$277,701	\$281,176	\$292,144	\$304,025
Between \$10,000 and Cut Off	4,589	4,159	3,736	3,385
Total Over \$10,000	9432	9147	8446	7799
Per cent Under Cut Off	49%	46%	45%	44%

Although the average residential unit transaction values within the stage one are over the affordability cut-off, the average transaction values have been decreasing since 2011 (Table 3). The average transaction value was \$463,875 in 2011 within stage one and in 2014 the average transaction value decreased to \$368,588 (Table 3). This was an average annual decrease of seven per cent between 2011 and 2014, indicating that transactions are becoming more affordable over time. The decrease in transaction values may possibly be due to newer units coming on the market in higher density developments which are smaller and more affordable. In 2011 the average residential unit transaction values within stage two was \$257,935 and increased to \$295,696 in 2014, which was an annual increase of five per cent. In the Region, the average transaction value in 2011 was \$316,279 and was \$358,196 in 2014, which was an average annual growth of four per cent (Table 3).

Table 3. Average Residential Unit Transaction Value (T Transactions, Over \$10,000)

Year	2011	2012	2013	2014	3 Year Per cent Change
Stage one LRT	\$463,875	\$417,437	\$374,885	\$368,588	-7%
Stage two LRT	\$257,935	\$304,609	\$300,306	\$295,696	5%
CTC	\$378,802	\$379,963	\$349,942	\$340,848	-3%
Not In CTC	\$310,323	\$340,707	\$379,862	\$360,291	5%
Region	\$316,279	\$344,317	\$376,660	\$358,193	4%

Analysis

Average residential unit transaction values can help understand whether or not there may be a socio-economic divide within the CTC. The property transaction values indicate whether there is choice in housing forms, whether or not there is residential stability, financial stress, and access to affordable housing. Property transaction values enable determination of affordability level as well as the percentage of homes in the CTC that are affordable.

Average residential unit transaction values have been decreasing within the CTC, while average transaction values have been increasing in areas outside of the CTC and overall in the Region. Average transactions have been increasing faster outside of the core than within. There was a five per cent average annual increase in average transaction values from 2011 to 2014 outside the CTC, while there was a three per cent average annual decrease in average transaction values within the CTC. The CTC is generally more affordable than other areas in Waterloo

Region. Average transaction values within stage two have been increasing at the same rate as the Region at five per cent annually.

What does the literature tell us?

Housing Affordability Impacts of LRT and TOD Authors: Babin, R. & Moos, M.

The Canadian Mortgage and Housing Corporation (CMHC) (2014) defines affordable housing as housing, owned or rented, that costs the household less than 30 per cent of their before-tax income. However, higher income earners who spend more than 30 per cent of their income on housing may not necessarily be experiencing affordability concerns. It is therefore commonplace to employ both affordability and income thresholds when examining the extent of affordability concerns. Housing affordability pressures are generally most harshly felt by low- and middle-income households (Glanville, 2013). Housing affordability needs to be distinguished from ‘affordable housing’ that is sometimes used to describe subsidized or other below-market-rate housing.

It is important to note that transportation costs also affect housing affordability. Thus, the concept of ‘location affordability’ holds promise in portraying a more accurate picture of being able to afford to live in a particular location by accounting for expected transportation costs as well as housing costs —although data used to measure location affordability are generally more difficult to come by than traditional housing affordability measures. Location affordability can be seen as the incorporation of the location efficiency concept, which will be discussed further in this review, into affordability measures.

Due to data limitations, housing affordability is often assessed by comparing average incomes to the average cost of home ownership, generally at a city-wide or regional level. This metric is called the price to income ratio (PIR) (Lin, Chang, & Chen, 2014). Desjardins has developed a housing affordability index similar to PIR, which uses the ratio between average household disposable income and the qualifying income needed to secure a mortgage and pay for property taxes. The latest of their reports indicate a slight increase in affordability in the Kitchener metropolitan area in the first quarter of 2015 (Desjardins, 2015).

While this index, and other PIRs, identifies Kitchener as affordable, it deals only with average values across the metropolitan area. It does not explicitly identify spatial variations in affordability, it does not differentiate between owners and renters, nor does it consider affordability issues experienced by different kinds of demographic groups. Therefore, perhaps not surprisingly, aggregate PIRs using median values have been found to underestimate housing affordability concerns for low-income residents (Gan & Hill, 2006). Lin, Chang, & Chen (2014) recommend investigating micro-PIR, which involves identifying PIRs for individual properties and households rather than entire metropolitan areas or cities. The individual/household level

approach, considering affordability for different populations, is considered best practice in housing research in general.

Housing suitability also requires consideration in the context of affordability policy—a particular property may ‘look’ affordable from a cost perspective but may not be suitable to all demographic groups and household types (e.g., a studio apartment might be affordable to a middle-class, two-earner household with children but would likely not be considered suitable in terms of size). In this report, we discuss housing affordability in a more general sense and make use of specific definitions when necessary.

LRT, and TOD in general, can impact housing affordability by increasing the value of a particular location. This increases land and housing costs, thus making LRT-served locations less affordable. Densification near LRT stations and in TOD also contribute to the development of smaller housing units, impacting the suitability of housing near LRT for larger households. This section will outline some of the research documenting these effects.

Voith and Wachter (2009) argue that growth is the predominate source of affordability issues in contemporary cities, attributing this growth to many simultaneous socio-economic processes including the transition from a manufacturing to a knowledge-based economy and a growing desire by residents to live, work, and recreate locally.

Housing costs are partly a function of land costs, which are determined by location. The growing amenity provision in cities, and people’s desire to live near them, are thus contributing to increasing housing costs. Addison, Zhang, and Coomes (2013) add that growth management strategies carried out by municipalities can lead to undesirable affordability outcomes for low- and moderate-income residents, although in general the impact of growth boundaries on housing costs remain contested.

The research suggests that affordability is directly related to the presence of an LRT and station area planning, although the net effects of this relationship are neither clear nor straightforward to identify. A number of hedonic studies have found and explained significant positive price effects on residences near transit stations as well as within communities that contain elements of TOD (Baum-Snow & Kahn, 2000; Cervero & Duncan, 2002; Dziauddin, Powe, & Alvanides, 2014; Hess & Almeida, 2007; Krause and Bitter, 2013; Duncan, 2010).

It has also been noted in some cases that homes immediately adjacent to rail lines and stops received a negative or null price effect, which has been attributed to either nuisance, crime and vandalism, or a lack of transit-supportive land uses nearby (Bowes & Ihlanfeldt, 2011; Cervero, 2003). Whether LRT contributes to land value decline of nearby properties hence depends in large part on noise mitigation levels, station area design and socio-economic conditions.

Billings (2011) explains that hedonic studies estimating the price impacts of LRT vary greatly in the way they define and measure access or proximity. This is because there are different interpretations and measurements of what constitutes proximity. However, one consistent finding is that LRT station areas that developed with the guidance of explicit land use plans to support mixed-use, walkability and densified environments see the largest land value increases (Atkinson-Palombo, 2010; Mejia-Dorantes & Lucas, 2009).

One overarching survey of the research identified twenty-two studies showing an increase in housing values resulting from TOD, New Urbanism, and urban infill and revitalization; two studies also found a negative relationship between urban infill and revitalization and affordability (Addison, Zhang & Coomes, 2013).

Whether LRT leads to lesser or greater overall housing affordability is also confounded by how LRT influences transportation costs. Location efficiency is the concept that by living in more compact, well-transit-served neighbourhoods, residents are able to spend less on transportation and so are able to afford higher home prices or rents (Blackman & Krupnick, 2001; Belzer & Autler, 2002). In Addison, Zhang, & Coomes' (2013) study of the relationship between smart growth and housing affordability, they note that the increase in property values attributable to new transit infrastructure may be partially or entirely offset by the reduced transportation costs that these transit systems provide.

Therefore, while nearby homes themselves may become more expensive with LRT, living in them may become less or more affordable overall depending on the extent of transportation cost reductions they provide. This assumes that potential transportation savings are actually realized by households; although research on location efficiency generally supports affordability improvements from investments in public transportation infrastructure. For example, a study of Auckland that indicated when commuting costs were considered in the investigation of housing affordability, outlying suburban home were in fact less affordable than their transit-served urban counterparts (Mattingly & Morrissey, 2014).

There is also an element of temporal complexity related to housing affordability and TOD. Some studies found price effects occurred during the development of LRT (McMillen & McDonald, 2004) while others found them only once the system was operational (Yan, Delmelle, & Duncan, 2012). Golub, Guhathakurta, & Sollapuram (2012) add that property value impacts may exist at all stages of LRT implementation—during planning, construction, and operation—but that the magnitude of these impacts differ.

Gentrification:

While a goal of LRT implementation is often urban regeneration and revitalization, attention should be paid to the potential for these efforts to result in gentrification. Grube-Cavers &

Patterson (2014) synthesised contemporary literature to define gentrification as: increases in the social status of poor or working class neighbourhoods along with concomitant increases in rents and property values that occur at a faster rate than the city's average. Increases of land values as well as increases in residents' levels of education, income and engagement in professional occupations are often variables used to measure the occurrence of gentrification (Grube-Cavers & Patterson, 2014). Therefore, understanding of whether gentrification is occurring near LRT can lend insight into whether an area is becoming unaffordable for groups with lower-than-average incomes, or whether lower income earners may even be displaced in re-developed areas.

There are various interrelated factors that shape whether and how gentrification occurs. It was found that proximity to both transit and previously gentrified areas significantly impacted the occurrence of gentrification—particularly that gentrification most often occurred in areas near but not directly adjacent to the transit lines (Grube-Cavers & Patterson, 2014). Kahn (2007) adds from his study of 14 cases of TOD around rail transit systems (some LRT and some subway) that gentrification was more likely to occur around walk-and-ride stations rather than park-and-ride stations.

An additional element of spatial complexity is in the codetermination of value increases by the moderating impacts of multiple built form and land use variables (Duncan, 2010), for example: It was found access to retail significantly increased nearby property values only when located in pedestrian-oriented environments (Matthews & Turnbull, 2007). Nonetheless, if LRT is promoted in part as a strategy to increase retail and residential developments in the core, the research would suggest that it will lead to the development of the kinds of neighbourhoods attractive to gentrifiers—and hence a decline of affordability near LRT for some households.

It has been shown that poverty deconcentration—the push of low-income groups from central concentrations to disperse across a region—results partly from capital investments, such as LRT. These policies intend to increase competitiveness of central areas, and in doing so precede the onset of neighbourhood scale gentrification (Reese, Deverteuil, & Thach, 2010).

Gentrification is somewhat self-perpetuating once it has begun. As increases in high-end retail and restaurants, improvements in school quality, and increased provision of amenities take place, lower income earners are priced out of the area as land and housing values increase (Kahn, 2007).

Summary

Economic theory connects housing prices and rents to the value of land. The value of land is a function of accessibility and proximity to desirable locations (Skaburskis & Moos, 2010). Despite some disagreements regarding its implementation, LRT has generally become accepted as a

value-enhancing amenity that can function to attract investment to urban areas in a context of growing regions (Handy, 2002).

Evidence from research examining specific impacts of LRT on housing and land values (Cervero, 2003; Hess & Almeida, 2007), as well as broader assessments of how LRT contributes to gentrification (Quastel, Moos, & Lynch, 2012) suggests that LRT raises land values. In the instances where LRT contributes to decreases in land values, it is occurring in the absence of supportive station area planning and larger socio-economic issues already present in a community.

Overall, there are valid concerns regarding the impacts of LRT on affordability. It must be remembered, however, that most of the developments reviewed took place in a context of disinvestment in affordable housing and dismantling of housing policies (Hulchanski & Shapcott, 2004). Thus, negative impacts of LRT on affordability are not inevitable if supported by appropriate housing policies. Further research is required to evaluate existing (and if deemed necessary derive new) housing policy options appropriate in the context of Waterloo region LRT.

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Appendix A

CBS 8 Opportunities	
1	Fostering Investment
2	Enhancing Mobility throughout the Region
3	Creating High Quality Urban Places
4	Strengthening the Employment Opportunity
5	Enhancing the Learning Experience
6	Encouraging a Healthy Inclusive Community
7	Greening the Corridor
8	Creating a Great Place to Visit

Baseline Indicators with Framing Question and Relationship to CBS Opportunities					
	Dimension	Indicator	Metric	Framing Question	Opportunity
Moving People	Mobility	Transit Ridership	Number of trips made using Grand River Transit (R)	How are we moving around the Region?	2,4,5,6,8
		Daily Transit Activity	Per cent of daily average transit activity which occurred in the CTC	How are we moving around the Region?	2,4,5,6,8
	Sustainable Modes of Transportation	Transit Mode Share	Per cent of mode of travel share which was on transit	Is there more choice in how we travel?	2,6,7
		Active Transportation	Per cent of mode of travel share which was pedestrian and cyclist	Are we providing infrastructure to support cycling and walking? Are we supporting active and healthy lifestyles?	2,4,5,6,8
		Walkability	Per cent of population living in "high" or "very high"	Do more people live in walkable areas?	2,4,5,6,8

			walkable areas		
Building Community	Vibrant Communities	Land Use Mix	Per cent of all regional land uses which were found in the CTC	Is there a diverse mix of land uses that are accessible within the corridor?	2,8
		Population	Per cent of region's residents who lived in the CTC	Do people live and work close to transit options?	1,4
	Art and Culture	Cultural Vibrancy	Number of arts and culture establishments	Are there increased opportunities to create, appreciate, and participate in arts and culture?	1,3,4,5,6,8
		Restaurants	Per cent of region's restaurants	How are restaurants contributing to vibrancy communities?	1,3,4,5,6,8
	Heritage	Heritage Resource Retention	Number of demolition permits on pre-1920 and designated built heritage resources	Have we conserved our identified heritage assets?	5,8
	Investment	Building Activity	Dollar value of building permits	Building permits are an indication of public and private sector investment, and translate into future assessment and taxes	1,3,4
		Assessment	Assessed value	Are	1,3

		Value	of properties	assessment values anticipated to increase within the CTC?	
	Environment	Emissions	Tonnes of net air emissions per capita (R)	Are we minimizing the impact of transportation on the environment?	3,6,7
	Crime and Safety	Perception of Safety	Per cent of people who perceive that their downtowns are safe at night	Do people perceive that our downtown communities are safe?	6,8
		Calls for Service	Per cent of police calls for service which were related to potential public perception	Do people perceive that our downtown communities are safe?	6,8
	Inclusive Community			What is the per cent of properties that are affordable in the CTC?	1,6
(R) – measured at a Regional scale					

Appendix B

Existing Land Uses in the CTC in 2011

Code	Property Description	# Parcels Region	# Parcels CTC
100	Vacant residential land not on water	6444	467
102	Conservation Authority land	103	18
103	Municipal park (excludes Provincial parks, Federal parks, campgrounds)	529	48
105	Vacant commercial land	315	143
106	Vacant industrial land	444	73
110	Vacant residential/recreational land on water	16	1
112	Multi-residential vacant land	55	14
113	Condominium development land - residential (vacant lot)	4	4
114	Condominium development land - non residential (vacant lot)	2	2
125	Residential development land.	120	2
127	Townhouse block - freehold units	36	2
130	Non-buildable land (walkways, buffer/berm, storm water management pond,etc)	442	24
134	Land designated and zoned for open space	255	5
140	Common land	11	2
231	Intensive farm operation - with residence	9	1
260	Vacant residential/commercial/ industrial land owned by a non-farmer with a portion being farmed	283	6
261	Land owned by a non-farmer improved with a non-farm residence with a portion being farmed	625	1
301	Single family detached (not on water)	109072	10804
302	More than one structure used for residential purposes with at least one of the structures occupied permanently	129	28
303	Residence with a commercial unit	329	103
304	Residence with a commercial/ industrial use building	114	28
305	Link home – are homes linked together at the footing or foundation by a wall above or below grade.	631	52
309	Freehold Townhouse/Row house – more than two units in a row with separate ownership	6806	347
311	Semi-detached residential – two residential homes sharing a common center wall with separate ownership.	11563	1258
314	Clergy Residence	8	4
322	Semi-detached residence with both units under one ownership – two residential homes sharing a common center wall.	363	139
332	Typically a Duplex – residential structure with two self-contained units.	2509	1285
333	Residential property with three self-contained units	741	297
334	Residential property with four self-contained units	251	118

335	Residential property with five self-contained units	92	54
336	Residential property with six self-contained units	253	81
340	Multi-residential, with 7 or more self-contained units (excludes row-housing)	780	264
341	Multi-residential, with 7 or more self-contained residential units, with small commercial unit(s)	31	15
350	Row housing, with three to six units under single ownership	126	29
352	Row housing, with seven or more units under single ownership	131	39
360	Rooming or boarding house – rental by room/bedroom , tenant(s) share a kitchen, bathroom and living quarters.	137	91
365	Group Home as defined in Claus 240(1) of the Municipal Act, 2001 – a residence licensed or funded under a federal or provincial statute for the accommodation of three to ten persons, exclusive of staff, living under supervision in a single housekeeping un	36	6
366	Student housing (off campus) – residential property licensed for rental by students.	679	386
372	Life Lease - Return on Invest. Property where occupants can receive either a guaranteed return or a market value based return on the investment. Typically, represented by Fixed Value, Indexed-Based, or Market Value Life Lease Types.	5	3
373	Cooperative housing – equity – Equity Co-op corporations are owned by shareholders. The owners of shares do not receive title to a unit in the building, but acquire the exclusive use of a unit and are able to participate in the building's management.	2	2
374	Cooperative housing - non-equity – Non-equity Co-op corporations are not owned by individual shareholders, the shares are often owned by groups such as unions or non-profit organizations which provide housing to the people they serve.	31	9
380	Residential common elements condominium corporation – consists only of the common elements not units.	29	3
400	Small Office building (generally single tenant or owner occupied under 7,500 s.f.)	128	52
401	Small Medical/dental building (generally single tenant or owner occupied under 7,500 s.f.)	71	38
402	Large office building (generally multi - tenanted, over 7,500 s.f.)	202	119
403	Large medical/dental building (generally multi - tenanted over 7,500 s.f.)	25	12
405	Office use converted from house	281	199
406	Retail use converted from house	163	101
408	Freestanding Beer Store or LCBO - not associated with power or shopping centre	11	2
409	Retail - one storey, generally over 10,000 s.f.	77	30
410	Retail - one storey, generally under 10,000 s.f.	285	140
411	Restaurant - conventional	55	30
412	Restaurant - fast food	16	5
413	Restaurant - conventional, national chain	2	
414	Restaurant - fast food, national chain	44	20

415	Cinema/movie house/drive-in	3	3
416	Concert hall/live theatre	7	5
417	Entertainment complex - with a large cinema as anchor tenant	1	
420	Automotive fuel station with or without service facilities	88	26
421	Specialty automotive shop/auto repair/ collision service/car or truck wash	172	72
422	Auto dealership	65	32
423	Auto dealership - independent dealer or used vehicles	6	2
425	Neighbourhood shopping centre - with more than two stores attached, under one ownership, with anchor - generally less than 150,000 s.f.	26	3
426	Small box shopping centre less than 100,000 s.f. minimum 3 box stores with one anchor (large grocery or discount store)	6	2
427	Big box shopping/power centre greater than 100,000 s.f. with 2 or more main anchors such as discount or grocery stores with a collection of box or strip stores and in a commercial concentration concept	15	4
428	Regional shopping centre	6	6
429	Community shopping centre	7	3
430	Neighbourhood shopping centre - with more than 2 stores attached, under one ownership, without anchor - generally less than 150,000 s.f.	247	87
432	Banks and similar financial institutions, including credit unions - typically single tenanted, generally less than 7,500 s.f.	30	14
433	Banks and similar financial institutions, including credit unions - typically multi tenanted, generally greater than 7,500 s.f.	12	9
434	Freestanding supermarket	6	2
435	Large retail building centre, generally greater than 30,000 s.f.	9	5
436	Freestanding large retail store, national chain - generally greater than 30,000 s.f.	13	6
438	Neighbourhood shopping centre with offices above	16	8
441	Tavern/public house/small hotel	21	5
444	Full service hotel	9	3
445	Limited service hotel	14	6
450	Motel	9	1
471	Retail or office with residential unit(s) above or behind - less than 10,000 s.f. gross building area (GBA), street or onsite parking, with six or less apartments, older downtown core	321	172
472	Retail or office with residential unit(s) above or behind - greater than 10,000 s.f. GBA, street or onsite parking, with 7 or more apartments, older downtown core	48	38
473	Retail with more than one non-retail use	6	5
477	Retail with office(s) - less than 10,000 s.f., GBA with offices above	21	16
478	Retail with office(s) - greater than 10,000 s.f., GBA with offices above	24	22
480	Surface parking lot - excludes parking facilities that are used in conjunction with another property	73	60
481	Parking garage - excludes parking facilities that are used in conjunction with another property	4	4
482	Surface parking lot - used in conjunction with another property	63	41

489	Driving range/golf centre - stand alone, not part of a regulation golf course	3	1
490	Golf course	26	1
496	Communication buildings	27	7
510	Heavy manufacturing (non-automotive)	17	5
520	Standard industrial properties not specifically identified by other industrial Property Codes	979	244
521	Distillery/brewery	1	1
525	Process elevators - flour mills, oilseed crushing, malt houses	1	1
530	Warehousing	268	49
531	Mini-warehousing	19	5
540	Other industrial (all other types not specifically defined)	542	80
544	Truck terminal	1	1
558	Hydro One Transformer Station	4	1
560	MEU Transformer Station	47	14
566	Private Transformer Station	1	1
580	Industrial mall	317	47
590	Water treatment/filtration/water towers/pumping station	113	12
591	Sewage treatment/waste pumping/waste disposal	13	2
596	Recycling facility	1	1
597	Railway right-of-way	10	3
598	Railway buildings and lands described as assessable in the Assessment Act	13	6
601	Post secondary education - university, community college, etc.	31	17
605	School (elementary or secondary, including private)	235	37
608	Day Care	13	5
610	Other educational institution (e.g. schools for the blind, deaf, special education, training)	2	1
611	Other institutional residence	15	4
621	Hospital, private or public	8	4
624	Retirement/nursing home (combined)	9	3
625	Nursing home	12	1
626	Old age/retirement home	36	12
627	Other health care facility	2	2
700	Place of worship - with a clergy residence	49	19
701	Place of Worship - without a clergy residence	298	79
702	Cemetery	69	7
705	Funeral Home	15	5
710	Recreational sport club - non commercial (excludes golf clubs and ski resorts)	33	7
711	Bowling alley	3	1
720	Commercial sport complex	7	3
721	Non-commercial sports complex	37	10
730	Museum and/or art gallery	9	4
731	Library and/or literary institutions	13	5

735	Assembly hall, community hall	27	5
736	Clubs - private, fraternal	62	18
742	Public transportation - easements and rights	4	3
760	Military base or camp (CFB)	3	3
805	Post office or depot	9	3
810	Fire Hall	25	4
815	Police Station	6	4
Total Number of Parcels		154,475	18,556

Land Uses not existing in CTC in 2011

Code	Property Description	# Parcels Region
101	Second tier vacant lot – refers to location not being directly on the water but one row back from the water	15
120	Water lot (entirely under water)	2
169	Vacant land condominium (residential)-defined land that's described by a condominium plan	66
200	Farm property without any buildings/structures	442
201	Farm with residence - with or without secondary structures; no farm outbuildings	63
210	Farm without residence - with secondary structures; with farm outbuildings	94
211	Farm with residence - with or without secondary structures; with farm outbuildings	1328
220	Farm without residence - with commercial/industrial operation	17
221	Farm with residence - with commercial/industrial operation	362
223	Grain/seed and feed operation	5
228	Farm with gravel pit	25
230	Intensive farm operation - without residence	7
232	Large scale greenhouse operation	1
234	Large scale poultry operation	10
235	Government - agriculture research facility - predominately farm property	3
240	Managed forest property, vacant land not on water	25
242	Managed forest property, seasonal residence not on water	1
244	Managed forest property, residence not on water	29
262	Land owned by a farmer improved with a non-farm residence with a portion being farmed	77
307	Community lifestyle (not a mobile home park) – Typically, a gated community. The site is typically under single ownership. Typically, people own the structure.	3
313	Single family detached on water – year round residence	25
369	Vacant land condominium (residential - improved) – condo plan registered	322

	against the land.	
371	Life Lease - No Redemption. Property where occupants have either no or limited redemption amounts. Typically Zero Balance or Declining Balance Life Lease Types.	2
375	Co-ownership – percentage interest/share in the co-operative housing.	2
381	Mobile home – one or more mobile home on a parcel of land, which is not a mobile home park operation.	1
382	Mobile home park – more than one mobile home on a parcel of land, which is a mobile park operation.	3
383	Bed and breakfast establishment	5
391	Seasonal/recreational dwelling - first tier on water	37
392	Seasonal/recreational dwelling - second tier to water	1
395	Seasonal/recreational dwelling - not located on water	8
407	Retail lumber yard	1
462	Country inns & small inns	1
465	Child and community oriented camp/resort	3
486	Campground	9
491	Ski resort	1
495	Communication towers - with or without secondary communication structures	5
512	Cement/asphalt manufacturing plant	4
513	Steel mill	3
514	Automotive assembly plant	1
516	Automotive parts production plant	1
517	Specialty steel production (mini-mills)	1
522	Grain elevators - Great Lakes waterway	6
523	Grain handling - Primary elevators (including feed mills)	7
528	Food processing plant	3
529	Freezer plant/cold storage	1
545	Major distribution centre	1
561	Hydro One Right-of-Way	5
589	Compressor station - structures and turbines used in connection with transportation and distribution of gas	27
592	Dump/transfer station/incineration plant/landfill	5
593	Gravel pit, quarry, sand pit	62
602	Multiple occupancy educational institutional residence located on or off campus	2
630	Federal penitentiary or correctional facility	1
718	Exhibition grounds/fair grounds	2
725	Amusement park	1
739	Local government airport	1
748	Transit garage	1
806	Postal mechanical sorting facility	1
812	Ambulance Station	1

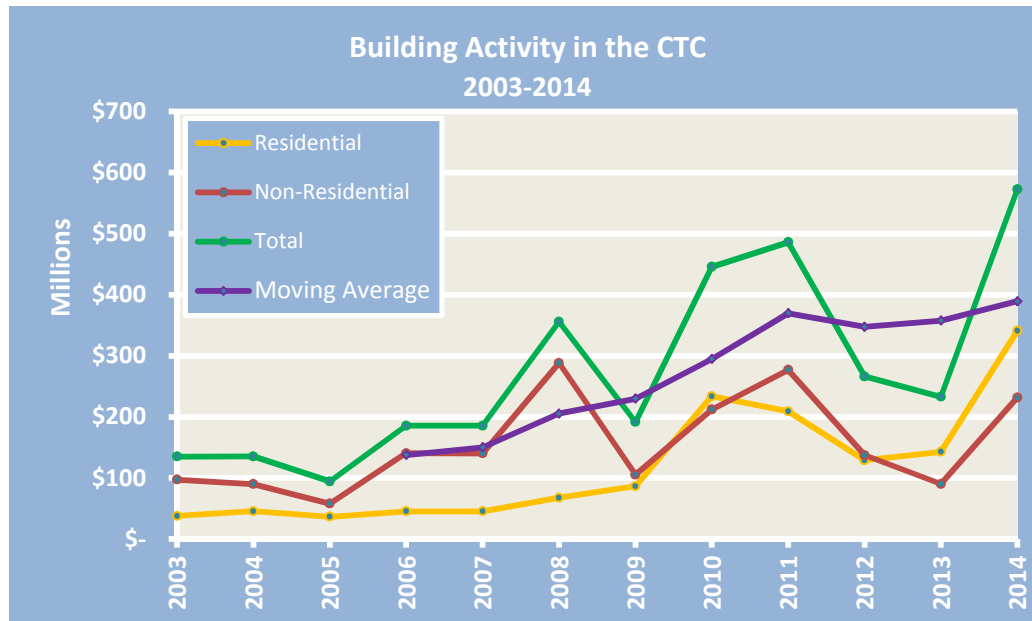
Appendix C

List of the 6-digit NAICS codes counted for the Great Places to Visit Indicator

NAICS	Description
311811	Retail Bakeries
312120	Breweries
312130	Wineries
453920	Art Dealers
511110	Newspaper Publishers
511120	Periodical Publishers
511130	Book Publishers
511210	Software Publishers
512110	Motion Picture and Video Production
512120	Motion Picture and Video Distribution
512130	Motion Picture and Video Exhibition
512190	Post-Production and Other Motion Picture and Video Industries
515110	Radio Broadcasting
515120	Television Broadcasting
519121	Libraries
541310	Architectural Services
541320	Landscape Architectural Services
541410	Interior Design Services
541420	Industrial Design Services
541430	Graphic Design Services
541490	Other Specialized Design Services
541810	Advertising Agencies
541850	Display Advertising
541860	Direct Mail Advertising
541870	Advertising Material Distribution Services
541899	All Other Services Related to Advertising
541920	Photographic Services
561510	Travel Agencies
561520	Tour Operators
611610	Fine Arts Schools
711111	Theatre (except Musical) Companies
711120	Dance Companies
711130	Musical Groups and Artists
711311	Live Theatres and Other Performing Arts Presenters with Facilities
711319	Sports Stadiums and Other Presenters with Facilities
711321	Performing Arts Promoters (Presenters) without Facilities
711410	Agents and Managers for Artists, Athletes, Entertainers and Other Public Figures

711511	Independent Artists, Visual Arts
711512	Independent Actors, Comedians and Performers
711513	Independent Writers and Authors
712111	Non-Commercial Art Museums and Galleries
712115	History and Science Museums
712119	Other Museums
712120	Historic and Heritage Sites
721111	Hotels
721114	Motels
722110	Full-Service Restaurants
722210	Limited-Service Eating Places
722310	Food Service Contractors
722320	Caterers
722410	Drinking Places (Alcoholic Beverages)

Appendix D

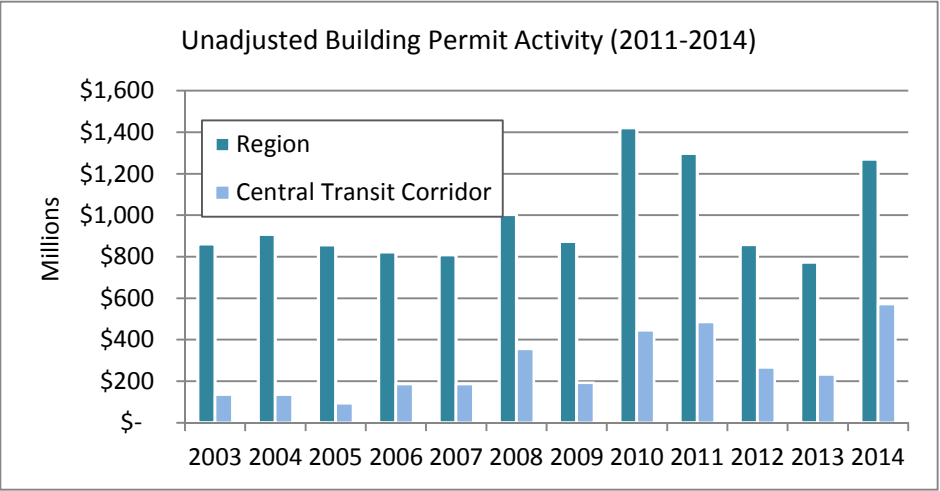


Building Activity from 2011 to 2014 in the Region (Adjusted 2011 dollars)*

Structure Type	2011		2012		2013		2014	
	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.
Singles	\$381,648,896	1334	\$282,185,364	922	\$258,854,774	847	\$301,271,242	956
Semi-detached	\$10,222,129	91	\$11,844,359	117	\$9,974,159	121	\$13,379,288	137
Townhouses	\$43,588,458	301	\$75,115,031	476	\$81,912,114	524	\$104,632,910	675
Apartments	\$296,357,200	1860	\$135,229,100	883	\$179,015,348	1072	\$369,855,009	2037
Residential Total	\$731,816,683	3586	\$504,373,853	2398	\$529,756,395	2564	\$789,138,449	3805
Commercial	\$102,528,894	687,886	\$110,868,026	409,483	\$62,928,099	78,467	\$100,549,678	655,744
Industrial	\$82,584,285	419,742	\$42,396,138	20,909	\$37,720,368	28,196	\$87,114,628	1,002,645
Institutional	\$380,961,899	553,673	\$189,399,338	269,053	\$125,261,613	236,186	\$235,227,373	490,469
Non-Residential Total	\$566,075,078	1,661,301	\$342,663,502	1,891,246	\$225,910,080	1,376,589	\$422,891,679	2,148,858
Total Value	\$1,297,891,761		\$847,037,356		\$755,666,475		\$1,212,030,128	

Building Activity from 2011 to 2014 in the CTC (Unadjusted)

Structure Type	2011		2012		2013		2014	
	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.	Value	Units/Sq. Ft.
Singles	\$ 4,167,241	13	\$ 3,256,885	12	\$ 3,171,962	11	\$ 3,432,000	10
Semi-detached	\$ 103,000	4	\$ 1,119,000	18	\$ 1,616,500	20	\$ 2,288,000	25
Townhouses	\$ 6,192,614	44	\$ 27,243,704	179	\$ 8,015,900	48	\$ 15,353,000	92
Apartments	\$ 198,660,800	1144	\$ 97,278,250	611	\$ 129,926,950	610	\$ 319,808,684	1604
Residential Total	\$ 209,123,655	1205	\$ 128,897,839	820	\$ 142,731,312	689	\$ 340,881,684	1731
Commercial	\$ 41,302,500	165,331	\$ 46,123,551	391,308	\$ 21,951,000	76,667	\$ 35,653,866	144,132
Industrial	\$ 8,500,000	3,600	\$ 2,470,000	20,909	\$ 3,795,000	28,196	\$ 15,100,194	8818
Institutional	\$ 227,079,899	246,346	\$ 88,689,000	269,053	\$ 64,339,248	236,186	\$ 180,840,389	322103
Non-Residential Total	\$ 276,882,399	415,277	\$ 137,282,551	681,270	\$ 90,085,248	341,049	\$ 231,594,449	475,053
Total Value	\$ 486,006,054		\$ 266,180,390		\$ 232,816,560		\$ 572,476,133	



Appendix E

A list of the WRPS call type codes used to count the number of total police calls for service in the CTC Public Order Maintenance; Police Reported Violent Occurrences Against a Person; and Police Reported Non Violent Occurrences

Public Order Maintenance		Police Reported Violent Occurrences Against a Person		Police Reported Non Violent Occurrences	
9190	Prostitution	9000	Bomb Threat	9110	Break and Enter
9200	Gaming and Betting	9010	Homicide	9120	Theft over \$5000
9210	Drugs	9040	Sex Offence	9130	Motor Vehicle Theft
9290	Unwanted Contact	9060	Threatening	9790	Theft Under \$5000
9350	Intoxicated Person	9070	Assault	9180	Property Damage
9360	Unwanted Person	9080	Abduction	9920	Graffiti
9370	Mentally Ill	9090	Robbery		
9380	Public Mischief	9100	Extortion		
9470	Suspicious Person	9170	Offensive Weapon		
9480	Suspicious Vehicle	9460	Prowler		
9600	Abandoned Vehicle	9850	Human Trafficking		
9610	Liquor Offence	9900	Criminal Harassment		
9650	Youth Complaint	9050	Indecent Act		
		9310	Dispute		