

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

by

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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.”

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

00 ABSTRACT

The Waterloo Region ION Transit Corridor and its Inter-Urban Design

In 2018, the ION transit corridor will begin the process of linking the Tricities – Waterloo, Kitchener and Cambridge – into a linear metropolitan area, which will offer many economic and infrastructural development opportunities for Waterloo Region. This rebirth of local, high-capacity rail transit will offset the present reliance on private vehicular traffic and relieve perpetually overloaded 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. The Region is often referred to as *the Silicon Valley of The North*, known as a young and prosperous area, boasting prestigious post-secondary institutions, which have created a symbiotic network of expanding cooperative education and startup culture. High-rise infill towers are being erected to replace low density development in an effort to house the student and startup populations in their respective urban districts. Many of these developments are creating a problematic effect on the overall urban perception, with tall building facades directly bordering sidewalks, and little attention paid to a desirable urban mixed-use functionality or human-scaled streetscape. An influx of population with lack of public amenities and streetscape is creating partially and badly urbanized zones, many of which make up the future trajectory of the ION.

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 Regions 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.

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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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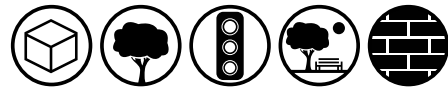
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LIST OF ABBREVIATIONS

LRT	Light Rail Transit
BRT	Bus Rapid Transit
KWCI	Kitchener Waterloo Collegiate Institute
GR HOSPITAL	Grand River Hospital
GRT	Grand River Transit
GGH	Greater Golden Horseshoe
OFA	Ontario Federation of Agriculture
ROW	Region of Waterloo
WR	Waterloo Region
CKW	Cambridge-Kitchener-Waterloo; aka. Tricities
FBC	Form-Based Code



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 theorists 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.

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.



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 neighbourhood, property value, etc.



URBAN INFLUENCE

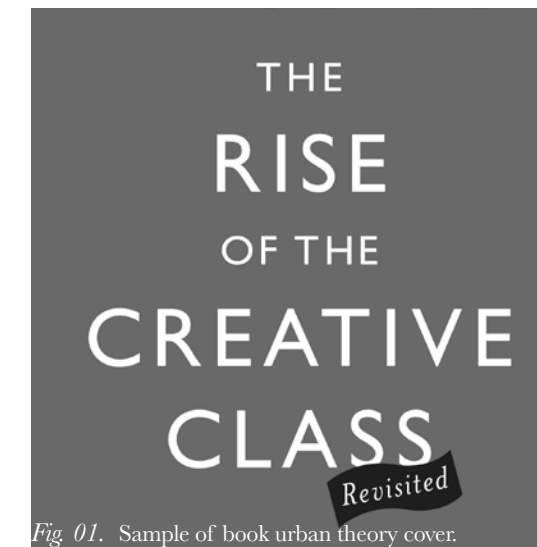


Fig. 01. Sample of book urban theory cover.

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.



initials of urban theorist

OPACITY



relevant theme of urban theorist



theme not covered by urban theorist

THEME / CATEGORY



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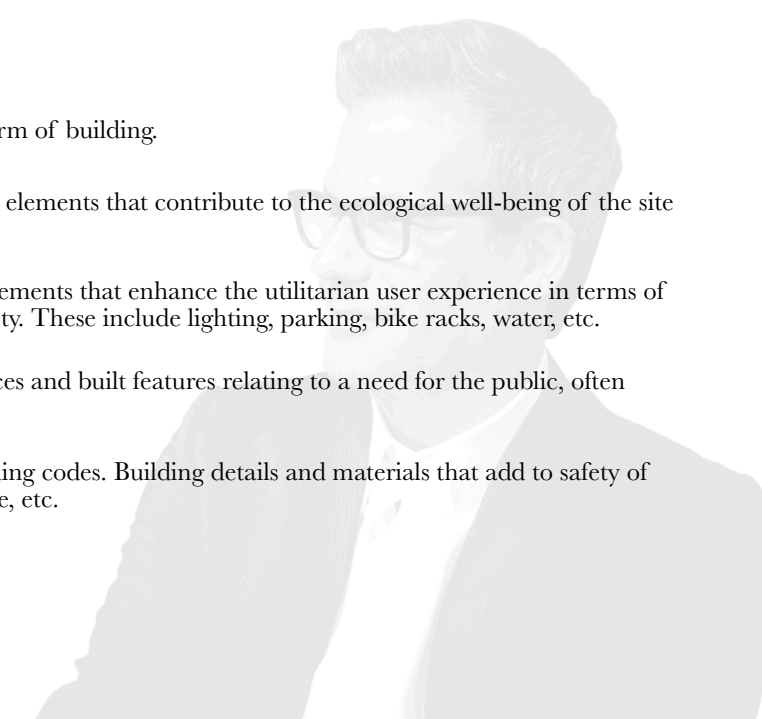
programmatic / public: Services and built features relating to a need for the public, often fulfilling a social need.



built: In addition to base building codes. Building details and materials that add to safety of neighbourhood, property value, etc.

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 they develop to still make the same profit or more?



Vancouver killed the freeway because they didn't want the freeways to kill their neighbourhoods. 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



INTRODUCTION

Fig. 02. Aerial Image over King and Victoria Streets of Future Transit Hub.

*No urban area will prosper unless it attracts those
who can choose to live wherever they wish.*
— *Jonathon Barnett*

INTRODUCTION TO ION: AN OVERVIEW



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

part 01: Introduction to the ION development, demographics and historical data. Overall goals for thesis.

part 02: The Rise of A Tech Hub

part 03: The Design Site.

part 04: The Mechanics of Linear Urbanism in Waterloo Region

part 05: A Design for Midtown

In 2018, the ION transit corridor will begin the process of linking the Tricities – 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 rebirth of local, high-capacity rail transit will offset the present reliance on private vehicular traffic and relieve perpetually overloaded 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 population, many new high-rise buildings have been erected as an extension of the university zone to accommodate the almost 60,000 local postsecondary students. The new constructions are quickly having a problematic effect on the overall perception of the cityscape, with many of the tall building facades directly bordering sidewalks,

and with little attention paid to a more desirable urban mixed-use functionality or human-scaled streetscape. This partially and badly urbanized area is the future trajectory of the ION.

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, where, historically, a series of small towns have slowly grown into one larger metropolitan area. The focus to date has been on large scale regional planning and there is a need for a unified urban design framework for the Waterloo Region Transit Corridor. 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 ION stop at the Grand River Hospital is located at a key regional level urban attractor but the hospital is surrounded by a low-density residential zone, massive parking lots, and underused commercial land. This approximately three-kilometer corridor on King Street should become a prime area of focus to connect the two downtown cores and create a cohesive dense urban environment for future prosperous development.

This thesis examines Waterloo Regions 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 urban intensification design to areas along the corridor, as they spread away from the main urban growth centres. Areas for research and design in this thesis include a study of surrounding neighbourhoods, opportunities for increased residential population densities, new building heights and massing, outdoor public spaces, issues of development phasing, proximity to urban pedestrian trails and other transit stops, storefront based 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 Uptown Waterloo and Downtown Kitchener, with growth traveling to Midtown, to eventually create one large urban growth centre. Once this intensification occurs, growth can occur along the corridor, traveling outward from the urban growth centre, extending its borders. Once desired growth has been achieved along the transit corridor

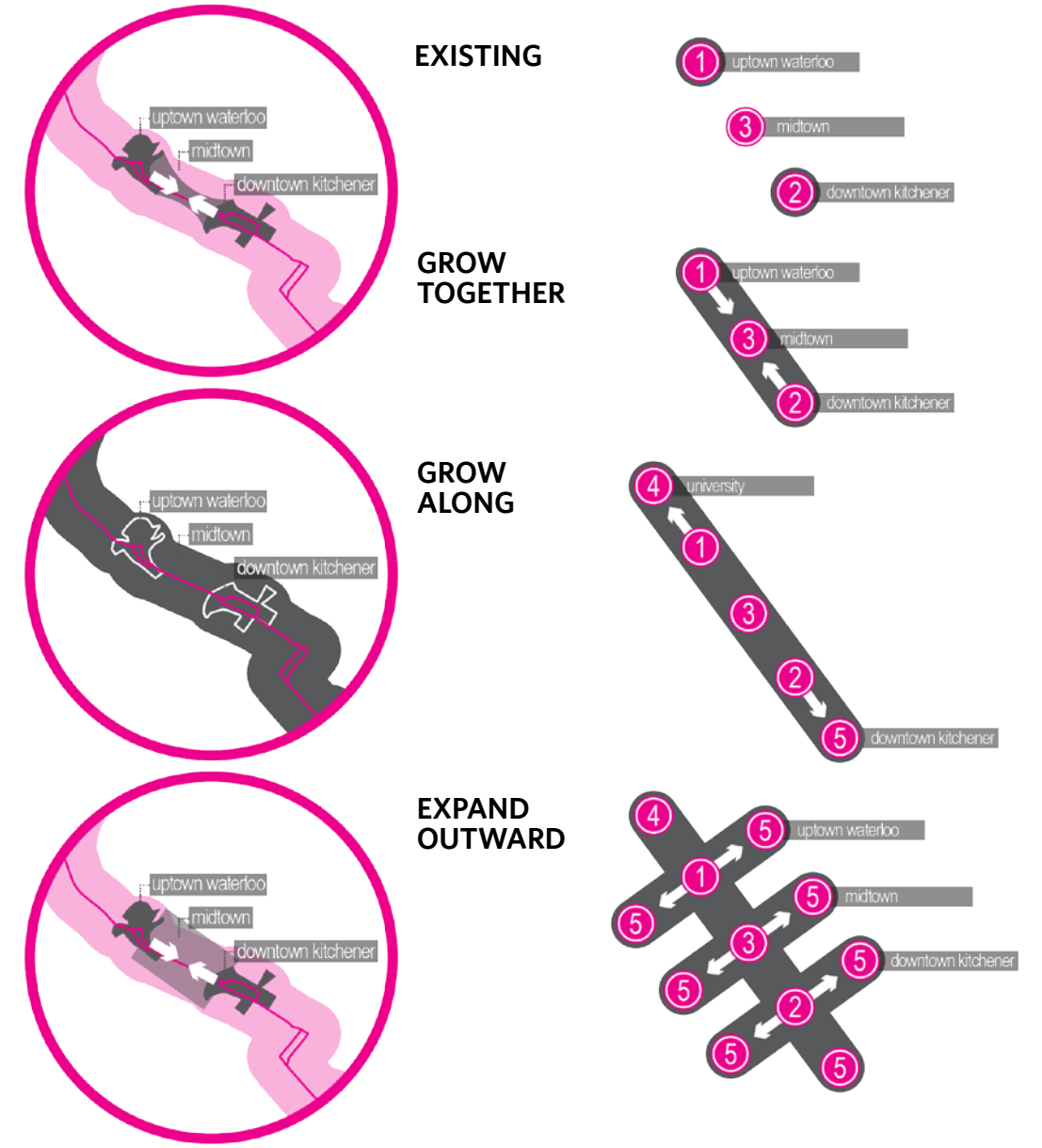


Fig. 04. Proposed Phasing Diagram for the ION Corridor.

“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



Fig. 05. Future ION Stop near Kaufmann Lofts in Kitchener.



Fig. 06. Illustration of ION vehicle in front of Grand River Hospital.

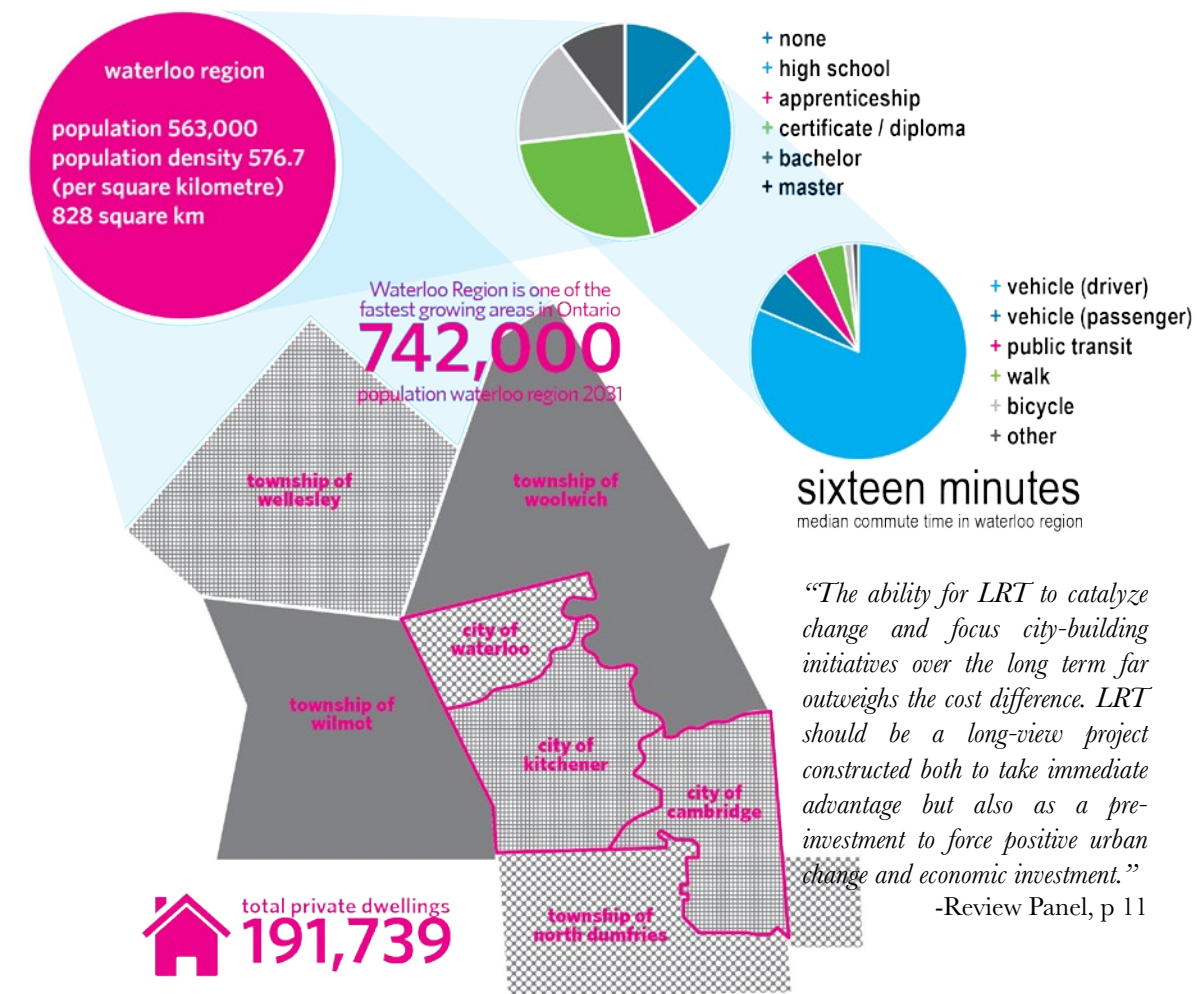
WATERLOO REGION

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.¹

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 centred on the town 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.

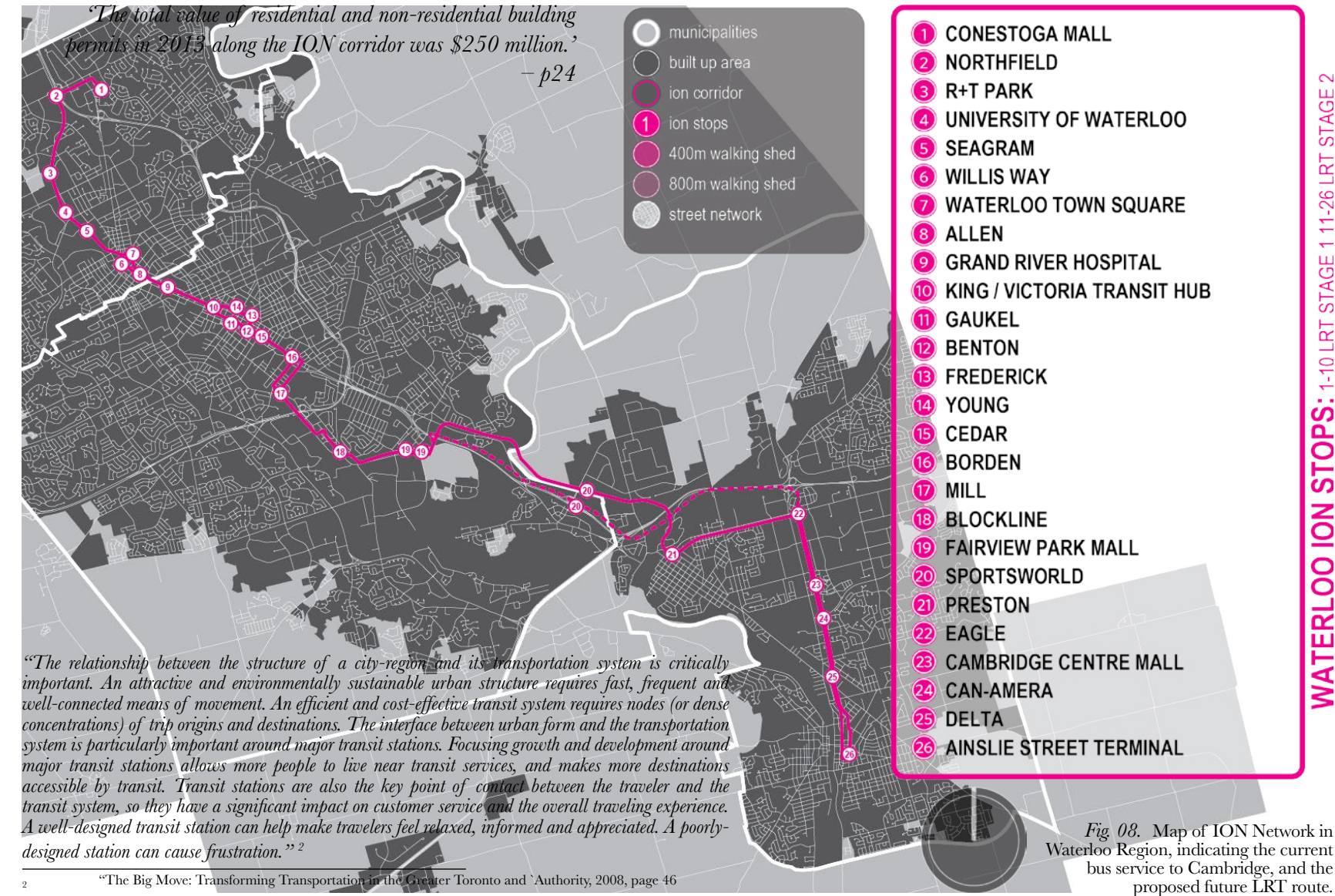
¹ Planning, Research & A. “Population.” Region of Waterloo. Region of Waterloo 2016, <http://www.regionofwaterloo.ca/en/doingbusiness/population.asp>.



“The local construction industry will surge by 10 per cent in 2014 and 2015 as work on LRT begins” - Conference Board of Canada – 24

Fig. 07. Demographics Waterloo Region.

ION DEVELOPMENT



² “The Big Move: Transforming Transportation in the Greater Toronto and Authority, 2008, page 46

HISTORY REPEATS ITSELF

rail transit coming full circle

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 Beasley 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.

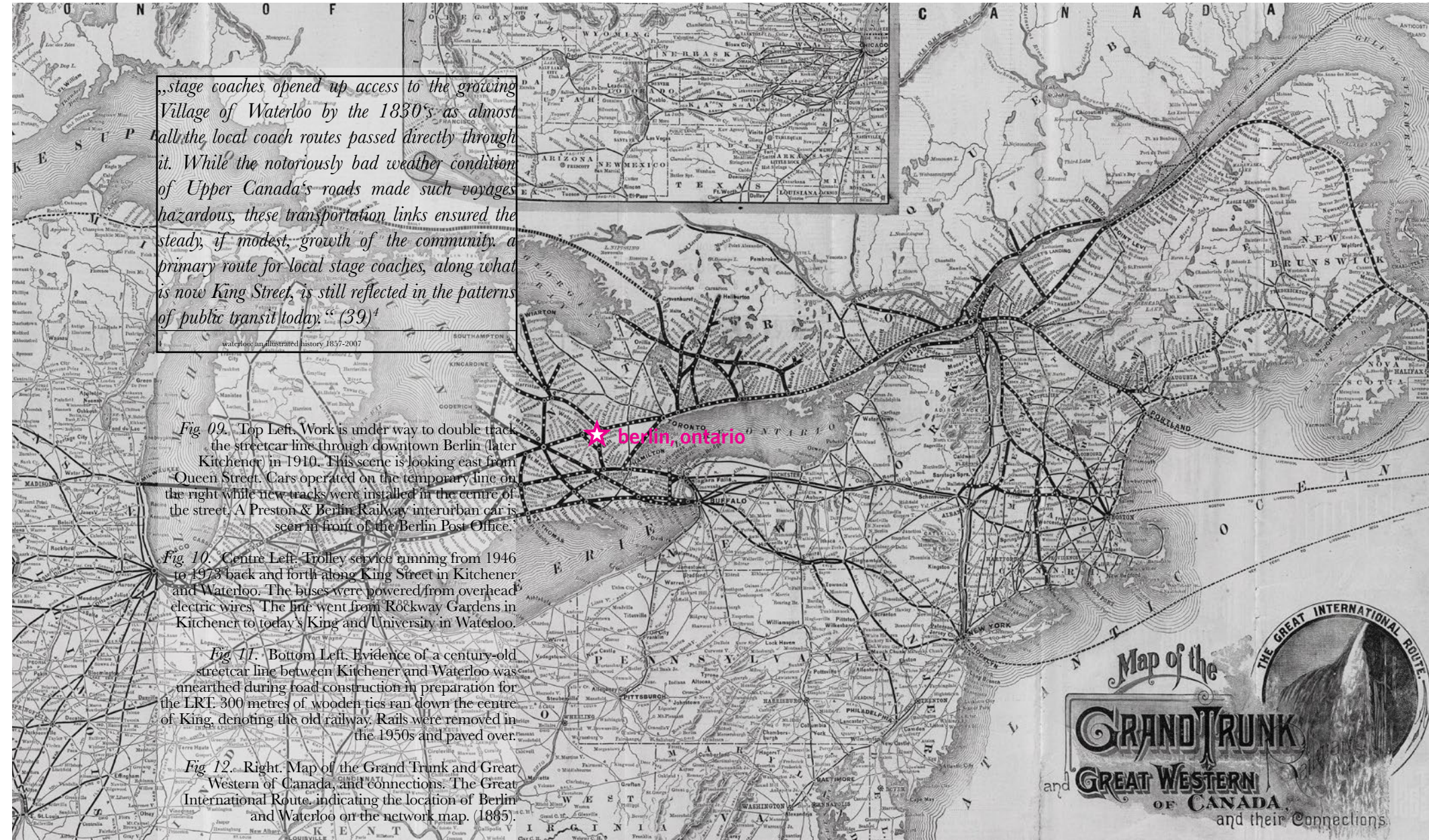
The competition for the location of roads and highways, and perhaps more importantly railroads, was fierce. Railroads connected a community to the larger world, increased development and allowed businesses to flourish. Railways were largely

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. Rivalry 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 this competition, which led it to become the lead 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 1955.³ 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.

³ <https://home.cc.umanitoba.ca/~wyatt/alltime/kitchenes-on.html>



...stage coaches opened up access to the growing Village of Waterloo by the 1830's as almost half the local coach routes passed directly through it. While the notoriously bad weather conditions 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)⁴

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. (1895).

HISTORY OF TRANSIT IN WATERLOO REGION

a timeline showing key moments that have shaped today's transit

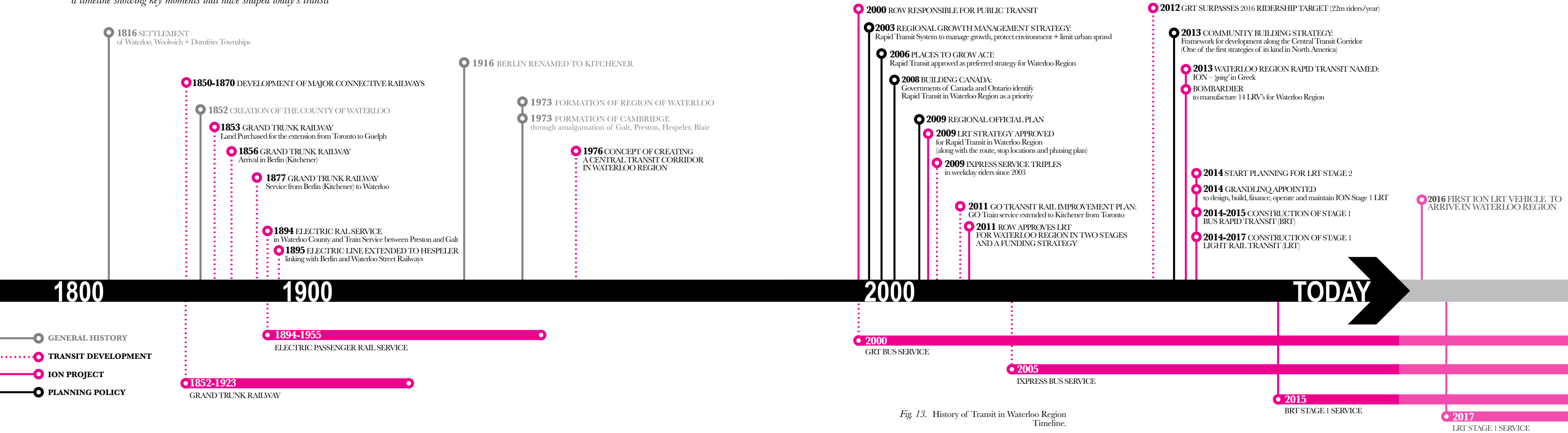


Fig 13. History of Transit in Waterloo Region Timeline.

“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 state-of-the-art multi-modal transportation facility that accommodates a broad range of users arriving by different modes, while furthering the continuing revitalization of Downtown Kitchener. Given this importance, the proposed Transit Hub’s design has to reflect the functional prominence of transit use within the region is providing a transit facility that is convenient and easy to use, that exemplifies high quality design and architecture complementing the site’s context, and that residents and visitors can identify with and embrace.” (12)



Fig. 14. Aerial photo over transit hub in Kitchener.

THE VICTORIA TRANSIT HUB

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 platform, multi-use trail 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.⁵

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*

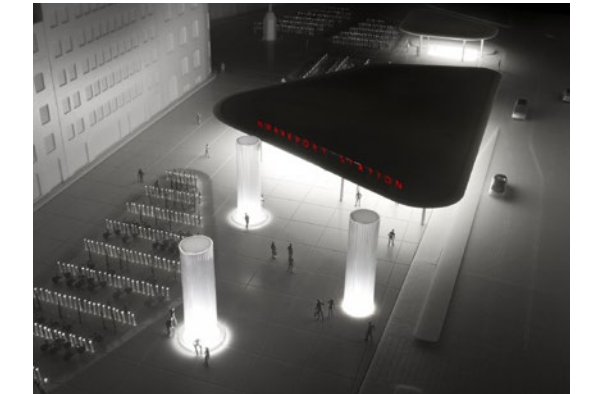
them much more accessible and welcoming, but also contributing to greater safety in the square. and the bicycle parking as small gardens throughout the urban plaza. A study of pedestrian movement analysis across the square formed the basis for the station design. The low flow areas informed the situation of buildings, facilities 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. -Copenhagen X Gallery

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.

Fig. 15. Nørreport Station in Copenhagen.

Fig. 16. Nørreport Station in Copenhagen.

Fig. 17. Nørreport Station in Copenhagen.



⁵ <https://www.kitchenerpost.ca/news-story/7141374-king-victoria-transit-hub-will-be-a-decade-out/>

INTERCITY CONNECTIONS

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 businesses to commute from San Francisco to Kitchener for a meeting, and on to Toronto in the span of a working day.

⁶ <https://news.ontario.ca/mto/en/2015/04/ontario-improving-go-transit-service-along-all-corridors.html>
⁷ <http://www.therecord.com/news-story/5529608-century-old-streetcar-line-found-under-lrt-construction/>

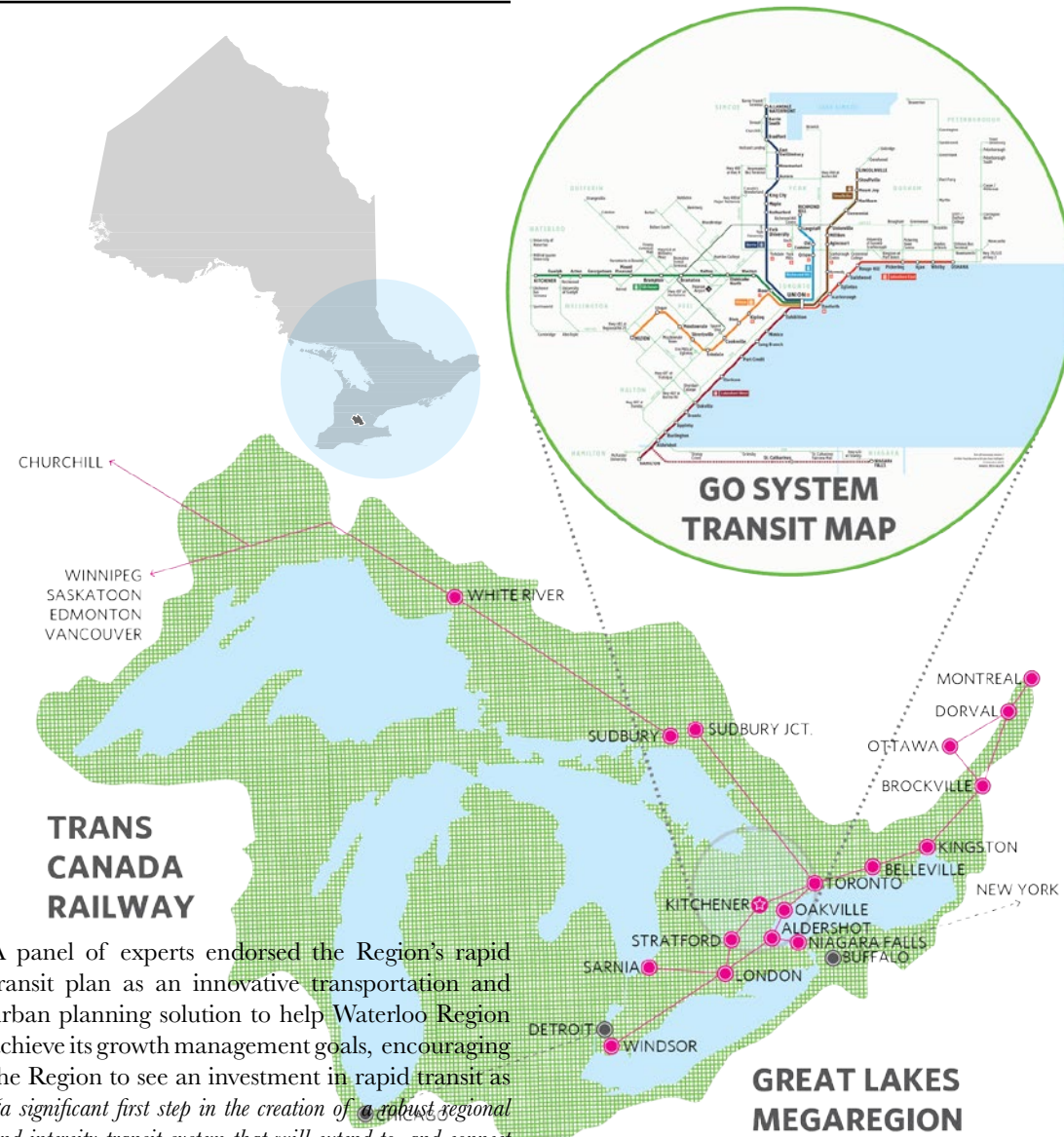


Fig 18. GO System Transit Map.

A panel of experts endorsed the Region's rapid transit plan as an innovative transportation and urban planning solution to help Waterloo Region achieve its growth management goals, encouraging the Region to see an investment in rapid transit as "a significant first step in the creation of a robust regional and intercity transit system that will extend to, and connect with, Guelph, Hamilton, 16 son Airport, the GTA and beyond."⁸

⁸ <https://rapidtransit.regionofwaterloo.ca/en/multimedialibrary/resources/IONStory.pdf>

Fig 19. Trans Canada Railway Map.

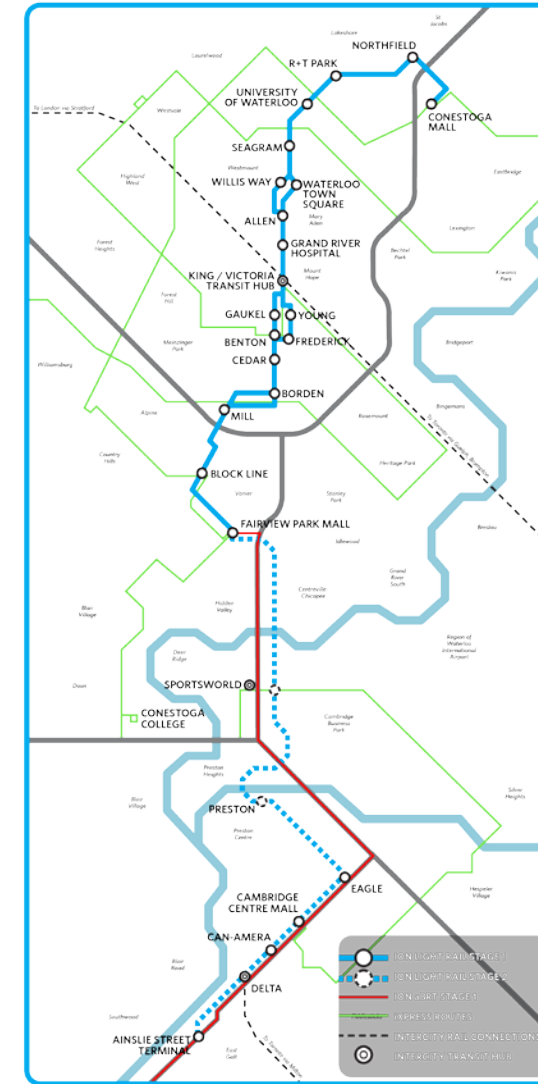


Fig 20. ION and iXpress transit system map re-illustrated by author. Original by Region of Waterloo.



'Premier Kathleen Wynne ...announced the government's plans to bring full-day, two-way GO Train service between Waterloo Region and the Greater Toronto Area (GTA). As estimated in a City and Region of Waterloo report, this investment would create more than 33,000 net new jobs.'



Fig 21. Bottom Right. GO Train at Kitchener Station. Image by author.

TRANSPORTATION IN WATERLOO REGION

web of transportation

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 transfer connections occur to close the gaps between transit companies and modes of transport.

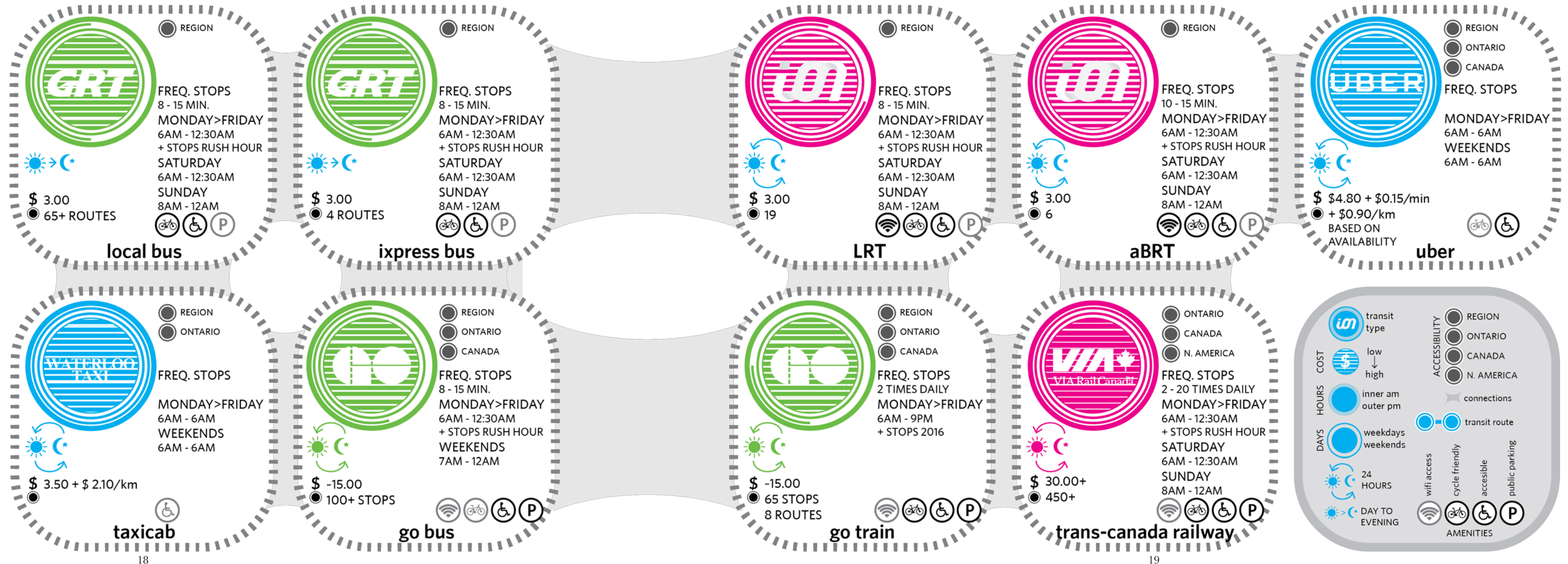
Fig. 22. Grand River Transit website. <http://www.grt.ca/en/index.asp>

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

\$984
MAX. COST OF
TRANSIT PASS
(\$82/MONTH)

x10 **\$9000**
AVG. ANNUAL COST OF OWNING A CAR

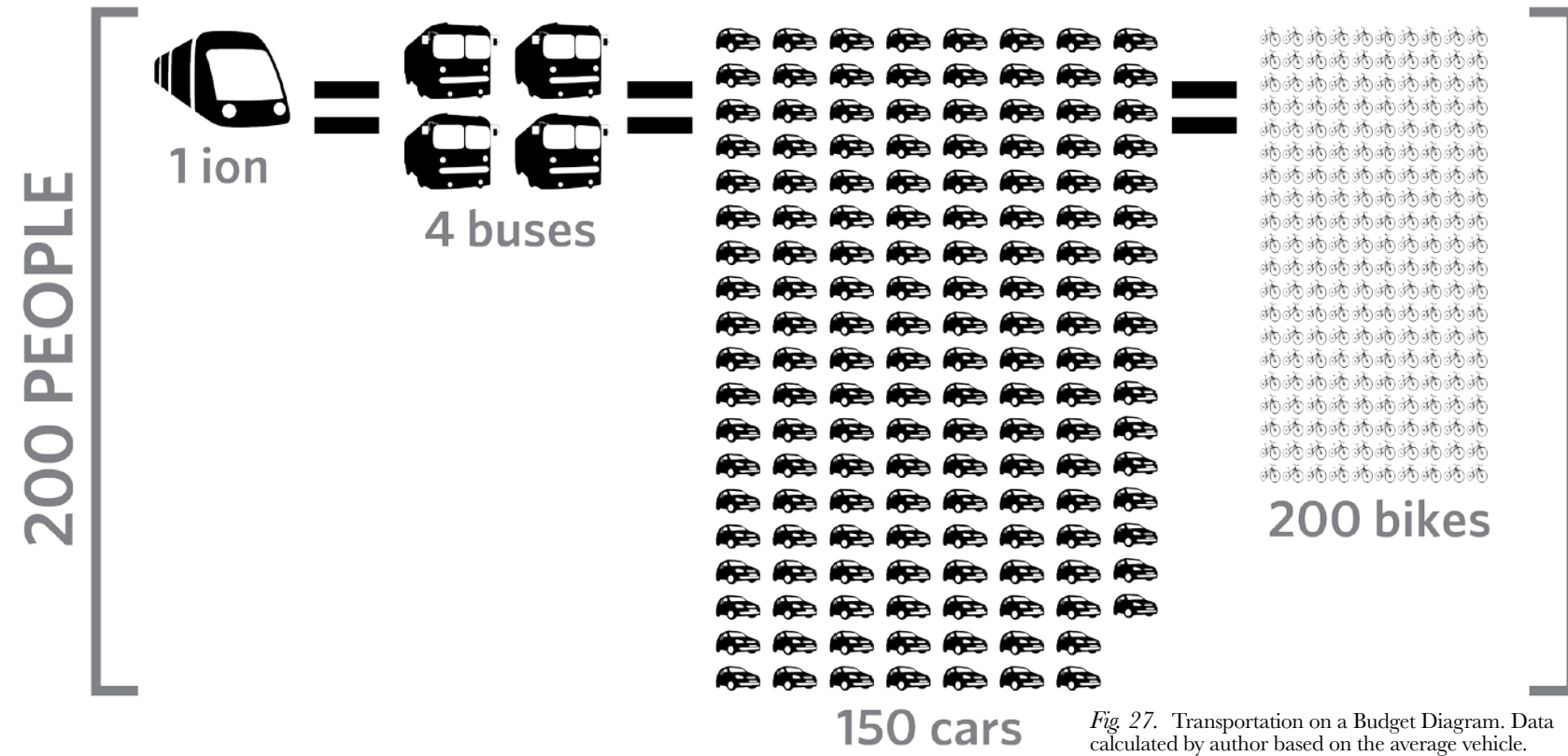


Fig. 27. Transportation on a Budget Diagram. Data calculated by author based on the average vehicle.

THE GREEN COMMUTE

happy 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.

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 TRANSIT?

Vancouver killed the freeway because they didn't want the freeways to kill their neighbourhoods. 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



VEHICULAR

TRANSIT

BIKING

WALKING

- + BEST: CARPOOLING
- + CONTROL OF CLIMATE
- + EASY + FLEXIBLE
- COSTLY TO MAINTAIN CAR
- ISSUES OF PARKING
- GAS PRICES CONTINUALLY RISE
- TRAFFIC
- UNSAFE WEATHER CONDITIONS
- LONG COMMUTES STRESSFUL
- 'NON-PRODUCTIVE' TIME

- + TIME TO RELAX
- + ABILITY TO MEET OTHERS
- + MORE AFFORDABLE THAN CAR
- + WORK DURING COMMUTE
- AT THE MERCY OF THE TRANSIT SCHEDULE
- NOT ALWAYS CLIMATE CONTROLLED
- TRAIN / BUS CAN BE FULL

- + AFFORDABLE
- + MINIMAL GEAR REQUIRED
- + GREAT EXERCISE
- + FRESH AIR
- + NO FEES FOR PARKING, GAS
- + MANAGEABLE IN GREATER DISTANCES THAN WALKING
- NOT IDEAL UNDER CERTAIN WEATHER CIRCUMSTANCES
- CAN BE UNSAFE IF THERE ARE NOT DEDICATED BIKE LANES

- + FREE!
- + GREAT EXERCISE
- + FRESH AIR
- + NO FEES FOR PARKING, GAS
- + TIMING IS FAIRLY PREDICTABLE
- NOT IDEAL UNDER CERTAIN WEATHER CIRCUMSTANCES
- NOT MANAGEABLE FOR VERY LONG COMMUTES

AFFORDABILITY + GREEN COMMUTE RATIO INCREASE

Fig. 28. Above. Diagram showing varying affordability of typical modes of transportation that residents use for commuting.

Fig. 29. Bottom Right. Completed prototype of the EasyGo pay platform validator at ION light rail stops which is activated by touching ones card to the blue/green target. The platform validator will check your card for a valid transfer, pass or stored value.





LIFESTYLE TRANSITION: CAR-DEPENDENT TO CAR-FREE

Urban Structure Matters

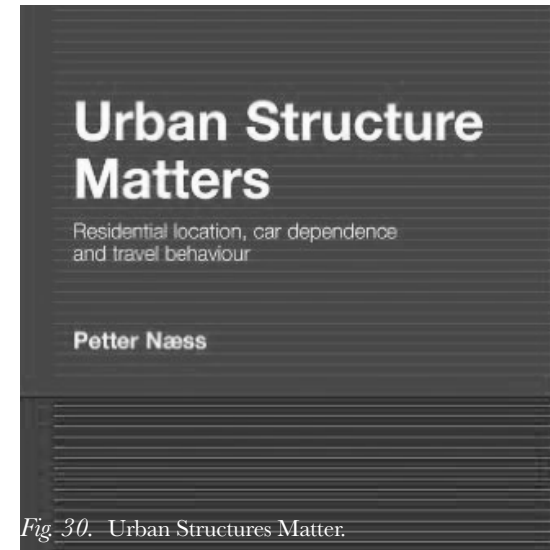
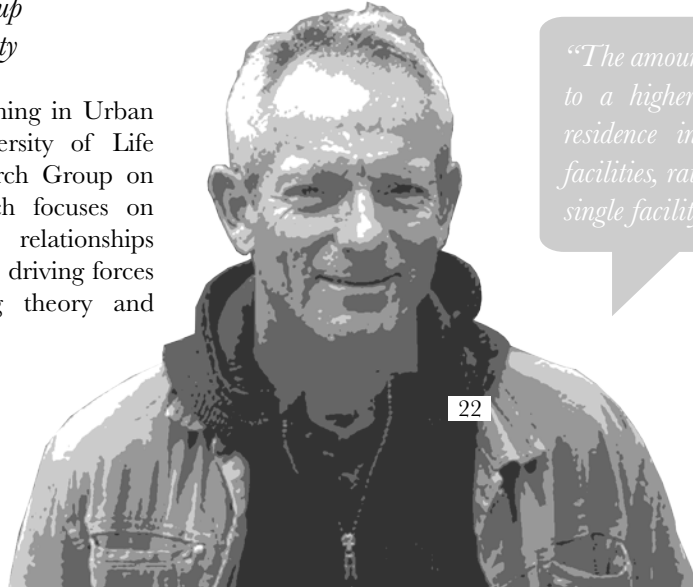


Fig. 30. Urban Structures Matter.

PETTER NÆSS

Professor, Urban Theorist
Head of Research Group
on Urban Sustainability

Petter Næss is a Professor in Planning in Urban Regions at the Norwegian University of Life Sciences, and head of the Research Group on Urban Sustainability. His research focuses on sustainable urban development, relationships between urban form and transport, driving forces in urban development, planning theory and philosophy of science.



For more than 25 years he investigated influences of urban structures on travel behavior, mainly in Nordic countries, but also in China and Southern Europe. He currently heads a project which investigates influences of residential location on travel, physical activity and health in the four largest Norwegian urban regions. He has investigated possibilities and limitations of ecological modernization strategies to achieve sustainable urban development.⁹ Naess's 2006 book *Urban Structure Matters* uses the comprehensive study of the Copenhagen Metropolitan Area as an empirical case to examine the relationship between urban structure and travel behavior. The overall theme of this book is how urban spatial planning influences the amount of travel and the modal split. The research results are relevant not only to land use and transport planning in Denmark, but to a wider global context.

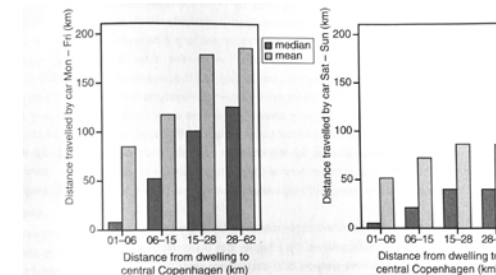
9 <https://www.nmbu.no/ans/petter.nass>

“The amount of travel will then be influenced to a higher extent by the location of the residence in relation to concentrations of facilities, rather than the distance to the closest single facility within a category.” (30)

Fig. 31. Upper Right. Copenhagen Metro Plan. The geometry of the Copenhagen metro provides opportunities to cross through routes and make connections in a non-linear fashion. This means more transfers, but less travel time. This model could be very effective with a polycentric urban area.

Fig. 32. Centre Right. The Finger Plan of the Copenhagen Region (39). Copenhagen's regional framework of the 5 Finger Plan originated in the 1940s, with the concept continuing to shape the regional form. Under the guidance of a regional planning body, urban areas are confined to linear corridors that are linked by transit and extend like fingers from the central core. Green wedges protect the from urban development.

Fig. 33. Lower Right. Travel Distances to Copenhagen City Centre, 1837 respondents. Median and arithmetic mean travel distances by car on weekdays (left) and weekends (right) among respondents living in different distance intervals from the city centre of Copenhagen.



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 behaviour. 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 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

Is it better for cities to have a concentrated urban centre, or many centres for accessibility? Is the urban identity diluted with 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 greenspace 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 zones where there is less access to transit. In Waterloo Region, many neighbourhoods have access to only a single facility, rather than a cluster of facilities, creating car-centric cities and extended travel distances to retrieve necessities.

TRAVEL DISTANCE + BEHAVIOUR

Naess' studies analyze 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 behaviour. Naess' empirical studies determined the following factors affect residential location:

Income | Age | Lifestyle | Household | Vehicle

- + The location of the dwelling relative to the center structure of the Copenhagen Metropolitan Area has the strongest influence on the travel behavior of the respondents.
- + Distance between one's residence and the next closest urban centre or urban railway station, as well as density of inhabitants and work places in the local area.
- + Availability of nearby facilities and trip distances
- + Transport and environmental attitudes, the possession 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 more strongly affects 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.

WR TRANSIT MAP

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 iXpress routes in 2018. A few changes were made to optimize the legibility of the map. As iXpress routes expand in the Region, they would be added to the map, creating less of a gap between routes.

These traditional diagrammatic 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 iXpress. 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.

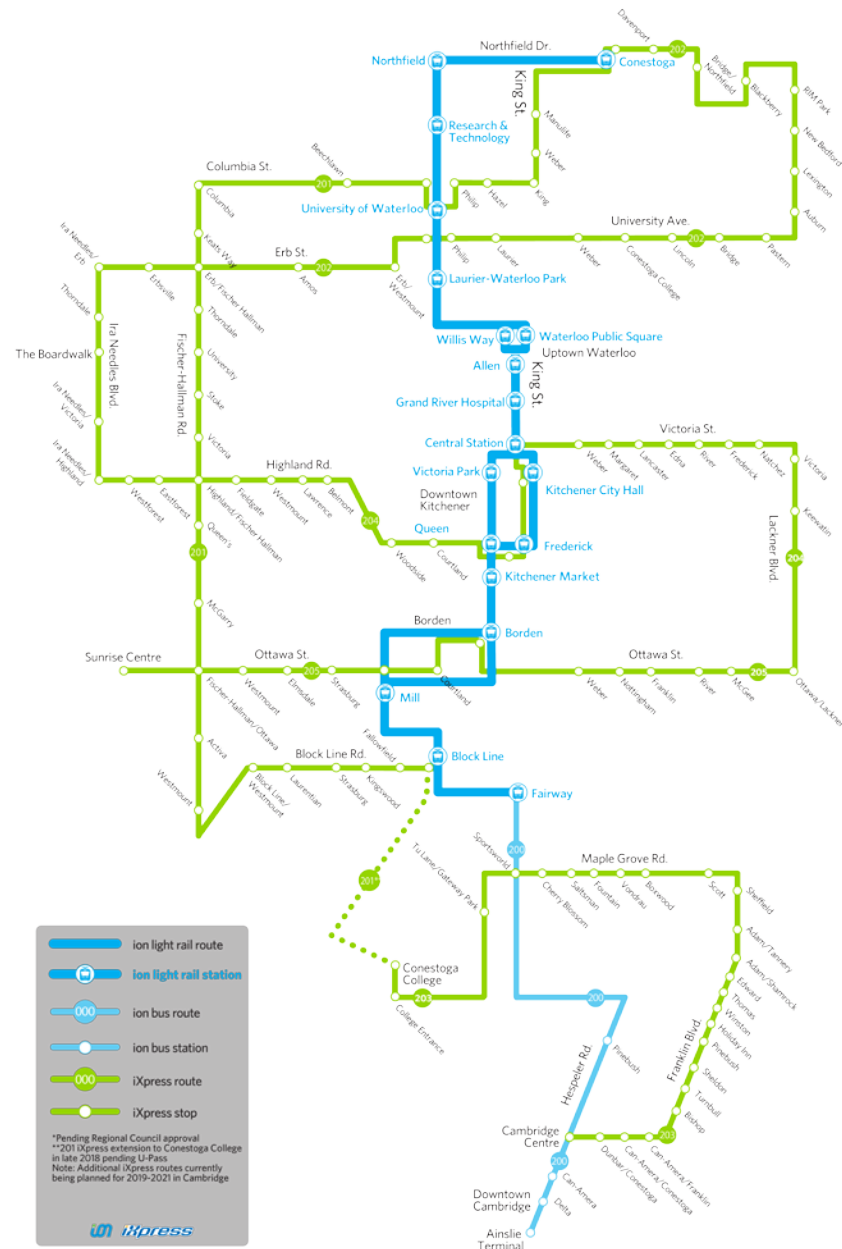


Fig. 34. Diagrammatic Transit Map of ION and iXpress Integration by 2018.

PUBLIC TRANSIT NETWORK

the sixteen minute commute



Fig. 35. Above. ION vehicle at Northfield warehouse.

The adjacent map illustration shows how much of a neighbourhood 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 busying road traffic.

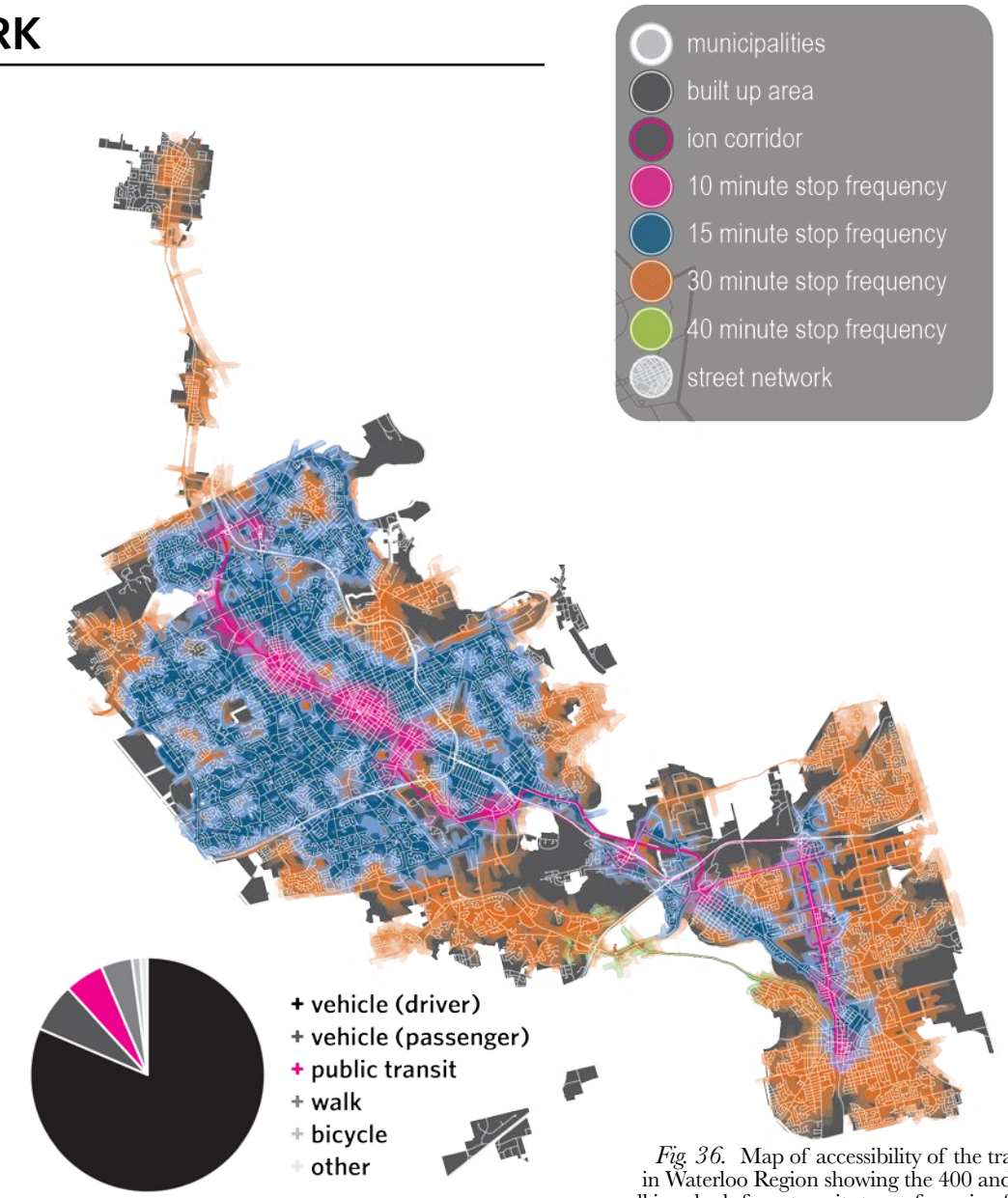


Fig. 36. Map of accessibility of the transit system in Waterloo Region showing the 400 and 800 metre walking sheds from transit stops of varying frequencies.

LIGHT RAIL CORRIDOR

10 minute stop frequency

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. Numerous times the bus system has not worked for travelers as routes have such limited hours when people may 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 is just over double the 16 minute commute time.

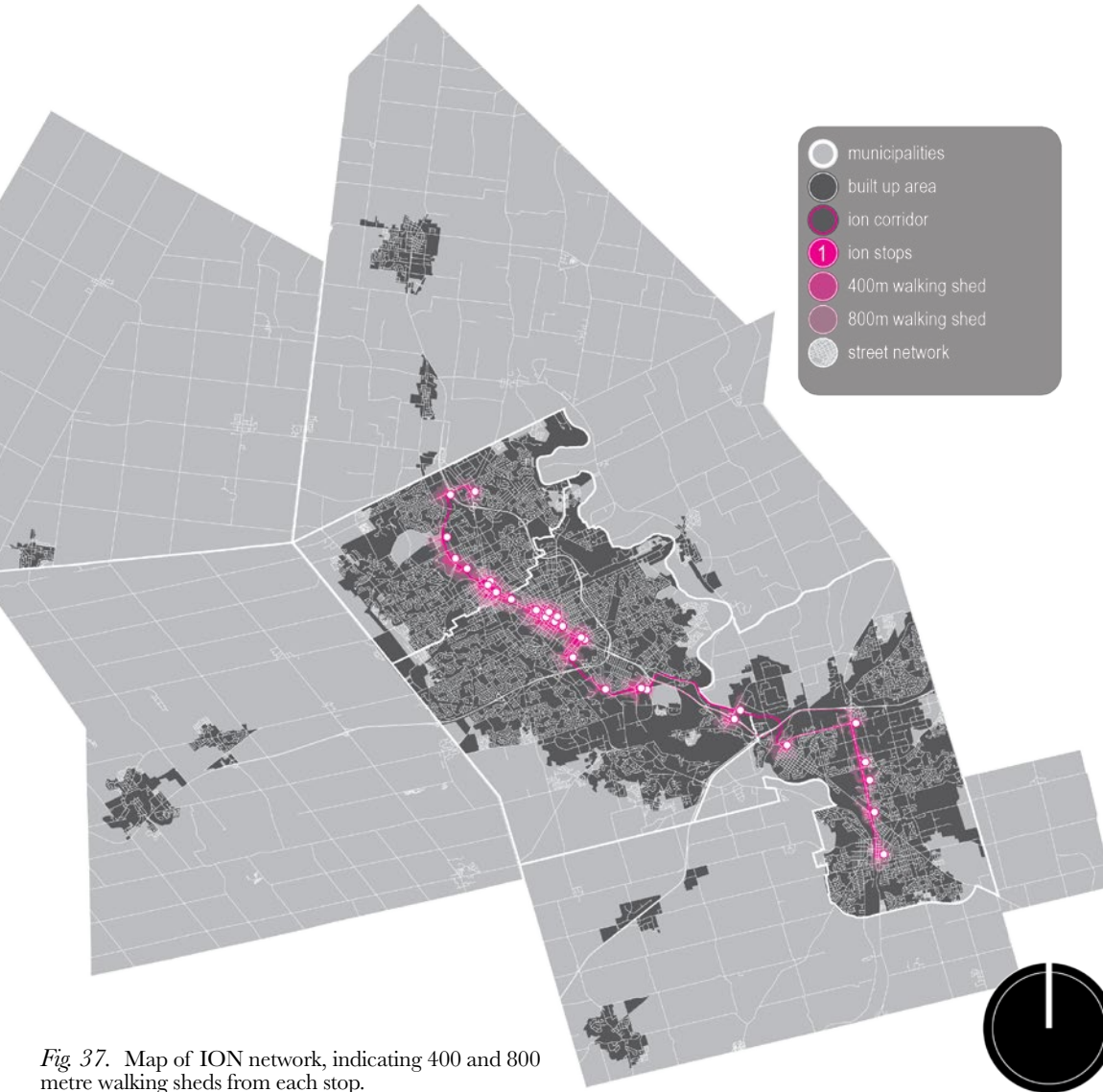


Fig. 37. Map of ION network, indicating 400 and 800 metre walking sheds from each stop.

10 <https://rapidtransit.regionofwaterloo.ca/en/multimedialibrary/resources/IONStory.pdf>, p 18

FUTURE EXPANSION

current iXpress routes to become new ion routes

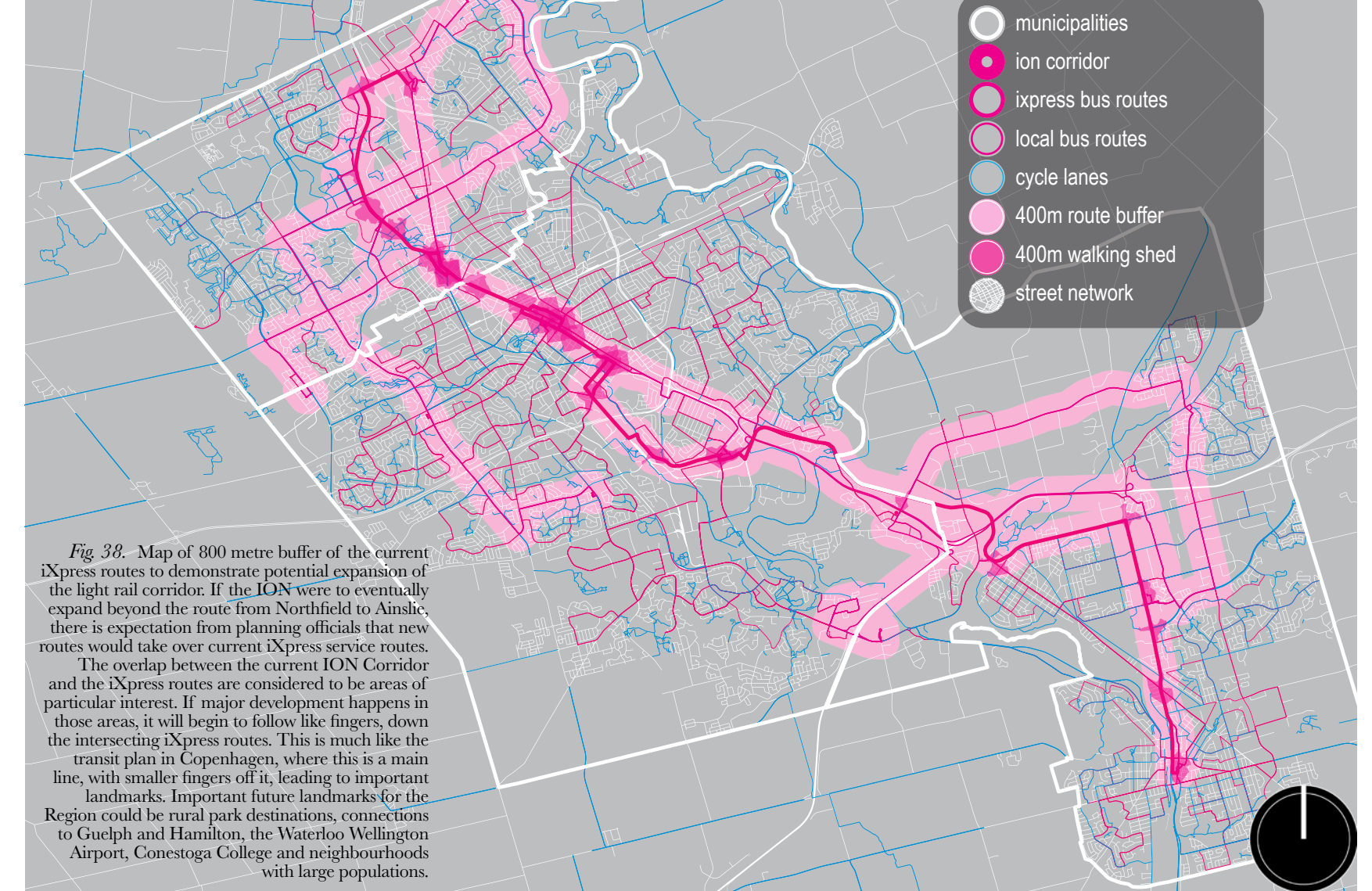


Fig. 38. Map of 800 metre buffer of the current iXpress routes to demonstrate potential expansion of the light rail corridor. If the ION were to eventually expand beyond the route from Northfield to Ainslie, there is expectation from planning officials that new routes would take over current iXpress service routes. The overlap between the current ION Corridor and the iXpress routes are considered to be areas of particular interest. If major development happens in those areas, it will begin to follow like fingers, down the intersecting iXpress routes. This is much like the transit plan in Copenhagen, where this is a main line, with smaller fingers off it, leading to important landmarks. Important future landmarks for the Region could be rural park destinations, connections to Guelph and Hamilton, the Waterloo Wellington Airport, Conestoga College and neighbourhoods with large populations.

IXPRESS BUS ROUTES

15 minute stop frequency

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 efficiently and on time. The signalled 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. Select stations also have map displays, bike racks and bike lockers. All GRT buses now have bike racks, so walking, cycling and transit connect seamlessly.”²¹¹

11 <http://www.grt.ca/en/routesschedules/ixpress.asp>

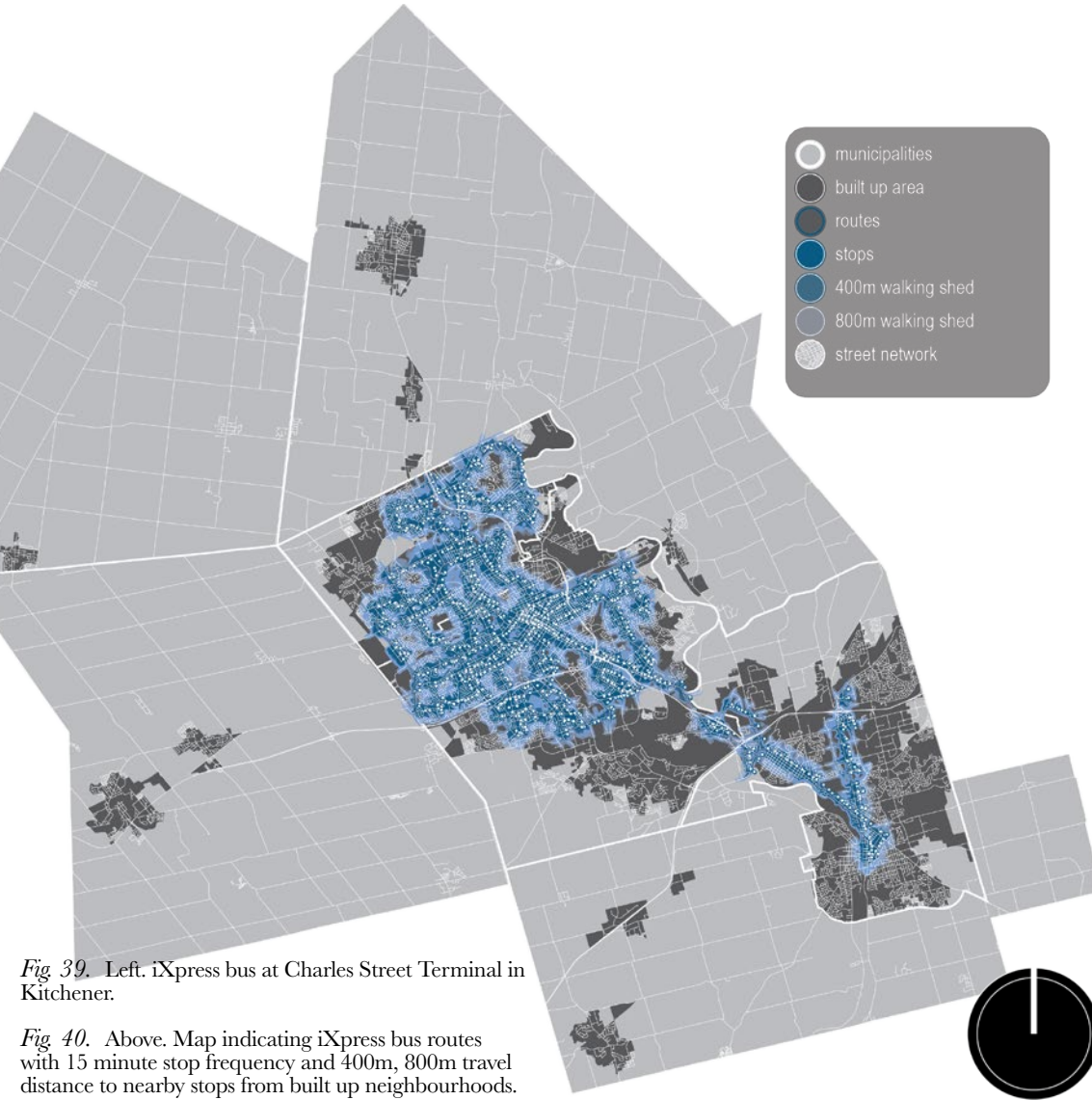


Fig. 39. Left. iXpress bus at Charles Street Terminal in Kitchener.

Fig. 40. Above. Map indicating iXpress bus routes with 15 minute stop frequency and 400m, 800m travel distance to nearby stops from built up neighbourhoods.

GRT BUS ROUTES

30 and 40 minute stop frequency

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 stop 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 to reach into St. Jacobs and Elmira 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 access, as shown in the voids on the map. The 40 minute stop frequency should also be eliminated, and all stop frequencies reduced to 30 minutes maximum.

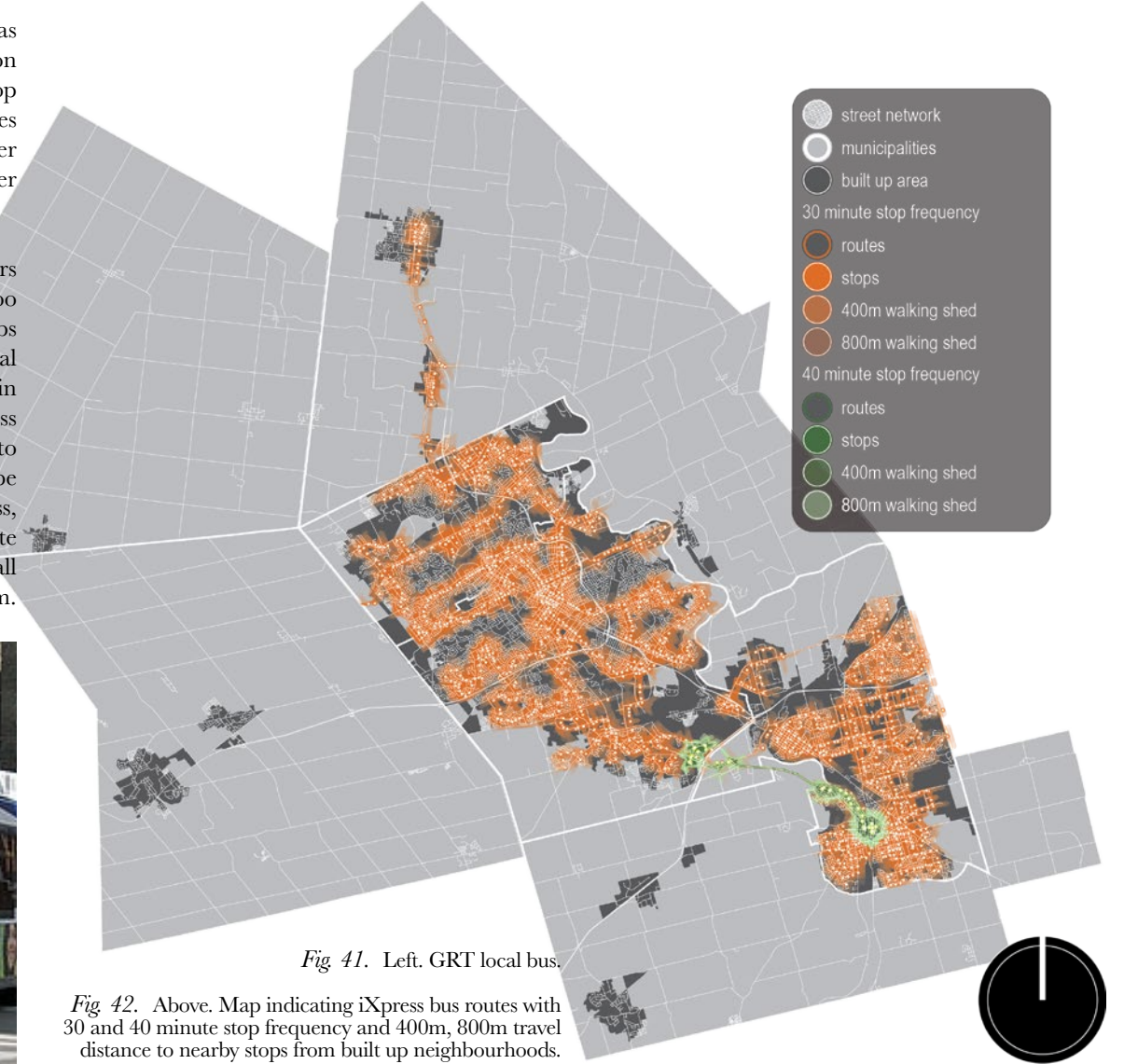


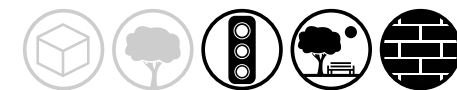
Fig. 41. Left. GRT local bus.

Fig. 42. Above. Map indicating iXpress bus routes with 30 and 40 minute stop frequency and 400m, 800m travel distance to nearby stops from built up neighbourhoods.

Fig. 43. Right. OnTheLine Exhibit by Data Lab. Data Lab is a research group out of the University of Waterloo.



Fig. 44. Right. Data Lab is a research group out of the University of Waterloo.



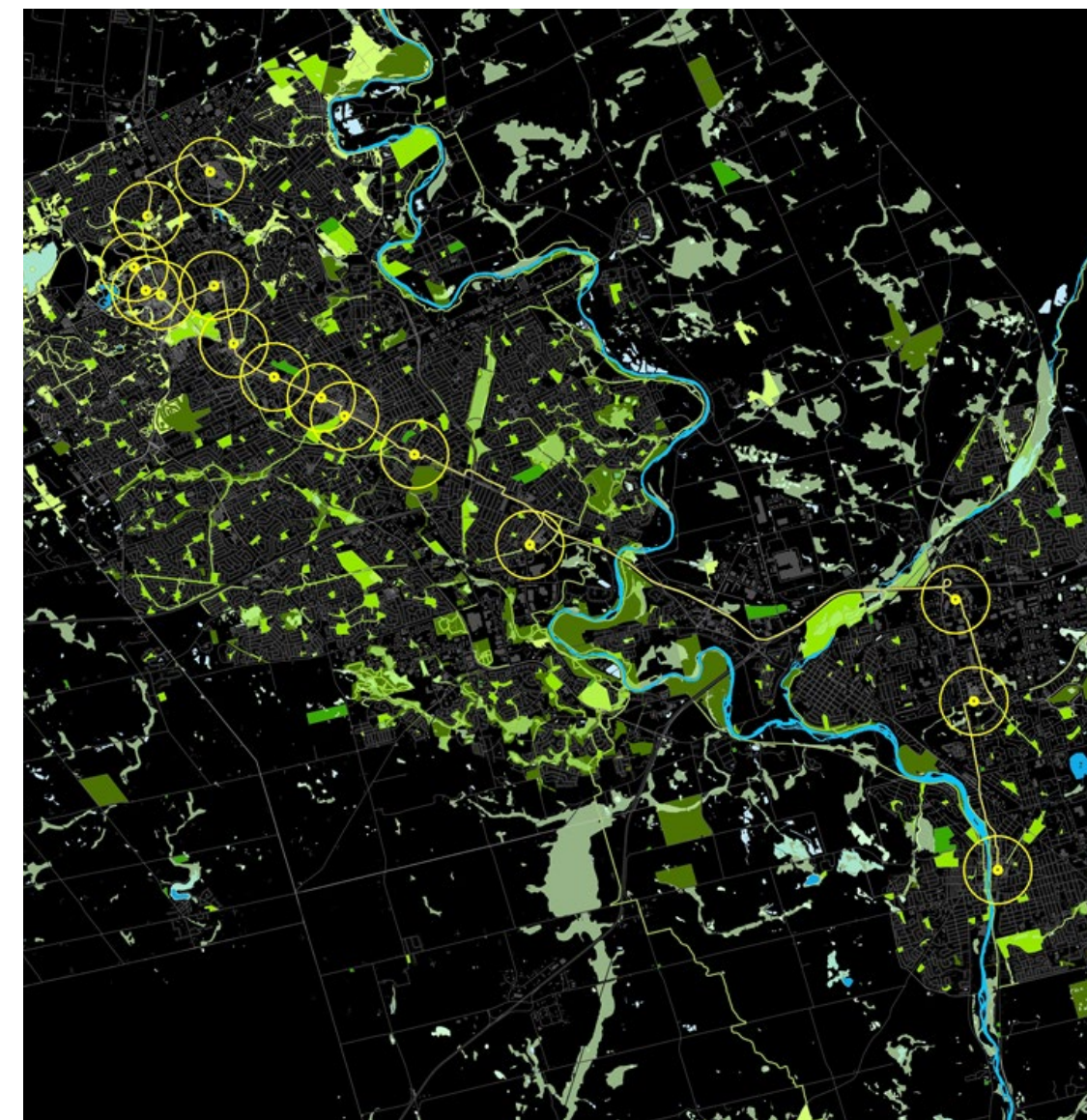
WAYFINDING

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 OTLExhibit by DataLab 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.

Fig. 45. Right. Mapping studies completed for by Data Lab for the OTL Exhibit.



KEY PLAYERS + RELATIONSHIPS

BIRTH OF WATERLOO REGION

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 1990's with little progress. It wasn't until 2005 that Kitchener's city council voted to visit the subject again, with the possibility of reducing the seven constituent municipalities into one or more cities. In 2010, 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 2-1 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 is deep-rooted and was first presented in 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.

¹² <http://rapidtransit.regionofwaterloo.ca/en/resourcesGeneral/TheIONStory.pdf>

Fig. 46. Regional Official Plan, 2015.

Fig. 47. Growth Plan for the Greater Golden Horseshoe, 2006.

Fig. 48. Places to Grow Act, 2006.

Fig. 49. Community Building Strategy, 2013.

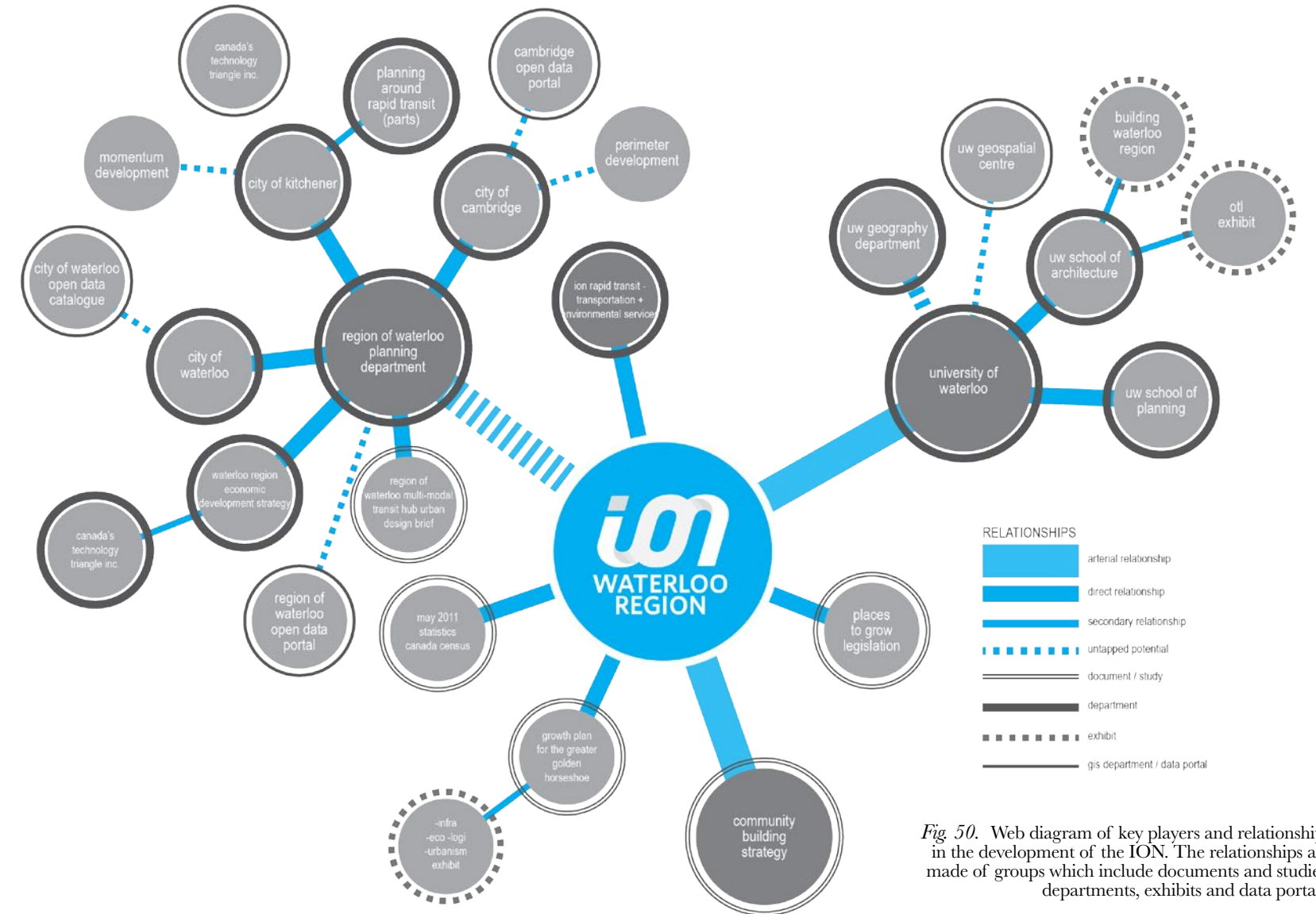
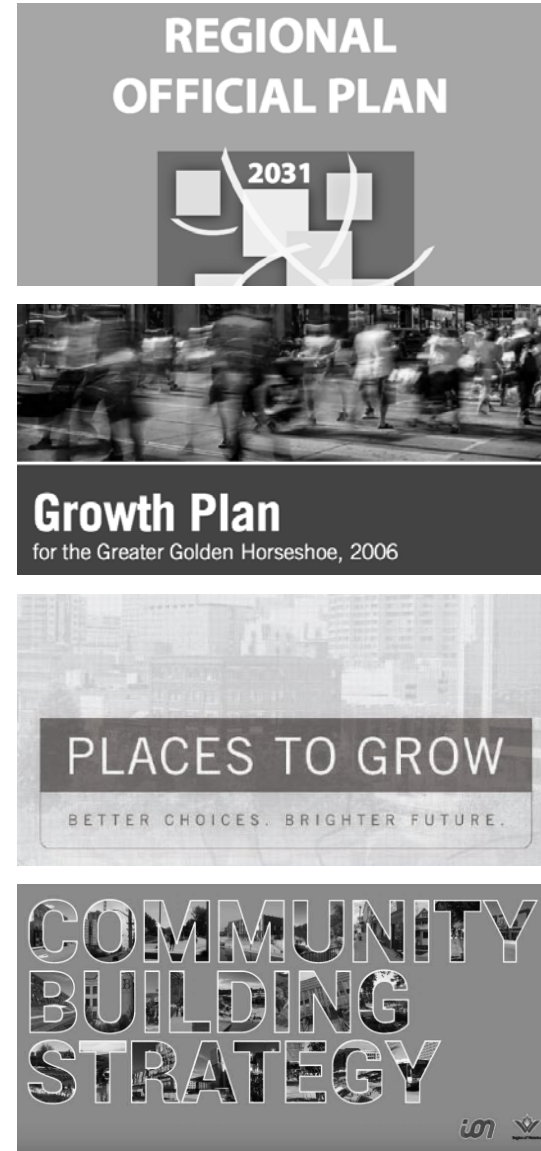


Fig. 50. Web diagram of key players and relationships in the development of the ION. The relationships are made of groups which include documents and studies, departments, exhibits and data portals.

PLACES TO GROW

and the greater golden horseshoe

The Region of Waterloo is using the Places to Grow Act and many of the principles set out for the Greater Golden Horseshoe to manage development and ensure that precious local farmland, wetlands and forested areas are protected from suburban development. The Places to Grow Act aims to better manage development in the Greater Golden Horseshoe between now and 2031 to ensure “stronger, prosperous communities.”

The Growth Plan of Places to Grow states: New development taking place in designated greenfield areas will be planned, designated, zoned and designed in a manner that contributes to creating complete communities creates street configurations, densities, and an urban form that support walking, cycling, and the early integration and sustained viability of transit services provides a diverse mix of land uses, including residential and employment uses, to support vibrant neighbourhoods creates high quality public open spaces with site design and urban design standards that support opportunities for transit, walking and cycling. (Places to Grow 2.2.7)

The designated greenfield area of each upper- or single-tier municipality will be planned to achieve a minimum density target that is not less than 50 residents and jobs combined per hectare.¹³

The Regional Official Plan (ROP) closely conforms to the Growth Plan for the Greater Golden Horseshoe. In 2013, the Ontario Municipal Board (OMB) issued a decision regarding the development

¹³ Government of Ontario, Ministry of Infrastructure.

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 Region of Waterloo is very disappointed with the result ruling, as it does not address the goals for growth in Ontario, and the lifestyle shift that is happening in midsize cities across Canada.

The Region of Waterloo has been working with the community since 2004 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, on the premise that the 197 acres of farmland that the Region planned to open for development is not sufficient, and that instead 2,593 acres of farmland is necessary. The decision was made based upon a technical difference in methodologies, with the OMB siding with the appeal by concluding that land budgets should be made based on the way people have lived historically. In contrast, the Region recognized that planning decisions should be based on the way that people increasingly want to live and on the province’s growth goals.^{14 15}

Waterloo Region is in the process of appealing the

¹⁴ Casello, Jeff + Professors from the University of Waterloo, Department of Planning. “Waterloo OMB Response”, February 26, 2013. Accessed April 21, 2015.

¹⁵ Morrice, Mike on behalf of Sustainable Waterloo Region. “SWR Supports the Region’s Smart-Growth Planning Policies.” Sustainable Waterloo Region. April 2, 2013. Accessed April 23, 2015. <http://www.sustainablewaterlooregion.ca/our-programs/policy-engagement/regional-smart-growth-plan/>.

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 of Waterloo Region continuing to increase, with little regard to the guidelines set out by the Places to Grow Act. 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, will violate Provincial rules. The OMB felt that the density targets must be planned for, but are not required to be met.”¹⁶

¹⁶ Casello, Jeff + Professors from the University of Waterloo, Department of Planning.

THE NEED FOR CONCENTRATION

population density studies for waterloo region

On January 4, 2011, the Province of Ontario approved the new ROP, and the vision established became official policies that will promote balanced growth by:

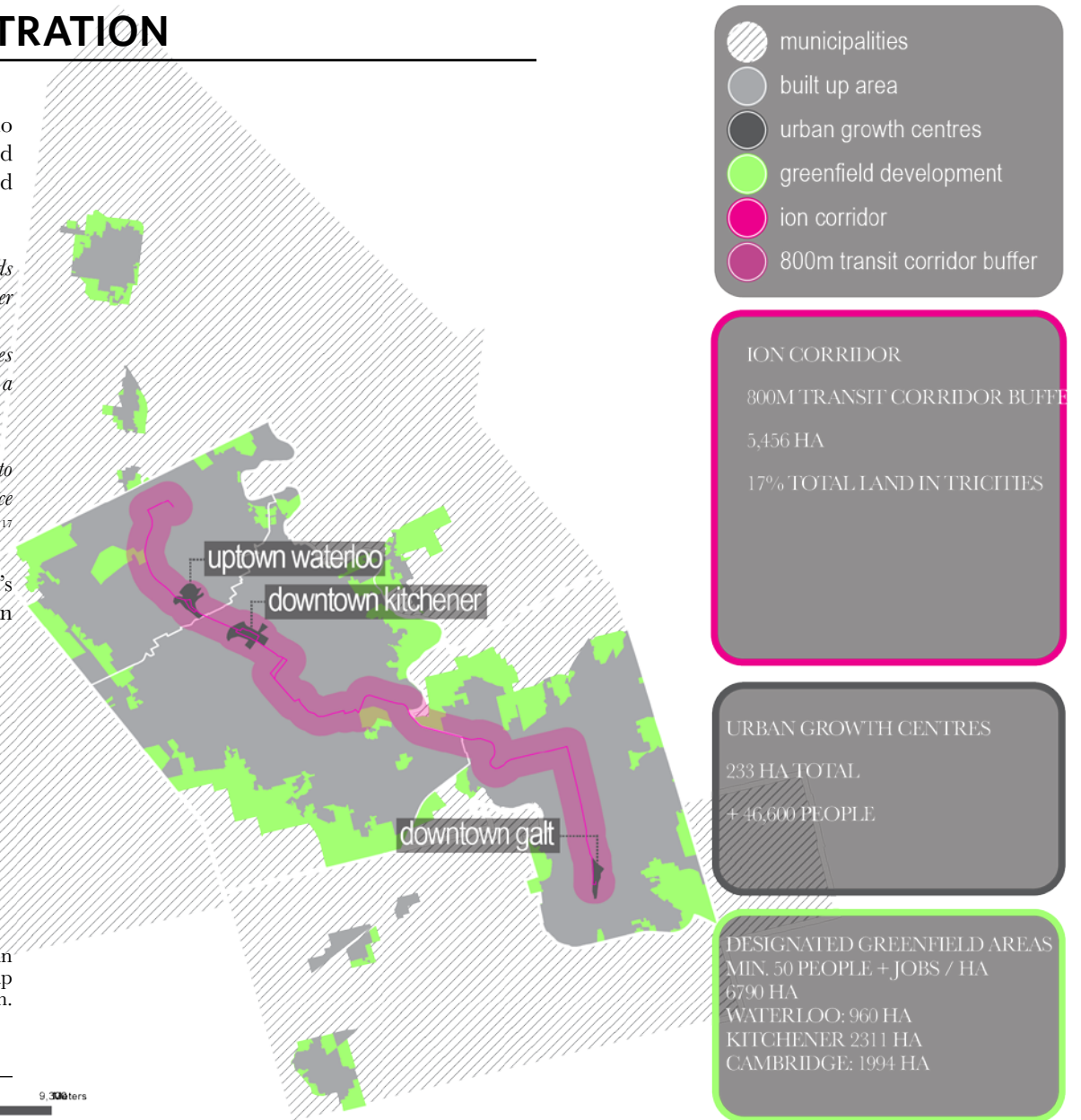
- + Directing more of our community’s future growth towards the built-up areas in our community, which will make better use of land, existing infrastructure, and services; and
- + Creating more compact, vibrant and complete communities in our suburban areas with walkable neighbourhoods and a better mix of employment, housing, shopping and services.

Balancing growth like this will make it more cost effective to provide services such as sidewalks or transit, and will reduce the need to expand roads or water and wastewater facilities.¹⁷

More in-depth information about the Region’s growth management policies can be found in Chapter 2 of the Regional Official Plan.

Fig. 51. Map indicating greenfield development in Waterloo Region, which surround the current built up urban form.

¹⁷ <http://www.regionofwaterloo.ca/en/abouttheenvironment/growthmanagement.asp>



AGAINST GREENFIELD DEVELOPMENT

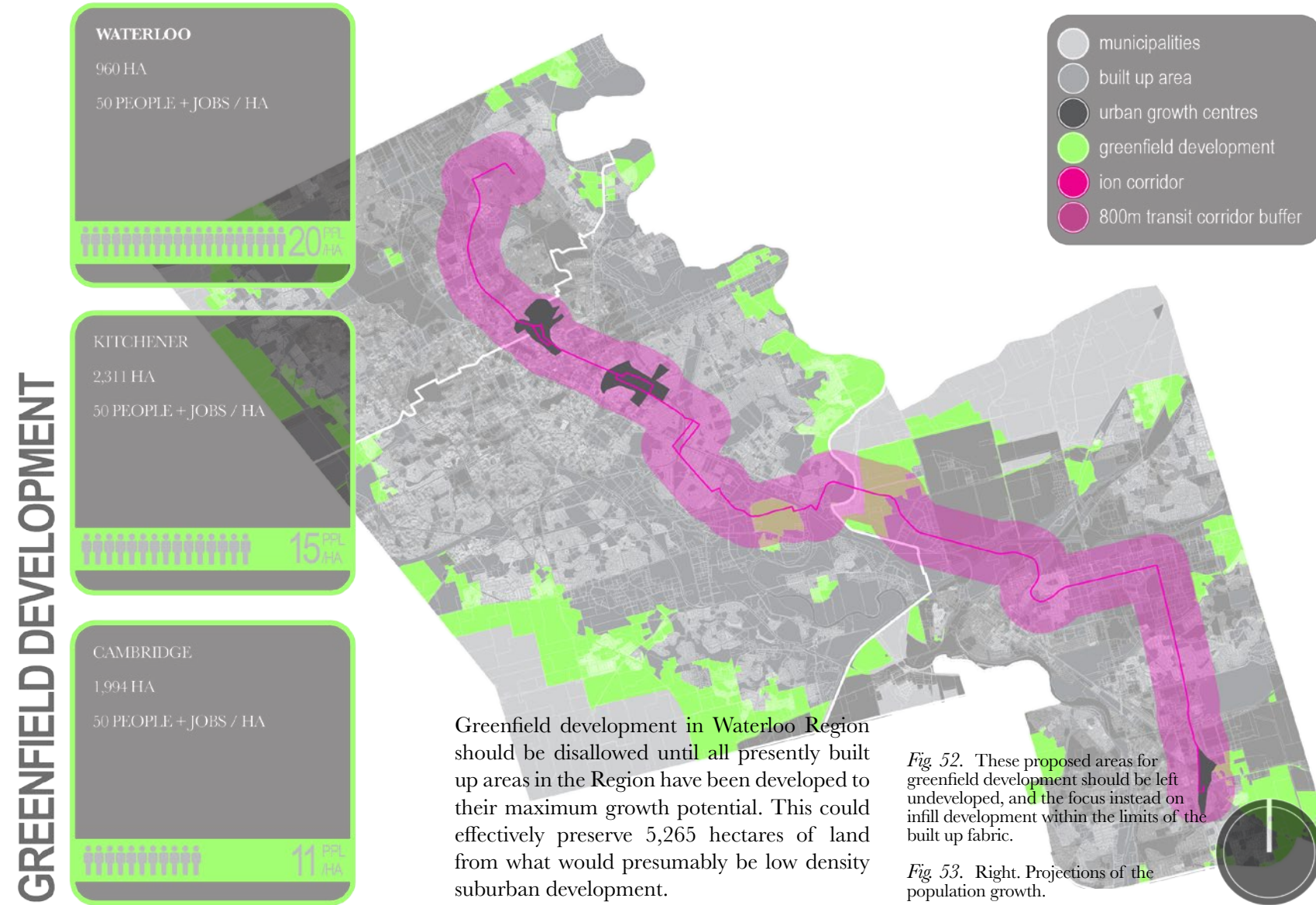
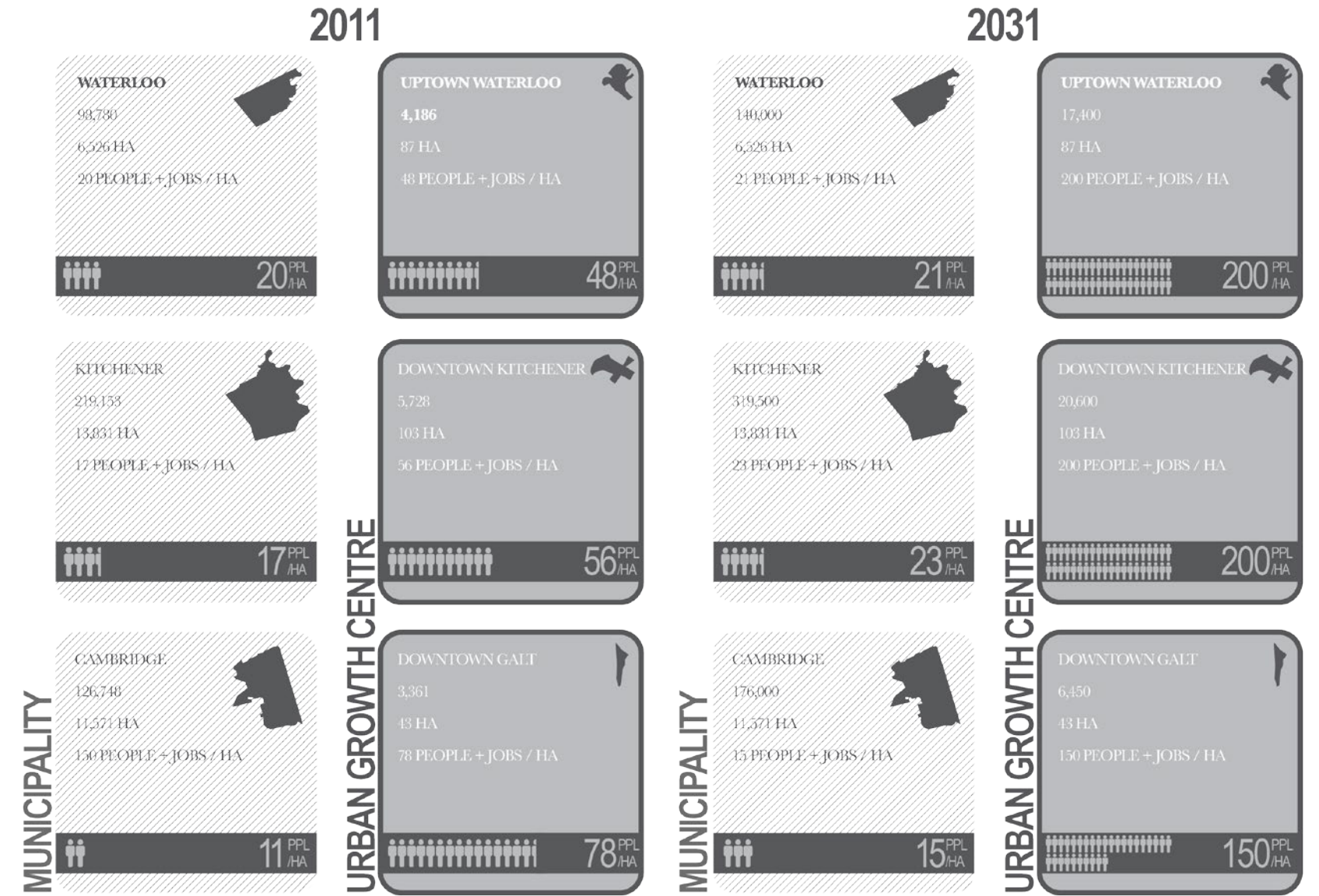


Fig 52. These proposed areas for greenfield development should be left undeveloped, and the focus instead on infill development within the limits of the built up fabric.

Fig 53. Right. Projections of the population growth.

TARGETS FOR THE GROWTH CENTRES



GREENBELT EXTENSION

water conservation in waterloo region and the waterloo moraine

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 centres and urban roots of living close to amenities and urban life.

The Region of Waterloo has included Environmentally Sensitive Landscapes or ESL's in their Regional Official Plan to protect the environmental features from development and construction. The ESL's 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 landforms on the Waterloo Moraine, while the Blair-Bechtel-Cruickston ESL encompasses the juncture 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 contain the northern fringe of the Carolinian Forest Zone, Ontario's most threatened ecological area.¹⁸

¹⁸ <http://www.regionofwaterloo.ca/en/abouttheenvironment/environmentallysensitivelandscapeesls.asp>

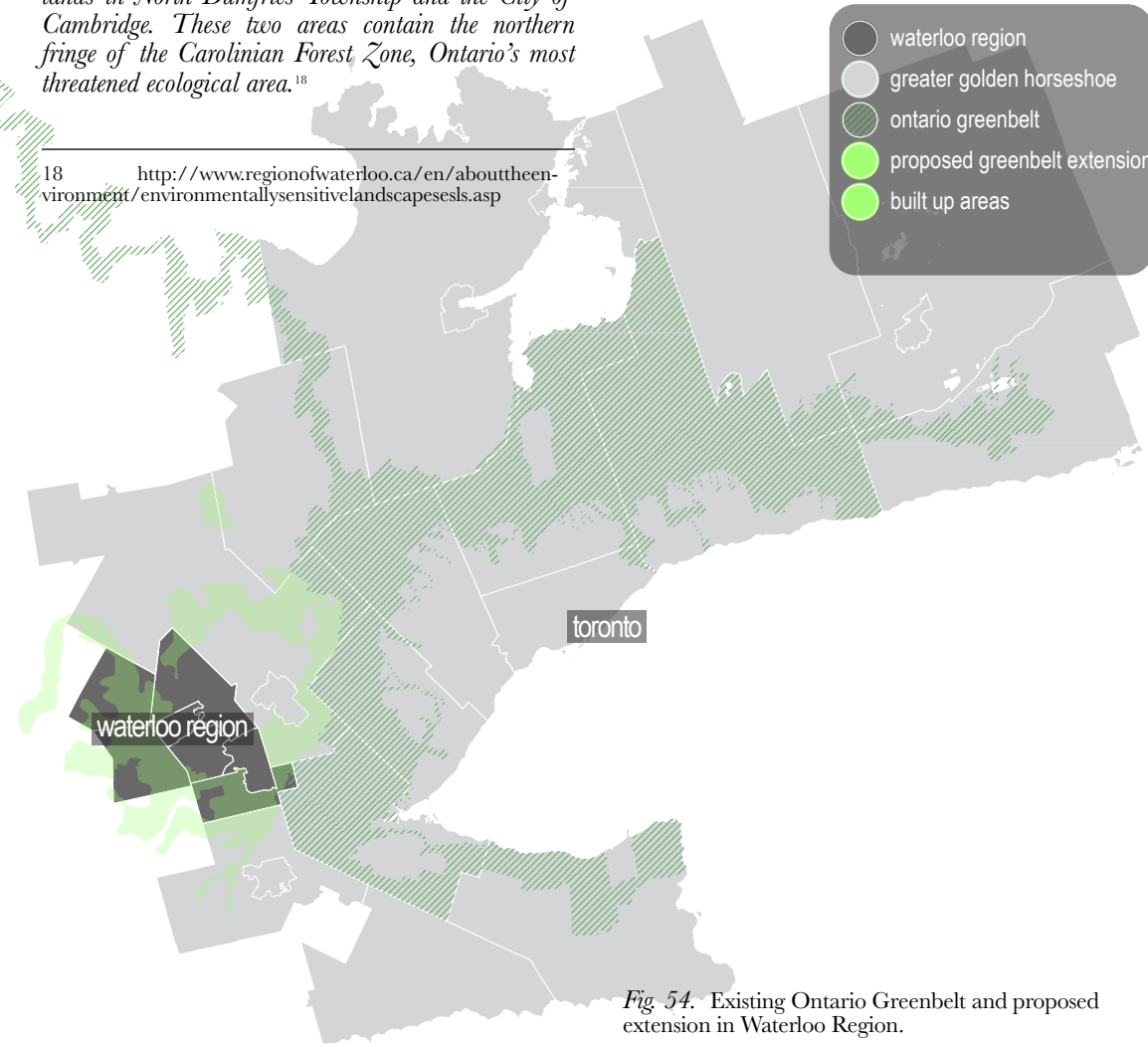
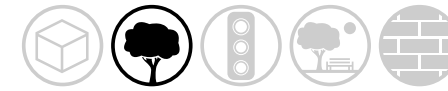


Fig. 54. Existing Ontario Greenbelt and proposed extension in Waterloo Region.



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.

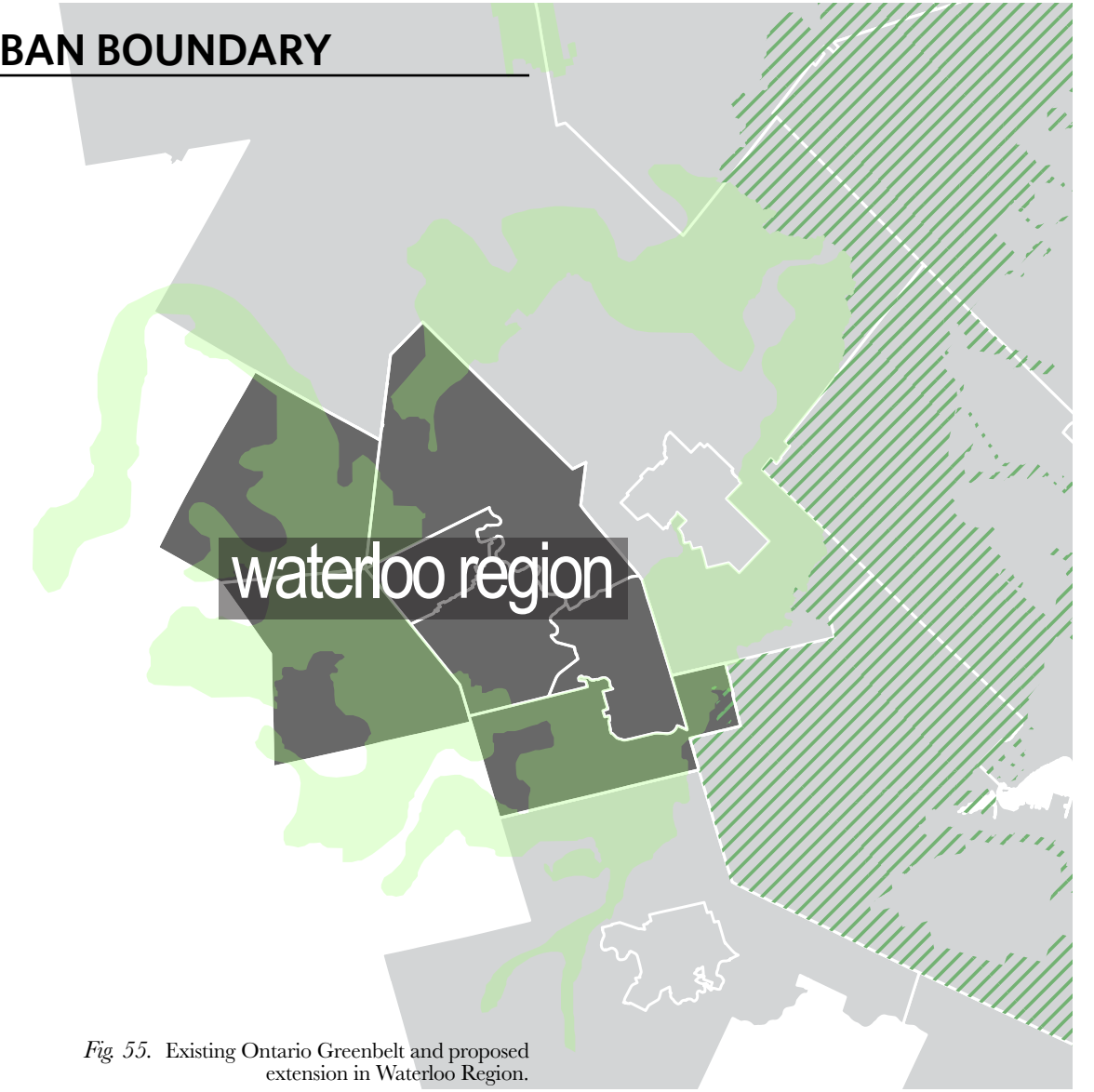
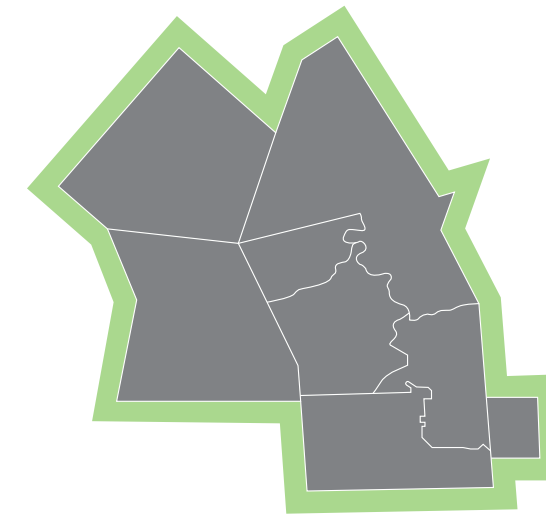


Fig. 55. Existing Ontario Greenbelt and proposed extension in Waterloo Region.

WATER-SHED

water conservation in waterloo region and the waterloo moraine

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-source aquifers for their drinking water, with about 90% of the water supply coming from the groundwater of the moraine aquifer.¹⁹ The Waterloo Moraine is currently 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.²⁰ There is speculation whether the Moraine can actually handle the projected population growth in The Region.²¹

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

¹⁹ https://en.wikipedia.org/wiki/Waterloo_Moraine
²⁰ http://gin.gw-info.net/service/api_ngwds:gin2/en/rdf/describe.html?q=urn%3Ageoscience.data.gc.ca%3Aid%3AaquiferSystem%3AWaterlooMoraine
²¹ <http://www.greenrocket.ca/2010/10/08/policy-concerns-waterloo-moraine/>

measures have been enacted.

It is an interlobate moraine, meaning that it consists primarily of sand and gravel. It contains large aquifers, which discharge into the Grand River and its tributaries and maintain a base water flow rate into that system.

‘Most of the region’s water supply comes from groundwater. Much of this groundwater is located just outside the western edges of Kitchener and Waterloo. By encouraging growth inward and limiting urban sprawl, ION will help protect the region’s groundwater sources.’²²

²² <http://www.rideion.ca/common-questions.html>



Fig 56. Top right. The Waterloo Moraine is North America’s largest

Fig 57. Middle right. Canoeing on the Grand River, near Paris, Ontario.

Fig 58. Bottom right. Although just north of Waterloo Region, the Elora Gorge is popular tourist destination and geological formation in and around the Grand River in Elora, Ontario.

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

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

This is where we get in trouble because the ecology and the economy play out on this landscape.”

- Gord Miller,
Ontario Environmental Commissioner

Fig 59. Right. Map of the Waterloo Moraine, and protected countryside / greenspace in contrast with built up area.

Fig 60. Bottom Left. Image of the Grand River and surrounding greenfield. Image by author.



AGRICULTURE-SHED

preservation of farmland and culture in smalltown ontario

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.”¹

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 equates 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 sentiments 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.

Fig 61. Image of farmland in Waterloo Region.

Fig 62. Modern and traditional farming technologies meet in a field outside of Elmira in May 2014. The Mennonite community makes up a large amount of the farming in Waterloo Region.

Fig 63. Exterior photo of St. Jacob’s Farmers Market hall building. The market hosts vendors from around Ontario, both indoors and out, open year round.

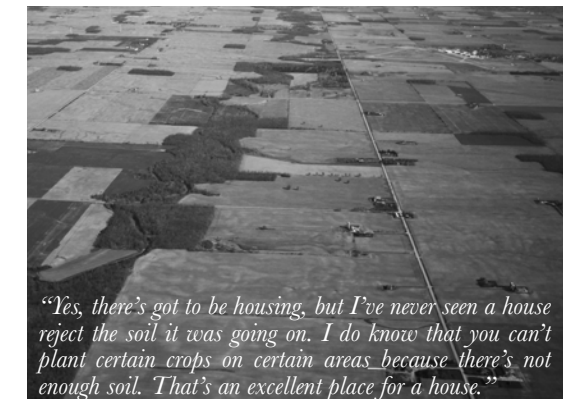


“Some of the best farmland in Ontario lies just outside our urban areas. ION safeguards the Region’s precious agricultural lands and preserves the community’s natural beauty by intensifying the core areas of the community and limiting urban sprawl.”

-The Story of Transit in Waterloo Region, p.3

def. *prime agricultural area*
specialty crop areas and areas where prime agricultural land (Classes 1 to 3) predominates. Prime agricultural areas may also include smaller pockets of poorer-capability lands (Classes 4 to 7) and additional areas with a local concentration of farms.²
~2% of all agriculture in Ontario occurs within Waterloo Region

def. *greenfield development*
undeveloped land in an urban or rural area currently used for agriculture or landscape design, or left to evolve naturally. These areas of land are usually properties being considered for urban development. Rather than greenfield development, a developer should choose to redevelop brownfield or greyfield lands, areas that have been developed but left abandoned or underused.³



“Yes, there’s got to be housing, but I’ve never seen a house reject the soil it was going on. I do know that you can’t plant certain crops on certain areas because there’s not enough soil. That’s an excellent place for a house.”

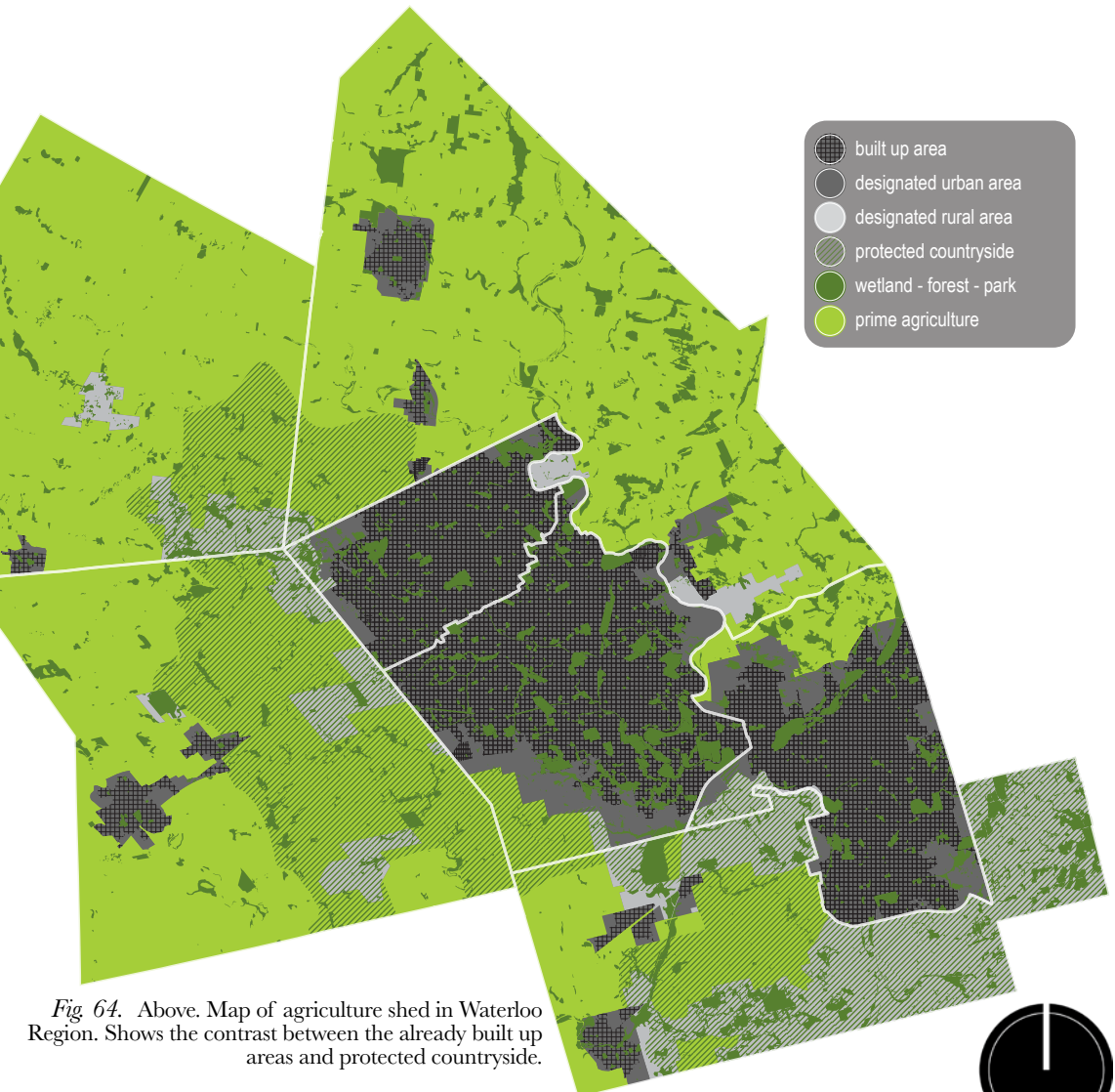


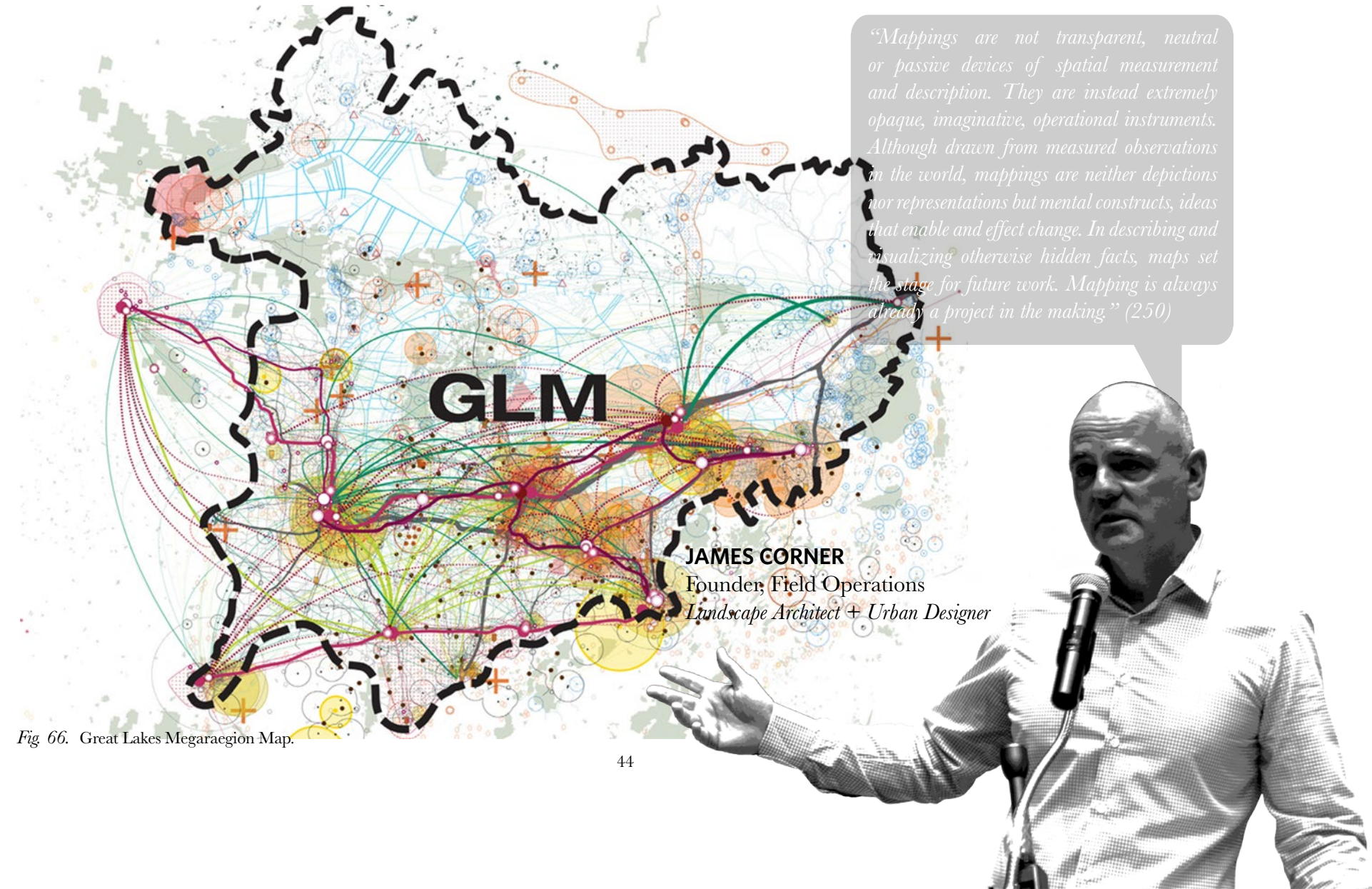
Fig 64. Above. Map of agriculture shed in Waterloo Region. Shows the contrast between the already built up areas and protected countryside.

Fig 65. Left. Aerial image of Grand River and surrounding farmland.



METHODS FOR MAPPING

cartography as an analytical tool



“Mappings are not transparent, neutral or passive devices of spatial measurement and description. They are instead extremely opaque, imaginative, operational instruments. Although drawn from measured observations in the world, mappings are neither depictions nor representations but mental constructs, ideas that enable and effect change. In describing and visualizing otherwise hidden facts, maps set the stage for future work. Mapping is always already a project in the making.” (250)

JAMES CORNER
Founder, Field Operations
Landscape Architect + Urban Designer

Fig. 66. Great Lakes Megaregion Map.

INFRA-ECO-LOGI_URBANISM EXHIBIT RVTR: Design Research Project + Exhibition on Thinking, Urban Architecture + The Common in The Post-Metropolitan Condition

The exhibit demonstrates cartography as a tool for regional analysis, layering of data, mapping routes and identifying areas for design proposal. The exhibition took place in 2012, shown as a manifesto for architecture at the urban scale within the post-metropolitan condition. A projected future development for the Great Lakes Megaregion of North America, and developed through research, the exhibit illustrated a methodology for urban analysis and design intervention that sought to address boundaries, governance, politics and public architecture. The exhibition took a position to apprehend megaregional issues and a methodology that operates from regional to micro scales, and a debate around regional systems and the role of design in calculating their futures.

„The exhibition is organized as a territory. In both its form and content it posits an approach to urban design that is not about a singular vision or a grand scheme; rather, proposed is an assemblage of reciprocal relations nested at micro and macro scales of both time and space. The content of the exhibition consists of regional cartographies, relational analyses, design drawings, historical research, writings, photographs and large physical models, all spatially arrayed so that the multiple interrelations, scales and connections are made visible and apprehensible from multiple viewpoints and routes.”²³

23 <http://www.rvtr.com/projects/infra-eco-logi-urbanism>

Mapping studies to consider for Waterloo Region:

- AGRI-SHED | ECONO-SHED | ENER-SHED | ENVIRO-SHED | LEISURE-SHED | MOBILITY-SHED | TECH-SHED | WATER-SHED

The exhibition looks at the political issues surrounding planning in a Megaregion, which can be scaled down to look at Waterloo Region urban planning. To understand the rapid transit corridor in Waterloo Region there first needs to be an understanding of the Region as a whole, and how it has grown to its present day formation. The process of mapping Waterloo Region through this thesis has been an effort that combines information provided from Waterloo OpenData and the University of Waterloo Geospatial Centre, in combination with data that I have collected from the City of Kitchener GIS Department and a portion of which I have created and mapped myself. One of the major difficulties in mapping the Waterloo Region is combining all of the data that is provided for the three separate cities of Waterloo, Kitchener and Cambridge, but not the Region as a whole. As such, there are often patches required to merge the data, and sometimes there is information only available for one of the three major cities in the Region. Much of the data is also missing for the Townships and rural areas of the Region. This is problematic being that the ION transit corridor runs through all three of the Tricities, but a problem, which I slowly patched pieces through comprehensive research and analysis.

The means of cartographic exploration provide an opportunity to analyze the Region in its entirety and also at micro-scales. The Region of Waterloo is expected to grow at one of the highest rates in Canada, with an expected rise in population of 200,000 residents by 2031, according to the Places to Grow Act.²⁴ The thesis includes experimental mapping to project population growth along the ION corridor in areas of opportunity. For the design site, the projected population density maps are used to estimate the population and number of units in the Grand River Hospital Zone. This method will also help to determine which building and housing typologies are appropriate for areas of growth and development along the corridor.

In order to reach the density targets in the Places to Grow Act of 100-150 people and jobs / hectare, densification must occur strategically along the ION corridor. An opportunity for such growth exists between the two downtown cores of Waterloo and Kitchener. I see this as a natural solution, however, due to separate planning departments for the ION corridor, the cities of Waterloo and Kitchener are not working together to devise solutions that would benefit both communities equally, and are instead more focused on other areas of development that are on the opposite sides of this void.

24 Government of Ontario, Ministry of Infrastructure. “Places to Grow Act, Growth Plan for the Greater Golden Horseshoe.” Places to Grow, June 16, 2006. Accessed April 21, 2015. https://www.placestogrow.ca/index.php?option=com_content&task=view&id=9&Itemid=14.

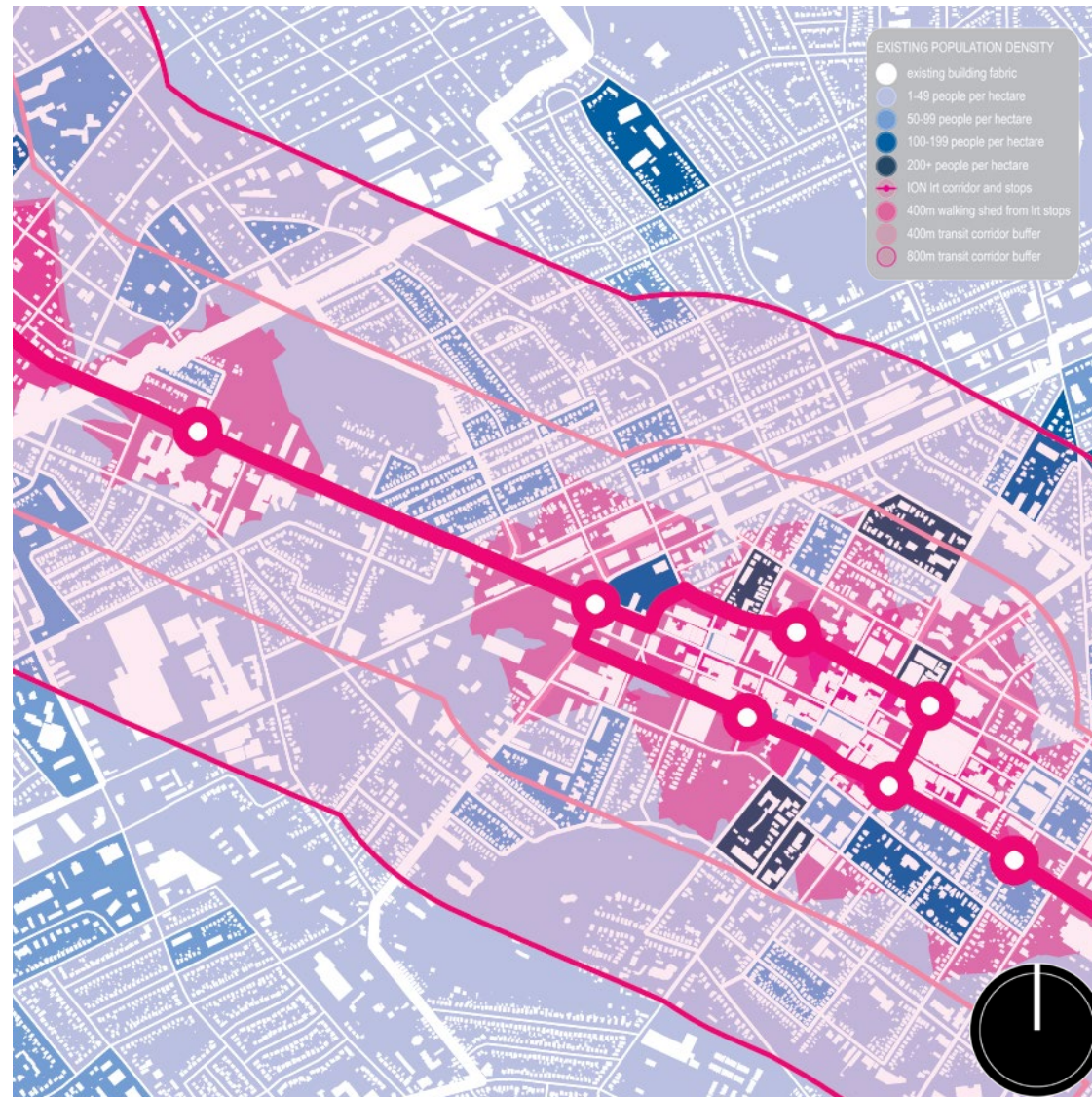
THE NEED FOR DENSITY

jane jacobs four generators of diversity in a city: condition 4 of 4

“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 decrease.²⁵

²⁵ http://communityservices.regionofwaterloo.ca/en/housing/resources/2013_Waterloo_Region__A_Housing_Overview.pdf



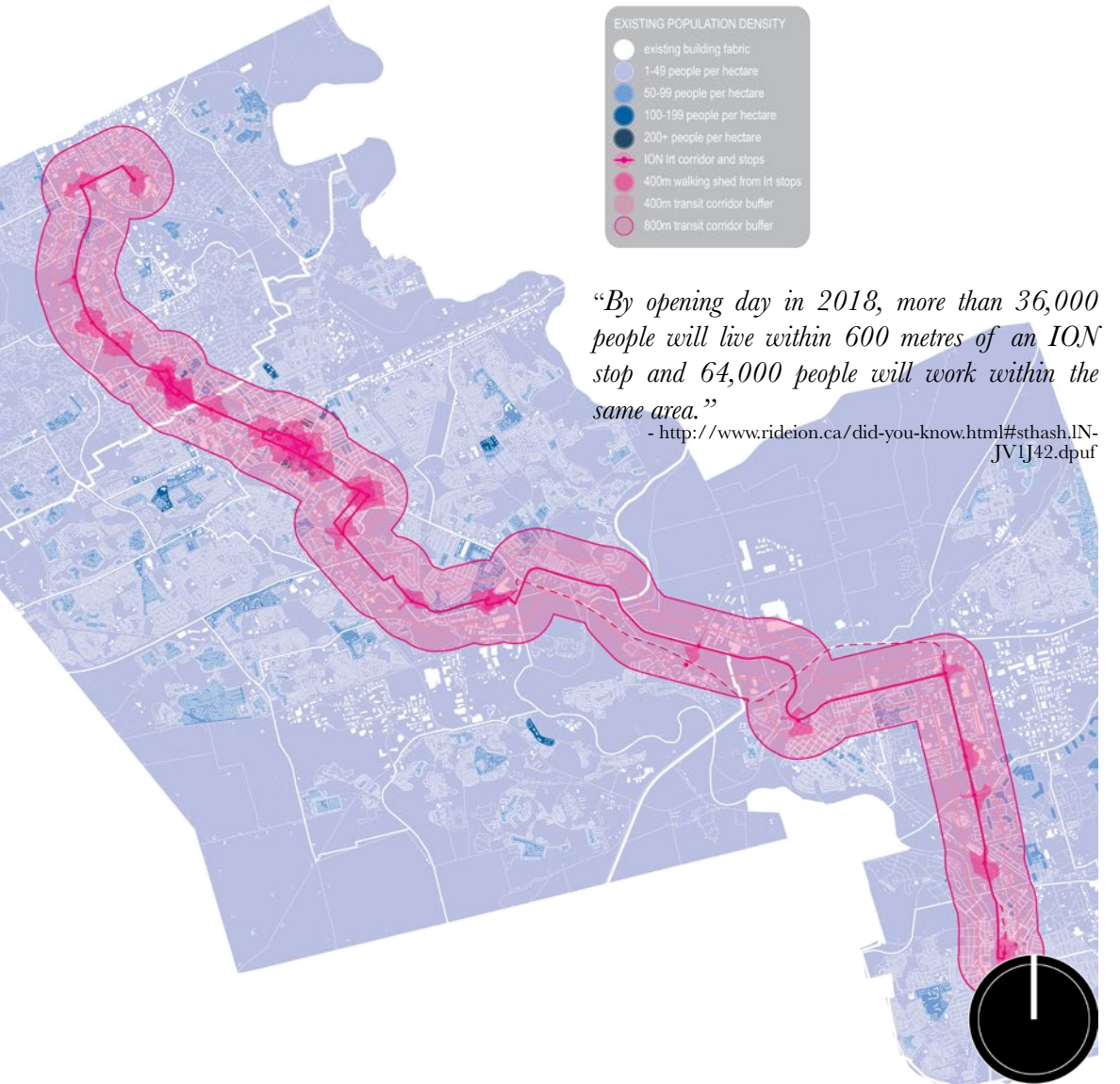
800M LRT CORRIDOR BUFFER

establishing a buffer to extrapolate potential population densities

For Waterloo Region to hit the Places to Grow Act target of 200 people and jobs per hectare combined, 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 neighbourhoods, featuring many options for local amenities and green commuting along various points on the network. For the most part, this density of 200 people and jobs per hectare can be achieved through 6-10 storey developments, without so 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 neighbourhoods 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.



“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.IV1J42.dpuf>

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.

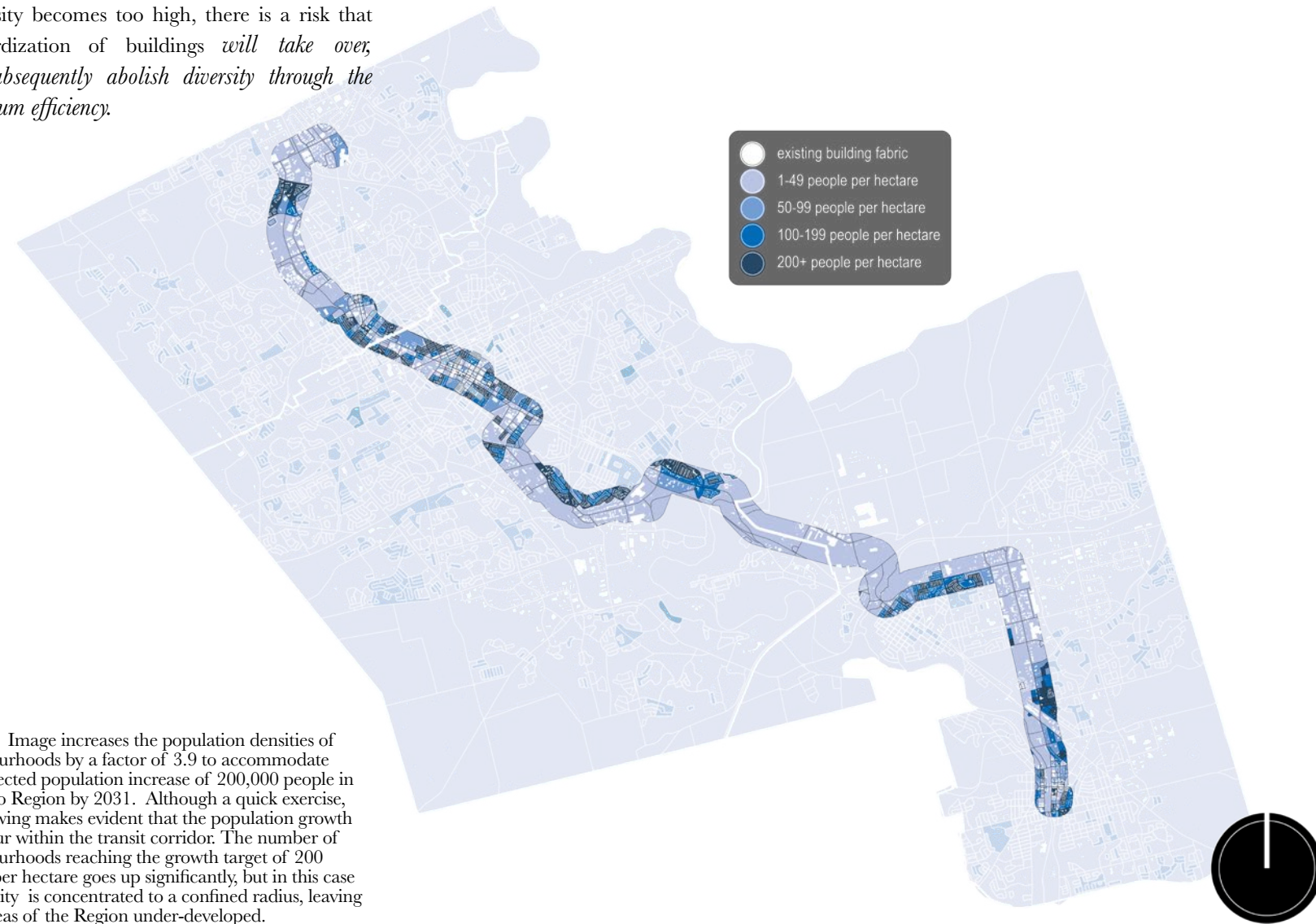


Fig. 68. Image increases the population densities of neighbourhoods by a factor of 3.9 to accommodate the projected population increase of 200,000 people in Waterloo Region by 2031. Although a quick exercise, this drawing makes evident that the population growth can occur within the transit corridor. 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 under-developed.

800m ION CORRIDOR BUFFER

200,000 new residents - population increase factor 1.6

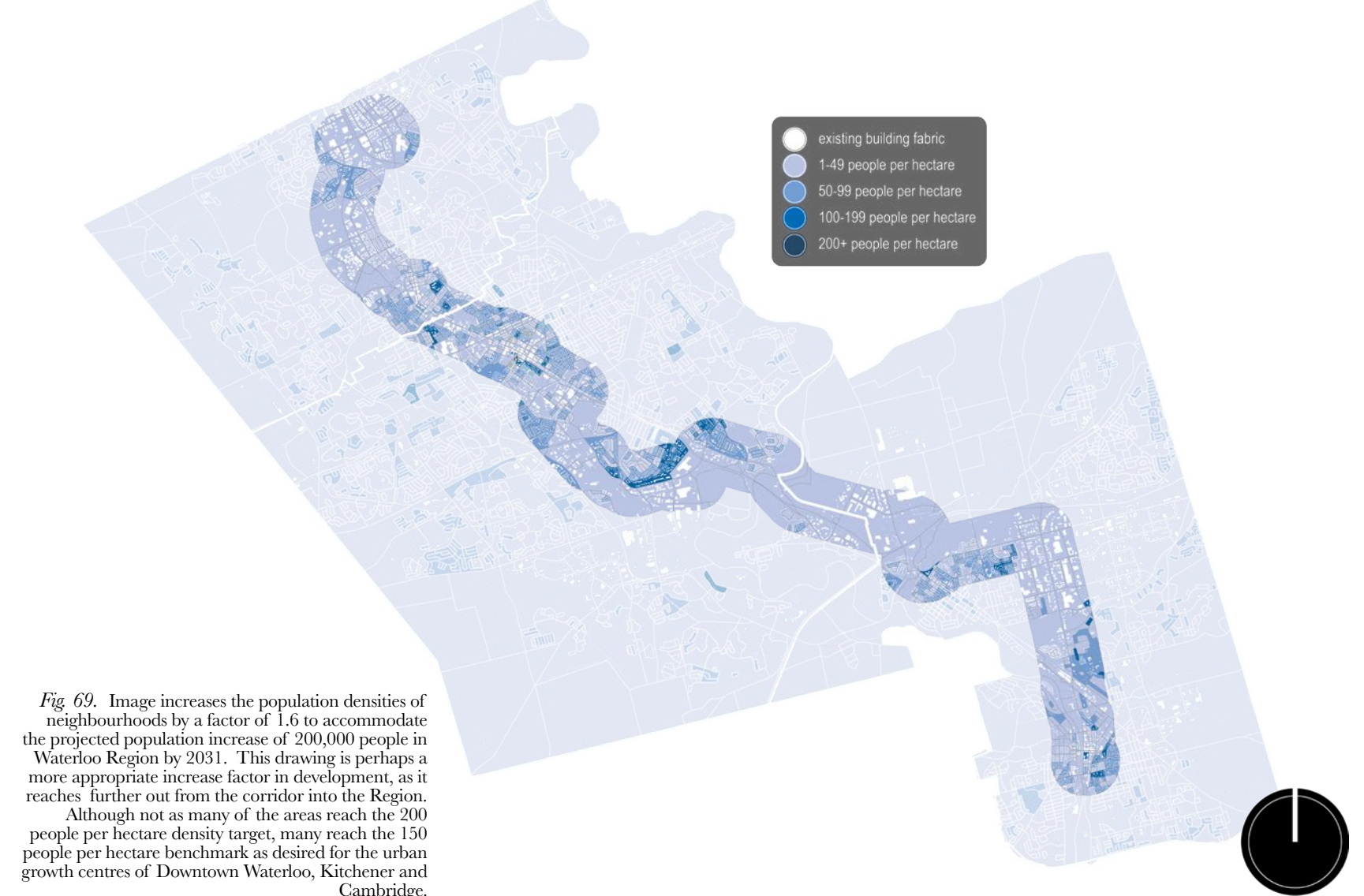


Fig. 69. Image increases the population densities of neighbourhoods by a factor of 1.6 to accommodate the projected population increase of 200,000 people in Waterloo Region by 2031. This drawing is perhaps a more appropriate increase factor in development, as it reaches further out from the corridor into the Region.

Although not as many of the areas reach the 200 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.

MAPPING WATERLOO REGION



- ### MAPPING WATERLOO REGION
- LAND PARCELS
 - EMPTY PARCELS
 - GRAND RIVER WATERSHED
 - GRAND RIVER
 - LAKE / POND
 - FOREST
 - PARK
 - STREET TREES
 - BUILDING FOOTPRINT
 - BIKE PATHWAY
 - GRT ROUTE
 - LRT ROUTE
 - WALKING SHED

Fig. 70. Mapping Analysis of Waterloo Region at various scales



50

51

“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.”
—Economist Enrico Moretti, *The New Geography of Jobs*

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.



DEMOGRAPHICS

target group analysis



'I need easy access to Pearson Airport for when my family comes to visit from Japan. I do not have a driver's license, so I need to live somewhere that has access to all my daily needs within walking distance, and everything else in the transit network. I also admire community spaces, as I do not have family local to me.'

- Permanent Resident / Immigrant



'We want to be close to our jobs in the tech sector, but also to have easy access to amenities for when we have children of our own. Easy access to a network of trails and parks would be ideal, especially if there is no guarantee of us having a yard.'

-Young Couple



'I would love to get into the real estate market, but most of my money is going towards starting my business. I really wish there was something affordable and easy to maintain, but a step up from the student housing scene.'

-Recent Graduate



'I often commute to Toronto for meetings, and my head office is in San Francisco. Right now I am doing a great deal of driving on the 401, but it would be ideal if I could spend my commute being productive or relaxing. I would be willing to pay for a place close to GOtransit connections to Toronto.'

-Commuter



'Joe had a stroke last year and is now unable to drive. We recently moved into a retirement condo in Kitchener and look forward to doing our errands with the safety of the transit system- less walking during bad weather in spring and winter is a bonus in our books.'

-Retired Couple



'We have two family vehicles at the moment. It would be great to lessen our monthly expenses and decrease to one vehicle. Our family has never used the transit system before, and we are not sure where to start. We spend a lot of time going to community centre for sports and to the grocery store.'

-Suburban Family

Fig 72. Target Group Analysis.

'Silicon Valley employs approximately 380,000 tech workers; the Toronto-Waterloo corridor has nearly 280,000. The Waterloo Region boasts nearly 1,000 companies, contributing more than \$30-billion annually to the global economy. In 2013, Startup Genome ranked Waterloo as 16th among the world's 20 global startup hubs.'

The Region of Waterloo has grown rapidly in recent past, due to a myriad of factors including proximity to some of Canada's best post secondary institutions, with a large percentage of graduates committed to technological startups. 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 grabbing recent graduates before they left to support another economy. The area has quickly taken on the vibe of a tech hub, and communities like Velocity and Communitech have been established to foster starting companies, some of which were born while students were still in school, due to the unique policy at the University of Waterloo that students own their work and research. Despite this nickname, there is still a wide demographic of students, families, baby boomers and professionals, all of which create a diverse community. With diverse people come diverse needs, some of which can be met through a new urban model for the light rail transit spine that will be connecting the Region in the coming years.

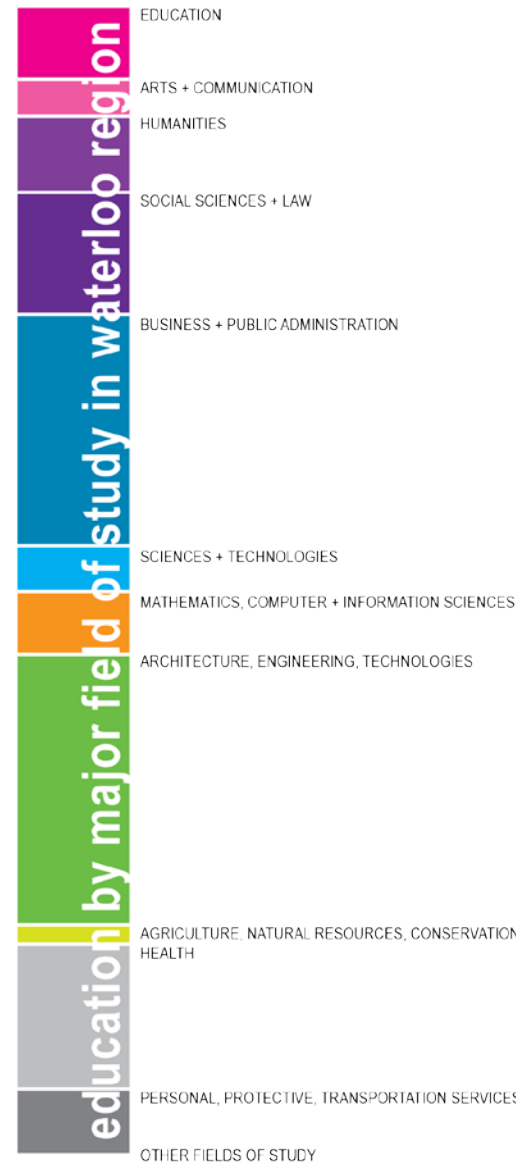
A current disadvantage in the Region is the inability for recent graduates and retirees to find housing appropriate for their needs and budgets. There have been many articles in the local newspapers,

as well as in The Toronto Star regarding the transforming needs for residents in the Greater Golden Horseshoe. There is a gap of affordability in the Region between the typical student house, and the high-end condominium or family home. There is a need for more housing for the groups of transitioning populous, who have desires for an independent living space, with community amenities and a budget suiting their income. These groups have particular interest in access to transit, and are a target group that needs to be a major focus for the ION development. An article in The Toronto Star discussed the local housing market, and how there is a new trend of housing needs and a transit lifestyle coming to the Region:

*"We're seeing signs that the future has got to be different than the past — that demographics are changing, that the current generation doesn't necessarily want the suburban lifestyle and the expensive automobile they grew up with."*¹

In order for citizens to fully embrace the new transit lifestyle coming to the Region, the solution is not to wait until light rail transit comes, and expect development to follow it, but to develop core zones along the corridor, so that the user base already exists when the ION hits the tracks.

1 Pigg, Susan. "Waterloo Housing: The Dream ... and the Surprising Reality." The Toronto Star, March 20, 2015, Business sec. Accessed April 23, 2015. <http://www.thestar.com/business/2015/03/20/waterloo-housing-the-dream-and-the-surprising-reality.html>.



There are people who oppose the ION system, are convinced they would never use transit, and the project budget would be better spent on improving local roads. This was proven inaccurate when the Region released statistics stating road construction is funded entirely by the Region and the cost for roadways (\$1.5B) for the growing population would cost more than the construction of the ION (\$1B). Some have doubts that the ION will help to combat traffic, or that there will be enough ridership to consider additional routes. One can speculate that it is easier to convince young and elderly populations in the Region that transit is a feasible means for travel and lifestyle for there is a higher chance they have been exposed to more transit through living in large cities, or lack of a drivers license causing them to rely on transit. Suburban families often think that transit won't work for them. This could be due to a lack of local transit in their upbringing, or questioned safety of their children on routes. If more developments along the ION are focused on these two target groups to begin with, as the project becomes successful, more groups could be convinced.

Fig 73. Left. As shown in the diagram of education by major field of study in Waterloo Region, the architecture, engineering and technology sector is dominating the market. This is advantageous, as these fields are constantly transforming; adapting to and creating new technological advances. The startups work together in incubator hubs, often sited in refurbished warehouses. Employees of said startups are not only looking for career opportunities, but also cities that have amenities they're looking for: bars, restaurants, parks, entertainment, farmer's markets, etc.

"House builders are stubbornly clinging to a past that continues to destroy farmland and requires new roads, schools and other costly services that the region can no longer afford. If boomers aren't yet moving in big numbers, it's partly because alternatives like urban townhouses, condos and apartments have only recently been available in The Region. And they've largely been built by newcomers and builders from other cities who recognize the great need in Waterloo Region."

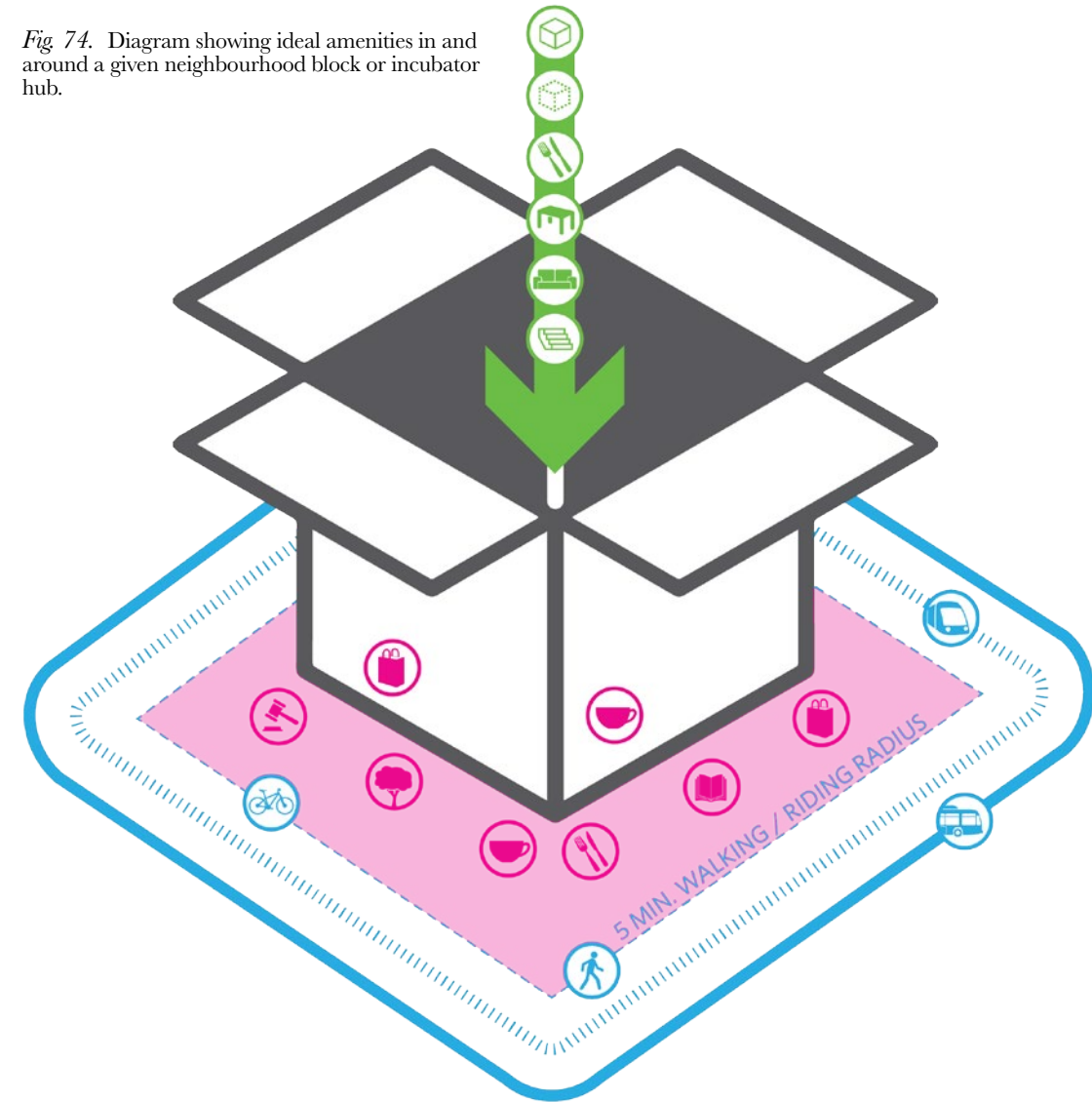
-Kevin Thomason, Local Resident
+ Co-Founder of Smart Growth Waterloo Region



THE HUB

growth of the incubator / tech hub typology

Fig 74. Diagram showing ideal amenities in and around a given neighbourhood block or incubator hub.



“The mathematics do not bode 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 move back 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 lifestyle preferences as they age.”

-Richard Florida

The Rise of the Creative Class (307).

INCUBATOR HUB TYPOLOGIES

- CLOSED OFFICE / BOARDROOM
- OPEN OFFICE SPACE
- COMMON KITCHEN / CORE OFFICE SPACE
- TOUCH DOWN WORKSTATION
- LOUNGES / NOOKS
- CHANGE IN ELEVATION AS SPACE DIVIDER / SEATING

HUB AMENITIES TRANSIT HUB TYPOLOGIES

- RETAIL
- EDUCATION
- DINING
- CIVIC
- PARK
- CAFE
- BICYCLES
- WALKERS
- LIGHT RAIL TRAINS
- BUSES
- VEHICLES

GAN

“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/>

Velocity Hub

“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/>

Google

“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 interaction between Googlers within and across teams, and spark conversation about work as well as play.”
<https://blog.google/>

Makerspace

“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 projects. Making is a meaningful form of personal expression that fosters creativity, builds community and encourages the collaborative practice of innovation.”
 -Dale Dougherty, Founder & CEO
<https://makershare.com/>

IMPACT HUB

“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 believe a better world evolves through the combined accomplishments of creative, committed and compassionate individuals focused on a common purpose. Joining our diverse community of members and collaborators will inspire, connect, and enable you to develop your best work every step of the way.”
<http://www.impacthub.net/>

Fig 75. The Hub Typology and its global reach.

THE CREATIVE CLASS

who are they and what are their needs?

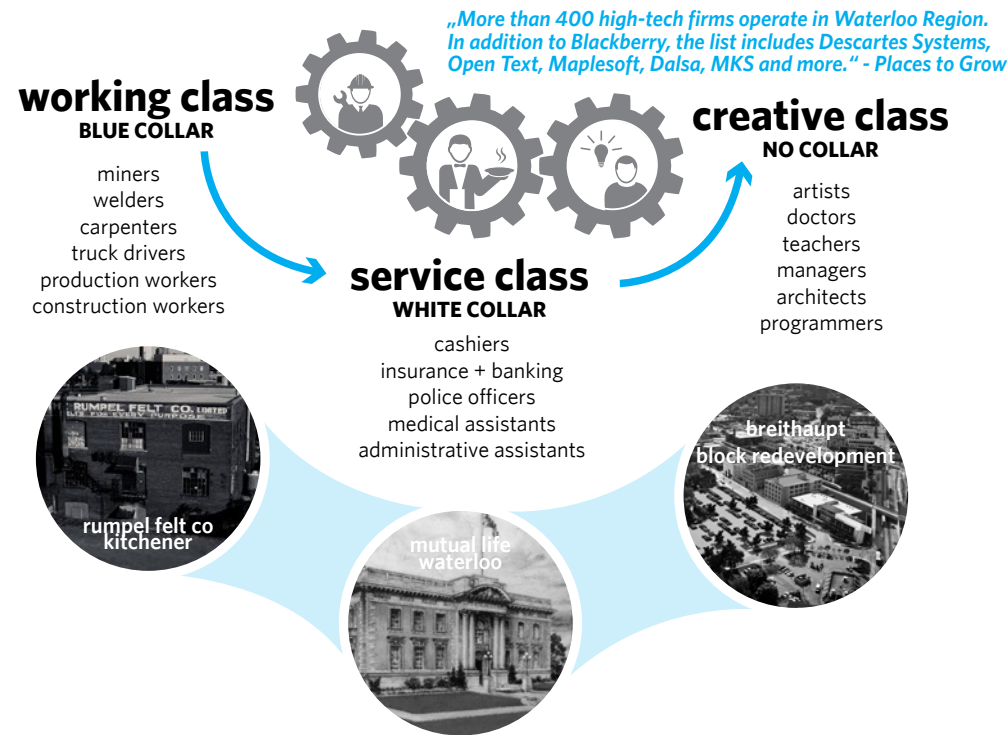
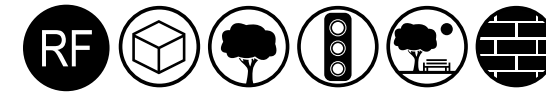


Fig. 80. Bottom Left. Engineering 5 Building, University of Waterloo, Main Campus. Logan, Lisa. Engineering V, Perkins Will. 2010. Waterloo.

Fig. 81. Bottom Centre. The Velocity Garage at the Communitech Hub in Kitchener. Velocity is an entrepreneurship program at the University of Waterloo boasting the largest free startup incubator in the world. Velocity provides the knowledge, tools, space and network that startups and entrepreneurs need for success.

Fig. 82. Bottom Right. Shopify Offices in the former Seagram Distillery Building in Waterloo at Tech Talks event in February 2016. When startups outgrow Communitech, companies like Shopify expand into their own office space, and take part in a network of events focused around the tech community in Waterloo Region.



A STARTUP ECONOMY

the rise of the creative class

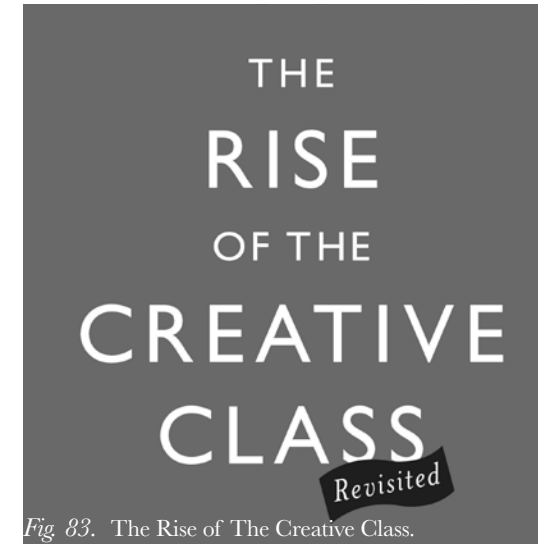


Fig. 83. The Rise of The Creative Class.

RICHARD FLORIDA
Urban Studies Theorist
Professor, Author

Richard Florida is an urban studies theorist with key interests in social and economic theory. He is currently a professor and the head of the Martin Prosperity Institute at the Rotman School of Management at the University of Toronto. He wrote *The Rise of The Creative Class* and *Who's Your City?*, in which he coined the term for the socioeconomic class: The Creative Class.

Super-Creative Core:

This group comprises about 12% of all U.S. jobs, with a wide range of occupations (e.g. science, engineering, education, computer programming, research), with arts, design, and media workers forming a small subset. Florida considers those belonging to this group to “fully engage in the creative process”¹. They are considered innovative, creating commercial products and consumer goods. The primary job function of this group is to be creative and innovative. “Along with problem solving, their work may entail problem finding”².

² Florida. 69.

QUALITY OF PLACE + **WHAT'S THERE:**
THE COMBINATION OF THE BUILT ENVIRONMENT AND THE NATURAL ENVIRONMENT; PROPER SETTING FOR A PURSUIT OF CREATIVE LIVES.

+ **WHO'S THERE:**
THE DIVERSE KINDS OF PEOPLE, INTERACTING AND PROVIDING CUES THAT ANYONE CAN MAKE A LIFE IN THAT COMMUNITY.

+ **WHAT'S GOING ON:**
THE VIBRANCY OF STREET LIFE, CAFE CULTURE, ARTS, MUSIC, AND PEOPLE ENGAGING IN OUTDOOR ACTIVITIES - ALTOGETHER A LOT OF ACTIVE, EXCITING, CREATIVE ENDEAVOURS.

Creative Professionals:

These professionals are the classic knowledge-based workers and include those working in healthcare, business and finance, the legal sector, and education. They “draw on complex bodies of knowledge to solve specific problems” using higher degrees of education to do so. (Florida, 2002).

“I call the age we are entering the creative age because the key factor propelling us forward is the rise of creativity as the primary mover of our economy.”
“If you are a scientist or engineer, an architect or designer, a writer, artist, or musician, or if your creativity is a key factor in your work in business, education, health care, law, or some other profession, you are a member [of the creative class].”
- Richard Florida



STARTUP ECONOMY

local startups and the technology triangle

"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 Vidyard's Michael Litt.³



VELOCITY STARTUP COMMUNITY
 HEADQUARTERS: TANNERY
 OTHER: MAIN CAMPUS, FOUNDRY
 FOUNDED: 2008
 CATEGORY: STARTUP SUPPORT

"What would happen if we took the University of Waterloo's brightest students and gave them access to a learning-focused community of mentors and like-minded peers, the latest equipment, and the resources to turn their business ideas into successful startups? What better place to build such a unique community than University of Waterloo, which Maclean's Magazine has named "Canada's most innovative university" 21 years running."

METHOD

+education
 +idea sharing and
 +creation of support systems
 successful startup community, which contributed to the success of companies like Kik, Thalmic Labs, BufferBox, Vidyard and MappedIn.

OUTPUT



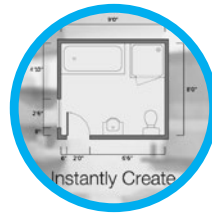
HEADQUARTERS: TANNERY
 FOUNDERS: UW ENG GRADS
 FOUNDED: MAY 2012
 TEAM SIZE: 62
 CATEGORY: HEALTH + WELLNESS

"We're a world-class team of engineers, researchers and designers building the future of human-computer interaction. We're closing the gap between humans and technology by solving a fundamental question: How do we connect the real and the digital worlds as we move towards wearable and ubiquitous computing? Thalmic Labs is a startup developing gesture control and wearable technology, such as 'MYO,' a gesture control armband."



HEADQUARTERS: TANNERY
 FOUNDERS: UW ARCH GRADS
 FOUNDED: JANUARY 2013
 TEAM SIZE: 6
 CATEGORY: APP DESIGN

"We believe that every homeowner should have the opportunity to create and live in a beautiful space. 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."



HEADQUARTERS: KING ST.
 FOUNDERS: UW STUDENTS
 FOUNDED: 2011
 TEAM SIZE: 19
 CATEGORY: MAPPING

"MappedIn began with the shared frustration of a few university students trying to find their way around campus. They believed there had to be a simpler way to navigate in between and within buildings. Yet to their surprise, there was no clear solution. So they created MappedIn, an ingenious platform for indoor mapping and navigation."

ELEMENTS OF WAYFINDING:
 1. FLOOR PLAN
 2. 3D MAP
 3. PATHS
 4. LOCATIONS
 5. VENUE SPECIFICS
 6. FINALIZED MAP

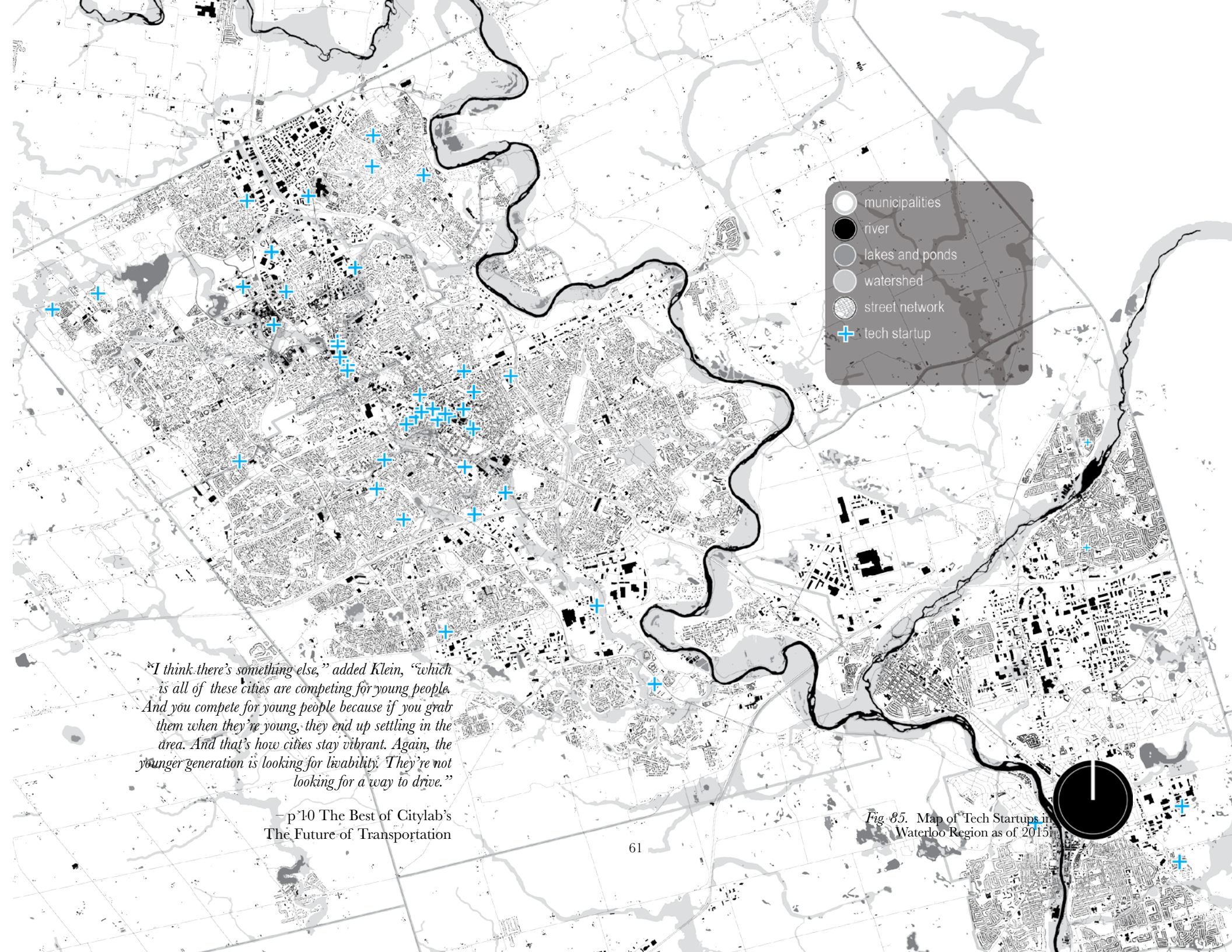


Fig 84. Diagram of startups in Waterloo Region.

Fig 85. Map of Tech Startups in Waterloo Region as of 2015

RF **QUALITY OF PLACE**
the soul of a successful community

There are many places within Waterloo Region, all of which will be exemplified through the following categories. The ideal scenario, however, would be if these places were more frequent, and available to locals in their neighbourhood.



Fig. 86. Communitech Building at the Tannery in Kitchener. McCurry, John W. Google Canada is located in the historic Lang Tannery building in Kitchener, Ont. Kitchener: In Site Selection Magazine, October 2011.

THICK LABOUR MARKETS

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 innovations that power economic growth. (288) 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.

LIFESTYLE

The highest-rated nightlife 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. (289) 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.



Fig. 87. Yukon Blonde concert at Maxwell's Concert and Events in Waterloo.

SOCIAL INTERACTION

“The ability to meet people and make friends is one of the most important factors that determines our happiness with our lives and communities.” (290) Everyone has their preferred local cafe, where one often runs into their neighbours, 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.” (291) 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.



Fig. 88. Settlement Co. Coffee Roaster and Cafe, in Kitchener and Waterloo.

THE MATING MARKET

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. (292) 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 ones immediate group of friends, and many casual environments in which to do so.



Fig. 89. Right. Abe Erb is a small brewpub located in the heart of Uptown Waterloo.



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

DIVERSITY

“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 organizations. It seeks to re-imagine downtown venues with multidisciplinary visual and performance art. Contributors and participants reanimate pockets of the city core, share rare 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.



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

AUTHENTICITY

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. (295) 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.

SCENES

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.



Fig. 92. Left. Annual Kitchener Blues Festival in Downtown Kitchener, 2013.

IDENTITY

Today, where we chose 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. (299) 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. 93. Left. Habitat for Humanity volunteer build in Waterloo Region featuring Walter Fedy.



FIRST PLACE, SECOND PLACE, THIRD PLACE

... and fourth and fifth place

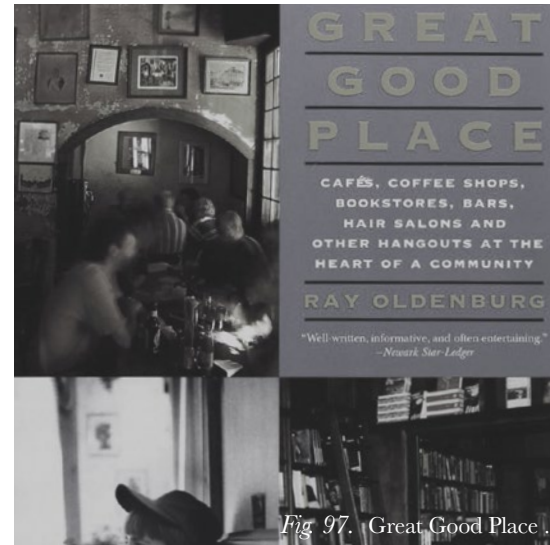


Fig. 97. Great Good Place

RAY OLDENBURG
Professor, Urban Sociologist

1989. *The Great Good Place: Cafés, Coffee Shops, Community Centers, Beauty Parlors, General Stores, Bars, Hangouts, and how they Get You through the Day.*

Ray Oldenburg (born 1932) is an American urban sociologist, known for writing about the importance of informal public gathering places for a functioning civil society, democracy, and civic engagement. He used the term third place and is also the author of *The Great Good Place*.

As the population of Waterloo Region continues to grow, the median commute time for workers of fifteen minutes may be on the rise, leaving entrepreneurs looking for an alternative to their current methods of living 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 lives to exist, and get everything they need, from their daily errands to an evening out within a certain radius of their front door. The key to a functional neighbourhood features access to a myriad of combinations of first, second and third places.

*"Most needed are those 'third places' which lend a public balance to the increased privatization of home life. Third places are nothing more than informal public gathering places. The phrase 'third places' derives from considering our homes to be the 'first' places in our lives, and our work places the 'second.'"*⁴

def. first place
home

def. second place
workplace

def. third place
"anchors" of community life

⁴ Oldenburg, Ray. 1996. "Our Vanishing Third Places." *Planning Commissioners Journal* (25): 6. 67



Fig. 94. Townhouse Developments. "...the dwellings of a district need to be supplemented by other primary uses so people on the streets will be well spread through the hours of the day." -Jane Jacobs, 262



Fig. 95. Aerial view over suburban neighbourhood in Waterloo Region. Image by author.

"What suburbia cries for are the means for people to gather easily, inexpensively, regularly, and pleasurably — a 'place on the corner,' real life alternatives to television, easy escapes from the cabin fever of marriage and family life that do not necessitate getting into an automobile."¹

¹ Oldenburg, Ray. 6.



Fig. 96. Aerial view of new construction apartment towers near Columbia Street and University Avenue in Waterloo. Properties transformed from single family dwellings to highrise condos. The population and density of this neighbourhood continue to rise, but there are not enough amenities available to local inhabitants.

Third Places:

- +help unify neighbourhoods.
- +serve as 'ports of entry'.
- +are 'sorting' areas.
- +can bring youth and adults into association with one another.
- +help care for the neighbourhood.
- +foster political debate.
- +help reduce the cost of living.
- +are entertaining.
- +give the gift of friendship.
- +are important for retired people.

"In the absence of informal public life, living becomes more expensive. Where the means and facilities for relaxation and leisure are not publicly shared, they become the objects of private ownership and consumption."
-Ray Oldenburg

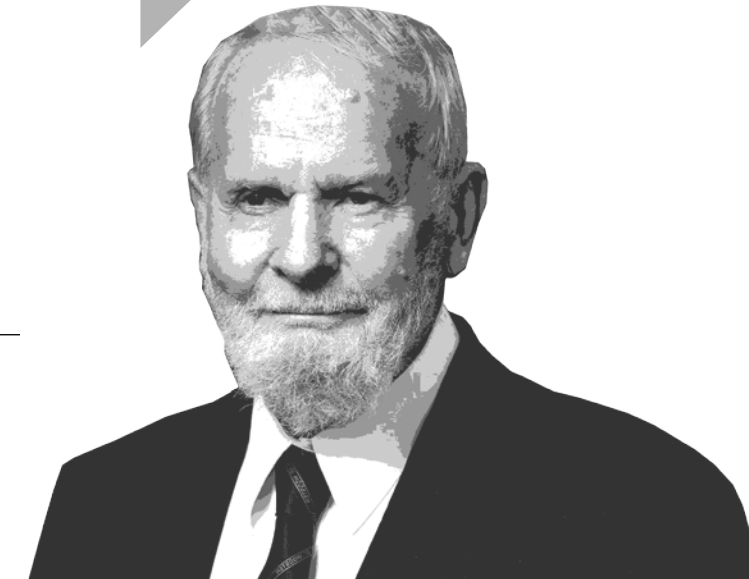


Fig. 98. Silodam multi-housing building by MVRDV in Amsterdam. The architects designed the building to act like a village, with different neighbourhoods. There is a mix of apartments with patios, social housing, and luxury residences with gardens. This creates a unique mix of residents and a diverse 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.



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 living 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 that 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. Both can exist in a radius further from one's first and second places.

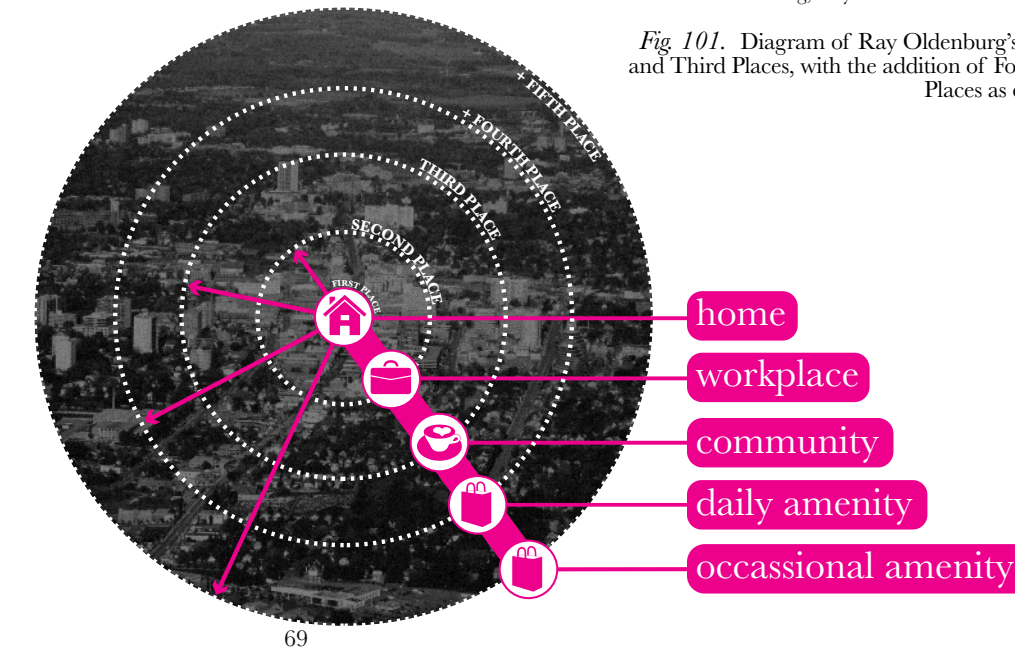
def. *fourth place*
daily amenity - frequent errands, places one does not often linger

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 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 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 grassroots of democracy, but sadly, they constitute a diminishing aspect of the American social landscape."

5 Oldenburg, Ray.

Fig. 101. Diagram of Ray Oldenburg's First, Second and Third Places, with the addition of 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 locale.



"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 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 grassroots of democracy, but sadly, they constitute a diminishing aspect of the American social landscape." - Ray Oldenburg



*Most needed are those "third places" which lend a public balance to the increased privatization of home life. Considering our homes to be the "first places" in our lives, and our workplaces the "second," Ray Oldenburg

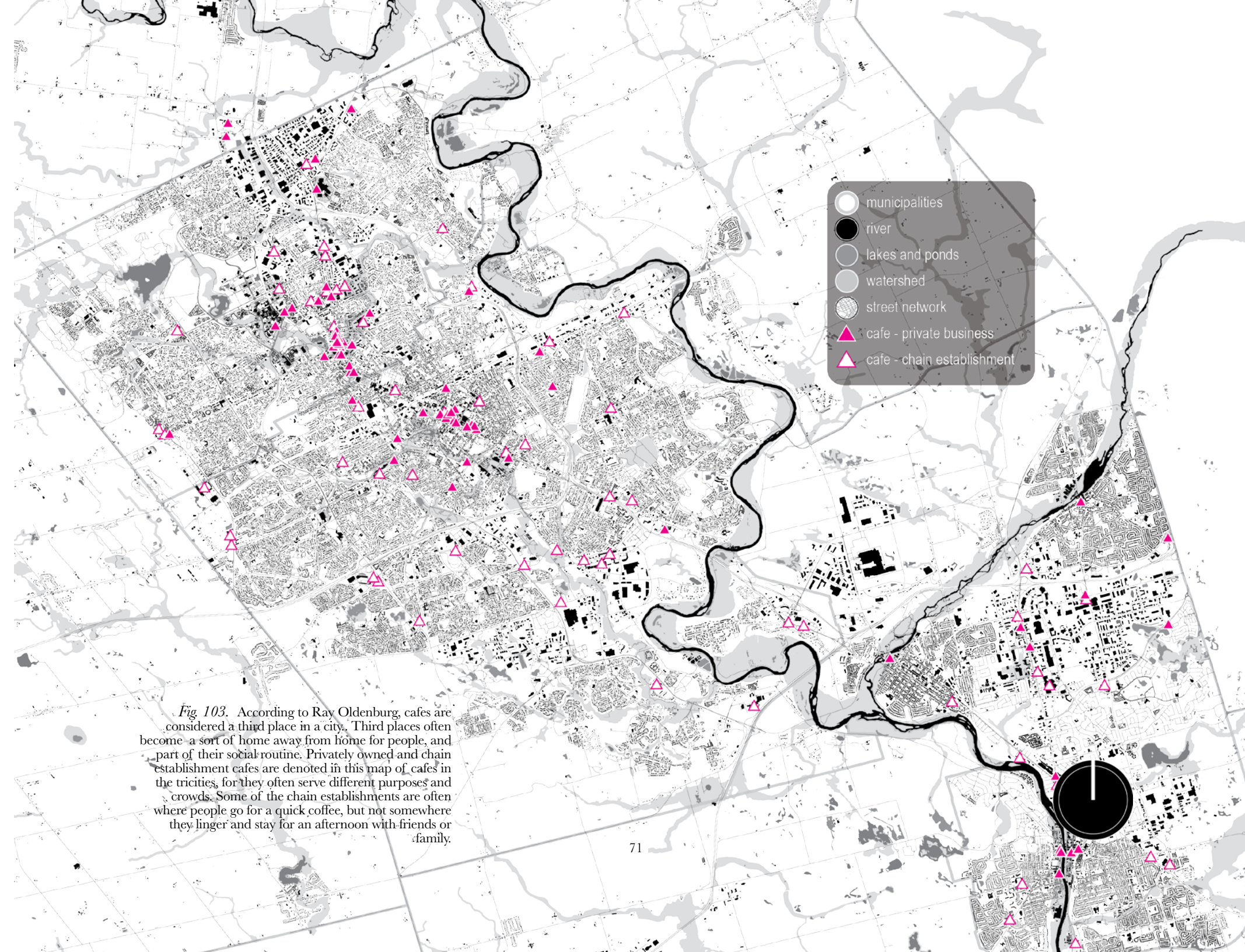


Fig 103. According to Ray Oldenburg, cafes are considered a third place in a city. Third places often become a sort of home away from home for people, and part of their social routine. Privately owned and chain establishment cafes are denoted in this map of cafes in the tricities, for they often serve different purposes and crowds. Some of the chain establishments are often where people go for a quick coffee, but not somewhere they linger and stay for an afternoon with friends or family.



THE DESIGN SITE

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, sheds and holes in current design guidelines, and the original intention of restructuring 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 issues of population growth and local development, there is a battle between the cities and their plans for 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 swath of land equaling ____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 light rail are broken into one of six categories that classify the 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 for high amounts of development.

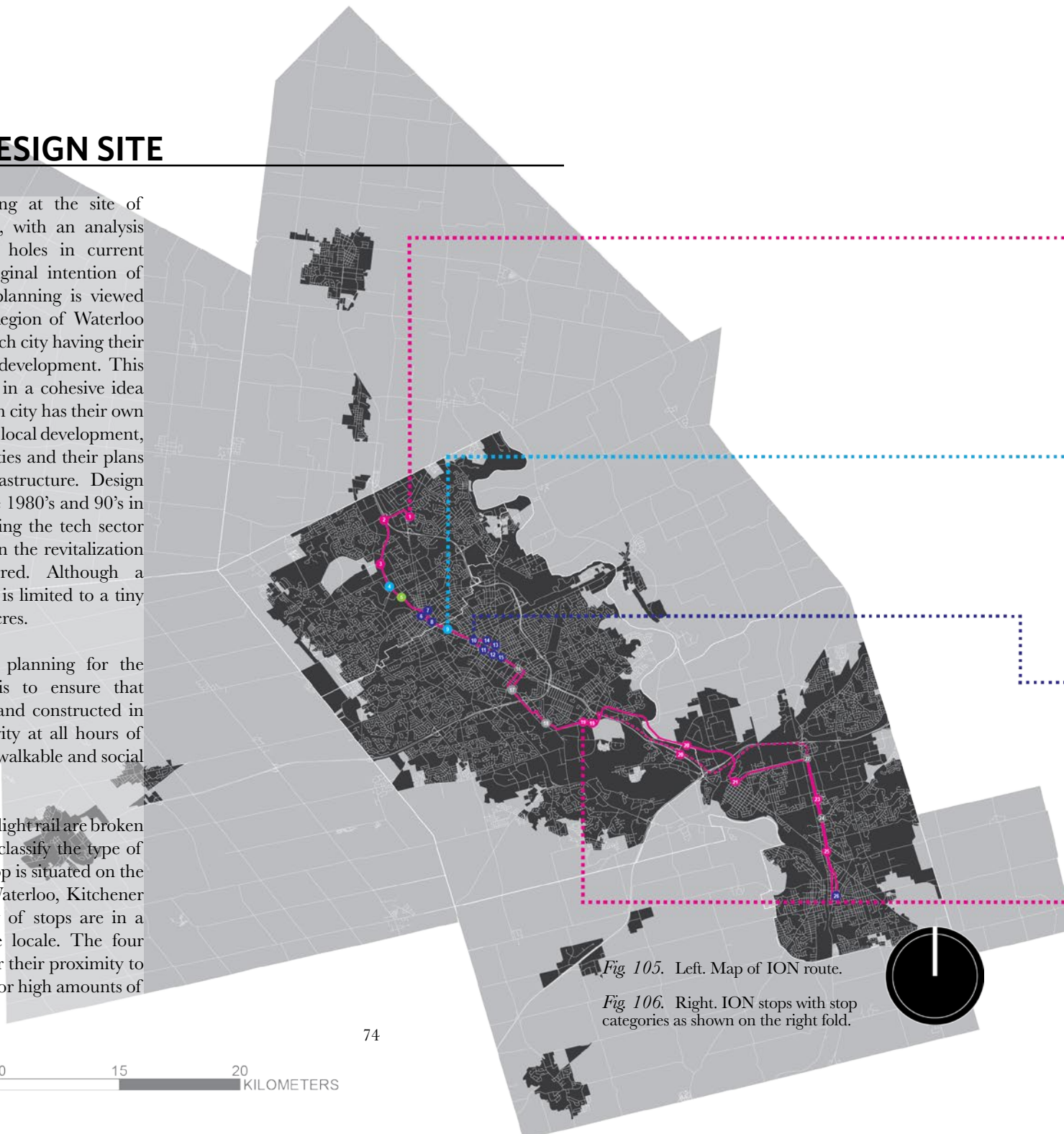
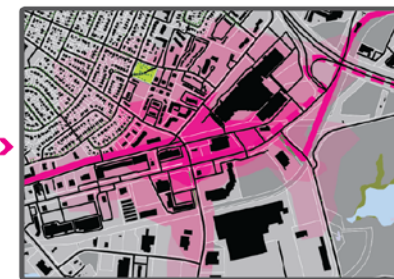


Fig 105. Left. Map of ION route.

Fig 106. Right. ION stops with stop categories as shown on the right fold.



- 1 historic downtown / transit hub
- 1 urban park
- 1 institutional zone
- 1 shopping centre / business park
- 1 commercial / industrial zone
- 1 suburban zone

- MAPPING WATERLOO REGION
- land parcels
 - empty parcels
 - grand river watershed
 - grand river
 - lake / pond
 - forest
 - park
 - street trees
 - building footprint
 - bike pathway
 - grt route
 - lrt route
 - walking shed

- 1 CONESTOGA MALL
- 2 NORTHFIELD
- 3 R+T PARK
- 4 UNIVERSITY OF WATERLOO
- 5 SEAGRAM
- 6 WILLIS WAY
- 7 WATERLOO TOWN SQUARE
- 8 ALLEN
- 9 GRAND RIVER HOSPITAL
- 10 KING / VICTORIA TRANSIT HUB
- 11 GAUKEL
- 12 BENTON
- 13 FREDERICK
- 14 YOUNG
- 15 CEDAR
- 16 BORDEN
- 17 MILL
- 18 BLOCKLINE
- 19 FAIRVIEW PARK MALL
- 20 SPORTSWORLD
- 21 PRESTON
- 22 EAGLE
- 23 CAMBRIDGE CENTRE MALL
- 24 CAN-AMERA
- 25 DELTA
- 26 AINSLIE STREET TERMINAL

WATERLOO ION STOPS: STOP CATEGORIES

NORTHFIELD

Located at the North end of the transit corridor in Waterloo, Northfield is currently populated with Conestoga Mall, big box retail, suburban housing subdivisions and lowrise industrial / commercial developments. The area is gaining character as a business district and employment centre, with the increased construction of office hubs, 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 facades 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 66,000 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 streetfront buildings and create a diversified neighbourhood with a focus on encouraging methods of transportation other outside of 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.

Fig 107. Aerial view of Conestoga 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 Conestoga Mall will be used frequently for riders to access the LRT from surrounding areas. For this, 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 vernacular is mostly lowrise buildings, with a mix of housing, stripmalls and business plazas, big box shopping centres and chain restaurants. The area lacks local retail, but is home to many local manufacturing and construction companies.

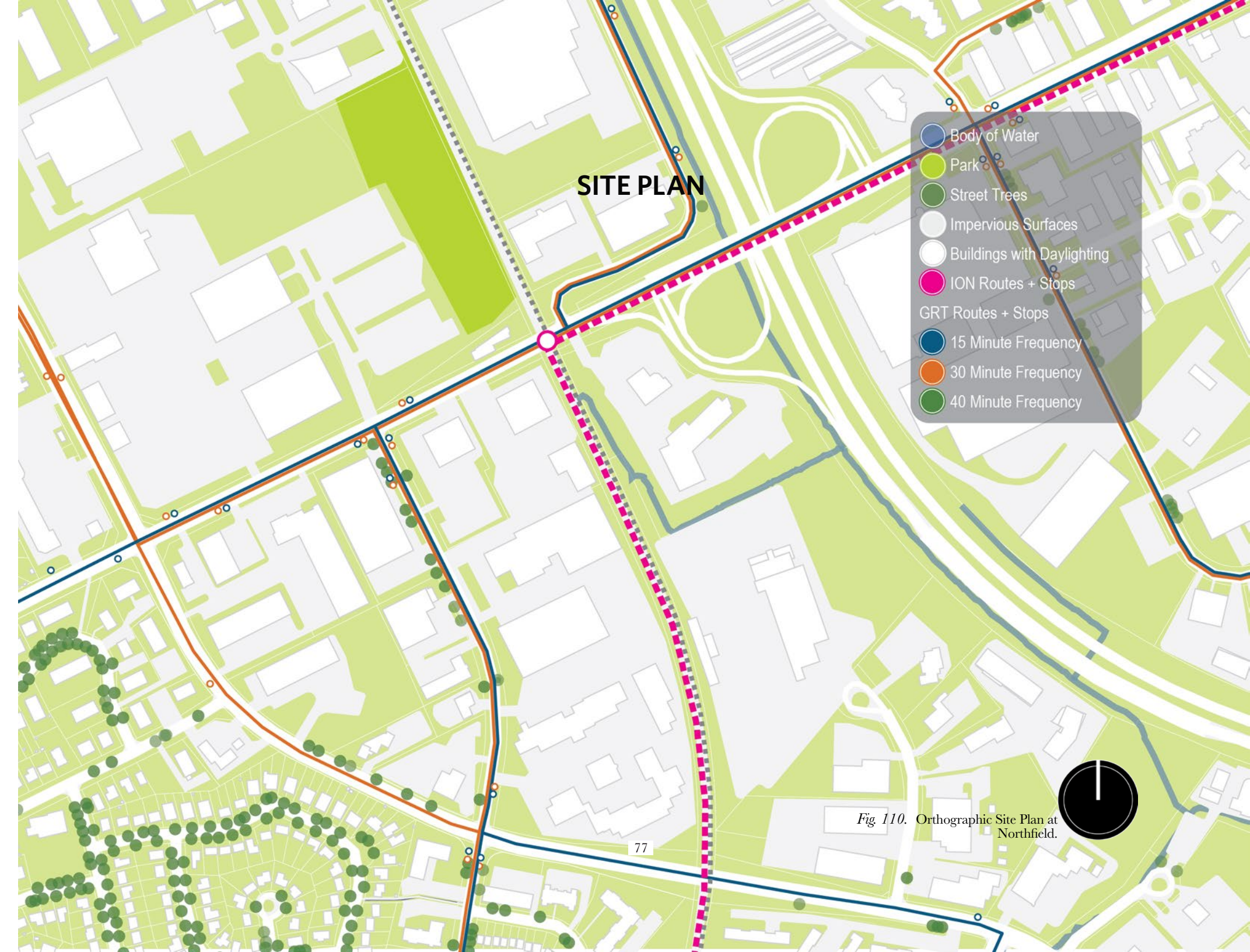


Fig 110. Orthographic Site Plan at Northfield.

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 many 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. 111. Right. Expansive surface parking lot adjacent to Sun Life Financial on King Street and Mount Hope Street in Midtown.



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



Fig. 113. Right. Construction of the light rail infrastructure on King Street near the Hospital, with surrounding medical offices occupying low density detached house conversions.



Fig. 114. Orthographic Site Plan at Grand River Hospital/Midtown.

CENTRAL STATION - INNOVATION DISTRICT

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 its name of the Innovation District. This is in part response to a redevelopment strategy by The City 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 this stop, (provide stat) with the bulk focused on large residential developments featuring commercial space.



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



Fig 116. Centre right. LRT tracks 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 Streets near the future transit hub site in Downtown Kitchener, with Google Headquarters in the background.

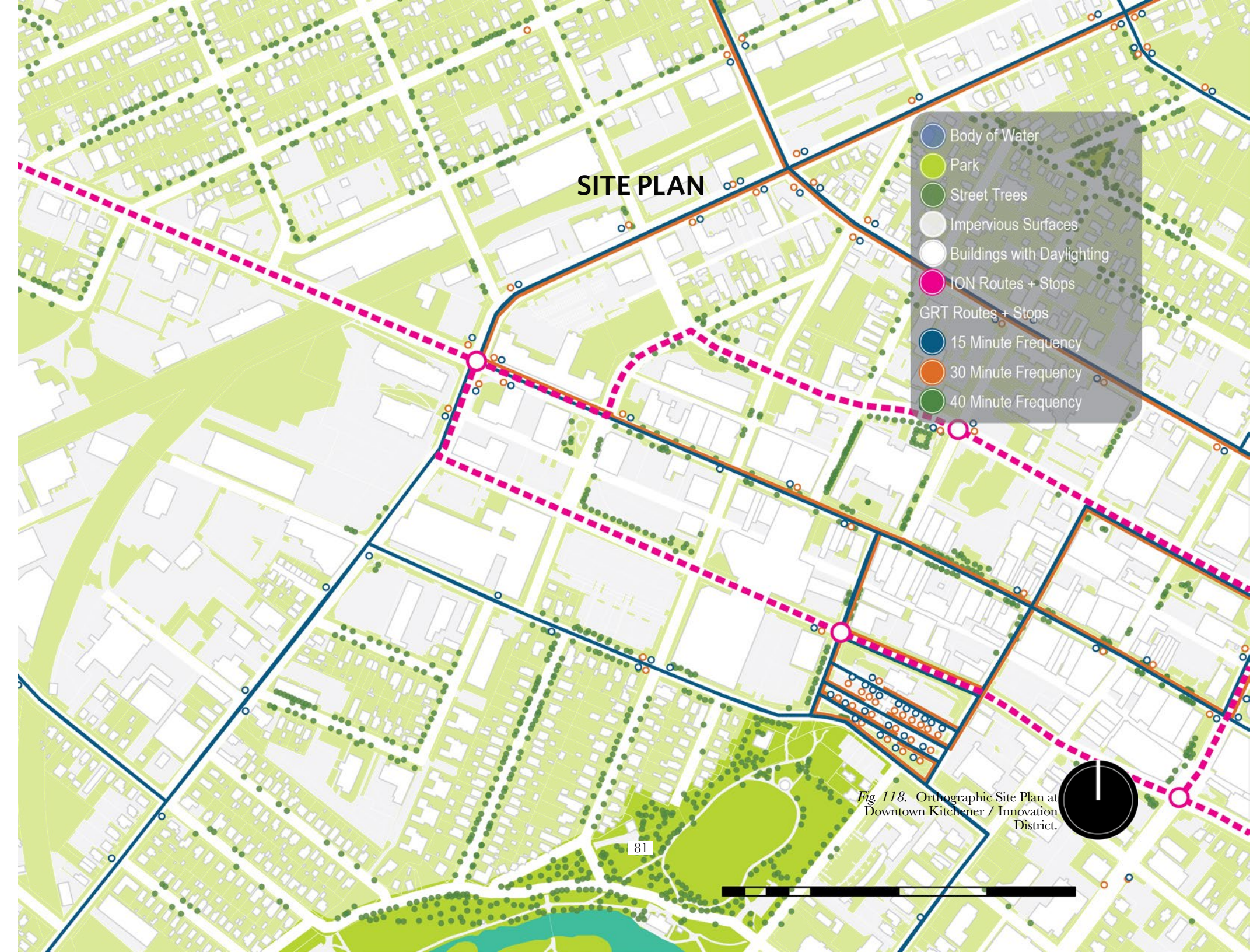


Fig 118. Orthographic Site Plan at Downtown Kitchener / Innovation District.

FAIRVIEW

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, 85 and 401 for a gateway to the surrounding Region, as well as Toronto. There are many established residential neighbourhoods surrounding this stop, with many older apartment towers. There is still space for infill at this site, and is in some ways similar to site issues at Northfield, with the exception of this stops 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 119. Aerial view of Fairview Park Mall area.



Fig 120. Parking lot at Fairview Mall.



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.

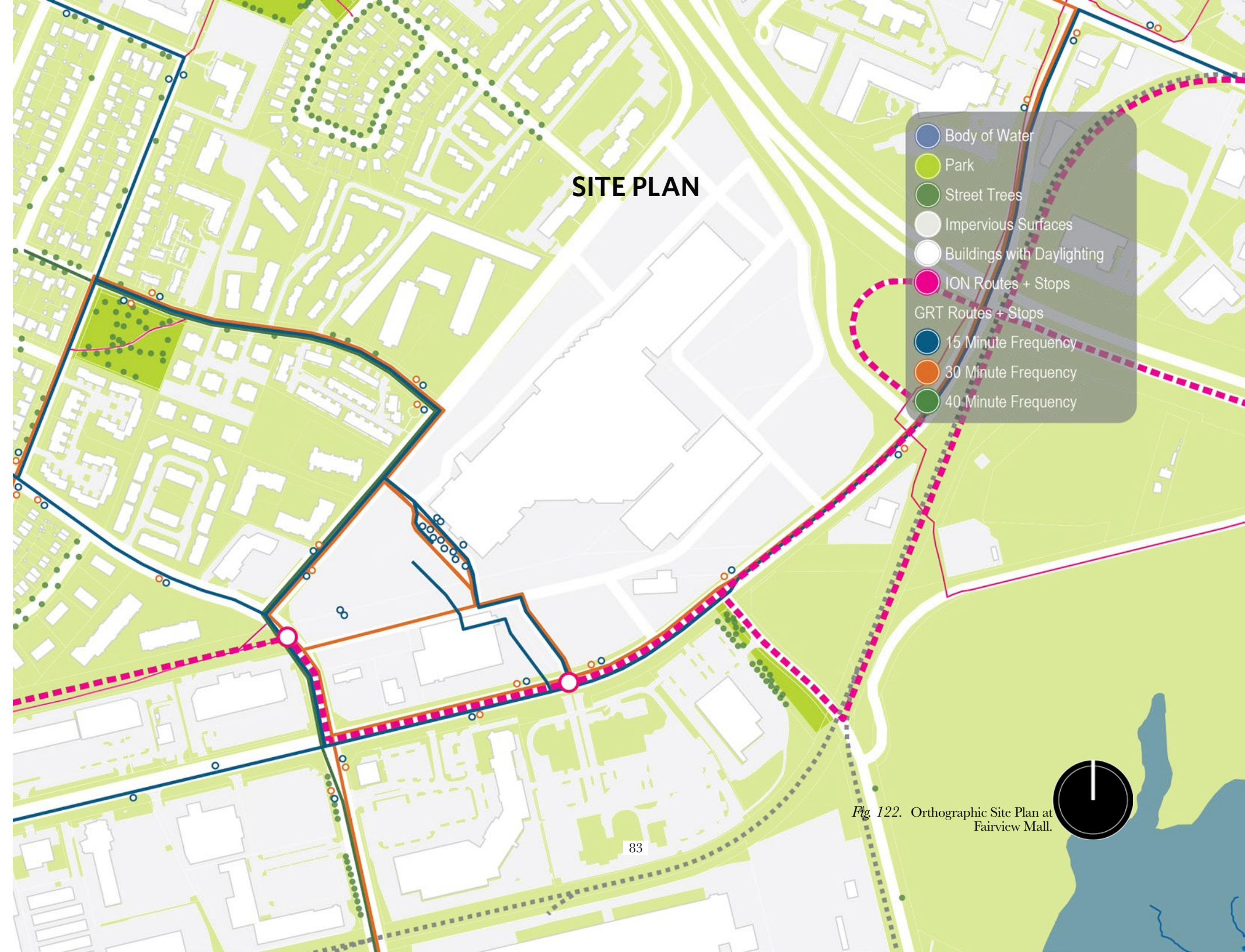


Fig 122. Orthographic Site Plan at Fairview Mall.

THE DESIGN SITE:

midtown and beyond

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 design 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 majorly institutional zone surrounding Grand River Hospital could earn the name of Midtown, and serve as the connector between Uptown and Downtown, making a sizable 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 with ease, 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.

MISSING FROM MIDTOWN

As much of Midtown is occupied by low density construction, surface parking and infill space, the district is a blank canvas in terms of potential development. A detailed analysis of the site was conducted to provide insight for the removal of existing buildings, the construction of new streets, opportunities for public space and elements missing from the street. Potential amenities in Midtown vary, an example would be park and event space, which never goes amiss in a city so long as they are planned to have access to sunlight, and the potential to be safe. Hotel space could support

the Hospital and local visitors, especially since closure of Waterloo Inn, this leaves only the Delta in Waterloo, and The Crowne Plaza in Downtown Kitchener as major options for hotel destinations. There are also opportunities to create support for the massive employment cluster in the area (Grand River Hospital, Sun Life Financial, public schools, medical and tech offices) via housing options for people working in the area to live in the area or public amenities for commuters (washrooms, water, food, errands).

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



EMPLOYMENT IN MIDTOWN

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, lacklustre 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 this 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.

Fig. 124. Aerial view of Grand River Hospital.

Fig. 125. Sun Life Financial building.

Fig. 126. Aerial view of Midtown.

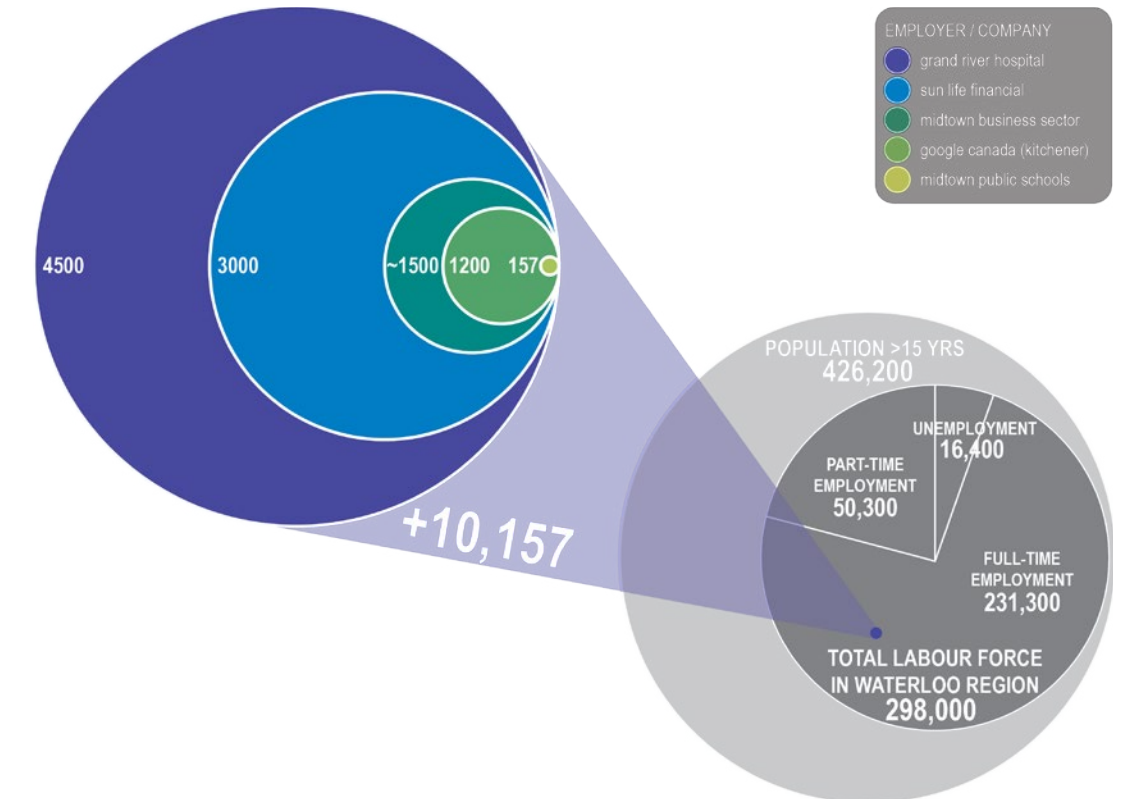


Fig. 127. Top Left. Kitchener Waterloo Collegiate Institute on King Street in Midtown. Secondary School that employs teachers and administrative staff.

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.

GRAND RIVER HOSPITAL
+4500 employees (550 staff, +800 volunteers)

SUN LIFE FINANCIAL
3000 employees at union blvd office

KING EDWARD PUBLIC SCHOOL
25 staff + 290 students

KITCHENER-WATERLOO COLLEGIATE INSTITUTE (KCI)
132 staff + 1200 students

GOOGLE KITCHENER
1200 employees

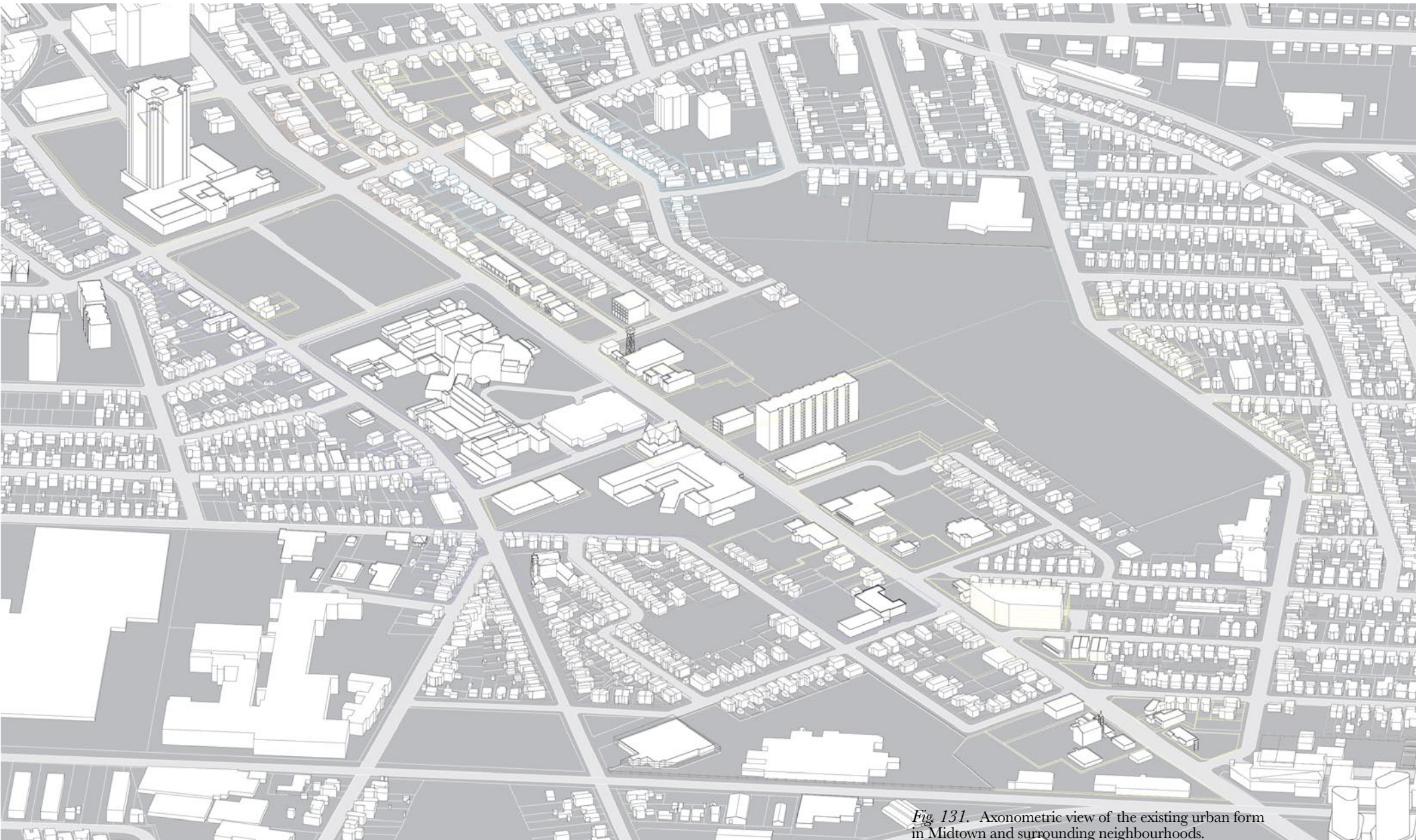


Fig. 131. Axonometric view of the existing urban form in Midtown and surrounding neighbourhoods.

CREATING THE MISSING URBAN FORM

the search for the sustainable city

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 theatre, and back home again. This situation also arises when considering the work environment and options for lunch spots, the ability to run some errands at lunchtime, 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

friends, to shops, entertainment, 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? Isn’t wide choice and rich opportunity the point of cities?”¹

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 live their everyday lives. She analyses 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.”²

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

¹ Jacobs. 151.
² Jacobs. 158.

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 to 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. We have had the bicycle around for a good 100 years now, and in certain countries and cultures, bicycles are a widespread form of transportation. 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 sustainable buildings.”

-Jan Gehl

Fig. 132. Aerial screenshot from Google Maps of the area surrounding Grand River Hospital.



EXISTING SECTION

cutting through king

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

DISTRICT OF URBAN SECTION @ nearest intersection

MAPPING WATERLOO REGION

- LAND PARCELS
- EMPTY PARCELS
- GRAND RIVER WATERSHED
- GRAND RIVER
- LAKE / POND
- FOREST
- PARK
- STREET TREES
- BUILDING FOOTPRINT
- BIKE PATHWAY
- GRT ROUTE
- LRT ROUTE
- WALKING SHED

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.

EXISTING CONDITIONS

no space for public features

The ION stops were been 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 symbolism 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.

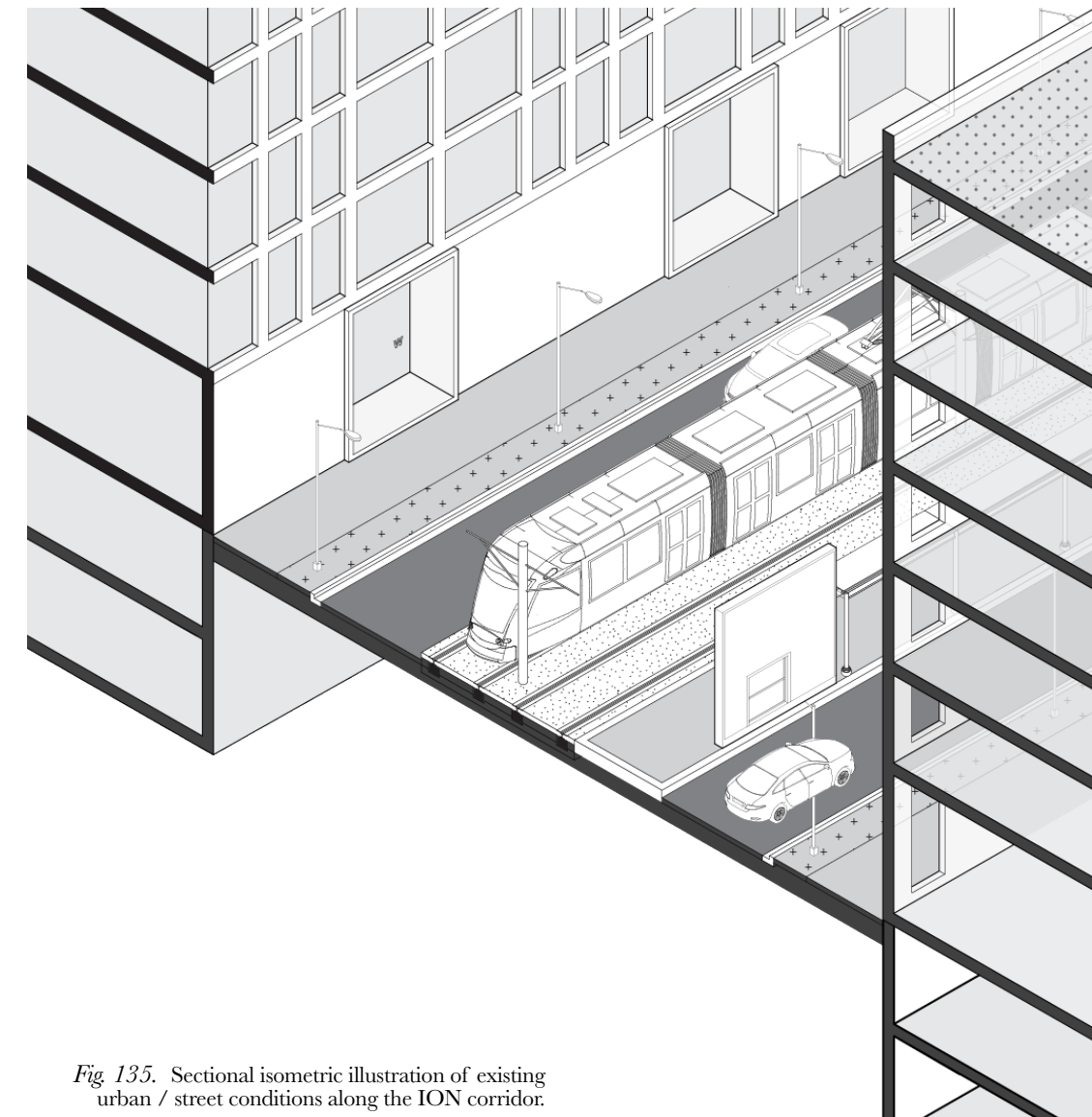


Fig. 135. Sectional isometric illustration of existing urban / street conditions along the ION corridor.



Fig 136. Aerial image of University Avenue and Columbia Street with University of Waterloo campus in distance.

UNIVERSITY



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 colour blocks represent multidisciplinary areas of study coming together. Blue and gray are colours of intelligence and black is a colour of sophistication.



Fig 137. Above. ION Stop Anchor Wall Design at the University of Waterloo. Image from ION Stop Anchor Wall Designs document, 2015.

Fig 138. Top Right. Aerial view of University of Waterloo Campus.

Fig 139. Centre Right. Snapshot from Google Maps.

Fig 140. Bottom Right. Snapshot from Google Maps.

EXISTING SECTION

urban condition at university district

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 1,200 beds, but when planned new developments are included, the surplus increases to over 8,300,”³ 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.

³ <http://www.570news.com/2016/02/25/waterloo-facing-oversupply-of-student-housing/>

Fig 141. Existing Urban Condition at University District.

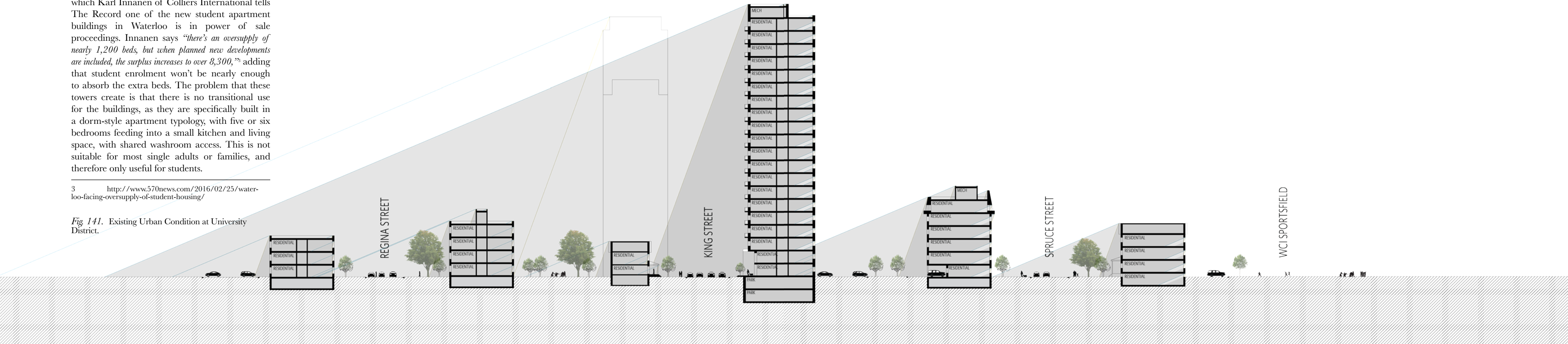




Fig 01. Aerial image of University Avenue. Image by author.

UPTOWN WATERLOO



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.

Fig 142. Above. ION Stop Anchor Wall Design at Waterloo Town Square. Image from ION Stop Anchor Wall Designs document, 2015.

Fig 143. Top Right. Beertown in Waterloo is one of many developments by the Wideman family in an effort to create a culture for local food and drink.

Fig 144. Middle Right. Death Valley's Little Brother is a cafe and whiskey bar on King Street that often hosts local events.

Fig 145. Lower Right. Balsillie School of International Affairs at Wilfrid Laurier University in Waterloo. There is a lot of attention to the construction of new institutional buildings surrounding the universities.



EXISTING SECTION

urban condition in the uptown district

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.

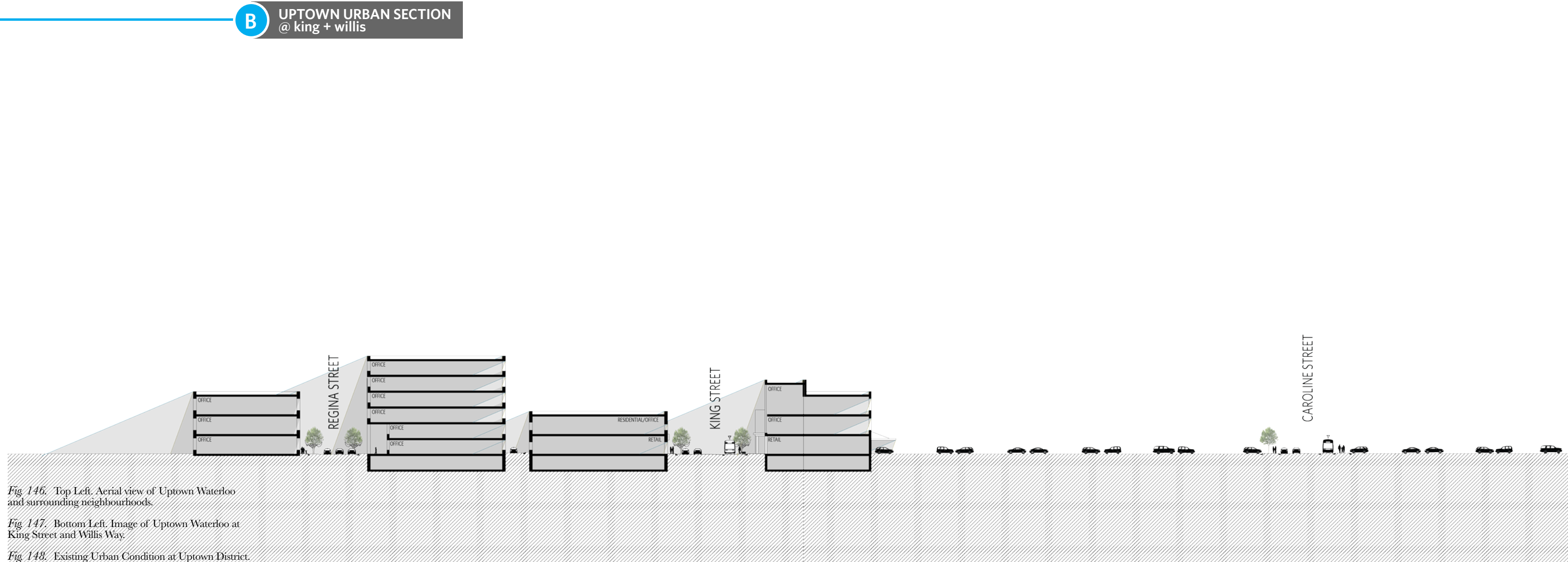


Fig. 146. Top Left. Aerial view of Uptown Waterloo and surrounding neighbourhoods.

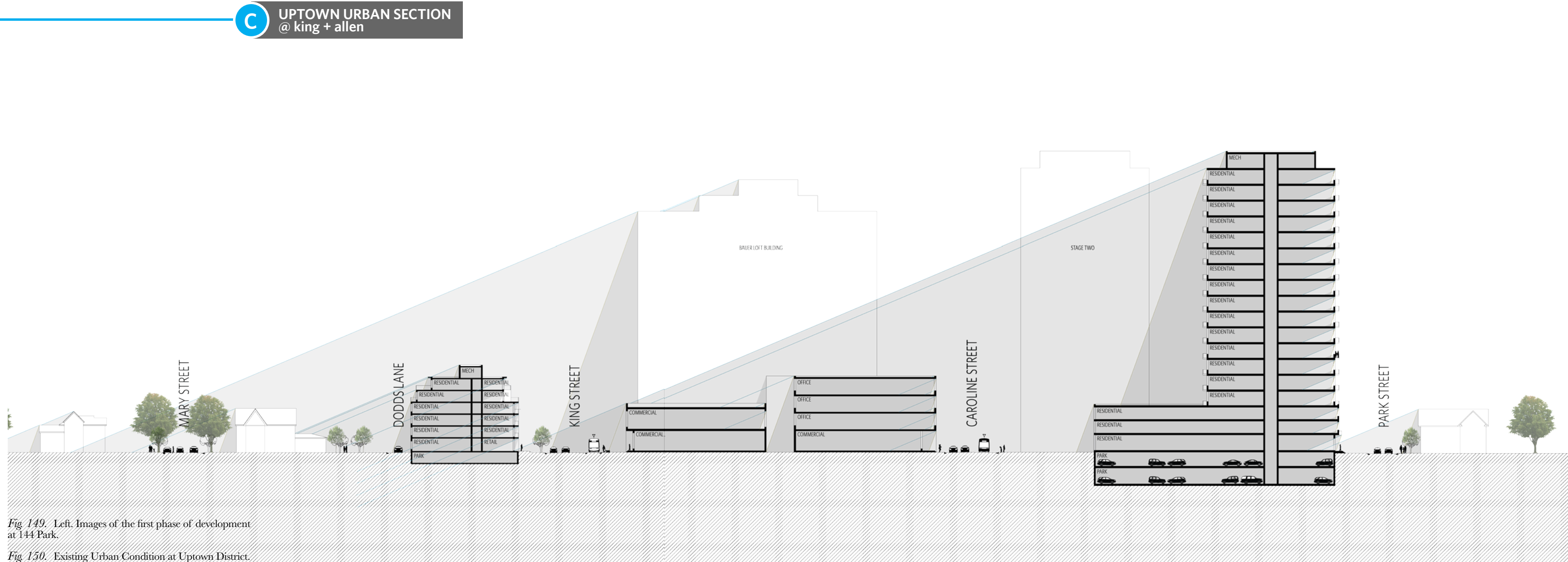
Fig. 147. Bottom Left. Image of Uptown Waterloo at King Street and Willis Way.

Fig. 148. Existing Urban Condition at Uptown District.

EXISTING SECTION

urban condition at uptown district

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 brownstone typology.





GRAND RIVER HOSPITAL / MIDTOWN



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.

Fig 151. Above. ION Stop Anchor Wall Design at Grand River Hospital. Image from ION Stop Anchor Wall Designs document, 2015.

Fig 152. Top Right. ION Stop Median in front of Grand River Hospital.

Fig 153. Middle Right. Aerial view of Bauer Loft building, Sun Life Financial building and adjacent surface lot in Midtown.

Fig 154. Lower Right. Aerial image above Grand River Hospital.



EXISTING SECTION

urban condition at grand river hospital

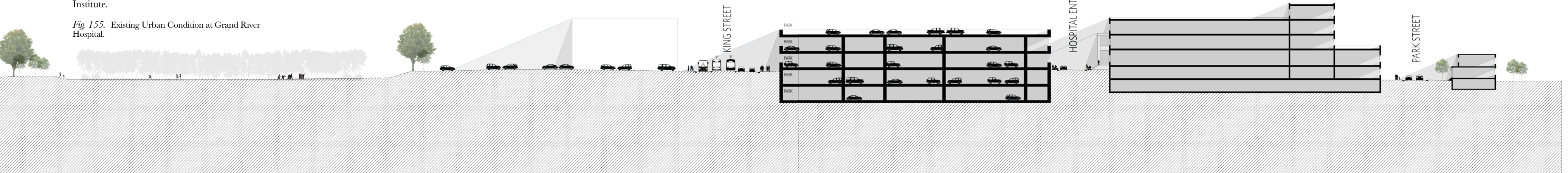
D MIDTOWN URBAN SECTION @ king + union

The parking garage that services the Grand River Hospital borders King Street and Green 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.

Fig. 155. Existing Urban Condition at Grand River Hospital.



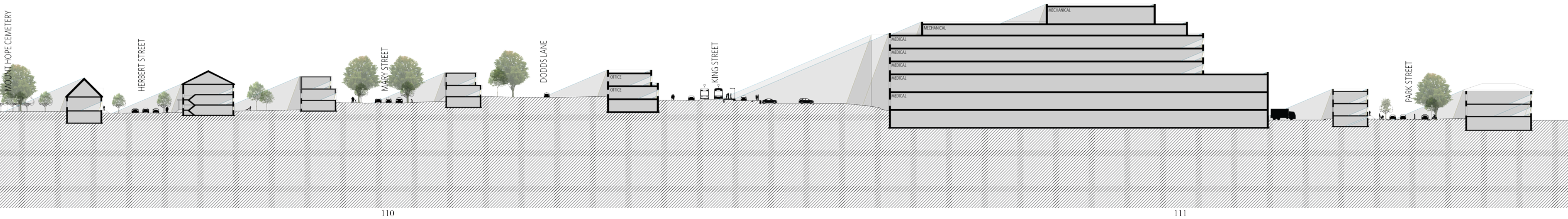
EXISTING SECTION

urban condition at grand river hospital

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. 156. Existing Urban Condition at Grand River Hospital.

E MIDTOWN URBAN SECTION @ king + mount hope



110

111

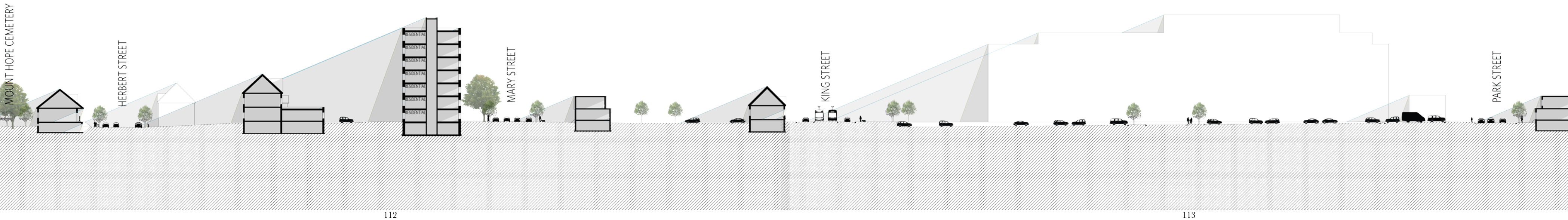
EXISTING SECTION

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 neighbourhood, and generous setbacks, leaving space for new street features beyond existing sidewalks.

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

F MIDTOWN URBAN SECTION @ king + green



112

113



DOWNTOWN KITCHENER



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 neighbouring 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.

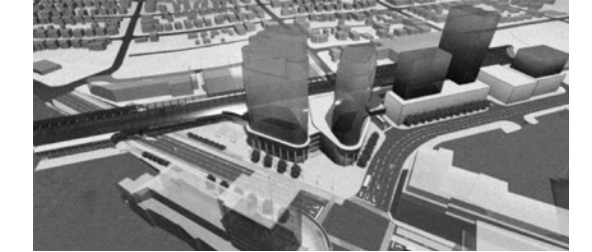


Fig 158. Top Right. The Kaufman Lofts are one of the original examples of loft conversions in Waterloo Region. The downfall to this building is its lack of ground floor public space. The building covers an entire block, and although it is effective in meeting the street, it makes for a long walk with 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.

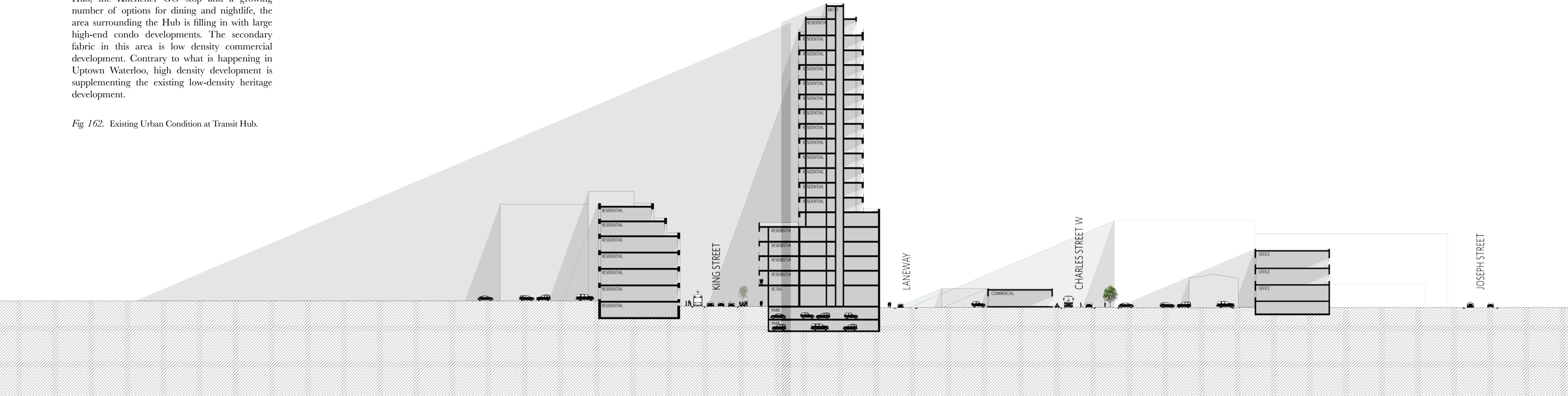
EXISTING SECTION

urban condition at transit hub

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.

B DOWNTOWN URBAN SECTION @ king + victoria



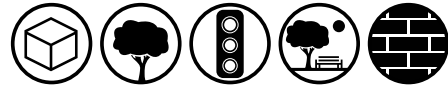
THE MECHANICS OF LINEAR URBANISM IN WATERLOO REGION

"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

Fig. 163. Birdseye image of Downtown Kitchener.





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 theorists 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 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 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.

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.



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 neighbourhood, property value, etc.

“Architects 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.

- Johnathon Barnett (1974), Urban Design as Public Policy: Practical Methods for Improving Cities, 6.

OPACITY



theme of urban theorist



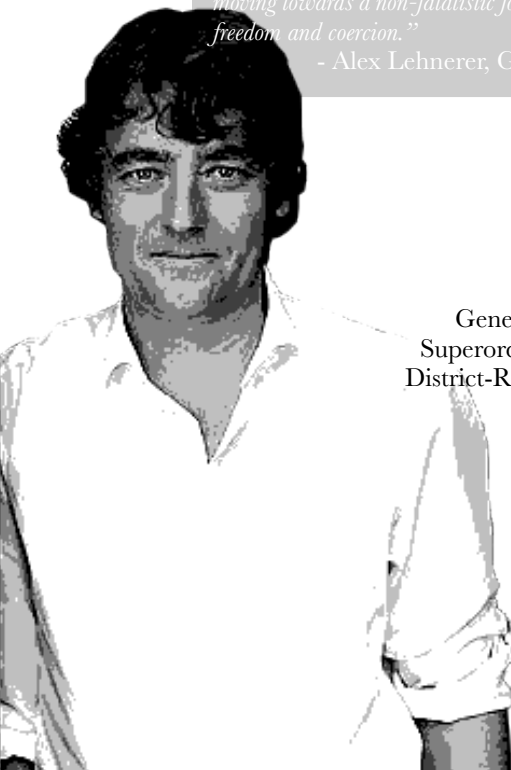
theme not covered by urban theorist



GRAND URBAN RULES

“Grand Urban Rules is a tribute to the city’s will to form, manifest in its vast number of steering regimes. The book contains a total of 115 significant ingredients for the Grand Project of our contemporary metropolis. Not always positive but always powerful, these rules are the inverted, abstracted and extracted image of a city’s actual situation. Setting standards is first and foremost a cultural act. We read cities by their rules! Rules link the physical with the social city, connecting quality with quantity and latent characteristics to manifest ones. Thereby and almost unnoticed, they have become design instruments. In fact, regarding rules as tools offers a valuable (urban) design attitude - departing from an approach that wants to control everything, and moving towards a non-fatalistic form of control between freedom and coercion.”

- Alex Lehnerer, Grand Urban Rules



General Declarations
Superordinate Land Use
District-Related Lane Use
Streetscape
Neighbourhood
Plot/Blocks
Building

RULE CATEGORIES

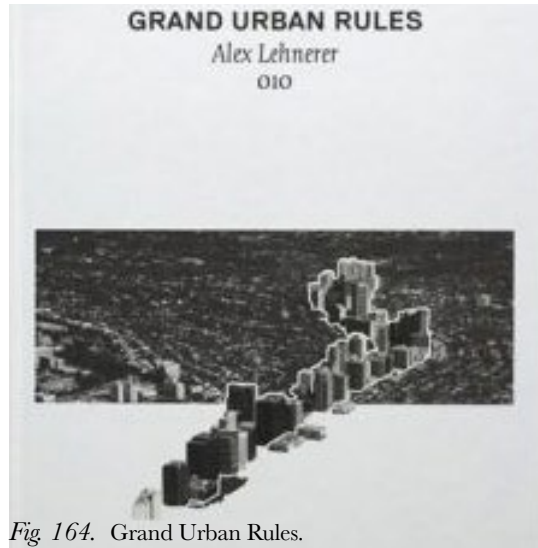


Fig. 164. Grand Urban Rules.

ALEX LEHNERER

Founder, Field Operations
Architect, Urban Designer, Professor

Alex Lehnerer is an architect and urban designer, who is a professor at ETH in Switzerland, and part of their Future Cities Laboratory in Singapore. He is partner of an architectural office in Zurich, called Ciriacidislehnerer Architekten. While appreciating the city as a panoramic projection, the practice explores urban and architectural condition, their forms, ingredients and rules. This is done both in an academic and professional environment.

WHY GRAND URBAN RULES FOR WR?

Alex Lehnerer describes different kinds of rules; some refer to form, some to process of creating it, while some to its subsequent performance. Some are legal minimums others are used as guides in design. Grand Urban Rules is used as a tool in this thesis to help create new urban rules for Midtown as a test site, and then ultimately to other areas of the corridor.

There are a plethora of documents and urban guidelines currently published in the various municipalities within the greater Waterloo Region, but this is an act to simplify and consolidate local urban planning. The rules created for the purpose of this thesis are merely a sampling of base urban rules that should be utilized in local urban, street and building design. This collection of urban rules for Midtown is meant to grow with Midtown, and be something that is added to as needs transform.

chapter 01

Rules as Tools - A Token of Affection

Defines rules and how architects are unfond of them for constaining their artistic creativity. Lehnerer states that rules:

- + can't be abstracted
- + allow social fabric to manage
- + play a role in 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 deploys rules

chapter 02

The Tightrope Walk of Exercising Control over Private Property

Explains the relationship between public and private interest which lead to the creation of rules. Lehnerer talks about the history of American urban development 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

In a western, conflict is between the outlaw and law abiding citizen, but in urban design the conflict is between private and public interest.

chapter 03

Power is Nothing Without Control

Describes the power which is exerted by rules, mainly in their quality of drawing sharp lines between what is allowed and what is not. He talks about the difficulty in setting thresholds and gives examples from San Gimignano, Chicago and New York.

“Whether directly physical, whether taking the form of a line on a building plan, a zone, or a maximum or minimum value, the setting of thresholds has always been among the problematical core issues of urban plannings. To set thresholds in such a way that the city can enforce them as the representative of the public interest without at the same time curtailing private intentions determines whether an urban plan or rule is to be successful, productive, and generally accepted.”(87)

chapter 04

Codified Aesthetics

Shows that rules are considered to be design-tools. Urban planning control arises from a diversity of motivations. He talks about how every self-respecting North American city needs a downtown, and gives examples from San Francisco, Vancouver, London and New York.

chapter 05

Connected Isolation - Neighbourhood

How rules are considered as facilitators of freedom and the issues that arise with neighbours due to extreme proximity. He talks about how elements 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 1960's New York

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

chapter 07

Within or Without

Describes for whom rules are made and how they apply. Rules are introduced for their potential use in and special districts.

chapter 08

Difference and Consistency

Case studies that demonstrate how urban elements are formed by mutual consistency, while at the

same time they possess the capacity to facilitate differences to emerge from their context.

chapter 09

Designed Variation

Outlines the design-tool potential of rules. He discusses the impact of Raymond Unwin's methodology in 20th century urban planning practices and also Midtown Manhattan.

“Rules ought to observe, not only in their function as administrative instruments, but especially as tools for urban design, three important principal tasks: firstly they should serve to generate diversity by facilitating development potential within clearly defined limitations. The resulting diversity should allow different development strategies. Second, they exert a certain automatic guidance on design processes and the resulting urban development, in other words, they act as a regulatory mechanism. Third, they function as an evaluation instrument: does the resulting urban ensemble comply with every underlying rule and is this according to the original intentions? Where does the regulatory mechanism fail? What adaptations are conceivable?”¹

chapter 10

Synthesis - A Designed 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 rule-based instruments. The book tries to show the regulations as a positive part of the planning process.

CURB-IN URBANISM

As per Waterloo Region's functional design for the ION corridor, there is allowance for a roadway design, and the provision of a sidewalk adjacent to the curbline. This does not factor in public space, landscaping, cycle lanes or on-street parking. Along King Street through the Midtown area, there is an average of 40 metres clearance between building faces. Because the buildings are so far set back from the streetline, there is space to design a highly desirable public streetspace that would feature expansive pedestrian sidewalks, protected cycle lanes, a collonade of urban trees and landscape, and on-street parking -- all elements missing from the current design. before the area is redeveloped and built out to the new streetline.

A model of curb-in urbanism has been created for the site of the ION corridor. The design shown can be adapted along the entire corridor. A constraint for the design extents was made to exclude the roadway and LRT line, as their design had already been approved and partially constructed prior to this thesis. The area for street design is outside of the indicated boundary.

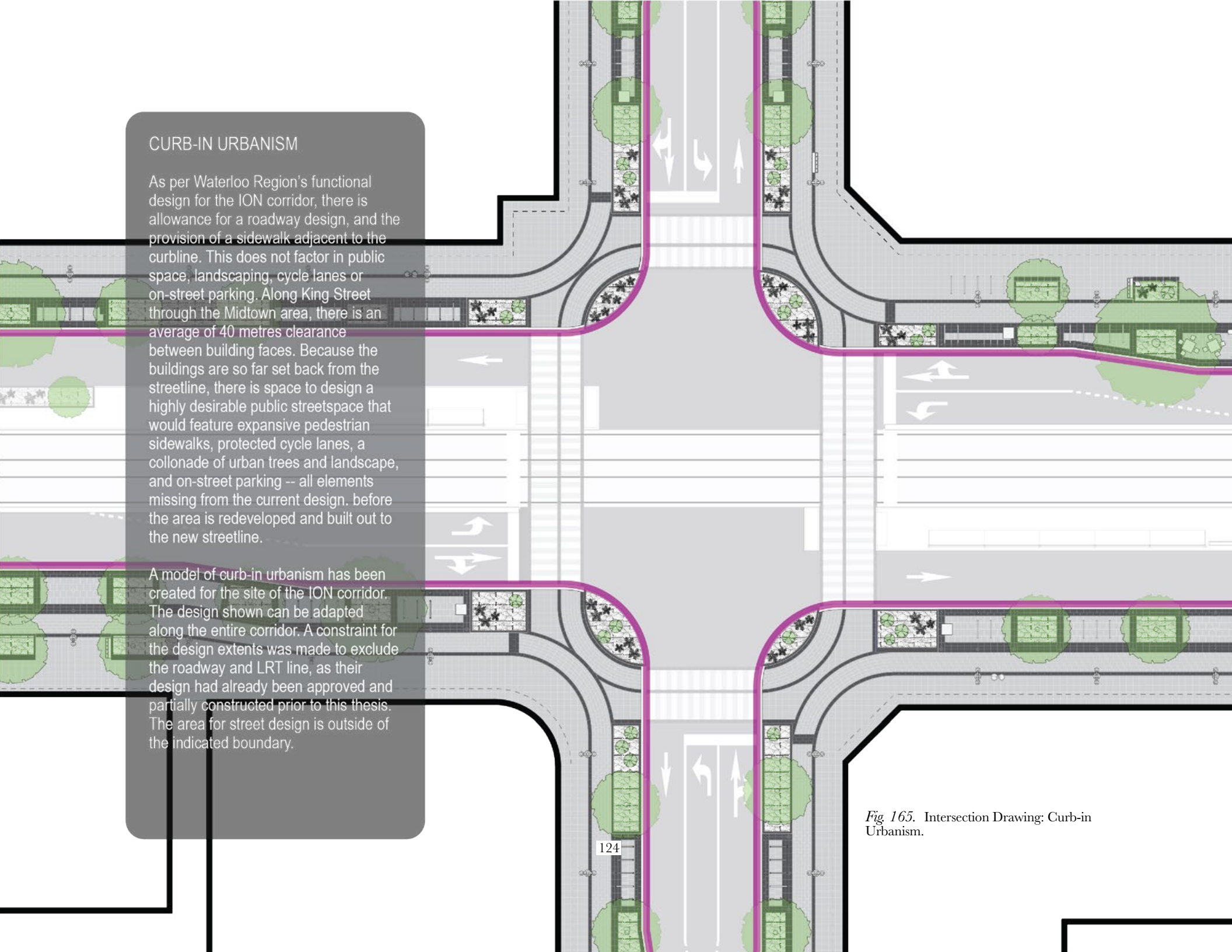


Fig 165. Intersection Drawing: Curb-in Urbanism.

DESIGN INTRODUCTION

an overview of what's to follow

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.

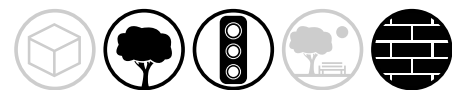
Fig. 166. King Street in Midtown in front of KCI Secondary School. The transition between the road and curb is abrupt.



Fig. 167. King Street in Midtown in front of KCI Secondary School. The transition between the road and curb is abrupt.



Fig. 168. King Street in Downtown Kitchener in front of the Berlin. The transition between the road and curb is minimized by using a curb similar to one of a driveway entry.



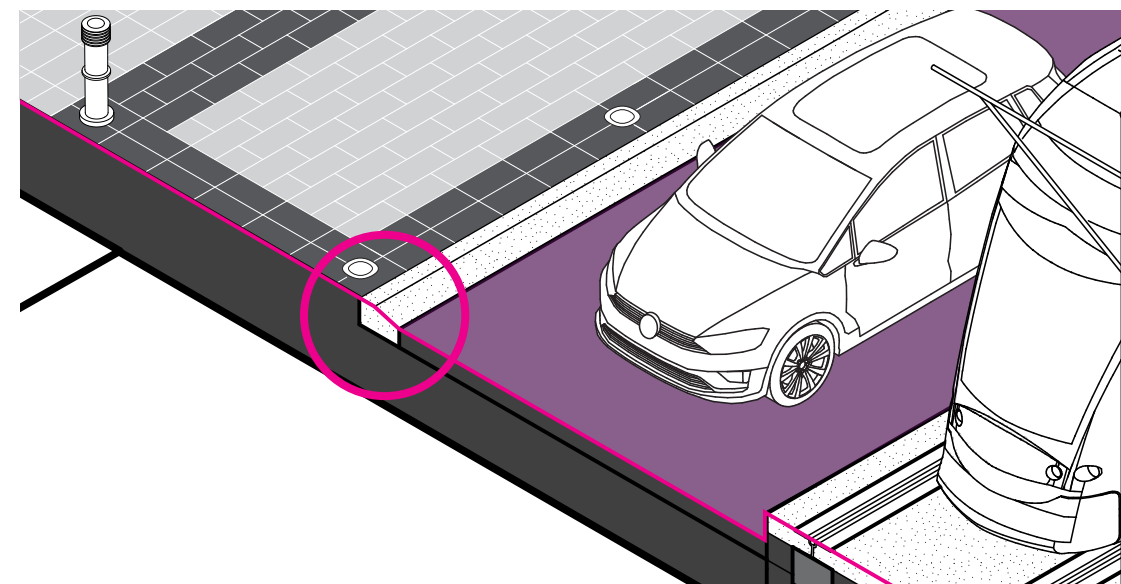
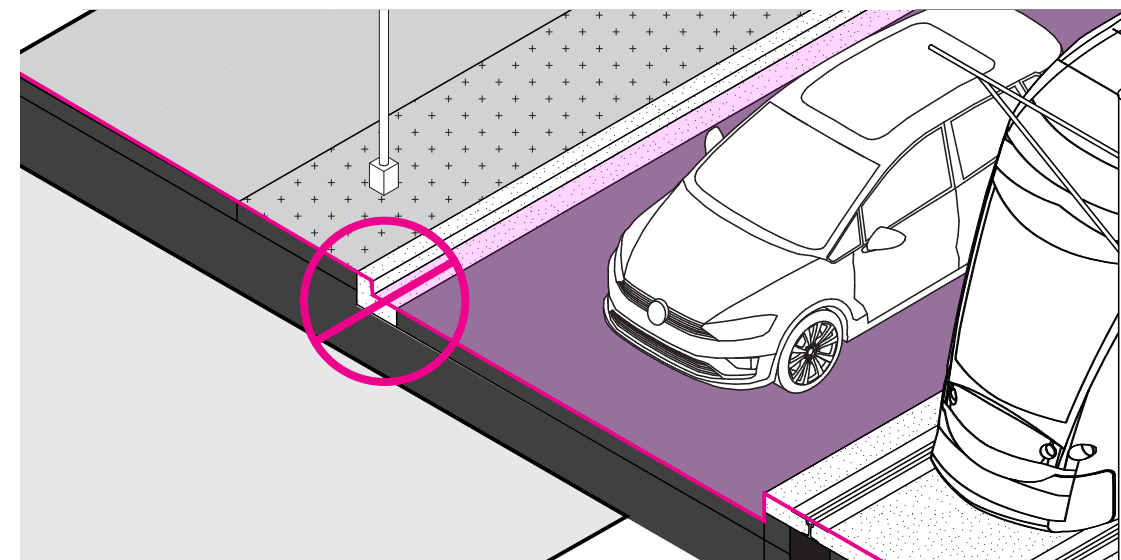
BLUR BOUNDARIES

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 border dividing the two realms. It causes motorists to travel with heightened caution, and often at a lesser 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.

Fig. 169. Urban Rule: Blur Boundaries.



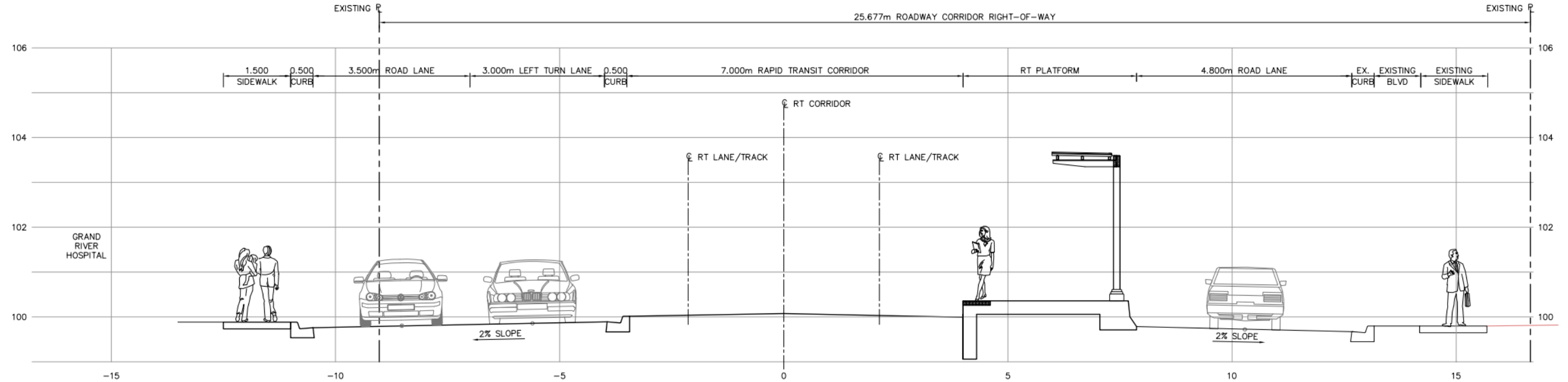
FUNCTIONAL DESIGN DRAWINGS

king street at grand river hospital

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.



SECTION 'F'-'F'
 KING STREET - GRAND RIVER HOSPITAL STATION
 264338-SK-201; SHEET 13
 1:50

CITY OF KITCHENER URBAN DESIGN GUIDELINE

Below are examples of sections of the Kitchener Urban Design Guideline 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 realm. 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 vehicular traffic, a median, pedestrian crossing,

dedicated bike lane and on-street parking.

(iii) Boulevard – This area includes items (iv) through (vii) listed below.

(iv) Buffer Zone – This zone provides a buffer against the roadway and parked vehicles, and accommodates sign and utility posts, and snow storage.

(v) Landscaping and Site Furnishing Zone – This zone provides a buffer between pedestrians and vehicular 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.

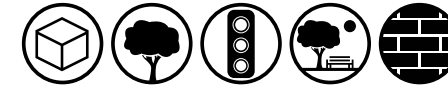
(vi) Pedestrian Clearway Zone – This zone is designated for pedestrian and barrier-free movement. This zone should be clear of obstructions and be of sufficient width to accommodate pedestrian traffic.

(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, and landscaping, and spill out spaces for patios and retail. (B-14, 15)

Fig 171. Top Right. The images to the right show the concrete light rail tracks in magenta and the public space for pedestrians in cyan. The area presently given to the public for pedestrian circulation is extremely limited and close to the road traffic. There is an opportunity in Midtown to resurrect this issue, and create a model for urban design along the ION corridor in areas that have not yet been developed. GRH ION platform in magenta, and sidewalks in cyan.

Fig 172. Centre Right. GRH ION platform in magenta, and sidewalks in cyan.

Fig 173. Bottom Right. GRH ION platform in magenta, and sidewalks in cyan.



MORE THAN JUST SIDEWALKS

existing street isometric diagram

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 7 metre concrete light rail track right-of-way designed to have train approach stops 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 sidewalks are immediately adjacent to the road.
- 5 Existing setback zone from edge of sidewalk to face of building. This area is undesigned.
- 6 Existing building fabric in Midtown often consists of lowrise residential buildings and stripmalls filled with medical offices.

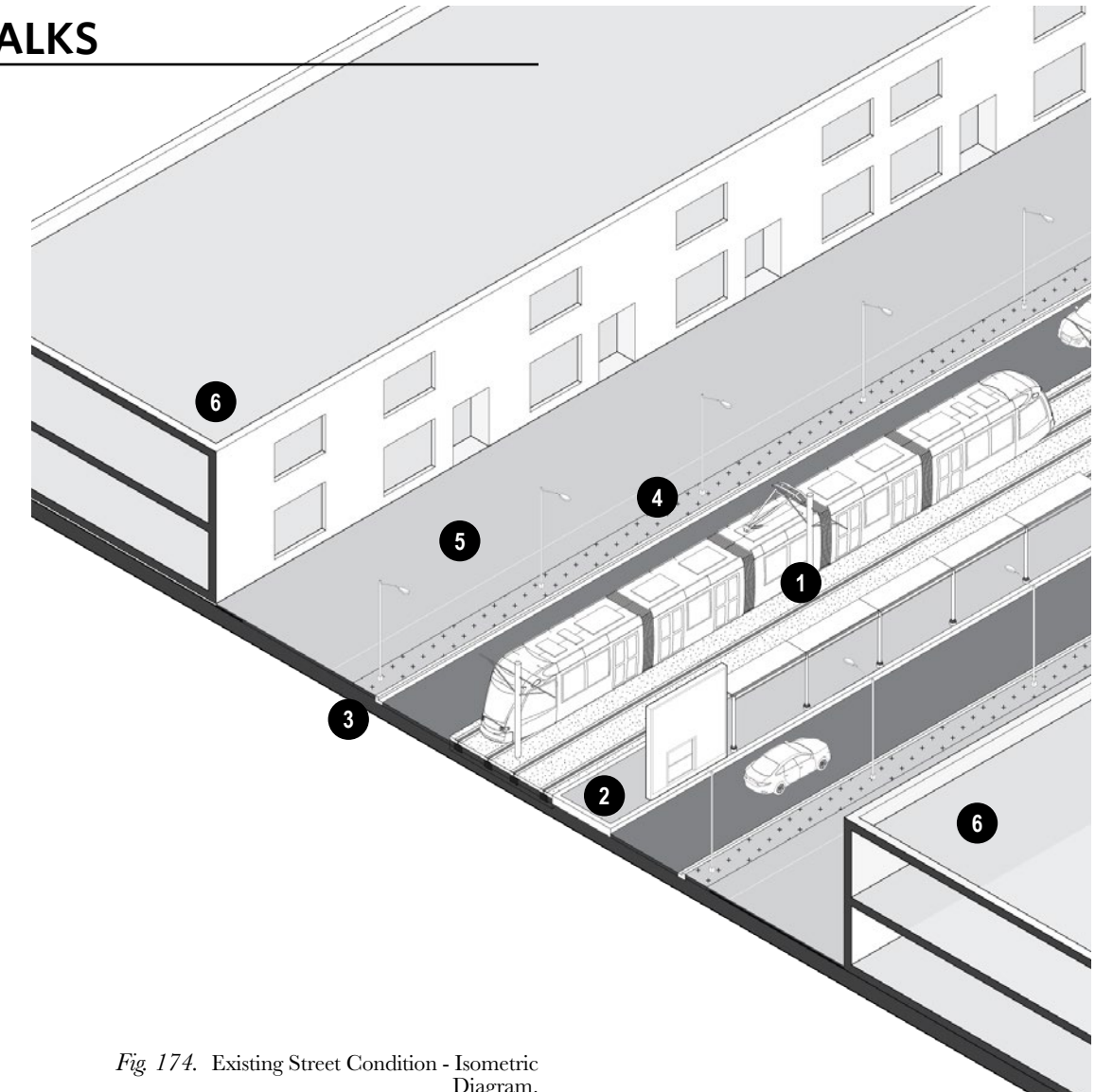


Fig 174. Existing Street Condition - Isometric Diagram.

THE REALITY - DEVELOPER'S PARADISE

- 1** 7 metre concrete light rail track right-of-way designed to have train approach stops 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, patio space and bike/vehicular parking. Often an absence of trees and urban street elements.

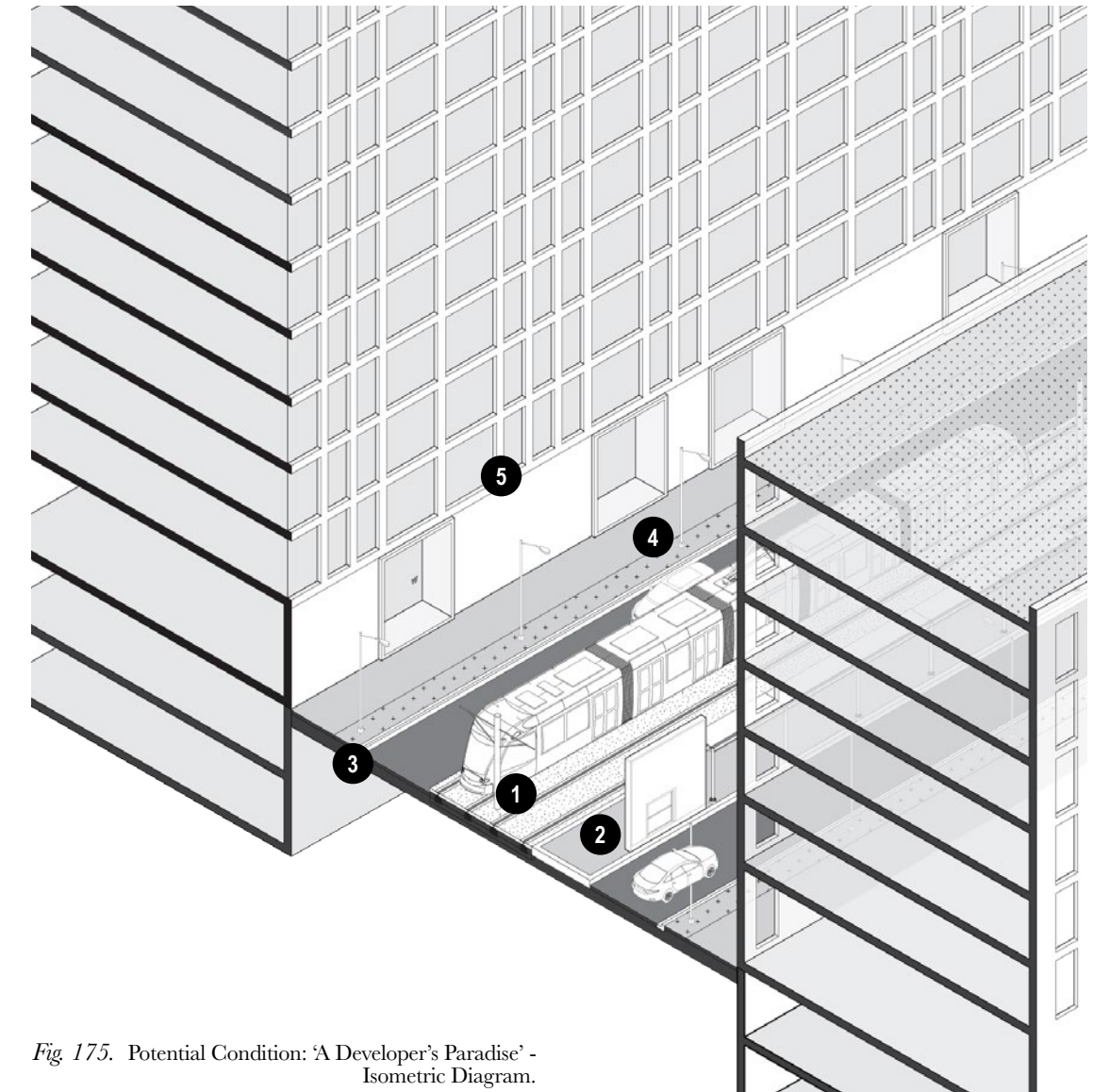


Fig. 175. Potential Condition: 'A Developer's Paradise' - Isometric Diagram.

A CONNECTIVE GREEN CORRIDOR

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 redevelopment 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.

Fig 176. existing boulevard condition

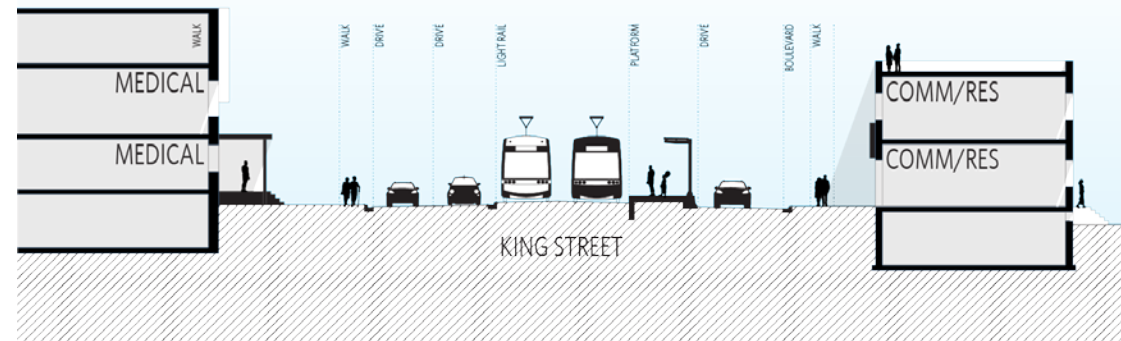
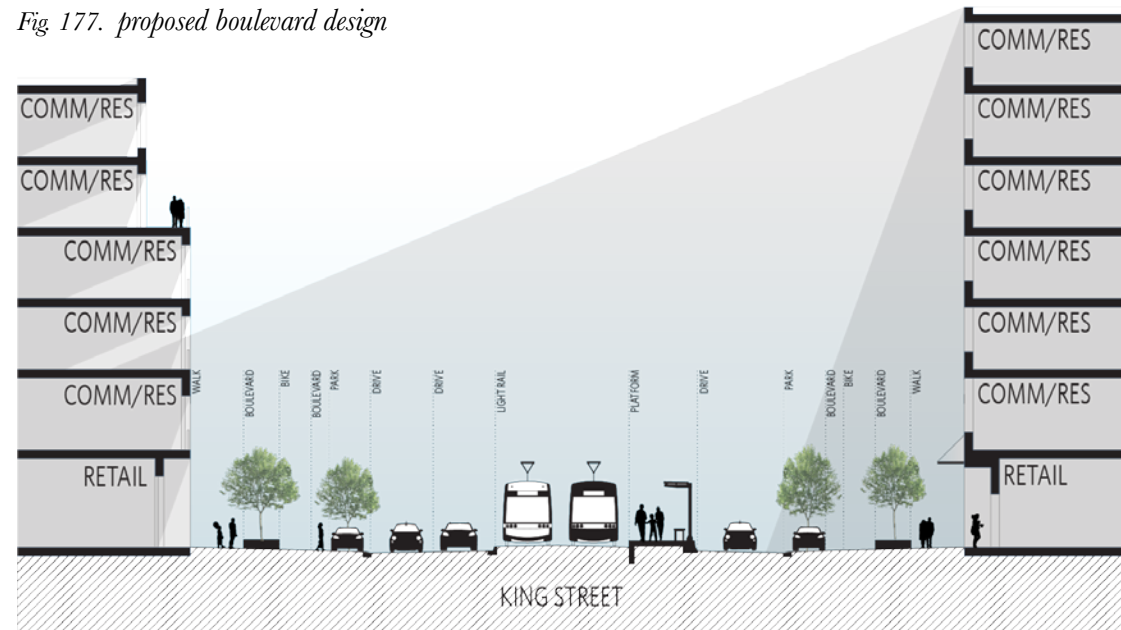


Fig 177. proposed boulevard design



PROPOSED BOULEVARD DESIGN

- 1 7 metre concrete light rail track right-of-way designed to have train approach stops 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
- 5 Existing setback zone from edge of sidewalk to face of building. This area is undesigned.
- 6 Existing building fabric in Midtown often consists of lowrise residential buildings and stripmall filled with medical offices.

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)

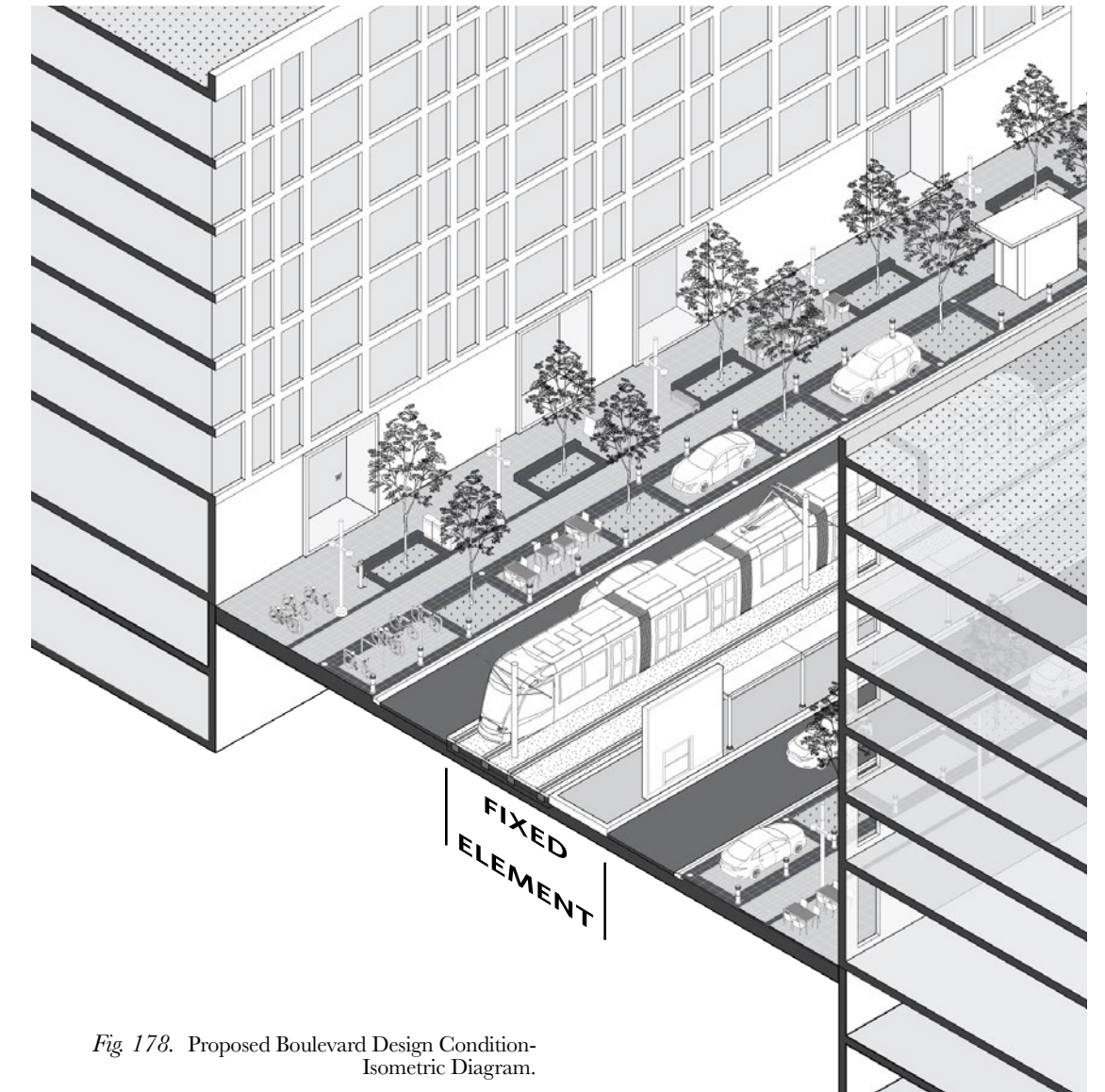


Fig 178. Proposed Boulevard Design Condition-Isometric Diagram.

RE-IMAGINED FUNCTIONAL DESIGN

king street at grand river hospital

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.

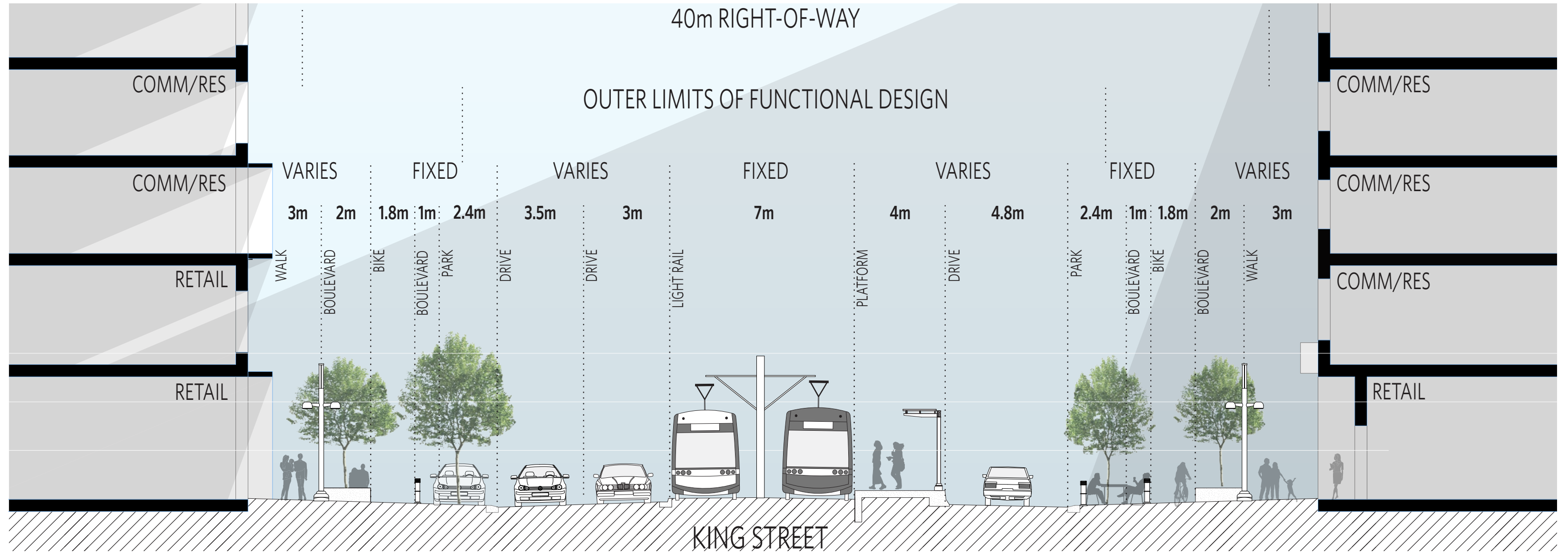
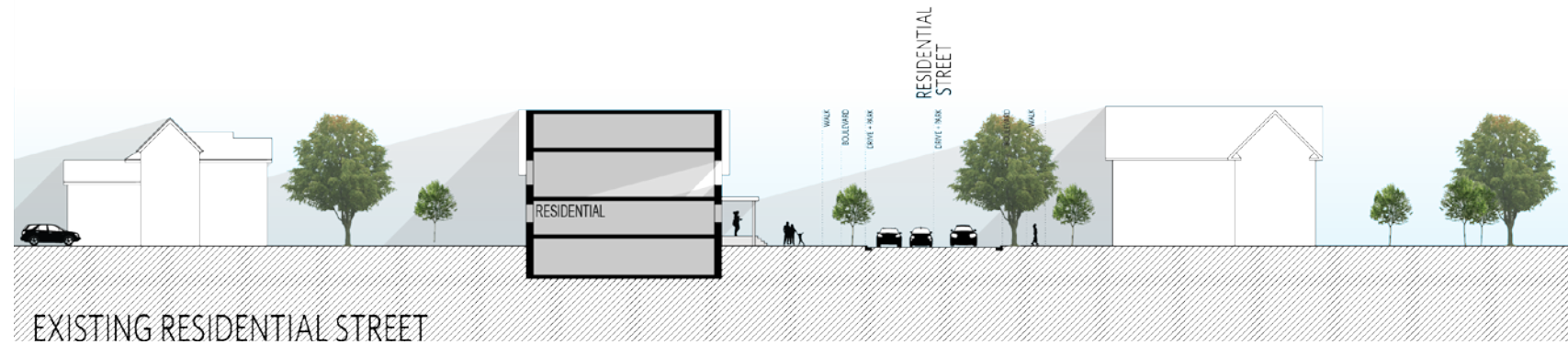
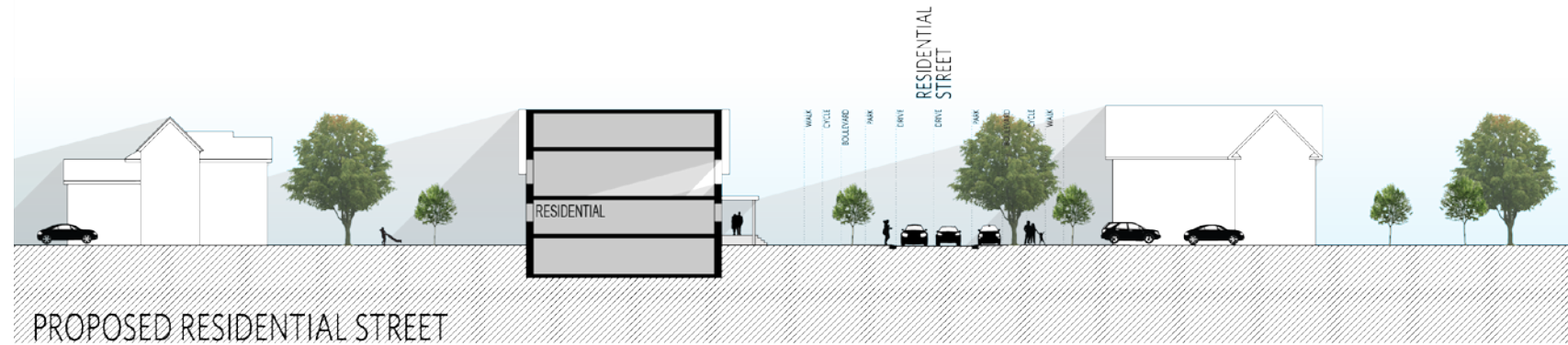
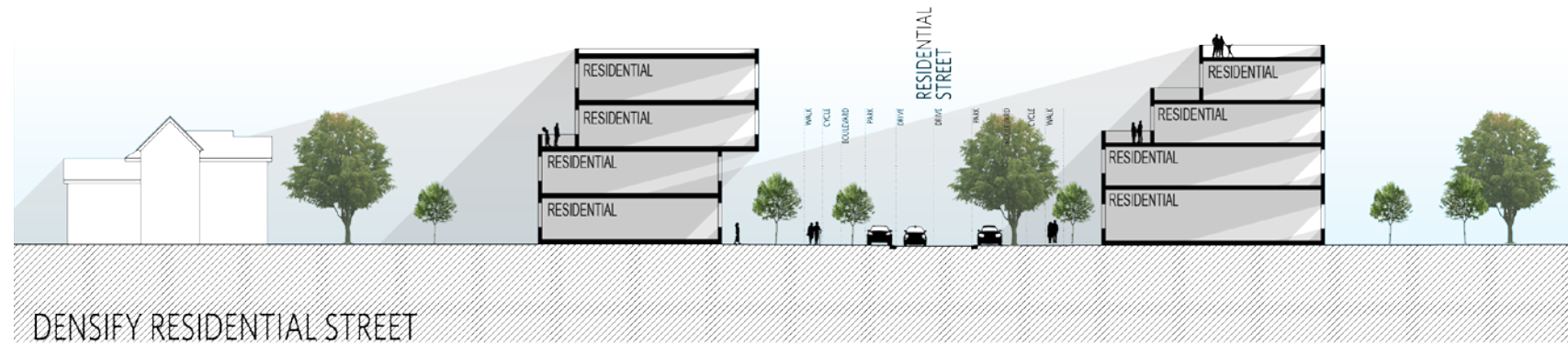


Fig. 179. Proposed Functional Design Section at ION Stop at Grand River Hospital.



SECONDARY NEIGHBOURHOOD

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 tree boulevard and 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, and 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.

Fig. 180. Left. Residential Street Design Sections.

Fig. 181. Right, three images. Views of the secondary neighbourhoods surrounding Midtown can be seen in the aerial photos. It is easy to see the juxtaposition between the large scale fabric of the institutional buildings on King Street and the smaller residential blocks that are sprinkled with single family dwellings and the odd apartment building.



Fig. 182. Below 300 Germain 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 urban 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. This type of project could occur immediately on King Street, or in a secondary neighbourhood scenario to add some density and variety to an underused street.



Fig 183. The Four Principles of a Woonerf based on Eran Ben-Joseph's article² 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,

² Ben-Joseph, Eran. "Changing the Residential Street Scene: Adapting the Shared Street (Woonerf) Concept to the Suburban Environment." *Journal of the American Planning Association* 61, no. 4 (1995): 504-15.



Fig 184. Proposed Woonerf for West Don Lands as part of the Waterfront Toronto project.



Fig 185. Second image of proposed Woonerf for West Don Lands as part of the Waterfront Toronto project.



MINIMIZE ROAD SPACE

a transition to maximizing public space

"A street designed primarily with the interests of pedestrians and cyclists in mind and as a social space where people can meet and where children may also be able to play legally and safely. These roads are still available for use by motor vehicles, however their design aims to reduce both the speed and dominance of motorised transport." – from Wikipedia

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 by 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.

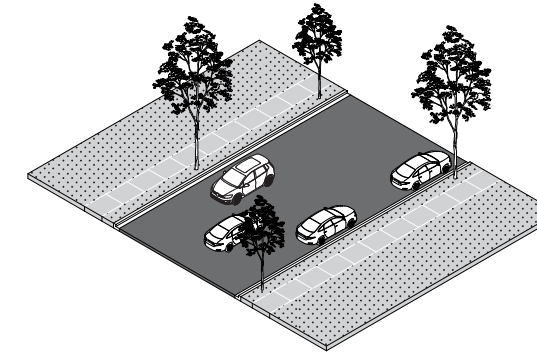


Fig 186. Existing state of residential roads. There is parking on the side of the road, creating an expanse of asphalt. More room on the road allows for vehicles to speed excessively without the fear of obstacles. In this scenario, there is not much room for street trees to grow, causing heaving in sidewalks.

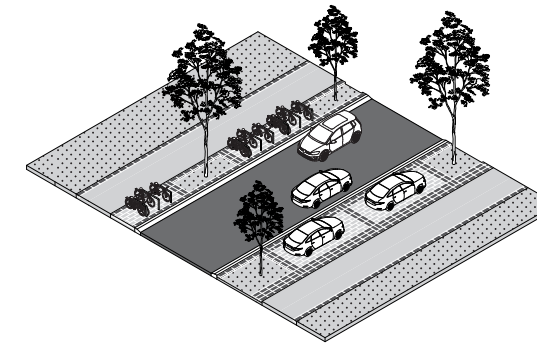


Fig 188. There are areas where there are physical barriers and not enough space for parking, where existing buildings are close to the road. When this occurs, parking is not an option in order to maintain the ability to have access to the multi-use path system. Features like gardens, bike parking and seating can be added in lieu.

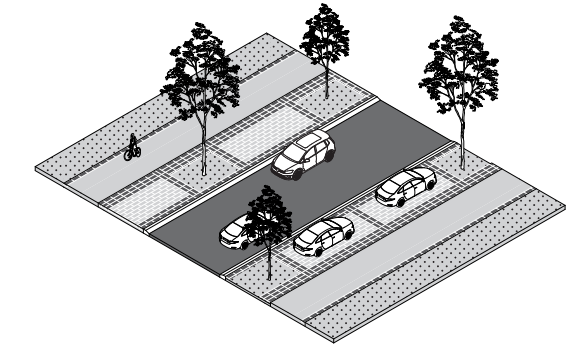


Fig 187. The road space is minimized, with parking added onto the boulevard, creating a barrier between moving vehicles and a 3m multi-use path for cyclists and pedestrians. When parking spaces are unoccupied, it leaves space for children to play or one's yard to expand without being on the road.

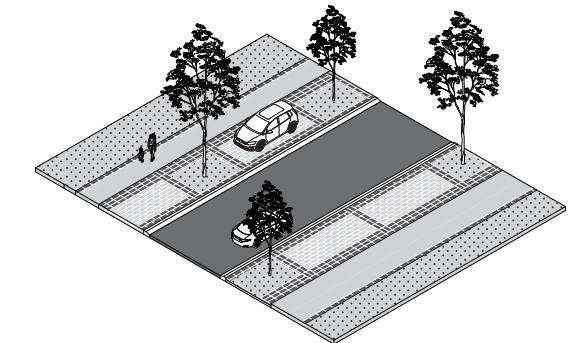
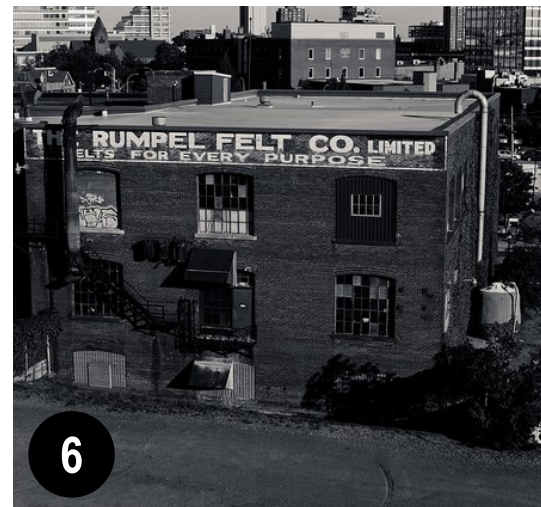
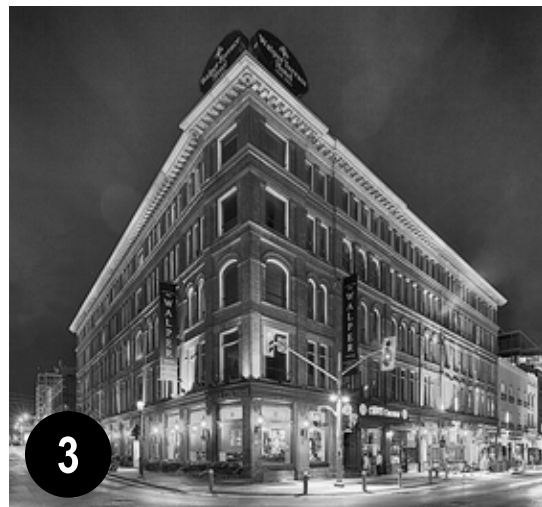


Fig 189. As demand for transit increases, and reliance on driving and parking decreases, parking spaces can be used as an expansion of public space and turned into parkettes, gardens or patios. Roads can be shared with cyclists and the multi-use path can be used solely by pedestrians.

REDEVELOPMENT IN WATERLOO REGION

breathing new life into historic factories and urban fabric

- 1 INCUBATOR**
Fig 190. The Lang Tannery
 Boasting open office and garage workbays, Communitech is able to accommodate a range of tenants at their tech startup hub.
- 2 HIGH-END MIXED USE**
Fig 191. Bauer Lofts
 Built atop a refurbished factory full of high end dining, grocery and cafe options.
- 3 FORMER GLORY DAYS**
Fig 192. 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.
- 4 NEW AGE OFFICE**
Fig 193. Breithaupt Block
 The Breithaupt Block has been redeveloped and expanded to create a the home of Google Kitchener, and a myriad of flexible office space with outdoor courtyards.
- 5 COZY HOME**
Fig 194. Blacksmith Lofts
 Former manufacturing facility turned into 27 condos with a rooftop patio.
- 6 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.



DESIGN FOR FLEXIBILITY

learning from (not mimicking) historic fabric

Design and build in such a way that buildings can be flexible, and eventually change use as needs in the neighbourhood evolve. 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, concrete or some other material other than wood, and roofed with slate, metal, tile composition or shingles, laid on some fire-proof material.'*

- 7 NEW AGE WAREHOUSE**
Fig 196. Northfield Station
 This office hub took cues from the warehouse typology, with open floorplates, expansive ceiling heights and sturdy building materials to suit the Canadian climate. This building will have the ability to host multiple occupancies through its lifespan.

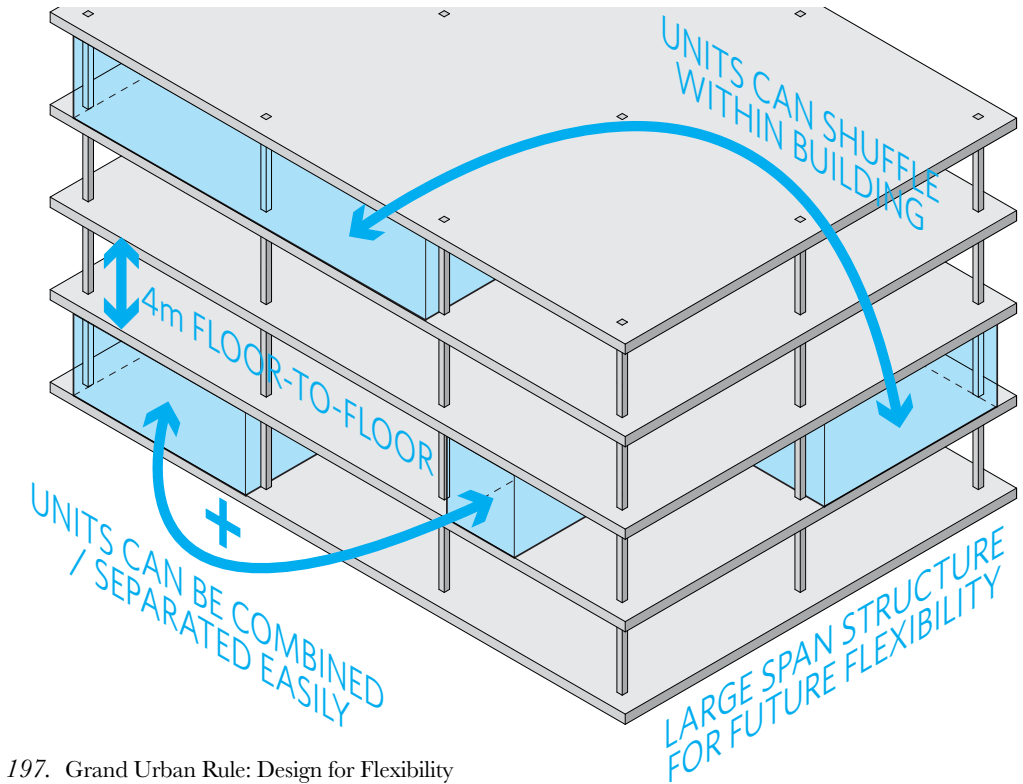


Fig 197. Grand Urban Rule: Design for Flexibility





BUILDING FACE MEETS STREET

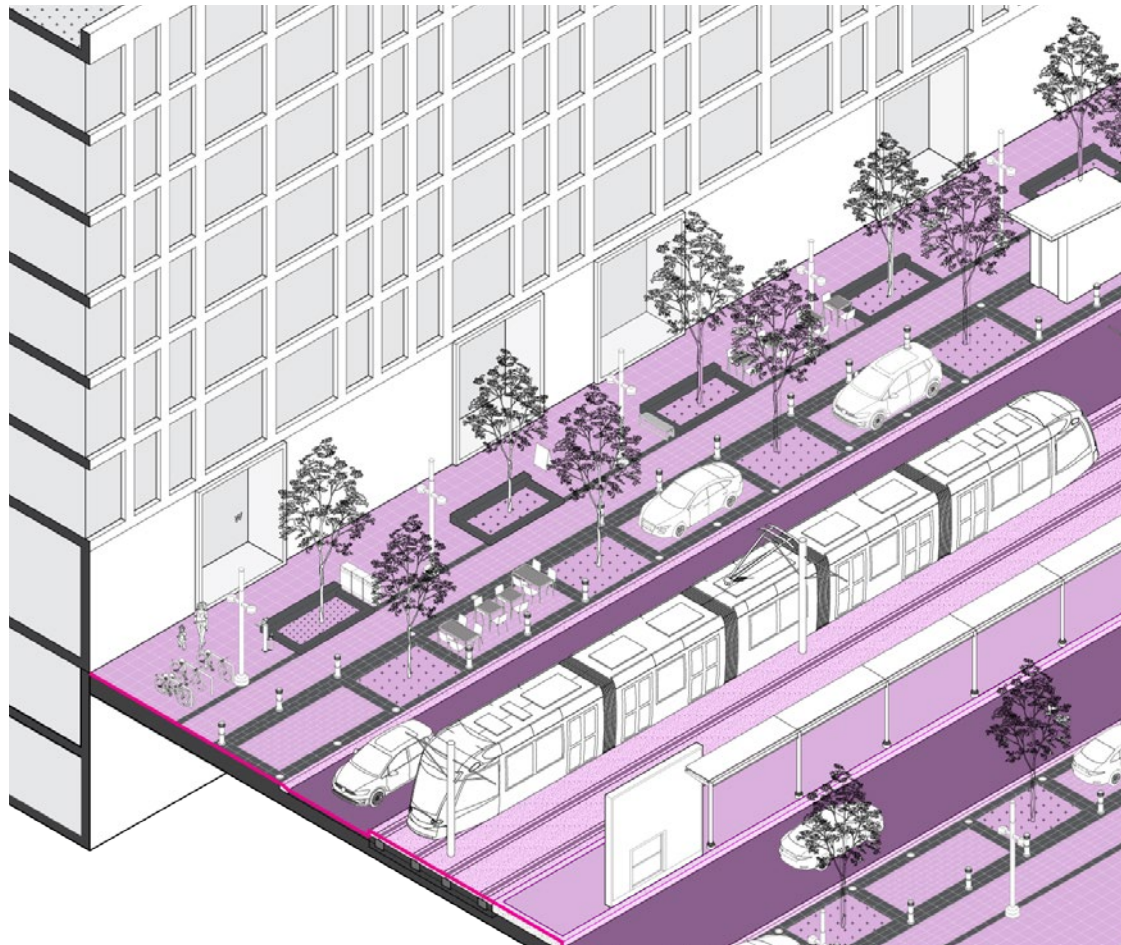
Gaps from street line to building face should be used for public space instead of dead space. Closing the gap allows more space for the built environment and well-designed streetspace, lessening the feeling of an expressway for cars, and making space about people.

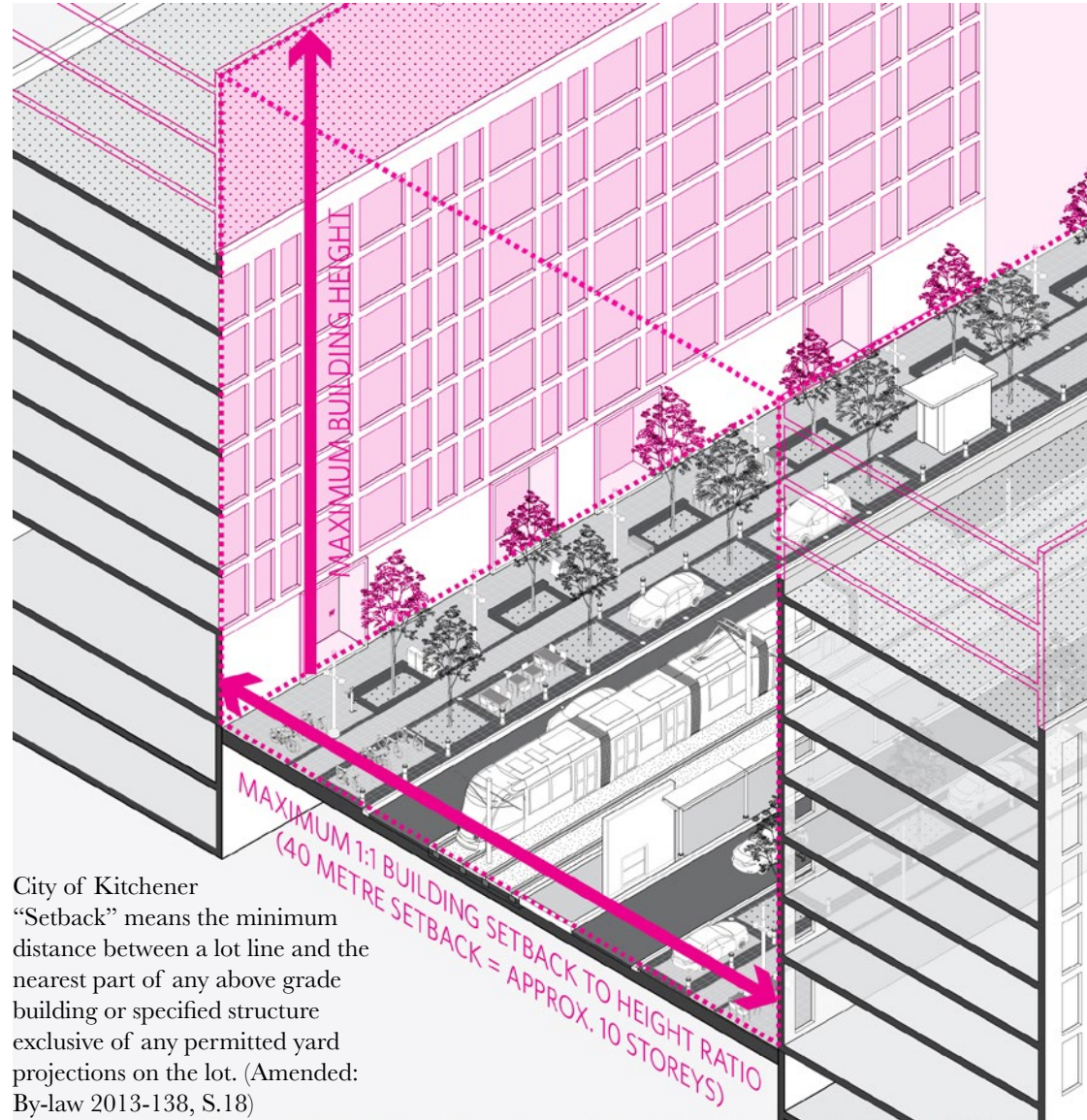
In the case of King Street in Midtown, the street is adorned with converted single family homes to the North and institutions to the south, which are interspersed with some lowrise office buildings. The vast majority of the buildings are set so far back from the street as to form a vacuous street, devoid 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.

1 EXISTING BUILDING FACE

Fig 198. Below and Right. 40 metre clearance between existing buildings on King Street.





City of Kitchener
 “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)



BUILDING SETBACKS

When a building’s height surpasses the proportional width of the street it fronts on, setbacks should be considered so the street does not become dark, or have a wind tunnel effect.

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. Left. Urban Rule: Building Setback.

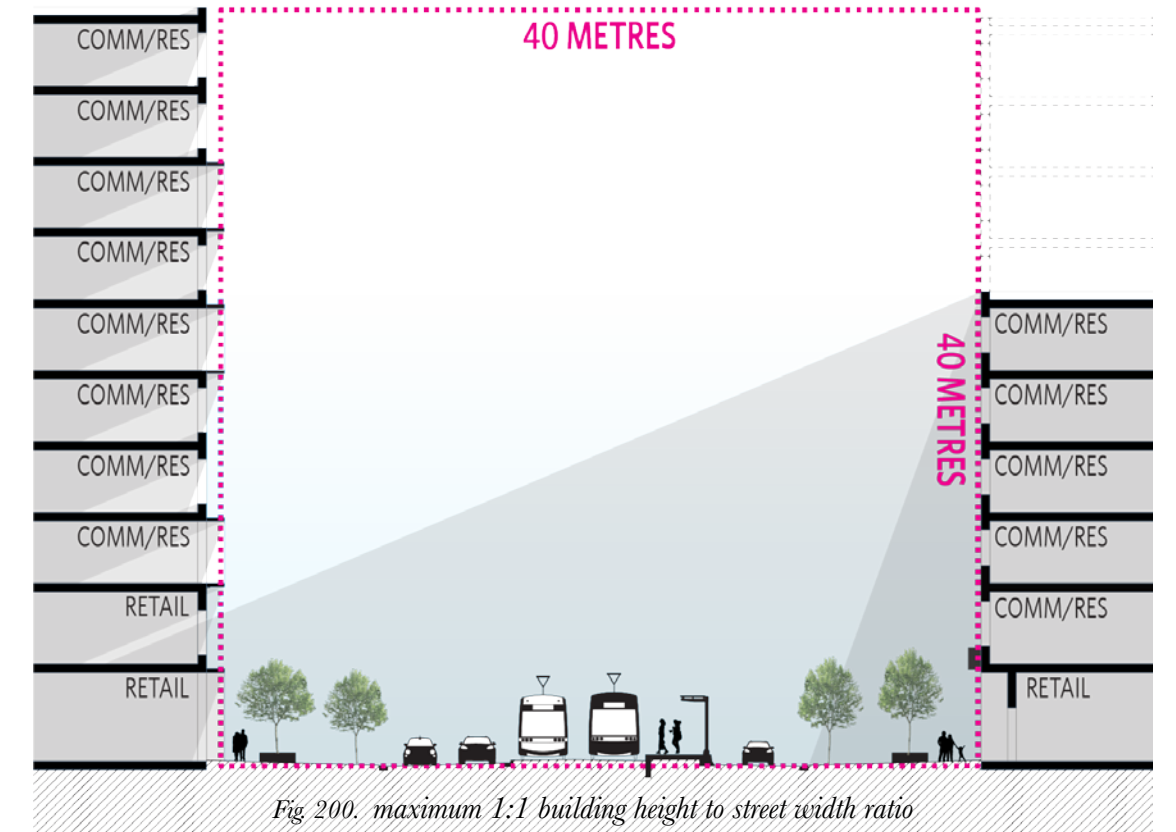


Fig. 200. maximum 1:1 building height to street width ratio

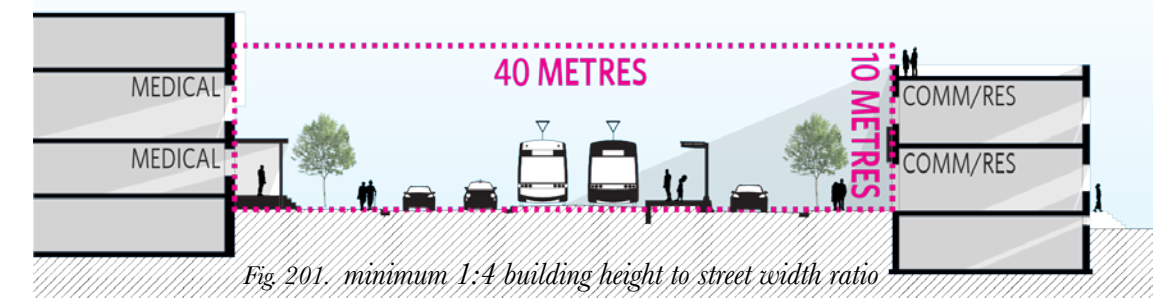
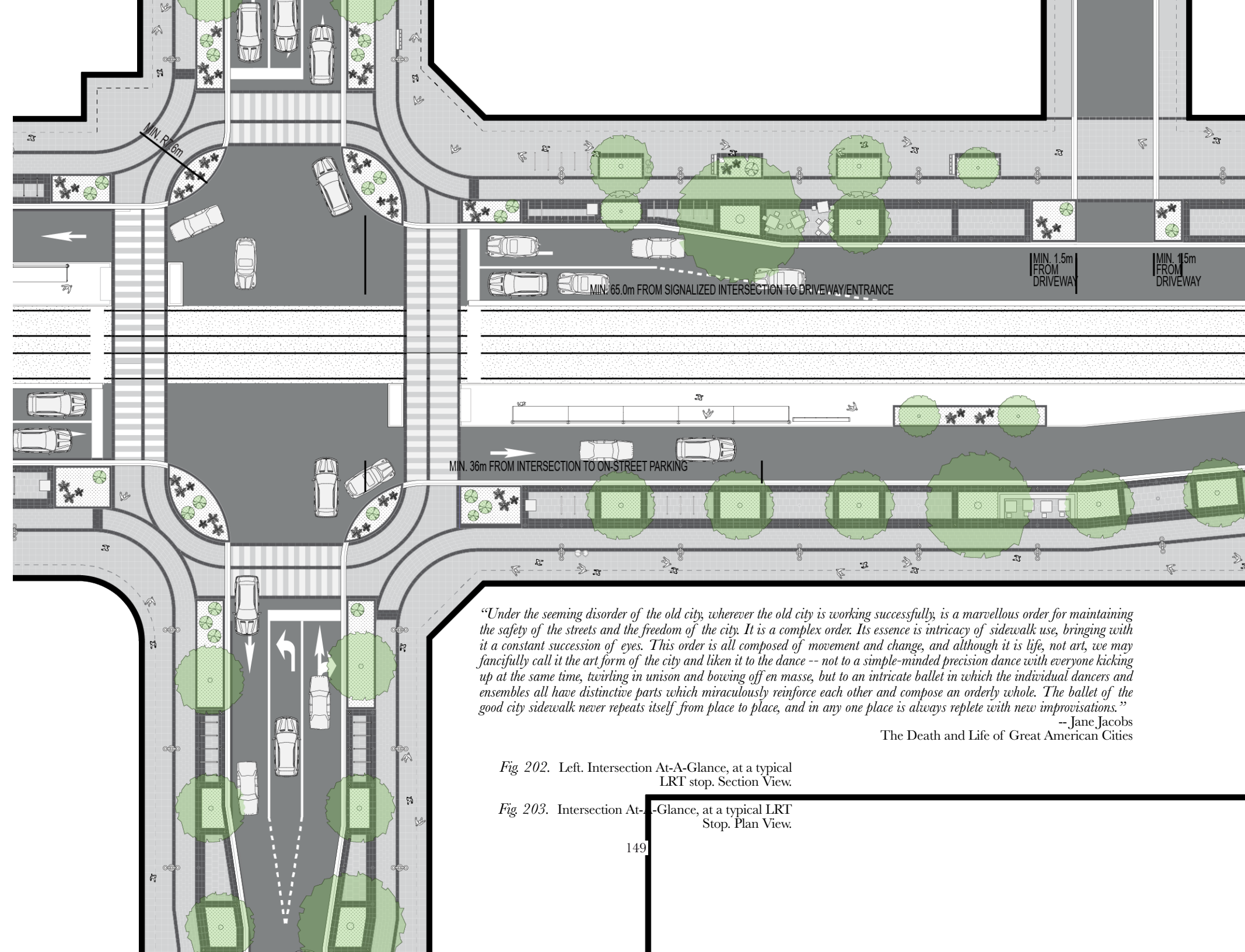
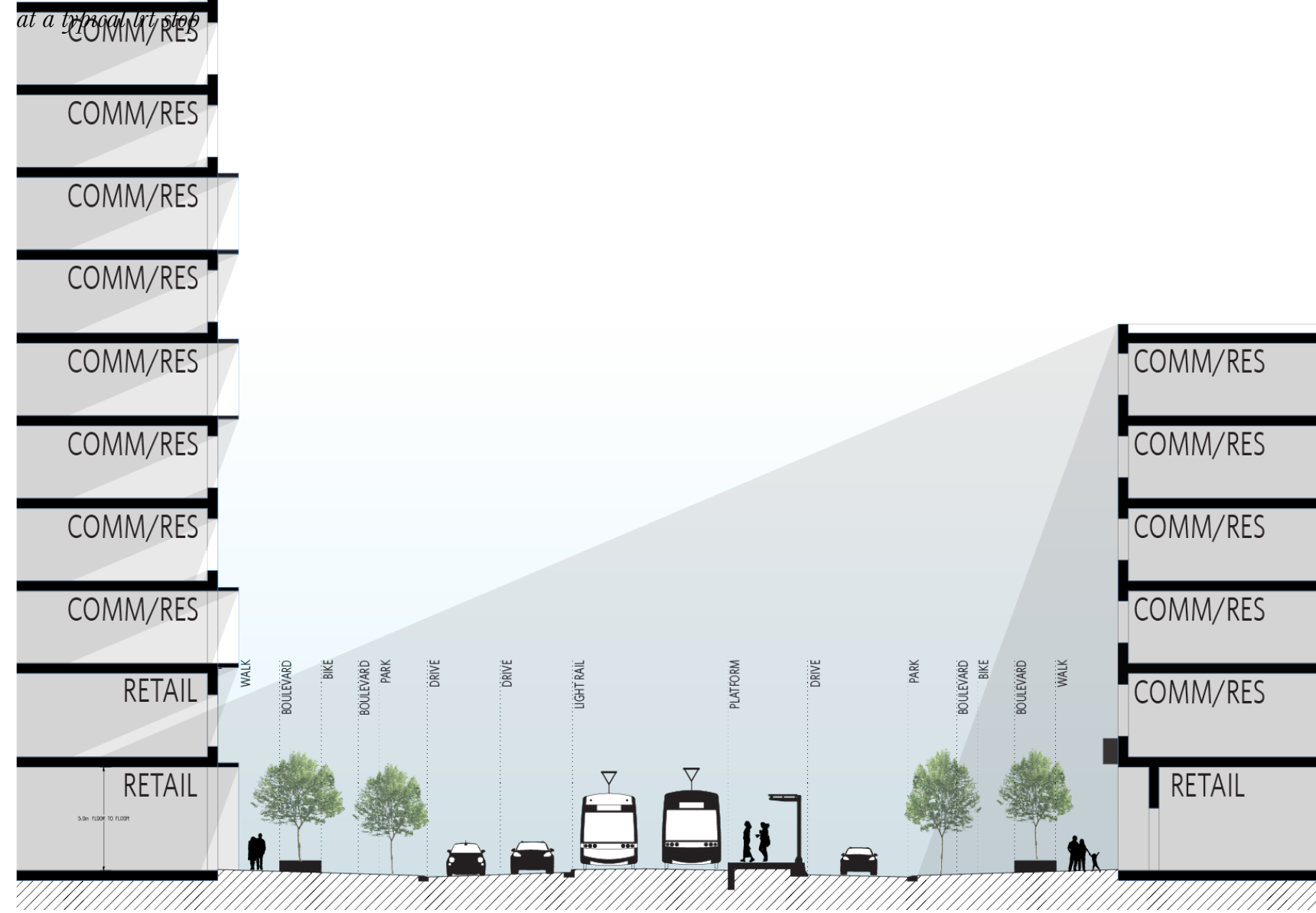


Fig. 201. minimum 1:4 building height to street width ratio

INTERSECTION AT-A-GLANCE



“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 life, not art, we may fancifully call it the art form of the city and liken it to the dance -- not to a simple-minded precision dance with everyone kicking up at the same time, twirling in unison and bowing off en masse, but to an intricate ballet in which the individual dancers and ensembles all have distinctive 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

at a typical lrt stop

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 corners. Signage at intersections can indicate this 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.

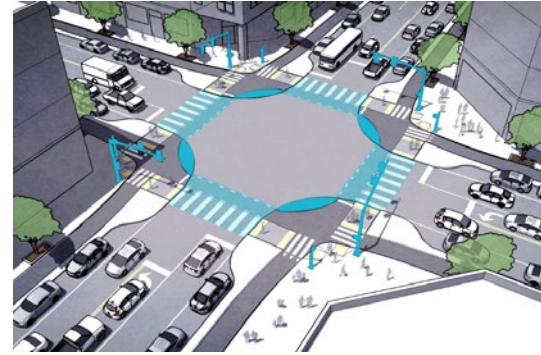


Fig. 205. Protected Intersection Diagram showing cyclist and pedestrian crossing, as well as refuge island.

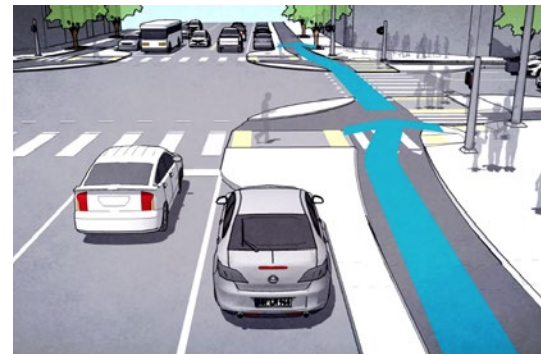


Fig. 206. Protected Intersection image showing cyclist and pedestrian crossing, as well as refuge island.



INTERSECTION RADII

Minimizing the curb radius will reduce motorist speed and shorten the crossing distance for pedestrians. As is, King Street will take approximately 20 seconds for the average pedestrian to cross the corridor as pictured adjacent. The tighter turning radii are important in areas of heavy pedestrian activity.

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 pedestrians and cyclists on the boulevard. Planters can be strategically placed elsewhere along the corridor to separate motorists from cyclists and pedestrians without obstructing visibility.

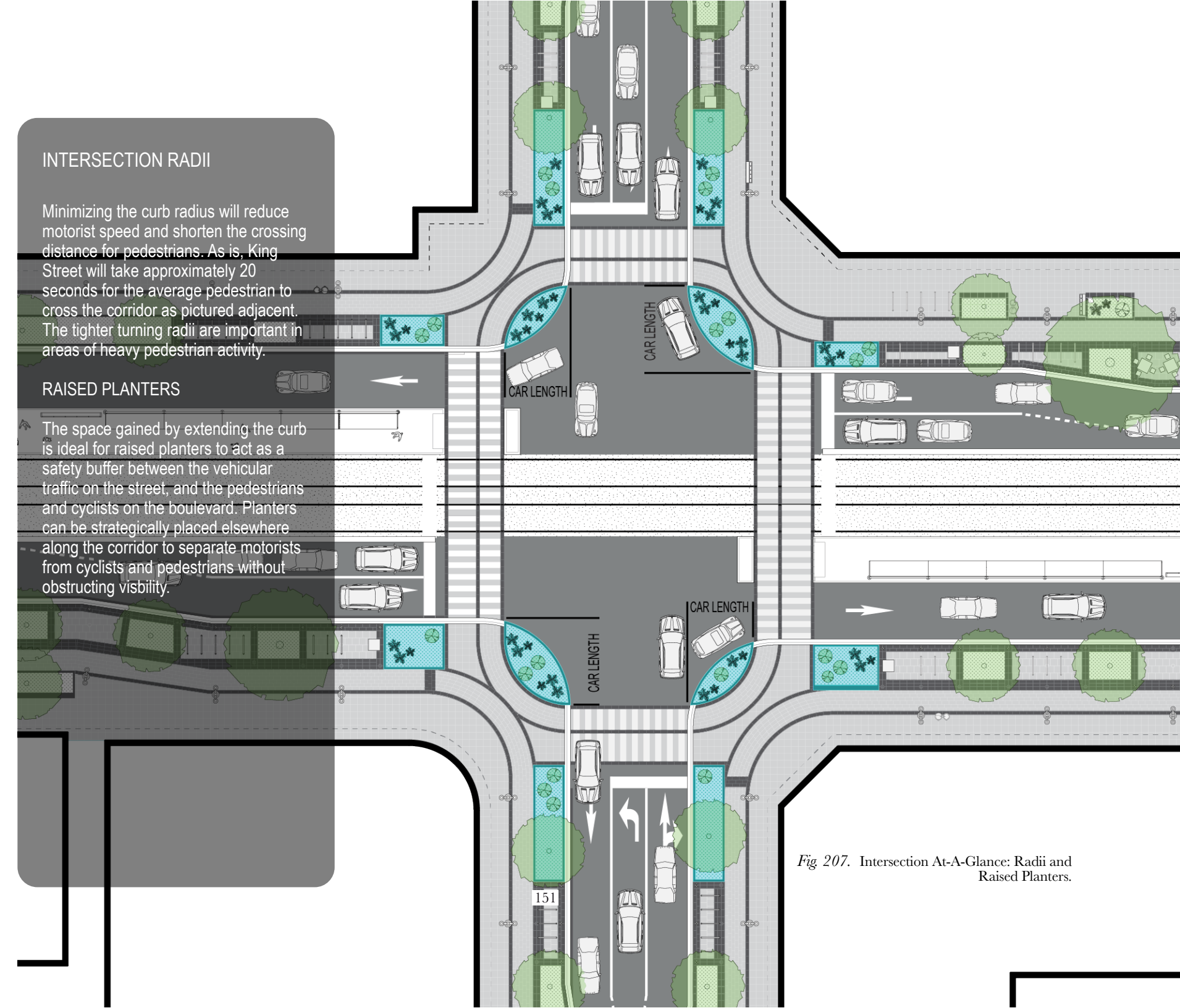


Fig. 207. Intersection At-A-Glance: Radii and Raised Planters.

Fig. 208. Right. Protected cycle lane in Seville, Spain.



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



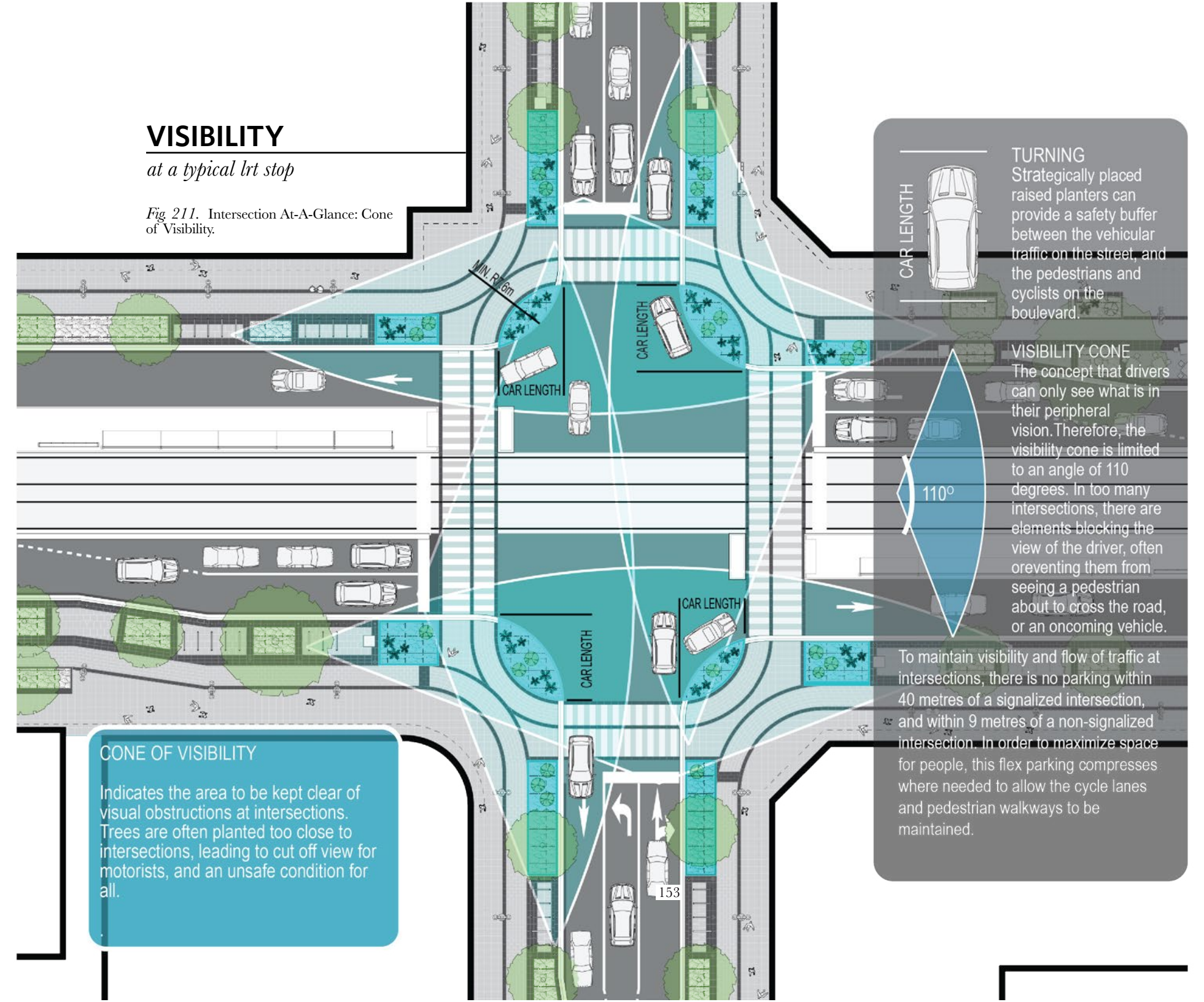
Fig. 210. Protected cycle lane in Essen, Germany.

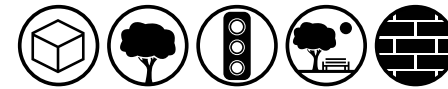


VISIBILITY

at a typical lrt stop

Fig. 211. Intersection At-A-Glance: Cone of Visibility.





RENOVATE + RESKIN

There are many older apartment buildings constructed in the 1960's and 70's 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 at 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 floor, 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-minded reality for these buildings. According to Toronto's Tower Renewal Plan, environmental building and site upgrades could reduce energy use and greenhouse gas production by over 50%, while the sites themselves can accommodate needed community services, usable open space, and retail, which together enable diverse and vibrant neighbourhoods.

Following Toronto's Community Initiative Program for improving their 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 to 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 district solar, wind and geothermal power, developing on-site waste management and urban agriculture, along with providing improved access to public transit and other alternatives to car use.

2. Creating 'complete communities' within inner suburban high-rise apartment neighbourhoods with the full range of community services and amenities, opportunities for employment and entrepreneurship, and housing types and tenures, specific to the needs of residents, responsive to built and cultural heritage, integrated into the community at large, and enabling sustainable lifestyles.

*3. Further developing world-class Canadian industries dedicated to high-quality building retrofits, sustainable development, and community design."*²

Like Toronto, the heritage of inner-suburb 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.

Fig. 215. Top Right. Creation of the Residential Apartment Commercial Zone in Toronto zoning bylaws.

² <http://www.towerrenewal.com/the-tower-renewal-project/>

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 renewal for a podium coming out to meet the street, and a renovated and re-skinned building to update the energy efficiency of the building.



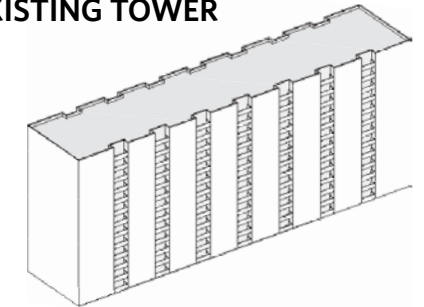
Fig. 213. Towers in the park adjacent to Fairview Mall in Kitchener. The only amenity local to this neighbourhood is Fairview Mall, which only provides big box retail stores. This scenario is better than some, where the towers are surrounded only by other homes.



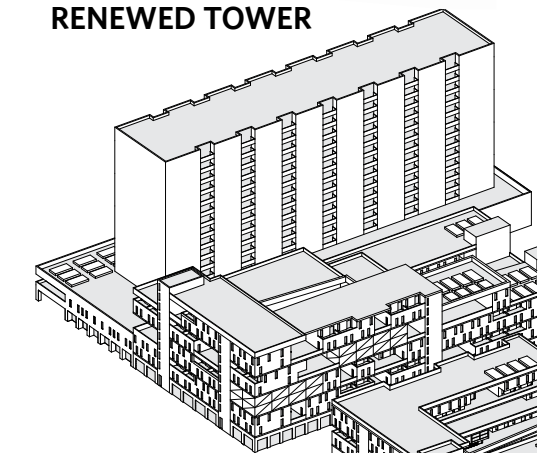
Fig. 214. Towers North of Mount Hope Cemetery in Kitchener. Surrounded by large parking lots and single detached homes, it would be a minimum 15 minute walk from the lobby of one of these towers to any sort of public amenity or retail establishment. This makes transportation difficult for local apartment 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.



EXISTING TOWER



RENEWED TOWER





LIVING OVER THE STORE

/ architecture and local urban life

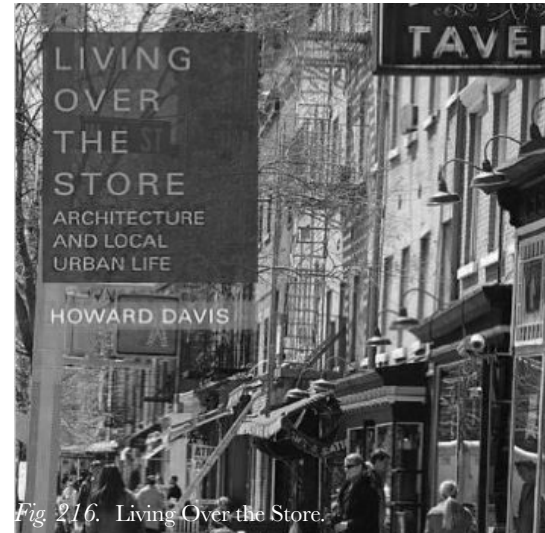


Fig. 216. Living Over the Store.

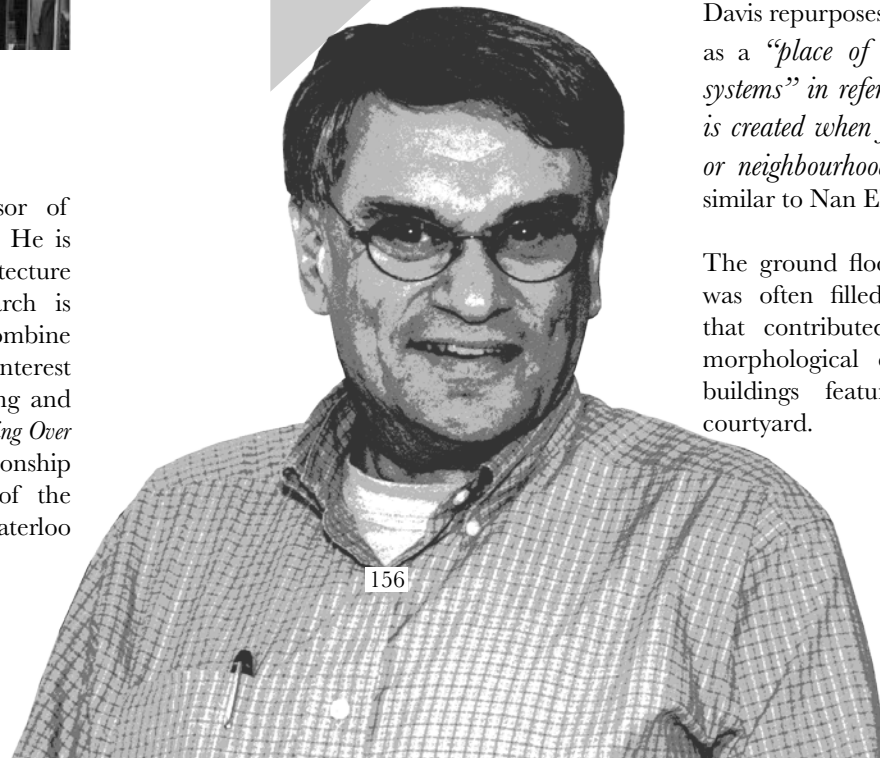
HOWARD DAVIS

Urban Theorist
Professor, Author,

Howard Davis is a writer and professor of architecture at the University of Oregon. He is known for his research in vernacular architecture and building history. His current research is concerned with urban buildings that combine commercial and residential uses, as well as interest in museums and memorials to war, housing and architectural education. His latest book, *Living Over The Store*, created an interest in the relationship between the public and private duality of the street, and the lack thereof in much of Waterloo Region.

“[T]he shop/house, in its many different guises, is a critical building. Indeed, far from being a mere artifact of the past, it is central to current initiatives intended to revitalize cities. By putting functions together in the same building and the same street, the shop/house helps to support diversity of neighbourhood life. By putting dwelling and work into the same unit, the shop/house gives economic support to a family that wants to start a business with minimum resources—and this is as true for the “new economy” of web designers and one-person consultant firms as it is for a low-income family wanting to start a hair salon or repair business. By helping to support the small-business opportunities of low-income people, in turn, the shop/house may continue to provide recent immigrants with a means of entering the formal economy. By using land intensively, the shop/house supports increased urban density and the city’s ability to maintain viable public transportation.”

-Howard Davis, *Living Over The Store*



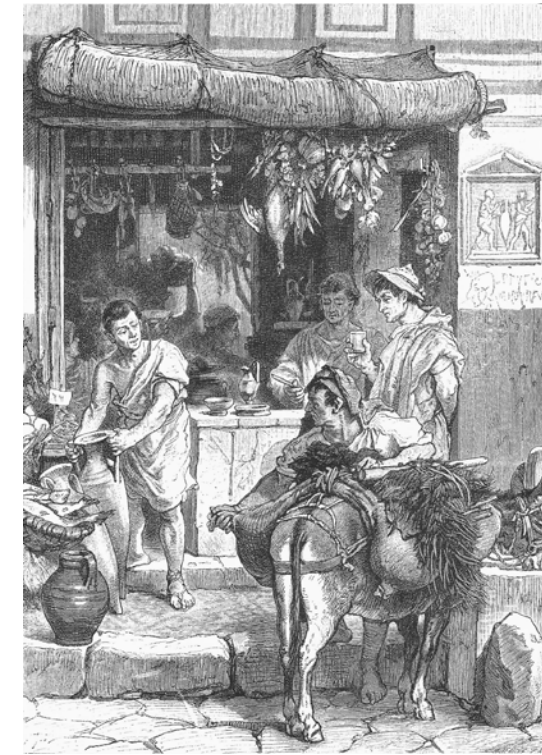
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Davis repurposes the biological idea of an ecotone as a “*place of overlap between two ecological systems*” in reference to the city, and overlap that is created when functions, programme, businesses or neighbourhoods meet.” This concept is very similar to Nan Ellin’s integral urbanism.

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

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 throughout 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 an extension of Jane Jacobs argument in favour of urban diversity in her Greenwich Village



neighbourhood 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 neighbourhood—programmatically, socially and economically. If there is enough diversity in a neighbourhood, it is argued that it can withstand change in demographic, use and economy without becoming derelict. A mixing of classes in a neighbourhood 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 buffer area between the two. The Midtown area has ample opportunity for this sort of architecture as an infill tactic, or a technique to mesh together old residential neighbourhoods. There is a current trend of historic single-family homes being used for medical offices in the Midtown area, with the office taking up the entire building, or rental apartments above the office on the ground floor. Although useful in their adaption of the space, there leaves a question of site density in these areas, as they have a suburban density in an urban artery, and are often set far back from the street, creating a

Fig. 217. Left. The Roman Shop/House – Street Scene in Pompeii, where shops were owned by people of all incomes. It is suggested this intermingling of people of all incomes living and working erased any sense of a stigma between classes. (*Living over the Store* p 32)

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vacuous and loose connection. When there is sufficient 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 writes of the birth of zoning bylaws and separation of use through Le Corbusier’s dedication 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. (The formal, guild-based apprenticeship system in England did not take hold in the America)
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, on the part of the middle and upper classes, that began to demand exclusive districts dedicated to that activity alone.



RETAIL FRONTAGE + DIVERSITY

economic stability of a neighbourhood

Ground floors on main or arterial streets should accommodate retail and commercial space. The types and operating hours of these programs should be mixed in nature to create a diverse block. A single retailer cannot take up the frontage of an entire block, and should be pushed behind the others if said retailer requires more space.

“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 neighbourhoods.”

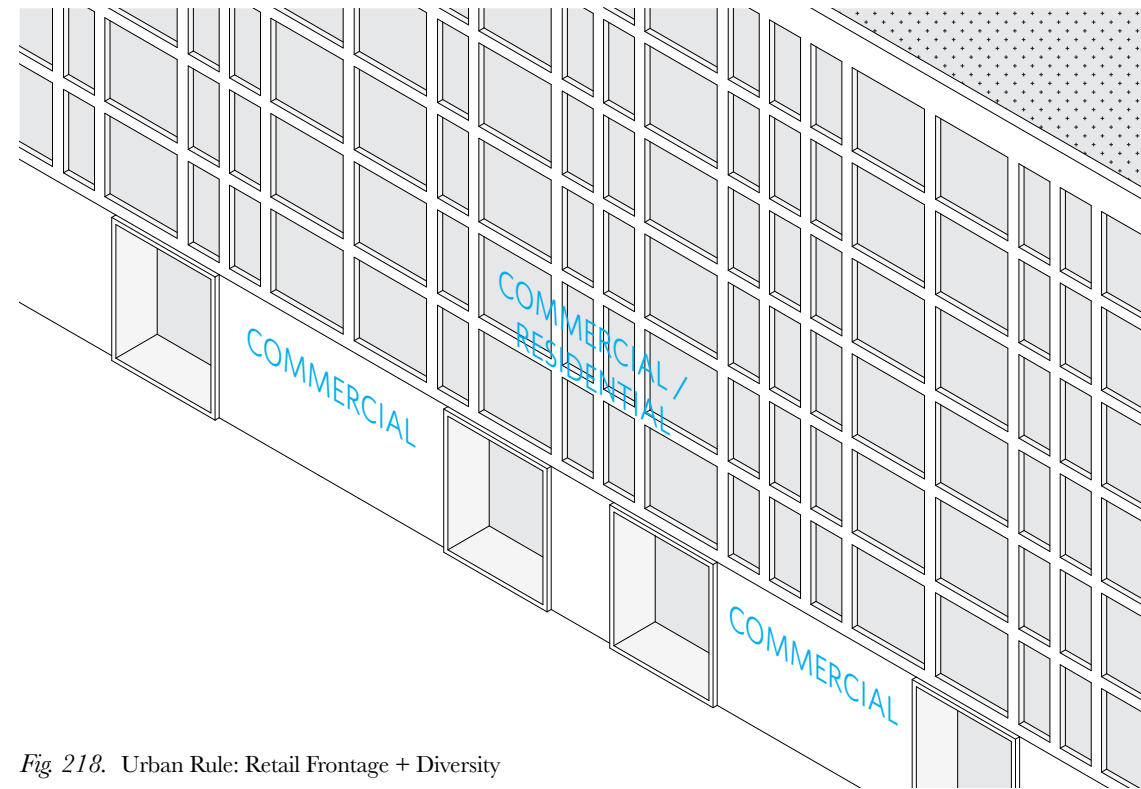


Fig 218. Urban Rule: Retail Frontage + Diversity

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 city street equipped to handle strangers, and to make a safety asset, in itself, out 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 ooze into each other as they do typically in suburban settings or in projects.

Second, there must be eyes upon the street, eyes belonging to those we might call the natural proprietors of the street. The buildings on a street equipped to handle strangers and to insure the safety of both residents and strangers, must be oriented to the street. They cannot turn their backs or blank sides on it and leave it blind.

And third, the sidewalk must have users on it fairly continuously, 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

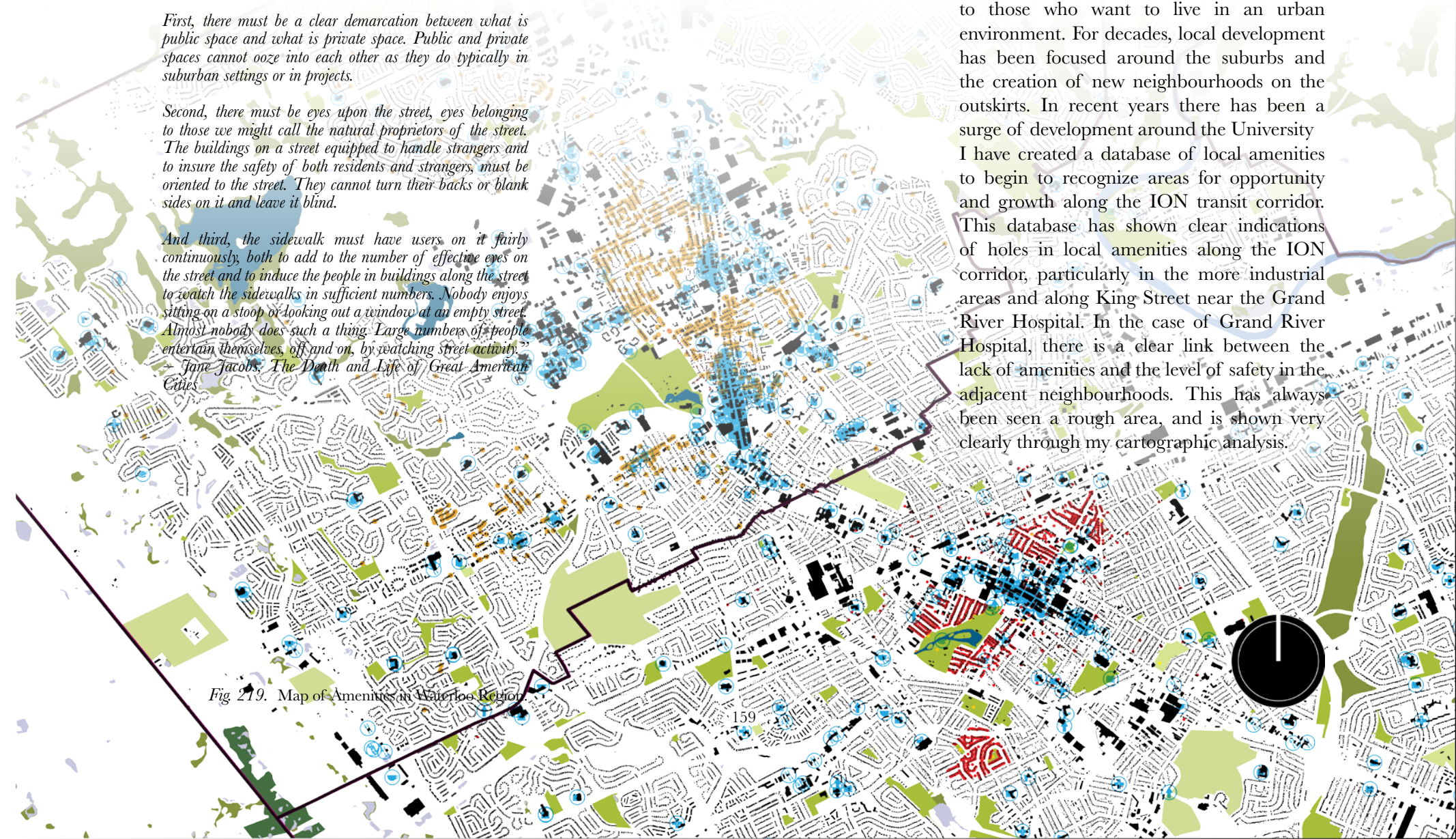


Fig 219. Map of Amenities in Waterloo Region

MAPPING AMENITIES

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 suburbs 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 a rough area, and is shown very clearly through my cartographic analysis.



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 windows for views to the street.

NEIGHBOURHOOD SAFETY

'We will work with community partners to create complete, connected, safe and walkable neighbourhoods 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 neighbourhoods and fostering a stronger sense of community belonging.*
- 3.2 Create safer streets in our neighbourhoods through new approaches to traffic calming*
- 3.3 Manage growth, curb urban sprawl, and foster more mixed-use development, ensuring new development is integrated with the diversity 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 Continue to encourage active participation in existing recreational facilities while moving forward with the provision of new recreational opportunities in underserved areas of the city.*
- 3.6 Provide opportunities and support for citizens to lead the way in creating active and vibrant public places that promote people's health, happiness and well-being by capitalizing on local community assets such as community centres, pools, arenas, libraries, parks, trails and other public spaces. Actions that the City of Kitchener will take to make progress on the above include, but are not limited to: implement a framework to guide and support citizens in creating neighbourhood action plans; expand the community gardens program; expand the city's public art program with a specific focus on neighbourhoods.'*

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



IEWS TO AND FROM STREET

To help create a safe and thriving neighbourhood, 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 multi-use 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 street. 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 neighbourhood safety, as listed on the opposite page.

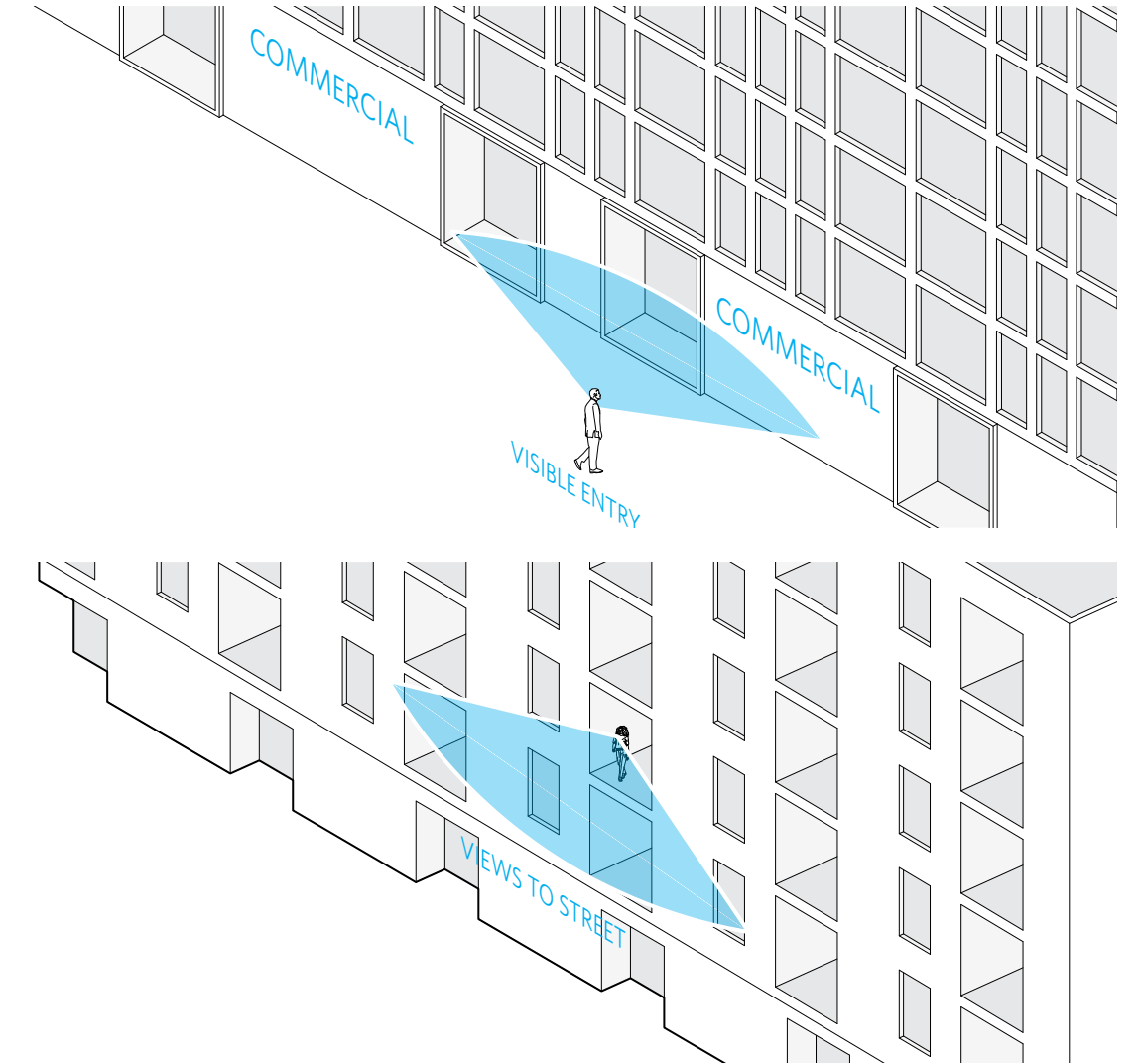
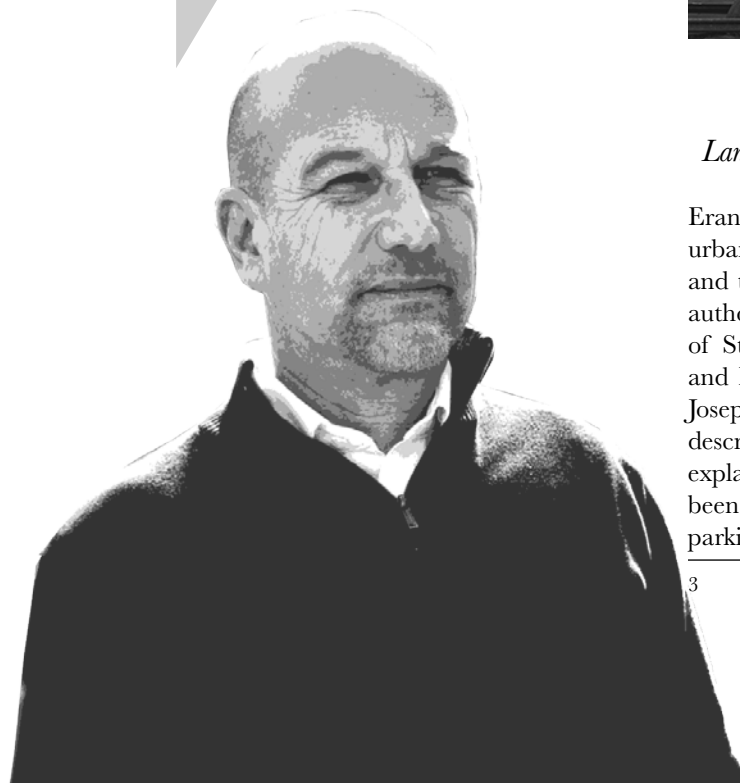


Fig. 222. Urban Rule: Views to and from Street



RETHINKING A LOT

“As long as cars exist, they will continue to occupy space. This space will have to be provided whether it is required by law or by need. In the United States, parking requirements are typically tied to zoning regulations. Suggestions for off-street parking standards as part of the urban planning-zoning strategy started to appear in the 1930’s. At that time, with zoning being a newly minted instrument of urban planning and development control, it was seen as the easiest way to directly make property owners contribute to solving the on-street parking problem. Parking thus became a perpetual, legally binding element of development, as have more conventional requirements such as fire safety and sanitation infrastructure provisions.” (8)



ERAN BEN-JOSEPH

Author

Landscape Architecture and Planning Professor

Eran Ben-Joseph has worked as a city planner and urban designer in Europe, Asia, the Middle East, and the United States. He is a Professor at MIT, author of *The Code of the City* and coauthor of *Streets and the Shaping of Towns and Cities* and *RENEW Town*. In *ReThinking a Lot*, Ben-Joseph shares a vision for parking’s future. He describes parking lots as, *are ripe for transformation*, explaining that their design and function has not been rethought for decades. Ben-Joseph pushes the parking lot into the twenty-first century.³

³ http://rethinkingalot.net/#!/page_Teachers
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Fig 223. Parking Lot at Herman Miller Plant.

Through many case study examples, such as the Herman Miller furniture plant in Georgia, Ben-Joseph demonstrates that parking lots can be 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 shows 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 an element so much a part of urban fabric is paid such little design attention.

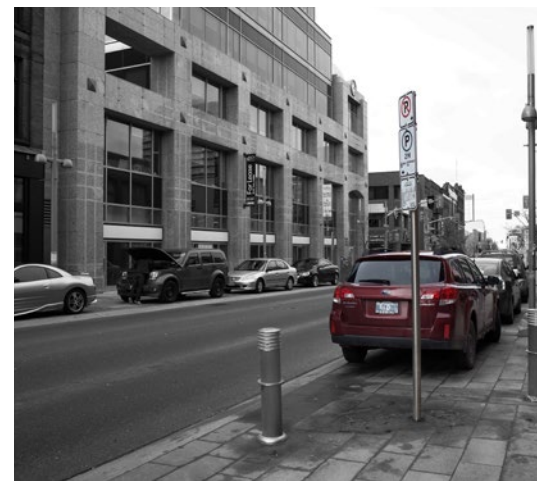


Fig 224. Above. Three examples of parking in Kitchener, including surface, garage and street parking

PARKING

“There are an estimated 600,000,000 passenger cars in the world, and that number is increasing every day. So too is Earth’s supply of parking spaces. In some cities, parking lots cover more than one-third of the metropolitan footprint. It’s official: we have paved paradise and put up a parking lot.”⁴

There is currently no plan for on-street parking on the King Street light rail corridor, much less in the Midtown District. As part of this thesis design study, on-street parking has been implemented similar to the design and function of Downtown Kitchener’s King Street Reconstruction, by IBI Group⁵ in 2010, where its flexibility, use of paving material and interspersed tree planters create an expansion of the sidewalk and overall streetlife (shown in photo on bottom left). Street parking along the LRT corridor should be metred, 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 not effective when the surface parking lots outnumber the built fabric. Parking can be relocated from expansive surface lots to flexible street parking and parking garages, with design tactics that are effective for transitional use, when cars are no longer 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 codes

⁴ http://rethinkingalot.net/#!/page_About
⁵ <http://www.ibigroup.com/projects/king-street-reconstruction>

rely on incentives and opportunities, rather than simple enforcement.

PARKING GARAGE

There are many areas in the Downtown cores of the Tricities where underground parking garages are not a possibility from a water table standpoint. There are many underground springs and creeks that make multi-level underground parking difficult and expensive from a sitework and engineering standpoint. For this, there is a precedent of ongrade garages. The garage at Grand River Hospital bordering on King Street is an example of this, which leaves a sizable distance on King with no groundfloor public space. Garages can be designed so they have proper ceiling heights to have part of the building act as storefront, or renovated into a public building when parking is less of a priority. Buildings should have ground floor public programming at the street to maintain a continuous walkable neighbourhood and help populate the possibly unsafe parking garages which can be dead zones late at night.

SURFACE PARKING

When surface parking must remain, pervious paving should be used, and the parking lot should be equipped for sports/activities, or food trucks when not in use. They should also be shared between uses, where for example, a school yard uses a lot during the week, and that same lot is used for paid parking on weekends. The same can be done with office uses and cultural programming. There is no need for every building occupancy to design their parking for the worst case scenario of the few days a year that more parking is required.

PRECEDENT: 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 garages, reducing demand in overused areas. Through SFpark, demand-responsive pricing works to readjust parking patterns in the city so that parking is easier to find.'*²⁶

HOW RATES ARE DETERMINED

SFpark charges the lowest possible hourly rate to achieve the right level of parking availability. In areas and at times where it is difficult to find a parking space, rates will increase incrementally until at least one space is available on each block most of the time. In areas where open parking spaces are plentiful, rates will decrease until some of the empty spaces fill.

Fig. 225. SFpark Map of Downtown San Francisco.

6 <http://sfpark.org/about-the-project/>



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Fig. 226. Above. SFpark diagram illustrating the fee structure for parking on busy and quiet streets. The red shows a street at 100% capacity, and cars circling to find an open parking space. The yellow shows a 30% occupied street where parking is much more affordable to attract drivers.



The SFpark pilot uses demand-driven 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, minimize cars circling the block in search of parking and decrease the associated emissions, SFpark has determined that onstreet parking should remain a maximum of 80% full at any given time, and affordability 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.⁷

Research from the pilot suggests that for a street to optimize congestion levels and reduce the pollution created in the quest for the ideal parking space, street parking should operate at 80% capacity. This means that drivers won't be circling a block looking for a space to park, and in turn contributing to traffic.

7 sfpark.org

Fig. 227. Left. Parking meter used for the SFpark pilot.

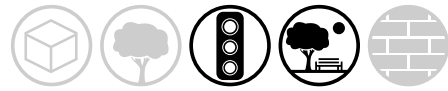
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To assure users that the pilot can be a successful model for urban parking, all of the profits from SFpark go into a separate fund that contributes to the creation of neighbourhood and street amenities in that area. Therefore, money from both locals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

This would not only create a source of revenue for the City to maintain the roads and sidewalks, adding to its neighbourhood's public space, but would eliminate free long-term 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.

WITHOUT SFPARK

Without a system like SFpark, neighbourhoods become more polluted due to circling traffic and emissions from idling vehicles who's 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.



[WR]PARK

how SFpark can work for Waterloo Region

“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.”⁸

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

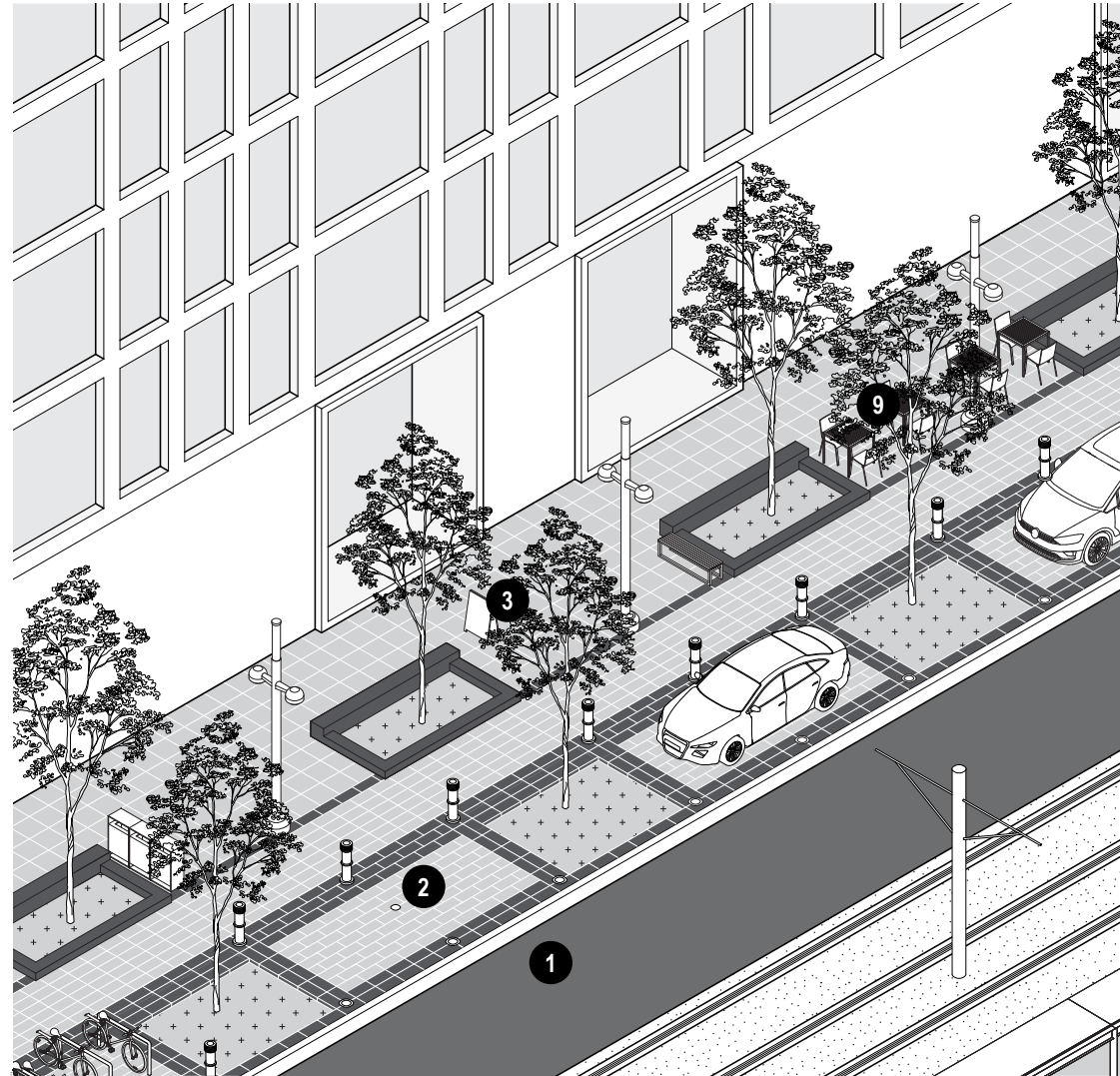


Fig 228. Urban Rule: [WR]park

0 TRIP PLANNING

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.

0 CHECK THE APP

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

1 FIND A FREE SPOT

If driving solo, or a smartphone is unavailable, drivers should easily be able to eye out a parking space as they approach their destination, all the while better able to pay attention to changes in traffic and pedestrians or cyclists if they do not have to strain to find a space to park.

2 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.

3 PAY FOR PARKING

Using a smartphone or incrementally spaced parking metres, 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 farther away and walk to their destination at a lesser rate.

4 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.

5 PRICING ADJUSTMENT

Based on the information received from the parking sensors, prices are adjusted up or down to meet the needs of the neighbourhood 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.

7 LEAVE OR FEED METER

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.

8 80% FULL BLOCKS

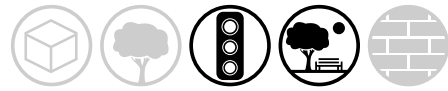
If blocks are an average of 80% occupied, and there is a balance of space readily available, the model is a success. Goal to create shift in perception of an acceptable distance from parking space to destination.

9 PROFIT TO NEIGHBOURHOOD

Profits 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 neighbourhood association deems a positive addition.

10 EXPAND IMPLEMENTATION

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



MAXIMUM PARKING

abolish parking minimums for development

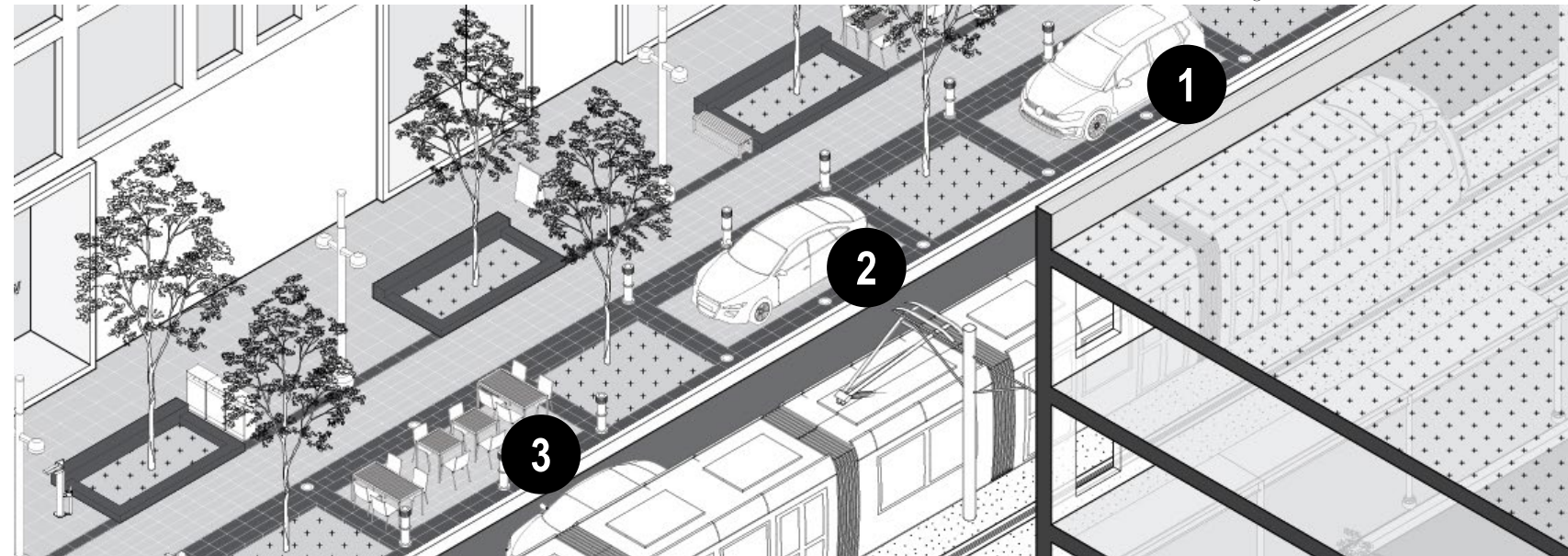
As it stands, parking is an issue of zoning bylaws, where parking minimums are established for sites based on the zone in which they are grouped. This is impractical as a tactic for site design, as number of parking spaces is often based on the square footage of a building. In the case of large assembly 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 neighbouring 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. If Waterloo Region enacted the SFpark pilot to promote maximum parking and flexible rate parking depending on location, time of day and day of week, it would provide the ability to acquire a parking spot more efficiently, alleviate traffic, and discourage circling for a parking spot. It is important to have access to quick one and two hour parking for retail and commercial vitality in

the downtown zone of a midsize city, where there are still a large number of drivers. Parking spots can be adapted for other uses when not required for parking, or simply given back to the boulevard for greenspace.

All parking zones are to include electric vehicle parking, bike parking, special parking for families with small children, accessible parking and temporary parking for taxis and deliveries. There is potential for special event parking – parking spaces rented as parkettes, or the availability for food trucks to have permits.⁹

9 Rethinking A Lot. 129.



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1 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.

2 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.¹⁰

3 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. Left. Urban Rule: Maximum Parking

10 <https://kitchenerutilities.ca/en/businessinkitchener/KingStreetMasterPlan.asp?hdnContent=>



Fig. 230. Removable bollards positioned to the street side of parking space to close off portion of street from parked cars. This can be done if a business would like space in front of their business for cafe tables, or if extra bike parking is needed 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.



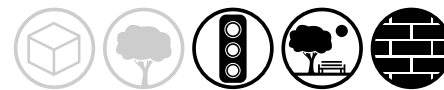
Fig. 232. Restaurants and commercial spaces in Montreal are taking over some of the on-street parking spaces for highly designed parkettes. Although a parking space seems to be a small area, there is greater than 15 square metres to work with, enough for a collection of tables, lounge furniture or a pocket garden, as a few examples.

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Fig. 233. A group of friends gathers for drinks on a micro patio outside the Rhapsody Barrel Bar downtown Kitchener.



Fig. 234. 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.



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 neighbourhood 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

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.

2 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 wrPark Pilot.

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.

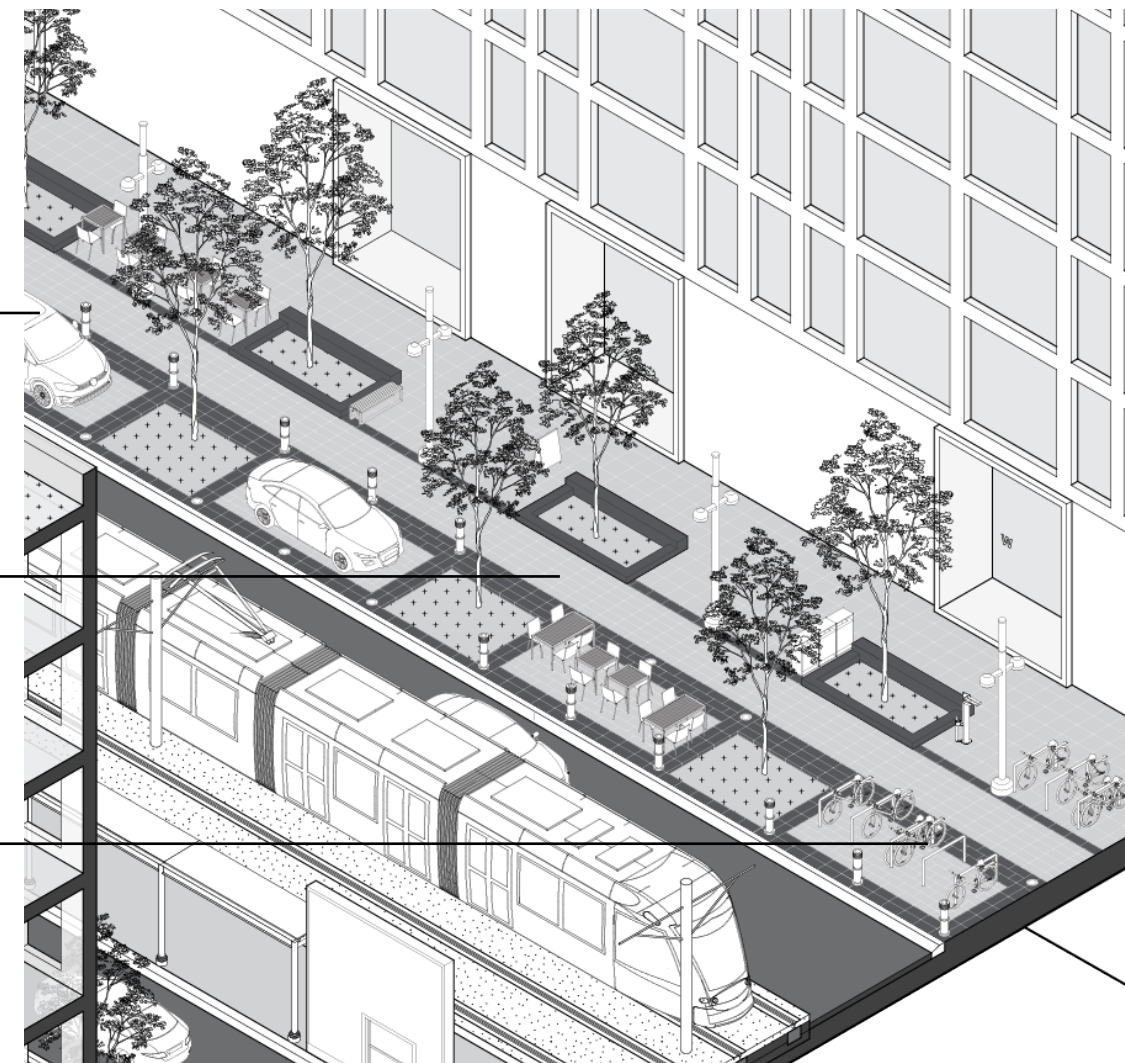


Fig. 235. Urban Rule: Flex Space

COMPONENTS OF PARKING

at a typical lrt stop

1 REMOVABLE BOLLARDS

Fig. 236. Bollards can be moved with special tools by a city worker. 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.



FLEX PARKING SYSTEM

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 off the street to traffic or to convert on-street parking spaces into areas for outdoor cafes, patios and restaurant seating.'

No Parking within
6m from public entry
9m from intersection (no light)
15m from intersection (traffic light)
as per MTO regulations

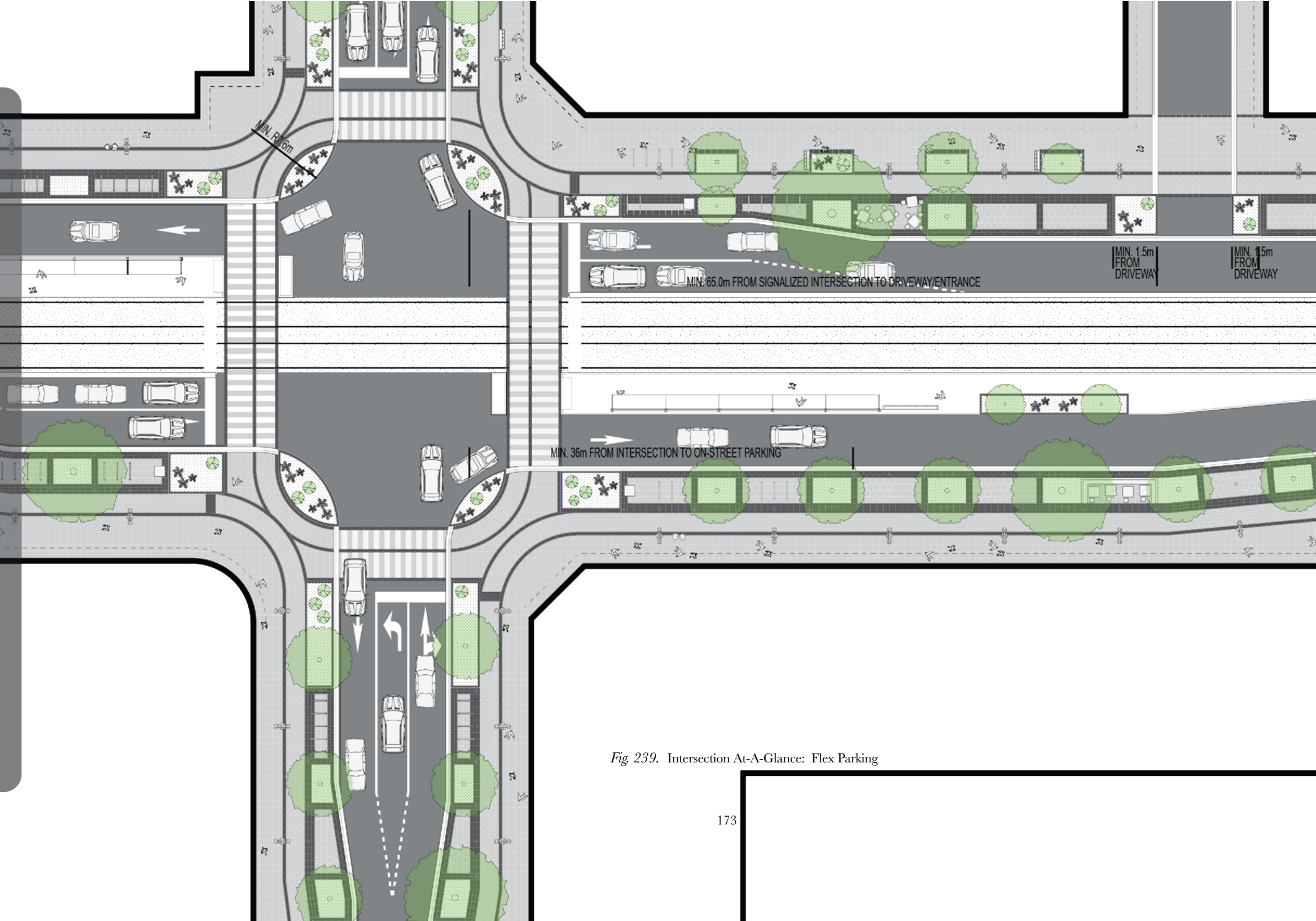


Fig. 239. Intersection At-A-Glance: Flex Parking



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])

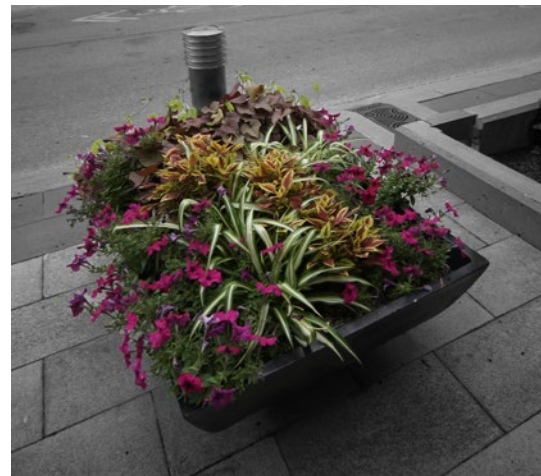


Fig 240. Above. Movable planter in a closed parking space on King Street.

1 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 tree matures. 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.

2 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 241. Above. Raised planter for trees and plantings, with perimeter bench atop 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. Storefronts can add ambient and direct lighting to the street through canopy, spot and patio lighting.



3 SOIL CELL SYSTEM

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 from tree to tree promote the growth of larger trees, and if the soil conditions are healthy, will reduce roots desire to seek out new growth locations and interfere with pavement at grade. The implementation of soil cell systems in combination with open planters debunks the frequent use of tree coffins in the urban realm, where only the trunk is exposed. This causes uneven heaving in pavement, and can often kill off trees when there are unable to have access to proper water, or space for the trunk to grow.



Fig 245. Above. Street lighting in Downtown Kitchener. The integration of low lighting in planting beds brightens the sidewalk and provides ambient lighting.

4 STREET LIGHTING

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 246. Above. Street lighting in Downtown Kitchener.



TREE PRESERVATION

Keep mature trees, providing adequate undisturbed root space, and replant / replace if necessary with a local mix of species. Establish guideline for street trees and site planting as a tool for designers, developers and property owners.

Avoid cutting trees, but replant if necessary

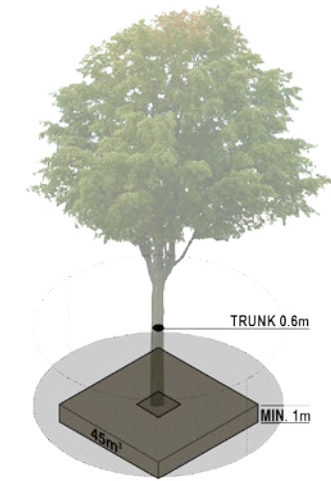


Fig 247. Urban Rule: Tree Preservation





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 ¹¹

PLANTING REQUIREMENTS

≥2 TREES PER CONTAINER
REQUIRES 20m³ SOIL / TREE

MIN. 1m SOIL DEPTH

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

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

RULES FOR OPTIMAL GROWTH

- + Fertilize only when there are low levels of essential elements in the soil¹²
- +Proper soil depth allows roots to grow, deeper soil allows roots to
- + 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.



Fig. 249. Urban Rule: Creation of an Urban Tree Atlas

SANTAMOUR'S FORMULA FOR TREE DIVERSITY

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.

¹¹ <http://www.planthardiness.gc.ca>

¹² up by roots,69.

SUN REQUIREMENTS

Plants receive 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 sun for trees include:

- +Full Sun
- +Part Shade
- +Shade

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

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 climactic zones.

POLLINATOR

Much of the world's crop and food supply is made possible by the pollen that is spread by trees and bees. Bees love to live in an urban setting where it is easy for them to travel between plants for pollination.¹³ Certain species of trees, most often fruit-bearing trees need to be planted amongst like or other species of pollinator trees in order for them to flower and produce fruit.

¹³ Suzuki, David. "Create a bee-friendly garden". David Suzuki Foundation, <http://www.davidsuzuki.org/what-you-can-do/food-and-our-planet/create-a-bee-friendly-garden/>, 8. December 2015.

SALT TOLERANT

Soil accumulates large volumes of salt from winter de-icing that can be toxic to soil and a plants 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.¹⁴

Avoiding Salt Damage:

- + Plant salt-tolerant species (see Appendix)
- +Reduce salt application rates, lower the throwing distance, and apply before roads freeze
- +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.
- +Improve drainage so salt can leach from trees

<http://www.umass.edu/urbantree/factsheets/18roadsalttrees.html>

¹⁴ Up By Roots

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 season. 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.

DROUGHT TOLERANT

Planting a tree in its more mature state will help with drought resistance and its ability to survive in harsh weather conditions. If planting saplings, there are watering devices that store water and gradually seep into the soil below. They help to protect the tree and keep it hydrated while it is establishing roots.

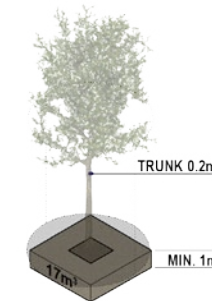
The ability to collect rainwater before it runs into storm sewers will also help plants get as much water as possible. Species in the Appendix provide information on drought requirements for potential urban trees.

Fig. 250. Right. Small, Medium, Large Stature Trees

S SMALL STATURE TREE

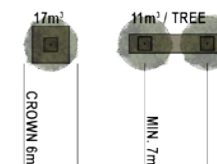
GROWTH PATTERN

0.2m trunk
7m s spacing
32m² crown spread
6m diameter



PLANTING CONDITIONS

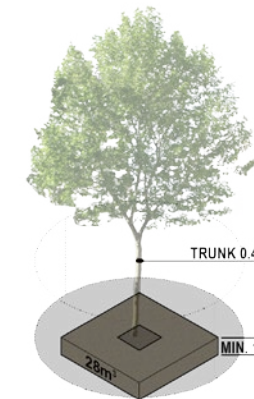
17m³ soil solo
11m³ soil shared



M MEDIUM STATURE TREE

GROWTH PATTERN

0.4m trunk
10m spacing
74m² crown spread
10m diameter



PLANTING CONDITIONS

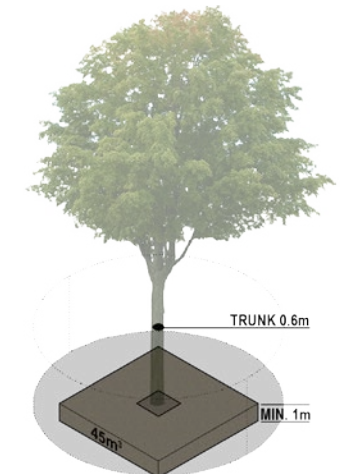
28m³ soil solo
19m³ soil shared



L LARGE STATURE TREE

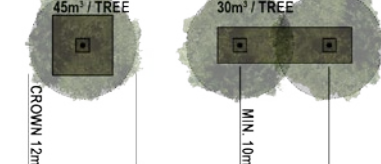
GROWTH PATTERN

0.6m trunk diameter
10m spacing
111m² crown spread
12m crown diameter



PLANTING CONDITIONS

45m³ soil solo
30m³ soil shared





PERVIOUS SITE MATERIALS

porous concrete
 Porous concrete at light rail stop islands for its ability to percolate rain water. As sections of concrete are replaced along the ION, it should be replaced with porous concrete. Even when slightly blocked, it has the ability to process water.

planted material
 Open green planters provide the best opportunity for oxygen to get into the soil. A generous layer of natural mulch atop soil prevents the growth of weeds and allows for some drought resistance. It acts as a barrier for the soil and roots.

reflective paint
 Reflective paint or equivalent applied to roadways at crosswalks to maintain visibility and safety during night hours. This is less important in the pedestrian realm, more so for intersections. Various patterns can be applied.

unit pavers
 The inclusion of unit pavers are flexible and allow for replacement of single stones when cracked or damaged, and also allow some percolation of water through the cracks between the stones. When required, pavers can be lifted to access services below the sidewalk.

contrasting pavers
 Contrasting unit pavers help to demark 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

materials and textures

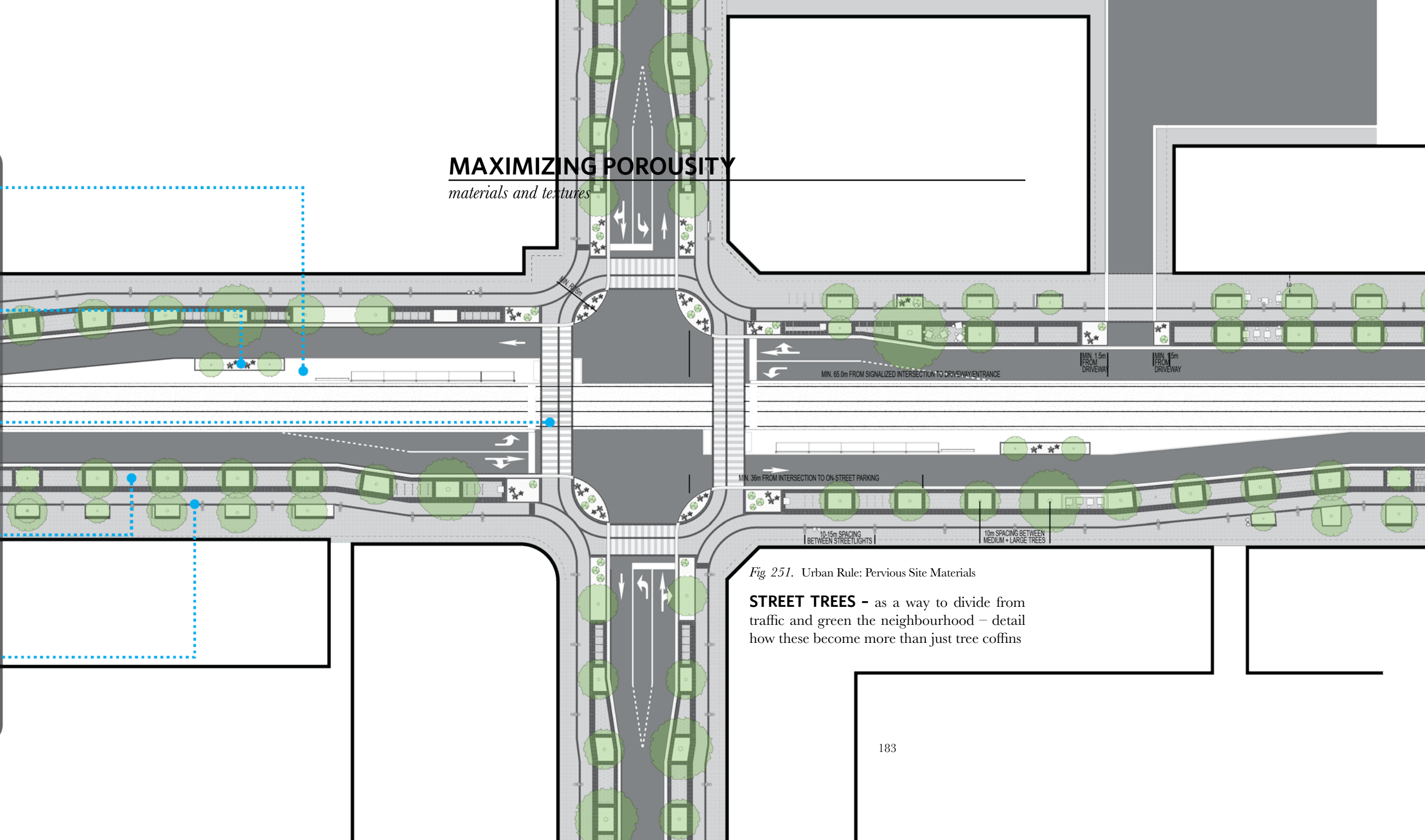


Fig. 251. Urban Rule: Pervious Site Materials

STREET TREES - as a way to divide from traffic and green the neighbourhood - detail how these become more than just tree coffins



Fig 252. Pavement of LRT track at College and Spadina in Toronto.

Fig 253. Concrete detailing of inset tracks on King Street in Midtown.

Fig 254. Concrete detailing showing wire mesh underlay and gravel substrate on King Street in front of Grand River Hospital.

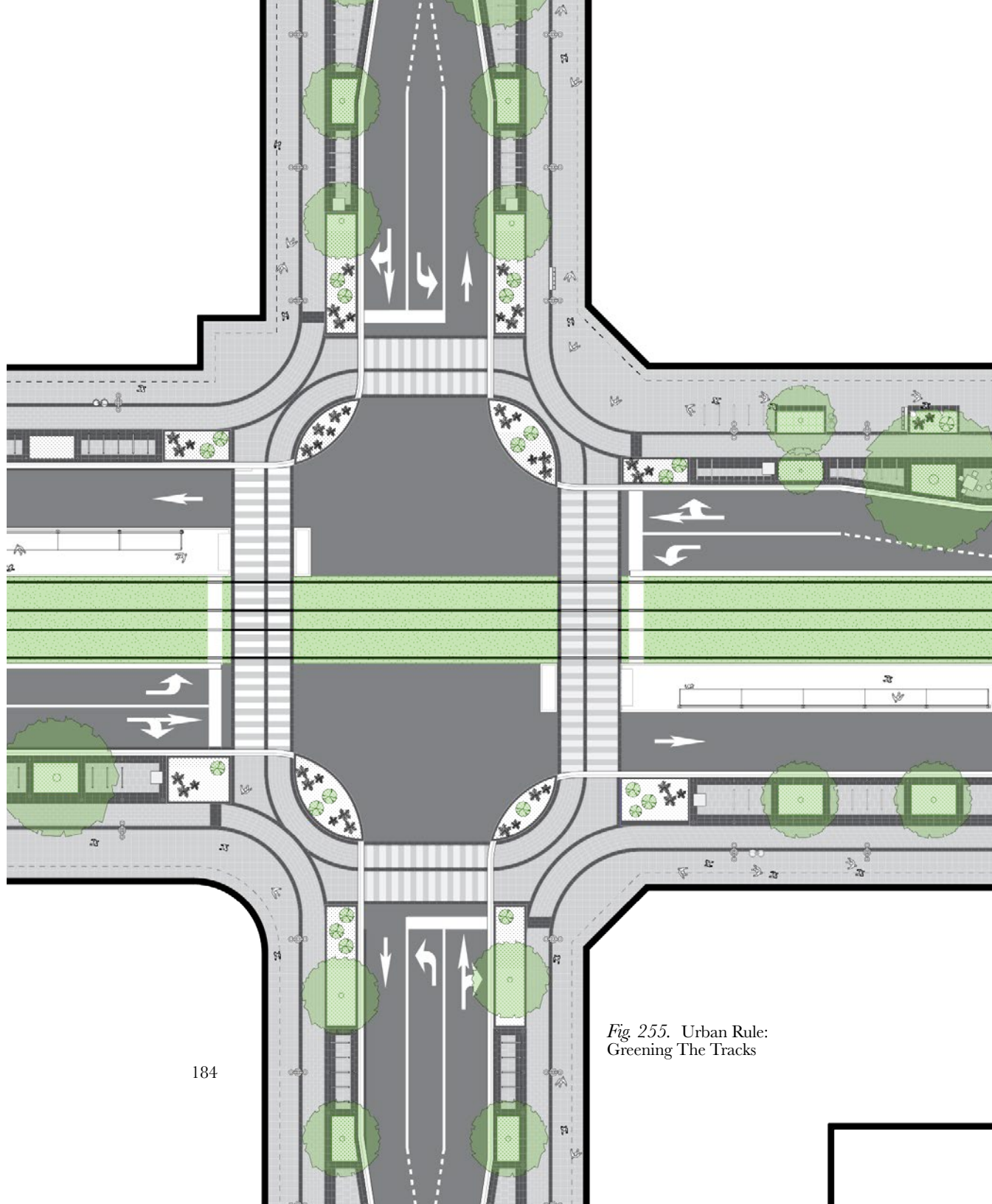
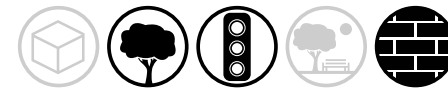


Fig 255. Urban Rule: Greening The Tracks



GREENING THE TRACKS

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.

MAINTENANCE

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.

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.¹⁵ The Region has its own salt management program in order to reduce the

¹⁵ <http://sustainabilityprogress.regionofwaterloo.ca/water/corporate/reduction-of-regional-salt-application.html>

overall amount of salt that makes its way into waterways. The Region uses a mix of anti-icing salt brine, 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) working their way through concrete and causing the reinforcing steel inside to decay.¹⁶

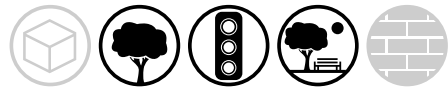
¹⁶ <http://www.fastcodesign.com/3062816/exposure/behind-the-scenes-at-americas-craziest-fan-con>



Fig 256. Top Right. St. Charles Avenue streetcar in New Orleans, which has operated since 1835.

Fig 257. Centre Right. Streetcar in Düsseldorf with planted tracks. Germany has many other track designs such as this, and a climate similar to Canada. Herbert Sieben. GT8S Triebwagen 3051 im September 2010 auf der Linie 719 in Richtung Haltestelle Poststraße in Düsseldorf. September 2010. Düsseldorf. In Flickr. September 2010.

Fig 258. Bottom Right. Further expansion of the Saint-Etienne Tram Line is underway. Saint-Etienne Métropole. The face of the future Étienne tramway. April 2, 2015. Saint-Etienne. In Activ Radio. April 2, 2015.



WATER MANAGEMENT ON SITE

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 divert 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

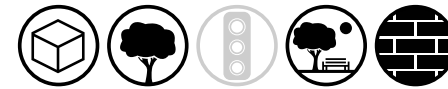
+Do not plant shrubs or groundcover in rootball zone of tree

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

Fig. 259. Storm water grate feature in Downtown Kitchener. When there is rainfall, water is directed into the planting beds, where it absorbs into the soil and helps to water the trees and plants. If there is extreme rainfall, runoff water overflows into the storm drain to prevent flooding.



Fig. 260. Seams between granite pavers also allow water to percolate through into the soil below, reducing the reliance on storm sewers.



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 usable 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.

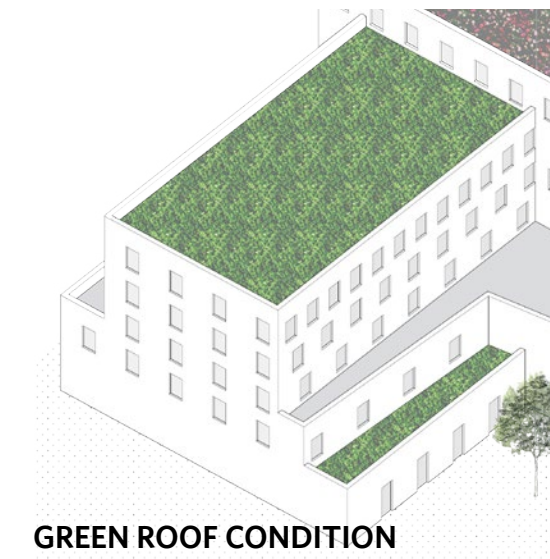
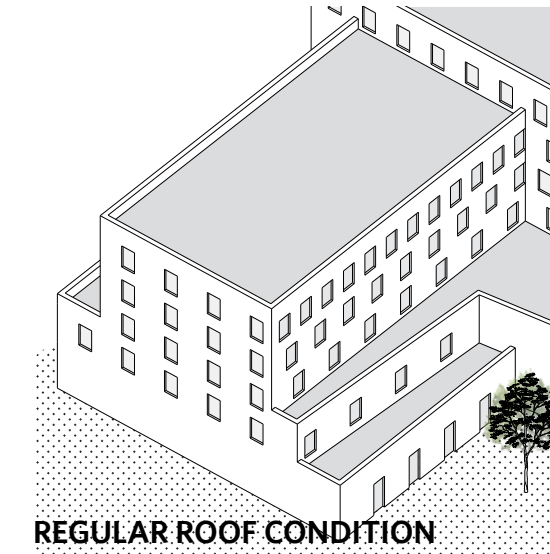
Where applicable, a surface will be covered by plant material and sedum, which are able to absorb the rainwater after heavy rain, but can also deal with lengthy dry periods. When they look out of their windows, neighbours will have a view of a variety of green and planted surfaces with a mix of container gardens.

¹⁸ https://www.toronto.ca/legdocs/municode/1184_492.pdf

Fig. 261. Roof Garden at 401 Richmond, Toronto. 401 Richmond Street West is a restored, heritage-designated, industrial building turned arts-and-culture hub in downtown Toronto. It is home to over 140 artists, cultural producers, social innovators, microenterprises, galleries, festivals, and shops.

Fig. 262. Centre and Bottom Right. Multi-use housing proposal with a variety of trees, community gardens, planter boxes and sedum covered roofs. With small units, the terraces offer a huge addition in living space for the complex. Image by author in collaboration with Fraser Plaxton, 2012.

Fig. 263. Right. Urban Rule: Not Just A Roof



IMPERVIOUS SURFACES

existing condition

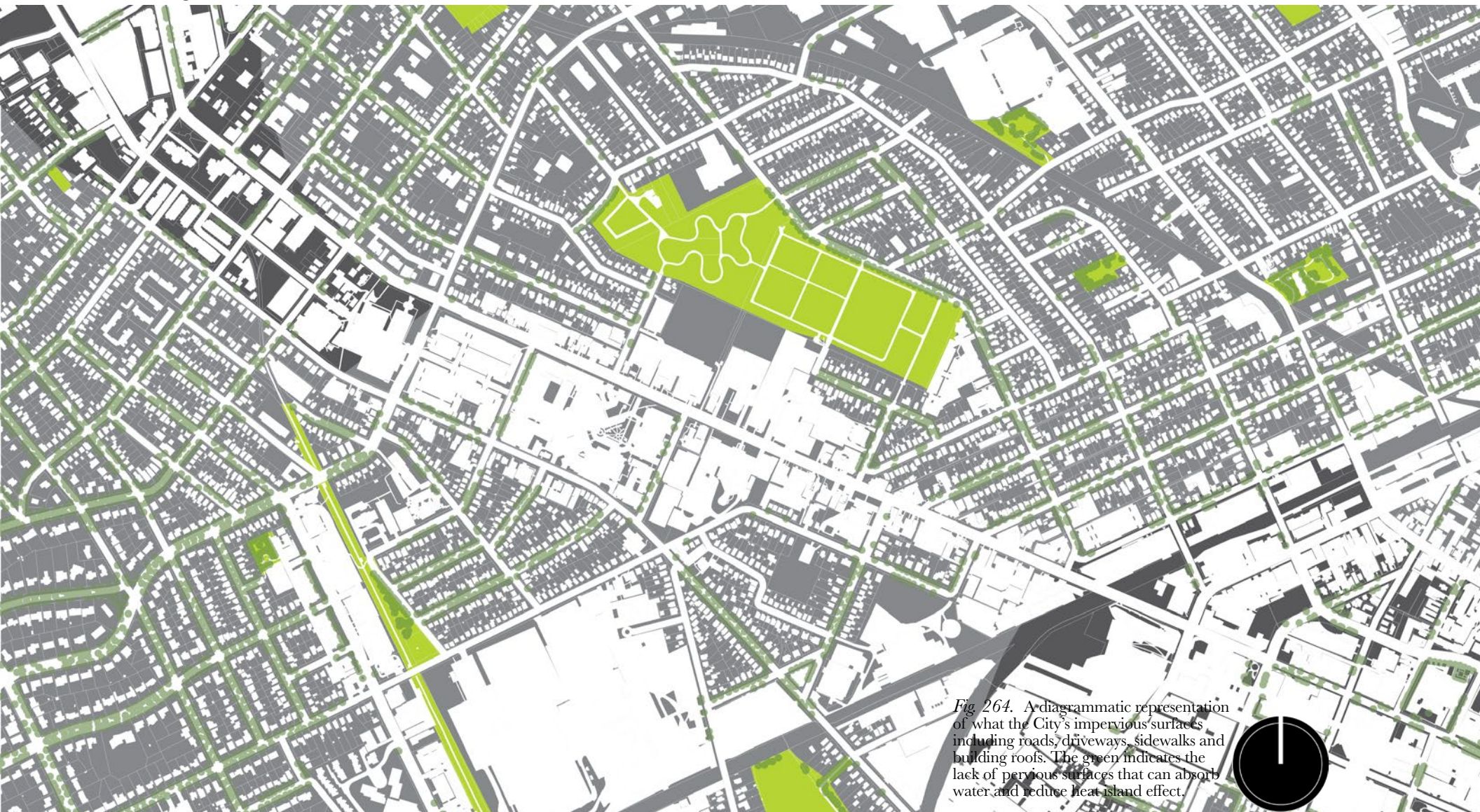


Fig. 264. A diagrammatic representation of what the City's impervious surfaces including roads, driveways, sidewalks and building roofs. The green indicates the lack of pervious surfaces that can absorb water and reduce heat island effect.

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IMPERVIOUS SURFACES

proposed condition of reduced impervious surfaces

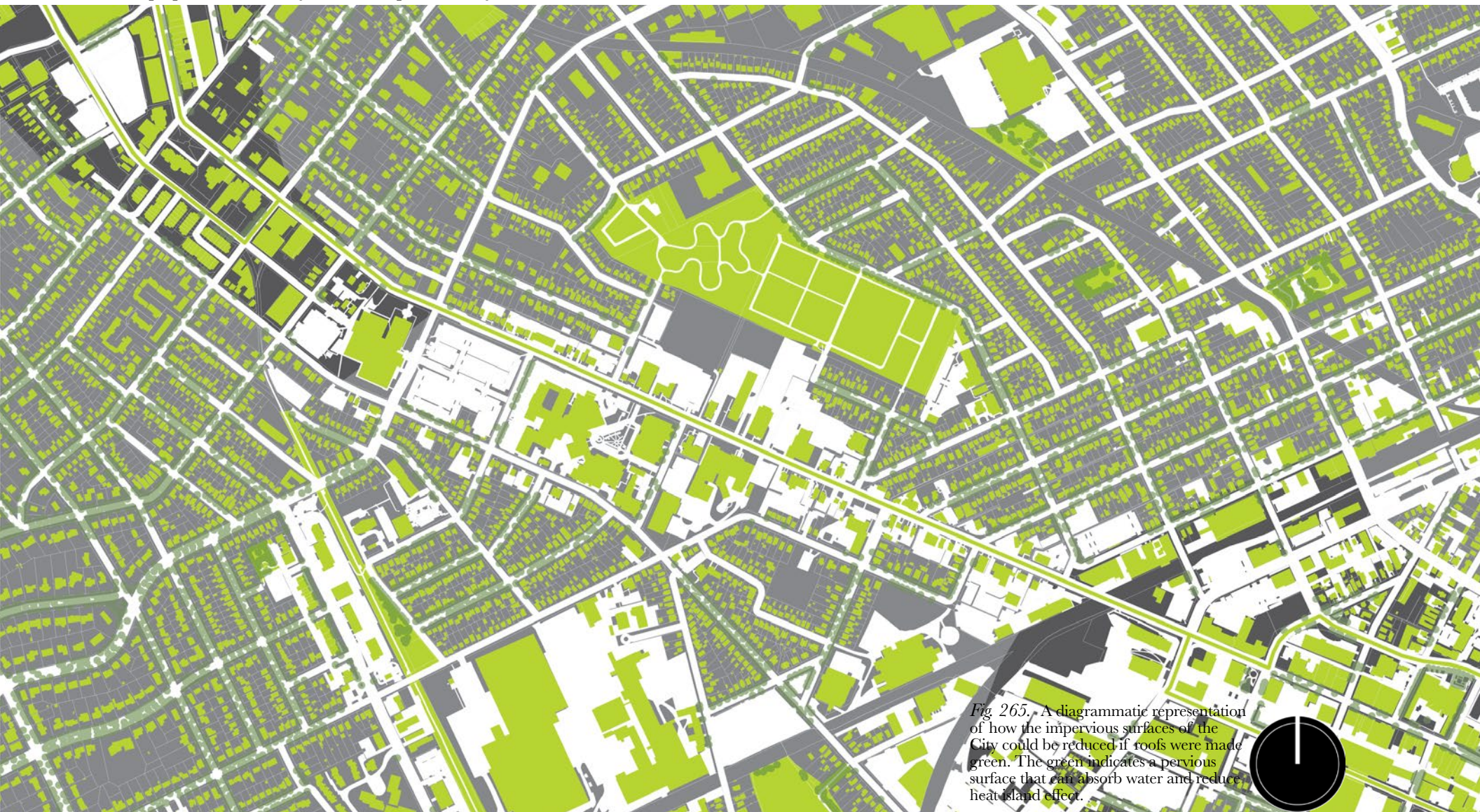


Fig. 265. A diagrammatic representation of how the impervious surfaces of the City could be reduced if roofs were made green. The green indicates a pervious surface that can absorb water and reduce heat island effect.

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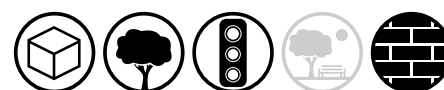
Fig. 266. Top Right. Eglinton Protected Bike Lanes, Toronto. The goals for the project include: This is our opportunity to have safe and accessible cycling infrastructure along the whole length of Eglinton, including:

- + Safe, protected bike lanes along Eglinton
- + Connections to off-road trails and on-road bike route
- + Safe crossings over Eglinton
- + High quality bike parking in accessible, well-lit areas
- + Cyclist access into the new transit stations
- + Clear, visible signage

Second Right. Coolsingel, Rotterdam by West 8.
http://www.west8.com/projects/revitalization_of_the_coolsingel/

Fig. 267. Third Right. Coolsingel, Rotterdam by West 8

Fig. 268. Bottom Right. Coolsingel, Rotterdam by West 8



ACCOMMODATE THE GREEN COMMUTER

Details for a safe and happy green commute to include:

- + Bike Storage
- + Access to a shower via nearby gym membership, shower in building
- + Change room where possible to change from outerwear/exercise clothing into work clothes
- + Availability of drinking water
- + Corporate transit passes
- + Sufficient coat room for outerwear in heating season
- + 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.¹⁹ The new vision for the motorist-dominated boulevard will transform Coolsingel to a space for pedestrians and cyclists alike. The design vision 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

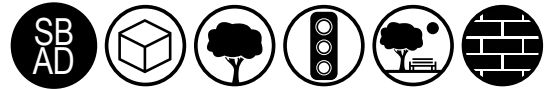
¹⁹ http://www.west8.com/projects/revitalization_of_the_coolsingel/

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, decorated subway 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.

Fig. 269. View from above. Coolsingel, Rotterdam by West 8.





CYCLE INFRASTRUCTURE



Fig. 270. Cycle Infrastructure.

STEFAN BENDIKS

Director of Artgineering

Author, Urban Planner, Cycling Expert

+ AGLAÉE DEGROS

Director of Artgineering

Author, Urbanism Professor, Urban Planner

Artgineering is an organization for research and design on the relationship between infrastructure and urban planning. Stefan and Aglaée conduct various experiments and design projects regarding public space in the Netherlands and Belgium where cycling is not only a primary mode of transport, but an effective solution to improve the city as a whole. They devise and implement design strategies for complex (inter)urban conditions with particular attention to the role of infrastructure and its ties to cycling.

Fiets Infrastructure, or Cycle Infrastructure, is a seminal handbook about the exploration of the potential of cycling paths and a study of how cycling adds infrastructural and cultural value to the Netherlands. The book describes various cities as precedents for bicycle urbanism, and their relationship to the city as a region scale, and to other modes of transportation, lane negotiation and parking on a localized scale. Cycling is in the process of making a worldwide comeback, with experiments in new cycling facilities, protected lanes and trail networks underway all over. This culture is beginning to pickup in Canada, but there is still apprehension regarding the ease of access of safety of cycling in areas that are not dedicated

(often rural) bike trails. Waterloo Region is on the way to embracing public cycling by implementing a bike share program, and greater access to cycle lanes throughout the cities. There are however, few protected or dedicated cycle lanes that offer protection for the cyclist. It also widely varies which paths are maintained in the winter season, not yet making winter cycling a full possibility. Cycling offers spatial qualities and affordable transportation to cities, but its potential has not yet been fully realized in the majority of Canada.

Its goal is to activate the full potential of cycling for the urban landscape and to consider cycling infrastructure as an integral design challenge, rather than purely an issue of traffic engineering.

Fig. 271. Left. Stefan Bendiks and Aglaée Degros.



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“The majority always reply in surveys that the main reason they cycle is because the bicycle is quick and convenient. Period. This is of course presupposes making the car less attractive and more difficult to use in our cities and the catalogue of ideas for how to do that is a weighty volume.”²⁰ (9)

²⁰ Bendiks, Stefan, 1971- author. 2013. Fietsinfrastructuur = Cycle Infrastructure. Rotterdam: nai010 uitgevers/nai010 publishers.



Fig. 272. Community Access Bike Share program in Downtown Kitchener.

Fig. 273. Winter cyclists in Copenhagen, 2013.

Fig. 274. Dedicated cycle lane in Copenhagen.

‘CROW Institute’s Dutch requirements for cycling:

1. Cohesion: *The cycle infrastructure forms a continuous whole, logically connected to one’s point of departure and one’s destination.*

2. Directness: *The cycle infrastructure provides cyclists with as short a route as possible between point of departure and destination, while taking account of all factors having an effect on travel time.*

3. Attractiveness: *The cycle infrastructure is designed, furnished, illuminated and protected in such a manner as to make cycling attractive and socially safe.*

4. Traffic Safety: *The cycle infrastructure ensures the traffic safety of cyclists and other road users, e.g., by means of a separation of automobile and cycle traffic.*

5. Comfort: *The cycle infrastructure enables cycle traffic to circulate smoothly and comfortably, e.g., by means of a flat and robust pavement, and a minimum of inclines.’ (15)*
In order to design future cycle infrastructure, according to Bendiks/Degros, there are three additional traffic-related requirements that can more explicitly treat the infrastructure and its context. (15)

6. Spatial Integration: *Cycle infrastructures are carefully integrated into their spatial context, with the aim of attaining a unity between the cycle routes in both the urban and rural contexts. (20)*

7. The User’s Experience: *A cycle infrastructure provides cyclists (and others, e.g., pedestrians, and those living nearby) with a positive experience, not just with regard to the design and aesthetic of the cycle route itself, but to how the context is perceived as a whole, as well. (21)*

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8. Socio-economic Value: *A cycle infrastructure creates added value for its context from both a social and economic standpoint. The route takes accounts of facilities and (commercial) developments. This requires involving residents and users, as well as innovative forms of communication and management. (22)*

Although there are cycle lanes being added to roads 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 neighbourhoods along the Corridor. Protected cycle lanes provide cyclists and motorists with safer travel, as they are separated for the majority of their commutes, with the exception of intersections. It is problematic that there is no consideration for incorporation of cycle lanes into the street design of the ION corridor.

The effectiveness of separation from encroachment depends on the type of separator used:

- + A painted median with delineator posts is likely the least effective, because cars and small trucks can sneak between posts
- + Separation by on-street parking is very effective provided that the parking is well used
- + A concrete median, mountable curb or elevated curb can be effective but, while they are unlikely to straddle it, cars and trucks can still park with two wheels on top of the median or curb
- + A higher barrier or planters completely prevent encroachment into the path

EXISTING CYCLE LANES

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.

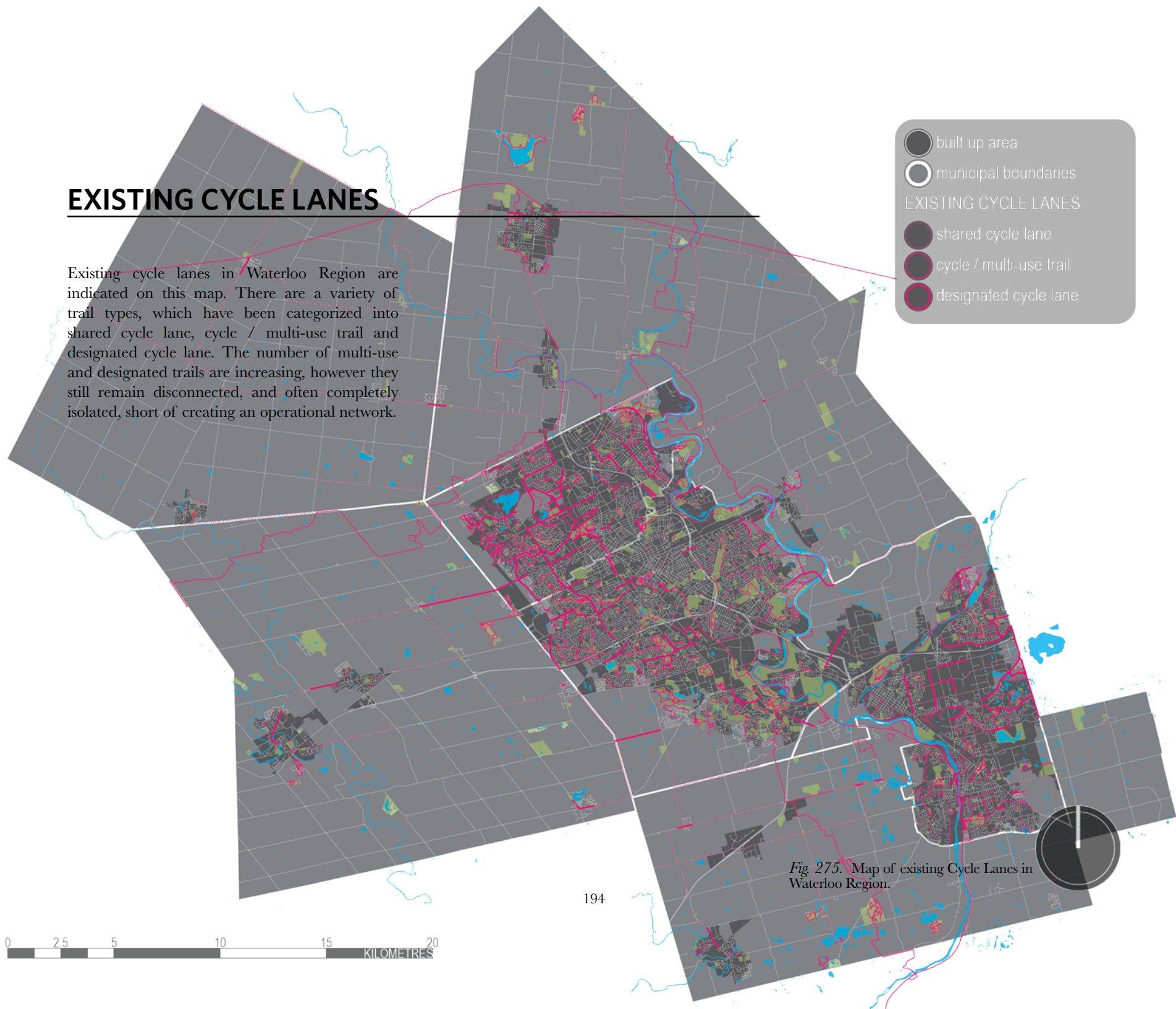


Fig 275. Map of existing Cycle Lanes in Waterloo Region.

FUTURE CYCLE LANES

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.

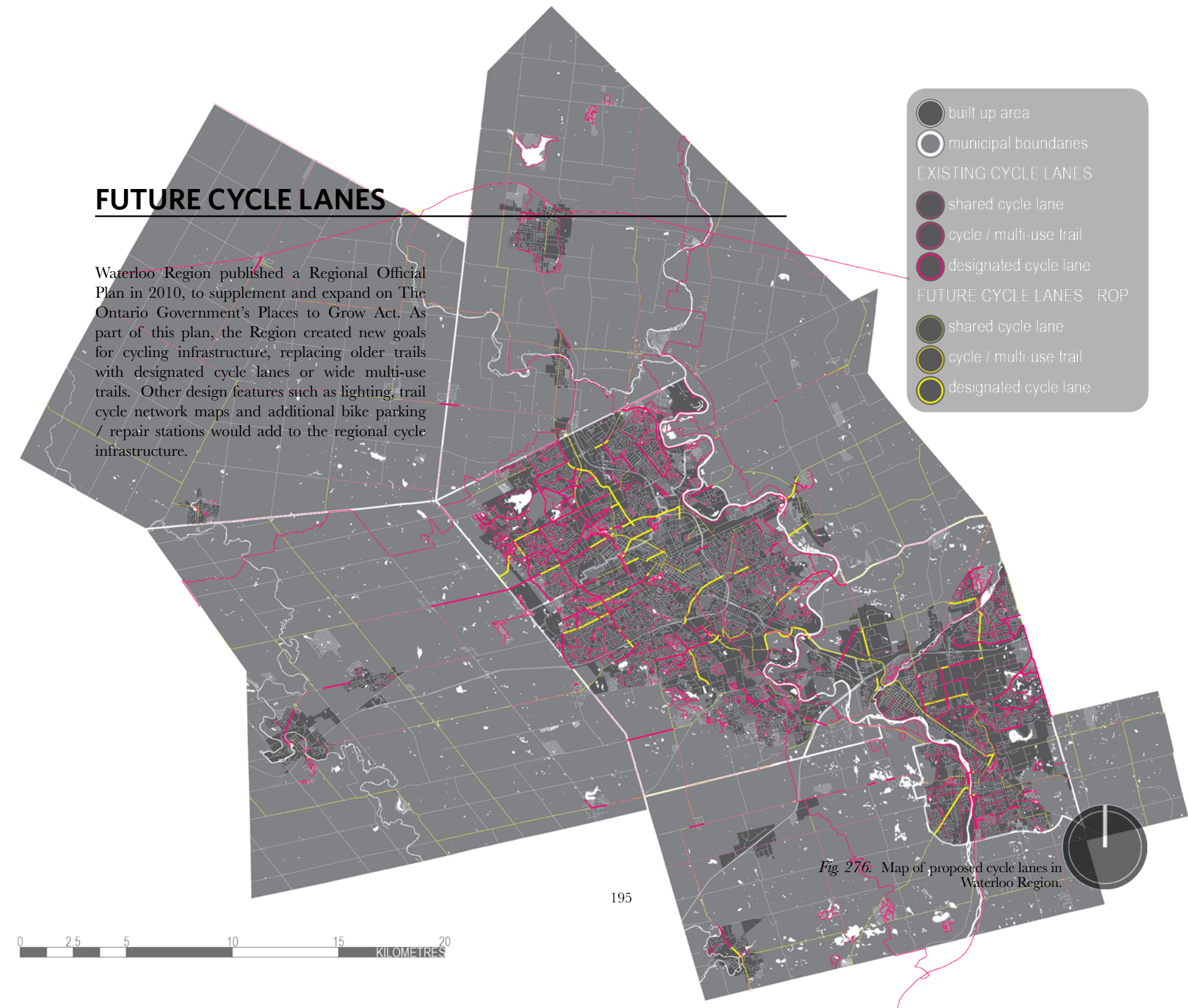


Fig 276. Map of proposed cycle lanes in Waterloo Region.

PROMINENT CYCLE TRAILS

Kissing Bridge Trail - 45km

Woolwich, 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 Eric 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

Woolwich 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 southwest Kitchener, with over 400 daily users.



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 frees 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"

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

In a fast growing community, the trade-offs between environment and development can easily become conflicted. The Region recently faced such a case when the decision for a partial sale of KW's Iron Horse Trail went to Waterloo's city council for the final decision. The sale will accommodate the development of a new residential apartment building on Caroline street.

The final decision allowed for the movement of the location of the trail, with \$83,000 and 700 square feet of land to go to the City of Waterloo, and the trail to be re-routed through a commercial parking lot in return. Some residents attending the council meeting expressed concerns about the lack of consultation with users of the trail, along with what kind of precedence moving trails to accommodate the developer would set.

¹ <http://www.greenrocket.ca/2013/06/12/iron-horse-trail/>

Fig 280. Enlarged cycling map shows extreme gaps in the current cycle infrastructure in Midtown and Downtown Kitchener.



Fig 281. Bicycle traffic lights installed at eye-level to direct bicycle traffic flow in Amersfoort, Netherlands.

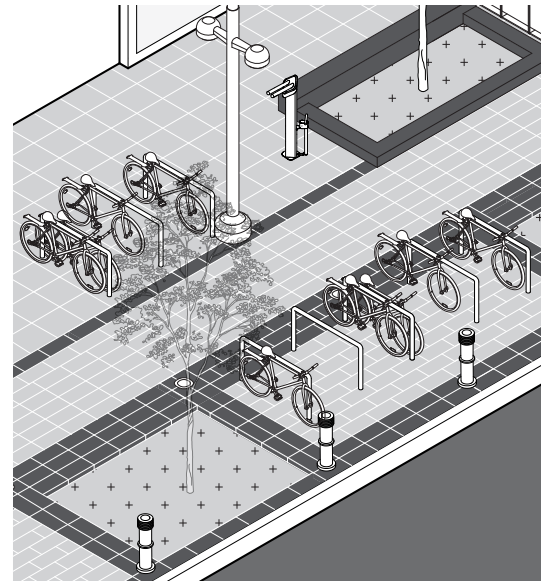


Fig 282. Diagram of street design showing bicycle infrastructure available to public including bicycle lanes, bicycle repair stations and bicycle parking.

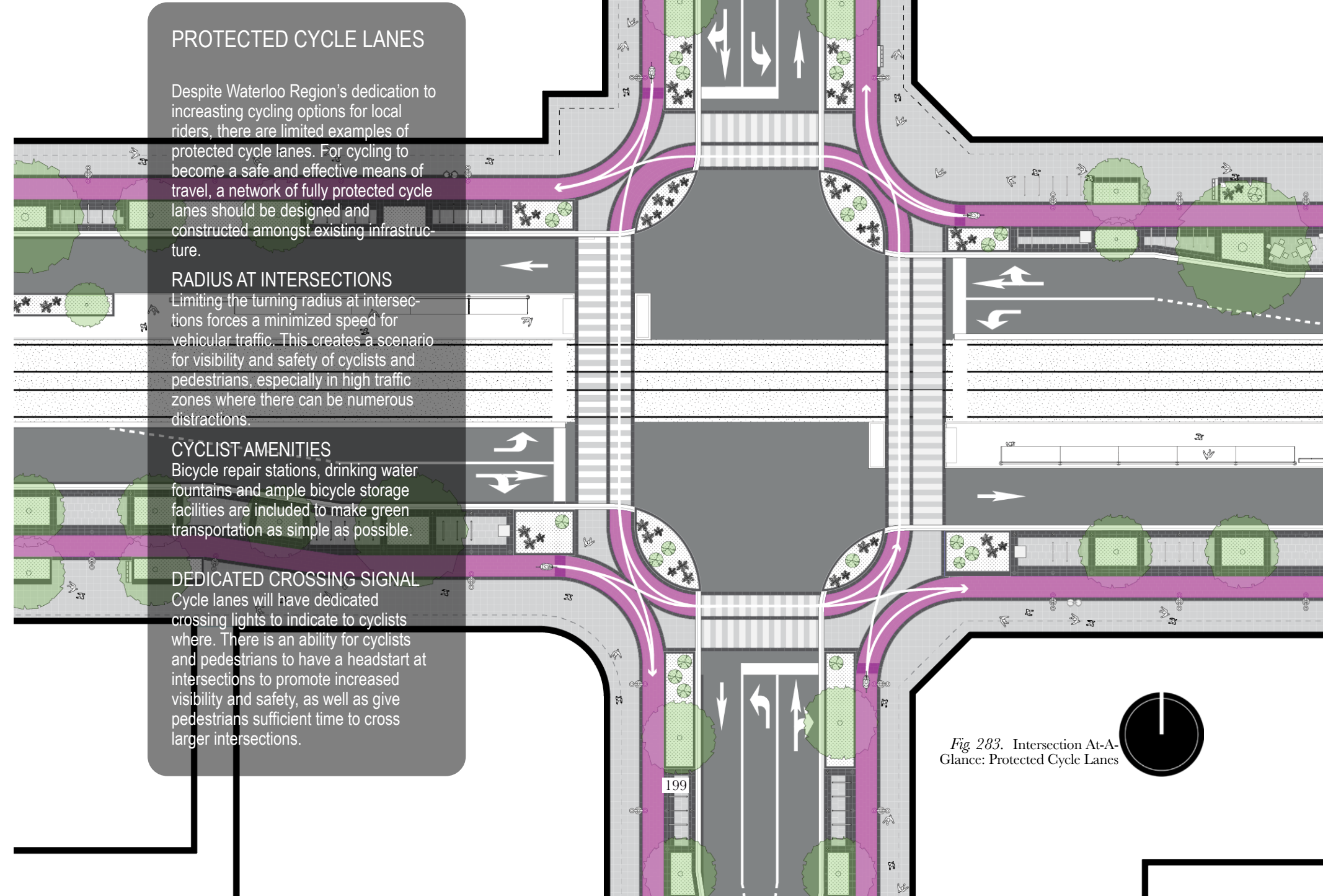
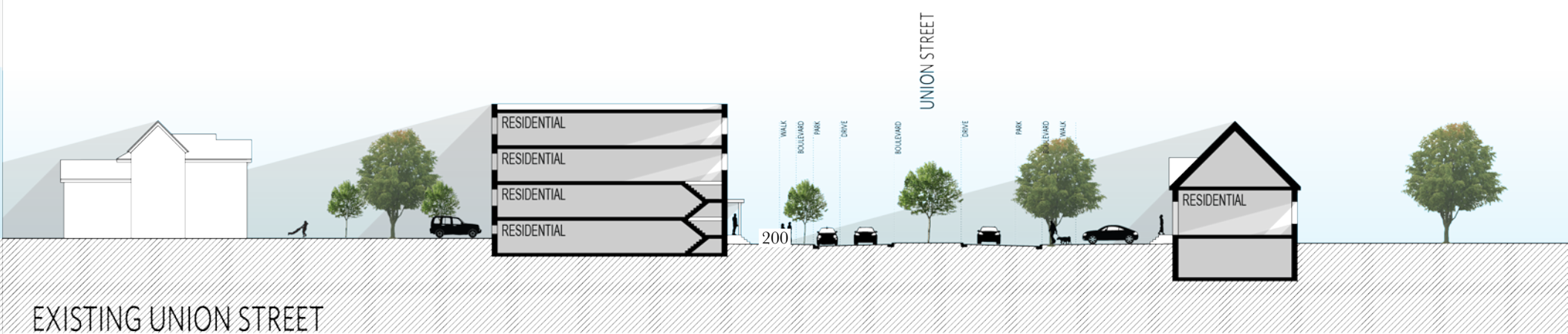
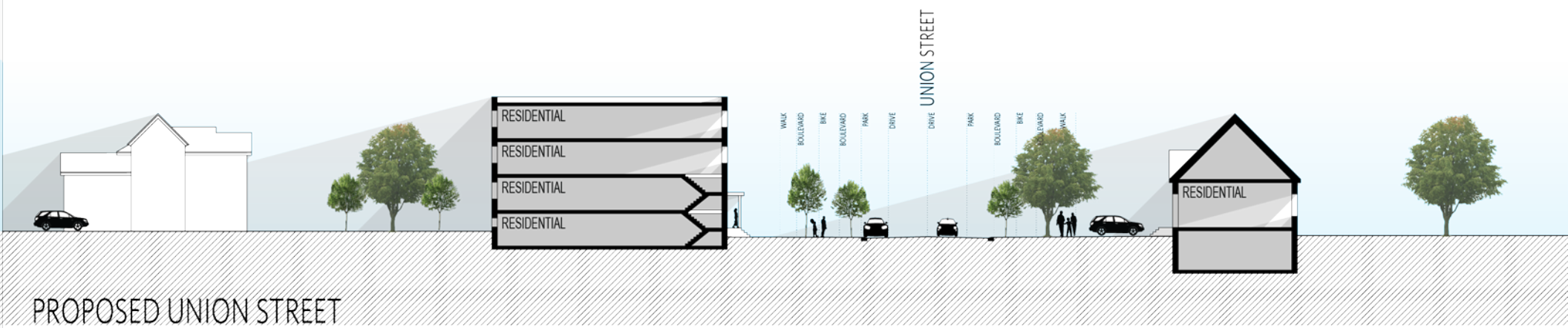
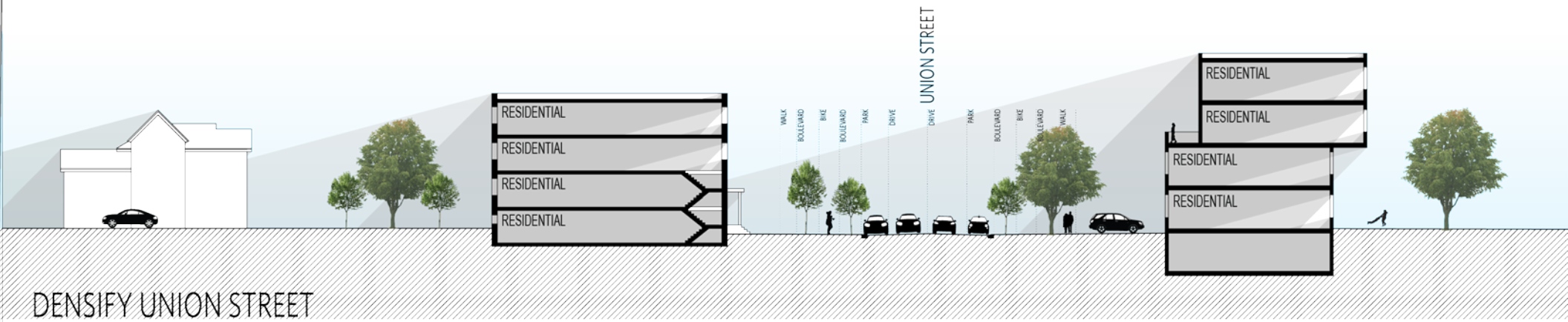
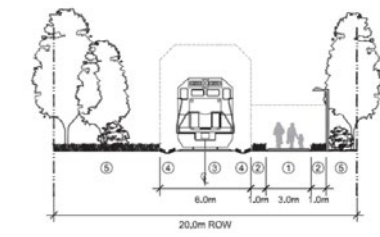


Fig 283. Intersection At-A-Glance: Protected Cycle Lanes



CONNECTIONS TO A LARGER NETWORK (TRAILS)

the creation of new protected cycle trails feeding the lrt corridor



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 alternates 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 separation between oncoming traffic, with the idea that it creates 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.

Fig 284. Union Boulevard.

Fig 285. Union Boulevard.

Fig 286. Belmont Village, Kitchener.

Fig 287. Spur Line Trail Regeneration Project.

Fig 288. Left. Neighbourhood Sections at Union Street.

Fig 289. Protected bike lane at crosswalk with contrasting paint.



Fig 290. Massachussets Protected Intersection, featuring bike lanes and planters to create a buffer between vehicular and bicycle traffic.

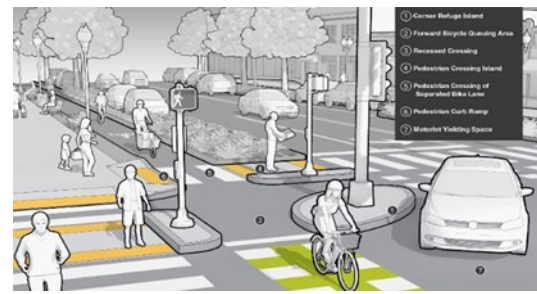
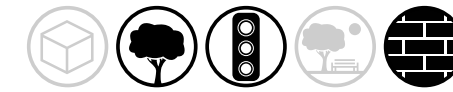


Fig 291. Vancouver Hornsby Protected Bike Lanes.



Fig 292. Protected Cycle Lane.



SAFETY IN CYCLING

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 0.75m. There should be no visual obstructions (0.75m or higher) within 30m of intersections. The raised planters maintain a safe separation between motorists and cyclists / pedestrian., 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.

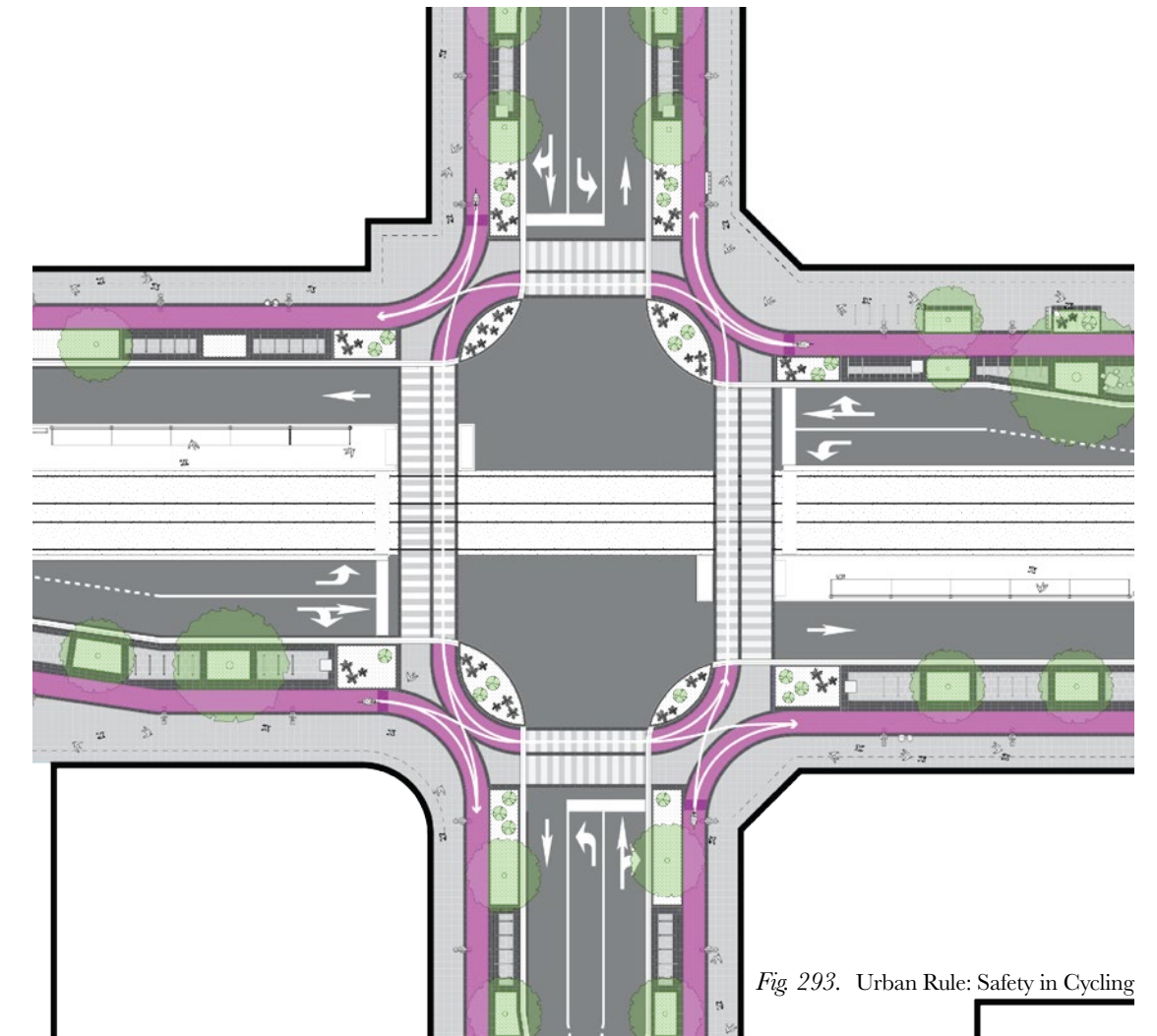


Fig 293. Urban Rule: Safety in Cycling

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.



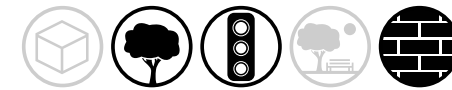
Fig. 296. The Nørreport Station project is effective in its integration of bike parking throughout the plaza. Bike parking is placed to be out of the way of pedestrian traffic flow, but convenient and in the open.



1 *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.

2 *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.

3 *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.



CYCLE INFRASTRUCTURE

4 *Parking Space - Bicycle Parking*
On-street parking (segregated bike lane is located between parking and sidewalk /boulevard); buffer width of 1.0m required to allow for opening parked car doors (minimum 0.5m if highly constrained).

5 *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.

6 *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.

7 *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.

8 *Planter Barriers (not shown)*
Trees and raised planters also form barriers. Planters; planter and vegetation height less than 0.75m; and lower within 30m of intersections.

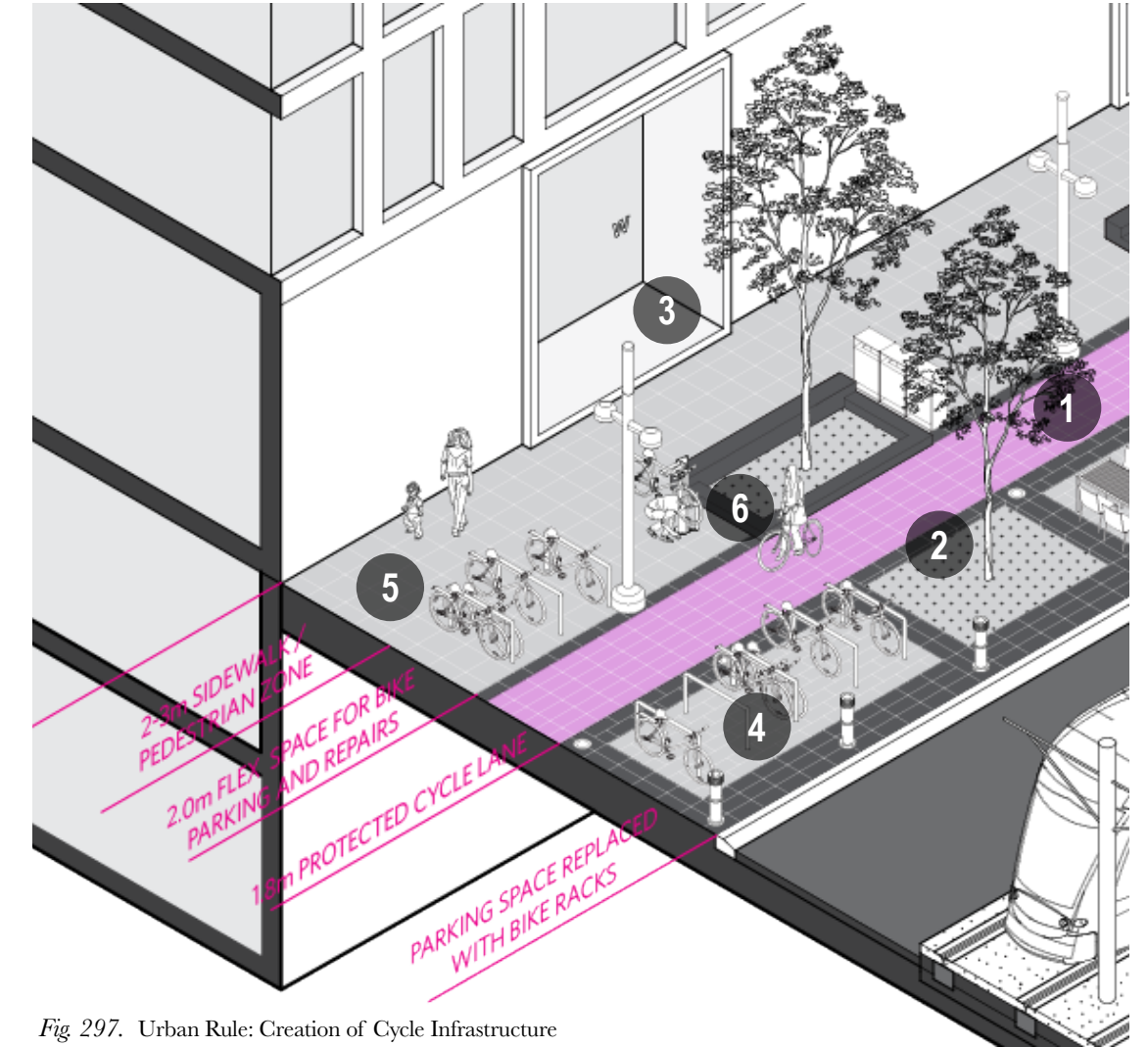


Fig. 297. Urban Rule: Creation of Cycle Infrastructure

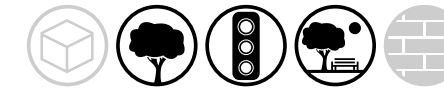
Fig. 298. Left. Standalone, accessible toilet units in San Francisco. The units are soon being replaced with a more updated version.



Fig. 299. Left. Urben Blu Canada turnkey toilet unit, shown in Contemporary style. The units are fully customizable to suit the a design palette on site or specific theme.



Fig. 300. Right. Integrated Units.
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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.

1 EXTERIOR FINISH + ACCESS

The units come in customizable exterior finishes to fit 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.

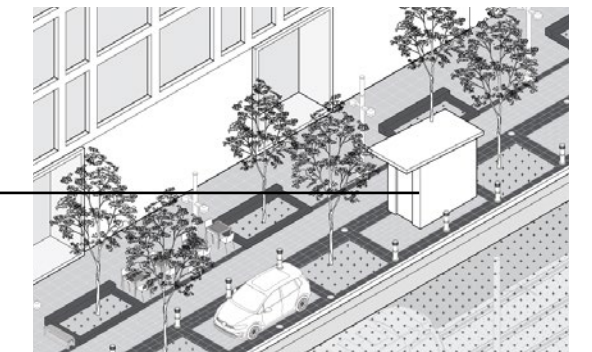
2 PUBLIC TOILET SYSTEM

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.

Fig. 301. Top Right. Turnkey Toilet Unit - Exterior.

Fig. 302. Urban Public Toilet System Placement.

Fig. 303. Turnkey Toilet Unit - Interior.



BLUEW LOCATIONS

-  municipal boundary
-  built up area
-  municipal urban fabric
-  body of water
-  bluew location
-  800m ion walking shed

"It seemed like a great idea," said Neil Moser, marketing manager for Insight Eyecare, also located in uptown.

"You can stop by, you can fill up your water, there's no pressure to come in and buy, it's just 'Hey, we're here, you're welcome' and that kind of appealed to us."

Fig 304. Map of bluew locations in Waterloo Region

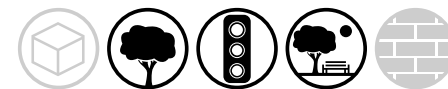


Refill your bottle here
www.bluew.org

"Wherever you are in the world, you won't have to pay for a drink of water when you are thirsty. The Blue W is a unique community-based program dedicated to promoting municipal tap water as a healthy, easily accessible alternative to purchasing bottled drinks. We provide mapped details on where to find clean, free, public and commercial sources to fill your reusable bottle without compelling you to make additional purchases - just look for the Blue W decal in participating shop and restaurant windows. Search [the map] to find more than 26,000 water bottle refill locations - and we're growing!"

-Evan Pilkington, www.bluew.org

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THE RIGHT TO DRINKING WATER

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 spaces and private development would reduce the load of waste from disposable beverages if citizens knew there was water available to them during their commute, 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 24h 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 to have access to tap water during business hours, as the minimum.

The map to the right illustrates 183 BlueW locations in Waterloo Region as of 2013. The database consists of small businesses, community centres and chain establishments, to name a few, and has since grown to 237 locations, which continues to grow. As shown on the map, there are many future ION stops which do not currently have any BlueW locations. Most of them are on public buildings or small privately-owned businesses, but some chains have signed on including the Running Room and Tim Hortons in Uptown Waterloo.

The Blue W 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

²¹ <http://www.waterloo.ca/en/living/tapwater.asp>

Fig 305. The blue "W" decal at a storefront in Waterloo indicates the building is a water-bottle friendly establishment, where anyone can fill up their containers with tap water.

Fig 306. Waterloo Region Municipal Water Wagon.

Fig 307. Indoor water filling station.



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TRAFFIC FLOW

pattern one

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.

TRAFFIC FLOW 1

A light rail vehicle is schedule to arrive at each stop along the ION every 8 minutes during peak periods and every 10-15 minutes the rest of the day.

The reduction in road lanes on King Street will increase traffic congestion, as the space for vehicular traffic will be cut in half along much of the corridor. This will increase reliance on adjacent street networks to pick up diverted traffic.

In an effort to combat looming issues with traffic congestion, it is in best interest to maximize efficiency at intersections. First priority, however, is to transit, pedestrian and cyclist traffic. If the urban fabric is kind to green commuters, there will be encouragement to use the system, and rely on it as an effective network of travel.

Seeing as the traffic system will yield to the light rail transit, it is in best interest to keep other lanes of traffic flowing as well as possible. Because there are not right hand turning lanes implemented in Midtown, this can slow traffic to a halt while a driver is waiting to turn right for pedestrians and cyclists to circulate the crosswalk.

the intersection is 36x21m

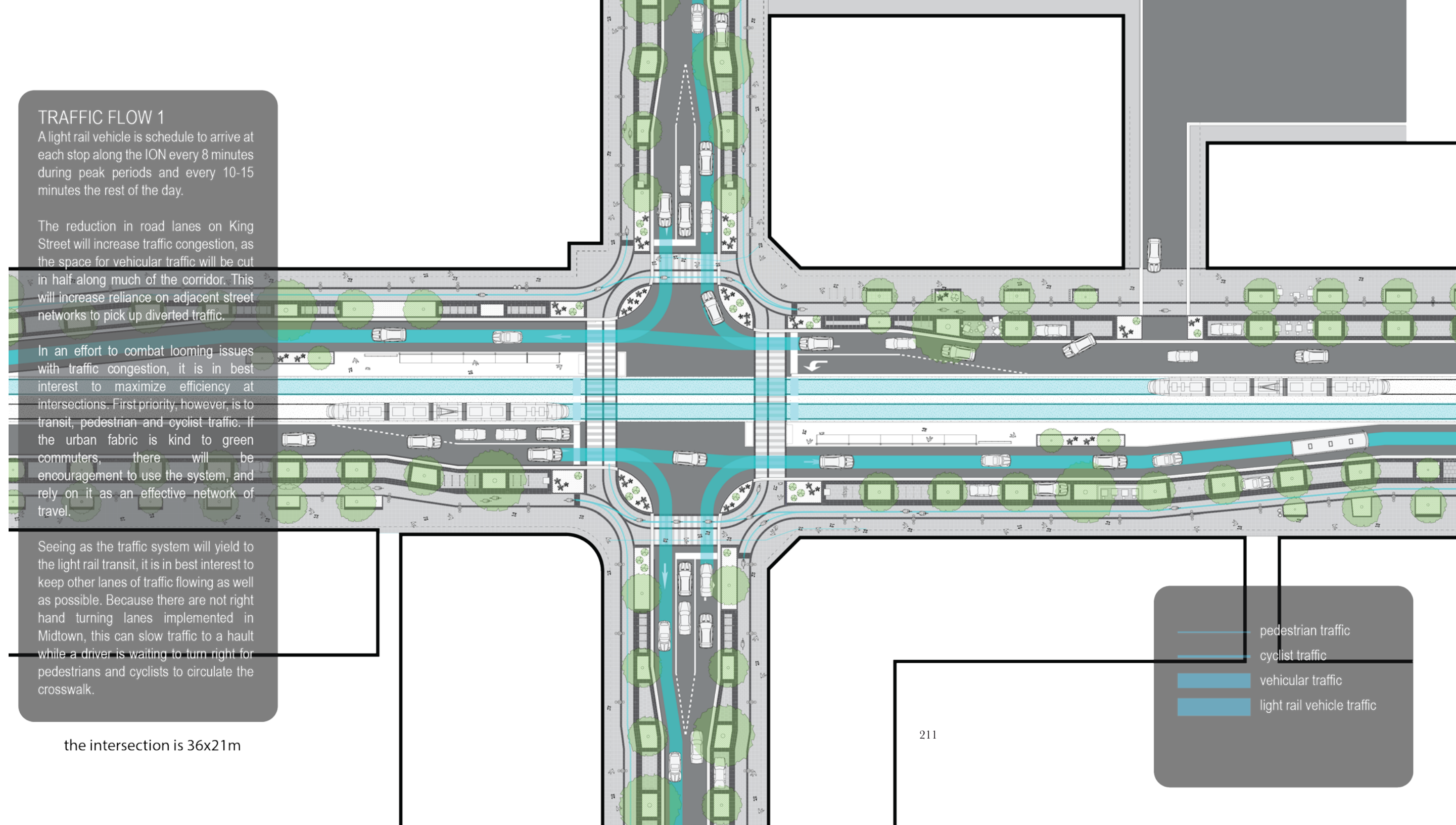
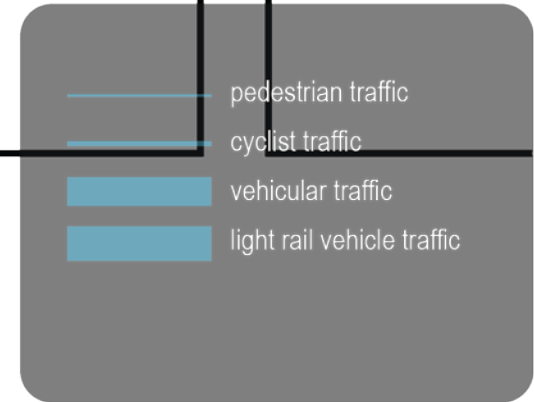


Fig 308. Traffic Flow: Pattern One

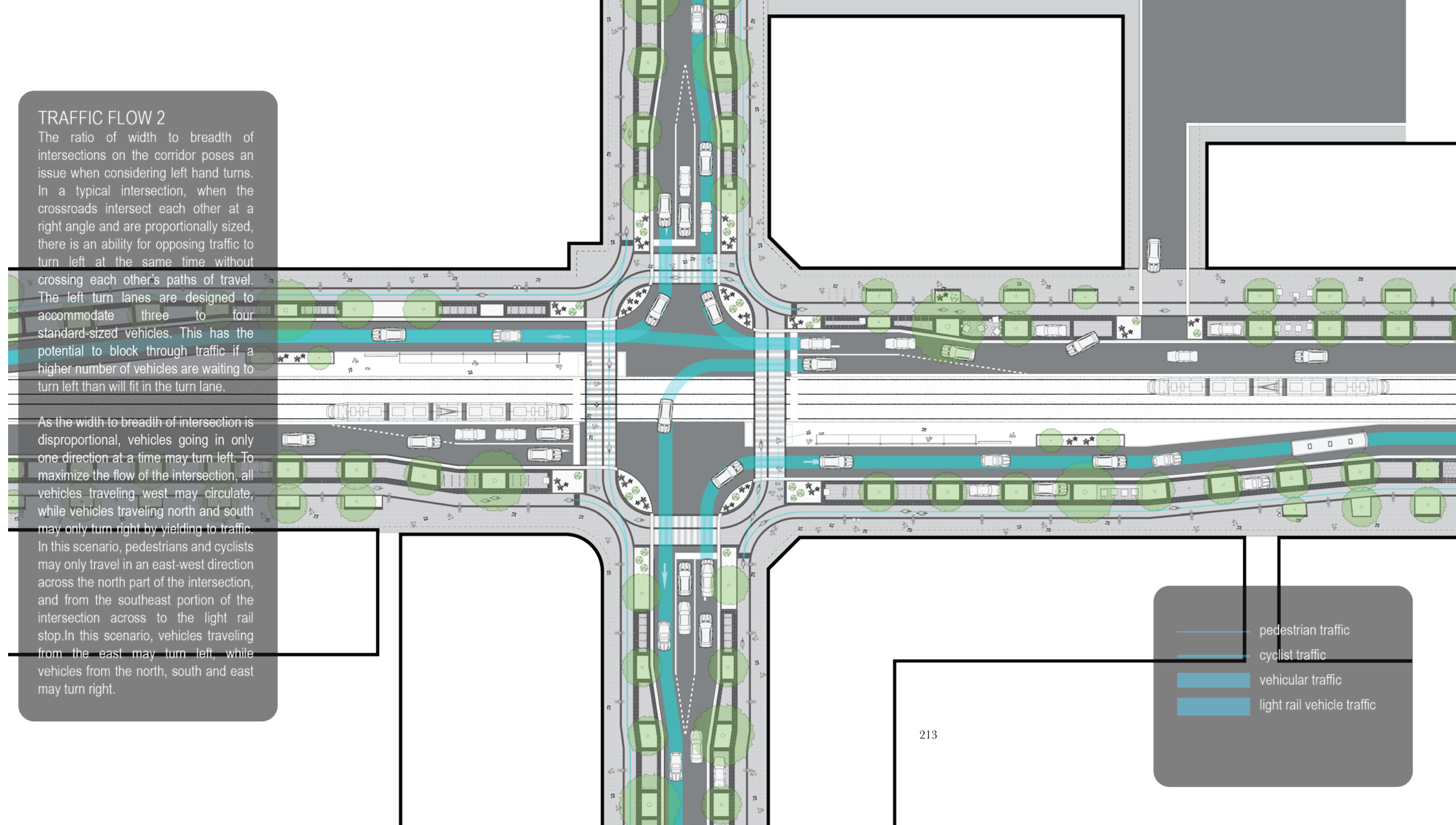
TRAFFIC FLOW

pattern two

TRAFFIC FLOW 2

The ratio of width to breadth of intersections on the corridor poses an issue when considering left hand turns. In a typical intersection, when the crossroads intersect each other at a right angle and are proportionally sized, there is an ability for opposing traffic to turn left at the same time without crossing each other's paths of travel. The left turn lanes are designed to accommodate three to four standard-sized vehicles. This has the potential to block through traffic if a higher number of vehicles are waiting to turn left than will fit in 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 maximize the flow of the intersection, all vehicles traveling west may circulate, while vehicles traveling north and south may only turn right by yielding to traffic. In this scenario, pedestrians and cyclists may only travel in an east-west direction across the north part of the intersection, and from the southeast portion of the intersection across to the light rail stop. In this scenario, vehicles traveling from the east may turn left, while vehicles from the north, south and east may turn right.



- pedestrian traffic
- cyclist traffic
- vehicular traffic
- light rail vehicle traffic

Fig 309. Traffic Flow: Pattern Two

TRAFFIC FLOW

pattern three

TRAFFIC FLOW 3

In this instance, the opposite scenario would take place, where the cars traveling from the west 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 west and south must yield to pedestrian and cyclist traffic crossing the intersection. Because the vehicles are stopping 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 arc of the raised planter bed on the corner) if the driver is able to get a better view of obstacles.

Pedestrians are free to travel in either direction across the southern half of the intersection. They may also cross the intersection to transit stops where road traffic does not interfere. Cyclists can travel in the direction of travel, along the right side of the road lane and cross in the same area as pedestrians.

- pedestrian traffic
- cyclist traffic
- vehicular traffic
- light rail vehicle traffic

Fig 310. Traffic Flow: Pattern Three

TRAFFIC FLOW

pattern four

TRAFFIC FLOW 4

Once again, due to the ratio of width to breadth of intersections on the corridor poses an issue when considering left hand turns. For this, only vehicles going in one direction at a time may turn left. To maximize the flow of the intersection, all vehicles traveling north may circulate, while vehicles traveling south may only turn right. In this scenario, pedestrians and cyclists may only travel in a north-south direction across the east part of the intersection, and from the southeast 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 traffic issues. If there is room, the best scenario would be to install right turning lanes at busy intersections. Once pedestrians and cyclists are safely on the transit stop island or have passed the transit stop, vehicles should be able to proceed around the corner.

Pedestrians and cyclists may also travel south from the transit stop on the west side of the intersection (or vice versa from the sidewalk). Vehicles turning right must yield to their travel.

- pedestrian traffic
- cyclist traffic
- vehicular traffic
- light rail vehicle traffic

Fig 311. Traffic Flow: Pattern Four

TRAFFIC FLOW

pattern five

TRAFFIC FLOW 5

This 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 40m wide, and too difficult to properly account for oncoming traffic. For this, all lights should be set up to have a light indicating right turns in addition to other regulatory lights.

If an intersection becomes too backlogged with traffic because a left turn lane is full and vehicles may not turn right on the red light, there will be the ability to clear that direction of traffic when the light turns in their favour. If there is a perpetual traffic problem, lengthening the left turn lane can be done by carving more out of the parking and pedestrian zone and repainting the traffic lines.

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 axis of the intersection at a time from Traffic Flows 2 through 5.

- pedestrian traffic
- cyclist traffic
- vehicular traffic
- light rail vehicle traffic

Fig 312. Traffic Flow: Pattern Five

TRAFFIC FLOW

pattern six

TRAFFIC FLOW 6

Vehicles in Traffic Flow 6 may travel north and south through the intersection, excepting left turns. Vehicles turning right on a red light may do so when the intersection does not contain a transit stop, and the intersection is more proportionally even.

The diagram shows the ability for the traffic coming from the east and west to turn right despite the transit stop to show how pedestrian and cyclist traffic would circulate.

Traffic Flows 1 and 6 can help to clear the intersections quickly. As previously stated, one vehicle can wait to turn right can do so on the arc of the raised planter bed. This would allow pedestrians and cyclists to proceed safely on the crosswalk, and to keep traffic flowing past the waiting car.

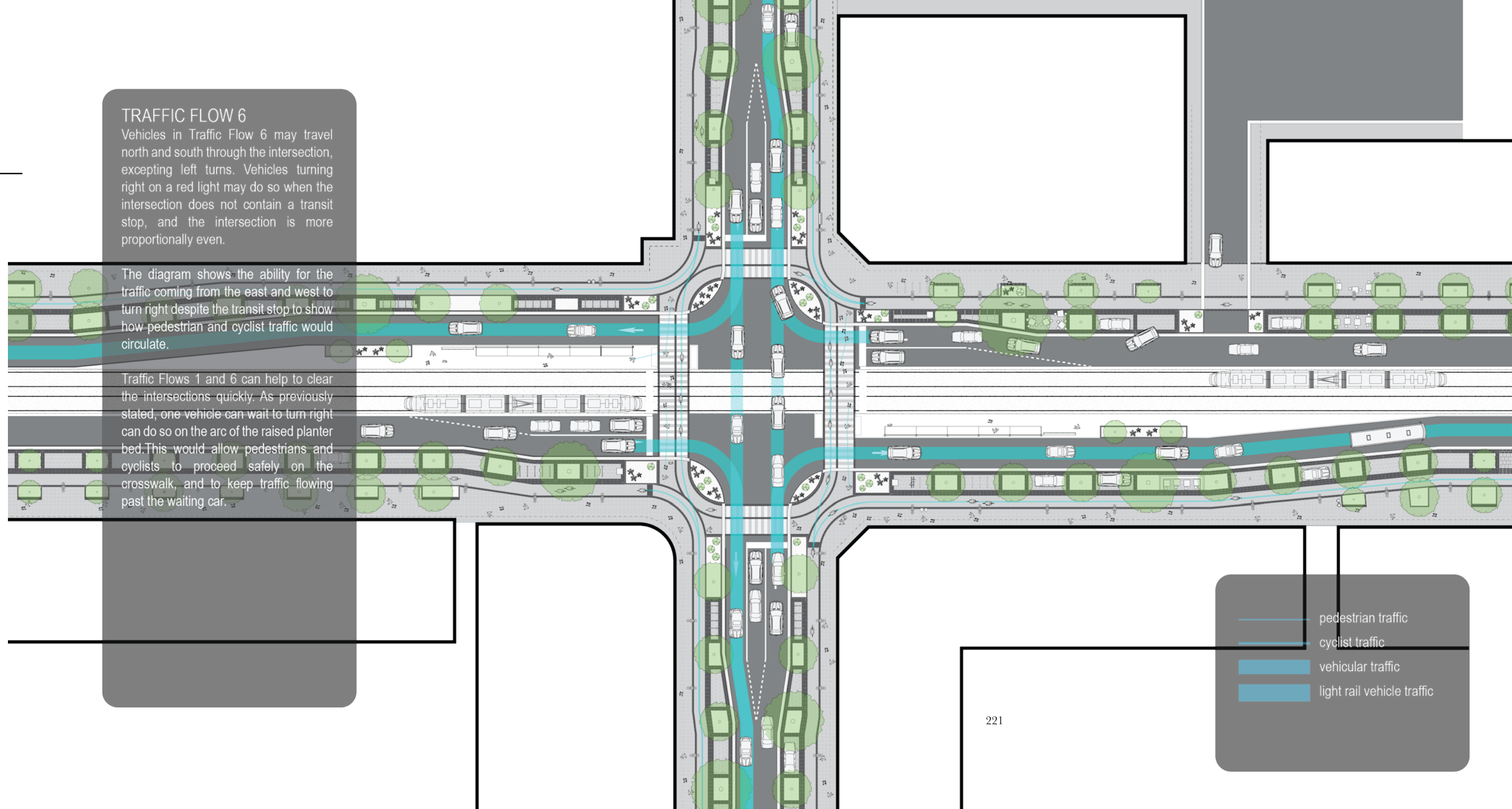


Fig 313. Traffic Flow: Pattern Six

SITE AERIAL

existing condition

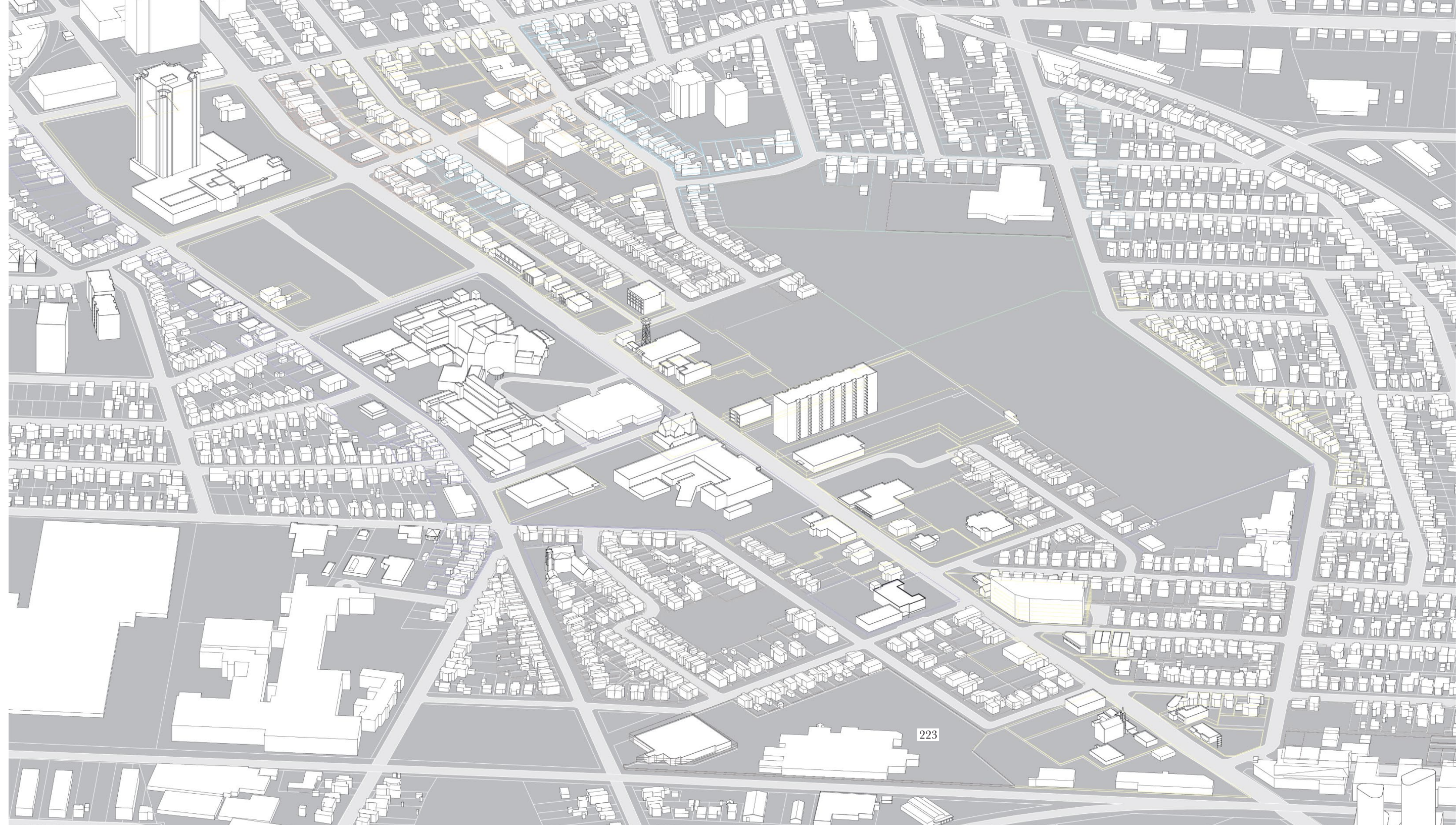


Fig 314. Aerial Site Illustration

A DESIGN FOR MIDTOWN

"...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 so dominate the building of roads that sections of city streets have been seen as compromised extensions of that free, unencumbered movement. They have been measured first by the capacity to move traffic and only very secondarily by their capacity to sustain the life of the city around them."

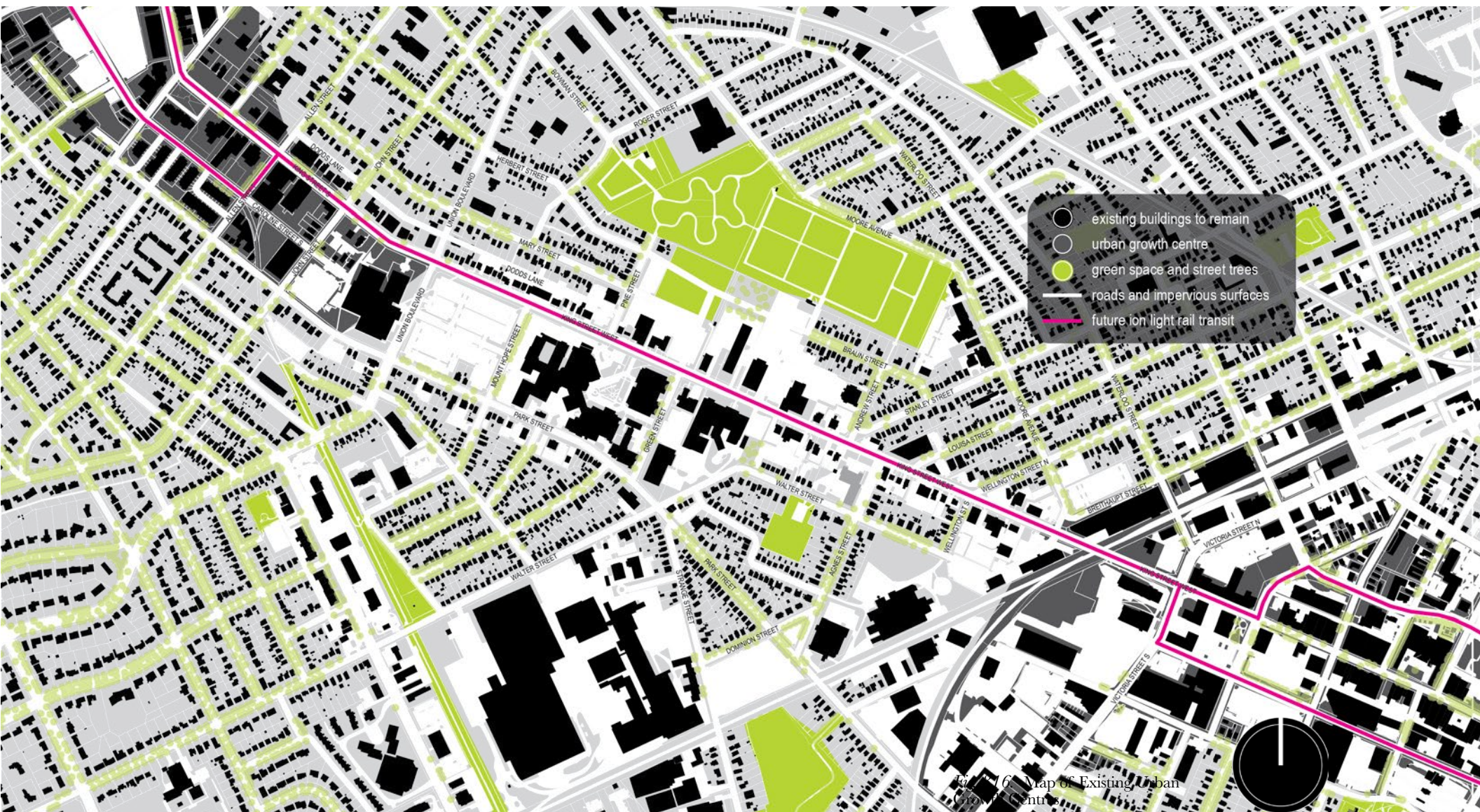
- Donlyn Lyndon, Places Magazine¹

¹ Lyndon, Donlyn, 1997. "Streets: Old Paradigm, New Investment." Places Magazine, 3.

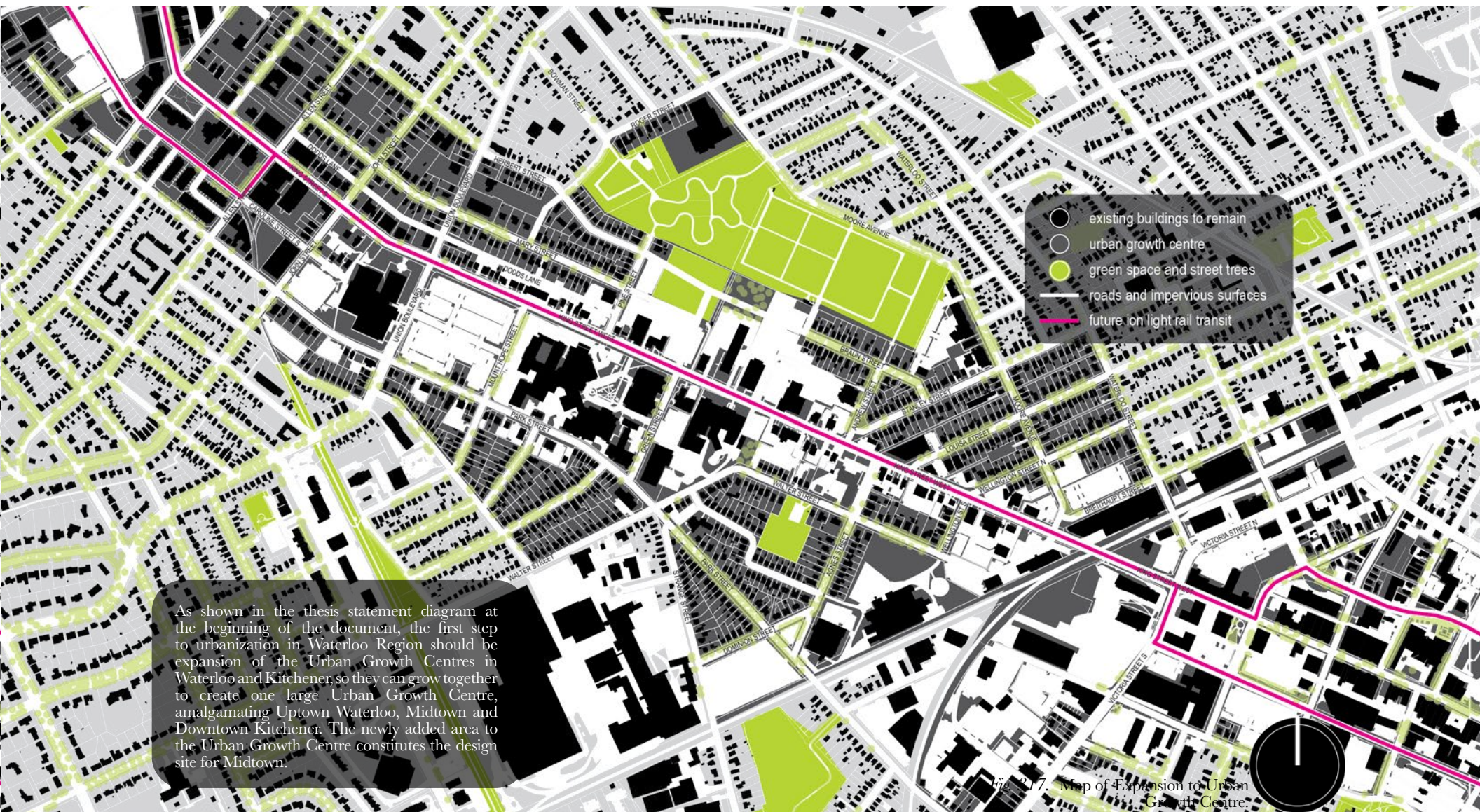
Fig. 315. Aerial image of Midtown, above Grand River Hospital and KCI, with Mount Hope Cemetery in the background.



EXISTING URBAN GROWTH CENTRES



EXPANSION TO URBAN GROWTH CENTRE



ANALYSIS OF MIDTOWN

site amenities in midtown



Fig 318. Map of Site Amenities in Midtown

EXISTING SITE

existing buildings to be demolished in midtown

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 uses. The existing buildings for demolition in Midtown have been selected using the following system:

1 *Making room for new roads to connect the neighbourhood* 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 thoroughways for pedestrians, cyclists and motorists alike outweighs the benefit of keeping a single-use low density building.

2 *Relocate thriving businesses* into the base of Central Fresh Market on King Street, a family run business since 1953. This business is one of a few that should be reopened in the base of a larger building with residential or commercial zoning above. Existing businesses should be given the chance to relocate into the public programming of new constructions, with the advantage that more density of residents would mean a higher bracket of potential business for said establishment.

3 *Detached houses converted into small businesses* are an effective typology in a secondary neighbourhood, 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 centre.

4 *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 in front of them, leaving a gap between the storefront and the sidewalk.

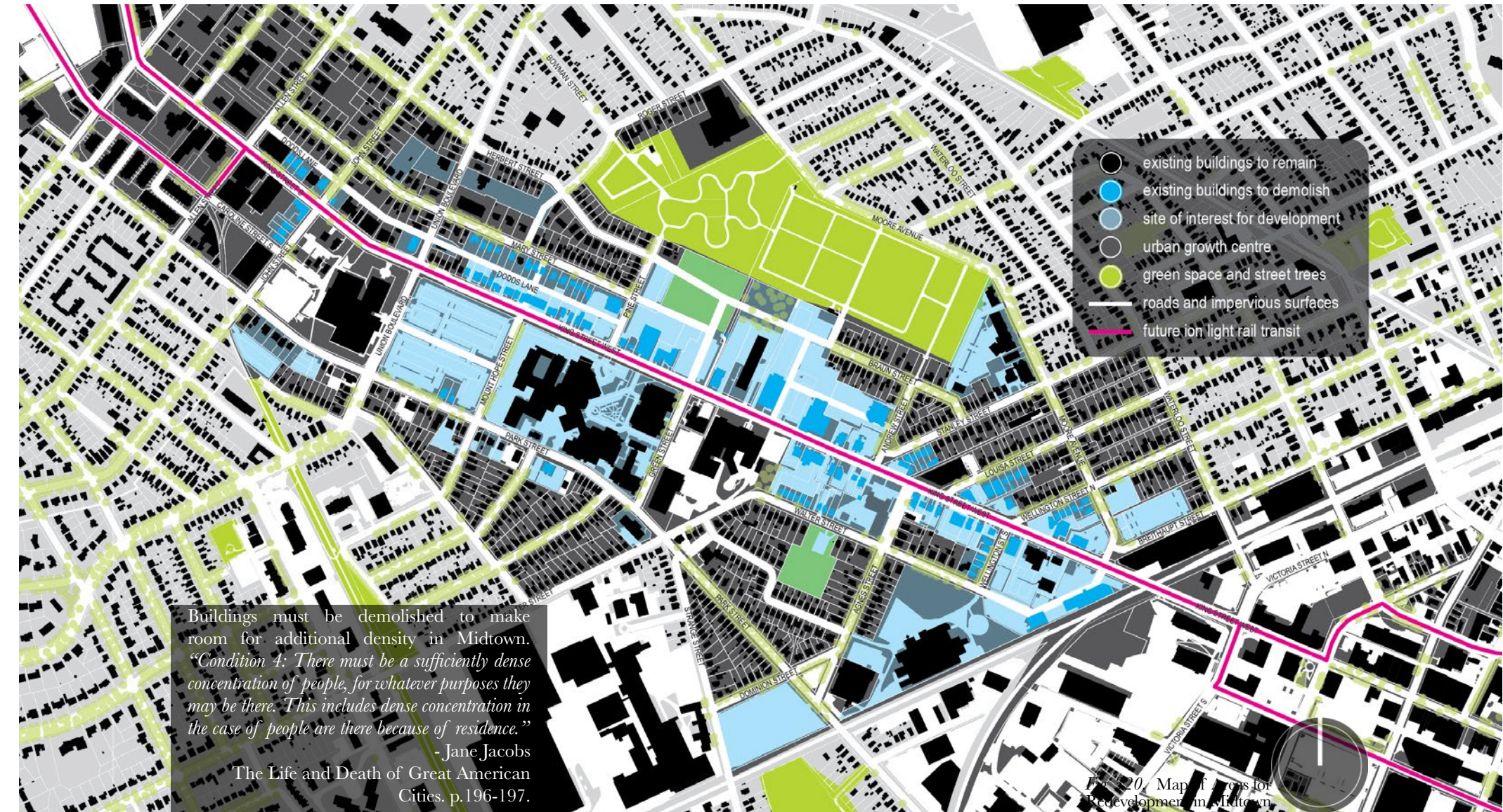
5 *Buildings of low repair and density* are not worth maintaining when they do not have strong heritage, retail or residential value. The two-storey medical building pictured is an example of one that could be demolished and redeveloped. If these building types are replaced with a mixed development of 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.



SITES OF INTEREST

areas for redevelopment in midtown





JANE JACOBS

THE DEATH AND LIFE OF GREAT AMERICAN CITIES

Fig. 321. The Death and Life of Great American Cities

JANE JACOBS

Journalist

Author, Grassroots Activist, Urban Theorist

(1916-2006) The writings and theories of Jane Jacobs can be incredibly influential when applied to any midsize city, for she has broken her manifesto into simple categories for effective urbanism, and the components for a thriving neighbourhood. Her grassroots efforts and urban theories are still seminal today, with her opinion that urban development does not often keep in mind the needs of the city dweller.

URBAN THEORY

In the second part of her book, *The Death and Life of Great American Cities*, Jacobs describes generators for diversity in the city. Although demographically 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 an urban rule for Midtown.

FOUR GENERATORS OF DIVERSITY:

Jacobs outlines conditions that contribute to a city's diversity. *"To generate exuberant diversity in a city's streets and districts, four conditions are indispensable:*

- 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 insure the presence of people who go outdoors on different schedules and are in the place for different purposes, but who are able to use many facilities in common.*
- 2. Most blocks must be short; that is, streets and opportunities to turn corners must be frequent.*
- 3. The district must mingle buildings that vary in age and condition, including a good proportion of old ones so that they vary in the economic yield they must produce. This mingling must be fairly close-grained.*
- 4. There must be a sufficiently dense concentration of people, for whatever purposes they may be there. This includes dense concentration in the case of people are there because of residence."*²

² Jacobs. 196-197.

"The more successfully a city mingles everyday diversity of uses and users in its everyday streets, the more successfully, casually (and economically) its people thereby enliven and support well-located parks that can thus give back grace and delight to their neighbourhoods instead of vacuity."

- Jane Jacobs

The Death and Life of Great American Cities



THE MIDTOWN DISTRICT

Although considered a major sector for employment, 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 details, to massing and mixed-use development.

In a time when people are increasingly transient in their careers and choices of where to live, it is frequent that residents do not know their neighbours. For this, residents and visitors alike choose to seek out community in other forms, most frequently through the temporary habitation of public space, otherwise known as their third space. In urban areas, one should have access to first, second and third places within a five-minute, or approximate 400 metre walking shed of their location.

THE USES OF CITY NEIGHBOURHOODS

"If the only kinds of city neighbourhoods that demonstrate useful functions in real-life self-government are the city as a whole, streets, and districts, then effective neighbourhood physical planning for cities should aim at these purposes:

- 1. To foster lively and interesting streets.*
- 2. To make the fabric of these streets as continuous network as possible throughout a district of potential subcity size and power.*
- 3. To use parks and squares and public buildings as part of this street fabric; use the, to intensify and knit together the fabric's complexity and multiple use.*
- 4. To emphasize the functional identity of areas large enough to work as districts."*³

³ Jacobs. 168.

It is evident through the map projections of Waterloo Region shown in this thesis, there is not a lack of local greenspace, so long as it is preserved. The invention of additional urban park space to meet the needs of families with young children, citizens with dogs and those who would like to participate in public programming, such as urban gardening or a special outdoor sport are often lacking. Another inadequacy is indoor urban public programming, with hours beyond the typical office hours, to populate the streets at all hours of the day. There is an effort to create districts within Waterloo Region, but too much of an effort is still focused on suburban development, rather than continuing to strengthen and grow urban cores that will meet to create one large urban spine.

URBAN INFILL / DENSIFICATION

When designing a vision for a midscale city, it is important to realize the difference between the maximum density high-rise tower, and the midrise building. The Region is growing by a range of 5-10%⁴ per year, and new construction demands must coordinate. The Region and its respective municipalities need to control how much development is taking place to ensure that there are not issues of over-densification or exorbitant vacancy rates within the built fabric. The case for the midsize city is becoming a prevalent issue, as large urban centres like Toronto grow continue to grow up. Smaller communities within the Great Lakes Megaregion are intensifying as they become popular destinations in terms of affordability, career opportunities and access to leisure programming.

⁴ <https://www.therecord.com/news-story/7110570-waterloo-region-growing-but-not-as-fast-census-shows/>
233

One can speculate that the rising tech hub, local innovative universities, diversified populations and active agricultural community in the Region of Waterloo have together contributed to the spike in population, and in turn, building development. The effects of the light rail transit have created more than \$2 billion in development along the corridor between 2011 and 2015. \$1.4 billion in building permits were issued across the Region in 2016.⁵ This vast amount of construction in recent years has been in part an attempt to deal with the recent shortage of student housing due to increased populations at the local colleges and universities. The buildings constructed near the universities are not contributing in a positive manner to the urban fabric. They were constructed on converted detached dwelling lots. Over time, those properties were converted to student housing, eventually falling into disrepair and creating a student slum of sorts, their owners waiting to cash in for a condo tower to be developed in its place. The over-development of University district has created an environment where the constant rows of towers overshadow each other, are designed poorly in relation to the street, and more often than not, contain no ground floor commercial or public programming. This is not to say that towers need to be eliminated as a typology in the urban fabric, or part of a future of the city, but a base density should be established more evenly in the urban cores before jumping to maximum density in select blocks, and then leaving the rest of The Region with a suburban development model to accommodate the remaining population growth.

⁵ <https://www.waterloochronicle.ca/news-story/7469587-region-sees-more-than-2-billion-invested-along-lrt-corridor/>

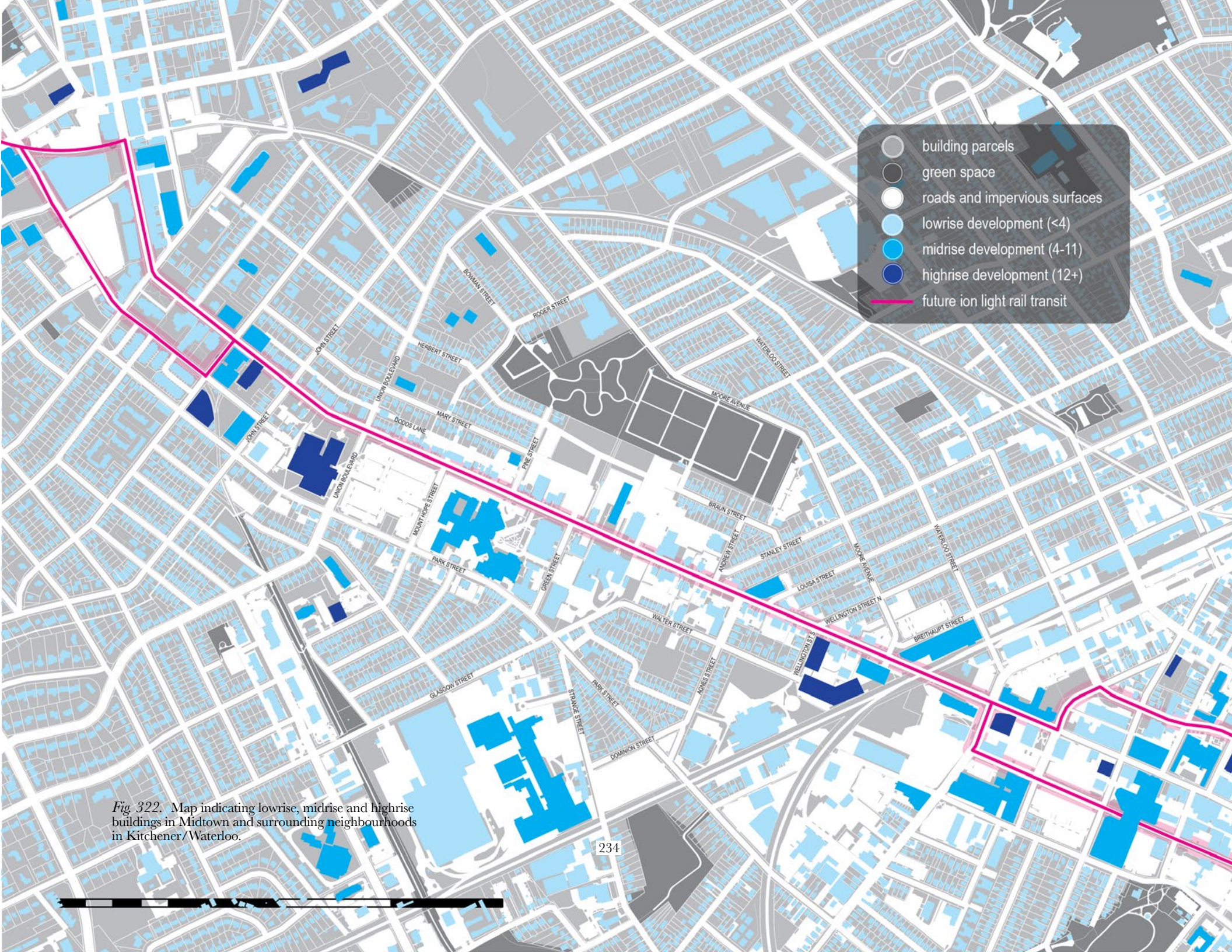


Fig 322. Map indicating lowrise, midrise and highrise buildings in Midtown and surrounding neighbourhoods in Kitchener/Waterloo.



MIX TYPES ON BLOCK

the need for mixed primary uses

*'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 insure the presence of people who go outdoors on different schedules and are in the place for different purposes, but who are able to use many facilities in common.'*⁶

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. A more even, midrise development typology would be preferred and allow increased density to be spread further through the cities. 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

—The Story of Transit in Waterloo Region, p.24

6 Jacobs, 198.
7 https://rapidtransit.regionofwaterloo.ca/en/resources/ION_Story_revised_R_0315.pdf



Fig 323. Aerial view of Midtown showing the low density of current built fabric.



Fig 324. Aerial view of Midtown showing the irregular occurrence of higher density developments at Sun Life Financial and nearby apartment towers.



SHORT BLOCKS

*'streets and opportunities to turn corners must be frequent.'*⁸

*Condition 2: Most blocks must be short; that is, streets and opportunities to turn corners must be frequent.'*⁹

Blocks must be short and multi-use to serve a variety of functions wherever possible. For short blocks to be a norm in Midtown, there are many disconnected blocks that must be joined. The Mount Hope Cemetery causes a major disconnection in the block structure, which is rectified slightly by meandering walking paths through the greenspace. Additional continuity can be achieved in the block structure south of the cemetery, where there are currently minimal roads, many of which deadend. This may not have been an issue in the past, as the surrounding residential neighbourhood is fairly quiet, and it is conceivable that one could meander through adjoining parking lots to traverse the site. This will not be useful as the area begins a new life of redevelopment.

The major institutions on the south side of King Street West also make for oversized blocks. These blocks cannot be broken up, often 200 to 400+ metres in length. Where possible, other blocks can compensate to add to the walkability and variety of the street. The creation of shorter blocks gives people options of routes, breaking the monotony of a single route trip. Where not possible to add a thoroughfare street, there is potential to add a generous, well-lit walking paths to shorten travel distance and increase safety for pedestrians and cyclists.

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 corridor (LRT corridor).

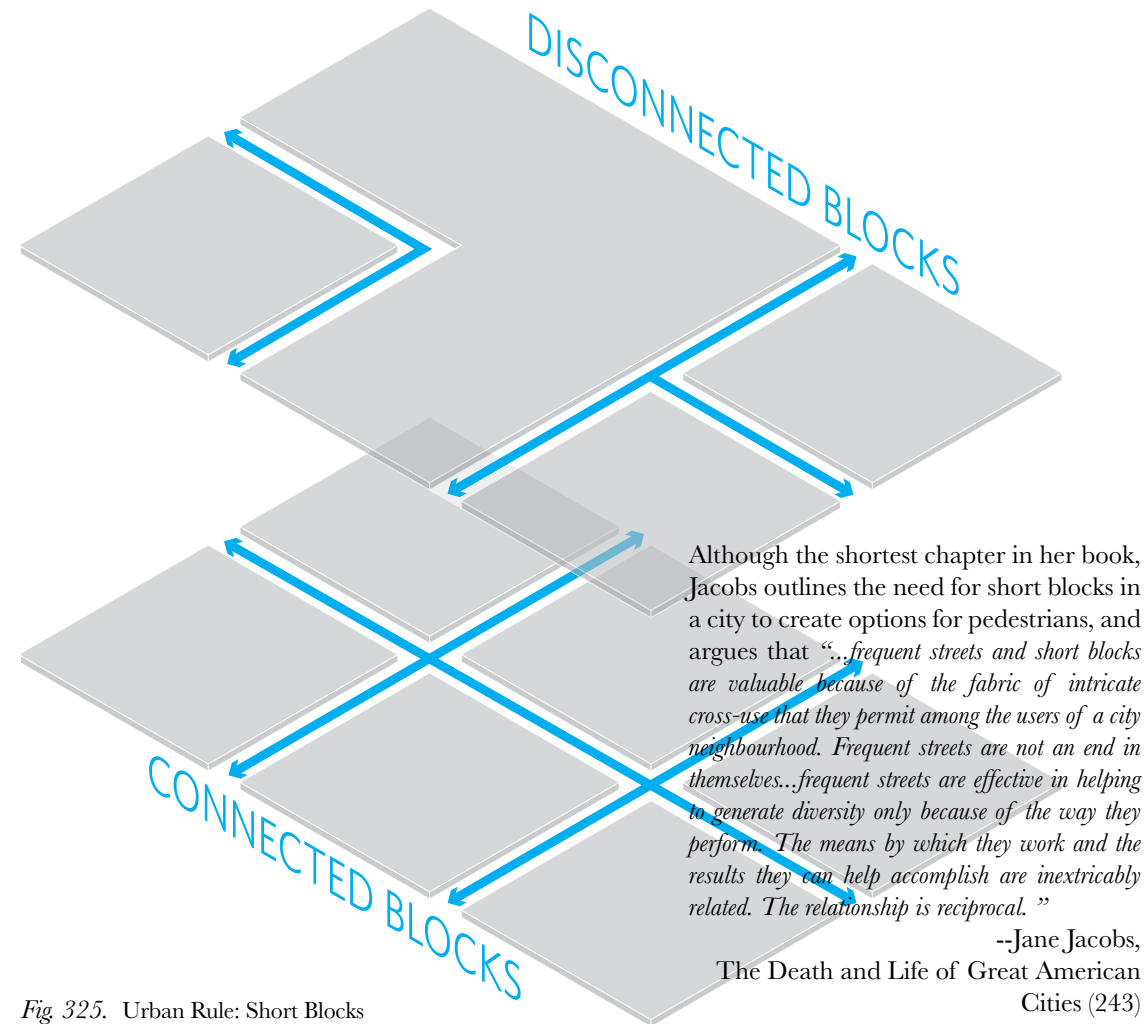


Fig 325. Urban Rule: Short Blocks
236



Fig 326. Existing block structure in Midtown

8 Jane Jacobs. 233.
9 Jacobs. 233.

EXISTING SITE

proposed roads in midtown

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:

- 1** *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
- 2** *Mount Hope Street Connection:* through block from Mary Street to King Street. House on King already proposed for demolition (see demolition diagram) Best to line up with Mount Hope intersection on King Street, and make a short jog in the secondary street (Mary Street and Roger Street) behind. Demolition Required: 2 buildings

- 3** *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

- 4** *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 southwest corner of the Sun Life lot, the large block could be used for new development. Demolition Required: 0 buildings

- 5** *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

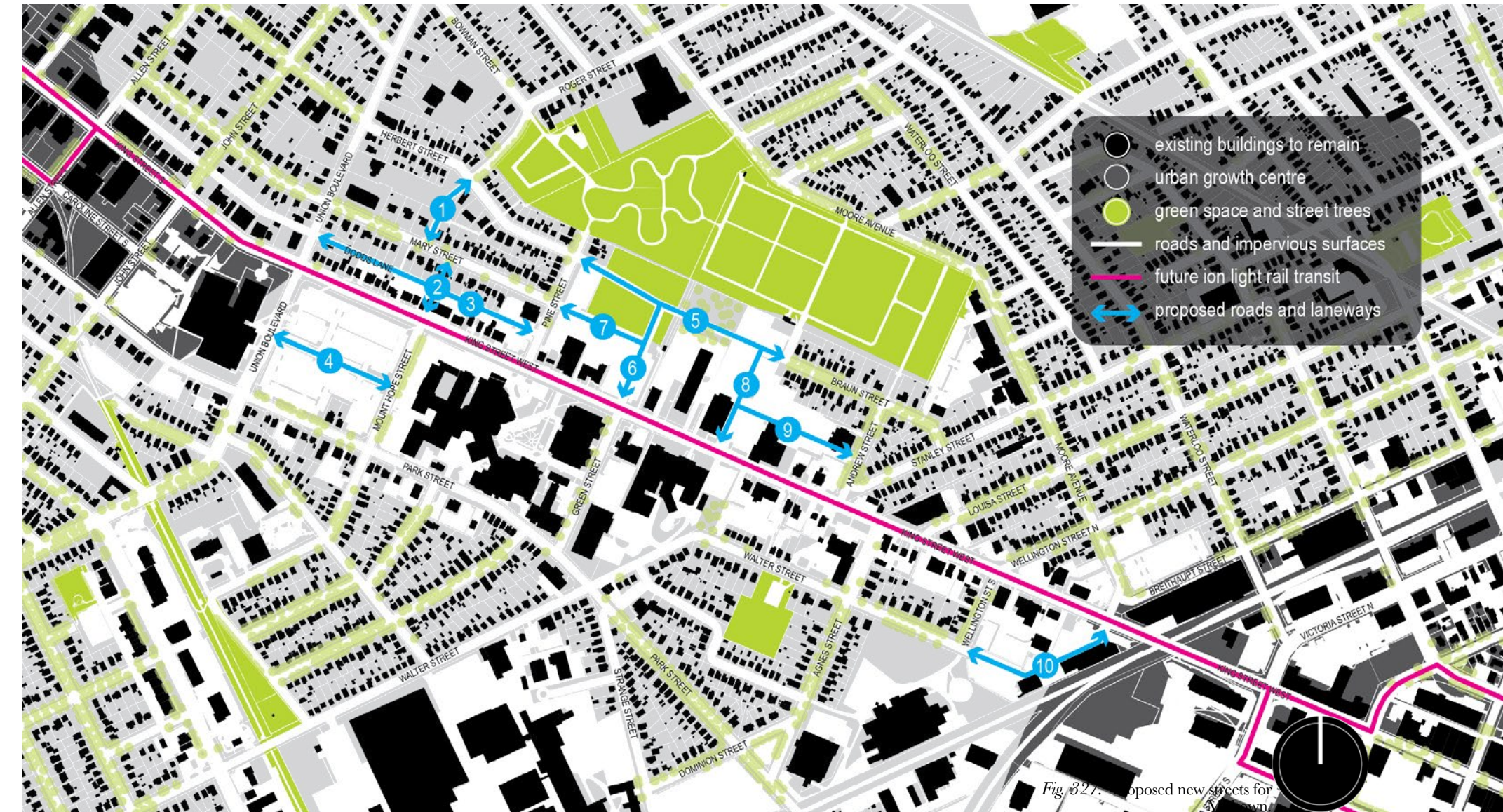
- 6** *Green Street Extension:* to complete the intersection at King Street and meet up with the Braun Street extension. True to its namesake, Green Street will create a green gateway to a large sportsfield and the historic Mount Hope Cemetery -- a scenic thoroughway to the residences north of Moore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

- 7** *Mary Street Extension:* to break up the block that meets King Street, leaving a 80 metre deep block, which is ample for midrise developments with site access and greenspace. This still leaves room for a generous, designed sportsfield and field house, which the nearby secondary school already uses for games. Demolition Required: 0 buildings

- 8** *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

- 9** *New Street, South of Braun:* to provide access to the back of the properties that front onto King Street, and complete the one-sided block of residential properties on Braun Street. This would leave an ~60 metre deep block fronting onto King Street for development of midrise buildings. Demolition Required: 1 building

- 10** *Walter Street Extension:* to create a connection to King Street. Although there is a large development by the Zehr 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



RESIDENTIAL TYPOLOGIES

and where to find them

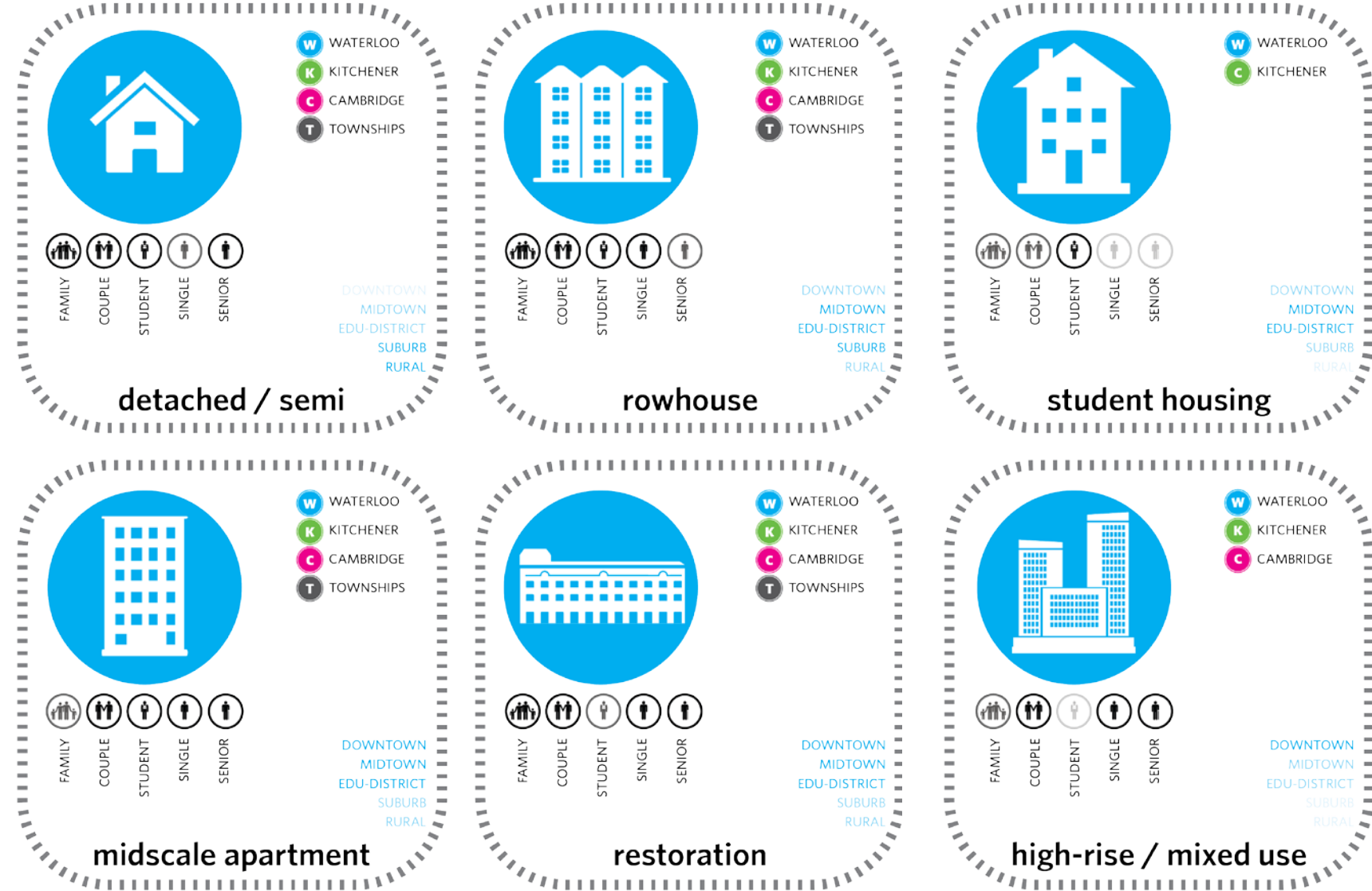


Fig. 328. Residential Typologies

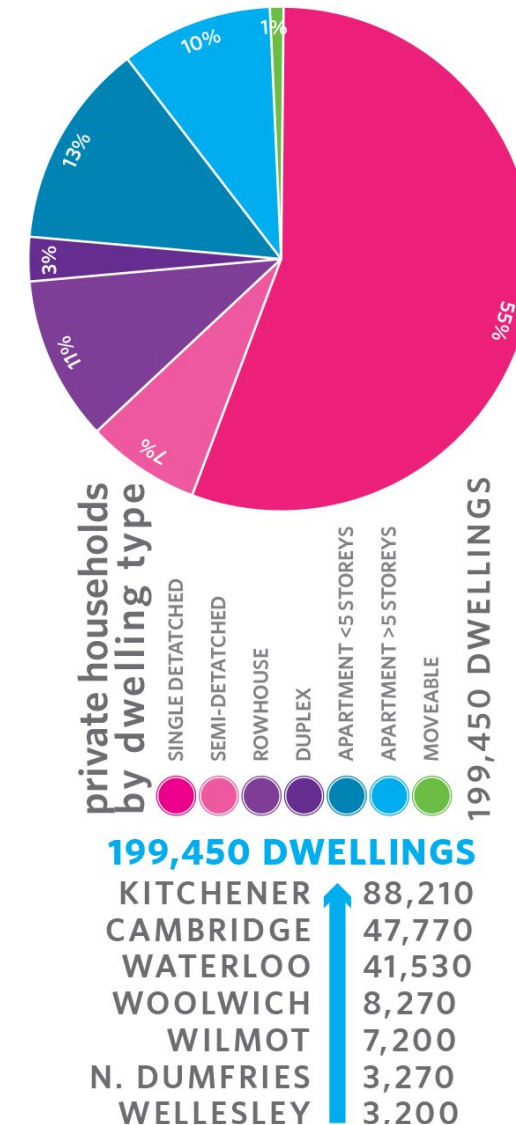


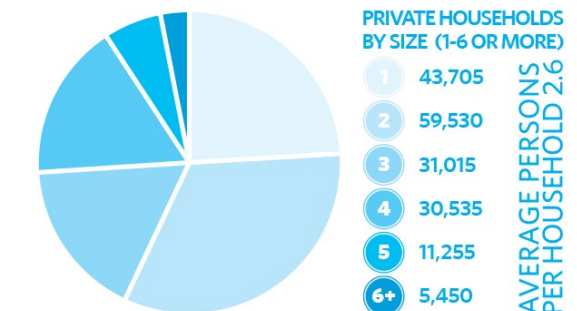
Fig. 329. Dwellings by Type and Location

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 spacial 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?

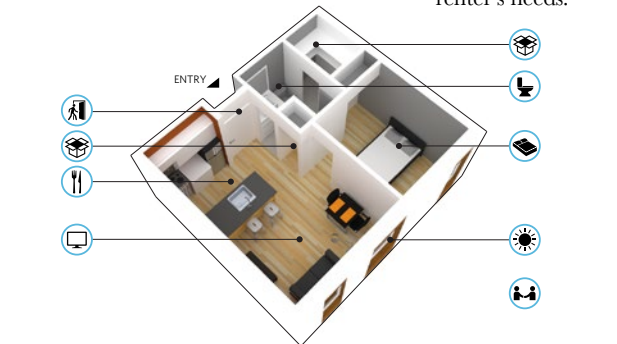
+ “A small, typically urban, self-contained apartment that is between 150-350 square feet.”
 –What is a Micro Unit? By David Friedlander
 +Rental unit akin to a hotel room



+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. 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.



EXISTING SITE

heritage properties in waterloo region

There are a large number of heritage properties in the Tricities, 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 listed 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 constructions) 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 unloved 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 on to a century-old building without the major cost of matching delicate 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 333. Conceptual image of the Galt Post Office being readapted into the future Idea Exchange in Cambridge, by RDH Architects from Toronto.

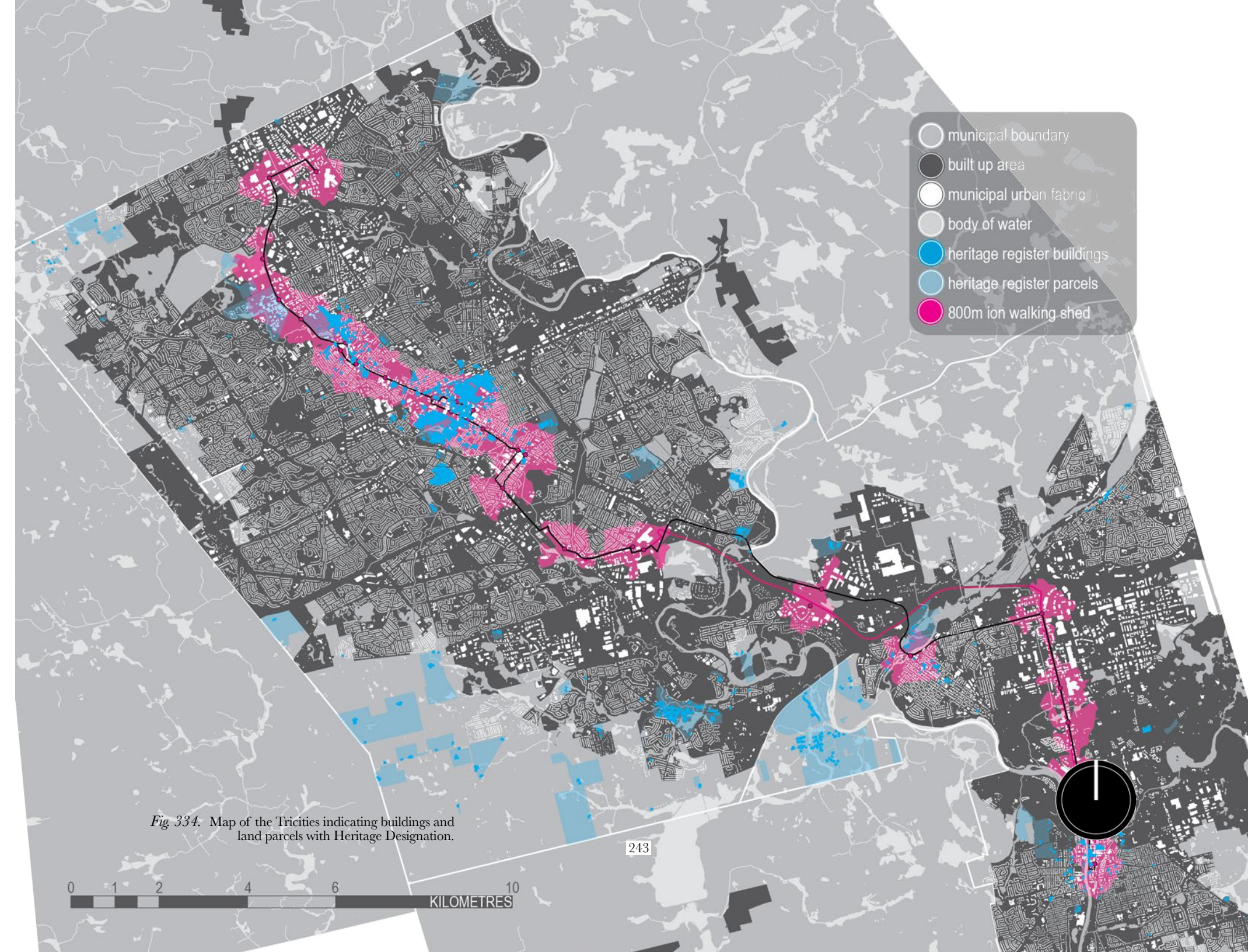


Fig 334. Map of the Tricities indicating buildings and land parcels with Heritage Designation.



A MIX OF OLD AND NEW

existing heritage buildings on site

'Condition 3: The district must mingle buildings that vary in age and condition, including a good proportion of old ones.'¹⁰

There are currently 91 designated heritage properties in Kitchener, a list continues to grow, multiple of which are in Midtown. Some are single family dwellings, and others are parts of larger institutions that are being maintained or looking for a new use. The former Ratz Bechtal Funeral Home and Sacred Heart Convent are both looking for future users and redevelopment. This balance of old and new construction diversifies neighbourhoods, creating layers of materials, stories and inhabitants. Heritage Kitchener has begun implementing a set of *Heritage Best Practices* for properties such as the ones pictured.¹¹

1. The City of Hamilton *Built Heritage Management Protocol* is used as a model to draft a similar protocol, and identify engineers to use 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.

¹⁰ Jacobs. 244.
¹¹ <http://www.kitchener.ca/en/livinginkitchener/heritage-best-practices.asp>

4. 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.

5. 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.

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 longterm 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.



Fig 335. Sixo Redevelopment.

Fig 336. Sun Life Financial Building.

Fig 337. Sacred Heart Convent Building.
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Fig 338. Map of Heritage Buildings in Midtown



NAN ELLIN



Fig. 339. Integral Urbanism.

NAN ELLIN

Founding Dean

Professor + Urban Designer

Nan Ellin is the Founding Dean of the College of Architecture, Planning and Public Affairs at University of Texas. She holds a PhD in Urban Design from Columbia University. Ellin's research and design in urban revitalization, placemaking, community-building, and university-neighborhood partnership seek to enhance the built and natural environments, and improve quality of life. Ellin spearheaded an initiative called *canalscape*, which created vital urban hubs in metropolitan Phoenix where canals meet major streets, with an additional focus on the improvement along light rail.¹²

¹² <http://www.uta.edu/cappa/people/faculty-staff/profiles/nan-ellin.php>

“Master planning and Modern Urbanism ultimately have fallen short in achieving their goals, however, because they are too inclusive and utopian to be realized fully. Realized only partially, they produce fragments of cities that do not congeal into an urban fabric. In addition, the segregation and rigidity of master planning and Modern Urbanism run counter to the integration and dynamism of the life lived in them.” (118)



SHIFT TO FORM-BASED CODE

This thesis is not an exercise in traditional master planning, but is about designing details of public space and built form. If a framework of key public spaces and street types are designed and executed in relation to building massing, facade details, landscape and environmental elements, a massive variety of buildings could be designed and constructed in the placeholders.

A form-based code is a land development regulation that fosters predictable built results and a high-quality public realm by using physical form (rather than separation of uses) as the organizing principle for the code. A form-based code is a regulation, not a mere guideline, adopted into city, town, or county law. A form-based code offers a powerful alternative to conventional zoning regulation. In her book, Nan Ellin defines form-based code as the following:

def.

Form-Based Code:

“assumes that what happens within a building is less important than the form of the building and its relationship to other buildings and the street. The goal is to produce high-quality public space that will support healthy civic interaction while allowing uses to change according to owner’s wishes and market demand...The FBC is developed through a community visioning process and is conveyed through clear illustrations and diagrams along with

explanatory text. The code designates building types, assembling plan and section diagrams for each type...These standards typically establish maximum and minimum building heights, placement in relationship to adjacent buildings and street, and location and configuration of entrances, windows, porches, parking, yards, and courtyards.” (38)

Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. The regulations and standards in form-based codes are presented in both words and clearly drawn diagrams and other visuals. They are keyed to a regulating plan that designates the appropriate form and scale (and therefore, character) of development, rather than only distinctions in land-use types.

This approach contrasts with conventional zoning’s focus on the micromanagement and segregation of land uses, and the control of development intensity through abstract and uncoordinated parameters (e.g., FAR, dwellings per acre, setbacks, parking ratios, traffic LOS), to the neglect of an integrated built form. Form-based codes are regulatory, and not to be confused with design guidelines or general statements of policy, . They are drafted to implement a community plan. They try to achieve a community vision based on time-tested forms of

urbanism. Ultimately, a form-based code is a tool; the quality of development outcomes depends on the quality and objectives of the community plan that a code implements. Unlike conventional zoning, the focus of a form-based code is on how buildings relate to the streetscape, not on what uses occur inside of them.

Integral Urbanism veers away from master planning’s comprehensiveness, aiming to master everything including nature. Instead...it proposes more punctual interventions that contribute to activating places throughout the creation of thresholds or places of intensity.” (119)

“...a vulnerable urbanism embraces change; it surrenders to it. In contrast to the modern clean-it-up and fix-it mentality, there is acceptance of the dirt, the broken, the imperfect.” (122)

Landuse planning has been the method of planning in Waterloo Region, where zoning bylaws are dictated by the separate municipalities in the Region. For example, Kitchener’s zoning bylaw establishes and regulates the use of land by implementing the policies their Official Plan, including:

- + Permitted use of land
- + Height and location of structures
- + Lot size
- + Density of development
- + Parking requirements.

These tactics can be short-sided in the sense that they undersell innovation and a transforming vision for the Region. There are bylaws that ensure the safe operation of a neighbourhood, but others that seem random and an artifact of the past.

Taking a form-based rather than landuse-based approach to planning in the Waterloo Region can alleviate overgeneralized streetspace, where the majority of the street is left unused, and front yards are consumed by driveways. It would be best to ensure that blocks are designed for the pedestrian, and not just a conduit for vehicular traffic.

FBC *“attempts to veer away from the ultra-controlled master plan without stepping aside and allowing the market to hold sway. All of these approaches propose a “kit of parts” that can be variously assembled by others to produce original combinations that nonetheless share common elements, offering variation within a larger unity.” (127)*

It is good to achieve a minimum density in a neighbourhood in terms of population, but as seen in the proposed design in Chapter 5, the population density requirements outlined by the Places to Grow Act can be achieved in many types of built forms.



TOSS THE COLOURED ZONING

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 being established in the Region of Waterloo already, but many are currently broken in such a way to denote their original subdivision development. Areas that serve university students have different needs than an

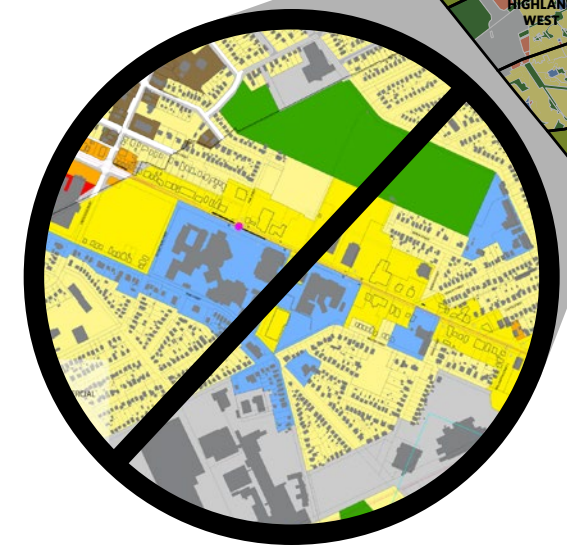


Fig 340. Traditional Zoning Map of the Tricities, including division of neighbourhoods and a zoomed view of Grand River Hospital.
248

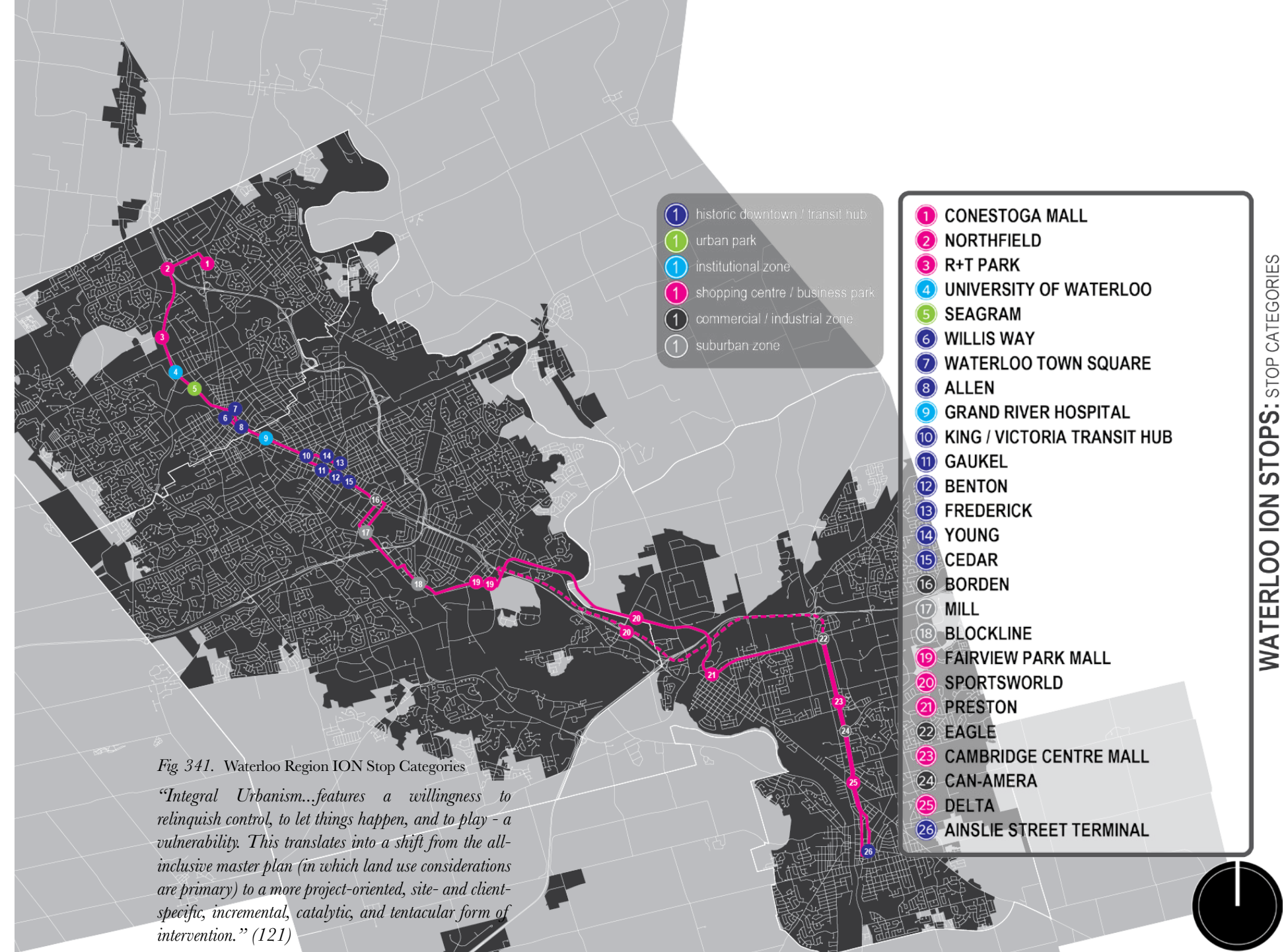
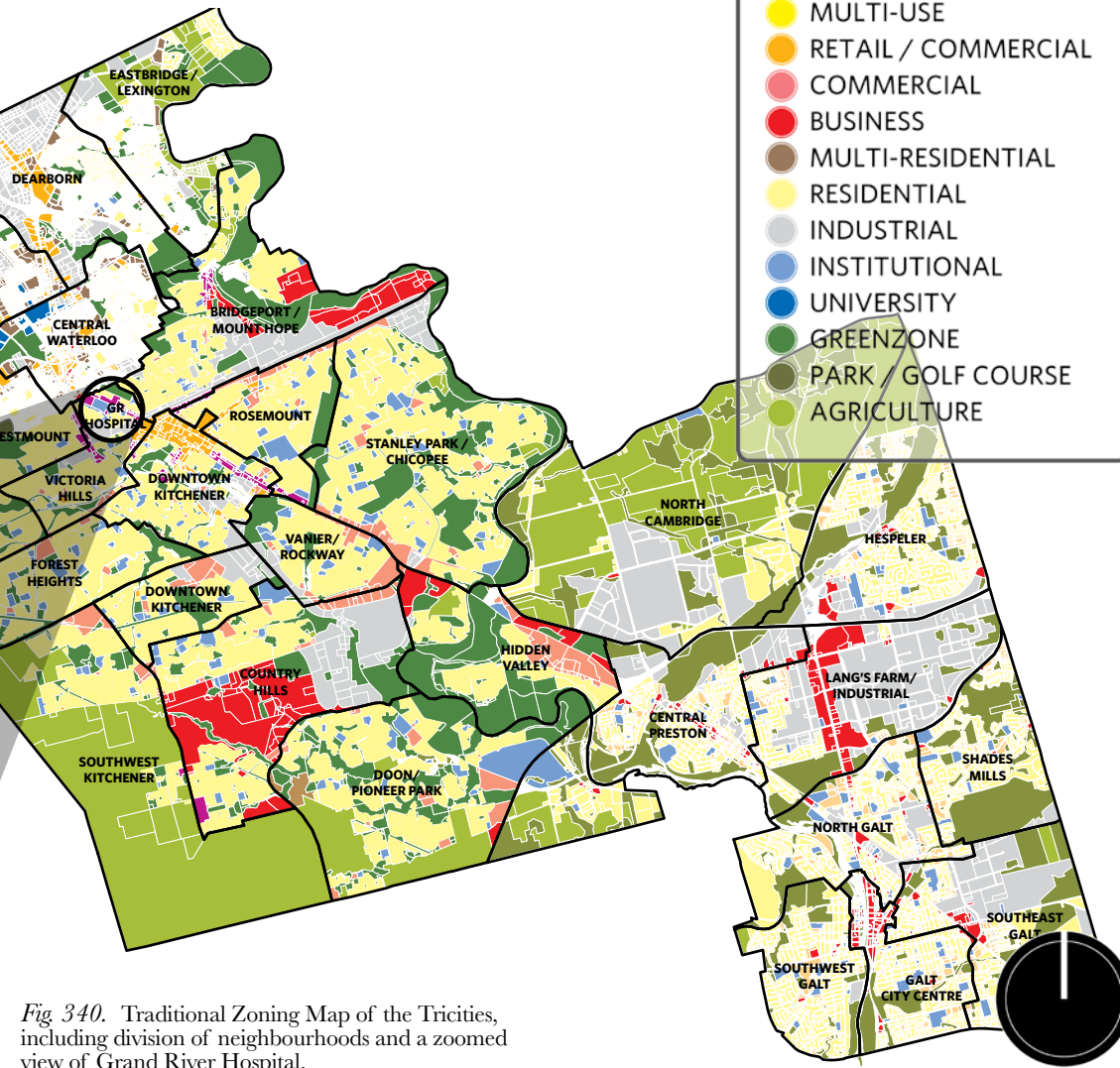


Fig 341. Waterloo Region ION Stop Categories

“Integral Urbanism...features a willingness to relinquish control, to let things happen, and to play - a vulnerability. This translates into a shift from the all-inclusive master plan (in which land use considerations are primary) to a more project-oriented, site- and client-specific, incremental, catalytic, and tentacular form of intervention.” (121)

DENSITY STUDY

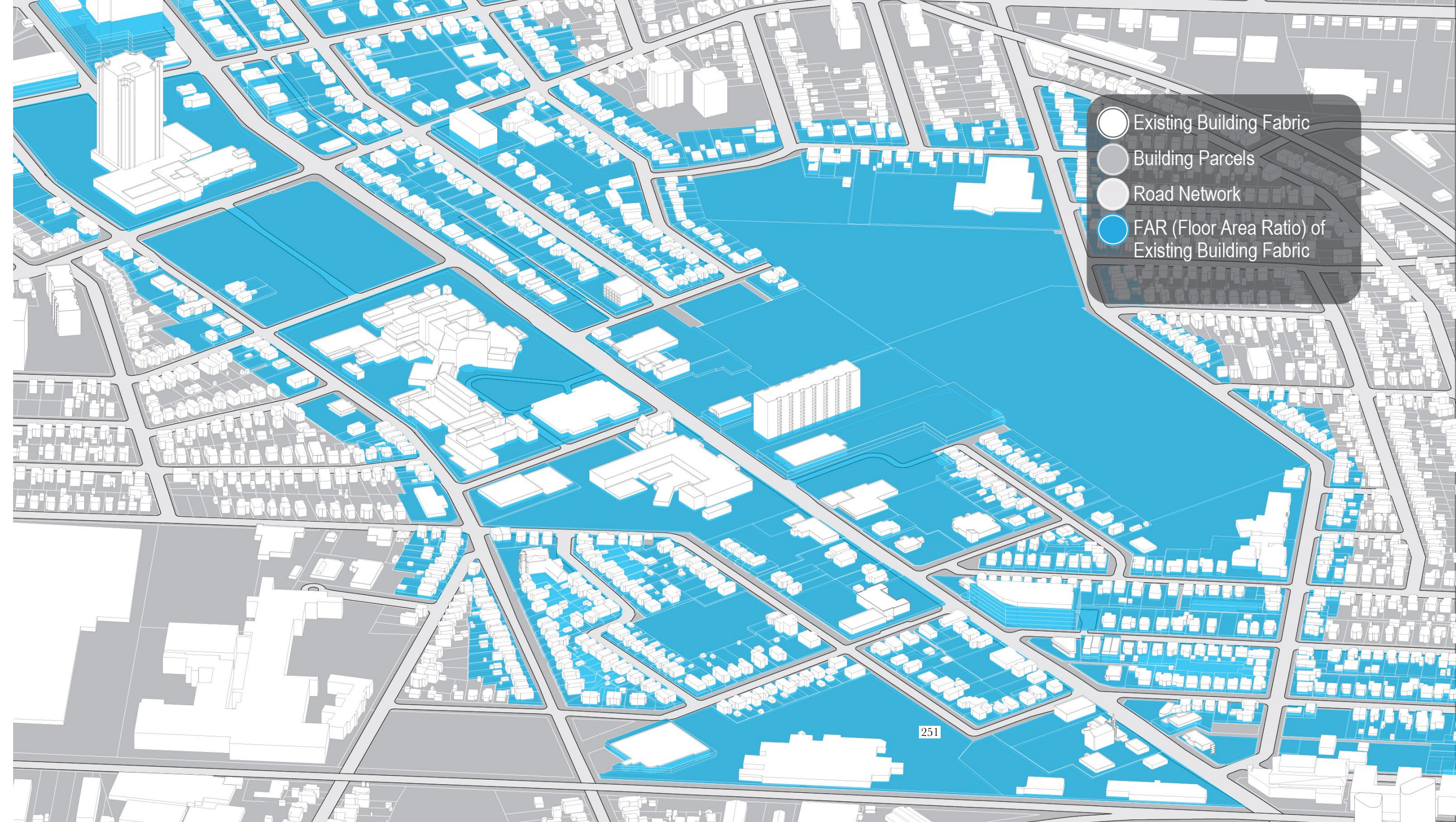
existing density, existing FAR

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 storey, it would cover 100% of the building parcel. Each 4 metre high extrusion of the site area demonstrates that the particular site has a 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:

Building Area (square metres)	70SM
Storeys	x2
Gross Floor Area	=140SM
Site Area	384SM
FAR	0.36
Multiplier x4m	x4
(rounded floor to floor height)	
4.655	=1.44 storeys

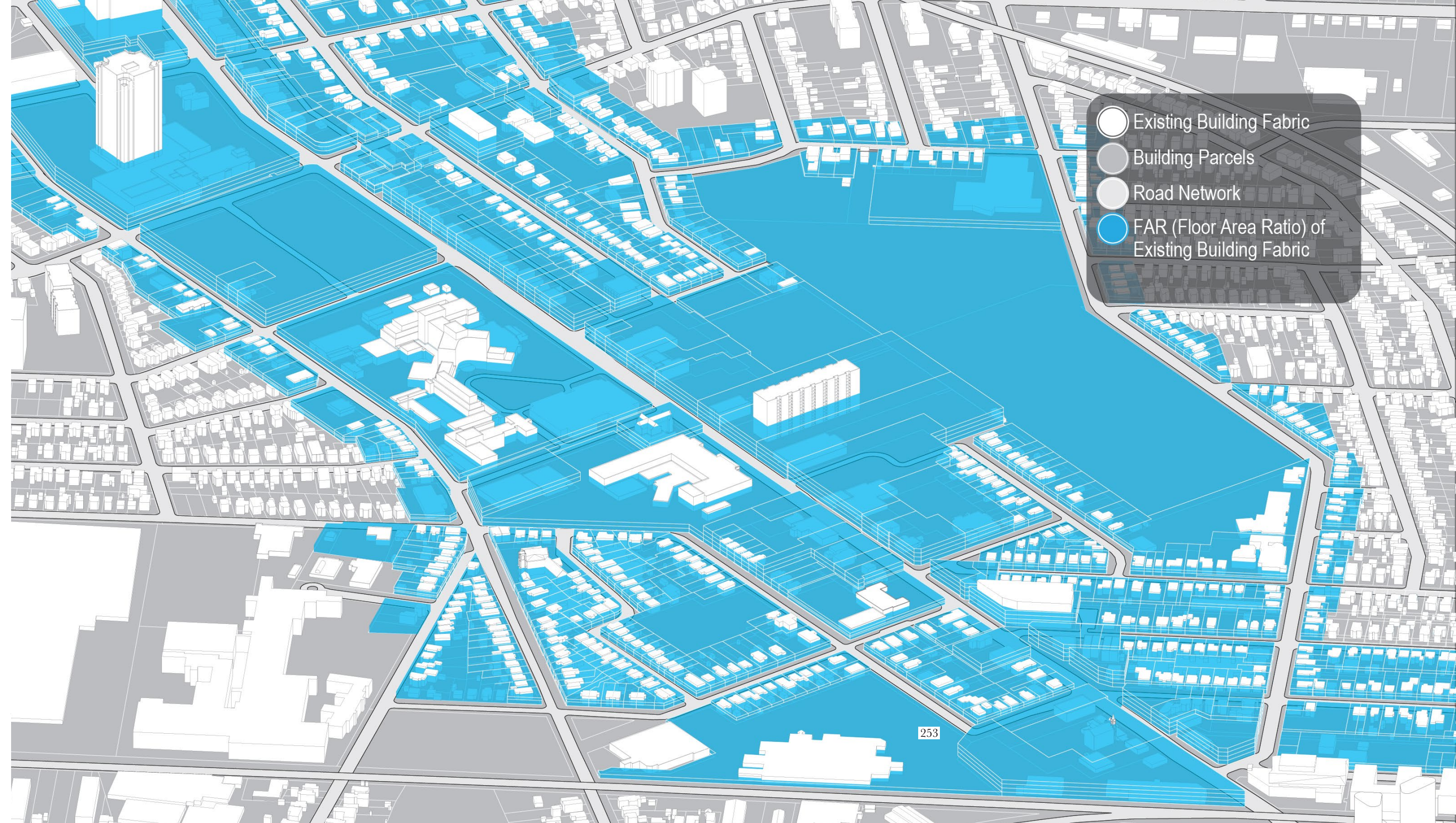


DENSITY STUDY

existing density, maximum FAR

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.

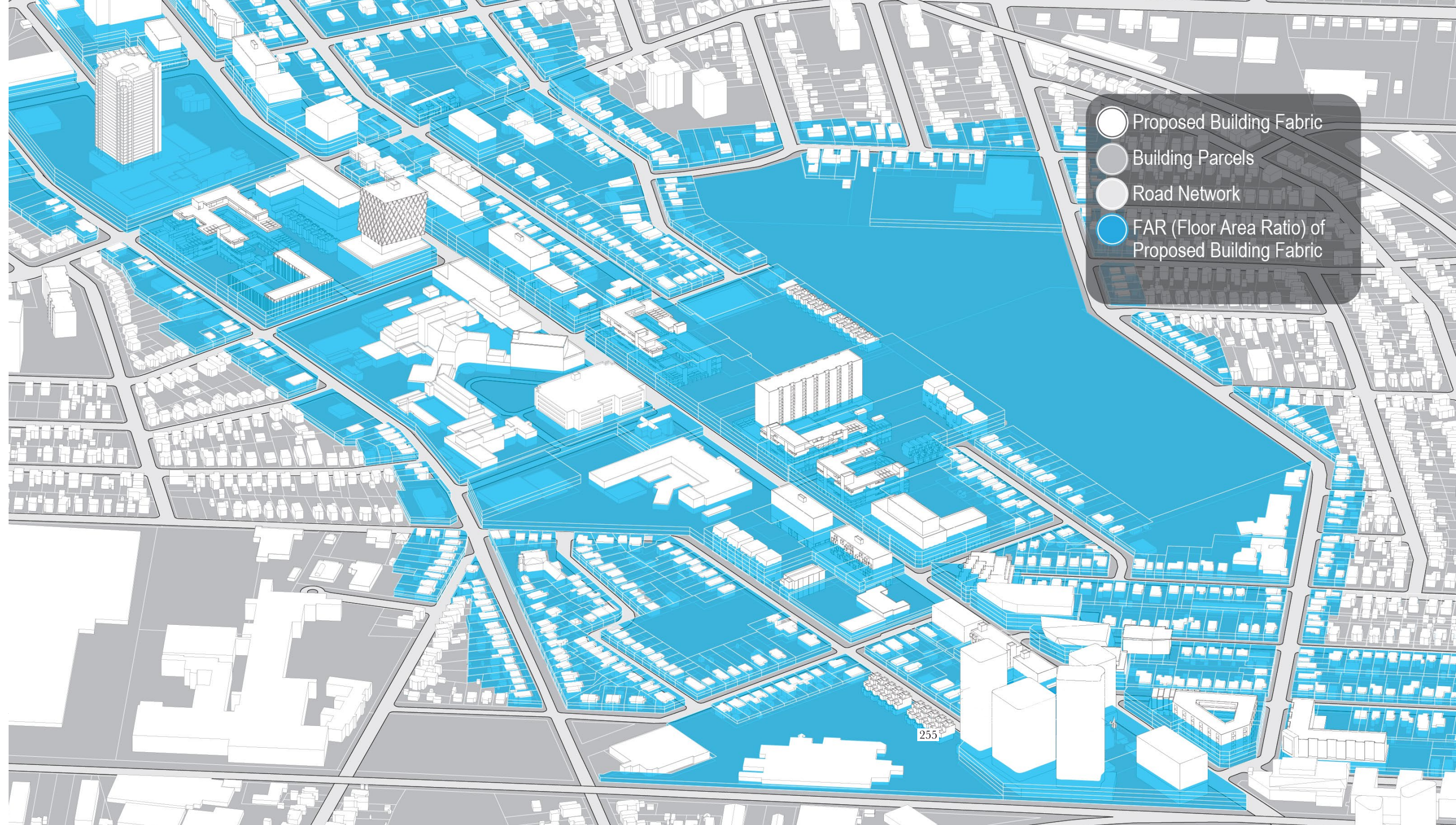
When buildings are below the FAR simulation, they are far below the maximum site density. Most of the buildings in Midtown are currently below the maximum density as outlined by the municipal zoning bylaws. The maximum FAR simulation is



DENSITY STUDY

proposed density, maximum FAR

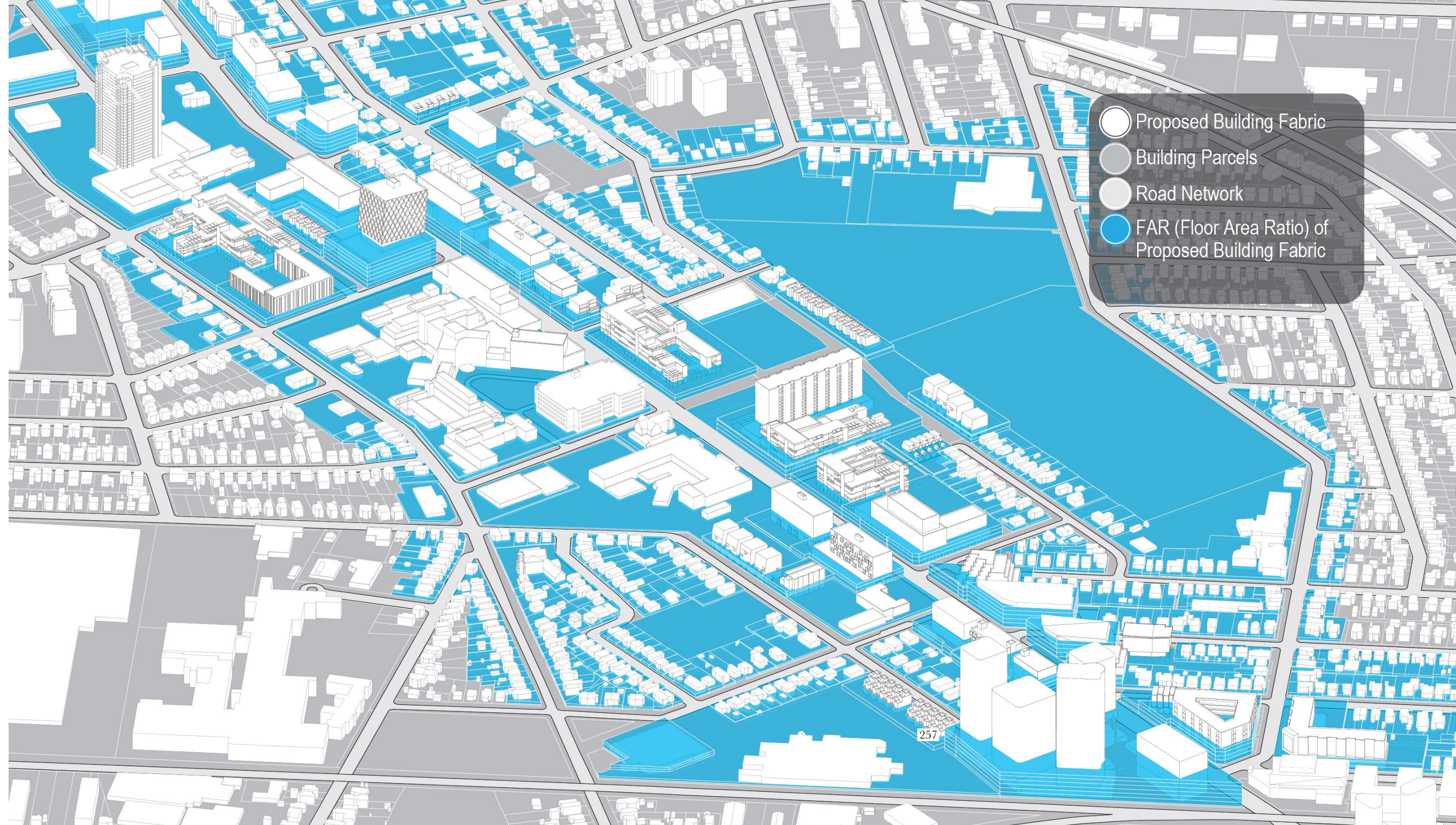
applied to the proposed design for Midtown in this scenario. An increased amount of the properties meet the density standards.



DENSITY STUDY

proposed density, ideal FAR

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.





DAYLIGHTING

Public spaces and neighbouring 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 maximize 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

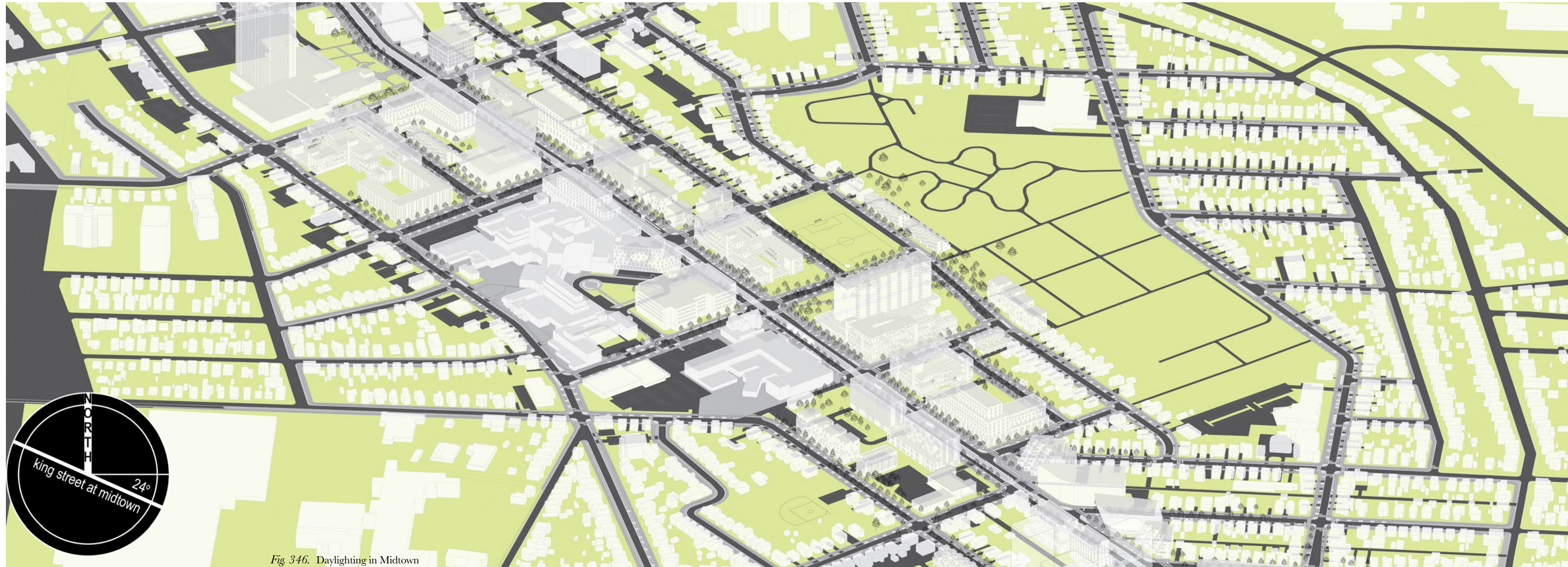


Fig 346. Daylighting in Midtown

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 neighbourhood. The sections are cut from Park Street to Herbert Street, far enough to see how the new design would blend with existing neighbourhood 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

Fig 347. Top left. Aerial photo above Grand River Hospital, 2017.

Fig 348. Centre left. Aerial photo of King Street South and the intersecting GO rail on the bottom left.

Fig 349. Bottom left. Aerial photo of Sun Life Financial and Grand River Hospital, showing context where urban design sections have been cut.

Fig 350. Right. Map of Cutting Through King 260

DISTRICT OF URBAN SECTION @ nearest intersection

A series of sections have been cut through King Street 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 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



MIDTOWN URBAN SECTION @ king + union **A**

MIDTOWN URBAN SECTION @ king + mount hope **B**

MIDTOWN URBAN SECTION @ king + green **C**

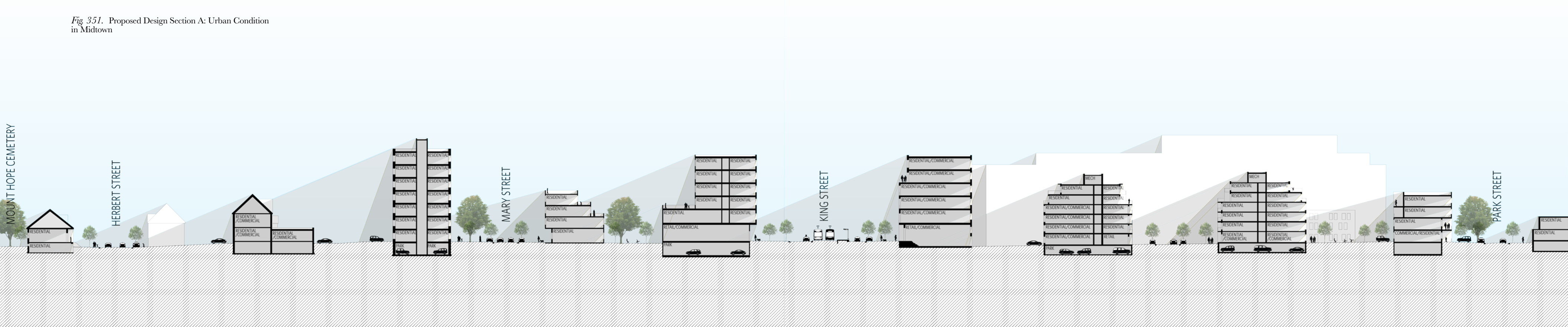
PROPOSED DESIGN SECTION

urban condition in midtown

A MIDTOWN URBAN SECTION @ king + parking lot infill

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



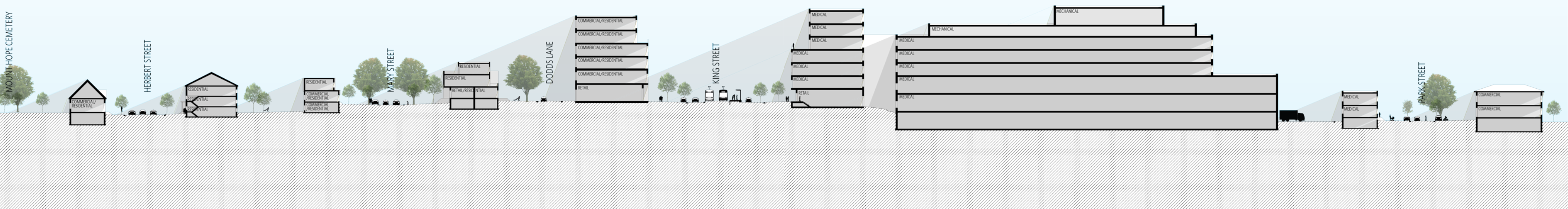
PROPOSED DESIGN SECTION

urban condition in midtown

B UPTOWN URBAN SECTION @ king + grand river hospital

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 faces King Street. A mix of midrise multi-use buildings facing the Hospital on King, and stacked townhousing in the secondary neighbourhood toward Mount Hope Cemetery add variety and density.

Fig. 352. Proposed Design Section B: Urban Condition in Midtown



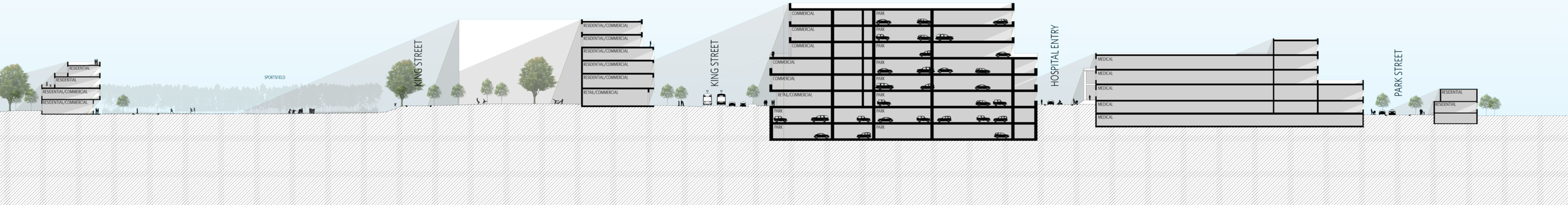
PROPOSED DESIGN SECTION

urban condition in midtown

C UPTOWN URBAN SECTION @ king + parking garage

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.



- 1 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 where...

- A King Street South meets John Street East / West
- B King Street South/West meets Union Boulevard / Street East
- C King Street West meets Mount Hope Street
- D King Street West meets Pine Street
- E King Street West meets Green Street
- F Mary Street meets Green Street
- G King Street West meets New Street
- H King Street West meets Andrew Street
- I King Street West meets Louisa Street
- J King Street West meets Wellington Street North / South
- K King Street West meets Breithaupt Street / Moore Avenue
- L Mutual Drive meets Mount Hope Street

Fig 354. Axonometric Intersections Key Map

ZOOM ONE

sun life financial, parking lot infill, grand river hospital



Fig 355. Zoom One of Intersections Key Map

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ZOOM THREE

public schools, park space, residential and commercial infill



Fig. 357. Zoom Three of Intersections Key Map

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ZOOM FOUR

public schools, park space, residential and commercial infill



Fig 358. Zoom Four of Intersections Key Map

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MIDTOWN

conceptual birds eye perspective at grand river hospital



Fig 359. Birds Eye Perspective of Midtown

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



Fig 360. Top left. Bauer Loft Condo Building 15-storey tower and neighbouring historic redevelopment.



Fig 361. Lower left. View of the heritage Sun Life Financial building with office tower in the background.

DESIGN FEATURES

- 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.¹³ According to David Podmore, Chairman and Chief Executive Officer of Concert, “*The projected growth of the Waterloo area 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 street level parking, with commercial space on the ground floor to help activate the street.¹⁴

¹³ <https://renx.ca/concert-properties-now-too-big-too-busy-to-hide/>

¹⁴ <https://www.therecord.com/news-story/3250226-six-storey-apartment-approved-by-city-of-waterloo-and-transport-advocacy-group/>

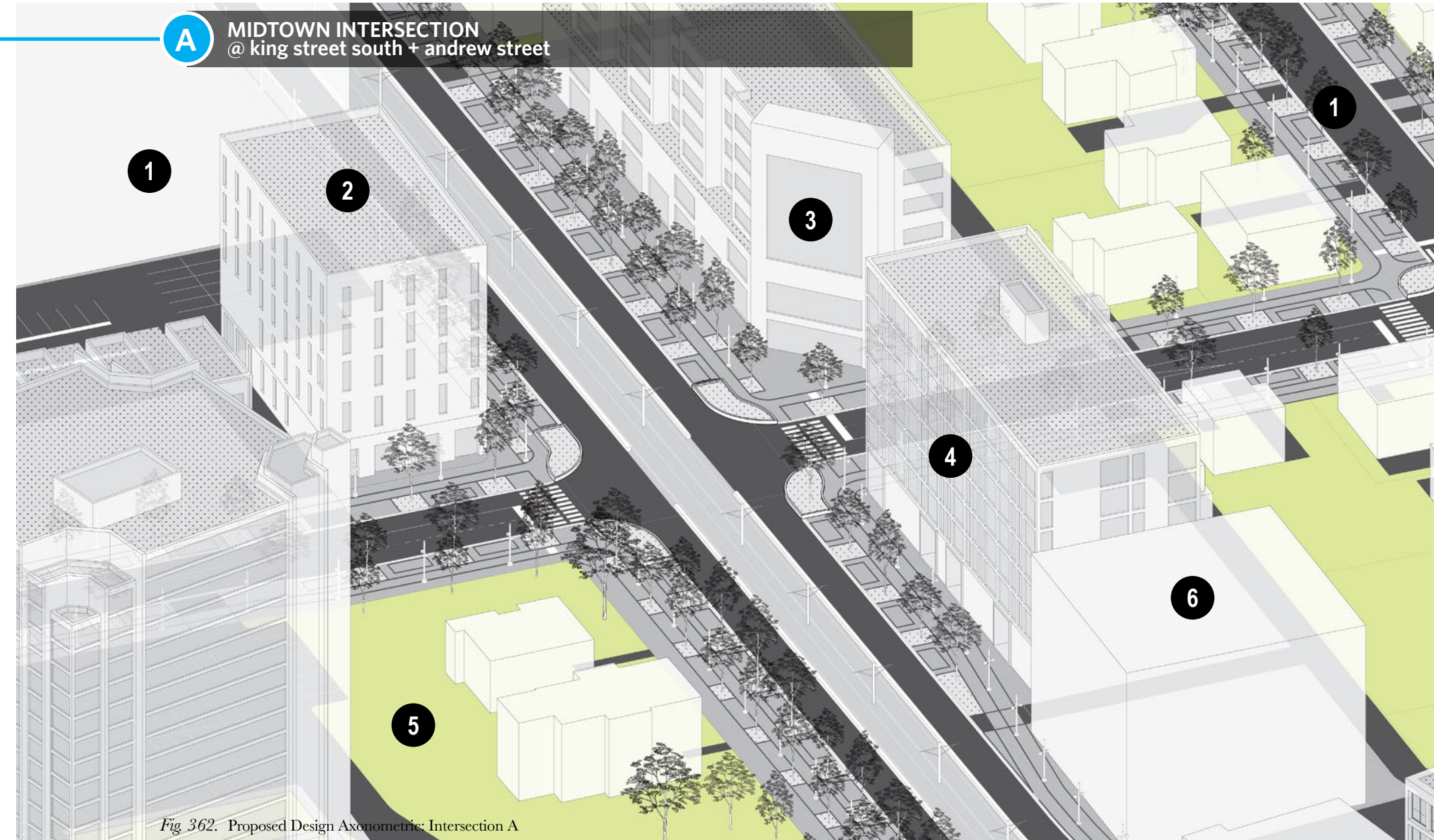


Fig 362. Proposed Design Axonometric: Intersection A

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

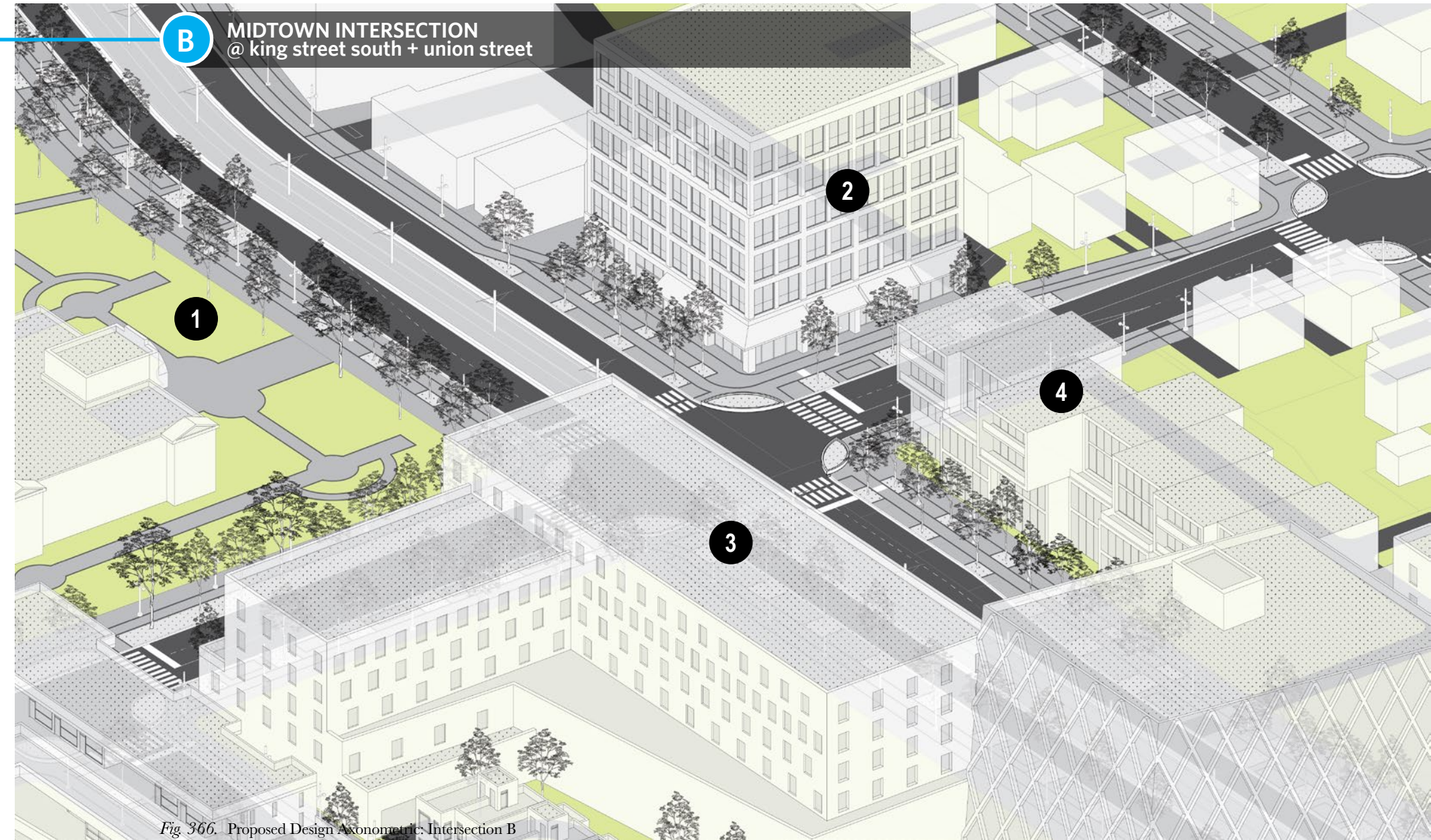
- 1** Landscaped ground surrounding Sun Life Financial is to stay similar to its existing condition, but modified where needed to accommodate sidewalk / cycling paths. The usual double colonnade of trees on King Street is reduced to disturb the least amount of property possible near the King and Union intersection in front of Sun Life.
- 2** A six-storey building can nestle between King Street and Dodds 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. Ground floor retail would offset the lack thereof at Sun Life Financial across the street, and surrounding low density residential fabric.

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.

- 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 neighbourhood on Herbert Street and fit the shallow lot depth on this block. Each floor of one unit is approximately 150 square metres, or 1600 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.



B MIDTOWN INTERSECTION @ king street south + union street

Fig. 366. Proposed Design Axonometric: Intersection B

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



Fig. 367. Top Left. View of large surface lot between Sun Life Insurance and Grand River Hospital. Borders Mount Hope Street and Union Boulevard.

Fig. 368. Bottom Left. Additional view of block for proposed redevelopment adjacent to Grand River Hospital.

DESIGN FEATURES

- 1** The Sun Life parking lot is 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. Due to there being no housing on the southwest side of King Street between
- 2** There is potential on this site for additional housing if a new hospital is instead built on another site in Waterloo Region, to relieve pressure on this particular institution. The site is large enough to host a large cultural venue, a combination of housing and employment occupancies if the surface parking lot is consolidated and pushed below grade into a parkade. A relationship could even exist wherein the parking of new structures is shared with the insurance company on either side of the parcel, as parking would most likely be opposite occupancies, as the insurance company is only operational during standard business hours, and parking needs would decrease substantially during late evening hours when residents would be returning home from work.
- 3** 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.
- 4** 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.
- 5** 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.

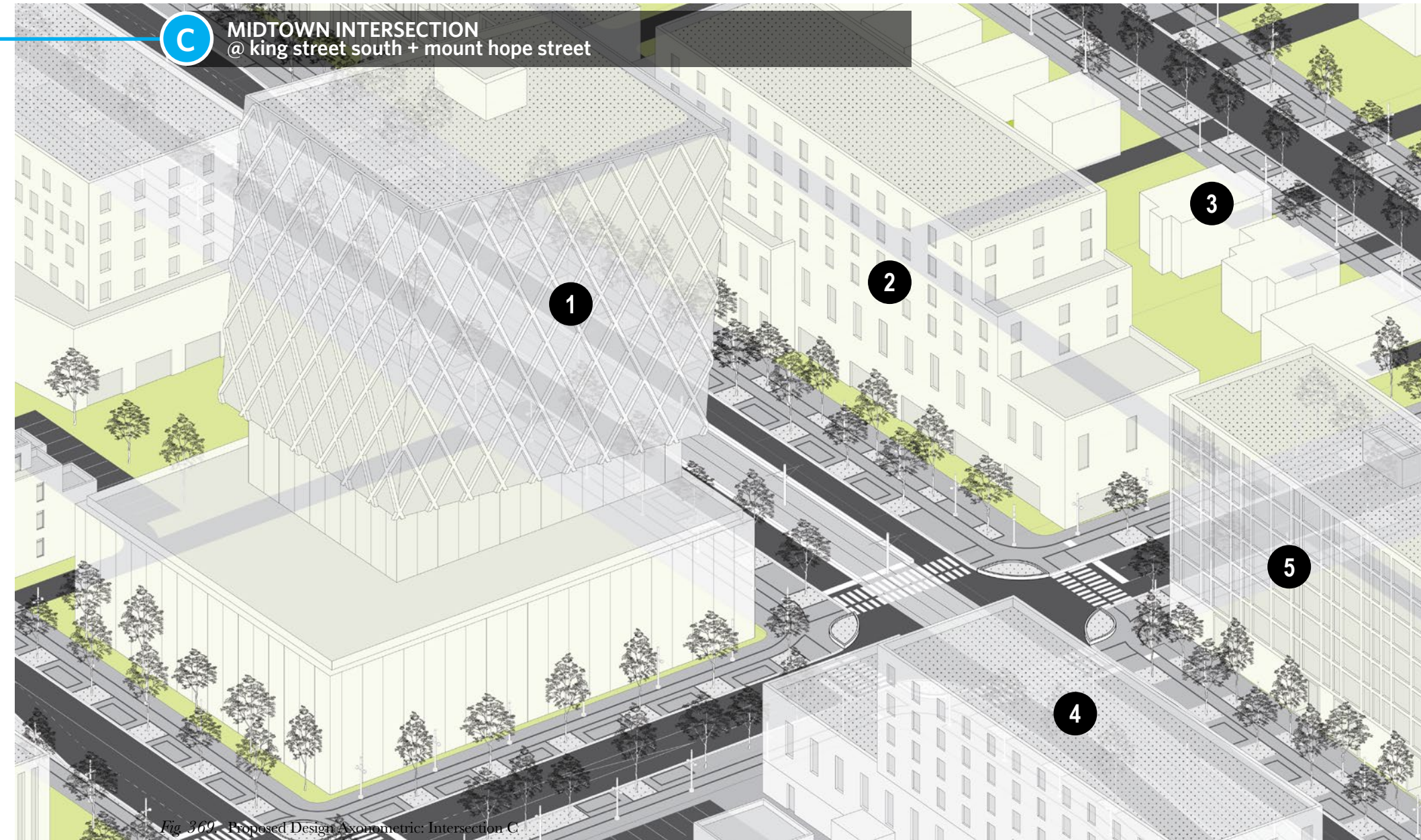


Fig. 369. Proposed Design Axonometric: Intersection C.

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

1 The rear corner of the block could support a new housing typology that allows for an open and commercial ground plane with vertical neighbourhoods above. The building typology consists of a regular system of vertical cores around which can cluster a variety of modular units that can support a wide demographic, from workers and single families to student housing. The flexibility of the housing units which terrace downwards, dissolving the courtyard typology and creating areas for elevated parks, gardens and community spaces. All of the unit typologies are open on two sides and include a living/working space.¹⁵

2 Linked townhouses face Mutual Drive, and fill in greenspace behind a larger half-courtyard building facing King Street South and Union Street.

¹⁵ Building taken from a design model created for a housing The Nuovo Mercati Generali by Sara Radcliffe and Fraser Plaxton.

Fig. 370. Aerial Image showing Sun Life parking lot that.

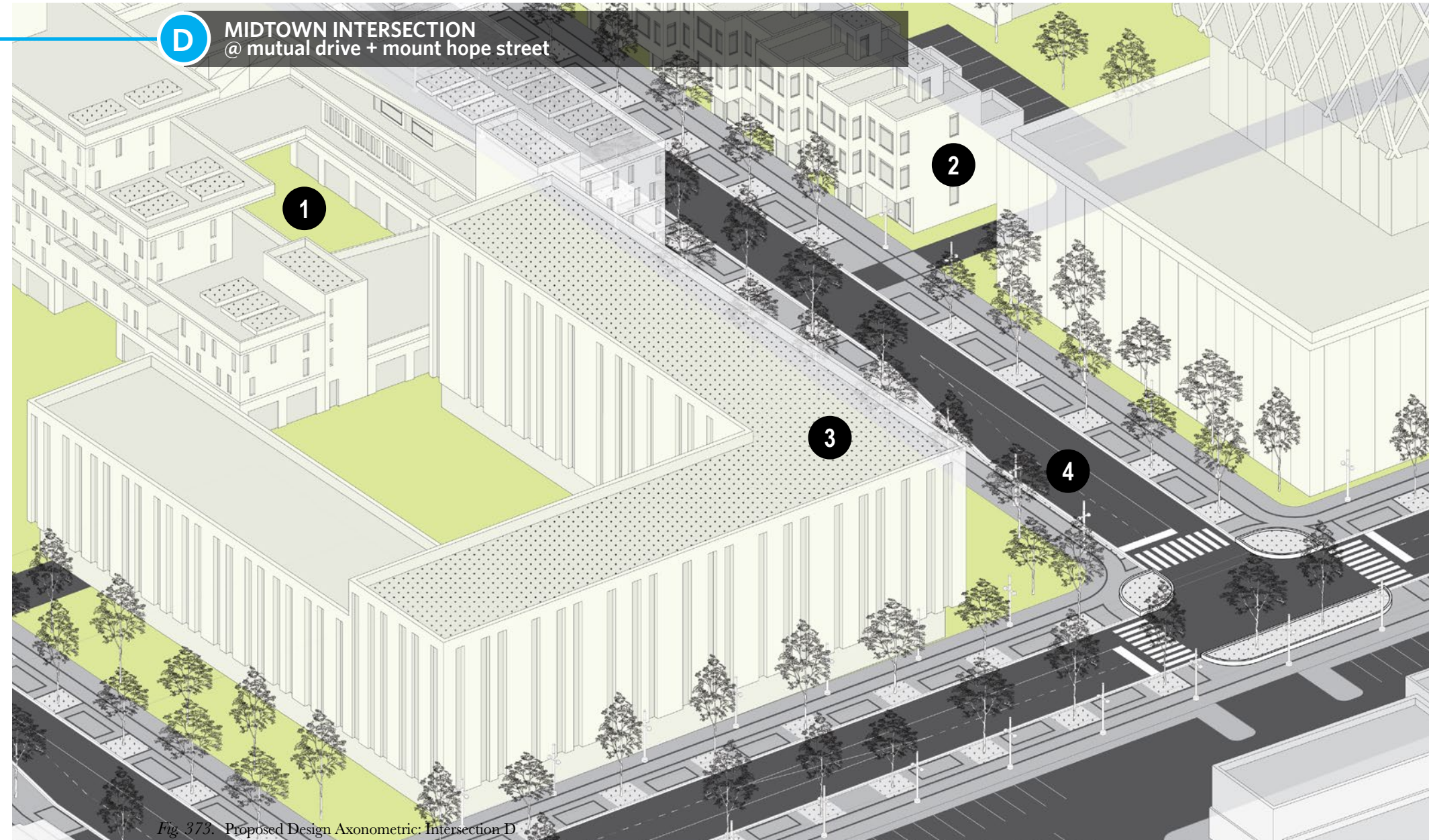
Fig. 371. Image showing the only two buildings still standing on the block that makes up the Sun Life parking lot.

Fig. 372. Conceptual image of the courtyard building typology adapted for the rear corner of the block. A mix of housing, commercial fitup and community space form to create accessible rooftop terracing. Image created in collaboration by Sara Radcliffe and Fraser Plaxton in 2012.

Providing a mix in building types on any site in Midtown will attract residents with varying needs and uses.

3 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.

4 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.



D MIDTOWN INTERSECTION @ mutual drive + mount hope street

Fig. 373. Proposed Design Axonometric: Intersection D

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

- 1** 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. Driveway access points to the buildings across from the Hospital on King Street should be diverted to side streets to avoid further confusion and additional traffic disruption.
- 2** 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

Fig. 374. Top Left. Sidewalk running immediately adjacent to the street in front of Grand River Hospital showing the vacuous space between street and building face.

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.

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incorporated into an expanded wing along King Street, walk-in traffic could also service the amenities.

- 3** Another extension to the Hospital could be made between the emergency department and main entrances. If the majority of the structure is pushed up a storey, 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 atop.
- 4** 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.
- 5** 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.
- 6** The current home of lowrise CTV Kitchener and Grand River Hospital medical centre can be accommodated in a terraced courtyard building.

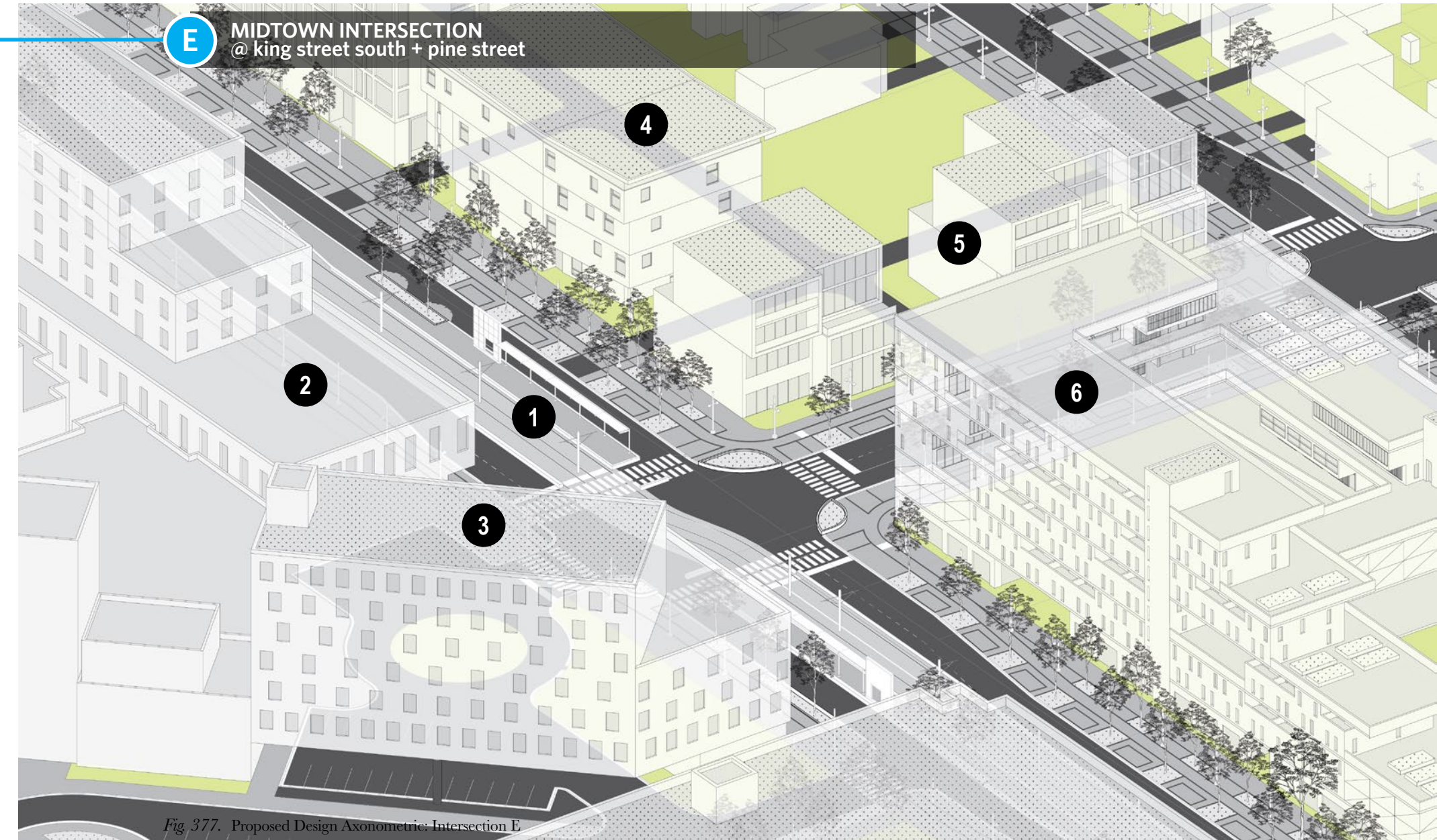


Fig. 377. Proposed Design Axonometric: Intersection E

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HOSPITAL STOP

conceptual image of light rail stop at grand river hospital



Fig 378. Conceptual Image at Hospital Stop

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

1 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.

Fig. 379. Image of parking garage at Grand River Hospital showing a lack of frontage on King Street.

Fig. 380. Image at ION Stop at Grand River Hospital.

Fig. 381. Image of Kings Tower on King Street South.

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

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

4 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.

5 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.

6 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.

7 Kitchener-Waterloo Collegiate & Vocational School described in a following image.

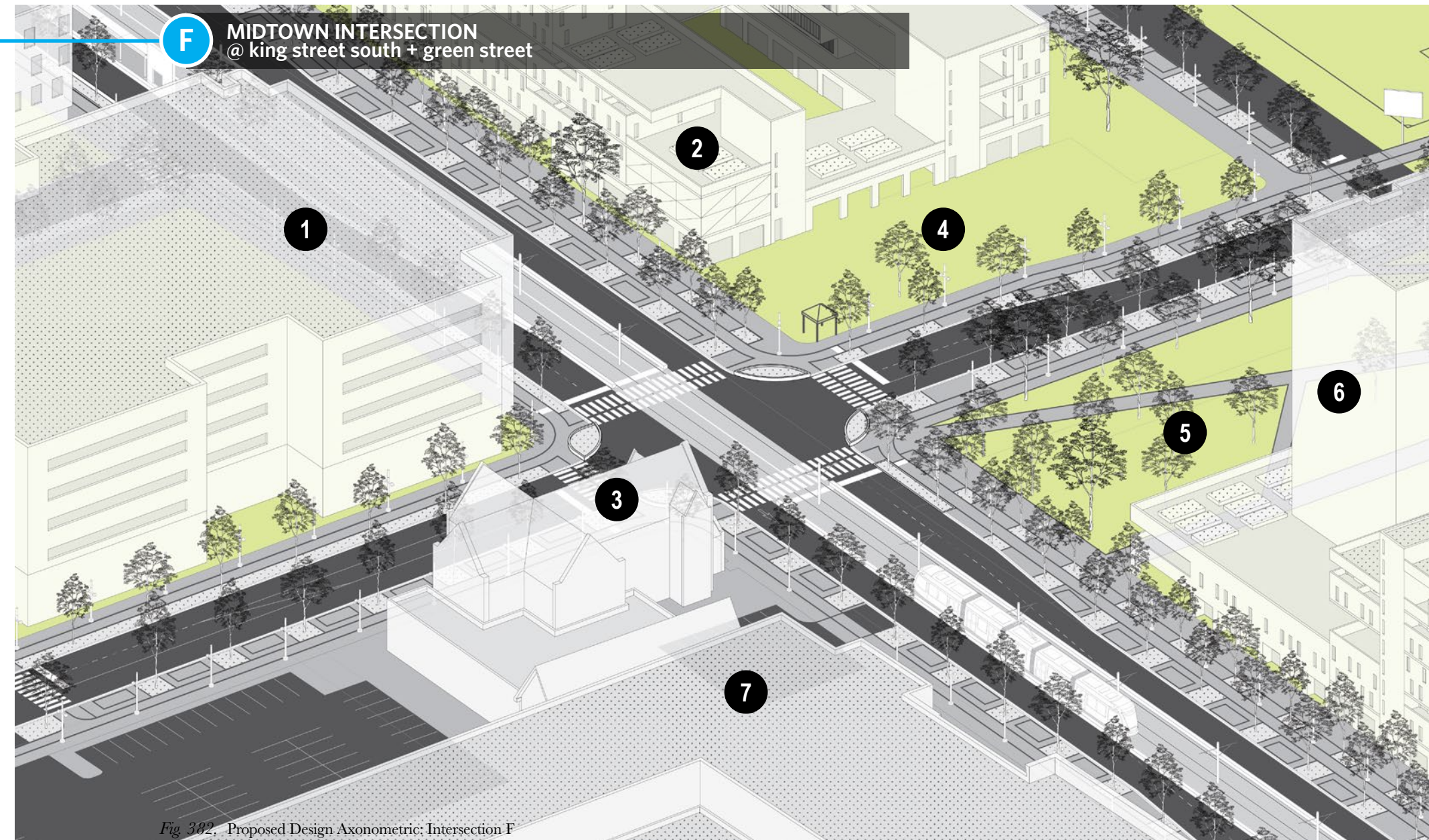


Fig. 382. Proposed Design Axonometric: Intersection F

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

1 The greenspace (shown in image to the left) is the primary field space for students 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 sportsfield¹⁶ 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.

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

¹⁶ Regulation field sizes: Football field: ~48m x 110m, Soccer Pitch: ~90-120m x 45-90m

Fig. 383. Aerial image of greenspace used for KCI sportsfield and Mount Hope Cemetery beyond.

Fig. 384. Image of traffic lights on King Street in Midtown.

Fig. 385. Central Fresh Market.

3 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.

4 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 borders 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 1874.¹⁷ It is now valued as a park and heritage landmark.

5 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.

¹⁷ http://www.kitchencemeteries.ca/en/resources/CEM_walkingtour_MountHope.pdf
<http://www.waterloo.ca/en/living/mounthopemeteries.asp>



Fig. 386. Proposed Design Axonometric Intersection G

URBAN PARK

conceptual image of secondary neighbourhood + greenspace



Fig 387. Conceptual Image at Urban Park

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

- 1 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.
- 2 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.
- 3 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

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.

southwest side of King Street to allow for added greenspace.

- 4 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 plates depending on building use.
- 5 Swath 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.
- 6 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.

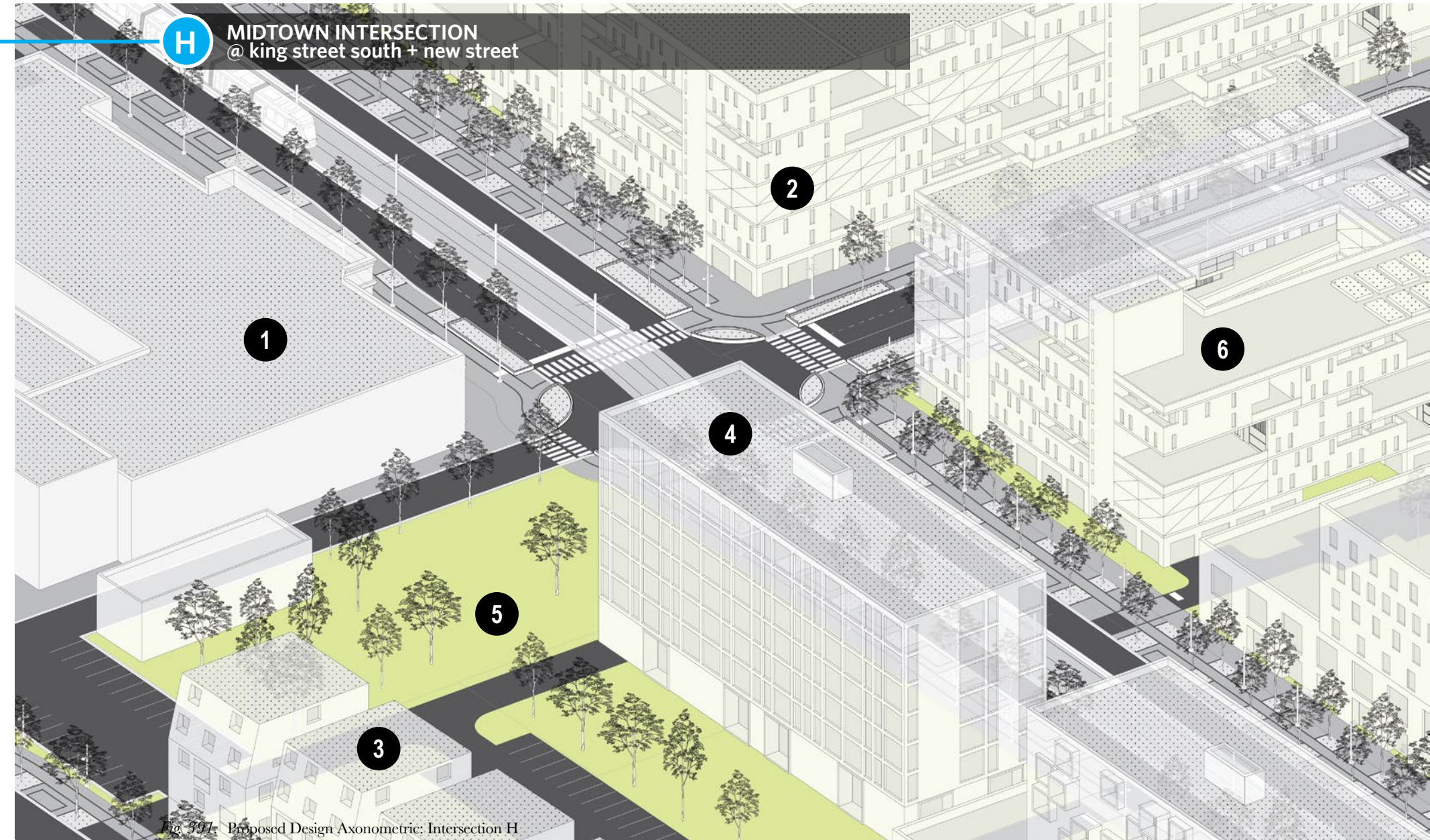


Fig 391. Proposed Design Axonometric: Intersection H

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

- 1** 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.
- 2** 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.
- 3** 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

Fig. 392. Exterior view of King Edward Public School.

Fig. 393. Exterior of the front corner of Midtown Lofts on King Street South.

Fig. 394. Aerial view of King Edward Public School and surrounding existing urban fabric.

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.

- 4** 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.
- 5** 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.
- 6** The one-way laneway between buildings on this block provides interior access points to buildings and exits onto King Street South.

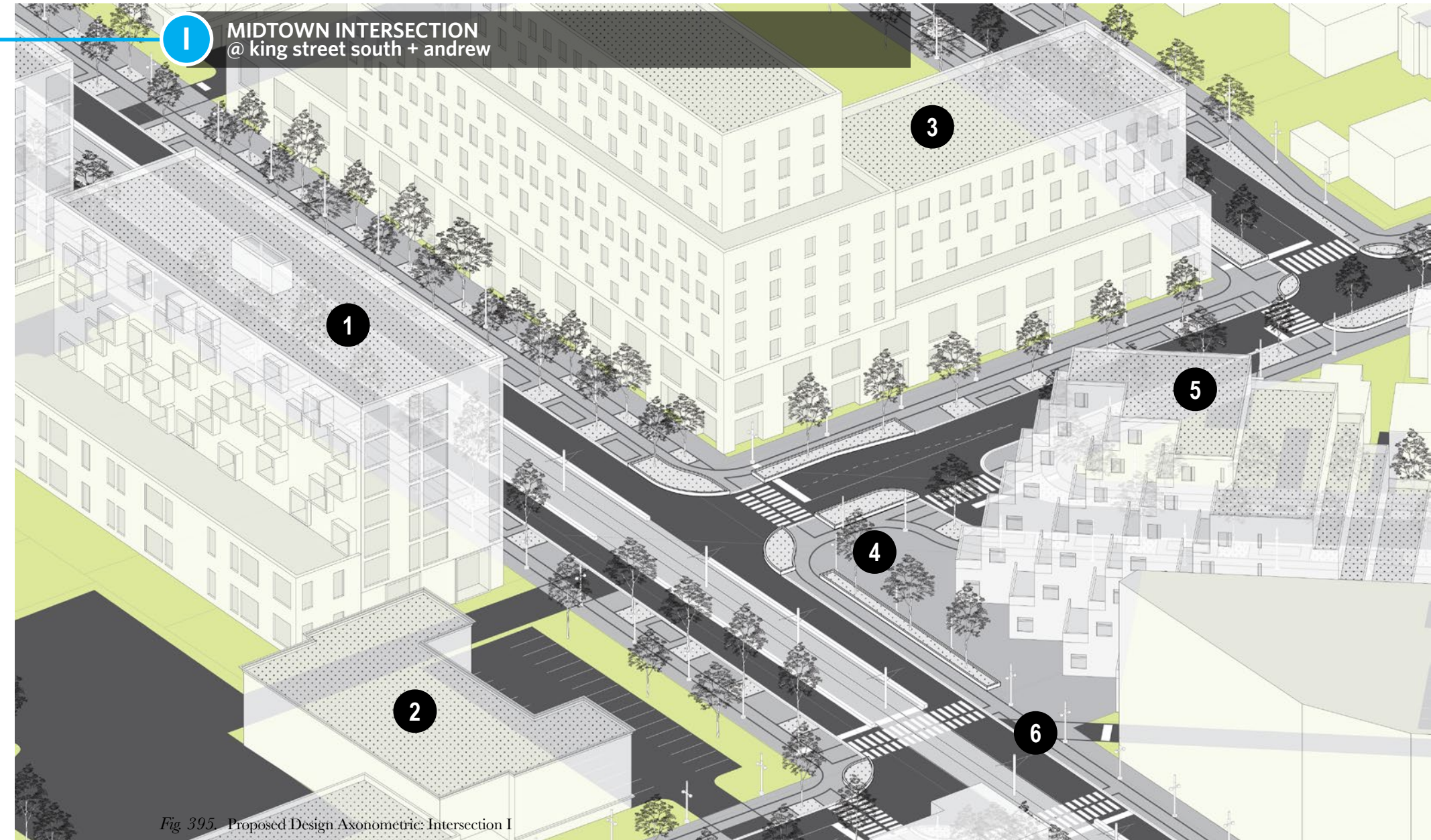


Fig. 395. Proposed Design Axonometric: Intersection I

STREET AERIAL

conceptual image of the transit corridor in birds eye view

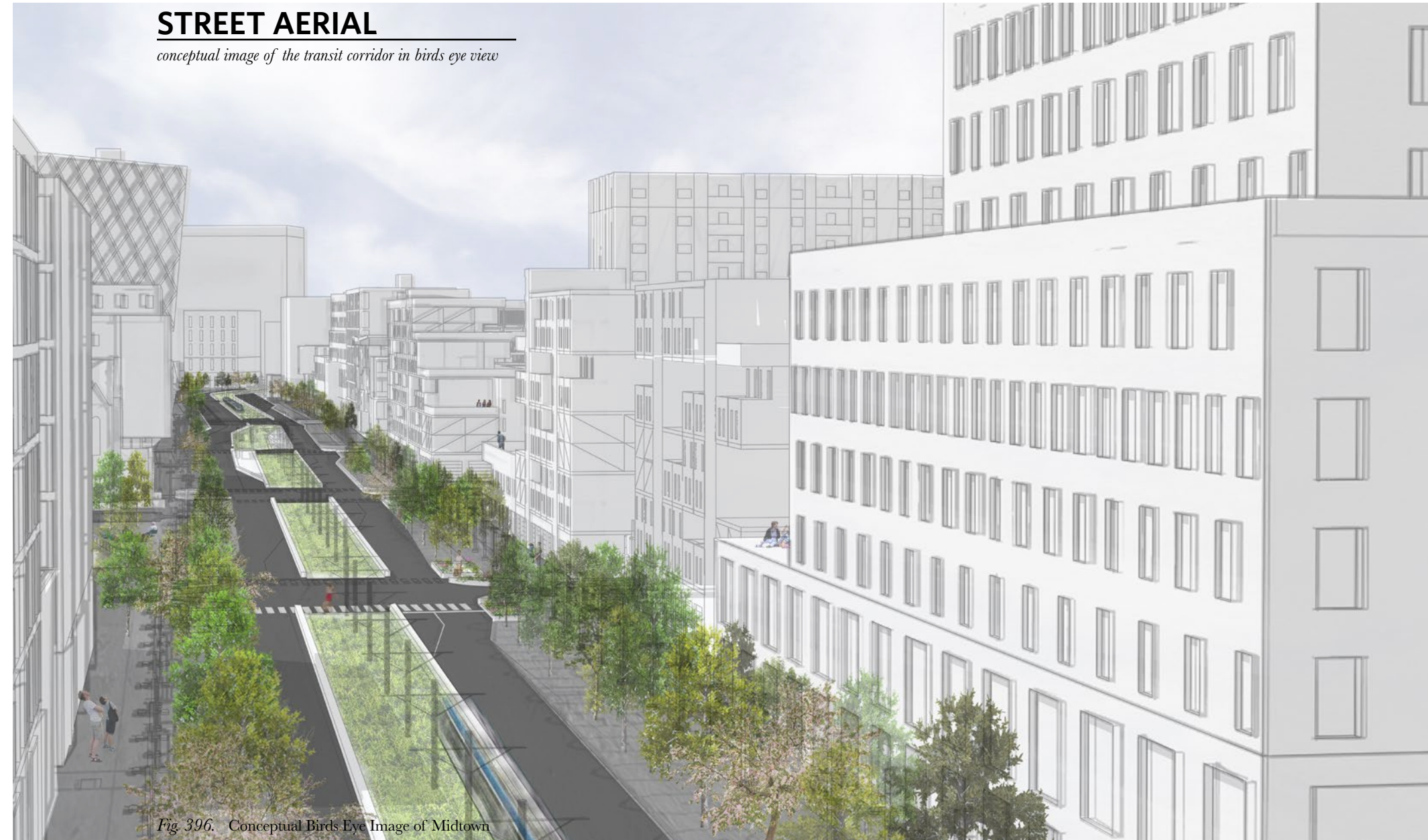


Fig. 396. Conceptual Birds Eye Image of Midtown

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 curb 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

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.

more gradual fade into the two-storey 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.

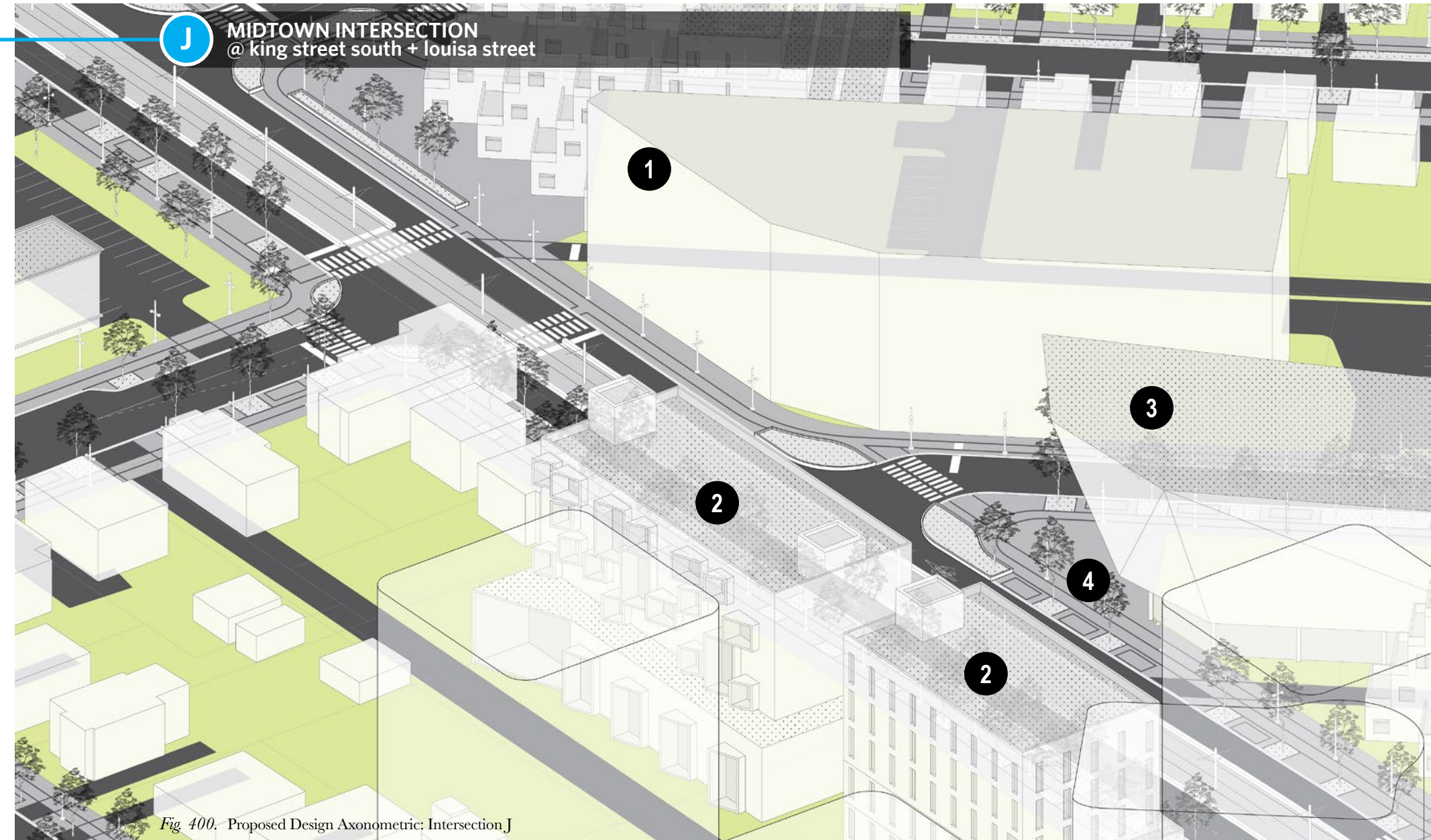


Fig. 400. Proposed Design Axonometric: Intersection J

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

- 1** 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.
- 2** 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, leaving ground floor space for
- 3** Linked townhouses are elevated above the ground floor plate 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.

Fig. 401. Top Left. Sixo Condo Development.

Fig. 402. Middle Left. Sixo Condo Development.

Fig. 403. Bottom Left. Sixo Development from Above.

- 4** The acute angle at northwest corner of the block allows extra space for a restaurant or event space to spill onto the street.
- 5** 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, highend residential and mixed-use units. The redevelopment is pictured to the left in conceptual images provided by Zehr Group.
- 6** The one-way laneway between buildings on this block exits onto King Street South.
- 7** A midrise courtyard building facing King Street and Moore Avenue/Breithaupt Street is described in next diagram.



Fig. 404. Proposed Design Axonometric: Intersection K

PROPOSED DESIGN AXONOMETRIC

urban condition in midtown



DESIGN FEATURES

- 1** This odd shaped courtyard building faces King Street, Breithaupt Street and Moore Avenue, backing onto an access laneway between buildings. The centre of the building has a generous courtyard for residents or public/private events, depending on the occupancy.
- 2** Future redevelopment site of the Former Ratz Bechtal Funeral Home. Imagery of the approved development is on the previous spread.
- 3** 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

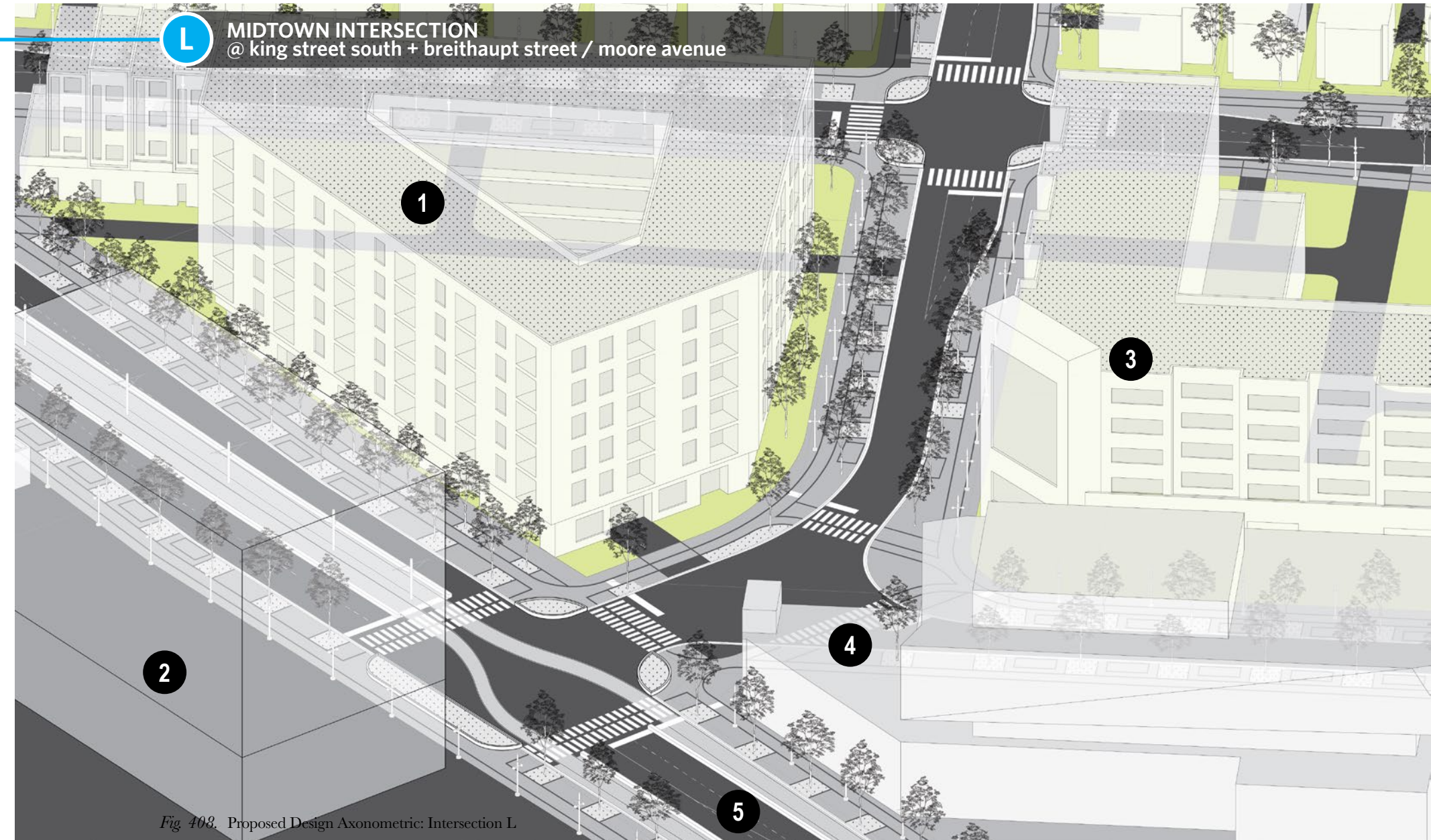
Fig. 405. Top left. Image of the former Ratz Bechtal Funeral Home and future site of Sixo Condo Development by Zehr Group.

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.

left to the south side of King Street for this reason.

- 4** Home of the Google Kitchener Waterloo Office which borders the site of future development of the Victoria Transit Hub.
- 5** 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).



L MIDTOWN INTERSECTION @ king street south + breithaupt street / moore avenue

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. Since he 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

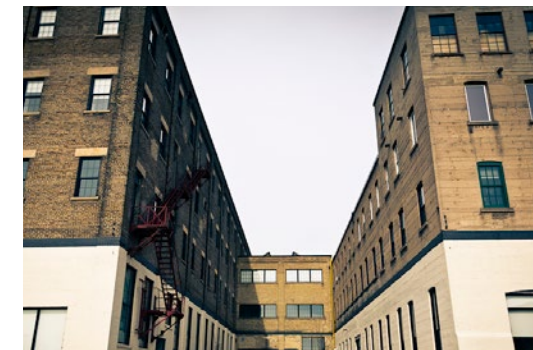
Fig 409. Upper Right. Shopify Restoration of the historic Seagram Distillery building.

Fig 410. Second Right. Interior of Velocity Hub.

Fig 411. Third Right. Breithaupt Block.

Fig 412. Bottom Right. Communitech, Kitchener.

DESIGNING FOR FLEXIBILITY + TRANSITIONAL USES



How can the site design be adapted for not only different areas along the ION corridor, but change over time as demand for different ways of living emerge, commercial needs change, or there is another major growth in population?

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 (use 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 Versus 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, artisan studios, 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.





SHUFFLING STOPS ON THE ION

areas for redevelopment in midtown

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 propose 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 employees' 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

future considerations for ion

This thesis examines Waterloo Regions 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 midscale cities that are seeing too much growth in suburban areas, or small concentrations of high density development, 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 is 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 understandably 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 process and document collection by the City of Kitchener, which has grown into a true planning multiple mega-report.

It now crowds the thesis when it didn't before, hence its absence in this body of work. This thesis anticipates much of the 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 curb-in approach, to avoid 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 massing 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.

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GLOSSARY

CREATIVE CLASS

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

COMPACT URBAN FORM

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

This is essential for the development of Waterloo Region so as not to expand beyond the existing boundaries of the urban fabric.

Varying Residential | Apartments | Transit | Retail | Multi-Storey Commercial | Hub Design | Neighbourhood

FORM-BASED CODE

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

GREATER GOLDEN HORSESHOE

The Greater Golden Horseshoe is a geographic area in Ontario, with a specific growth plan and vision. The GGH vision provides the basis for 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 competitive economy while maintaining diversity.
- + Protect, conserve and enhance natural resources of land, air and water for current and future generations.
- + Optimize the use of existing and new infrastructure to support growth in a compact, efficient form.
- + Promote collaboration among all sectors of government, private and non-profit—and residents)

ION CORRIDOR

The ION Corridor are 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 rights-of-way/transitways including buses and light rail for moving people.

Intensification along the corridor has the potential to provide a focus for higher density mixed-use development consistent with planned transit service.

CURB-IN URBANISM

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.

GLOSSARY

- SHED

A way of layering mapping studies by category to create new combinations of study for the Waterloo Region. Infra Eco Logi Urbanism uses sheds to help describe areas for development in the Great Lakes Megaregion.

Sheds in the Waterloo Region may include:

Agriculture-shed | Cafe-shed | Heritage-shed | Edu-shed | Econo-shed | Inno-shed | Water-shed | Cycle-shed | Culture-shed | Infra-shed | Tech-shed

URBAN IDENTITY

Urban is defined as relating to the characteristics of a city, and identity as the essential character of being as claimed; together they represent the essential character or characteristics relating to a city, hence an urban identity.

Urban identity exist mostly 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 census metropolitan area in Southern Ontario. They form the cities within the Region of Waterloo or Waterloo Region, alongside the Townships of North Dumfries, Wellesley, Wilmot and Woolwich. The Tricities are often seen as one area, however public vote has turned down the proposal for these cities to be officially amalgamated.

URBAN MILIEU

Urban surroundings, of a social or cultural nature.

The Creative 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.

Building | Street | Park | Urban Setting | Region | City

URBAN GROWTH CENTRE

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

WALKABILITY

The walkability of a neighbourhood or region can be defined as having access to all amenities necessary for a healthy lifestyle. The stray from big box stores and stripmalls is essential for the walkability factor. When you imagine walking to the grocery store, it's not always a long distance to the nearest intersection, but when the massive parking lot is factored in, this can decrease walkability and environment.