The Public Space of LRT Boulevards:
The Waterloo Region Ion Corridor as an Urban Place

by

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in fulfilment of the
thesis requirement for the degree of
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in
Architecture

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AUTHOR'S DECLARATION

“I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners. I understand that my thesis may be made electronically available to the public.”
This current lack of local urban identity can be traced back to an absence of clearly mandated urban design and planning objectives by municipal government. With focus already on the possibilities of the ION system in developing the more central urban areas surrounding the Victoria Transit Hub in Downtown Kitchener, and the recently revitalized Uptown Waterloo, much consideration still needs to be given to the urban linkage between the two city centres, known as Midtown, in combination with a unified urban design framework for the Waterloo Region Transit Corridor. The single ION stop in Midtown is located at a key urban attractor, the Grand River Hospital, but it is surrounded by a low-density residential zone, massive parking lots, and underused commercial land. This approximately three-kilometer section of the Corridor is the prime area of research and design for this thesis-to connect the two downtown cores and create a cohesive, dense urban environment for future prosperous development.

This thesis examines Waterloo Region future LRT development as a means to urbanize and link the Downtowns of Waterloo and Kitchener through a linear green corridor, with the goal of adapting this model of curb-in urban intensification design to areas along the corridor, as they spread away from the main urban growth centres.

You can’t rely on bringing people downtown, you have to put them there.”
—Jane Jacobs, The Death and Life of Great American Cities
ACKNOWLEDGEMENTS

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Jake Lovie, for his tireless assistance with GIS questions. I would also like to thank my external reader, Glenn Scheels of GSP Group for his expertise from an urban planning perspective. It has been a pleasure to get to know so many individuals with such a vast collection of knowledge and insight on Waterloo Region.

This thesis has been informed and enriched by many conversations with professionals in city building in Waterloo Region and several groups within the Cities of Kitchener and Waterloo.

A big thanks to my family and friends for providing necessary distractions, insightful criticisms, and continuous support. A special thanks to my Uncle Fred, for flying me over the Region and a providing perspective from above.

Thank you to everyone who supported, inspired, and challenged me throughout this process.

DEDICATION

For the next generation of Waterloo Region, who will not know what it's like to live without light rail transit.
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<th>Abbreviation</th>
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<tr>
<td>LRT</td>
<td>Light Rail Transit</td>
</tr>
<tr>
<td>BRT</td>
<td>Bus Rapid Transit</td>
</tr>
<tr>
<td>KWCI</td>
<td>Kitchener Waterloo Collegiate Institute</td>
</tr>
<tr>
<td>GR HOSPITAL</td>
<td>Grand River Hospital</td>
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<tr>
<td>GRT</td>
<td>Grand River Transit</td>
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<tr>
<td>GGH</td>
<td>Greater Golden Horseshoe</td>
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<tr>
<td>OFA</td>
<td>Ontario Federation of Agriculture</td>
</tr>
<tr>
<td>ROW</td>
<td>Region of Waterloo</td>
</tr>
<tr>
<td>WR</td>
<td>Waterloo Region</td>
</tr>
<tr>
<td>CKW</td>
<td>Cambridge-Kitchener-Waterloo; aka. Tricities</td>
</tr>
<tr>
<td>FBC</td>
<td>Form-Based Code</td>
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The principle driving the forthcoming ION rapid transit system is to connect the three major cities in Waterloo Region - Waterloo, Kitchener and Cambridge - through the creation of a unified transportation spine. For this linking agent to become something beyond a mere infrastructural network, a design model for urbanization and street network design needs to be identified and carried out in Waterloo Region. In order to establish a design for the thesis site of Midtown, there first needs to be a base of urban design principles and theories to inform the design process, with the outcome of a body of new urban rules that can then plug into a future design process for areas outside of the thesis design site.

The following rules for linear urbanism shall be read in addition to base building code laws unless otherwise noted. The rules are ideal conditions for the urban area that makes up the ION corridor. As the ION corridor expands, so should the urban conditions it creates. These rules can and should be modified if the Region outgrows the current conditions, and another layer of density is required.

The current Urban Design Guideline for the City of Kitchener is comprehensive, providing many specific rules for site and built environment, but lacks an overall vision to inspire better community design.

The Rules do not address suburban development.

**RULES FOR LINEAR URBANISM**

**THEME / CATEGORY**

- **TYPOLOGY**
  - Classification and form of building.
- **ENVIRONMENT**
  - XS to XL design elements that contribute to the ecological well-being of the site or neighbourhood.
- **INFRASTRUCTURE**
  - Street design elements that enhance the utilization user experience in terms of consistency, reliability, and safety. These include lighting, parking, bike racks, water, etc.
- **PROGRAM/ PUBLIC**
  - Services and built features relating to a need for the public, often fulfilling a social need.
- **BUILT**
  - In addition to base building codes. Building details and materials that add to safety of neighborhood, property value, etc.

The urban theorists supporting and influencing this thesis are well-known urban designers, cartographers, economists and artists. The principles of said urban theorists are the driving force behind the urban rules created for Waterloo Region, specifically Midtown. It is disappointing that all of these theories exist in urban theory, but often aren't put into practice, despite some of their theories and rules being from decades past. In order for these changes to take effect, a combination of things need to happen.

**URBAN INFLUENCE**

**THEME / CATEGORY**

- **TYPOLOGY**
  - Classification and form of building.
- **ENVIRONMENT**
  - XS to XL design elements that contribute to the ecological well-being of the site or neighbourhood.
- **INFRASTRUCTURE**
  - Street design elements that enhance the utilitarian user experience in terms of consistency, reliability and safety. These include lighting, parking, bike racks, water, etc.
- **PROGRAM/ PUBLIC**
  - Services and built features relating to a need for the public, often fulfilling a social need.
- **BUILT**
  - In addition to base building codes. Building details and materials that add to safety of neighborhood, property value, etc.

**NAME OF URBAN THEORIST**

**Title**

**Expertise**

The urban theorists supporting and influencing this thesis are well-known urban designers, cartographers, economists and artists. The principles of said urban theorists are the driving force behind the urban rules created for Waterloo Region, specifically Midtown. It is disappointing that all of these theories exist in urban theory, but often aren't put into practice, despite some of their theories and rules being from decades past. In order for these changes to take effect, a combination of things need to happen.

**GOALS FOR LINEAR URBANISM IN WATERLOO REGION:**

1. Educate Public - encourage bottom-up development and public input while avoiding target surveys.
2. Educate Designers
3. Convince developers to change their tune. How can the developer still make the same profit or more?
Vancouver killed the freeways because they didn’t want the freeways to kill their neighborhoods. The city flourished because walking, cycling, and using public transit all increased. If you don’t waste billions of dollars building freeways, you actually end up with less traffic.

Rick Cole
No urban area will prosper unless it attracts those who can choose to live wherever they wish.
— Jonathan Barnett
part 05: Urbanism in Waterloo Region

In 2018, the ION transit corridor will begin the process of linking the Tri-cities—Waterloo, Kitchener, and Cambridge—into a linear metropolitan area, which will offer many economic and infrastructural development opportunities for Waterloo Region. The corridor will not only provide a new regional rapid high-capacity transit route with expanded access and extended hours, but also offer many economic development opportunities and infrastructural benefits for the overall Region. This re-embellished, high-capacity rail transit will offer the present reliance on private vehicular traffic a relief, perpetually overburdened by buses. If suitably developed, there is potential for the creation of a new urban identity as a bicycle, transit, and, human-friendly regional metropolis.

In the last decade, Waterloo Region has undergone tremendous transformation, with the commencement of new construction on a daily basis. Waterloo Region has an advantage as a young and prosperous area, and is often referred to as the Silicon Valley of the North, boasting prestigious post-secondary institutions, which together create an ever-expanding cooperative education and startup culture. Each year, 5,000 plus students graduate from the University of Waterloo alone, with a notable percentage committed to technological startups. As well as housing the startup culture, many new high-rise buildings have been erected as an extension of the university zone to accommodate the almost 60,000 local post-secondary students. This re-embellished, high-capacity rail transit will offer the present reliance on private vehicular traffic a relief, perpetually overburdened by buses. If suitably developed, there is potential for the creation of a new urban identity as a bicycle, transit, and, human-friendly regional metropolis.

The current lack of local urban identity can be traced back to an absence of urban design and planning objectives for the Waterloo Region government, which, historically, a series of self-contained small towns have slowly grown into one larger metropolitan area. The focus to date has been on large scale regional planning and there is need for a unified urban design framework for the Waterloo Region Transit Corridor. With focus already on the creation of a new urban identity as a bicycle, transit, and, human-friendly regional metropolis.

This thesis examines Waterloo Region’s future LRT development as a means to urbanize and link the downtowns of Waterloo and Kitchener, with growth transitioning to Midtown, to eventually create one large urban growth centre. Once this transition occurs, growth will occur along the corridor, traveling outward from the urban growth centre, extending its borders. Once this model of urban intensification design to areas along the corridor, as they spread away from the main urban growth centres. Areas for research and design in the thesis include a study of surrounding neighbourhoods, opportunities for increased residential population densities, new building heights and massing, outdoor public spaces, issues of development planning, proximity to urban public transit and other transit stops, foot and bicycle routes, retail opportunities, and affordable housing for young professionals.

PHASING

The adjacent illustration demonstrates the pattern for phasing along the ION corridor. The idea is to first densify the urban growth centres of Upper Wateron and Downtown Kitchener, with growth transitioning to Midtown, to eventually create one large urban growth centre. Once this transition occurs, growth will occur along the corridor, traveling outward from the urban growth centre, extending its borders. Once this model of urban intensification design to areas along the corridor, as they spread away from the main urban growth centres. Areas for research and design in the thesis include a study of surrounding neighbourhoods, opportunities for increased residential population densities, new building heights and massing, outdoor public spaces, issues of development planning, proximity to urban public transit and other transit stops, foot and bicycle routes, retail opportunities, and affordable housing for young professionals.

Fig 03. Future ION Stop. Image by author. Future ION Stop at King and Victoria Streets. Image by author.

Fig 04. Proposed Phasing Diagram for the ION Corridor.
The Story of Transit in Waterloo Region, p.6

ION Stage 1 LRT capital costs are $818 million - more than two thirds of these costs will be paid for by the Ontario ($300 million) and Canadian (up to $265 million) governments. The Region of Waterloo will contribute $253 million.

-The Story of Transit in Waterloo Region, p.6

Waterloo Region

As the fourth largest community in Ontario, and the tenth largest in Canada, the population of The Region of Waterloo was 551,800 by the end of the 2011 Census year.

Formerly known as Waterloo County, the Region of Waterloo, falls into three regions: the southern and river lands of North Dumfries Township and Cambridge; the western lands centered on the towns of New Hamburg, and the Mennonite farm lands of Wellesley and Woolwich.

The Region has had an average population growth of 1.63% per year. By 2031, the population is expected to spike to over 742,000 residents, as per the Growth Plan for The Greater Golden Horseshoe, a significant growth over such a short period. This is the equivalent of adding another population the current size of the City of Kitchener (233,222 2016 Census) to the Region, and is in part due to the growing tech sector that has overtaken the area. For this, Waterloo Region has earned a nickname as The Silicon Valley of The North. During a time when many economies are at a decline, Waterloo Region is at an advantage as a young and prosperous municipality, with many young innovators graduating from the local universities and colleges, a noticeable percentage committed to technological startups.

Waterloo Region

population 550,000
population density 139.7
per square kilometers
830 square km

Waterloo Region

population 742,000

Waterloo Region

population 191,739

The ability for LRT to catalyze change and focus city-building initiatives over the long term far outweighs the cost difference. LRT should be a long-view project constructed both to take immediate advantage but also as a pre-investment to force positive urban change and economic investments.

-Review Panel, p 11

The local construction industry will surge by 10 per cent in 2014 and 2015 as work on LRT begins.

-Conference Board of Canada, 2014

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-Conference Board of Canada, 2014
The relationship between the structure of a city-region and its transportation system is critically important. An attractive and environmentally sustainable urban form requires fast, frequent, and well-connected modes of movement. An efficient and cost-effective transit service requires nodes (or dense concentrations) of trip origins and destinations. The interface between urban form and the transportation system is particularly important around major transit stations. Focusing growth and development around major transit stations allows more people to live near transit services, and makes more destinations accessible by transit. Transit stations are also the key point of contact between the traveler and the transit system, which has a significant impact on customer service and the overall traveling experience. A well-designed transit station can help make travelers feel relaxed, informed, and appreciated. A poorly-designed station can cause frustration.

“The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Areas,” 2008, page 46

The total value of residential and non-residential building permits in 2013 along the ION corridor was $250 million.”

Fig. 08. Map of ION Network in Waterloo Region, indicating the current bus routes in Cambridge, and the proposed future LRT route.
**HISTORY REPEATS ITSELF**

**settlement**

During the 16th and 17th centuries, the area that is now Waterloo Region was inhabited by the Iroquoian speaking Attawandaron Nation. Although historical accounts differ, it is generally agreed that the Seneca and Mohawk tribes of the Six Nations wiped out the smaller Attawandaron tribe around 1680-85. In 1784, the British government granted the Grand River Valley to the Iroquois as compensation for their lost land from the American War of Independence. Iroquois settled into what is now the County of Brant in the lower Grand River Valley, and sold parts of the land to Colonel Richard Brandy for part of Waterloo Township.

**services and industry**

The towns and villages of the Region grew up to serve the needs of the surrounding farm communities. Hotels were available for arriving settlers and travelers. The primary industries of the province in the first three-quarters of the 19th century were agricultural, milling and manufacturing. The towns were service centres for farms, where storage and shipment of produce occurred. Town merchants provided the goods essential to running a successful farm. Many towns were established where water power was available to drive mills.

The competition for the location of roads and highways, and perhaps more importantly railroads, was fierce. Railroads connected a community to the larger world, increased development and allowed businesses to flourish. Railways were largely developed in the 1850-1870 period, with growth up to the turn of the 20th century. The Grand Trunk Railway made its way through Kitchener-Waterloo in 1877. Brandy for institutional development led to further dominance and growth as towns were selected for sites of post offices, court houses, registry offices and the county seat. Berlin (now Kitchener) won the competition, which led it to become the local community in the county.

Until the 1870s, most of the industrial growth had been limited to crafts shops and smaller operations, but as the century progressed significant investment in more substantial industries took place. This was also true elsewhere in the province as the age of inventions, and society shifted toward a consumer base. Electric railways came to what was then Waterloo County in 1894, when trains started running between Preston and Galt. In 1895, the line was extended to Hespeler, and soon linked with the Berlin Street Railway and the Berlin and Waterloo Street Railway. Intercity bus transit began in 1930’s, replacing some of the railed transit. The rise of the automobile closed the local electric passenger train, and ended service in 1955.

The rail lines were paved over, only to be unearthed during the construction of ION lightrail, running an almost identical route to the historical streetcar. Historic lines from the Grand Trunk Railway have been brought back to life and re-popularized by GO Transit throughout Canada, gaining in use as more lines become available to connect cities without use of vehicular traffic.

https://home.cc.umanitoba.ca/~wyatt/alltime/kitchener-on.html

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“stage coaches opened up access to the growing Village of Waterloo by the 1830’s as almost all the local coach routes passed directly through. While the notoriously bad weather condition of Upper Canada’s roads made such voyages hazardous, these transportation links ensured the steady, if modest, growth of the community. A primary route for local stage coaches, along what is now King Street, is still reflected in the patterns of public transit today.” (39)

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Fig. 09. Top Left. Work is under way to double track the streetcar line through downtown Berlin (later Kitchener) in 1910. This scene is looking east from Queen Street. Cars operated on the temporary line on the right while new tracks were installed in the centre of the street. A Preston & Berlin Railway interurban car is seen in front of the Berlin Post Office.

Fig. 10. Centre Left. Trolley service running from 1946 to 1973 back and forth along King Street in Kitchener and Waterloo. The buses were powered from overhead electric wires. The line went from Rockway Gardens in Kitchener to today’s King and University in Waterloo.

Fig. 11. Bottom Left. Evidence of a century-old streetcar line between Kitchener and Waterloo was unearthed during road construction in preparation for the LRT. 300 metres of wooden ties ran down the centre of King, denoting the old railway. Rails were removed in the 1950s and paved over.

Fig. 12. Right. Map of the Grand Trunk and Great Western of Canada, and connections. The Great International Route. indicating the location of Berlin and Waterloo on the network map. (1885).
HISTORY OF TRANSIT IN WATERLOO REGION

Timeline showing key moments that have shaped today’s transit.

1916: Berlin renamed to Kitchener.

1852: Creation of the County of Waterloo.

1900-1923: Development of major connective railways.

1904: Electric line service between Berlin and Galt.

1836-1870: Development of major connective railways.

1915-1914: Planning for LRT stage 2.

1914: Grand Linq appointed to design, build, finance, operate and maintain ION Stage 1 LRT.

1905: ION project.


2014: First ION LRT vehicle to arrive in Waterloo Region.

2006: Berlin to Kitchener.

2000: Kitchener to Waterloo.

2015: LRT strategy approved.

2013: Community building strategy.

2009: Transit management strategy.

2014: Building Canada.

1816: Settlement of Waterloo, Woolwich and Dumfries Townships.

1852: Creation of the County of Waterloo.

1853: Grand Trunk Railway.

1856: Grand Trunk Railway.

1894: Electric line extended to Hespeler, linking with Berlin and Waterloo Street Railways.

1895: Electric line extended to Hespeler, linking with Berlin and Waterloo Street Railways.

1976: Concept of creating a central transit corridor in Waterloo Region.


2000: Onam responsible for public transit.

2009: Regional growth management strategy.

2010: Regional transit strategy.

2012: Get ready: Kitchener target.

2013: Waterloo region rapid transit named.


2015: Go Transit rail improvement plan.

2016: Row approves LRT for Waterloo region in two stages and a funding strategy.

2020: Go Transit rail improvement plan.

2021: LRT strategic planning.

2023: LRT strategic planning.

2027: LRT strategic planning.

Fig. 13. History of Transit in Waterloo Region.
The proposed Transit Hub will be at the heart of Waterloo Region’s future transit network, functioning as the central point for moving residents and visitors to and throughout Waterloo Region. It is intended to be a contemporary statement of the art and multi-modal transportation facilities that accommodate a broad range of users, serving the different needs, while the HSR’s proposal focuses on new regional transit services. In important, the proposed Transit Hub will also serve to reflect the population diversity of Kitchener within the region at large. The design is intended to be consistent with and to enhance the visual and aesthetic qualities of the surrounding context, including the Walkway and the historic cityscape in general. (12)

The Victoria Transit Hub is at the intersection of King Street West and Victoria Street North in Kitchener, just southeast of the CN Rail/GO/Via train line that connects Sarnia to Toronto. A potential layout for the site is shown in the illustration to the lower right by IBI Group. The transit hub as a whole will be 800,000 to 1 million square feet, with four buildings programmed with high-density residential, retail and office use. The GO Train platforms, multi-level walkways across King Street and pedestrian under or overpass will also be developed following the first phase of the project. The goal is to connect all forms of transit in the Region through a single location. The Charles Street Terminal, a bus station for Grand River Transit (local and iXpress), Greyhound, Megabus, at 15 Charles Street West in Kitchener will be relocated to the transit hub. The hub will also be home to an ion light rail transit stop, the GO/ Via Rail station, as well as bicycle and vehicular parking for commuters and visitors. The towers are programmed for mixed-use and will include space for retail, offices and residential. The focus for the next stages of development will be on transit components that will link passengers with all the transit services described above. These components include a transit hall, plazas, parking and a temporary Victoria Street bus loop, bus bays and passenger pickup and drop-off lanes. Cues can be taken from similar successful projects like the Nørreport Station in Copenhagen which is conceived as floating pavilions, covered with transparent glass to welcome the public into the building, making them much more accessible and welcoming, but also contributing to greater safety in the square and the bicycle parking is small gardens throughout the urban plaza. A study of pedestrian movement analysis across the square formed the basis for the station design. The low flow areas informed the situation of buildings, facades and bicycle parking, which will generate flow across the square. Bicycle parking is distributed in small islands. At the edge of the square, a number of trees at street level provide greenery. In the open areas there is space for street life, seating, shops and outdoor eating. (13)

The province of Ontario committed to $43 million of project funding in 2016. When complete, the transit hub is projected to generate more than $100 million in transportation-related benefits over a 30 year period.

In 2011, GO Train service was extended to Kitchener, under the GO Transit Rail Improvement Plan. Leading up to the 2014 election, the Liberals promised two-way, all-day GO train service between Kitchener and Toronto.6 The tech hub and ION should bring more demand for GO. The provincial initiative known as GO Regional Express Rail proposes a substantial increase in Kitchener Line service over the next decade. During peak hours, trains would run in peak direction every 30 minutes from Kitchener to Union Station and every 15 minutes from Mount Pleasant to Union Station.7

LOCAL + GLOBAL AMENITIES

In order for Waterloo Region to grow as a Canadian hub destination, it must be easy for users to access both local, regional and national destinations. There is currently no public transit solution through GRT or GO Transit to access the Region of Waterloo International Airport from anywhere in The Region, despite offering daily flights to Western Canada and sun destinations. The airport is primed for expansion and additional flights by new budget airlines, namely Jetlines, starting as early as June 2018. A shuttle service departing from the future ION Transit Hub on Victoria Street would suffice as an easy connection between GO train service, the ION rapid transit line, and the ROW International Airport until a more permanent solution could be resolved. As flight paths expand, this could for instance, allow business to commute from San Francisco to Kitchener for a meeting, and on to Toronto in the span of a working day.8

TRANSPORTATION IN WATERLOO REGION

There are multiple options for transportation in Waterloo Region outside personal vehicles. It is best for citizens to be able to understand their options and navigate best routes based on their accessibility to things like nearby car and bike parking. As it stands, a trip that would take 25 minutes to drive takes well over an hour with public transit. This is unacceptable as a reasonable way for people to navigate the Region. Google Maps provides options for trip planning through various modes of transportation, but it would be beneficial if they were available on the go, with realtime updates. The transit companies operate on different websites and through different managerial bodies. There is a linked fare system between Grand River Transit and ION, but an integrated app system for transit, parking and taxi services would be beneficial. The GO Transit and VIA Rail stations in Kitchener allow for intercity connections to Toronto, Montreal and Canada. All local transit maps should indicate where these transit connections occur to close the gaps between transit companies and modes of transport.

Fig. 22. Grand River Transit website: http://www.grt.ca/en/index.asp
Fig. 23. Uber Kitchener-Waterloo website.
Fig. 24. Waterloo Taxi website.
Fig. 25. GO Transit website.
Fig. 26. ION website.
TRANSPORTATION ON A BUDGET

owning a car vs. public transit

$904
MAX. COST OF TRANSIT PASS ($2/2 MONTH)

$10
AVG. ANNUAL COST OF OWNING A CAR

1 ion = 4 buses = 200 bikes

150 cars

WASHINGTON REGION, TOGETHER WITH GRAND RIVER TRANSIT AND ION WILL BE INTRODUCING AN INTEGRATED FARE SYSTEM FOR THE LIGHT RAIL AND BUS SYSTEM ALIKE ALLOWING USERS TO TRANSFER SEAMLESSLY. RIDERS CAN TOP THEIR CARD ON THE Bus AND TRANSFER TO ION OR VICE VERSA WITHIN 90 MINUTES WITHOUT PAYING ANOTHER FARE. PASSENGERS WILL BE ABLE TO SWITCH BETWEEN MODES OF TRANSPORTATION, WITH THE ION FULLY ACCESSIBLE FOR THOSE WITH BIKES, STROLLERS, WHEELCHAIRS AND THE LIKE.

Fig. 27. Transportation on a Budget Diagram. Data calculated by author based on the average vehicle.

The diagram to the left illustrates the annual cost of owning an average priced personal vehicle compared to the price of having an annual transit pass, as well as what it would look like if 200 people took various modes of transportation. 150 cars (~1800sm) takes up almost four times more space than one ION train (~115sm), 4 buses (~150sm) and 200 bikes (~200sm) combined.

WHY TRANSPORT?

Vancouver killed the freeway because they didn’t want the freeways to kill their neighborhoods. The city flourished because making it easier to drive does not reduce traffic; it increases it. That means if you don’t waste billions of dollars building freeways, you actually end up with less traffic.

– Rick Cole

THE GREEN COMMUTE

Appy commute, healthy living.

Waterloo Region, together with Grand River Transit and ION will be introducing an integrated fare system for the light rail and bus system alike allowing users to transfer seamlessly. Riders can tap their card on the bus and transfer to ION or vice versa within 90 minutes without paying another fare. Passengers will be able to switch between modes of transportation, with the ION fully accessible for those with bikes, strollers, wheelchairs and the like.

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In a comprehensive case study of the Copenhagen metropolitan area, Næss combines traditional quantitative travel surveys with qualitative interviews in order to identify the mechanisms through which urban structure affects travel behavior. The study findings are compared with those from other Nordic countries and analyzed and evaluated in the light of relevant theory and literature to provide valuable conclusions for planning sustainable urban development.

With a broader range of statistics than previous studies and conclusions of international relevance, Urban Structure Matters provides well-grounded studies and conclusions for how spatial planning of urban areas can be used to reduce car dependence and achieve a more sustainable development of cities.

**CONCENTRIC VS. POLYCENTRIC**

It is better for cities to have a concentrated urban centre, or many centres for accessibility? Is the urban identity diluted with a polycentric plan? Waterloo Region already has a polycentric plan, being that it is made up of several cities and communities. There is however, too much uncontrolled development, leaving the choice for concentration and preserved green space up to developers rather than planning professionals. A recognizable focus on polycentric development would mean that residents could have access to multiple centres with ease, especially in suburban areas where there is less access to transit. In Waterloo Region, many neighborhoods have access to only a single facility, rather than a cluster of facilities, creating car-centric origin and extended travel distances to retrieve necessities.

**TRAVEL DISTANCE vs BEHAVIOUR**

Næss studies the relationships among residential location, travel behavior, trip length, activity participation and travel time. Going beyond previous investigations into urban land use and travel, Næss presents research from Denmark on residential location and travel to show how and why urban spatial structures affect people’s travel behavior. Næss’ empirical studies compared those from other Nordic countries and analyzed and evaluated in the light of relevant theory and literature to provide valuable conclusions for planning sustainable urban development.

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**The location of the dwelling relative to the center of the Copenhagen Metropolitan Area has the most influence on the travel behavior of the respondents.**

- The location of one’s residence and the next closest urban or urban railway station, as well as density of inhabitants and work places in the local area.
- Availability of security facilities and trip distances
- Transport and environmental attitudes, the perception of a driver’s license affect the choice of where one lives in respect to urban centres.
- Great variation among subgroups of the population with respect to the location of the residence. The location of residence must strongly affect those in the workforce.
- More and longer trips are made outside of the local region among residents of dense location areas. Trip frequencies may decrease if the distances to the relevant destinations are long.
The figure to the right is a slightly modified drawing of the new Transit Map for Waterloo Region, bridging the cities of Waterloo, Kitchener and Cambridge, to show the integration of the ION and Xpress routes in 2018. A few changes were made to optimize the legibility of the map. As Xpress routes expand in the Region, they would be added to the map, creating less of a gap between routes.

These traditional diagramatic transit maps should be included at all stations, stops and in transit vehicles, with a ‘you are here’ indicator of where patrons are within the transit system. Although not geographically accurate, the Grand River should be an element in the map, as a wayfinder and key landmark in Waterloo Region.

This map should also show integration of intercity transit interacts with the ION and Xpress. Connections to GO Transit, and a more detailed map including all GRT lines should also be featured. It is important to assume that the map would be used as a tool for travelers who are foreign to the local transit system and geography.

The adjacent map illustration shows how much of a neighborhood is accessible within a 5 and 10 minute walk of any given transit stop. It is surprising to see that the majority of the built up area has a transit stop within 800m of a street address, however there is still an obvious gap in the reliability of the public transit and green commute systems in Waterloo Region.

The median commute time in Waterloo Region as per the 2011 census was 16 minutes. The pie chart shows the proportion of commuters using vehicular transport in relation to modes of green transportation. It is hoped that these ratios change as the availability of public transit in the Region increases. To ensure that priority is given to methods of green transportation — walking, cycling, public transit — designs will be proposed to provide urban resources and pleasant alternatives to the busy road traffic.
The ION will create a 36 kilometre corridor through Waterloo, Kitchener and Cambridge. Although the purpose of this thesis is not to critique where the ION travels for the purposes of transit engineering, there are some missed opportunities in the specific stops it makes that will be discussed further in the site research section of the document. The ION forms a ‘joint fare system with GRT ensures residents can easily transfer between the bus and rail services at no additional cost.’10 The hours of the GRT and iXpress should match the operating hours of adjacent ION corridor so the system is safe and useful for those living beyond the borders of the ION. Alumimium times the bus system has not worked for travelers as commutes often limited hours when people stay rely on it most.

The ION could travel approximately 13 kilometres during this 16 minute commute time, based on an average speed of 50km/h in combination with its dedicated lane system and no unforeseen delays. By the time the second stage of the ION is complete, one could travel the ION corridor in its entirety just over double the 16 minute commute time.


Future Expansion

If the ION were to eventually expand beyond the route from Northfield to Ainslie, there is potential for new routes to be added. The overlap between the current ION Corridor and the current iXpress routes are considered to be areas of particular interest. If major development happens in these areas it will begin to follow the intersecting iXpress routes. This is much like the transit plan in Copenhagen, where there is a main line with smaller fingers off of it, leading to important landmarks. Important landmarks include hospitals in Kitchener to Guelph andHamilton, the Waterloo Wellington Airport, Guelph, and local communities with large populations.
The iXpress travels along key routes in the Region, replacing traditional GRT local bus routes, making fewer stops, therefore creating the ability to travel faster. There is speculation that future expansions to the ION corridor will replace existing iXpress routes, and expand the network. The iXpress network expands when there is need for additional express routes. Where possible, the iXpress schedules should jive with those of local buses, to create the most seamless trip for riders. Certain traffic lights in the Region are outfitted with transit priority signals to help the buses move more efficiently and on time. The signalized lights detect the buses and either extend an existing green light or shorten a red light to maximize efficiency.

"iXpress stations connect existing GRT routes, walking and cycling. Digital signs in shelters display the actual arrival time of the next bus. Most stations also have maps depicting bike routes and bike lockers. All GRT buses now have bike racks, so walking, cycling and transit connect seamlessly."

From 2009 to present, Grand River Transit has operated the local bus system in Waterloo Region that runs every day, on 30 and 40 minute intervals. This is an extended time between buses at a given stop, making it taxing to wait for another bus if one has been missed while making a transfer from another route or the passing bus was full.

The 800m walking shed of the GRT system covers a great majority of the built up area in Waterloo Region, even beginning the stack into St. Jacobs and Elgin in Woolwich Township. Additional bus routes should meet all built up areas (shown in dark grey) in townships to provide greater access for riders. As busy local routes change over to iXpress routes, additional local routes should be created in neighbourhoods without transit service, as shown on the map. The 40 minute stop frequency should also be eliminated, and all stop frequencies reduced to 30 minutes maximum.
ION stops should include Wayfinding Maps to show local destinations and amenities. Signs in transit shelters, much like the one pictured to the left from the OTL Exhibit by Data Lab at the University of Waterloo School of Architecture.

The posters should provide up-to-date information on which restaurants, stores, cultural programming are nearby, as well as practical information like access to public washrooms, bicycle and vehicular parking, connections to other forms of transit. Signs would indicate distances to amenities, like ‘5 min to bike to …’ or ‘10 min to walk to …’

The boards could also display information about apps to download that could give live updates on transit and show the amenities described above in categories.
In 1973, the regional municipality style of government was imposed on the county. The fifteen towns and townships of the county were reduced to just seven in the new Region of Waterloo. The former county government was given broader powers as a regional municipality. Further municipal amalgamation began in the 1990s with little progress. It wasn’t until 2005 that Kitchener’s city council voted to revisit the subject again, with the possibility of reducing the seven constituent municipalities into one or more cities. It wasn’t until 2010 that a new proposal to study only the merger of Kitchener and Waterloo with a public referendum on whether the idea should be looked into. Kitchener residents voted 2-1 in favour of studying the merger while Waterloo residents voted 3-1 against. Waterloo city council subsequently voted against the study, leaving the Region basically where it started in 1973.

ION PLANNING AND POLICIES
The idea of a rapid transit corridor in Waterloo Region can be traced back to 1976, when it was highlighted in the Regional Official Policies Plan. Planning for ION began in 2000 after the Region assumed responsibility for transit, after which the Region included rapid transit in its Growth Management Strategy. The Places to Grow Plan was established in 2006 when the Province of Ontario mandated the Region to plan for major population growth. With little opportunity to expand the road network in core areas, Council chose to examine rapid transit as the most sustainable solution to meet the community’s growth and transportation needs. As a result, with support from the Province of Ontario and the Government of Canada, and following the completion of an extensive public consultation process, Council chose to implement LRT in two stages in Waterloo Region in 2011-12. The group that makes up the ION development project is comprised of various people, from target groups in the general public, to local developers, to exhibition committees and building professionals. A plethora of documents have been released in accordance with provincial and municipal development. The Region of Waterloo is comprised of municipalities that all have separate levels of government and non-profit groups within those cities. Upon reading many of the documents, it is obvious that resources could be better allocated if the cities within the Region worked together on more levels, issuing documents for the Region rather than overlapping with multiple cities, and incongruent visions. There are negligible climactic differences between communities within the Region, but every city has their own full set of documents, GIS data creation, bylaws and design visions. An efficient solution would be to have subareas within documents for the diverse areas within the Region. This is something the Region has tried time and time again with no luck.

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PLACES TO GROW

The Region of Waterloo is the Places to Grow Plan for the Greater Golden Horseshoe for the Region of Waterloo. In 2015, the Ontario Municipal Board (OMB) issued a decision regarding the development of the Region, in an appeal from local developers. The OMB agreed with the developers, and issued their decision based on word discrepancies and interpretations of articulation of the Growth Plan. The decision previously made by the OMB, as they drew conclusions based on past local development, rather than the new goals for a changing lifestyle and demographics in Waterloo Region. If the ruling by the OMB is not re-evaluated, there will be an immediate issue with development being too flexible, and the footprint set out by the OMB to continue with, rather than the new goals for a changing lifestyle and demographics in Waterloo Region. The following was stated by the University of Waterloo Planning Department in response to the ruling by the OMB:

"If extensive new outward development were allowed, the Region argued that densities would be less than what is required by the Growth Plan and, as a result, would violate Provincial rules. The OMB felt that the density targets must be planned for, but are not required to be met." [14]

The Region of Waterloo has been working with the community since 2000 to create a new Official Plan, a key component of which is a land budget that calculates the amount of land required to meet forecasted growth. The Official Plan was appealed by a group of developers to the OMB. The OMB argued that the density targets must be planned for, but are not required to be met. The OMB agreed with the developers, and issued their decision based on word discrepancies and interpretations of articulation of the Growth Plan. In contrast, the Region argued that densities would be less than what is required by the Growth Plan and, as a result, will violate Provincial rules. The OMB felt that the density targets must be planned for, but are not required to be met. [16]

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AGAinST GReenfieLd deveLoPMenT

Greenfield development in Waterloo Region should be disallowed until all presently built up areas in the Region have been developed to their maximum growth potential. This could effectively preserve 3,263 hectares of land from what would presumably be low density suburban development.

TARGETS FOR THE GROWTH CENTRES

Fig. 52. These proposed areas for greenfield development should be left undeveloped, and the focus instead on infill development within the limits of the built up fabric.

Fig. 53. Right. Projections of population growth.
The Region of Waterloo is in the process of enacting a greenbelt of sorts around the perimeter of the current Regional boundaries, in an effort to preserve the many surrounding greenspaces and agricultural properties. To combat the constant influx of new suburbs popping up in the outer fringes of the Region, there is also a lot of urban construction going on to house the expanse of newcomers. Aside from an issue of space, there is a trend towards moving back to the city centers and urban roots of living close to amenities and urban life.

The Region of Waterloo has included Environmentally Sensitive Landscapes or ESLs in their Regional Official Plan to protect the environmental features from development and construction. The ESLs include areas such as wetlands, rivers and creeks, groundwater recharge areas and the habitat of endangered and threatened species. They also include farms, villages, small towns and outdoor recreation areas. So far, four ESLs have been designated in Waterloo Region.

The Laurel Creek Headwaters ESL links several important natural habitats and landscapes on the Waterloo Moraine, while the Blain-Bechel-Cruickston ESL encompasses the junction of the Grand River and the Speed River. Together these 3,456 hectares are home to provincially significant wetlands and a wide variety of wildlife, birds, amphibians, rare plants and species at risk.

The Beverly ESL and North Dumfries Carolinian ESL are made up of 11,918 hectares of sensitive lands in North Dumfries Township and the City of Cambridge. These two areas protect the southern fringe of the Carolinian Forest Zone, Ontario’s most threatened ecological area.

CREATION OF A HARD URBAN BOUNDARY

Like the GTA, Waterloo Region could benefit greatly from enforcing a greenbelt around the municipal boundaries. There is plenty of space for development within the Regional boundaries, with a focus on decreasing suburban, detached dwelling development. This would lead to preservation of the invaluable greenspace, farmland and Grand River basin that insulates the Region. All new construction and development should first occur in built-up areas.
Covering 400 square kilometres, the Waterloo Moraine provides drinking water for 300,000 people in Waterloo Region, and is the largest area in North America dependent on ground-water aquifers for their drinking water, with about 90% of the water supply coming from the groundwater of the moraine aquifer. The Waterloo Moraine is not protected by provincial legislation although there are groups throughout the Region who see to its preservation. The moraine covers a large portion of the cities of Waterloo and Kitchener and the township of-Wilmot, as well as parts of the townships of Wellesley and North Dumfries.

According to the Groundwater Information Network, local rivers, namely the Nith and Grand, and streams are hydrologically connected to the Waterloo Moraine. The groundwater is abundant and characterized by high quality water, with approximately 75% of it potable. This groundwater supply is potentially threatened by the rapid growth of the population and cities. There is speculation whether the Moraine can actually handle the projected population growth in the Region.

During late 1989 and early 1990, groundwater contamination in Elmira forced the Region to shut down some well fields. As a result, new land use management guidelines and water protection measures have been enacted.

"The Region of Waterloo has the best water conservation plan in the province, but is it enough? There’s tremendous growth pressure driving up against natural limits, and do we recognize those natural limits?

My concern is that our land-use planning system is still based on simply identifying private-based parcels of land. It’s parcel-based and we don’t recognize key features on the landscape.

This is what we’re in trouble because the ecology and the economic play out on this landscape.

- Gord Miller, Ontario Environmental Commissioner"
The historic Village of Waterloo was built on some of the richest agricultural land in Upper Canada. In an effort to preserve the ever-active farming culture and local heritage of the Region, planning restrictions must be legislated to halt suburban sprawl and the sale of local farmland to hungry developers through densification of existing cores and suburban neighbourhoods. Consequently residents and businesses of The Region can continue to have the harmonious advantage of the urban centre – rural landscape relationship.

According to the Ontario Federation of Agriculture (OFA), Waterloo Region has been one of the best in Southern Ontario at preserving their farmland. McCabe, former President of OFA, and farmer in Lambton County, stated that according to census data, suburbs are replacing farmland at a rate of 350 acres per day, which drives up the price of the land that is left over—land that is needed to grow food. According to an article in the KW Record, “The OFA is calling on the Ontario government to freeze urban boundaries until at least 2031 to ensure cities grow up before they grow out.”

McCabe said the close proximity between new developments and farmland is also bringing rural and urban life into conflict.

The Mennonite farming community has deep roots in Waterloo Region, dating back to the purchase of all unsold land previously owned by Beasley to a group of Pennsylvania German Mennonite farmers. Together, the land formed the German Company Tract, divided into 128 farms of 1.81 hectares and 32 farms of 1.2 hectares for distribution among families. This equals to approximately 3% of the area that makes up Waterloo Region today. There are still traditional Mennonite communities located north and west of Kitchener/Waterloo in the Townships.

German-speaking Mennonites made the area a popular choice for German settlers from Europe starting in the 1840’s. These Germans founded their own communities in the south of the area settled by the Mennonites, the largest being the town of Berlin (changed to Kitchener, named for Lord Kitchener), due to anti-German sentiment during World War I. The Waterloo Region remained predominantly German-speaking into the early 20th Century, and its German heritage is reflected in the Region’s large Lutheran community and the annual Kitchener-Waterloo Oktoberfest.
The exhibition demonstrates cartography as a tool for regional and urban planning. The exhibit examines the fine grain of urban and regional planning for the Greater Golden Horseshoe. This is a region of North America, and it was developed through research and interviews. The exhibit examines the role of design in calculating their futures. The exhibition looks at the political issues and routes and identifying areas for design proposal. The exhibition is organized as a territory. In both its form and content it presents an approach to urban design that is not about a singular topic or a partial solution, rather it is assembled from a series of micro and macro cycles of both theoretical and empirical research. The exhibition includes cartography, interviews, writings, photographs and large physical models, all equally aimed at that the multiple interrelations, scales and connections are made visible and apprehensible from multiple viewpoints and routes. The exhibit demonstrates cartography as a tool for regional and urban planning. The exhibit examines the fine grain of urban and regional planning for the Greater Golden Horseshoe. This is a region of North America, and it was developed through research and interviews. The exhibit examines the role of design in calculating their futures. The exhibition looks at the political issues and routes and identifying areas for design proposal. The exhibition is organized as a territory. In both its form and content it presents an approach to urban design that is not about a singular topic or a partial solution, rather it is assembled from a series of micro and macro cycles of both theoretical and empirical research. The exhibition includes cartography, interviews, writings, photographs and large physical models, all equally aimed at that the multiple interrelations, scales and connections are made visible and apprehensible from multiple viewpoints and routes.
The need for density

Jane Jacobs identified four generators of diversity in a city, and one of them is:

“...the district must have a sufficiently dense concentration of people, for whatever purpose they may be there. This includes people there because of residence.”

According to Jane Jacobs in The Death and Life of American Cities, a minimum of 100 dwellings per acre (equal to ~250 dwellings per hectare) should be set in place to support enough density to achieve diversity. Currently, a typical residential block in Midtown sits at ~8-10 dwellings per acre. This increase in concentration can be easily accommodated in the construction of row housing, stacked townhouses, apartment buildings, etc., without adding too much height to the overall city building datum. If density becomes too high, there is a risk that standardization of buildings will take over, and subsequently abolish diversity through the maximum efficiency. As shown in the adjacent map studies, the anticipated population growth of the Region can be easily accommodated along the ION corridor, without the need to expand the Regional borders. If a more even, midrise density were applied to the 400 metre and 800 metre walking sheds of the future ION stops, there would be no reason to continue to build suburban developments on city fringes. This is important for growing prosperity in the Region, as Statistics Canada data has demonstrated that the housing market is changing, and the amount of home buyers looking for a single family home, where they have to get in a car to access all amenities, are on a decline.25


“By opening day in 2018, more than 36,000 people will live within 600 metres of an ION stop and 64,000 people will work within the same area.”

http://www.rideion.ca/did-you-know.html#sthash.lNJV1J42.dpuf

For Waterloo Region to hit the Places to Grow Act target of 200 people and jobs per hectare, it would be more effective to spread this density along the entire ION corridor, rather than building over the target at a few intersections within downtown boundaries and allowing the remaining greenfield space to be developed. This would create a continuous network of walkable neighborhoods, forming unique options for local amenities and green commuting along various points on the network. For the same parsimony density of 200 people and jobs per hectare to be achieved through 6-10 storey developments, without too much focus on behemoth developments that tower over historic downtown developments and darken the narrow historic streets. If there is a more even fabric, with special cases of highrise development, this can allow all neighborhoods to benefit from access to the LRT transit corridor and to provide opportunity for fingers to spread from the original corridor.

Fig 67. Image showing areas currently reaching the building density target for urban growth centres in Waterloo Region.
400m ION CORRIDOR BUFFER
200,000 new residents - population increase factor 3.9

If density becomes too high, there is a risk that standardization of buildings will take over, and subsequently abolish diversity through the maximum efficiency.

Fig. 68. Image increases the population densities of neighbourhoods by a factor of 3.9 to accommodate the projected population increase of 200,000 people in Waterloo Region by 2031. This drawing makes evident that the population growth can occur within the transit corridor. The number of neighbourhoods reaching the growth target of 200 people per hectare goes up significantly, but in this case the density is concentrated to a confined radius, leaving large areas of the Region underdeveloped.

800m ION CORRIDOR BUFFER
200,000 new residents - population increase factor 1.6

Fig. 69. Image increases the population densities of neighbourhoods by a factor of 1.6 to accommodate the projected population increase of 200,000 people in Waterloo Region by 2031. This drawing is perhaps a more appropriate increase factor in development, as it reaches further out from the corridor into the Region. Although not as many of the areas reach the 250 people per hectare density target, many reach the 150 people per hectare benchmark as desired for the urban growth centres of Downtown Waterloo, Kitchener and Cambridge.
Fig. 70. Mapping Analysis of the Waterloo Region at various scales.
For each new high-tech job in a city, five additional jobs are ultimately created outside of the high-tech sector in that city, both in skilled occupations and in unskilled ones. What is more, innovation has a disproportionate effect on the economy of American communities. Most sectors have a multiplier effect, but the innovation sector has the largest multiplier of all: about three times larger than that of manufacturing.

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The Rise of A Tech Hub

Fig. 71. Aerial Image over the King Street corridor as it fades into the horizon. The intersection of King and Victoria Streets is in the foreground, with the surrounding Innovation District and Tech Hub.
The Region of Waterloo has grown rapidly in recent past, due to a myriad of factors including proximity to some of Canada’s best secondary institutions, with a large percentage of graduates committed to backstallings. The universities and other companies caught on quickly to the trend of graduates packing up and moving to Silicon Valley to work for big name corporations like Apple, and started rerouting their work to Waterloo Region in hopes of grasping recent graduates before they left to support another economy. The area has quickly taken on the vibe of a tech hub, and communities like Waterloo quickly to the trend of graduates packing up and moving to Silicon Valley to work for big name corporations like Apple, and started rerouting their work to Waterloo Region in hopes of grasping recent graduates before they left to support another economy. The area has quickly taken on the vibe of a tech hub, and communities like Waterloo

280,000. The Waterloo Region boasts nearly 1,000 companies, contributing more than $30-billion annually to the global economy. In 2015, StatCan ranked Waterloo as 158 among the world’s 200 global startup hubs. ’


Fig. 72. Target Group Analysis.

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"The mathematics do not look well for cities and regions that are content to watch their young people move away in search of fun and adventure, complacently believing that they will be able to lure them back once they hit their thirties and are ready to settle down and start families. The likelihood that they will succeed diminishes with each year they spend away. The winning places are the ones that establish an edge early on, by attracting and retaining residents in their mid-twenties. But in the end, age is less relevant than most people think. What does matter is that cities and regions have a people climate that values every type of person and every type of family. Creative Class people don’t give up their lifestyles preferences as they age."

- Richard Florida
The Rise of the Creative Class (307).

"The Global Accelerator Network (GAN) is the global champion of the seed-stage, mentorship-driven accelerator model and includes over 50 of the most respected accelerators from six continents around the world. Their goal is simple: support the top accelerators that grow top companies. Because of the strength and connections of their members, mentors, investors, founders, and strategic partners, well, the results speak for themselves."

https://www.gan.co/

"Working together as part of an ecosystem throughout Canada and around the world, CDMN hubs and partners embody the collaborative and entrepreneurial spirit necessary to create companies, jobs and wealth for Canada."

https://cdmn.ca/

"What you see in the Maker Movement is a wide range of people, young and old, who are developing their talents and discovering new ways to solve interesting, everyday problems by working together on innovation. Makers are committed to fostering creativity, building community and encouraging the collaborative practice of innovation."

Dale Dougherty, Founder & CEO
https://makershare.com/

"We strive to maintain the open culture often associated with startups, in which everyone is a hands-on contributor and feels comfortable sharing ideas and opinions. In our weekly all-hands meetings—not to mention over email or in the cafe—Googlers ask questions directly to Larry, Sergey and other execs about any number of company issues. Our offices and cafes are designed to encourage interactions between Googlers within and across teams, and spark conversation about work as well as play."

https://blog.google/

"Impact Hubs are where change goes to work. Part innovation lab, part business incubator, and part community center, we offer our members a unique ecosystem of resources, inspiration, and collaboration opportunities to grow impact. We help a whole range of organizations—from local schools and community centers to international development agencies and foundations—create hubs around the world and work together to accelerate impact in a collaborative and impactful way."

Dail Burgosky, Founder of OGI
http://www.impacthub.net/

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The Creative Class

who are they and what are their needs?

More than 450 high-tech firms operate in Waterloo Region, in addition to BlackBerry, the Intralastics Dendrites Systems, Open Text, Maplesoft, Dalsa, MKS and more. “— Places to Grow

Region.

take part in a network of

companies like Shopify expand into

Seagram Distillery Building in Waterloo at Tech

Velocity provides the knowledge, tools, space and

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entrepreneurship program at the University of Waterloo

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University of Waterloo, Main Campus. Logan, Lisa.

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Bottom Centre. The Velocity Garage at

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They could not settle for a location that provided just

particular places with particular specialties and capa-

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Another factor, that's so basic that it's hard to ima-

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In the absence of informal public life, living becomes more expensive. Where the

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“My whole life could exist within a three-block radius if I tried really hard,” says Matlock, with a laugh. But he means it: He can see his office from his nearby loft. Mike McCauley, co-founder of BufferBox and now product manager at Google, tells me his parking spot is farther from his desk than his house is. Thalmic Labs’ Stephen Lake lives within walking distance of his office, as does Plylr’s Michael Litt-

“Madmap designs with the shared innovation of a large company, but the benefits of a small company,” says Iman. “We’re trying to make spatial data management easy to manage in between and within buildings. We’ve done that once, many times. We’ve got an interface that’s open and simple for indoor mapping and navigation.”

“VELOCITY wants to build the future of human-computer interaction. We’re solving a fundamental question: How do we connect the real and the digital worlds as we move towards wearable and ubiquitous computing?”

“DraftingSPACE is a solution to the huge gap between homeowner’s expectations and the unhappy reality of most completed renovations. DraftingSPACE takes the pain out of the renovation process by automatically creating construction-ready designs, which you can customize to your desire.”

“Mapbox designs with the shared innovation of a large company, but the benefits of a small company,” says Iman. “We’re trying to make spatial data management easy to manage in between and within buildings. We’ve done that once, many times. We’ve got an interface that’s open and simple for indoor mapping and navigation.”

“My whole life could exist within a three-block radius if I tried really hard,” says Matlock, with a laugh. But he means it: He can see his office from his nearby loft. Mike McCauley, co-founder of BufferBox and now product manager at Google, tells me his parking spot is farther from his desk than his house is. Thalmic Labs’ Stephen Lake lives within walking distance of his office, as does Plylr’s Michael Litt-

http://www.huffingtonpost.ca/pat-d-lynch/you-say-toronto-i-say-kw-_b_4579065.html

“Mapbox designs with the shared innovation of a large company, but the benefits of a small company,” says Iman. “We’re trying to make spatial data management easy to manage in between and within buildings. We’ve done that once, many times. We’ve got an interface that’s open and simple for indoor mapping and navigation.”
They could not settle for a location that provided just one good job; they needed to go to a place that offered many and varied employment opportunities. The gathering of people, companies, and resources into particular places with particular specialties and capabilities generates both the efficiencies and the incentives that pursue economic growth. Known as a tech hub, an increasing number of companies are making Waterloo Region their home. At companies such as Communitech, one can work in a collaborative and supportive environment, until said company becomes profitable enough to leave the Hub and pursue their own office space in a nearby location. The cycle of incoming new businesses continues as population increases and residents are seeking services and amenities.

Other ratings options were cultural attractions from the symphony and theatre to music venues and late-night dining, followed by small jazz and music clubs and coffee shops. Bars, large dance clubs, and after-hours clubs ranked much farther down on the list. Most of the respondents desired a gestalt of entertainment options and safe and reliable after-hours transportation. Waterloo Region has a small collection of formal theatres and concert halls, but the newest addition is Maxwell’s Concerts and Events in Waterloo. The space is flexible in use, and able to host concerts, fundraisers, corporate events and private parties.

Another factor that’s so basic that it’s hard to imagine why it’s so often overlooked is the need to be in a place where you might find people to date or, if you desire, a life partner. For young people, or older people who are looking for a second chance, the thickness of the mating market is as important as the thickness of the job market. Pockets of small breweries, restaurants, bars and cafes are popping up in neighbourhoods throughout the Region. There is an increasing ability to meet people outside one’s immediate group of friends, and many casual environments in which to do so.

The ability to meet people and make friends is one of the most important factors that determines our happiness with our lives and communities. Everyone has their preferred local cafe, where one often runs into their neighbors, colleagues or makes plans to meet up with their urban tribe (close-knit group of friends that assumes roles of family). Many go to cafes to “hang out simply for the pleasures of good company and lively conversation.” Some also go to cafes to be anonymous, but there is still a sense of community in a warm and busy cafe. Ray Oldenburg describes the cafe as the ultimate third place, and can be considered the heart of a community’s social vitality.
They equate authentic with being real, as in a place that has real buildings, real people, real history. A place that’s full of chain stores, chain restaurants, and chain nightclubs is seen as inauthentic: Not only do these venues look pretty much the same everywhere, they offer the same experiences you could have anywhere.

Waterloo Region has had a large German population since the early 20th century, and its German heritage is reflected in the annual Kitchener-Waterloo Oktoberfest, the largest outside Munich. There are many other festivals and large events in Waterloo Region that make it unique.

"People were drawn to places that were known for diversity of thought and open-mindedness, and they looked for signs of it when evaluating communities — among them, a mix of ages, people of different ethnic groups and races, people with different sexual orientations and alternative appearances." (293) Events like the annual NIGHT\SHIFT exhibit in Kitchener bring together artists, makers, entrepreneurs and organisations. It seeks to reimagine downtown venues with multidisciplinary visual and performance art. Contributors and participants reimagine pockets of the city core, share core communal experiences and spark unexpected collaborations. Bright Whispers celebrates the diversity of Canada, and tells stories of immigrants who have made Canada, and often Waterloo Region, home.

"Technology and music scenes go together because they reflect a place that is open to new ideas, new people, and creativity. It is for this reason that I like to tell city leaders that finding ways to support a local music scene can be just as important as investing in high-tech business and far more effective than building a downtown mall." (296) Local music festivals, such as the Kitchener Blues Festival is one of the largest in Canada. The festival is free admission, making it an invaluable community and cultural event.

Today, where we choose to live as opposed to what we do has become our main element of identity. I travel by plane a lot and have noticed that the standard conversation starter has changed: When advertising job postings, many businesses showcase their involvement in the local community and team building mentality to show applicants that their potential role would be filling a gap in the community. Many Creative Class people express a desire to be involved in their communities. This is not so much the result of a do-gooder mentality as a reflection of their desire to establish their own identities in places, and to build places that reflect and validate those identities. (299)

Fig. 90. Right. Annual Night Shift exhibit in Kitchener, featuring Bright Whispers Exhibit from 2015.

Fig. 91. Right. KW Oktoberfest is the largest Oktoberfest outside of Germany.

Fig. 92. Left. Annual Kitchener Blues Festival in Downtown Kitchener, 2015.

Fig. 93. Left. Habitat for Humanity volunteer build in Waterloo Region featuring Walter Fedy.

Fig. 94. Left. Habitat for Humanity volunteer build in Waterloo Region featuring Walter Fedy.
Fig. 94. Aerial view over suburban neighbourhood in Waterloo Region. Image by author.

"What suburbia cries for are the means for people to gather easily, impromptu byillard, and spontaneously – place on the color – 'suburban depression to integration, ease escape from the cabin fever of marriage and family life that do not incorporate getting into an automobile.'

Fig. 95. Townhouse Developments. "The development of a related work can be supplemented by the process of a related work” as will spread through the laws of the day." – Jane Jacobs, 392

Fig. 96. Oldenburg, Ray. 199, "Our Vanishing Third Place: from coffee shops to cocktail cradles. Requires personal and social spatial networks to exist, and get everything they need, from their front door. The key to a functional neighborhood features access to a myriad of combinations of first, second and third places.

"Most valued are three ‘third places’ which lead a public balance to increased privatization of home life. Third places are more than informal public gathering places. The phrase ‘third places’ derive from considering our homes to be the ‘first’ places in our lives, and our work places the ‘second.’"

1 Oldenburg, Ray. 1992. "Our Vanishing Third Place: from coffee shops to cocktail cradles. Requires personal and social spatial networks to exist, and get everything they need, from...."

"...the dwellings of a district need to be supplemented by a further place into the community, 'a third place.' There is a sense that this is a personal happiness that is not publicly shared, they become the objects of private ownership and consumption.

"The means for people to gather easily, impromptu byillard, and spontaneously – place on the color – 'suburban depression to integration, ease escape from the cabin fever of marriage and family life that do not incorporate getting into an automobile.'" - Jane Jacobs, 262

"In the absence of informal public life, living becomes more expensive. Where the means and facilities for relaxation and leisure are not publicly sponsored, they become the objects of private ownership and consumption. (Oldenburg)"
Fig. 98. Silodam multi-housing building by MVRDV in Amsterdam. The architects designed the building to act like a village, with different neighbourhoods. There is a mix of apartments with patios, social housing, and luxury residences with gardens. This creates a unique mix of residents and a diverse neighbourhood.

Fig. 99. Financial District Toronto. There is a great deal of density in this area of the city, but lacks public amenities. The ground floor of the office towers are occupied by lobbies and elevator entry points. This is a phenomena to be completely avoided in Waterloo Region.

Fig. 100. Waterloo Region Museum in Kitchener.

Fig. 101. Diagram of Ray Oldenburg’s First, Second and Third Places, with the addition of Fourth and Fifth Places as defined above.

Access to Public Amenities

What does Waterloo Region need most?...The amenities of a major city

The Missing Third Place

As the population of Waterloo Region continues to grow, the average commute time for workers of fifteen minutes (source) may be on the rise, leaving entrepreneurs looking for an alternative to their current methods of commuting and working. This brings into consideration Ray Oldenburg’s (source) theory on the first, second and third place, and how individuals and families look for ways for their life to exist, and get everything they need, from their daily errands to an evening out within a certain radius of their front door.

Based on analysis regarding Ray Oldenburg’s first, second and third places, there are still some missing links. What I call the fourth and fifth places are the places that we need access to on a daily and semi-regular basis. For the transit corridor to be successful in aiding the transformation of The Region into a transit-minded area, people need to know they can access their needs by transit in an efficient and reliable manner. It is important to recognize the attractors that will help draw the creative class back to the Region, as well as the amenities that residents need to get rid of their car and rely on the transit lifestyle. From any given location, citizens should be able to reach a public destination within a 5 minute walk, providing multiple occurrences and a variety of spaces provides an option for a diverse population.

To expand upon Oldenburg’s theory of first, second and third place, I have defined what I think of as the fourth and fifth place. Each can exist in a radius further from one’s first and second places.

Def. fourth place
daily amenity - frequent errands, places one does not often linger

Def. fifth place
occasional amenity - special trip required, include hobbies and excursions

“The character of a third place is determined most of all by its regular clientele and is marked by a friendly mood, which contrasts with people’s more serious involvement in other spheres. Though a radically different kind of setting for a home, the third place is remarkably similar to a good home in the psychological comfort and support that it extends…They are the heart of a community’s social vitality, the practices of democracy, but sadly, they constitute a diminishing aspect of the American social landscape.”

Oldenburg, Ray.

Fig. 107. Diagram of Ray Oldenburg’s First, Second and Third Places, with the added Fourth and Fifth Places as defined above.


CAFE CULTURE

The ultimate third place

Fig. 102. Series of diagrams illustrating Ray Oldenburg’s theory of the Third Place, and its connection to cafe culture in various locales.

“...the character of a third place is determined most of all by its regular clientele and is marked by a playful mood, which contrasts with people’s more serious involvement in other spheres. Though a radically different kind of setting for a home, the third place is included in the psychological comfort and support that it extends... They are the heart of a community’s social fabric, the generator of democracy but sadly, they constitute a diminishing aspect of the American social landscape.” - Ray Oldenburg

Fig. 103. According to Oldenburg, cafes are considered a third place in a city. Third places offer long-term guests of those away from home for people, and locally owned coffee shops host their customers for an extended amount of time. On the other hand, privately owned and often chain establishments are often visited by people as a quick coffee, but not somewhere they linger and stay for an afternoon with friends or family.
Fig. 104. Aerial view of Midtown.
CHOOSING A DESIGN SITE

This thesis began with looking at the site of the ION corridor as a whole, with an analysis of demographics, deed and holes in current design guidelines, and the original intention of restructing the way urban planning is viewed locally. The structure of the Region of Waterloo is broken into municipalities, each city having their own rules and regulations for development. This creates an immediate problem in a cohesive idea for Regional growth. While each city has their own issue of population growth and local development, they are in a battle between the cities and their plans, all the expanded transit infrastructure. Design guidelines were proposed in the 1980’s and 90’s in Waterloo Region to help to bring the tech sector into the Region. This was when the revitalization of Uptown Waterloo occurred. Although a beautiful project, this zone still is limited to a tiny search of land equalling ____ acres.

A major issue in the urban planning for the future of Waterloo Region is to ensure that neighbourhoods are designed and constructed in such a way to encourage activity at all hours of the day, and above all, create a walkable and social neighbourhood.

The stops for both phases of the ION corridor are broken into one of six categories that classify different type of neighbourhood in which the stop is situated on the 37 kilometre route spanning Waterloo, Kitchener and Cambridge. The majority of stops are in a downtown or shopping centre locale. The four case study stops were chosen for their proximity to landmarks, hubs and potential to high amounts of development.
Fig. 107. Aerial view of Conestogo Mall, and the area surrounding the Northfield ION Stop. Situated at the north end of the new ION route, it is natural that the parking lot at Conestogo Mall will be used frequently; thus, the construction of a park and ride facility will take place.

Fig. 108. Northfield provides an important connection to the historic and popular tourist village of St. Jacobs, which also includes the area that houses the St. Jacobs Farmers Market.

Fig. 109. Northfield is being infilled with business parks in much of the vacant land in Northfield. The area is gaining character as a business district and employment centre, with the increased construction of office buildings, but remains unfriendly for pedestrians, with heavy traffic roadways, and little building occurring close to the road. There are large expanses of surface parking lots between the sidewalk and facade of buildings. Northfield will be home to a new Park ‘n Ride facility for commuters to transition from personal vehicles to light rail transit into the Tricities, as well as a 60,000 square foot development, Northfield Station, beside the stop, create a new source of employment in the area. There is opportunity for many of the parking lots to be developed into street-adjacent buildings and create a desired neighborhood with a focus on encouraging methods of transportation other than the widely used vehicular transit common to this area. There are also many opportunities for connection to rural amenities, such as trail networks, the St. Jacobs Farmers Market, the Grand River and surrounding small communities from the Northfield.
GRAND RIVER HOSPITAL
Located immediately in front of the Grand River Hospital, near the Waterloo-Kitchener border; this zone can be considered a Midtown, as it lies in the grey area between Uptown Waterloo and Downtown Kitchener. This stop provides access to medical services at the hospital, and neighbouring facilities, local schools, including Kitchener Waterloo Collegiate Institute (KWCI) and Sun Life Financial. The institutions are all located on the south side of the transit corridor, as there was a historic plan to expand King Street to the North, leaving many parking lots and re-purposed single family homes to the North. The area is considered a major employment hub, with the main institutional and business junctures. With such a concentration of employment in this area, it is questionable that there is not a higher concentration of housing, and amenities for workers and visitors at the hospital. At the moment, the Midtown area is a mere connecting gap between Uptown and Downtown, lacking in any sort of urban identity, or life beyond business hours. There is some construction of multi-unit residential occurring in this area, but like Northfield, it lacks quality street life and small destinations along the larger block structure of the institutions. Further back from the corridor are historic residential communities, Mount Hope Cemetery and nearby connections to the Iron Horse Trail Network. This is the only urban stop on the ION transit corridor that does not meet the 400m walking shed analyses, which is the approximate distance for a pedestrian to reach a destination five minutes from the stop.

Fig. 112. Right. Aerial image of the Grand River Hospital and surrounding lowrise urban fabric in Midtown.

Fig. 113. Right. Expansive surface parking lot adjacent to Sun Life Financial on King Street and Mount Hope Street in Midtown.

Fig. 114. Orthographic Site Plan at Grand River Hospital/Midtown.
The Central Station is the future home of the ION transit hub, as well as a major connection point to GO Transit and Via Rail services, linking riders in Waterloo Region to Toronto and surrounding cities. The Ontario Provincial government has approved plans to expand the GO Train service beyond the current minimal route and schedule. Downtown Kitchener has quickly become home to a vast population of startup companies, and satellite campuses of the local universities, earning it the name of the Innovation District. This is in part response to a redevelopment strategy by The City of Kitchener to clean up the downtown core, and create new uses for the plethora of dilapidated historic factories that housed the major nodes of employment for the City in its early days as Berlin. There is a massive amount of investment in real estate and development happening near the stop, (provide stat) with the bulk focused on large residential developments featuring commercial space.

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**Fig. 115.** Top right. Aerial image above the future transit hub, with a view down the King Street corridor.

**Fig. 116.** Centre right. LRT track to be split and run along edges of the road at King, starting at the rail underpass. The low density Midtown transitions into high density construction Downtown Kitchener, with the University of Waterloo Pharmacy building and 1 Victoria condo tower in the background.

**Fig. 117.** Bottom right. Road construction of the area surrounding the rail underpass at King and Victoria Street near the future transit hub site in Downtown Kitchener, with Google Headquarters in the background.
Fairview Mall marks the transition from which the first stage of the light rail system changes over to bus rapid transit and continues to Ainslie Terminal in Cambridge, until the second stage of the light rail construction is completed. This is considered a major via point in current GRT and Ixpress bus services, with many routes coming into Fairview. The area including and surrounding the mall is growing as a shopping destination, with easy access to a highway junction that provides entry to highways 8, 73, and 401 for a gateway to the surrounding Region, as well as Toronto. There are many established residential neighborhoods surrounding this stop, with many older apartment towers. There is still space for infill at this site, and in some ways similar to the issues at Northfield, with the exception of this stop’s proximity to the 401. Many suburbs on the outer edges of Cambridge are appealing to buyers for this very reason, but there is not much of an option in housing typology for home buyers beyond the single-family dwelling or a townhouse development.

Fig. 120. Aerial view of Fairview Park Mall area.

Fig. 121. The Gresham Place apartments at 600 Greenfield Avenue. The towers are located near Fairview Park Mall and the Conestoga Parkway. They contain private building amenities, but no ground floor public space. Although at a slight advantage being close to the mall, the buildings are still surrounded by a largely unwalkable site.

Fig. 122. Orthographic Site Plan at Fairview Mall.
The obvious choice for a design site at first appeared to be Transit Hub and surrounding area at the Central Station stop, but after research reached beyond initial stages, it became evident that the site was already under major redevelopment through efforts by local developers and the City of Kitchener. There is also a smaller area of opportunity for transformation due to the large amount of heritage preservation and tight street networks in the area surrounding the stops. This area of the City, for the most part, seems to be under control, and is continually filling with new development. Although the preliminary designs for the Transit Hub by IBI Group provides opportunity for further development, it became obvious that it would be more an issue of transit engineering than that of urban design, combating the many intersecting forms of transportation and logistics.

Since the overall goal for the development of the ION corridor is to unify and connect the Cities within the greater Waterloo Region, it is evident that this connection in an urban context does not exist, and the single addition of LRT transit will not create this atmosphere. The LRT is not just about moving people, but creating a cohesive urban environment. The core urban districts of Uptown Waterloo and Downtown Kitchener were historically settled very close together, but have never completely grown together through continued urbanization of the cities. For the Region to be one unified entity, there is first a need for the Municipalities within the greater Region to operate at an increased level of cohesion. There are many politics surrounding the planning strategies and economics of this issue, but if there were less of a literal disconnect between the major urban centres of Waterloo and Kitchener, a mere 1.6 kilometre stretch, this would help to start the process. If urbanized, the majority of street networks surrounding Grand River Hospital could earn the name of Midtown, and serve as the connector between Uptown and Downtown, making a suitable portion of the regional transit corridor a continuous, walkable community. Compared to another urban metropolis, like Toronto, it is very easy for residents and visitors alike to be open to walking longer distances of the city, for there is a continual exposure to urban life on the majority of streets.

The development of Midtown as a landmark destination in the Region could create an opportunity for a spread of density along the corridor, and an increased base of amenities to support the surrounding residential fabric north and south of the King Street corridor.

Fig. 123. Right. Aerial image of Midtown showing large institutions, Grand River Hospital and Sun Life Financial separated by the adjoining surface parking lot.
MAJOR INSTITUTIONS

The major institutions on the site act as anchor points for an otherwise clean slate in Midtown for concentrated development of mixed use space, currently taken up by parking lots, lackluster strip malls and ill-maintained Victorian homes turned medical offices. The major institutions in Midtown combine to one of the largest concentrations of employment in Waterloo Region, employing around 10,000 staff, between Grand River Hospital, Sun Life Financial, and the public schools, excluding additional employees at surrounding medical practices and small businesses. The creation of housing and urban amenities for the vast employment population would be beneficial for the creation of a safe and vibrant community.

The street becomes largely unpopulated after standard working hours due to a lack of housing adjacent to King Street, and little opportunity for activity beyond hospital visiting hours, a fast food restaurant and a single storey stripmall.

I have chosen to ignore creating design options for the properties that make up the major institutions on King Street, as they are very political sites, with expansion plans that are completely independent of urban growth models. As they will expand as needed to suit their capacities and the changing nature of their businesses. There can, however, be rules created for how these future expansions come out to the street, and meet the sidewalk in key locations. An example of this will be shown for the site of the Hospital in the design proposal. This allows the fabric surrounding these major sites to remain soft and flexible, as surrounding fabric will be developed as needed for future expansion.

Another issue to address is how these institutions meet up with surrounding fabric of single family dwellings, and if any sort of buffer should be made to allow for a less dramatic transition between the two very distinct programmes. The biggest problem for the site as it currently stands is the stark transition from a busy neighbourhood during business hours, to one lacking life outside of those business hours, which is ill-suited for walkability. The site design seeks to activate Midtown during all hours and days of the week, through the creation of varied programming and amenity spaces. There is a high potential for shared amenities among different user groups on the site. The uses and user groups of parking, park space, coffee shops, ground-floor public programming and commercial space would change through the day.

Midtown is a close walk to the future Google office, which will have the largest concentration of Google employees outside the United States, with 1,200 plus employees. There is also a large local population of aging baby boomers, many of who are looking to downsize from their suburban detached houses with large yards, to a more manageable square footage, in close proximity to amenities within walking distance, and nearby healthcare. Midtown provides an opportunity to fill this gap in the housing market, with a mix of unit sizes and budgets for the elderly population looking for independent or assisted living.

EMPLOYMENT IN MIDTOWN

- Grand River Hospital: +4,500 employees (550 staff, +800 volunteers)
- Sun Life Financial: 3,000 employees at union blvd office
- King Edward Public School: 25 staff + 290 students
- Kitchener-Waterloo Collegiate Institute (KCI): 132 staff + 1,200 students
- Google Kitchener: 1,200 employees

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- Sun Life Financial: 3,000 employees at union blvd office
- King Edward Public School: 25 staff + 290 students
- Kitchener-Waterloo Collegiate Institute (KCI): 132 staff + 1,200 students
- Google Kitchener: 1,200 employees

Fig. 127. Top Left. Kitchener Waterloo Collegiate Institute on King Street in Midtown. Secondary School that employs teachers and administrative staff.
Fig. 128. Centre Left. King Edward Public School on King Street in Midtown. Elementary School that employs teachers and administrative staff.
Fig. 129. Bottom Left. New Google Kitchener Headquarters adjacent to Midtown.
Fig. 130. Above. Labour Force in Waterloo Region.
The current condition
There are varying pockets in the Region that are starting to boast beautiful restaurants, cafes and park spaces. The greatest obstacle is the lack of connective tissue throughout the Region tying these pockets together. The amenities are still too few and far between, causing residents to rely on vehicles to get them from dinner, to a bar or theater, and back home again. This situation also arises when considering the work environment and options for lunch spots, or to walk to a meeting at another office. There are still too many aspects of the everyday lifestyle that have not been fully investigated, with little to no design solutions provided.

A series of cross-sections have been cut through key urban areas along the LRT corridor to show existing conditions of development. Sections were chosen based on their varying nature and that they are all part of what is considered the most urban zone along the corridor. They should be evaluated, and used as precedent for advancement in design of the urban core that will be shown in the design test in the subsequent chapter.

The case for city neighbourhoods
Harvard planner, Reginald Isaacs posed the question as to whether the concept of a neighbourhood worked in a large city. “City people are mobile. They can and do pick and choose from the entire city (and beyond) for everything from a job, a dentist, recreation, or even in some cases their children’s schools. City people are not stuck with the provincialism of a neighbourhood, and why should they be? It’s their choice, and they have the opportunity to pick where they live.”

Jacobs agrees with Isaacs that the concept of a neighbourhood is meaningless when modeled on town neighbourhoods, or self-contained entities. She also states that neighbourhoods are a necessity of the city for people to feel connected to their community. She analyzes the neighbourhood as a self-governed organ, and establishes the three useful kinds of neighbourhoods, where all three should be present in all large cities:

1. The City as a Whole
2. Street Neighbourhoods
3. Districts - Large, Subcity Size, composed of 100,000 people or more in the case of the largest cities. “The chief function of a successful district is to mediate between the indispensable, but inherently politically powerless, street neighbourhoods, and the inherently powerful city as a whole.”

In reference to Jacobs’ description of Districts, the base qualifying population of 100,000 people is not necessary. Waterloo Region is slowly developing distinct districts within the larger body, but none of them have yet to reach this population base. In this instance, The Region would be considered The City as a Whole, Midtown/Grand River Hospital the District, and the individual streets within the Midtown District to be the Street Neighbourhoods. This is presently an issue at multiple locations in Waterloo Region.

A re-envisioned design guideline
The main goal of this thesis is to create a model that can be applied to multiple nodes along the ION corridor, and bridge gaps between disjointed neighbourhoods. The use of green transportation can transform from an idyllic model into a reality much easier if users feel like their trip from point A to B is engaging and amenity-filled. Although starting out by urbanizing the connecting corridor between Uptown Waterloo and Downtown Kitchener seems like a logical choice, it can be used as a model for design for other areas in The Region, whether they are part of the ION corridor, or part of a planned extension.
In response to an interview in Copenhagen in 2008...

What are the three qualities that should characterize a sustainable city?

"To me, a sustainable city would be a very people-friendly city. It would be a city with good public spaces and a city that is rather compact. It would be a city that really invites people to walk and bicycle as much as possible. A good walking and cycling environment with a good public realm is also a good environment for public transport, so there is an important connection here as well. Strengthening public transportation will be essential in the future, in order to become less dependent on private cars and also in order for the city to become more people-friendly.

A further point and quality to emphasize is the bicycle. The story of the bicycle started in England 100 years ago and has been going very well in certain countries and cultures. This goes for places like Holland and Denmark. Due to a welcoming infrastructure the number of cyclists have increased tremendously in Denmark for example. In Copenhagen, bicycling accounts for 36% of all commuting to and from work. Many cities around the world could, to a much higher degree, create more inviting circumstances for cyclists. We can see this in the US and Australia and in other places too, that people begin to become aware of the many positive aspects of cycling in the city.

A further, definitive quality to stress is that we need to make sure that cities become greener and that they have a substantial amount of vegetation, which can clean the air and help cool the city. Certainly, a sustainable city would be quite green. I am also aware that a sustainable city ought to have many green buildings as well. But, green buildings alone do not create a sustainable city. You could place an endless number of green buildings in Dubai, for example and yet it would hardly ever become a sustainable city, the way it looks now. It would only be a collection of unsustainable buildings.

-Jan Gehl
A series of sections have been cut through the King Street corridor to show existing urban typologies and how the scale of buildings affects the quality of life in said area, relating to factors such as daylighting, setback from street and attention to public space.

**Floorplates**

The floorplates are simplified in their use to:
- Commercial
- Mechanical
- Park
- Residential
- Retail

The sections are all facing southeast, and are as follows:

- **A. University at King Street and Columbia Street**
- **B. Uptown at King Street and Willis Way**
- **C. Uptown Waterloo at King Street and Allen Street West**
- **D. Midtown Kitchener at King Street and Union Boulevard**
- **E. Midtown Kitchener at King Street and Mount Hope**
- **F. Midtown Kitchener at King Street and Green Street**
- **G. Downtown Kitchener at King Street and Victoria Street**

**Fig. 133. Right. Map indicating locations of section cuts through various existing urban conditions along the ION corridor.**
Fig. 134. Aerial Image of the University Area including Waterloo Park. Photo by Iain Hendry. August 26, 2017. Posted to “I Support Light Rail Transit in Waterloo Region” Facebook page.

The ION stops were designed by the General Engineering Consultant, in combination with public and stakeholder consultation in 2013. GrandLinq is the DBFOM (Design-Build-Finance-Operate-Maintain) contractor. They were responsible for completing stop designs in coordination with Region staff to approve acceptable materials for the anchor walls based on criteria including aesthetics and durability. Combining the approved materials and the panel design of the anchor wall, Region staff and the General Engineering Consultant architects and designers created recommended anchor wall designs for each stop. Focus groups were held to review the recommended anchor wall designs. The intent for the individualized anchor wall designs is to reflect the character of the stop area and neighbourhood using criteria such as the purpose of the stop, nearby landmarks, materials and colours that best represent the area, and symbols that could be incorporated.

In their current design, the ION stops, which are centered in the road, are cramped for space. The stop islands have under 3.5 metres in length of circulation space by the time the anchor walls and steel overhead shelter are placed on the median, leaving approximately 1.5 metres for pedestrian circulation. Platforms are equipped with ticketing stations, system maps, and seating, but this does not leave much space when surrounded by oncoming traffic. For this, design strategies must take place adjacent to LRT stops on the sidewalk for passengers to have access to bike storage, water filling stations, washrooms, etc. before and after their light rail travels.

EXISTING CONDITIONS

no space for public features

Fig. 135. Sectional isometric illustration of existing urban / street conditions along the ION corridor.
There has been a construction boom near the campuses of University of Waterloo and Wilfrid Laurier University. This area is now over saturated with tall condo buildings that have laundry rooms and an elevator lobby for ground floors. They are built immediately adjacent to a narrow sidewalk where the only separation from the road is a curb.

**ANCHOR WALL DESIGN**

The gray, white, black and dark blue glass ties in with surrounding buildings including Engineering V. Black ties in with the University of Waterloo branding. Dispersed color blocks represent multidisciplinary areas of study coming together. Blue and gray are colors of intelligence and black is a color of sophistication.

*Note that rendering is simplified to focus on anchor wall design. For complete details refer to the ION LRT Stop Design board.*
The towers adorning the University District of Waterloo are literally overshadowing large parts of the City. In some areas where rebuilding has not yet occurred, there are 20-storey towers across the street from two-storey houses. Waterloo went from a desperate shortage of student housing to a surplus, which Karl Innanen of Colliers International tells The Record one of the new student apartment buildings in Waterloo is in power of sale proceedings. Innanen says “there’s an oversupply of nearly 5,000 beds, but when planned new developments are included, the surplus increase to over 8,300,” adding that student enrolment won’t be nearly enough to absorb the extra beds. The problem that these towers create is that there is no transitional use for the buildings, as they are specifically built in a dorm-style apartment typology, with five or six bedrooms feeding into a small kitchen and living space, with shared washroom access. This is not suitable for most single adults or families, and therefore only useful for students.

Completed as a re-urbanization project, Uptown Waterloo has undergone major transformation, and is now a destination for retail and nightlife. Due to the heritage nature of most of the buildings facing King Street, there was little density added to Uptown, forcing the density to be accommodated further back. In areas like Uptown Waterloo, where the majority of the buildings have heritage designation, increased density can be achieved further back from the direct downtown core, and can be used as infill projects for the many surface parking lots.

ANCHOR WALL DESIGN

The vibrant blue, dark blue, and white glass reflects the vibrancy of Waterloo Public Square. The vibrant blue and the white matches the colours of the Uptown brand. The vibrant blue pattern abstractly represents the heart of Uptown Waterloo, while the dark blue square represents the public square.

*Note that rendering is simplified to focus on anchor wall design. For complete stop details refer to the ION LRT Stop Design board.*
The revitalization of Uptown Waterloo created an successful pedestrian friendly public space boasting bustling shops and restaurants. Although the buildings facing King Street in Uptown are lowrise developments, many of which have pleasant detailing at the street, with awning features and arcades to provide shelter from the elements. If the existing surface parking lot behind Waterloo Town Square was converted to a garage, there is an opportunity to add density to the core.
Being that much of the urban core of Uptown Waterloo is part of a heritage district, there are limited options for dense development in the area. The large tower in this section is part of an attempt to develop a mixed use building to blend in with surrounding heritage architecture, with a 23-storey highrise condo sandwiched atop a limestone typology.

Fig. 149. Left: Images of the first phase of development at 144 Park.

Fig. 150. Existing Urban Condition at Uptown District.
The Grand River Hospital area is largely low-density with the exception of the major institutions that line the South side of King Street. There are almost more surface parking lots than buildings, and little to no retail or valued commercial space along this area of the corridor. Midtown is lacking a nightlife element, as the majority of the traffic has subsided after working hours with the large employment base. The majority of the buildings are set back far from the edge of the proposed LRT corridor and roadway, leaving room for development of the public realm, and opportunity for new construction to meet the sidewalk, providing more space for development.

ANCHOR WALL DESIGN

A solid soft blue ceramic represents the colour used for the “H” hospital symbol used on signage and on maps. A soft blue will tie in with the design of the hospital and the GRH logo. The colour blue gives the feeling of serenity, calm, intelligence, and trust.
The parking garage that services the Grand River Hospital borders King Street and Grove Street. As the Hospital has grown, locating parking is an issue. It is inevitable that this garage will need to expand its capacity as surrounding surface parking continues to be filled in with development. Between the parking garage, and the neighbouring hospital and church and secondary school, this leaves a

Since the church and high school are already built out the street, and unable to change in programming so long as their current occupancies remain, there is an option to provide ground floor public programming in the front of the parking garage.

This area has the benefit of having access to a large greenspace that opens onto the historic Mount Hope Cemetery. This greenspace is currently used as the sportsfield for Kitchener Waterloo Collegiate Institute.
Future expansion at the Hospital should come out to meet the street. Along King Street at the moment is the emergency department, with frequent ambulance and emergency vehicle traffic. Although it has been expressed that the light rail corridor can be accessed by emergency vehicles when they are unable to seek a path through traffic in the adjacent vehicular lanes, there could be potential for a lot of chaos of pedestrians, cyclists and vehicles surrounding the area where emergency vehicles would usually zoom into the hospital ambulance bay.

Fig. 3.6: Existing Urban Condition at Grand River Hospital.
The parking lot that is sandwiched between the Sun Life Financial and Grand River Hospital properties. The parking lot rests on a parcel with a depth more than twice that of the rest of the surrounding fabric. There are some older apartment towers and a variety of detached housing built into the residential neighbourhood in the blocks near the Hospital. There are quaint greenspaces throughout the residential neighborhood, and generous setbacks, leaving space for new street features beyond existing sidewalks.

Fig. 157. Existing Urban Condition at Grand River Hospital.

EXISTING SECTION
urban condition at grand river hospital

MIDTOWN URBAN SECTION
@ king + green
The City of Kitchener incentivized development, waiving many of the fees associated with development permits in order to attract construction in the area. The revitalization of the Downtown core has been made possible due to the exploding tech startups, taking up residence in the many historic factories, and a new concentration of high-end condo buildings. There is a mix of high-density construction, and low-density heritage preservation occurring in this area.

ANCHOR WALL DESIGN
Glass is the most representative finish for this innovative area. The green glass pulls in the colours of the School of Pharmacy, while the blue glass pulls in the colours of One Victoria, and the ION branding. The design of the lines represents multiple modes of transportation coming together at a hub.

Fig. 158. Top Right. The Kaufman Lofts are one of the original examples of loft conversions in Waterloo Region. The downfall to this building is its lack of ground floor public space. The building covers an entire block, and although it is effective in meeting the street, it makes for a long walk with no retail frontage.

Fig. 159. Upper Centre Right. One Hundred Victoria development from King Street.

Fig. 160. Lower Centre Right. Greenspace terrace at 100 Victoria Street. In addition to separate unit balconies, there is a large podium that will provide space for building amenities, including a party lounge, a fitness facility, theatre room and a rooftop terrace.

Fig. 161. Lower Right. Balzac’s Cafe in The Communitech Building, Downtown Kitchener.
As some of the highest value land in the Region, with proximity to the future Victoria Transit Hub, the Kitchener GO stop and a growing number of options for dining and nightlife, the area surrounding the Hub is filling in with large high-end condo developments. The secondary fabric in this area is low density commercial development. Contrary to what is happening in Uptown Waterloo, high density development is supplementing the existing low-density heritage development.

Fig. 162. Existing Urban Condition at Transit Hub.
When the outcome drives the process we will only ever go to where we’ve already been. If process drives outcome we may not know where we’re going, but will know we want to be there.

- Bruce Mau
The principle driving the forthcoming ION rapid transit system is to connect the three major cities in Waterloo Region—Waterloo, Kitchener, and Cambridge—through the creation of a unified transportation spine. For this linking agent to become something beyond a mere infrastructural network, a design model for urbanization and street network design needs to be identified and carried out in Waterloo Region. In order to establish a design for the thesis site of Midtown, there first needs to be a base of urban design principles and theories to inform the design process, with the outcome of a body of new urban rules that can then plug back into a future design process for areas outside of the thesis design site extents.

The current Urban Design Guidelines for the City of Kitchener is comprehensive, providing many specific rules for site and built environment, but lacks an overall vision to inspire better community design. The following rules for linear urbanism shall be read in addition to base building code laws. As the ION corridor expands, so should the urban conditions it creates. These rules can and should be modified if the Region outgrows the current conditions, and another layer of density is required. The Rules do not address suburban development.

**RULES FOR LINEAR URBANISM**

The principle driving the forthcoming ION rapid transit system is to connect the three major cities in Waterloo Region—Waterloo, Kitchener, and Cambridge—through the creation of a unified transportation spine. For this linking agent to become something beyond a mere infrastructural network, a design model for urbanization and street network design needs to be identified and carried out in Waterloo Region. In order to establish a design for the thesis site of Midtown, there first needs to be a base of urban design principles and theories to inform the design process, with the outcome of a body of new urban rules that can then plug back into a future design process for areas outside of the thesis design site extents.

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**THEME / CATEGORY**

- **typology**: Classification and form of building.
- **environment**: XS to XL design elements that contribute to the ecological well-being of the site or neighborhood.
- **infrastructure**: Street design elements that enhance the utilization user experience in terms of convenience, reliability, and safety. This include lighting, parking, bike racks, water, etc.
- **programmatic / public**: Services and built features relating to a need for the public, often fulfilling a social need.
- **built**: In addition to base building codes. Building details and materials that add to safety of neighborhood property value, etc.

Architecture and Planners have inherited some funny ideas about themselves as the keepers of the sacred flame of culture and the guardians of society’s conscience. There has been a tradition that a true professional, and certainly, a true artist, should not be too closely involved in the day-to-day process of government, or politics, or real estate development. Instead, he has sent his instructions to the policy makers as manifestos or visionary drawings, and, not surprisingly, the policy makers usually find them impossibly idealistic and irrelevant to the problem at hand.”

Instead of delivering finished designs outside of the institutional decision-making process, Barnett recommended that architects and urban designers themselves should write and design the basic underlying rules for the envisioned space of action.

WHY GRAND URBAN RULES FOR WR?

Alex Lehnerer describes different kinds of rules, rules that are additive, and rules that refer to form, in order to produce a culture of rules, while still allowing for some inherent performance. Some are legal minimums, with or without legal bearing, and are used as design. Grand Urban Rules is used as a tool in this regard, the book contains a total of 115 significant ingredients that attempt to engage in design using rule-based instruments. The book tries to show the regulations as a designed conclusion.

chapter 01

Rules and Codes - A Token of Affection

Different rules and code are continually questioned by their semantic relevance. Lehnerer states that rules:

- can't be abstracted
- lack in scale to our society (according to political economist Friedrich Von Hayek)
- are adjustable, but should stay operational
- are useful to a researcher engaging in analysis
- are useful to an urban planner in design
- are useful to a municipal who applies rules

chapter 02

The Tightrope Walk of Exercising Control over Private Property

Rules function in a specific design task, such asneighborhoods, and give examples from San Francisco, Vancouver, London and New York. Architectural rules, such as hedges, light and shadow affect the community, as well as superordinate rules that specify how far dependencies between neighbours may go.

chapter 03

Power is in Nothing Without Control

Lehnerer talks about the history behind the period from 1916 to 1961 in New York, and the history of American urban development as a resemblance of a Hollywood western: urban development as a result of conquering of land, laying grids in a city, basic organization based on ownership and use, planning or zoning, and building design. This collection of urban rules is meant to grow with Midtown, and efforts of this thesis are merely a sampling of base urban planning. The rules created for the purpose of this thesis are meant to be formed by mutual consistency, while at the same time some refer to form, some to process of creating rules. Lehnerer talks about the history of American urban design as a resemblance of a Hollywood western: 1. conquering of land, 2. laying grids in a city, 3. basic organization based on ownership and use, 4. planning or zoning, 5. the rivalry between neighbours.

chapter 04

Codified Aesthetics

Rules as tools are conceived by architects, urban planners, and economists (for example, Friedrich von Hayek). Rules can't be abstracted, but this is an act to simplify and consolidate local municipalities within the greater Waterloo Region, as a test site, and then ultimately to other areas of the country.

chapter 05

Connected Flexibility - Neighborhood

Rules are conceived by architects, urban planners, and economists. The book tries to show the regulations as a designed conclusion. Rules function in a specific design task, such as hedges, light and shadow affect the community, as well as superordinate rules that specify how far dependencies between neighbours may go.

chapter 06

Codes, Conventions and Maxims: Official and Informal Regimes, Rules of Place in Urban Design

Talks of the history behind the period from 1916 to 1961 in New York. Rules of the history behind the period from 1916 to 1961 in New York, when the city zoning ordinance was comprehensively revised for the first time.

chapter 07

Without or Within

Definitions for urban rules are needed because they apply rules are introduced to their potential use in and special districts.

chapter 08

Difference and Consistency

Rules that are additive are formed by a design process, while rules that are conceptual tools are formed by mutual consistency, while at the same time some refer to capacity the possibility to facilitate differences to emerge from their context.

chapter 09

Designed Variety

Lehnerer describes the impact of Raymond Unwin's methodology in 20th century urban planning practices and also Melbourne's

chapter 10

Synthesis - A Dropped Conclusion

Shows how rules function in a specific design task, he discusses a number of case studies and projects that attempt to engage in design using rules-based instruments. The book tries to show the regulations as a designed conclusion.
The public space is the first part of the city that users experience. This outdoor realm is invaluable, and sits on land that cannot be resurrected once it is eaten by the building footprints. It is therefore the first aspect of the design proposal for Midtown. It details design elements that create a lively, safe and environmentally conscious urban environment. A model of curb-in urbanism has been established for the King Street transit corridor, as described on the left fold. The street design is illustrated in a combination of cross-sectional and plan design drawings and axonometric diagrams. The design establishes building setbacks, plans for traffic management, implementation of green infrastructure and street parking, landscape design elements and materials selection for the site extents in Midtown.
Subtle changes in material and grade from the road surface to the sidewalk or pedestrian realm make it easier for events to occur on the street, eliminating the tripping hazard of the traditional curb. Blurring the boundaries leads to increased safety for pedestrians and increased caution for motorists as there is less of an implied barrier dividing the two realms; it causes motorists to travel with heightened caution, and often at a lower speed. There is also an added element of accessibility, for there would be the ability to push a baby stroller, wheel a wheelchair or pull a wagon up the curb at any point without a difficult change in grade.

This approach has been taken in Downtown Kitchener, with the treatment of the pavement and the arrangement of parking in the core. There are removable bollards for parking to be accommodated at various points in the year, or for parking to be removed from the street for a special event. This creates ultimate flexibility for storefronts and festivals when the need arises.

A similar approach is proposed for Midtown, not only along King Street, but also for residential streets that feed the corridor. Moving the parking from the roadside of the curb to the pedestrian side of the curb allows for flexibility and future use of the boulevard.
Functional design drawings were prepared for all stops and roadway types along the ION route. In this design, there is no allowance for cyclists, parallel street parking, landscaping or public space. As stated in the introduction, there is a missed opportunity in the redesign of the light rail transit network in Waterloo Region.

This lack of mindful design of public space during the construction of the ION allows developers the ability to build right up to the edge of the sidewalk, eliminating the potential for future development of a public realm. Once this space is gone, it’s gone. In order for public space to take priority, a design must be implemented prior to major construction and redevelopment along King Street in Midtown.

Although certain roads in the Waterloo Region are safe for biking, a focus needs to be paid to bike access to the Corridor. On the lane design planning by transit engineers, Hatch Mott McDonald, there is not a designated lane for bikers. This is problematic, considering that the development of the ION has been established to cater to transit and green transportation. The design of protected bike lanes, sidewalks and ION transit stops will be part of a cycling infrastructure design analysis. This initial analysis has been made possible by research in ArcGIS, showing where the holes in the cycle system are, and where key connections could be made to extend large loops and create easy inner-city access to rural bike trails and routes.
Below are examples of sections of the Kitchener Urban Design Guidelines that should be utilized in the strategic plan for Midtown.

**Mixed Use Corridors Design Objectives:**

The Mixed Use Corridor guidelines indicate the City’s design and development expectations in the public and private realms. Future development in the Mixed Use Corridors are expected to satisfy the following design objectives:

- Encourage compact urban form and promote intensification;
- Maintain human scale form and compatible development;
- Achieve high quality building and landscape design that contributes to a sense of place and corridor identity;
- Create walkable, transit supportive environments, and;
- Promote civic design and the creation of a high quality public realm that inspires innovation, creativity and corridor identity. (B-12)

5. Streetscape Design – Public streets should be designed for people and include a well-coordinated streetscape defined through the following elements:

(i) Road Right of Way – This area includes the roadway and the boulevard.

(ii) Roadway – The roadway is the area from curb to curb within the right of way and may include lanes for collection traffic, a median, pedestrian crossing, dedicated bike lane and on-street parking.

(iii) Boulevard – This area includes items (i) through (vi) listed below.

(iv) Buffer Zone – This zone provides a buffer between pedestrian and collection traffic. Street furniture, trees, and other fixed objects should be located in this area and aligned in a manner that maintains the pedestrian clearway zone.

(v) Pedestrian Clearway Zone – This zone is designated for pedestrian and barrier-free movement.

(vi) Pedestrian Clearway Zone – This zone should be clear of obstructions and be of sufficient width to accommodate pedestrian traffic.

(vii) Land Use Transition Zone – This zone acts as a setback from the pedestrian clearway to the building frontage. Depending on the space available, this zone may accommodate outdoor displays, street furniture, landscaping, and spill-out spaces for patios and retail. (B-14, 15)

**City of Kitchener Urban Design Guidelines**

As shown in the previous sectional design drawing, there is currently no set of rules that force more than just a sidewalk for the streets that make the ION corridor. Urban streets should not cater to solely the motorist, and should instead pay more attention to the pedestrian and cyclist. The diagram to the right indicates the design for the ION corridor in its current state.

1. Existing Street Condition - Isometric Diagram.

2. 7 metre concrete light rail track right-of-way designed to have train approach steps at a height to be fully accessible.

3. ION stop platform featuring steel awning for weather protection and a stop wall for indication of a stop.

4. Traditional concrete curbside bundling the road base to make the transition to the sidewalk.

5. 1.5 metre concrete pedestrian sidewalks are immediately adjacent to the road.

6. Existing setback zone from edge of sidewalk to face of building. This area is undeveloped.

Existing building fabric in Midtown often consists of lowrise residential buildings and strip malls filled with medical offices.
The Reality - Developer’s Paradise

1. 7 metre concrete light rail track right-of-way designed to have train approach steps at a height to be fully accessible.

2. Ion stop platform featuring steel awning for weather protection and a stop wall for indication of a stop.

3. Traditional concrete curbline bordering the road lane to make the transition to the sidewalk.

4. 1.5 metre concrete pedestrian sidewalk immediately adjacent to the road. Separation of pedestrians from vehicular traffic is often no more than the curbline.

5. Land is purchased for redevelopment and sites are maxed out in terms of site coverage and building height. The existing lowrise commercial fabric is replaced with highrise residential towers. When redeveloped, buildings come as close to the road as possible, in an effort to maximize the site. Little room is left for road expansion or urban elements such as bike lanes, patios space and bike/vehicular parking. Often an absence of trees and urban street elements.

Fig. 175. Potential Condition: ‘A Developer’s Paradise’ - Isometric Diagram.
Aside from the transportation planning and transit stop island design for the LRT, there is no grand vision for the ION corridor as a connector and recognizable creator of a new life for the Region. For this, I am proposing that the ION takes on a green boulevard quality, to transform the vast expanses of concrete that envelop local streets, into a lush and protected swatch of green throughout the Region. This design process started by imagining an ideal solution, had the ION corridor not been under construction already. This could be a model for future expansions of the network. I then evaluated what could be modified, in order to take a curb-in approach, as to not affect the completed site engineering and modifications needed to run the electrified LRT tracks down the centre of the roadway, with single lanes of traffic to either side, and services below the road lanes.

The overall intention for a design for the re-entanglement of Midtown is to create a model for urban planning that can be molded and recycled for other neighbourhoods along the corridor, as population growth and increased density demand. The following chapter details this current missing urban form, and a re-envisioned design guideline.

**A CONNECTIVE GREEN CORRIDOR**

Walter Hood - “advocates incremental transformations for the design of public space that blend old and new as well as surrounding sites and the various constituencies using public space.” (Integral Urbanism - 126)
Re-imagined functional design

Illustrated to the right is a re-imagined version of the current functional design section for the LRT at Grand River Hospital. Although this functional design takes up more space on the street than the outer limits of the current functional design, many features are added when room allows.

There are a combination of fixed and varying parameters on the street design. The sidewalk and consequent boulevard / flex space vary in dimension, with a minimum 2 metre width. The flex space compresses, and does not exist when there is not sufficient space on the street. The light rail corridor, bike infrastructure and parallel parking are all fixed dimensions, however parking is also a street element that ceases when there is not adequate street space. The transit platform and roadways vary in the sense that they are not active in all areas along the corridor, but are the same dimensions when they are present. The scenario shown is the widest possible right-of-way, with a light rail platform, a designated turn lane and full street parking on both sides of the street.

Fig. 179. Proposed Functional Design Section at ION Stop at Grand River Hospital.
The secondary neighbourhoods are considered to be supporting elements of King Street corridor. The majority of said streets are currently structured to support opposing lanes of traffic and parking on either side. The curbs are on the far side of the parallel parking, with a narrow sidewalk. By the time a driveway intersects the boulevard to provide private parking access to the residences, there is not much room for street parking between driveway openings, or greenspace on boulevards. Because the roadway is so wide, (almost four lanes) this causes unnecessary and dangerous speeding on roads with few obstacles.

The value of street parking in the secondary neighbourhood will increase as the plethora of surface parking lots in Midtown are infilled. An issue will rise when these neighbourhoods become space catered to cars, not people. When parking is not needed, or as the amount of vehicular traffic decreases in Waterloo Region, parking should become more of a flexible option. An option for redesign of residential streets should increase the size of boulevard and pedestrian space. In this scenario, the width of the road is decreased to be the minimal road lanes, and the parking is moved up on to the boulevard similar to the design of the parking design for the King Street corridor. This way, parking can be used flexibly for other uses when not needed. It also makes the street smaller, reducing car speed and causing motorists to feel as if they are driving through a place where people occupy the street.

**SECONDARY NEIGHBOURHOOD**

**Fig. 180.** Left, residential street design sections.

**Fig. 181.** Right, three images. Views of the secondary neighbourhoods surrounding Midtown can be seen in these images. This juxtaposition between the large scale fabric of the institutional buildings on King Street and the smaller residential blocks that are punctuated with single family dwellings and mid rise apartment buildings.

**Fig. 182.** Below, 300 German project still on the drawing board by Acre Architects. I worked on the initial stages of the project while working at the Acre. The project was an infill infill for a secondary street in Uptown Saint John. The building is a multi-unit residential building, with a mix of unit sizes. It is an appropriate midrise building as a precedent for Midtown, at five storeys in height, with covered parking on the ground floor and beautiful amenity space facing onto the street. The building would occur immediately in on King Street, or in a secondary neighbourhood scenario to add some density and variety to an underused street.

**Fig. 183.** Right, three images. Views of the secondary neighborhoods surrounding Midtown can be seen in these images. This juxtaposition between the large scale fabric of the institutional buildings on King Street and the smaller residential blocks that are punctuated with single family dwellings and mid rise apartment buildings.
The Four Principles of a Woonerf based on Eran Ben-Joseph’s article in the JAPA are:

1. Visible Entrances
2. Physical Barriers
3. Shared and Paved Space
4. Landscaping and Street Furniture

The entrances of the woonerf are distinctly marked by a sign, shown in image. The sign shows people playing and a car in the background, all interacting alongside a house. The small sign above shows that the street also allows bicycle traffic. The signs warn drivers to yield to pedestrian and cyclist traffic.

Based on the 1970's Dutch concept of the woonerf, or living yard, minimizing space for cars will help to slow traffic and create safer streets. The enormous amount of space currently reserved for the car on residential streets should instead be given to public, and used as space for cyclists, pedestrians and children playing outside. The minimum lane width in Waterloo Region is 7 metres. This allows for vehicles to make proper turns and have enough clearance to pass an oncoming vehicle.

Design alternatives for secondary streets, which are primarily of a residential typology have been proposed for Midtown as shown above. They attempt to take into account where the mature datum of street trees are situated, and add features of generous walking and cycling paths, while minimizing road space, and adding in flexible use parking.

As demand for transit increases, and reliance on driving and parking decreases, parking spaces can be used as an expansion of public space and turned into parkettes, gardens or patios. Roads can be shared with cyclists and the multi-use path can be used solely by pedestrians.
REDEVELOPMENT IN WATERLOO REGION

INCUBATOR
Fig. 190. The Long Tannery
Reusing open-springs and garage workspaces, Communitech is able to accommodate a range of startups at their tech startup hub.

HIGH-END MIXED USE
Fig. 192. Bauer Lofts
Built atop a refurbished factory full of high end dining, grocery and cafe options.

FORMER GLORY DAYS
Fig. 193. The Walper Hotel
Although not a factory, the Walper Hotel could see multiple uses through the remainder of its life. Recently restored to its former glory days as a bustling hotel in Downtown Kitchener.

NEW AGE OFFICE
The Breithaupt Block has been redeveloped and expanded to create the home of Google Kitchener, and a myriad of flexible office space with outdoor courtyards.

COZY HOME
Former manufacturing facility turned into 27 condos with a rooftop patio.

UNTAPPED POTENTIAL
Fig. 195. Rumpel Felt Co.
There are many historic buildings similar the 100 year old Rumpel Felt Building which currently sit vacant and are seeking a new life.

NEW AGE WAREHOUSE
This office hub took cues from the warehouse typology, with open floorplates, expansive ceiling heights and sturdy building materials to suit the Canadian climate.

DESIGN FOR FLEXIBILITY

Design and build in such a way that buildings can be flexible, and eventually change use as the neighbourhood evolves. As a history with deep roots in the manufacturing industry, Waterloo Region is filled with warehouses. The high level of desirability of these historic buildings is not surprising, for they have flexible open floorplates, due to their structural design, and high ceilings to accommodate transitional manufacturing operations through the years. New construction can learn from these historic buildings, not in mimicking their architectural style, but in paying attention to aspects of their typology and detailing that has made them so transitional over generations. There should be encouragement for even purpose-built projects to be designed in such a way.

In 1876, Waterloo issued its first fire-resistant building construction bylaw: ‘Every dwelling house, store, manufacturing or other building hereafter erected shall be built of stone, brick, cement, bricks or stone material other than wood, and roofed with slate, metal, tile composition or shingles, and all other fire-proof material.’

In 1876, Waterloo issued its first fire-resistant building construction bylaw: ‘Every dwelling house, store, manufacturing or other building hereafter erected shall be built of stone, brick, cement, bricks or stone material other than wood, and roofed with slate, metal, tile composition or shingles, and all other fire-proof material.’

WASHINGTON STATION
Fig. 196. Northfield Station
UNITS CAN BE COMBINED / SEPARATED EASILY
UNITS CAN SHUFFLE WITHIN BUILDING
LARGE SPAN STRUCTURE FOR FUTURE FLEXIBILITY

LEARNING FROM (NOT MIMICKING) HISTORIC FABRIC

Fig. 197. Grand Urban Rule: Design for Flexibility

Fig. 198. The Long Tannery

Fig. 199. Bauer Lofts

Fig. 200. The Walper Hotel

Fig. 201. The Breithaupt Block

Fig. 202. Rumpel Felt Co.

Fig. 203. Northfield Station

Fig. 204. Grand Urban Rule: Design for Flexibility
Gaps from street line to building face should be used for public space instead of dead space. Closing the gap allows more space for the built environment and well-designed streetspace, lowering the feeling of an expressway for cars, and making space about people.

In the case of King Street in Midtown, the street is adorned with converted single family homes to the North and institutions to the South, which are interspersed with some lowrise office buildings. The vast majority of the buildings are set so far back from the street as to form a vacuous street, devoid of public life, with more of an urban freeway vibe. The magenta area shown on the map drawing to the right

Fortunately, Midtown has enough cross-sectional space along King Street to host generous street design elements on top of the basic accommodations for light rail and motorist lanes. There is a fluctuation of 40 metres of clearance between buildings in the cross-section. This allows the potential for the street design to be implemented immediately, and for redevelopment to happen in phases. If the street design is complete prior to major redevelopment in Midtown, it will allow the space that the street requires, leaving a border for new buildings to meet.

![Existing Building Face](image1)

**Fig. 198.** Below and Right: 40 metre clearance between existing buildings on King Street.
“Setback” means the minimum distance between a lot line and the nearest part of any above grade building or specified structure exclusive of any permitted yard projections on the lot. (Amended: By-law 2013-138, S.18)

4.1.2. Built Form - Maintain a human scale of development through a comfortable street enclosure which is created through appropriate building massing in relationship to the street width (the height to street width ratio).

STREET ENCLOSURE

Avoid reverse lotting (Reverse Lotting: lots located adjacent to an arterial or collector road which front onto an internal street, while the rear yard faces onto the arterial or collector road. - definition according to the City of Hamilton Urban Design Guideline)

4.1.1. Design Guideline - Promote an urban street relationship by locating buildings close to the street, particularly along transit routes, with parking in the side or rear yards. Vehicular parking should not detract from the character of the neighbourhood.

Fig. 199. Urban Rule: Building Setback.

Fig. 200. Maximum 1:1 building height to street width ratio

Fig. 201. Minimum 1:4 building height to street width ratio
InTeRSeCTion AT-A-GLAnce

To maintain visibility and flow of traffic at intersections, there is no parking within 36m of a signalized intersection, and within 9m of a non-signalized intersection. In order to maximize space for people, this flex parking compresses where needed to allow the cycle lanes and pedestrian walkways to be maintained. Parking spaces can be given back to the green boulevard if not required or desired in a given area.

REMOVABLE BOLLARDS

Downtown Kitchener uses custom removable bollards to accommodate events and festivals. The bollards - freestanding, removable posts that delineate on-street parking spaces - are used to close the street to traffic or to convert on-street parking spaces into areas for outdoor cafes, patios and restaurant seating.

"Under the seeming disorder of the old city, wherever the old city is working successfully, is a marvellous order for maintaining the safety of the streets and the freedom of the city. It is a complex order. Its essence is intricacy of sidewalk use, bringing with it a constant succession of eyes. This order is all composed of movement and change, and although it is not set, it is very carefully held in the net frame of the city and thrown in the dance — not to a simple-minded precision where each person kicks up at the same time, turning to sense and bowing off in moves, but to an intricate ballet in which the individual dancers and amoeba-like, illogical, but organic parts which miraculously reinforce each other and compose an orderly whole. The ballet of the good city sidewalk never repeats itself from place to place, and in any one place is always replete with new improvisations."

— Jane Jacobs

The Death and Life of Great American Cities

Fig. 202. Left: Intersection At-A-Glance, at a typical LRT stop. Section View.

Fig. 203. Intersection At-A-Glance, at a typical LRT stop. Plan View.
The Protected Intersection

To encourage green transportation in the urban environment, cycling, walking and transit must become safe and convenient alternatives to private vehicular transportation. Modeled after the Dutch Intersection, the protected intersection creates a safe environment for the cyclist.

In this design, the refuge islands are replaced with raised planters, detailed in subsequent pages.

Advantages
Cyclists must yield to pedestrians in this situation, but are moving at a reduced speed to motorists. There is also enough room on the sidewalk and cycle lane for safe negotiation of space to occur.

The crossing distance is greatly reduced in the protected intersection, decreasing the amount of time that pedestrians and cyclists need to be in the road.

Difficulties
The creation of an obstacle at the intersection creates an element of difficulty for snowplows and large vehicles making turns. The radius is adequate for large vehicles, but as the reduced radius is intended to reduce speed and add safety for pedestrians and cyclists, motorists may need to yield to large vehicles rounding the corner. Signage at intersections can indicate the stipulation. Large transport trucks are already deterred from driving on the LRT corridor, due to the skewed dimensions of most streets with the addition of the dedicated light rail lanes.

Fig. 204. Protected Intersection Diagram showing cyclist and pedestrian crossing, as well as refuge island.

Fig. 205. Protected Intersection Diagram showing cyclist and pedestrian crossing, as well as refuge island.

Fig. 206. Protected Intersection image showing cyclist and pedestrian crossing, as well as refuge island.

Fig. 207. Intersection At-A-Glance: Radii and Raised Planters.

Minimizing the curb radii will reduce motorist speed and shorten the crossing distance for pedestrians. Fig. 209 shows the 500 King Street will take approximately 20 seconds for an average pedestrian to cross the corridor as pictured adjacent. The tighter turning radii are designed to reduce the crossing distance for both pedestrians and cyclists.

Raised Planters
The space gained by extending the curb is ideal for raised planters to act as a safety buffer between the vehicular traffic on the street, and the pedestrian and cyclist on the boulevard. Planters can be strategically placed elsewhere along the corridor to separate motorways from cyclists and other users while still obstructing visibility.
Fig. 208. Right. Protected cycle lane in Seville, Spain.

Fig. 209. Right. Protected cycle lane in Seville, Spain.

Fig. 210. Protected cycle lane in Essen, Germany.

VISSIBILITY
at a typical lrt stop

Fig. 211. Intersection At-A-Glance: Cone of Visibility.
Fig. 212. Kings Tower at 812 King Street South, across from the Grand River Hospital. There is a great deal of unused space surrounding the tower, which could be used in part of a renewed podium coming out to meet the street, and a renovated and re-skinned building to update the energy efficiency of the building.

Fig. 213. Towers in the park adjacent to Fairview Mall in Kitchener. The only amenity local to this neighbourhood is Fairview Mall, which only provides big box retail stores. This scenario is better than some, where the towers are surrounded only by other homes.

Fig. 214. Towers North of Mount Hope Cemetery in Kitchener. Surrounded by large parking lots and single detached homes, it would be a minimum 15 minute walk from the lobby of one of these towers to any sort of public amenity or retail establishment. This makes transportation difficult for local apartment dwellers to have access to daily amenities without the use of a car, or very frequent and reliable public transit. With many apartment buildings charging a monthly fee for parking on-site, this adds a level of expense to a housing option that many people seek for its level of affordability.

There are many older apartment buildings constructed in the 1960s and 70s in the Tricities that have been designed as a tower in the park scenario. Due to their age, the buildings are not at the end of their life, nor do they exist in their prime. They all have aging envelopes and mechanical systems, which make them wasteful from an energy standpoint.

They also lack public space at the ground level, much like some of the new towers constructed near the Universities. This leaves a large concentration of people living on a block, with no close access to amenities, surrounded by suburban homes. Due to the large area of many of the sites, redesign work can be done to ensure a renewed energy efficient and community-oriented reality for these buildings. According to Toronto’s Tower Renewal Plan, environmental building and site upgrades could be done to ensure a renewed energy efficient and community-oriented reality for these buildings.

Follows Toronto’s Community Initiative Program for improving these concrete apartment towers with funding from the Federal Government and assistance by the Municipality. Tower Renewal, which includes a building upgrade, community reinvestment and greening incentives programme, will bring social and economic benefit to the city. Together, the University of Toronto and ERA are heading up the project, stating three main principles in their goal of tower renewal:

1. Achieving significant reductions in greenhouse gas emissions in the Toronto region through ‘green’ investment into high-rise concrete residential buildings such as the thermal over-cladding, adding energy saving and renewable features to their site such as solar panels and wind farms, and providing access to public transit and other amenities to the city.

2. Creating ‘complete communities’ within inner suburban high-rise apartment neighborhoods, with the full range of community services and amenities, opportunities for employment and entrepreneurship, and reducing the social and cultural isolation of people living in high-rise towers.

3. Further developing world-class Canadian industries dedicated to high-quality building retrofits, sustainable development, and community design.

Like Toronto, the heritage of inner-suburban modern towers gives the Tricities the unique position to benefit from the environmental and community aspects of tower renovation. Tower Renewal is a key strategy in achieving green urbanism in Waterloo Region, while reducing waste from new construction, and maintaining an invaluable housing resource throughout Southern Ontario.
Davis repurposes the biological idea of an ecotone as a “place of overlap between two ecological systems” in reference to the city, and shop/houses is created when functions, programme, businesses or neighbourhoods meet.” This concept is very similar to Nan Ellen’s integral urbanism.

The ground floor of a Roman family’s Palazzo was often filled with shops on the periphery that contributed greatly to the street’s and morphological complexity of the block. The buildings featured a more private interior courtyard.

Davis describes how shop/houses are often set far back from the street, creating a useful in their adaption of the space, there leaves ample opportunity for this sort of architecture. Although not necessarily vital for a shop owner to live above their business, there is something to be said about creating a diverse neighborhood programmatically, socially and economically. If there is enough diversity in a neighborhood, it is argued that a community can withstand change in demographic, use and ownership without becoming derelict. A mixing of classes in a neighborhood can also suggest that there is no stigma with this intermingling, as demonstrated historically in cities such as Pompeii.

The location of shop/houses are dependent on foot traffic and the fabric of the street network / blocks, so are often best suited for a commercial street, near a major residential area, or in the bulb area between the two. The Middendorf area has ample opportunity for this sort of architecture, as an infill tactic, or as a means to introduce and old residential neighborhoods. There is a current trend of historic single-family homes being used for medical offices in the Middendorf area, with the office taking up the entire building, or rental apartments above the office on the ground floor. Although useful in their adaptation of the space, there leaves a question of site density in these areas, as they have a suburban density in an urban area, and are often set far back from the street, creating an oxvac and loose connection. When there is insufficient call for a higher density, apartments, or a secondary building programme can be built on upper floors to add more concentration to the site, and have the ability to compete with other dense developments.

Separation of family + business
Davis notes the birth of zoning bylaws and separations of use through Le Corbusier’s designation and promotion of the functionally zoned city, leading to strict land-use planning, class separation and the discouragement of the shop/house. The forces contributing to the separation of family and business include:

1. The “domestic ideal” and desire of the rising middle class to live in exclusively residential districts.
2. The decline of the apprenticeship system, which made shop apprentices into shop workers, and put them out of the houses of their masters.
3. The increase in size of shops.
4. The growing idea of the shop as a specially designed environment to promote the most effective marketing and display of goods, replacing the generic front room of the house.
5. The need for marketing that was occasioned by the apprenticeship system.
6. The rise of “shopping” as a leisure activity, the forces of the middle and upper classes, that began to demand exclusive districts dedicated to that activity alone.

The Fabric of Everyday Life
Living Over The Store details a socio-economic idea exhibited in a wide range of building typologies that combine residential and commercial uses in history and their application in present day city life. Davis writes of the difficulty that local building codes, zoning bylaws and lending policies have created for living an integrated life, for there is limited ability to live and work in the same place, if that is a person’s chosen lifestyle. Davis describes his book as a recreation of Jane Jacobs argument in favour of urban diversity in her Greenwich Village neighborhood as described in The Death and Life of Great American Cities, where many shop owners lived over their businesses. Although not necessarily vital for a shop owner to live above their store, there is something to be said about creating a diverse neighborhood programmatically, socially and economically. If there is enough diversity in a neighborhood, it is argued that a community can withstand change in demographic, use and ownership without becoming derelict. A mixing of classes in a neighborhood can also suggest that there is no stigma with this intermingling, demonstrated historically in cities such as Pompeii.

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SePARATION OF FAMILY + BUSINESS
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6. The rise of “shopping” as a leisure activity, the forces of the middle and upper classes, that began to demand exclusive districts dedicated to that activity alone.
According to Davis, there are varying degrees to which the shop and house can be connected and interwoven, which vary by culture and individual. For this, it is difficult to design a set of patterns or rules for the design of shop/house functions. Howards instead devised a set of attributes to consider when designing a shop/house:

1. Housing is more specifically designed than commercial space—sometimes resulting in challenges with respect to building configuration and structure.
2. Buildings or units have narrow frontages, with direct connection to the street or public realm.
3. On the commercial street, the shopfront takes precedence over the residential door and circulation—although there is a need for a balance between dwelling and commercial activity.
4. There are varying and fluid relationships between shops and dwellings, that often need to balance the desire for work and dwelling to be intertwined, and the ability to get away from work.
5. The kitchen is often located between the shop and dwelling, or a place easily accessible to both.
6. The façade expresses both the openness of the shop and the privacy of the dwelling—while also being unified as an architectural composition.

"A local economy that includes shop/houses supports interchange that recycles money within the community. If the building is architecturally flexible, it supports the building’s ability to produce income during the entire life cycle of a family, allowing the family to stay in the neighbourhood. These economic ideas are a foundation for the relative stability of neighborhoods."

"A city street equipped to handle strangers, and to make a safety asset, in itself, our of the presence of strangers, as the streets of successful city neighbourhoods always do, must have three main qualities:

First, there must be a clear demarcation between what is public space and what is private space. Public and private spaces cannot mix into each other as they do typically in suburban settings or in projects.

Second, there must be eyes on the street, eyes belonging to those we might call the natural proprietors of the street. The buildings on a street should be shaded by such eyes, and the eyes belong to those who live in the buildings. If the buildings are not equipped to handle strangers and to make safety an asset, they cannot turn their backs on the street. If they do turn their backs on the street, they cannot turn their backs on their streets.

And third, the sidewalk must have users on it—users both to add to the number of effective eyes on the street and to induce the people in buildings along the street to watch the sidewalks in sufficient numbers. Nobody enjoys sitting on a stoop or looking out a window at an empty street. Almost nobody does such a thing. Large numbers of people entertain themselves, off and on, by watching street activity."

— Jane Jacobs, The Death and Life of Great American Cities

"A major issue with the Waterloo Region at present is the lack of amenities available to those who want to live in an urban environment. For decades, local development has been focused around the outskirts and the creation of new neighbourhoods on the outskirts. In recent years there has been a surge of development around the University I have created a database of local amenities to begin to recognize areas for opportunity and growth along the ION transit corridor. This database has shown clear indications of holes in local amenities along the ION corridor, particularly in the more industrial areas and along King Street near the Grand River Hospital. In the case of Grand River Hospital, there is a clear link between the lack of amenities and the level of safety in the adjacent neighbourhoods. This has always been seen as a rough area, and is shown very clearly through our cartographic analysis."
NEIGHBOURHOOD SAFETY

“We will work with community partners to create complete, connected, safe and walkable neighborhoods with a range of housing options. We will encourage people to come together, interact with one another and build relationships through inclusive programs, services, events and great public gathering places. To achieve this, we will:

3.1 Give citizens the tools and opportunities to play an active leadership role in creating great neighborhoods and fostering a stronger sense of community belonging.

3.2 Create safer streets in our neighborhoods through new approaches to traffic calming.

3.3 Manage growth, limit urban sprawl, and foster more mixed-use development, ensuring new development is integrated with the density and character of the surrounding community.

3.4 Facilitate and promote housing developments that provide options for a diversity of lifestyles and household types.

3.5 Within the emerging corridor, existing undeveloped mixed-use public spaces are defined with the provisions of new recreational opportunities in underserved areas.

3.6 Provide opportunities and support for citizens to lead the way to creating active and vibrant public places that promote people’s health, happiness and well-being by capitalizing on local community assets such as community centers, pools, arenas, libraries, parks, trails and other public spaces. Actions that the City of Kitchener will take to make progress in the areas include, but are not limited to: implement a framework to guide and support citizen initiatives in creating neighborhood active public places; expand the community gardens program; expand the city’s public art program with a specific focus on neighborhoods.”

- Strategic Priorities and Strategies for 2015-2018, Kitchener’s Strategic Plan

To help create a safe and thriving neighborhood, entries should be well-lit and visible from the street so there is always a factor of safety. There should also be controlled entry from public to private areas of mid-rise buildings. There should be no winding exterior lobby spaces or dimly lit alcoves where someone could conceivably hide from view.

In addition to views to and from the street, commercial space on the ground floor with varying operational hours adds to the safety of the area. If shops and restaurants extend hours into the early evening, with bars and venues picking up later at night, there is only a small window when businesses are closed before things open again in the morning. The odd 24-hour coffee shop diner or hotel lobby could add traffic at all hours.

The City of Kitchener has a Strategic Plan in place for neighborhood safety, as listed on the opposite page.

Fig. 222. Urban Rule: Views to and from Street

Fig. 220. Exterior view of the 138 unit residential building called Midtown Lofts on King Street South and Louisa Street.

Fig. 221. 1 Victoria Development features ground floor retail and commercial space, and generous and windows for views to the street.

Fig. 223. 1 Victoria Development features ground floor retail and commercial space, and generous and windows for views to the street.
Re-Thinking A Lot

EB

sanitation infrastructure provisions.” (8)

conventional requirements such as fire safety and

legally binding element of development, as have more

parking problem. Parking thus became a perpetual,

property owners contribute to solving the on-street

control, it was seen as the easiest way to directly make

minted instrument of urban planning and development

Suggestions for off-street parking standards as part of

requirements are typically tied to zoning regulations.

required by law or by need. In the United States, parking

space. This space will have to be provided whether it is

“As long as cars exist, they will continue to occupy

parking lot into the twenty-first century.

been rethought for decades. Ben-Joseph pushes the

describing parking lots as,

explaining that their design and function has not

landscaped with trees and flowers and beautifully

served beyond parking, and shows examples that are

something more than car storage. Designed by

Michael Van Valkenburgh, the Herman Miller lot

was one of only a few to win a design award. Ben-

Joseph argues that the purposeful design of parking

lots could be significant public places, contributing as

much to their communities as great boulevards

and parks. He provides purposes that lots have

served beyond parking, and showcases examples that

are landscaped with trees and flowers and beautifully

integrated within the built environment. For all the

land they cover, it is curious that something that

is an element so much a part of urban fabric is paid

such little design attention.

Through many case study examples, such as the

Herman Miller furniture plant in Georgia, Ben-

Joseph demonstrates that parking lots can be

minimized to accommodate the incorporation of

protected bike lanes, and a double treed boulevard

populate the possibly unsafe parking garages which

can be dead zones late at night.

In an effort to maximize the walkability of King Street, parking will be

protected in Kitchener’s King Street Reconstruction, by IBI

Group in 2010, where its flexibility, use of paving material and integrated tree planters create an

expansion of the sidewalk and overall streetscape (shown in photo on bottom left). Street parking

along the LRT corridor should be metered, using San Francisco’s pilot model of smart pricing as a

prototype for parking in the urban cores in Waterloo Region.

The provision of parking is still necessary in Waterloo Region, although less effective when the

surfaces parking lots consumes the built fabric. Parking can be retooled from expansive

surfaces lots to flexible street parking and parking garages, with design tactics that are effective for

transitional use, when cars are not a primary mode of transportation. In an effort to maximize the

walkability of King Street, parking will be minimized to accommodate the incorporation of

protected bike lanes, and a double treed boulevard on either side of the street. The following

parking techniques

parking

PARKING

There are many areas in the Downtown cores of the

Titicaca where underground parking garages are not a possibility from a water table standpoint. There are many underground springs and creeks that make multilevel underground parking difficult and expensive from a groundwater standpoint. For this, there is a precedent of on-grade garages. The garage at Grand River Hospital bordering on King Street is an example of this, which leaves a sliver zone on King with no groundwater public space. Garages can be designed so they have proper egress heights to have part of the building act as storefront, or moved to have part of the building act as storefront, or renovated into a public building when parking is low of a priority. Buildings should have ground floor public programming at the street to maintain a continuous walkable neighborhood and help populate the possibly shrink parking garages which can be dead zones later at night.

PARKING GARAGE

Many surface parking must remain, previous parking should be used, and the parking lot should be equipped for special activities, of food trucks when not in use. They should also be shared between uses, especially for a school yard uses a lot throughout the week, and that lot is used for paid parking on weekends. The same can be done with offices uses and cultural programming. There is no need to every building occupancy to design their parking at the same time, and some of the few years that more parking is required.

SURFACE PARKING

PARKING

[4 http://rethinkingalot.net/#!/page_About]
PREFACE: SF PARKING PILOT

The San Francisco Municipal Transportation Agency (SFMTA) carried out a parking pilot, known as SFpark, to assess the parking in the downtown core of the city starting in 2008.

The idea behind knowing what sort of parking is available at a certain rate allows people the choice ahead of time whether to drive, take public transit, bike, or walk. If there is no parking available nearby a destination, a person may choose to walk if they are within reasonable distance of their destination without getting in their car.

“SFpark works by using smart pricing so that drivers can quickly find open spaces. To help achieve the right level of parking availability, SFpark periodically adjusts meter and garage pricing up and down to match demand. Demand-responsive pricing encourages drivers to park in underused areas, and garage occupancy rates are to local landmarks, busy areas and events. In order to optimize traffic flow, minimum cars circling the block in search of parking and decrease the associated emissions. SFpark has determined that contrast parking should remain a maximum of 80% full at any given time, and affordability is adjusted to produce this occupation. On a street that is very busy (shown in red in the adjacent diagram), the parking rate is increased in order to keep it at 80% occupied, and on a quiet street (shown in yellow in the adjacent diagram), the parking rate is decreased until some of the spaces are occupied. If drivers are seeking more affordable parking options, they may have to do some walking to reach their destination. A parking app similar to that of the Green P system in Toronto should be instated to provide options for drivers regarding location, pricing, and whether the parking is on, above or below ground.”

The SFpark pilot uses demand-responsive pricing to adjust pricing on streets based on how close they are to local landmarks, busy areas and events. In order to optimize traffic flow, minimum cars circling the block in search of parking and decrease the associated emissions. SFpark has determined that contrast parking should remain a maximum of 80% full at any given time, and affordability is adjusted to produce this occupation. On a street that is very busy (shown in red in the adjacent diagram), the parking rate is increased in order to keep it at 80% occupied, and on a quiet street (shown in yellow in the adjacent diagram), the parking rate is decreased until some of the spaces are occupied. If drivers are seeking more affordable parking options, they may have to do some walking to reach their destination. A parking app similar to that of the Green P system in Toronto should be instated to provide options for drivers regarding location, pricing, and whether the parking is on, above or below ground.

Research from the pilot suggests that for a street with 80% occupied street (shown in red in the adjacent diagram), the parking rate is increased in order to keep it at 80% occupied, and on a quiet street (shown in yellow in the adjacent diagram), the parking rate is decreased until some of the spaces are occupied. If drivers are seeking more affordable parking options, they may have to do some walking to reach their destination. A parking app similar to that of the Green P system in Toronto should be instated to provide options for drivers regarding location, pricing, and whether the parking is on, above or below ground.

To assure users that the pilot can be a successful model for urban parking, all of the profits from SFpark are put into a separate fund that contributes to the creation of neighborhood and street amenities in that area. Therefore, money from both locals and visitors parking in a specific neighborhood go directly back to planting trees, improving parks and other design elements that are specific to that particular neighborhood needed and desired.

This would not only create a source of revenue for the City to maintain the roads and sidewalks, adding to its neighborhood’s public space, but would eliminate free handouts parking on the streets. Employees of local businesses should have limited access to free parking to encourage use of local transit systems, alternative transportation or carpooling.

WITOUT SFPARK

Without a system like SFpark, neighborhoods became more polluted due to circling traffic emissions from idling vehicles whose drivers have left their vehicle turned on in a no parking zone while running an errand. There is more congestion in the street while cars seek out a place to park. These vehicles slow down public transit and get in the way of emergency vehicles. There are distracted drivers who are not always paying attention to pedestrians and cyclists while looking for a parking-space. There are more parking tickets issued to drivers who exceed the typical two hour parking limit, or have misinterpreted the confusing stipulations on a parking sign.

"IT'S ESTIMATED CLOSE TO A THIRD OF CITY TRAFFIC IS CAUSED BY DRIVERS CIRCLING WHILE LOOKING FOR A [PARKING] SPACE. SOME DRIVERS JUST GIVE UP AND DOUBLE PARK, CLOGGING [THE] STREETS."
"The distinction between car spaces and people spaces breaks down, acknowledging that cars are people spaces (because people drive them) and that we need not regulate them to leftover, neglected, separate places that ultimately tear the urban fabric to shreds."

A series of steps take place from the time a driver is looking for a parking space to the time they complete their trip.

**Program helps to inform users when is the best time and the best way to visit busy areas, perhaps causing them to adjust their travel plans to suit using a computer or smartphone app.**

**CHECK THE APP**

If it is too late to plan ahead, participants may use the smartphone app to check for available parking spots in an area of interest, all while retrieving information about pricing and proximity to nearby landmarks, similar to the Green P App for Toronto.

**PRICING ADJUSTMENT**

Base on the information received from the parking sensors, prices are adjusted up or down to meet the needs of the neighborhood and keep the given street an approximate maximum 80% occupied. Pricing is adjusted once per month, never by more than fifty cents per hour per month.

**PAY FOR PARKING**

Using a smartphone or incrementally spaced parking meters, the user may pay for parking via license plate if using a smartphone, or dashboard ticket if using the kiosk. If someone is unwilling to pay a higher rate for parking close to a busy place or event, they are able to park further away and walk to their destination at a lesser rate.

**LEAVE OR FEED METER**

If blocks are an average of 80% occupied, and there is a balance of space readily available, the model is a success. Finalize create shift in perception of an acceptable distance from parking space to destination.

**DATA ANALYSIS**

Parking data is harvested and analyzed using the sensor in the parking space to assess which areas receive more use, where rates can be adjusted and for what length of time spaces are being occupied.

**SENSORED PARKING SPACE**

Each parking space contains a sensor in the centre of the spot to determine when a parking space is occupied, eliminating it from the list of available spots.

**A user may continue to occupy a parking space for a longer period of time than initially planned, if they pay for more parking time, rather than the typical 30 minute or two hour parking limits that discourage shopping around, or multiple visits to an area per day.**

**EXPAND IMPLEMENTATION**

The model leads to heightened safety in neighborhoods, adding more ongoing pedestrian and vehicular traffic. After the system is working and successful in these downtown scenarios, the parking system can expand to growing urban areas to encourage infill, use of green transportation and reduce traffic.

**Profit to Neighbourhood**

Points from the WRpark program would go back to the local neighbourhoods, for money to be allocated for community gardens, trees, park equipment, seating, or whatever the neighborhood association deems a positive addition.

**Fig. 228. Urban Rule: WRpark**

Nan Ellin. 49.
MAxiMuM PARKinG

As it stands, parking is an issue of zoning bylaws, where parking minimums are established for sites based on the zone in which they are grouped. This is impractical as a tactic for site design, as the number of parking spaces is often based on the square footage of a building in the case of large assembly occupancies, parking lots are enormous and largely unoccupied save for special events and days surrounding holiday shopping. Due to the costly nature of constructing parking garages, it could be appealing for developers to have the option of sharing parking with neighboring sites. Developers have control over the real estate market – unused spaces in condos can be shared with other businesses, for example, daytime office parking and nighttime resident parking. If parking needs are significantly downsized, parking stalls in garages could be converted to storage for owners/renters.

ON-STREET PARKING

Although a measure taken for saving space on an already constrained right of way, the King Street redevelopment utilizes a flex parking method for on-street parking in the hopes of getting the best of both worlds – enhanced public space and easy access to short-term parking. Parking spaces are standard dimensions, but with the possibility of using parking for uses other than car storage.

REMOVABLE BOllARDS

Downtown Kitchener uses custom removable bollards to accommodate events and festivals. The bollards, freestanding, removable posts that delineate on-street parking spaces, are used to close off the street to traffic or to convert on-street parking spaces into areas for outdoor cafes, patios and restaurant seating.

FLEX PARKing SYSTEM

Flex parking for Midtown allows parking to become an element of public space, and totally transitional for future use. If there comes a time when parking is not necessary on King Street, the provision for parking can easily be given back to the sidewalk, and filled with landscaping, parkettes or patio space.

Fig. 229. Right: Urban Rule: Maximum Parking

Fig. 230. Removable bollards positioned to the street side of parking spaces to convert portions of street from parked cars. This can be done if businesses would like space for outdoor events or increased foot traffic. This bike parking is modelled on site.

Fig. 231. Food truck festival in Halifax, Nova Scotia. In this scenario, the parking lot has been transformed for a special event and used as a large, open public space for a weekend. Odds are, the parking lot would have been sitting majorly empty for that particular time. Temporary occupations of a parking lot can bring a variety of diverse events to an otherwise monotonous space.

Fig. 232. Restaurants and commercial spaces in Montreal are taking over some of the on-street parking spaces for highly designed parkettes. Although a parking space seems to be a small area, there is greater than 15 square metres to work with, enough for a collection of tables, lounge furniture or a pocket garden, as a few examples.
Fig. 233: A group of friends gathers for drinks on a patio attached to Rhapsody Barrel Bar downtown Kitchener.

Fig. 234: A patio occupying parking space in Downtown Kitchener in late summer 2016. The patio does not impede the sidewalk, but adds seating space for the restaurant, and the opportunity for customers to enjoy outdoor dining.

Fig. 235: Parking spaces can be used in their original intent to park vehicles if a storefront has no need for a patio or outdoor public space. This is especially convenient if customers require short-term parking.

PARKING AS PARKING
Parking spaces can be used in their original intent to park vehicles if a storefront has no need for a patio or outdoor public space. This is especially convenient if customers require short-term parking.

PARKING AS PATIO
If a business would like space for patio tables, outdoor seating, exhibit space or special furnishings, bollards can be relocated to prohibit parking in this space. Applications for funding can be received by the selfPark Pilot.

PARKING AS BIKE STORAGE
The City can allocate a parking space for bike parking when desirable. This could be especially important near transit stops, cultural venues and important landmarks.

FLEX SPACE
Flex space in front of retail and commercial space should be capitalized on, and used as an extension of indoor space. For at least six months of the year, this space can be used as additional public space, contributing to the neighborhood street life. Bollards can also be removed completely for events and street festivals such as Kitchener Blues Festival, or a parade.

1. PARKING AS PARKING
2. PARKING AS PATIO
3. PARKING AS BIKE STORAGE

The City can allocate a parking space for bike parking when desirable. This could be especially important near transit stops, cultural venues and important landmarks.
COMPONENTS OF PARKING

1. REMOVABLE BOLLARDS
   - Fig. 236: Bollards can be moved with special tools by city workers. Redesign of the bollards themselves could be considered if advised by the workers who work with them.

2. SPACE OPEN FOR PARKING
   - Fig. 237: When the bollards are positioned to the far side of a parking space, that area is considered open for parking. When blocks of parking spaces are available, the bollards line the perimeter of a set of spaces.

3. SPACE CLOSED FOR PARKING
   - Fig. 238: When the bollards are positioned to the curb side of a parking space, that area is considered closed for parking.

Fig. 239: Intersection At-A-Glance: Flex Parking

To maintain safety and flow of traffic at intersections, there is no parking within 3m of a traveled intersection and when one of a crosswalk forms an intersection, in order to maximize space for people, the fine parking spaces where needed to allow the cycle lane and pedestrian pathways to be maintained. Parking spaces can be given back to the green zone if not required or desired in a given area.
LANDSCAPED SPACE

...city of Kitchener urban design elements as a precedent

Flex space and additional space on the street should be used to maximize landscape elements, adding foliage to the urban environment. According to the City of Kitchener, "Landscaped Area" means any portion of a lot which:

i) has no building thereon;
ii) is not used for parking, access to parking, driveways or loading space;
iii) is not less than 28 square metres; and,
iv) is used for the purpose of landscaping.

(By-law 94-1, S.5[g])

TREE PROTECTION

It is unknown if the tree guards around the trees in Downtown Kitchener are installed as a measure to protect the street trees while they are small, and will be removed in the coming years as the trees mature. Tree guards should be eliminated, for they inhibit trunk growth and have a habit of trapping garbage. They also damage tree bark when trees sway in the wind, causing scarring. If a guard is necessary to use, it should be temporary and be removed from mature tree. A better option would be to provide 18-24” base around tree to avoid tripping hazard, but protect from cars, pedestrians and bikes. do not attach anything to tree - strings of lights, flood lighting, etc.

ANNUAL PLANTINGS

Local businesses or horticultural groups could have the chance to ‘adopt’ planters to fill with annual plantings on a seasonal basis. Adding colour and variety to the street, planters can also act as a divider or to indicate that a given area is not to be used for parking.

Fig. 240. Above. Movable planter in a closed parking space on King Street.

Fig. 241. Above. Raised planter for trees and plantings with perimeter benching and podium. This type of planter provides additional soil and protection for the tree.

Fig. 242. Below. Tree guards on small saplings Downtown Kitchener. There is not sufficient room for the rootball and tree to grow.

Fig. 243. Above. Silva Cell Planting System.

Fig. 244. Below. Street lighting in Downtown Kitchener.

The City of Kitchener specifies the use of a Silva Cell System to support the growth of the urban forest. Attached in the appendix are specifications of trees that work well in an urban setting. Making space for roots through connected soil volumes in trees, the tree system allows for the growth of larger trees, and if the soil conditions are healthy, will act as the root’s natural growth locations and interfere with pavement at grade. The integrated use of soil cell systems in combination with open planters disputes the frequent use of tree coffins in the urban realm, where only the trunk is exposed. This causes uneven heating in pavement, and can often kill off trees where there is not enough room for the trunk to grow.

Ample street lighting is important in the urban environment to promote street safety, proper visibility, and ambiance. Downtown Kitchener uses a combination of light features, which together illuminate the ends of planters and benches. It has been noted that the light from the currently tall standards does not travel in a large cone. Lights should be spaced every 15 metres to provide adequate illumination of the street. In the design for Midtown, the lights have been rotated by 90 degrees to help illuminate the cycle path to one side, and the pedestrian sidewalk to the other.

Fig. 245. Above. Street lighting in Downtown Kitchener. The integration of lighting in planting beds heightens the sidewalk and provides ambience.

Fig. 246. Above. Street lighting in Downtown Kitchener.
Keep mature trees, providing adequate undisturbed root space, and replant / replace if necessary with a local mix of species. Establish guidelines for street trees and site planting as a tool for designers, developers and property owners.

Avoid cutting trees, but replant if necessary.

**Fig. 247. Urban Rule: Tree Preservation**
Fig. 248. Map of urban street trees in Kitchener and Waterloo. Data unavailable for Cambridge and Townships.

**Urban Tree Atlas**

**Waterloo** Hardiness Zone 5B
**Kitchener** Hardiness Zone 5B
**Cambridge** Hardiness Zone 6A

**PLANTING REQUIREMENTS**
- ≥2 TREES PER CONTAINER
- REQUIRES 20m
- MIN. 1m SOIL DEPTH

**SUN REQUIREMENTS**
- POLLINATOR
- FRUIT-BEARING
- S ONTARIO NATIVE
- SALT TOLERANT
- DROUGHT TOLERANT

**REQUIREMENTS FOR SOIL / TREE**
- ≥2 TREES PER CONTAINER
- SOIL / TREE
- MIN. 1m SOIL DEPTH

**RULES FOR OPTIMAL GROWTH**
- Fertilize only when there are low levels of essential elements in the soil
- Proper soil depth allows roots to grow deeper
- 20% species diversity will avoid insect infestation / disease and maintain soil health
- Monocultures should be avoided in large areas, as to avoid disease and insect infestation. Having a 20% species diversity will avoid this, as well as maintaining a healthy soil balance.

**SANTAMOUR’S FORMULA FOR TREE DIVERSITY**
Frank Santamour created a diversity for species, creating a theoretical minimum of 12 species of trees for a given urban environment.
- No more than 10% from any one species
- No more than 20% from any one genus
- No more than 30% from any one family

**BENEFITS OF THE URBAN FOREST**
- Canopy shade reduces urban temperatures
- Improve environmental performance of buildings by reducing heating and cooling costs
- Reduce wind speeds and create shelter
- Provide food and shelter for wildlife
- Improve polluted soil
- Remove dust and particulates from air
- Reduce effects of flooding by slowing the rate at which rainfall reaches the ground
- Increase property values
- Mature landscapes with trees can be worth more as development sites
- Can improve the health of local populations
- Provide a long term renewable energy source

**SANTAMOUR’S FORMULA**
Frank Santamour created a theory for species diversity, creating a theoretical minimum of 12 species of trees for a given urban environment.
- No more than 10% from any one species
- No more than 20% from any one genus
- No more than 30% from any one family

This is a greater diversity than is found in most cities.
Please review some reflected sunlight off adjacent buildings, but still need direct sunlight if they are not a shade planting.

Trees can be planted in a variety of environments, but it is important to select the proper species for the area in which it is being planted. Similar to any other plant, categories of sites for trees include:

+ Full Sun
+ Part Shade
+ Shade

Species in the Appendix provide information on sun requirements for potential urban trees.

**Pollinator**

<table>
<thead>
<tr>
<th>Tree Species</th>
<th>Sun Requirement</th>
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<tbody>
<tr>
<td>Bee-flower</td>
<td>Partial Sun</td>
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<tr>
<td>Butterfly weed</td>
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<tr>
<td>Honey locust</td>
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<tr>
<td>Mountain laurel</td>
<td>Partial Sun</td>
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<tr>
<td>Wild geranium</td>
<td>Part Shade</td>
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</tbody>
</table>

**Salt Tolerant**

Soil accumulates large volumes of salt from winter de-icing that can be toxic to soil and a plant's ability to move water into its roots, causing drought-like symptoms for the plant. Salt damage can be severe if there is not sufficient early spring rainfall, or there is a late season ice storm. 

- Use a less harmful de-icing product
- Raise planting site, block off trees from road with a barrier or small curb can help to avoid damage.
- Water the tree and keep it hydrated while it is establishing roots.

**Drought Tolerant**

- The ability to collect rainwater before it runs into storm sewers will also help plants get as much water as possible. Species in the Appendix provide information on drought requirements for potential urban trees.

**SUN REQUIREMENTS**

Please review some reflected sunlight off adjacent buildings, but still need direct sunlight if they are not a shade planting.

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**Drought Tolerant**

- The ability to collect rainwater before it runs into storm sewers will also help plants get as much water as possible. Species in the Appendix provide information on drought requirements for potential urban trees.

**FRUIT-BEARING**

Fruit-bearing trees provide food for people and wildlife. Fruit trees are an alternative to small trees, as a way to create food for the community and their ornamental beauty when flowering and changing through the growing seasons. Cities throughout North America, including Toronto are developing urban foraging organizations for those who are interested in learning about the advantages of urban gardening. This is especially important as food prices continue to rise, making healthy eating less affordable. When choosing fruit tree species to plant in urban areas, it is recommended to grow full-size fruit as they are more drought tolerant and can survive with less maintenance than their dwarf counterparts.

**TREE ORIGIN**

Tree species native to Waterloo Region are recommended, as it is more likely that they are compatible with local soil types, and cohabit with other local plant species. Trees and plants that are not native have a higher likelihood of creating an invasive environment.

The best selection of species may vary throughout the Region, with the different climatic zones.
PERVIOUS SITE MATERIALS

Porous concrete
Porous concrete at light rain step avoids the daily need to remove free water. The sections of concrete are replaced along the city's sidewalks replacing with porous concrete. Even when slightly blocked, it has the ability to soak up water.

PLanted material
Some street planting grubs live longer opportunity for designing get into the void. A general layer of cement rich soil allows for some drought resistance to add as a barrier to the void.

Reflective paint
Reflective paint or equivalent applied to minimise or maximise visibility and safety during night time. This is a key separator it's particularly keen, more so in the intersection. Darker paint can be the result.

Unit pavers
The inclusion of unit pavers are flexible and allow for modification of the area when needed or damaged, and also allow some permeation of water. Through the addition of gravel to the pavers, edging, and edges, pavers can be linked to access services above the pathway.

Contrasting pavers
Contrasting unit pavers help to demarcate features on the street and sidewalk, for example, a line of contrasting pavers would run along the border where the sidewalk meets the cycle lane.

MAXIMIZING POROUSITY

Fig. 251. Urban Rule: Pervious Site Materials

STREET TREES - as a way to divide from traffic and green the neighbourhood - detail how trees become more than just tree coffins
The LRT in Waterloo Region operates on an isolated line with curbs on either side, with outside access limited to emergency and track maintenance vehicles. The limited traffic makes the ION corridor an excellent candidate for a green trackway. If green track were implemented along Stage 1 and 2 of the ION, this would add approximately 26 hectares of pervious landscape to the Region, otherwise occupied by a mix of asphalt and granite base.

**PRECEDENT**

Greening the tracks of the ION Corridor can help to reduce heat island effect, water mitigation and absorb sound in the urban environment. Few boulevards in the Region are maintained with an irrigation system. In the occasion of a drought, there is no need for the track to be watered, so long as it is planted with a drought resistant material to survive extended periods with little irrigation.

**MAINTENANCE**

The use of road salt is concern for planting materials in an urban context. Many plants and trees are not resistant to road salt damage due to their inability to tolerate large amounts of saline damage to their root systems. Environment Canada is in the process of creating new benchmarks for road salt reduction. The Region has its own salt management program in order to reduce the overall amount of salt that makes its way into waterways. The Region uses a mix of anti-icing salt, road salt and sand applications in addition to plowing for winter maintenance of roadways and sidewalks.

A study by engineers at Northeastern University finds that concrete will be made less durable as climate change persists. Increased CO2 in the atmosphere, acid rain, and changing temperatures all accelerate the process of environmental elements like chloride from salty water worming their way through concrete and causing the reinforcing steel inside to decay.16

16 http://www.fastcodesign.com/3062816/exposure/behind-the-scenes-at-americas-craziest-fan-con-
Waterloo Region sits atop the Waterloo Moraine - North America’s largest ground fed water system. Dealing with water mitigation is a step in the preservation of the water system. Minimizing modifications to natural site grade are steps toward preservation. Bioswales can be used as planted garden space and parkland to prevent water from going directly into storm sewers.

As per the City of Kitchener urban design, planting beds should feature passive irrigation in order to direct water from storm drainage, and provide water to plants for less maintenance by city workers.

OTHER CONSIDERATIONS

- The provision of organic mulch in planting beds - 2 to 3 inches - cushions soil from compaction, holds water, moderates soil temperature, provides organic matter to soil.17

- Do not plant shrubs or groundcover in rootball zone of tree

- Allow storm drainage access to soil volume that can divert salt ridden water in the winter

---

NOT JUST A ROOF

All roof surfaces should be constructed of green roof material or soft surfaces and serve as amenity space. All roofs should be mobile or accessible unless they are fully planted. There should be an effort to replace the lost ground plane with other types of greenspace.

GREEN ROOFS

Toronto is the first North American city to enact a green roof bylaw.18 It provides parameters, construction details and information on coverage. Where applicable, a surface will be covered by plant material and sedum, which are able to absorb the rainwater after heavy rain, but can also deal with lengthy dry periods. When they look out of their windows, neighbours will have a view of a variety of green and planted surfaces with a mix of communities.

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17 https://www.toronto.ca/legdocs/municpo-de/1184_492.pdf

18 Right. Urban Rule: Not Just A Roof
Fig. 264. A diagrammatic representation of what the City's impervious surfaces including roads, driveways, sidewalks and building roofs. The green indicates the lack of pervious surfaces that can absorb water and reduce heat island effect.

Fig. 265. A diagrammatic representation of how the impervious surfaces of the City could be reduced if roofs were made green. The green indicates a pervious surface that can absorb water and reduce heat island effect.
Details for a safe and happy green commute to include:

- Bike Storage
- Access to a shower via nearby gym membership, showers in building
- Change room where possible to change from outdoor/exercise clothing into work clothes
- Availability of drinking water
- Corporate transit passes
- Sufficient coat room for outerwear in heating seasons
- Change room where possible to change from outside/exercise clothing into work clothes
- Availability of drinking water
- Commercial/office units to have facilities for staff to shower / change (green commute)

Coolsingel is an effective precedent for Waterloo Region as a promenade regeneration project in Rotterdam. West 8 is restoring the allure of the 19th century boulevard which once existed in Rotterdam as part of the city’s ‘Binnenstad als City Lounge’ initiative, which translates to the City Center as a City Lounge. The new vision for the motorist-dominated boulevard will transform Coolsingel to a space for pedestrians and cyclists alike. The design envision manages traffic while simultaneously restoring cycling, pedestrian and public transport corridors, without disrupting existing urban structure. Three lanes of vehicular traffic will be situated east of the existing tram line, with a spacious two-way bicycle and pedestrian promenade on the West side. By retaining the existing tramway and underground infrastructure, emphasis can instead be placed on the quality and allure of the public realm, much like the curb-in urbanism approach of this thesis. The design includes details such as paving, furniture, decrowned sidewalk entry points, lighting and plantings.

The design creates a focus on the quality of the existing green space and combines it with a new high quality public space, perfect for a meeting place at all times of the day and season. The space is framed by a colonnade of trees, and speckled with terraces and comfortable seating zones.

http://www.west8.com/projects/revitalization_of_the_coolsingel/
and its ties to cycling.

particular attention to the role of infrastructure strategies for complex (inter)urban conditions with public space in the Netherlands and Belgium. Various experiments and design projects regarding urban planning. Stefan and Aglaée conduct Artgineering is an organization for research and development of safety of cycling in areas that are not dedicated lanes and trail networks underway all over. This culture is beginning to pick up in Canada, but there is still apprehension regarding the ease of access to cycle lanes and trail networks. Waterloo Region is on the way to embracing public cycling by implementing a bike share program, and greater access to cycle lanes throughout The Region, there is little attention paid to the importance of the protected cycle lane. As the population in Waterloo Region continues to grow, there will be more pressure on the arterial roads that connect the major communities along the corridor. Protected cycle lanes provide cyclists and motorists with safer travel, as they are separated for the majority of their commutes, with some exceptions of intersections. It is problematic that there is no consideration for incorporation of cycle tracks into the street design of the ION corridor. The effectiveness of separation from encroachment depends on the type of separator used:

1. A painted median with delineator posts is likely the least effective, because cars and small trucks can park between posts.

2. A higher barrier or planters completely prevent straddle it, cars and trucks can still park with two wheels on top of the median or curb. A concrete median, mountable curb or elevated planters are the most effective, because they are separated for the majority of their commutes, with some exceptions of intersections. It is problematic that there is no consideration for incorporation of cycle tracks into the street design of the ION corridor.

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Existing cycle lanes in Waterloo Region are indicated on this map. There are a variety of trail types, which have been categorized into shared cycle lane, cycle/multi-use trail and designated cycle lane. The number of multi-use and designated trails are increasing, however they still remain disconnected, and often completely isolated, short of creating an operational network.

Fig. 275. Map of existing cycle lanes in Waterloo Region.

Waterloo Region published a Regional Official Plan in 2010, to supplement and expand on The Ontario Government’s Places to Grow Act. As part of this plan, the Region created new goals for cycling infrastructure, replacing older trails with designated cycle lanes or wide multi-use trails. Other design features such as lighting, trail cycle network maps and additional bike parking/repair stations would add to the regional cycle infrastructure.

Fig. 276. Map of proposed cycle lanes in Waterloo Region.
**PROMINENT CYCLE TRAILS**

**Kissing Bridge Trail - 45km**
Woolnoth, Wellesley Townships
The Kissing Bridge Trail runs from Guelph to Millbank, running through rural communities along the right-of-way of a former railway.

**Iron Horse Trail - 5.5km**
Waterloo, Kitchener
The Iron Horse Trail runs between Erb Street West in Waterloo and Ottawa Street in Kitchener.

**Cambridge to Paris Rail Trail - 18km**
Cambridge, Glen Morris, Paris
Built on the old Lake Erie and Northern Railway, the trail follows the Grand River through Carolinian forest.

The above listed trails are all part of the Trans Canada Trail Network.

**The Walter Bean Grand River Trail - 78km**
Woolnoth to Cambridge
Follows the path of the Grand River, passing through parks and recreational areas, and features information about local history, flora and fauna.

**The Hydrocut - 25km**
Kitchener
Single track mountain bike trails in southeast Kitchener, with over 400 daily users.

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Fig. 277: Only a handful of the trails (cycling or otherwise) are maintained through the winter in Waterloo Region, making the Iron Horse Trail a popular winter commute route for local cyclists. The only problem is that the Iron Horse Trail ends before making a connection to another trail or dedicated cycle lane network.

Fig. 278: The Cykelslangen, or Cycle Snake is an elevated cycle path designed by Dissing and Weitling Architects for a busy pedestrian shopping area in Copenhagen. The path enables cyclists to pass through the area without having to haul their bikes up and down stairs, and free the ground level for pedestrian traffic.

Fig. 279: Bike racks are maintained year round out front of Berlin Bicycle Cafe on Belmont Avenue Kitchener. Instagram image by Graham Roe, Owner of Berlin Bicycle Cafe @berlinbicyclecafe, captioned: “berlinbicyclecafe btw - we clear snow away from our bike racks cause we dont think cold should keep you away from your bicycle #wintercycling #kwbikesberlin #wrbikes”

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**CYCLE ALONG THE ION**

There is an extensive network of trails in and around Waterloo Region frequented by locals and tourists. Many of the trails are maintained by local organizations and are a beautiful amenity within such close radius to residents. For many, the issue is the inability to make the trip to the trails in a safe and connected way.

Copenhagen, among other European cities have led the urban cycling movement since the 1980’s and earlier, creating a...
Despite Waterloo Region’s dedication to increasing cycling options for local riders, there are limited examples of protected cycle lanes. For cycling to become a safe and effective means of travel, a network of fully protected cycle lanes should be developed and constructed amongst existing infrastructure.

**Radius at Intersections**

Limiting the turning radius at intersections limits the speed for vehicular traffic. This creates a scenario for visibility and safety of cyclists and pedestrians, especially in high-traffic zones where there can be numerous distractions.

**Cyclist Amenities**

Bicycle repair stations, drinking water fountains, and ample bicycle storage facilities are included to make green transportation as simple as possible.

**Dedicated Crossing Signal**

Cycle lanes will have dedicated crossing lights to indicate to cyclists, and pedestrians, the start of the cycle lane and promote increased visibility and safety, as well as give pedestrians sufficient time to cross larger intersections.
MAKinG connecTionS

Union Boulevard can be used as a connection from King Street, to both the Iron Horse Trail to the south and the Spur Line Trail to the north. The Spur Line Trail runs from Ahrens Street in Kitchener to King Street in Waterloo, where it connects to the Laurel Trail, linking to the University of Waterloo and R+T Park. Belmont Village is also a key point of connection from Union Boulevard.

iRon hoRSe TRAiL

Part of the Trans Canada Trail, the 5.5 kilometre Iron Horse Trail, connects Waterloo Park to Victoria Park and Uptown Waterloo to Downtown Kitchener. The trail became a reality when Waterloo and Kitchener formed a partnership to jointly purchase the abandoned rail line to preserve the corridor as an important part of the two cities’ heritage and for use as a recreation and transportation trail. The trail now runs along the former railway corridor, providing a scenic and historic route that connects to Ottawa Street in Kitchener and ends at Albert Street in Waterloo, before it is able to connect to King Street. This makes for an abrupt disconnection and path of travel for those using the trail to access the downtown areas. It is advantageous when more people can walk or bike, encouraging diversity among traffic, and less reliance on cars. With a lower number of young urban residents acquiring drivers licenses, it is vital to provide safe and efficient alternatives to single vehicle commuting. For this to happen, it is important to bridge gaps between trail networks to create a cohesive network via connections and points of access to allow users to have a greater sense of reliance on non-vehicular transportation.

union STReeT

Union Boulevard currently features boulevards, a sidewalk and trees on either side of the street, along with a treed boulevard down the centre of street. The centre boulevard can hardly be utilized as public space, but was designed to create a high-end neighbourhood. There is speculation that centre boulevards slow down vehicular traffic because there is an obstruction that makes drivers more alert about the change in the road. This same goal of slowing vehicular traffic can still be accomplished, in a more space efficient way, for the space to be dedicated to plantings, but also to serve active transportation users. If the road lanes were pushed together, and the centre boulevard was eliminated, there would be room for better public features on the street. There is not room for all the parking, a dedicated bike lane and sidewalk on Union. The solution is a multi-use trail approach, to form the main connector to Belmont, the Iron Horse Trail and Spur Line Trail.

CONNECTIONS TO A LARGER NETWORK (TRAILS)

the creation of new protected cycle trails feeding the IRT corridor

Fig. 284. Union Boulevard.
Fig. 285. Belmont Village, Kitchener.
Fig. 286. Spur Line Trail Regeneration Project.
Fig. 287. Left. Neighbourhood Sections at Union Street.
Elements from various types of protected cycle lanes have been adapted to the cycle lane design for optimal user safety and experience.

An ideal width of 2.0m allows cyclists to pass each other within a protected lane. 1.5m is for single file riding, and is acceptable at pinch points and at intersections if necessary.

When close to an intersection, tree planters are replaced with raised planters containing small vegetation, with a combined height less than 0.6m. There should be no visual obstructions of 0.75m or higher within 30m of intersections. The raised planters maintain a safe separation between motorists and cyclists/pedestrians. They form the path of travel for cyclists while rounding corners and crossing intersections. Unlike a pedestrian-only crosswalk, cyclists may remain on their bikes while crossing the intersection if they remain in their clearly marked section of the crossing strip.

There are no dedicated cycling separators, as the lanes are integrated into the pedestrian realm, giving pedestrians the ability to cautiously cross over the cycle lane into the parking and flex space as needed. The combination of street trees and delineator bollards create a barrier between the cycle lane and the street, in addition to a minimum 1m buffer for motorists to open their door and exit their vehicle without blocking a cyclist. Another colonnade of trees in combination with street lights form one bordering the sidewalk. Contrasting colours of paving are used to mark the cycle lane.
Fig. 294. Traffic sign Downtown Kitchener indicating the road lane to be shared with cyclist traffic. This is the only option for cyclist traffic in this stint of King Street as long as the road remains open to vehicular traffic. The right-of-way between buildings is too narrow, leaving a narrow roadway and no additional space for a cycle lane.

Fig. 295. The lighting at Nørreport Station provides ambient light through the square, and information beacons for wayfinding and distances to nearby landmarks.

Fig. 296. The Nørreport Station project is effective in its integration of bike parking throughout the plaza. Bike parking is placed to be out of the way of pedestrian traffic flow, but convenient and in the open.

**Bicycle Lane**

The protected cycle lane highlighted in magenta is between the minimum and ideal lane size at 1.8m. This allows room for cyclists to pass one another, or ride together. The direction of travel mimics that of the road traffic allowing chances to cross over and turn around at intersections with coordinating crosswalks.

**Contrasting Paving**

Contrasting paving pattern delineates the bicycle path, so users and nearby pedestrians are aware of the threshold. Although done in many cities with paint, this method requires seasonal repainting. Reflectors are installed on removable bollards and light standards to identify boundaries during dark hours.

**Street Lighting**

Lights are rotated 90 degrees from their orientation on King Street in Downtown Kitchener to allow for the downlamps to shine, one side to the pedestrian area, and the other to the cycle lane. The cylindrical beacon atop the light standard offers ambient 360 degree light. Additional ambient lighting on raised planters could help to illuminate surfaces without too much light flooding residential units at night.

**Pavement Space - Bicycle Parking**

On-street parking segregated bike lane is located between parking and sidewalk (1.2m); buffer width of 1.0m required to allow for opening parked car doors (minimum 0.6m if highly constrained).

**2.0m Flex zone - Bicycle Parking**

The 2.0m flex zone between the cycle lane and the sidewalk allows the City or adjacent building / business owners to install bicycle parking in areas of added demand.

**Cyclist Amenities**

The flex zone can also host amenities for cyclists such as bicycle repair stations, water fountains or rest stops along their route. Illustrated to the right is a repair station.

**Parking Buffer (not shown)**

1.0m buffer provided between 2.4m parking space and 1.8m cycle lane to allow vehicles to open doors on parked cars without interfering with cycle lane.

**Planter Barriers (not shown)**

Trees and raised planters also form barriers. Planters' planter and vegetation height less than 0.8m, and lower within 50m of intersections.

**Fig. 297. Urban Rule: Creation of Cycle Infrastructure**
ACCESS TO PUBLIC TOILETS

Access to public toilets is a missing link in the implementation of an on-ground transit system. Many subway networks, including Toronto, New York City and Montreal have a network of public toilet facilities for use by transit patrons. So long as you are within the network, there is access to a toilet. Private businesses and even buildings considered to run public operations often prohibit free public use of their facilities. The cost of facility maintenance and supplies is a burden for local business owners if the washroom user is not supplementing the use of the facilities with paid business.

Urben Blu is a Canadian company which manufactures self-cleaning toilet systems. This would be an effective option throughout the Region, as they wouldn’t require maintenance by Municipal staff, and are designed to be safe, robust and clean. The units are fully accessible and family-friendly. The technology is based off European models that have existed for decades, and adapted to Canadian building regulations and climate.

Prior to installation, the site preparation is required to have the water, sewage and electrical ready to go for the turnkey unit to arrive. Although units are spreading through cities in North America, there are not yet any examples of this unit in Ontario, so Waterloo Region could act as a local pioneer. The toilets undergo a cleaning cycle every 15-20 uses, and require a full cleaning every 1-2 days.

If used in tandem, the compartment will wait to enter a cleaning cycle until after the second user exits.

EXTERIOR FINISH + ACCESS

The units come in customizable exterior finishes to blend into a variety of urban designs. The units can be fully maintained from the exterior and locked during certain hours to prevent permanent occupation overnight.

PUBLIC TOILET SYSTEM

The toilet unit can be comfortably placed in an area the size of an onstreet parking space as a standalone turnkey unit, or built into the ground level of a public or private building. The unit operates as a turnkey project, with a maintenance panel accessible from the outside. There are standalone units that take up less than that of a parking space, or units that can be integrated into the base of a new or existing building. There are no moving parts or sharp edges, making the units very durable and virtually indestructible.
The availability of free drinking water in cities is not a new, or even revolutionary concept. As a human necessity, it should be readily available to the public. The placement of drinking fountains in both urban public space and private development would reduce the load of waste from disposable beverages. If citizens knew there was water available to them during their commutes, or daily errands throughout the Region.

There are drinking fountains that are designed specifically for cold climates, making them frost and freeze-resistant. This way, fountains could stay in operation year-round, without risk of water lines freezing. Although there is a dedication to the consumption of tap water, there is not yet a program in place to provide 24/7 access to water.

The Waterloo Region has a Water Wagon program that provides a water station to large events of 500 people or more, at sponsored events during the summer months. In addition to drinking fountains along streets and in public parks, a program, known as BlueW is a database of local businesses who openly advertise their willingness to provide free drinking water to the public at their establishment. Their website features an interactive map, friendly for both computer and smartphone users, that gives details about the establishment, including the business name and address, where to seek out the water on said property, hours of operation and details about the quality of water served, such as chilled tap water. It would be encouraged for all communities and businesses in the Region to participate in this program, for residents and visitors have access to tap water during business hours, as the minimum.

The BlueW program logo is popping up in storefronts around the region. If you see it on a business or public facility, you know you can refill your reusable bottle there with free tap water.21


Fig. 306. Waterloo Region Municipal Water Wagon.

Fig. 307. Indoor water filling station.
The following illustrations dictate traffic flow patterns for a typical intersection of the design proposal. Some of the elements are based on Jan Gehl’s protected intersection design, adapted to meet the needs of the multiple modes of transportation using a busy intersection on King Street. The intersection design is intended to improve safety, flow of traffic and efficiency of all modes of transportation with a keen focus on green commuting.

Fig. 308. Traffic Flow Pattern One
TRAFFIC FLOW

Fig. 309. Traffic Flow Pattern Two

TRAFFIC FLOW

The ratio of width to breadth of intersections on the corridor passes an issue when considering left hand turns. In a typical intersection, when the crossroad traffic ends up at a right angle and the proportion's saved, there is an ability for opposing traffic to turn left at the same time. After crossing each other's paths of travel the left turn lanes are designed to accommodate traffic for the standard-based vehicles. This has the potential to block through traffic if a higher number of vehicles are waiting to turn left than will fit into the turn lane.

As the width to breadth of intersection is disproportional, vehicles going in only one direction at a time may turn left. To reduce the risk of the intersection, all vehicles traveling and then exit while vehicles traveling north and south may turn left at the same time. In this scenario, pedestrians and cyclists may cross from an east-west direction across the north part of the intersection, and from the southeast portion of the intersection to the light rail stop. In this scenario, vehicles traveling from the southeast to the northwest may turn right.
TRAFFIC FLOW

pattern three

TRAFFIC FLOW 3

In this interaction, the opposite scenario would take place, where the cars traveling from the east side of the intersection would turn left, while also having the ability to go straight, and turn right. Vehicles traveling from north and south sides would have the ability to turn right. However, vehicles traveling from the east must stop completely.

Vehicles turning right from the east and south must yield to pedestrians and cyclist traffic crossing the intersection. Because the vehicles are moving parallel to cyclist traffic, those coming from the south must come to a full stop at the stopline for the intersection before proceeding to make their turn. Vehicles coming from the west may proceed to turn around part of the intersection to the left of the raised median and on the corner. The driver is able to get a better view of the intersection.

Pedestrians are free to travel in either direction across the southern half of the intersection. They may also cross the intersection to travel across streets, but traffic does not continue. Cyclists can travel on the lane parallel to the walking lane of the road, but must be careful on the same area as pedestrians.
TRAFFIC FLOW

Figure 311. Traffic Flow: Pattern Four

Pattern Four

TRAFFIC FLOW

Once again, due to the ratio of width to breadth of intersections on the corridor, this is not done when considering right hand turns. For this reason, vehicles going in one direction of a lane may turn left. To maintain the flow of the intersection, all vehicles travelling north may circulate, while vehicles travelling south may only turn right. In the scenario, pedestrians and cyclists may only travel in the westward direction along the east part of the intersection and from the southward portion of the intersection across to the light rail stop.

Vehicles turning right from the south must yield to cyclist and pedestrian traffic creating the potential for conflict if there is room for the cyclist to stop. A turning point for this separation creates a conflict at the tunnel stop. Vehicles should be able to proceed around the corner.

Pedestrians and cyclists may also travel south from the tunnel stop on the east side of the intersection. In rural areas from the south, pedestrians may travel on foot past the tunnel to connect to the west-bound pedestrian path to the trail.
TRAFFIC FLOW

pattern five

TRAFFIC FLOW 5

The scenario is the direct opposite to that of Traffic Flow 4.

Vehicles that are coming from the west and south cannot turn right on a red light, as the intersection is one-way, and too difficult to properly account for opposing traffic flow. For this, all lights should be set up to have a light flowing right turn in addition to their usual left turn lights.

In an intersection becoming too backed up with traffic because a left turn lane is full and vehicles may not turn left at the left turn signal, the ability to cause that congestion of traffic when the light turns from red to green, if there is a permanent traffic pattern, lengthening the left turn lane can be done by placing more of the parking and pedestrian zone and repainting the lanes.

When the intersection is not at a transit stop, pedestrians will not be able to cross only part of the intersection at a time without the aid of the transit stop. They would only be able to cross one side of the intersection at a time from transit stops, traffic lights, or traffic.

Fig. 312. Traffic Flow Pattern Five
TRAFFIC FLOW

Fig. 313. Traffic Flow: Pattern Six

Vehicle flow: Mode A: Traffic flow through the intersection is controlled by traffic signals. Mode B: Traffic flow through the intersection is not controlled by traffic signals. In Mode B, traffic flow at the intersection is determined by traffic volume and the signal timing.

TRAFFIC FLOW

Vehicle flow: Mode A: Traffic flow through the intersection is controlled by traffic signals. Mode B: Traffic flow through the intersection is not controlled by traffic signals. In Mode B, traffic flow at the intersection is determined by traffic volume and the signal timing.
The design of streets has all too often been assumed a moot issue, the province of faceless, if not soulless, engineers and subject to the dictates of civil engineering manuals and the mysteries of traffic flow. The mentality of "freeway," with all its misleading implications of freedom of action and for free, has come to dominate the bodies of roads that included city centers. These have been reduced, flattened, and lowered to a mere measured movement. They lack both meaning and by the capacity to move traffic and site improvement for anyone to maintain the life of the city around them.

-Donlyn Lyndon, Places Magazine


A DESIGN FOR MIDTOWN
Fig. 316. Map of Existing Urban Growth Centres

As shown in the thesis statement diagram at the beginning of the document, the first step to urbanization in Waterloo Region should be expansion of the Urban Growth Centres in Waterloo and Kitchener, so they can grow together to create one large Urban Growth Centre, amalgamating Uptown Waterloo, Midtown and Downtown Kitchener. The newly added area to the Urban Growth Centre constitutes the design site for Midtown.
ANALYSIS OF MIDTOWN

Fig. 318. Map of Site Amenities in Midtown
EXISTING SITE

The majority of the ground floor on King Street is taken up by medical, law, and financial offices, with an absence of storefront retail. The concentration of low-density office occupancies open only during the day create a dead zone after regular business hours and on weekends. The existing fabric of employment could be maintained if supplemented by retail and residential use. The existing buildings for demolition in Midtown have been selected using the following system:

Making room for new roads to connect the neighborhood means that some houses on the shown properties need to be demolished. This is true in the Herbert Street and Mary Street block, where one house would need to be demolished for the street to go through the block. In cases like these, the benefit of having a complete block and more consistent throughways for pedestrians, cyclists, and motorists alike outweighs the benefit of keeping a single-use low density building.

Detached houses converted into small businesses are an effective typology in a secondary neighborhood, but are not effective on a main corridor. Many of the houses are periphery medical offices to the Grand River Hospital, which could easily be moved to an upper floor, and do not need to occupy a storefront. Detached houses are not the correct typology for achieving density on a main corridor or urban growth centers.

The stripmall typology is too low density for a large corridor. Although it is appealing to have retail at the ground floor, there needs to be density on floors above. Stripmalls do not meet the street, as there is parking infront of them, leaving a gap between the storefront and the sidewalk.

Buildings of low density are not worth maintaining when they do not have strong heritage, retail or residential value. The two-storey medical building pictured is an example of one that could be demolished and redeveloped. If these building types are replaced with a mixed development of three to six storeys, they can serve the community from a public perspective, and also provide increased amounts of residential units.

Fig. 319. Existing buildings:
1. Residential properties at 46 and 48 Mary Street.
2. Central Fresh Market, 760 King Street West.
3. Small businesses in houses at 954 King Street West.
4. Payday loan stripmall at 648 King Street West.
5. Low rise medical buildings at 940 King Street West.

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URBAN THEORY
In the second part of her book, The Death and Life of Great American Cities, Jacobs describes four generators for diversity in the city. Although geographically diverse, there are a few things Waterloo Region could learn from Jacobs’ seemingly simple, but well-established principles. Each of her four generators of diversity will create a more robust and vibrant community.

OUR GENERATORS OF DIVERSITY:
Jacobs contends that conditions that contribute to a city’s diversity: “To generate and sustain this diversity in a city’s streets and districts, four conditions are indispensable:
1. The district, and indeed so many of its internal parts as possible, must ever more than one primary function, preferably more than two. These must create the presence of people who go outdoors on different schedules and are in the places for different purposes, but who look to the same facilities in common.
2. Most blocks must be short; that is, streets and districts, four conditions are indispensable:
3. To use parks and squares and public buildings as a part of the city’s infrastructure for city planning for cities should aim at these purposes:
4. To make the fabric of these streets as continuous network as possible throughout a district of potential subcity size and maximum density high-rise tower, and the midrise focused on suburban development, rather than urban public programming, with hours beyond the typical office hours, to populate the streets at all hours of the day. This is an effort to create districts within which the life begins in the morning and continues throughout the day, rather than limited to the work day.

THE USES OF CITY NEIGHBOURHOODS
If the only kinds of city neighbourhoods that demonstrate the uses of city neighborhoods are not contributing in a positive manner to the urban public realm, they were constructed on convoluted and disconnected lots. Over time, those properties were converted to student housing, eventually filling in the voids of those owners, wanting to reside in a five- or ten-minute walk from their place of employment. The over-development of University district has created an environment where the constant rows of new buildings, and the over-development of University district has created an environment where the constant rows of new buildings, and the midrise focused on suburban development, rather than urban public programming, with hours beyond the typical office hours, to populate the streets at all hours of the day. This is an effort to create districts within which the life begins in the morning and continues throughout the day, rather than limited to the work day.

THE MIDTOWN DISTRICT
Although considered a major sector for development, Midtown lacks other aspects akin to a comprehensive urban form. The following text will outline these issues, and how they can begin to be addressed through urban redesign, from street streets and districts, four conditions are indispensable:
1. The district, and indeed so many of its internal parts as possible, must ever more than one primary function, preferably more than two. These must create the presence of people who go outdoors on different schedules and are in the places for different purposes, but who look to the same facilities in common.
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Condition 1: The district, and indeed as many of its internal parts as possible, must serve more than one primary function, preferably more than two. These must involve the presence of people on go-schedules or different schedules and in the place for different purposes, but who are able to use many facilities in common.

Both building and programme types within said buildings should be mixed on a block to create a diverse neighbourhood. Waterloo Region has not yet reached a population that can sustain a dense population of high rise developments. Among others, midrise development typology would be preferred and allow increased density to be spread further through the city. There is a lack of the midrise typology. No specific building type is required, but must address surroundings (can’t fill entire block with towers or single-storey developments). There should never be an entire block of towers, despite this happening in the University Zone even when there is not a need for additional residential units.

For the first time in more than a decade, construction of apartments and townhouses outnumbers new single family and semi-attached home construction, demonstrating the desire for compact, urban living in our community. 7

6 Jacobs. 198.

"The Story of Transit in Waterloo Region, p.24"
The continuation and connection of blocks in the Midtown area will help to create this model for short blocks, while joining together streets to complete blocks that are currently fragmented, creating poor traffic and pedestrian flow. The addition of these connector streets will also allow for the dispersal of traffic, with the goal of reducing traffic from the arterial corridors (LRT corridor).

Although the shortest chapter in her book, Jacobs outlines the need for short blocks in cities to create options for pedestrians, and argues that: “...frequent streets and short blocks are valuable because of the fabric of intricate cross-use that they permit among the users of a city neighborhood. Frequent streets are not an end in themselves, frequent streets are effective in helping produce density only because of the way they permit the means by which they work and the high density that is accomplished are economically related. The relationship is reciprocal.”

--Jane Jacobs, The Death and Life of Great American Cities (243)

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--Jane Jacobs, The Death and Life of Great American Cities (243)
As the population increases in Waterloo Region, it is inevitable that more people will bring more traffic. According to Jane Jacobs’, creating short blocks with more connections makes for better flow of people and traffic, as well as more lively streetlife.

The Midtown District is currently plagued by a lack of storefront operations, and too large a gap between blocks. This makes the area seem vacuous and unwalkable. As the area is already fairly maxed out in terms of large institutions, the neighbouring blocks should be broken up to avoid too many large footprint and highrise buildings being constructed, further taking away from the walkability of Midtown.

Below is a list of proposed new road connections and laneways in Midtown, in no particular order:

Roger Street Connection:
- through block from Herbert Street to Mary Street. Extends Roger Street which currently wraps around the edge of the cemetery to break up the large parcel of land with no throughways.
- Demolition Required: 1 building

Mount Hope Street Connection:
- along the south border of the Mount Hope Cemetery would eliminate a huge road block on site, break up an undifferentiated and undistinguished greenspace, and allow for the continuation of low density housing development backing onto the cemetery.
- Demolition Required: 0 buildings

Green Street Extension:
- to complete the intersection at King Street and meet up with the Braun Street extension. True to its namesake, Green Street will create a green gateway to a large sportfield and the historic Mount Hope Cemetery – a scenic thoroughfare to the residences north of Moore Avenue.
- Demolition Required: 0 buildings

New Street east of Central Fresh Market:
- to replace the entry to the parking lot and connect to the Braun Street extension.
- Demolition Required: 0 buildings

Mary Street Extension:
- to break up the block that meets King Street, leaving a 50 metre deep block, which is ample for midrise developments with site access and green space. This still leaves room for a green space, designed sportfield and field house, which the nearby secondary school already uses for games.
- Demolition Required: 0 buildings

Walter Street Extension:
- to create a connection to King Street. Although there is a large development by the Zehrs Group planned for the former Ratz Bechtal Funeral Home site, it would be important for there to be a connection through the site before the GO station and train tracks as there is almost 0.5km between Wellington and Victoria Streets.
- Demolition Required: 0 buildings

Mary Street south of Braun:
- to provide access to the back of the properties due east from King Street, and complete the midrise block of residential properties on Braun Street. This would clear an old former deep block fronting onto King Street for development of midrise buildings.
- Demolition Required: 1 building

Herbert and Braun Street Connection:
- along the south border of the Mount Hope Cemetery would eliminate a huge road block on site, break up an underutilized and undesigned greenspace, and allow for the continuation of low density housing development backing onto the cemetery.
- Demolition Required: 0 buildings

Union Boulevard to Mount Hope Street:
- to divide up the large block which currently houses the Sun Life surface parking lot. If all parking is directed to a garage at the northeast corner of the Sun Life lot, the large block could be used for new development.
- Demolition Required: 0 buildings

Demolition 2 buildings

Extension of Dodds Lane:
- which does not currently run completely through the block to meet Union Street, giving the laneway a dead end and making it difficult to access. The laneway helps to give access to rear lot parking, and secondary entry to properties.
- Demolition Required: 1 shed or 1 building

Fig. 327. Proposed new streets for Midtown.
RESIDENTIAL TYPOLOGIES
and where to find them

Fig. 328. Residential Typologies

On the left spread is a diagram showing the residential typologies prevalent in the Region. Each typology is common to certain cities in the Region, and districts within that specific city. The varying types attract different target groups for reasons related to spatial needs, lifestyle choice and affordability.

Single detached housing is still dominating the market with over 100,000 detached homes in existence in the Region. There is no need for this type of housing to exist in such a large number when over half the private households in the Region are occupied by one to two people. Small units for singles (or couples) are under represented in a local context. It is time for new types of housing to be considered for Waterloo Region.

WHAT QUALIFIES AS A MICRO-UNIT?

“A small, typically urban, self-contained apartment that is between 150-350 square feet.”

–What is a Micro Unit? By David Friedlander

+Rental unit akin to a hotel room

+Renters may have access to communal amenities – patio, rooftop garden, gym, etc.

Tiny homes could also qualify as a microunit, but are not yet allowed in Waterloo Region.

A difficulty of microunits is the inability to breach the mortgage market, as a unit must be a minimum of 600 square feet to qualify as a ‘house’, forcing this typology to be a rental unit or cash investment for the time being.

Fig. 329. Dwellings by Type and Location

Fig. 330. Both images below are a micro apartment design by Kobayashi and Zedda Architects. Developers saw a gap in the housing market for housing for the transient worker, young couple, recent graduate and new immigrant to design a 325 square foot unit that could be arranged in multiple configurations to meet a specific renter’s needs.

+Renters may have access to communal amenities – patio, rooftop garden, gym, etc.

What is a Micro Unit? By David Friedlander

*Rental unit akin to a hotel room

What Qualifies as a Micro-Unit?

+74 small, typically urban, self-contained apartments that is between 150-350 square feet

+What is a Micro Unit? By David Friedlander

*Rental unit akin to a hotel room
There are a large number of heritage properties in the Tri-cities, under the Ontario Heritage Act which enables the designation of any part of a community as a Heritage Conservation District to protect and enhance groups of properties or neighbourhoods that collectively give an area special character. In 2005, an allowance was made for properties of cultural heritage value to be added to the municipal register of heritage properties.

A property is designated under the Ontario Heritage Act following consultation with both the local heritage committee and the property owner. The individually designated property is subject to a designating bylaw that identifies the reasons for designation and a list of heritage attributes.

Vacant buildings and structures located on heritage properties designated under the Ontario Heritage Act, or identified as a property of high cultural heritage value and interest within a heritage conservation district are subject to heritage provisions.

CULTURAL HERITAGE VALUE
A non-designated property of cultural heritage value or interest is placed on the Municipal Heritage Register following a thorough and objective four-step process, which includes:
1. Initial evaluation of the property.
2. Property shortlist owner consultation.
3. Review of the short-listed property.
4. City council considers listing the property.

HERITAGE ALTERATIONS
In some cases, the owner of a property designated under the Ontario Heritage Act may require a heritage permit to make changes (renovations, demolitions, new construction) to either the building or the property in question.

HERITAGE REDEVELOPMENT
As the industry transforms and primary uses of buildings change in Waterloo Region, there is a goal to seek new uses for the reuse of the historic fabric. Factories, churches and libraries, to name a few are changing hands, sometimes after having been left empty and unused for decades. If the building is deemed structurally sound, it is slated for redevelopment. Depending on the governing heritage bylaw, the building interior need not meet the same stringent heritage design guidelines of the exterior. There is then the task of how to add use to a century-old building without the major cost of matching stone and leaded glass window detailing. To the right are takes on the redevelopment and recycling of heritage properties.

FIG. 331. Conceptual rendering of a former industrial building turned boutique hotel project in Brooklyn by Acre Architects.

FIG. 332. Conceptual image of an adaptive reuse of a historic church in Saint John, New Brunswick by Acre Architects.


FIG. 334. Map of the Tri-cities indicating buildings and land parcels with Heritage Designation.

Fig. 331. Conceptual rendering of a former industrial building turned boutique hotel project in Brooklyn by Acre Architects.

Fig. 332. Conceptual image of an adaptive reuse of a historic church in Saint John, New Brunswick by Acre Architects.

Fig. 333. Conceptual image of the Galt Post Office being readapted into the future Idea Exchange in Cambridge, by RDH Architects from Toronto.
A Heritage Procedural Protocol is prepared to provide direction on approved processes under the Ontario Heritage Act. This includes defining requirements for the demolition of listed heritage property, and processes for permits and non-compliance.

Heritage Promotion Sub-Committee
City staff leverage the skills and interests of members of Heritage Kitchener in striking a sub-committee to promote greater public education and awareness of heritage conservation.

City staff propose how best to proceed in preparing Conservation Plans for City-owned Cultural Heritage Resources, and in establishing a sustainable funding source for long-term maintenance.

City staff conduct a review of the Designated Heritage Property Grant Program to include examining grant amounts and eligibility.

City staff investigate opportunities to develop Partnerships with other municipalities, the Region, community groups, academic institutions and businesses to broaden support for heritage locally.

Heritage Kitchener has begun implementing a set of Heritage Best Practices for properties such as the ones pictured.

1. The City of Hamilton Built Heritage Management Protocol is used as a model to draft a similar protocol, and identify engineers to use in emergency situations affecting heritage property.

2. A Designation Sub-Committee is formed to review non-designated properties on the Municipal Heritage Register. Priority candidates will be evaluated for designation, with recommendations proposed in consultation with property owners.

3. City staff create a Heritage Monitoring Checklist to apply heritage considerations in the routine inspection of City-owned built heritage resources.

4. A Heritage-Demolition Protocol is prepared to provide direction on approved processes under the Ontario Heritage Act. This includes defining requirements for the demolition of listed heritage property, and processes for permits and non-compliance.

5. Heritage Promotions Sub-Committee
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3. City staff create a Heritage Monitoring Checklist to apply heritage considerations in the routine inspection of City-owned built heritage resources.

4. A Heritage-Demolition Protocol is prepared to provide direction on approved processes under the Ontario Heritage Act. This includes defining requirements for the demolition of listed heritage property, and processes for permits and non-compliance.

5. Heritage Promotions Sub-Committee
City staff leverage the skills and interests of members of Heritage Kitchener in striking a sub-committee to promote greater public education and awareness of heritage conservation.

6. City staff propose how best to proceed in preparing Conservation Plans for City-owned Cultural Heritage Resources, and in establishing a sustainable funding source for long-term maintenance.

7. City staff conduct a review of the Designated Heritage Property Grant Program to include examining grant amounts and eligibility.

8. City staff investigate opportunities to develop Partnerships with other municipalities, the Region, community groups, academic institutions and businesses to broaden support for heritage locally.

Heritage Kitchener has begun implementing a set of Heritage Best Practices for properties such as the ones pictured.

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This thesis is not an exercise in traditional master planning, but is about designing details of public spaces and built form. If a framework of key principles and master plans are designed and executed in relation to building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and character of streets and blocks. The regulations and standards of form-based codes are presented in both words and clearly drawn diagrams and other visuals. They are keyed to a logical progression of key ideas in the placement of form and built form.
Aside from the obvious of prohibiting a factory from being built beside a house, there are many building programmes that can play nice together. Zoning should instead be evaluated by the districts that the Region is made of, in an effort to create mixed neighbourhoods and increase the abundance of first, second and third places in a given area. Some districts are already established in the Region of Waterloo, but many are currently broken in such a way that original subdivisions development that serve university students have different needs than an...
The following illustrations show FAR, or floor area ratio in different scenarios for the design site in Midtown. This analysis was conducted to evaluate how the maximum densities in current local zoning bylaws effected development. It was also an exercise to see which properties were built out to their full potential as per those zoning bylaws.

The first illustration shows the existing building fabric with existing density overlaid, shown as FAR. FAR is calculated by dividing the gross floor area of all buildings on the property by the site area. An FAR of 1 means that if the floor area of a multi-storey building was spread across one story, it would cover 100% of the building parcel. Each 4 metre high extrusion of the site area demonstrates that the particular site has an FAR of 1 or more. Fractions less than 1 are proportionally shown in the extrusions as well.

A typical parcel with a single-family dwelling would be as follows:

<table>
<thead>
<tr>
<th>Building Area (square metres)</th>
<th>70SM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storeys</td>
<td>x2</td>
</tr>
<tr>
<td>Gross Floor Area</td>
<td>=140SM</td>
</tr>
<tr>
<td>Site Area</td>
<td>384SM</td>
</tr>
<tr>
<td>FAR</td>
<td>0.36</td>
</tr>
<tr>
<td>Multiplier/sqm</td>
<td>x4</td>
</tr>
<tr>
<td>(rounded floor to floor height)</td>
<td>=1.44 storeys</td>
</tr>
</tbody>
</table>

**Density Study**

Fig. 342. Density Study: Existing Density, Existing FAR

Existing Building Fabric

Building Parcels

Road Network

FAR (Floor Area Ratio) of Existing Building Fabric
For the purposes of the exercise, City of Waterloo Zoning Bylaws have been converted to their equivalent zoning type in the City of Kitchener Zoning Bylaw. There is not enough information provided with the City of Waterloo Bylaws to quickly determine a max FAR for multiple parcels.

When buildings are below the FAR simulation, they are far below the maximum site density. Most of the buildings in Midtown are currently below the maximum density as outlined by the municipal zoning bylaws. The maximum FAR simulation is...
DENSITY STUDY
proposed density, maximum FAR
applied to the proposed design for Midtown in this scenario. An increased amount of the properties meet the density standards.
The FAR simulation has been adjusted and applied to the proposed design for Midtown in this scenario. All parcels exceed the existing density, and the majority meet the established maximums outlined by the zoning bylaw without the need for highrise construction.
Public spaces and neighboring buildings have the right to daylighting. No habitable space should be shaded for more than two hours per day.

Design Street Patterns to optimize solar gain where possible (east-west street orientation to minimize southern exposure)

Midtown is oriented approximately 24 degrees from an east-west axis, therefore making the sun perpendicular to King Street in Midtown around 2 o’clock in the afternoon.

The large institutional buildings overshadow King Street and buildings across the street for large parts of the year.

SUN ANGLES

Winter Solstice (December 21)
- 23 degree altitude

Summer Solstice (June 21)
- 70 degree altitude
**PROPOSED DESIGN SECTIONS**

*cutting through king*

**URBAN SECTION CUTS**

The sections are all facing southeast, showing how the ION route could be adapted to a pedestrian and cycle-friendly neighborhood. The sections are cut from Park Street to Herbert Street, far enough to see how the new design would blend with existing neighborhood fabric, and are as follows:

- **A** Midtown at King Street South and Union Boulevard
- **B** Midtown at King Street South and Mount Hope Street through Grand River Hospital
- **C** Midtown at King Street South and Green Street through Hospital Parkade

**DISTRICT OF URBAN SECTION**

@ nearest intersection

- **#**

**FLOORPLATES**

The floorplates are simplified into programmatic categories. The programmes are not prescriptive, but merely guidelines based on potential scenarios:

- **commercial**: business office, medical office
- **mechanical**: indicating cores and roof access
- **park**: underground and aboveground parking
- **residential**: micro unit to multi-floor condo space
- **retail**: storefronts/restaurants, often on the ground floor

**SUN ANGLES**

Sun angles are depicted in the sections to show daylighting at both summer and winter solstice for Waterloo Region.

- **Winter Solstice (December 21)**
  - 23 degree altitude

- **Summer Solstice (June 21)**
  - 70 degree altitude
The parking lot in Midtown is prime for development into two midrise, mixed-use blocks. The large parcel can be subdivided into two smaller blocks, akin to the surrounding fabric. A throughway that provides circulation for the parking lot is the approximate location for the proposed new roadway.

Fig. 351. Proposed Design Section A: Urban Condition in Midtown
Bringing the face of the Hospital to meet the street is vital to the development of Midtown. As a public institution, the facility lacks parking, amenities for visitors and efficient traffic management at the Emergency / Ambulance Entry. Surface parking lots fronting on King Street are infilled in this scenario with an extension to that face King Street. A mix of midrise multi-use buildings facing the Hospital on King, and stacked townhousing in the secondary neighbourhood around Mount Hope Cemetery add variety and density.

Fig. 352. Proposed Design Section B: Urban Condition in Midtown
There is an opportunity to expand the existing parking garage at Grand River Hospital, to park additional cars, and create an element of street frontage. A mixed-use building opening onto the adjacent sportsfield could line the other side of King Street. Row housing borders Mount Hope Cemetery greenspace and the sportsfield.

Fig 353. Proposed Design Section C: Urban Condition in Midtown
INTERSECTION DESIGN

Snapshots of major intersections in Midtown are shown with greater detail in conjunction with notes about design tactics and photos of site conditions. Proposed built fabric, parking spaces, cycle lanes and pedestrian areas are indicated, as well as raised planters, trees and street lighting. A key labels streets of the intersections.

Note Indication
Planted Material / Gardens
Greenspace / Softscaping
Built Fabric*
Road / Driveway Surface
Planted LRT Track
Concrete Curbs + Transit Stops
Porous Brick Paver Element
Contrasting Porous Brick Paver Element to Indicate Cycle Lanes, Pedestrian Zones, Parking Spaces
Contrasting Road Markings

* Buildings are translucent to see street fabric and trees in the background.

INTERSECTION

where street name meets street name

AXONOMETRIC INTERSECTIONS

A B C D E F G H I J K L

AXONOMETRIC INTERSECTIONS

A B C D E F G H I J K L

Fig. 354. Axonometric Intersection Key Map
INTERSECTION DESIGN
Snapshots of major intersections in Midtown are shown with greater detail in conjunction with notes about design tactics and photos of site conditions. Proposed built fabric, parking spaces, cycle lanes and pedestrian areas are indicated, as well as raised planters, trees and street lighting. A key labels streets of the intersections.
ZOOM THREE

Fig. 337. Zoom Three of Intersections Key Map
ZOOM FOUR

Fig. 358: Zoom Four of Intersections Key Map
Fig. 359. Bird’s-Eye Perspective of Midtown

Conceptual birds eye perspective at grand river in view.
PROPOSED DESIGN AXONOMETRIC

MIDTOWN INTERSECTION
@ king street south + andrew street

1. Existing Bauer Loft Building and surrounding parking lot. Completed in 2009, the tower contains residential loft units, with the lower level and historic building filled with commercial space with a host of dining and shopping. Building amenities for loft residents include an exercise facility, underground parking and a residents lounge.

2. Existing houses converted to office space and a two-storey stripmall along Andrew Street could be replaced with higher density stacked townhousing and a new five-storey apartment or office building with ground floor commercial space. Office users could occupy upper floors in place of their current storefront locations.

3. A midrise building with angled frontage on King and Andrew Streets replaces a mix of detached houses with office occupations and a small walk-up apartment building. The proposed building would add 4 storeys of density to this parcel, more than tripling the density.

4. The existing Sun Life Financial headquarters is an 18-storey, 745,247 square foot office complex and associated parking comprised of a five-storey parking structure and a surface parking lot for a combined total site area of 15.9 acres. The property was sold for $145M to Concert Properties. According to David Podmore, Chairman and Chief Executive Officer of Concert, “The projected growth of the Waterloo region makes this an incredible opportunity for Concert. We are thrilled to invest in such a thriving area and are looking forward to building a strong symbiotic relationship with the Kitchener-Waterloo community.”

5. Landscaped ground surrounding Sun Life Financial to stay similar but modified where needed to accommodate sidewalk/cycling path. Double colonnade of trees on King Street reduced to disturb the least amount of property possible near the King and Union intersection.

6. A six-storey building on King Street South is under construction. The building will host a mix of one- and two-bedroom apartments. There will be a mix of underground and street level parking, with commercial space on the ground floor to help activate the street.

DESIGN FEATURES

1. Existing Bauer Loft Condo Building 15-storey tower and neighbouring historic redevelopment.

2. Lower left. View of the heritage Sun Life Financial building with office tower in the background.

3. Proposed Design Axonometric: Intersection A

4. Proposed Design Axonometric: Intersection B

5. Existing houses converted to office space and a two-storey stripmall along Andrew Street could be replaced with higher density stacked townhousing and a new five-storey apartment or office building with ground floor commercial space. Office users could occupy upper floors in place of their current storefront locations.

6. Midtown intersection at King Street South + Andrew Street


13 https://www.renx.ca/concert-properties-now-too-big-too-busy-to-hide/
### Proposed Design Axonometric

#### Existing Condition

Urban condition in midtown.

**Fig. 363.** Top Left. View of street in front of Sun Life Financial property at 227 King St. S, a site that borders the cities of Kitchener and Waterloo.

**Fig. 364.** Centre Left. Image showing lights and electric poles for light rail on King Street from Union Street.

**Fig. 365.** Bottom Left. Image showing existing Sun Life parking lot.

#### Design Features

1. Landscaped ground surrounding Sun Life Financial is to stay similar to its existing condition, but modified where needed to accommodate sidewalk/cycling paths. The usual double colonnade of trees on King Street is reduced to disturb the least amount of property possible near the King and Union intersections.

2. A six-storey building can nestle between King Street and Diddle Lane, preserving surrounding detached housing. Large floor to floor heights as new buildings are constructed along this area of King Street, they should be pushed back to have space for the elements of the urban street design. A generous floor to floor height and large, regularized windows allow flexible use.

3. Sun Life parking lot infilled with midrise buildings, with ample ground floor streetfrontage to make up for the lack thereof at the Sun Life property. Buildings can be dense in this location of King Street to help offset the 9-5 business hour operation of the insurance company to bring more life to this particular intersection. The building is a half-courtyard shape, with space for roof terraces and planted greenroof.

4. Linked walk-up style housing and commercial space can be built on northeast corner of King and Union to begin a taper effect into the neighborhood on Herbert Street and fit the shallow lot depth on this block.

- Each floor of one unit is approximately 130 square meters, 1,000 square feet, enough space for a generous apartment, small business or live/work studio to exist on a single floor of this building.
- Floors can also be divided into smaller units if need be, creating a minimum of 28 units in this building.
Existing residential fabric on the rear side of the block northeast of King Street. Sites along King Street and key sites that require infill and demolition should be part of the first stage of construction in Midtown, and other sites along the ION route. Further stages of development could include densification of the next layer of sites beyond King Street.

Both Sun Life Financial and Grand River Hospital are private occupancies in the sense that they do not enhance street life or provide storefront opportunity, creating a deadzone in the neighbourhood. This can easily create an unsafe condition, and is unappealing for neighbouring residents, without immediate access to third place needs.

For this, an expanded wing of the Hospital could run parallel to King Street, and offer ground level coffee and gifts shops and restaurants for hospital visitors and passersby with hospital occupancy above.

Any sort of narrow midrise building could face the Hospital on the north side of King Street. The extension of Dodds Lane that bisects this block provides helpful rear entry points to the buildings facing King and Herbert Streets without adding to traffic on the transit corridor.
Providing a mix in building types on any site in Midtown will attract residents with varying needs and uses.

Consolidation of the many health practices could be considered a suitable occupancy for a midrise building bordering the hospital. Such a building would be appropriate for those with accessibility needs than the current walk-up homes that have been converted into makeshift medical facilities, with limited access for patients and expansion for business owners. The two buildings shown in the photo to the left would be demolished to accommodate this new construction.

The streetway running through the existing parking lot for Sunlife Financial could create a roadway through a newly developed parcel. In its existing condition, the parking lot parcel consumes over 8 acres of urban real estate in a singular block. The 195 metre deep parcel would create too large of a building block. An additional road would break up the block, creating a new route to traverse Midtown, and allow access to new buildings and below grade parking. The scheme is sensitive to the neighbouring single detached residential buildings, tapering the building height to be reflective of building heights across the street.
King Street and Pine Street is the closest intersection to the only ION stop in Midtown. The emergency entrance and Ambulance Entry to Grand River Hospital collide with the ION stop, an intersection, and access to the visitor parking for the Hospital. Smooth circulation is of the utmost concern at this location so as to avoid accidents between the multiple modes of transportation—motorists, pedestrians and cyclists alike. Detour access points to the buildings across from the Hospital on King Street should be diverted to alleyways to avoid further confusion and additional traffic disruption.

There is a need to create public amenities for visitors and guests at the hospital who are in for short procedures, or a longer stay. The current layout of the Hospital does not provide many food or coffee options for visitors, patients or staff alike. If retail and restaurant businesses were incorporated into an expanded wing along King Street, walk-in traffic could also service the amenities.

Another extension to the Hospital could be made between the emergency department and main entrance. If the majority of the structure is pushed up a story, there is still allowance for emergency vehicles to circulate and park underneath the building. The extension meets the ground along King Street to allow space for a small coffee shop or retail enterprise, with the midrise wing connected to the main hospital atrium.

A smaller midrise building can help to offset the large institutional buildings across King Street. The parcel is narrow, but it is important to continue access to the laneway that bisects the block (Dodds Lane). Providing access to buildings that line King Street through laneways is a more efficient alternative than interrupting traffic.

Stacked townhousing replace a street level parking lot and a medical building. The buildings are four storeys, allowing for varying sizes and types of units.

The current home of lowrise CTV Kitchener and Grand River Hospital medical centre can be accommodated in a terraced courtyard building.

**Fig. 374.** Top Left. Sidewalk running immediately adjacent to the street frontage of Grand River Hospital showing the vacuous space between street and building facades.

**Fig. 375.** Centre Left. Existing low density buildings across from Grand River Hospital between Pine and Mount Hope Streets.

**Fig. 376.** Aerial view of Grand River Hospital and surrounding fabric.
Fig. 378. Conceptual Image at Hospital Stop

HOSPITAL STOP

Conceptual image of light rail stop at grand river hospital
The existing four-level parking garage at Grand River Hospital is constructed in such a way that it can be expanded to accommodate additional visitor and staff parking needs. As the area surrounding the hospital is developed, there will be less street parking available to the Hospital, and parking needs should be met on site. Visitors and hospital staff should be encouraged to make use of the public transit or cycling access where possible. Generous bicycle parking should be added to the existing parking garage for safe storage. The portion of the parking garage that faces King Street should be transformed into a storefront occupancy to help offset the adjacent block that makes up the high school, and offers no public street frontage. Known for being statistically unsafe, the increased traffic surrounding any parking garage creates a safer environment for patrons and passersby.

A courtyard building with the ability to taper down toward the sportsfield and neighbouring parkspace

St. Mark’s Lutheran Church, constructed in 1913 is a heritage property and remains in as is condition.

Outdoor public space is an extension of the linear park leading into the Mount Hope Cemetery, serving as space for farmers markets, small events and performance space, and ground level greenspace for hospital patients, staff and visitors across King Street.

Linear park connecting to historic cemetery and greenspace extending from King Street to Herbert Street along Green Street. A series of paths form connections through the park to intersections and building entrances.

Kings Tower (shown in image to the left) to be renovated and reskinned rather than demolished and replaced. The expansion would bring public programming out to King Street, with an accessible podium and an attached courtyard building.

Kitchener-Waterloo Collegiate & Vocational School described in a following image.
The greenspace (shown in image to the left) is the primary field space for athletes at KCI, as the high school is landlocked and limited on greenspace. The land that makes up the Sportsfield is owned by the City, but does not currently have the dimensions to accommodate a proper field for soccer, football or the like. In this proposal, the size of the Sportsfield is adjusted to host a field for practice and game use by the adjacent schools as well as community sports groups after hours. The ramped surface creates a fieldhouse below, with generous spectator space above. The fieldhouse could allow for changerooms, public washrooms and equipment storage. When not in use, the field could be used as an extension to the neighbouring park space as a great place to throw a frisbee or have a nap atop the fieldhouse.

The throughway allows for user parking and space for team buses to park while the field is in use.

A row of infill housing facing the extension of Braun/Herbert Street is added to create continual street frontage. The properties would be highly appealing to prospective buyers for their frontage onto field/greenspace and greenspace to the rear.

Mount Hope Cemetery was originally on the land now occupied by Grand River Hospital. In 1868 the Town of Berlin purchased two acres of land from John Hoffman, to establish a municipal cemetery. The Town of Berlin purchased an additional 10.25 acres in 1871 from John Hoffman for cemetery expansion, which bordered both Kitchener and Waterloo. In the early life of this community there was a cluster of churches around Church and Benton Streets. Most had their own cemetery, but as they eventually closed, many of those buried at the churches were moved to the Mount Hope municipal cemetery around 1874. It is now valued as a park and heritage landmark.

Parking around the sportsfield is limited to the opposite sides of the road to avoid vehicles parking too close to ongoing activities. The sidewalk and cycle lanes run past the ends of the field, but do not flank the sides to maximize field space and deter pedestrians from walking too close to a game.

Regulation field sizes: Football field: ~48mx110m, Soccer Pitch: ~90-120m x 45-90m


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URBAN PARK
conceptual image of secondary neighborhood + greenspace

Fig. 387. Conceptual Image at Urban Park
Kitchener-Waterloo Collegiate & Vocational School, or KCI, is a heritage building. There is an extreme grade change from street level to the ground floor at this site. Large staircases and ramps take up much of the frontage of the school. In this location, sidewalks, cycle lanes and greenery must be as cinched as possible to pass by the front of this property.

A large double courtyard building connects to the podium of the Kings Tower Expansion. The building connects to the podium of the reskinned King’s Tower, and easily creates street frontage on both streets, stepping down to meet the greenspace at the rear.

Linked housing leaves greenspace between KCI Secondary School and King Edward Elementary School, as both schools are landlocked and do not have direct access to soft landscaping.

There is a pause in density between Green Street and Agnes Street on the southwest side of King Street to allow for added greenspace.

Narrow mixed use buildings with ground level public space faces onto the greenspace between the public schools. A 15 metre floorplate allows for units on either side of a corridor, or open floor plans depending on building use.

South of greenspace forms connective tissue between the two public schools on the block, both of which lack soft landscaping. This area could be space for activities, small classes or lunch breaks, helping to further occupy the ground plane during daytime hours. The space could also be shared by adjacent residents. Shared communal space maximizes the use of space while it minimizes square footage, and ensures programmatic variance and occupancy at extended hours.

A similar terraced building could be constructed in this location to make up for population density lost by the schools across the street. The courtyard typology is not widely used in the Canadian climate, but can create beautiful outdoor space, as well as a secondary level of communal space for its residents if situated with access to proper daylighting.

**Fig. 388.** Image showing front of KCI school with narrow sidewalk.

**Fig. 389.** KCI.

**Fig. 390.** Existing built fabric to be intensified in design proposal. Photo taken from sidewalk in front of KCI.
A shallow building with a terrace backing onto the greenspace that links KCI and King Edward Schools. As mentioned on the previous drawing, this greenspace has potential for varied programming and users throughout the day. With close proximity to the parking lot at both schools, this area could also be used as a venue for small events, weekend markets or physical activities that often take place in a schoolyard.

King Edward Public School has the unique ability in its prime urban location to take on the role as a community centre and gathering space for local residents during after school hours.

Midrise building facing both King Street South and Andrew Street, opens up in the rear as a half-courtyard typology. Access points through the building on the ground floor are a possibility if they are well-lit and transparent in construction. Occupants of the ground floor in this location could have programming open up onto the greenspace behind the building via a patio, plantings, outdoor furnishings, etc.

Converging block structure allows for a small square outside the terraced building at King and Andrew. This would be prime spill space for a cafe or pub. Low-lying gardens and greenery could remove the effect of patrons drinking a coffee in the centre of a traffic zone.

This landlocked parcel is sufficient for a geometrically skewed building, made efficient by a terracing effect to provide tenants with access to outdoor space and varying sizes of units. Circulation would run through the building with units facing onto King Street or adjacent laneways in multiple configurations. Generous roof terracing makes up for what the site lacks in ground level greenspace.

The one-way laneway between buildings on this block provides interior access points to buildings and runs onto King Street South.
STREET AERIAL
Conceptual image of the transit corridor in birds eye view.
**Proposed Design Axonometric**

**Urban Condition in Midtown**

**Design Features**

1. The block at King and Louisa faces King Street at an angle. Building under construction is built too close to the curbs on both King and Louisa Streets, providing an example of the most minimized type of urban streetscape in this design. In this instance, only cycling and pedestrian paths fit between the building face and street.

2. Two new buildings on the southwest side of Louisa Street have a floorplate to fit between King Street and the rear laneway. They replace detached houses that had been converted to medical offices and small businesses. Any commercial uses could be moved into the larger new buildings, with added room for new tenants and greater accessibility for clients.

3. A building at the corner of King and Louisa overhangs the relief on the streetscape below. Its roof slopes down toward the rear, to provide a more gradual fade into the two-story residential fabric beyond.

4. The added space at the corner on the street level balances the lack of space on the opposite side of Louisa, where the new construction is tight to the roadside.

Fig. 397. Exterior view of the 138 unit residential building called Midtown Lofts on King Street South and Louisa Street.

Fig. 398. Image of low density existing fabric at King and Louisa with Ratz Bechtal building in background.

Fig. 399. Construction on King Street and surrounding houses turned small businesses.
This wedge-shaped parcel is perfect to accommodate a terraced typology with small units facing King Street in two directions. This building has potential for live/work units, micro apartments or small gallery spaces.

Heritage Home. The preservation of this property leaves a shallow and odd shaped property facing King Street. A triangular shaped terrace building could nestle between the heritage home, the laneway traversing the block, leviting ground floor space for

Linked townhouses are elevated above the ground floor plane to allow for public programming on the ground floor. Small shops owned by tenants living above, or unrelated business owners could operate the spaces with streetfront access.

The acute angle at northeast corner of the block allows extra space for a restaurant or event space to spill onto the street.

The former Ratz Bechtal Property borders the GO track, and is up for redevelopment by the Zehr Development Group. This site, called Sixo Development, is therefore not part of the proposed design for Midtown. The former funeral home building is being preserved, and surrounded by high density, high end residential and mixed-use units. The redevelopment is pictured to the left in conceptual images provided by Zehr Group.

The one-way laneway between buildings on this block exits onto King Street South.

A midrise courtyard building facing King Street and Moore Avenue/Breithaupt Street is described in next diagram.
PRoPoSed deSiGn AxonoMeTRic

This odd shaped courtyard building faces King Street, Breithaupt Street and Moore Avenue, backing onto an access lane way between buildings. The centre of the building has a generous courtyard for residents or public/private events, depending on the occupancy.

Future redevelopment site of the Former Ratz Bechtal Funeral Home. Imagery of the approved development is on the previous spread.

Midrise building is an example of an infill project for the surface parking lot facing Moore Avenue and Breithaupt Street. Although this site could handle a larger development, as it sits on a generous parcel of land, a tower too tall would overshadow much of the neighbourhood surrounding Moore Avenue. Large developments are better left to the south side of King Street for this reason.

Home of the Google Kitchener Waterloo Office which borders the site of future development of the Victoria Transit Hub.

The LRT track separates to go under a train bridge that services the local GO and freight lines. The separated tracks are shown in the top two photos to the left (images by author).

Fig. 405. Top left. Image of the former Ratz Bechtal Funeral Home and future site of Sixo Condo Development by Zehr Group.

Fig. 406. Centre left. Image of the Google Kitchener Headquarters while under construction.

Fig. 407. Bottom left. Image of the newly opened King Street underpass connecting Midtown and Downtown. The LRT track splits at the intersection of King Street and Moore Avenue before hitting Downtown Kitchener.

Fig. 408. Proposed Design Axonometric: Intersection L.
“One cannot rely solely on present patterns, since these are constantly shifting, and occur only within present possibilities and constraints… the designer’s work is still incomplete, even if he provides a variety of facilities for a carefully analyzed range of new and existing activities. None is providing open space, his principal task remains to devise forms which are uncommitted and plastic, which adapt themselves easily to a great variety of behaviours, and which provide neutral but suggestive material for spontaneous action.” (105)

- Kevin Lynch, The Openness of Open Space

FLEXIBILITY THROUGH DESIGN

- Avoid designing for a singular function – ie parking lots need to have a dual use when they are empty
- Parking lots that are used infrequently can be surfaced with grass or a similar pervious material rather than asphalt.
- Preserve existing buildings by finding a new use (see MVRDV project as precedent)

"Planners cannot significantly improve the design of cities without reforming local parking requirements to emphasize quality over quantity. While developers may object because better design will have a higher development cost, cities can mitigate these costs by reducing or removing minimum parking requirements. Reducing parking alone will improve urban design. As a famous architect once put it, less is more.” - 129

- Vinit Mukhija + Donald Shoup (Quantity vs Quality of Off-Street Parking Requirements)

The Lang Tannery is two city blocks of turn-of-the-century mill construction buildings. RAW masterplanned their conversion to a vibrant mixed-use community. Selective demolition and a combination of restoration and new construction has created a unique landmark and destination address for high-tech companies, doctors’ offices, artisans, a pharmacy, retail, restaurants, and a public event space.

The building was cleverly restored, keeping the heritage of the building alive, but adding modern elements through furniture, lighting and architectural details. The building is laid out to foster flexibility and offer many social spaces for groups to get together and talk about ideas, or just have lunch. There are also break out rooms for private business meetings or phone calls. I am hoping to get a tour of this building in the winter term from some friends at Communitech to better understand the needs of the startup companies that occupy the spaces.
Upon research and design surrounding the Hospital, there should be two ION stops in Midtown to anchor either end of the Hospital, replacing the single stop directly in front of the Hospital. The study to the left illustrates the current stop placement in contrast to the proposed stop placements, and their relation to stops at Allen and Victoria Streets. Midtown is the only site within the urban core where the 400 and 800 metre walking sheds do not overlap. This distance should be decreased, so there is an effective spectrum of walkability for Midtown. This may also encourage employees at the large institutions to use the ION for their daily commute if there is a stop within a five minute walking distance of their place of employment. Having two stops creates better odds to place an ION stop in closer walking proximity to an employee’s workplace than an available parking space. Similar methods can be applied along the ION corridor as urbanization continues to spread out from the main urban core—Uptown, Midtown, Downtown. As use of the ION corridor increases, additional trains can be purchased and run on the line, with increased frequency of service. It would take little more than the rearranging of some curbs and refuge islands to shuffle stops along the light rail line. This is not something that should be done regularly, but is beneficial if it increases usability of the line, and invites more travelers to explore the corridor.

Fig. 413. Shuffling Stops on the ION
CONCLUSIONS

This thesis examines Waterloo Region’s future LRT development as a means to urbanize and link the Downtowns of Waterloo and Kitchener through a linear green corridor. This model of linear urban intensification could be adapted to other areas along the corridor, as they spread away from the main urban growth centres, as well as to future areas for expansion of the LRT system. It can also be applied to other midsize cities that are seeing too much growth in suburban areas, or small concentrations of high density developments, with no overall intensification. The model is ideal for cities that need to intensify their cores to avoid the continuous issues of outward growth.

FLEXIBILITY IN FUTURE STOPS

The ION will connect the Region, but needs to be something of a flexible nature, to adapt as the Region creates new opportunities. The Region will continuously grow and change, and with that the needs of the light rail transit will also change. The infrastructure at transit stops is so permanent in its current design that it would be difficult to convince officials to move a stop if it is problematic in its location, or add another stop should a currently undeveloped area become dense and require a stop on the route. The placement of stops on future light rail lines should be considered and placed in areas where growth is projected and allowed by regional planners. A stop could always stay inactive until there is demand for its use if that is the preferred method. At an open house at the Northfield station, ION design officials stated that the stops are permanent. There is no intention of relocating stops along the route as neighbourhoods change and develop. This is problematic and a design flaw in its current state.

ACHIEVING DENSITY

Four to eight storey developments for Waterloo Region are an ideal scale to achieve density without having a building up to eleven storeys is still considered midrise and acceptable for sites that require increased density. As demonstrated in earlier studies, this density still achieves the density targets laid out by the Places to Grow Act of 150 people and jobs per hectare, and would spread resources along the corridor.

PHASE 2: CAMBRIDGE

When considering the planning for Stage 2 of the ION to Cambridge, it would be ideal if issues from the current design could be adapted and redesigned to better suit the Region. The green corridor is something that would unambiguously not occur in the immediate future on Phase 1, as everything is freshly constructed, but could be an appealing design feature for Phase 2.

CONTINUED RESEARCH

Additional Urban Rules could be added given more time for analysis and design. A more focused model of a form based code could be created for Waterloo Region to address design features on buildings given additional time and resources.

LIMITATIONS

It should be noted that the bulk of research and design for this thesis was completed prior to the proposal of PARTS discourse related to King Street, but beyond that, it looks at the actual form of the street itself.

The design proposal for Midtown is not a full master plan, and does not address building details. The model is based on a cut-and-try approach to avoiding designing and problem solving in areas that were already in construction phases at the beginning of the thesis. A full design is also better left for a specific project design. The choice to focus on mapping to indicate the general size and layout of potential buildings, placement and merging of parcels, and the public space that surrounds the built fabric was the preferred method to illustrate each intersection axonometric diagram along the ION corridor in Midtown. In its current state, the buildings in images are inserted for the purpose of creating a streetscape, and are not designed to a level that they should be directly copied for real design.
**GLOSSARY**

**CREATIVE CLASS**

The Creative Class is a postindustrial socioeconomic class identified by American economist and social scientist Richard Florida (Rotman School of Management at the University of Toronto). Florida divides the Creative Class as comprising 40 million workers (about 30 percent of the U.S. workforce) to continue the economic growth via creative careers.

**FORM-BASED CODE**

A land-use pattern that encourages efficient use of land, walkable neighborhoods, mixed land uses with a focus on all amenities being within one neighborhood. A close proximity to transit is essential.

**COMPACT URBAN FORM**

Activity within a building is less important than the building form and its relationship to other buildings and the street. To produce public quality space that will support healthy civic interaction and allows for development to change. Development through a community process and is conveyed through illustrations/ explanatory text. The code designates building types, establishes maximum building heights, placement in relationship to adjacent buildings and street, and location and configuration of entries, windows, porches, parking, yards, and courtyards.

**GREAT READER HORESCHOE**

The Greater Golden Horseshoe is a geographic area in Ontario, with a specific growth plan and vision. The GGH cross provides the basis for vision guiding decisions on how land is developed, resources are managed and public dollars invested:

- Build compact, vibrant and complete communities.
- Plan and manage growth to support a strong and vibrant economy.
- Protect, conserve and enhance natural resources are managed and public dollars invested:
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- Create a model of curb-in urbanism for the King Street transit corridor, as described on the left foot. The street design is illustrated in a combination of cross-sectional and plan drawings and axonometric diagrams. The design establishes building setbacks, plans for traffic management, implementation of green infrastructure and street parking landscape design elements and materials selection for the site extents.

**ION CORRIDOR**

The ION Corridor is the track and coinciding buffer zone for passage or conveyance of vehicles or people. The transportation corridor includes:

- Major roads, arterial roads, and highways;
- Rail lines/railways for moving people and goods;
- Transit right-of-way/transitways including buses and light rail for moving people.

Intensification along the corridor has the potential for the creation of high-density mixed-use developments consistent with planned transit service.

**CURB-IN URBANISM**

The public space is the first part of the city that users experience. This urban realm is inextricably interwoven with land on which it is situated. The curb-in urbanism is formed by the building footprints. It is therefore the first aspect of the design proposal for Millhouse. It delineates design elements that create a lively, safe and environmentally conscious urban environment. A model of curb-in urbanism has been established for the King Street transit corridor, as described on the left foot. The street design is illustrated in a combination of cross-sectional and plan drawings and axonometric diagrams. The design establishes building setbacks, plans for traffic management, implementation of green infrastructure and street parking landscape design elements and materials selection for the site extents.

**GREATUR CARENT 2000**

The Greater Golden Horseshoe Plan aims to target significant portions of intensification and growth in urban growth centres throughout Ontario. These urban growth centres are generally located within the existing fabric of municipal structures, and often contribute to new plans for expanded transit.

Locations within Waterloo Region: Uptown Waterloo | Downtown Kitchener | Downtown Cambridge

**GREATUR MILLEU**

Urban surroundings, of a social or cultural nature. The Greater City identifies, nurtures, attracts and sustains talent so it is able to mobilize ideas, talents and creative organizations. The built environment is crucial for establishing the milieu. A creative milieu is a place that contains the necessary requirements of infrastructure to generate a flow of ideas and inventions.

**WALKABILITY**

The walkability of a neighbourhood or region is essential for a vibrant urban growth area for all amenities necessary for a healthy lifestyle. The walkability factor is the most important factor for the design of the region. When you imagine walking to the grocery store, it’s not always the most convenient or the most cost-effective method of transportation. The walkability factor is essential for creating a healthy lifestyle.

Urban Identity exist most in balance with its own individual parts, whether even or uneven, the symbiotic communication between these participating parts creates the perceived image as a result of their common ground.

**TRICITIES**

The Tricities is comprised of the cities of Cambridge, Kitchener and Waterloo, who together form a major metropolitan area in Southern Ontario. They form the cities within the Region of Waterloo or Regional Region, due to the Townships of North Dumfries, Wellesley, Wilton and Woolwich. The Tricities are often seen in one area, however public role has turned down the proposal for these cities to be officially amalgamated.

**URBAN GROWTH CENTRE**

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