Post- Automobility: Applying Best Practices for Reducing Car Dependence to Toronto

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Abstract

What would a car-free downtown Toronto look like? As the threat of climate change looms and cities around the world prioritize public health, it is increasingly clear that cars, particularly those fueled by gasoline, are detrimental to a city's resilience, health, and vibrancy. Cities, including Toronto, are establishing goals of reducing car dependency and encouraging more people to use public transit, walk, or cycle. But our relationship with the car is one of path-dependent lock-in, with entrenched connections between the car and political economy, implications for the way we use land and space, and notions of individualism and the "good life". To truly break the grip that the car has on our urban spaces, interventions must be taken to disincentivize driving and make cars the least palatable choice of transportation mode. A review of case studies of cities from around the world reveals several practices in street design that could be employed in Toronto to discourage car use in the city's dense downtown area. Four possible design interventions are explored for two of Toronto's street types: the expressway, and the arterial.

Foreword

This paper is the culmination of two years of study to fulfill the requirements of the Master in Environmental Studies with a specialization in Planning at York University.

I used this paper to dig into the learning components of my Plan of Study (land use planning, public policy, and urban design) to unpack their relationship with automobility and reliance on the car. Through my research, I deepened my understanding of the complex political, economic, social and spatial processes that encourage the consumption and use of the car. One of the goals of my research was to answer a question that has been on my mind throughout my studies: of these three sectors, land use, policy, and design, which offers the most effective interventions for reducing car reliance? My answer: a holistic approach incorporating all three is best, but design offers the most immediate impact.

Within the first component, land use planning, this research has met all three learning objectives: 1.1 ("To obtain the knowledge and skills necessary to meet the program requirements of the Ontario Professional Planners Institute for candidate membership") and 1.2 ("To develop a deep understanding of land use planning methods and tools and history in Canada and Ontario") and 1.3 ("To gain comparative understanding of different methods and tools used elsewhere in the world, to have context in which to suggest changes"). In this paper I have employed a number of OPPI competencies, including written presentation and information and knowledge skills, engagement with emerging trends and issues related to the planning profession, and developing visions and outcomes. I have also strengthened my knowledge of planning and settlement history, municipal planning policy tools through a thorough analysis of Toronto's Official Plan and a number of secondary plans. Through my review of international case studies, I have been exposed to a breadth of alternative methods used in cities outside Canada.

For the third component, urban design, I have met learning objectives 2.1 ("To learn how to critically analyse the built environment, looking for financial and political motivations in city-building, as well as the role of power dynamics in urban design and planning") and 2.2 ("To gain knowledge of the history of urban design and modernism, to understand how our contemporary cities were built, and why they look and operate the way they do"). In the paper I have looked critically at the street and questioned why an overwhelming proportion of our urban space is devoted to the car, and dug into the economic, political and social processes behind that prioritization. I have engaged deeply with key 20th century works on design, space, and modernism, and have developed a strong understanding of the impact that mid-century city building still has today. While not explicitly part of my Plan of Study, I have also improved my practical design skills in creating renderings and models of my proposed interventions.

I am confident that this paper is representative of the work I have done in the MES program to combine my target learning objectives. I believe that my choice of focus has resulted in my development into a well-rounded planner with practical skills and the ability work within current planning and policy frameworks while thinking creatively and imagining ways of breaking the car-dependent mold.

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Introduction

How can Toronto massively reduce the use of cars? What transformative planning interventions are possible? Given that reliance on the personal vehicle is built into practically every aspect of our urban landscape and that our society highly values the independence offered by the car, transforming our built environment may seem like an impossible task.

The complete restructuring of Toronto's system of automobility is far too large a subject for a single graduate major paper: questions of land-use arise, economic entanglement, justice, and above all, politics. What interests me most is why Toronto continues to make driving the easiest way of getting around the city and cater to the car rather than people. Direct interventions in both policy and our built environment could shift the dominance of the city back to people from cars. Such policies and interventions have been successfully applied in other cities in Canada and elsewhere in the world. So, what are the best practices around the world for removing the influence and dominance of cars in city centres? Are any of those practices currently being implemented in Toronto and if not, how could they be applied here?

"Car" vs. "automobile"

These two terms are interchangeable, with "car" or "motorcar" being used more often in academic and professional writing and policy from Europe and "automobile" used more in North America. I am choosing to use "car" throughout this paper since it's what is used colloquially most of the time in Canada.

I have to start with the caveat that I myself own and regularly use a car and am not writing this paper as a diatribe against cars as a method of mobility. I grew up in a rural area and understand that most people in the country don't have access to decent reliable public transit. Even in the city, for certain trips, a car makes the most sense: transporting lumber for a DIY project, picking up a big load of groceries, dropping the kids off at hockey with all their equipment. But eventually the car seems like the essential choice for *every* trip, especially if your city is designed in a way that encourages driving. To use my own experience: my wife and I live in the east end of Toronto. Say my wife and I are going downtown to visit a friend who has recently moved to a new place at Adelaide and John Streets: according to Google Maps it's about ten minutes for us to zip south across the east end to the Gardiner Expressway, then about fifteen minutes from there to get downtown on the expressway, go north on Spadina Avenue, turn right on Adelaide Street, and arrive at our friend's building, about twenty-five minutes in total. Once we're there, over thirty on-street parking spaces are available within

two blocks, at a cost of ten dollars for two hours[1]. Compare this with a forty-five-minute trip on the subway at a cost of thirteen dollars for the pair of us. Why wouldn't we drive?

Toronto's population is booming and the development pipeline for the downtown and surrounding neighbourhoods is astounding. An extraordinary opportunity is present for the city to harness this growth to address its failings in sustainability, housing affordability, equity, and liveability. But on the other hand, the rapid growth could further cement our current situation: rampant gentrification and rising unaffordability, distributional injustice and systemic racism, and a public realm dominated by the car.

Toronto is taking many promising steps toward reducing the reliance on the car. New transit lines are being built and an extensive cycling network is planned. Land uses are being intensified and mixed, and compact, neighbourhood living is being encouraged. But I see potential for much bolder steps for a city that is expected to grow by nearly a million people in the next ten years[2]

Vision

I want to live and work in a Toronto where the *last* choice for transportation is to drive. Whatever the trip—going to work, picking up groceries, visiting friends—the chosen mode of transportation is public transit, cycling, or walking, and then, if absolutely necessary, the car. Fast, affordable (preferably free), reliable transit is within a ten-minute walk and can get me anywhere in the city I want to go. An interconnected network of separated cycling lanes and cycling priority streets reaches every corner of the city and lets me get where I'm going on a bike without having to mix with car traffic. I'm drawn to walking on wide sidewalks, under the shady canopy of large trees, through parks and public spaces that have green connections, space for the arts, street vendors and patios, and many outdoor "rooms" framed by human-sized urban form.

Well, none of the ideas in my vision above are ground-breaking. Much of this vision is present in strategic plans all over the world, including in Toronto's official plan. But I add this: I want a Toronto where taking the car isn't the *easiest* form of transport. Non-car transportation choices are *encouraged* by investment in transit improvement and expansion, land-use reforms to require mixed-use and transit-oriented development, and travel demand management (TDM) policies. But I believe to truly achieve large scale shifts, we need to see interventions that *discourage* the choice of the car. Until using a car is more time-consuming, more costly, or simply more irritating, people will invariably choose to drive.

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[1] Data from *Parkopedia*: https://en.parkopedia.ca/parking/meter/239_richmond_street_west/m5v/toronto/?arriving=202005261800&leaving=202005262000

[2] Government of Ontario, "Ontario Population Projections, 2018–2046," Report, Summer 2019, https://www.fin.gov.on.ca/en/economy/demographics/projections/projections2018-2046.pdf.

So, my vision for Toronto of the future is not one of a car-free city, but simply one where the car is subordinate to all other ways of moving around. It's a Toronto where the focus is on the circulation of *people*, not cars. It's a city where if I have to drive, I can, but driving is going to be my last choice, not my first.

I need to also acknowledge here that I am a young, able-bodied, cis, straight white male, and that I am comfortable in occupying spaces that many people are not safe or welcomed in, or unable to access. My vision for Toronto is coming from a place of privilege, and I need to bear this privilege in mind when examining the car and the city.

Rationale

Plenty of reasons exist to remove cars from the centre of our urban systems, the most immediate concern being climate change. It is accepted fact now that reliance on fossil fuels for transportation must end and that greenhouse gas (GHG) emitting gasoline-powered personal cars have to go. The most common proposal is that gas cars will eventually be replaced by cars that are carbon neutral, powered by electricity or non-GHG-emitting fuels like hydrogen. Electric cars certainly have a lower carbon footprint than traditional gasoline-powered cars or hybrids, but if considering emissions using a "well-to-wheel" lens, the savings are lower than they might seem at first, when considering all the energy involved in the production and distribution of the fuel of a vehicle in addition to its operation. As of 2013, over 67% of the world's electricity was generated by fossil fuel sources: an electric car powered by this kind of electricity only represents an approximately twenty percent savings in CO_2 emissions compared to a gas engine[3]. Thus, shifting the fuel of personal vehicles from gasoline to electricity will only curtail GHG emissions if energy production also follows a decarbonizing path.

Perhaps more importantly, while adoption of electric cars is increasing rapidly with battery costs decreasing, their widespread use is unlikely to occur in time to reduce GHGs by the amount needed to meet global climate change goals. According to analysis by Bloomberg New Energy Finance in 2016, electric cars are forecast to achieve a 35 percent market share of new private vehicles by 2040[4]. This would be a massive consumer uptake in electric cars from the less than one percent current market share, and will no doubt have devastating impacts on the oil industry, but will not be enough to achieve necessary reduction in greenhouse gas emissions if current patterns of car use continue on their current trajectories.

The electric-cars-will-save-us mindset also disregards the non-emissions effects of car use, like degradation of public safety and sprawling land use. The chokehold that cars have on the city has had devastating effects on public safety: despite Toronto's Vision Zero initiative, in 2019

[3] Venkat Sumantran, Charles Fine, and David Gonsalvez, *Faster, Smarter, Greener: The Future of the Car and Urban Mobility*, First MIT paperback edition. (Cambridge, Massachusetts: The MIT Press, 2018).

[4] Tom Randall, "Here's How Electric Cars Will Cause the Next Oil Crisis," Bloomberg, February 25, 2016, https://www.bloomberg.com/features/2016-ev-oil-crisis/.

there were 300 serious traffic-related injuries and 64 deaths, the large majority of which were pedestrians[5]. Even if the energy grid were to transition to completely carbon-free generation, electric vehicle battery production requires extraordinary amounts of lithium and other rare earth metals, which are associated with unsustainable mining practices and labour exploitation[6]. Thus, even a full decarbonization of the world's personal vehicles will continue a dependence on environmentally and social harmful extraction and consumption.

Study Approach

This section will outline my approach to understanding what makes people get in their cars, and what can be done to get them out. In order to critique the car, I draw upon *automobility*, which is a broad conceptual approach to questioning society's love affair with the car.

Automobility has a large body of literature that shows reliance on cars is an incredibly complex multi-scalar problem, with many paths to reducing car use (and much debate on whether automobility is even a problem). I've draw mostly on the range of writing that takes the normative approach that the world needs to detach from a path-dependent system that has tied politics, the economy, the self, and space to the car:

> …the contemporary city is not only a product of automobility, but the field upon which struggles originating under automobility are contested and transformed, producing new forms of vulnerability, inequality, and politics under contemporary capitalism. Any lasting reforms will thus have to involve changes not only to travel behaviour, but to the physical, social, economic, and political structure of the city as well.[7]

In the literature review I draw on research of automobility to try to unpack our society's relationship with the car and try to answer the question: Why do people drive? Our society, culture, and spaces have been transformed so completely by the car that the path to move away from reliance on the car is more complex than just offering better options for active or public transportation. Roadblocks must be put in place (pardon the pun) to disincentivize or even actively prevent choosing the car for that short trip to the store or to run across town to visit a friend. These strategies, which are being attempted all around the world, generally are confronted by growing pains and pushback from portions of the public (and affected industries, of course). I hope that this paper will help to contribute to the growing momentum

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[5] City of Toronto, "Vision Zero Dashboard," City of Toronto, October 3, 2019, https://www.toronto.ca/services-payments/streets-parking-transportation/road-safety/vision-zero/vision-zero-dashboard/.

[6] James Ellsmoor, "Electric Vehicles Are Driving Demand for Lithium—with Environmental Consequences.," *Solar Today* 33, no. 3 (2019): 13–15; Amit Katwala, "The Spiralling Environmental Cost of Our Lithium Battery Addiction," *Wired UK*, August 5, 2018, https://www.wired.co.uk/article/lithium-batteries-environment-impact.

[7] Alan Walks, "Driving Cities; Automobility, Neoliberalism, and Urban Transformation," in *The Urban Political Economy and Ecology of Automobility: Driving Cities, Driving Inequality, Driving Politics*, ed. Alan Walks (London: Routledge, 2015), 4–5.

away from car-reliant cities by showing that these growing pains are to be expected given the deep lock-in and entrenchment of the system of the car in our psyches.

In the second part of the paper, I look Toronto's relationship with the car, examining the city's historical and policy context. I have approached this view using the lens developed from the literature review: how has politics and spatial planning shaped transportation choices in Toronto? I am then focusing in on two road typologies present in Toronto, the expressway and the arterial, and exploring different possible urban design typologies to transform them away from prioritizing the car.

Figure 1: Boundaries of Downtown Toronto *(Google Earth)*

For the purpose of this paper I will be narrowing the scope to Toronto's Downtown. The City of Toronto defines the boundaries of the downtown in its Official Plan as roughly from the shore of Lake Ontario in the south to the Canadian Pacific rail corridor and Rosedale Valley Road in the north, and from Bathurst Street in the west to the Don Valley in the east. Downtown is the heart of the city economically, culturally, and socially; the area has the highest residential and employment densities in the city, and the convergence of most of the local and intercity transit lines. Union Station, the busiest multi-modal station in Canada, is at the heart of the downtown, within walking distance of the city's financial district, bringing in thousands of workers to the area every day. Downtown is home to more than 500,000 jobs and almost 240,000 residents, and the population is projected to nearly double by 2041[8]. The city has acknowledged the area, along with four other Urban Growth Centres, as the priority targets for growth over the coming decades and is developing a number of planning frameworks to deal with the coming growth, as well as to improve the quality of life for its current users.

To address automobility and car dependence in Toronto requires the use of a number of planning policy levers, of which urban design is only one. Intensification and diversification of land uses and effective supply of public transit are arguably the two most important factors in reducing Torontonians reliance on private transportation, to counter the sprawling development that has afflicted the Greater Toronto Area for the past seventy-five years. But still, while we may not be as bad as some of our contemporaries in the United States, Australia, or Asia, Torontonians still have an addiction to our cars, and the design of our roadways is a potential intervention point to address that addiction.

[8] City of Toronto, "TOcore: Overview," November 16, 2017, https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/tocore-planning-torontos-downtown/tocore-overview/.

To develop ideas for these interventions, I have gathered a number of international case studies. One of the exciting aspects of this area of research is that the movement away from the car to sustainable transportation is happening at a dazzling pace all over the world. Given the time, I could easily find enough case studies to write multiple PhD dissertations, especially with the wide scope I have given myself on this project. I tried to narrow the range of case studies somewhat through two criteria:

1. Deliberate re-allocation of car space or restriction of use: I focused as much as possible on cities who are not attempting to compromise and please all users, instead trying to use case studies where cities are aggressively minimizing the car's place in their spaces, or actively making it more difficult to drive.

2. Reduce, re-use, recycle: I tried to find case studies where major change has happened (or will happen, or could happen) by adapting existing infrastructure, allowing for a lower cost intervention with less disturbance to the existing urban fabric.

Why do we drive?

Cars as places of independence and autonomy are almost antithetical to the collective nature of the city. The *urban* is characterized by a certain critical mass of human activity where the benefits of density begin to outweigh the downsides. All of the pros of the city: easy access to essential services, employment, education, and public transportation, are only available because they are supported by a large number of people living together in close proximity. The stark individualism of the car, especially the common single-occupancy car use that is most typical of commuters, goes completely against this collective nature of the urban. The finite space between private property that exists in a city that should be used collectively becomes dominated by individual use, and thus precludes all the urban benefits. I think that the factors encouraging our use of cars can be broken down into three relationships:

The car and political economy: how the car became intertwined with economic policies and movements at all political levels, and governments' role in subsidizing its use.

The car and space: cars shape urban and exurban spaces through land use and urban design, and then those spaces feedback and encourage car use.

The car and the individual: the ideology and culture of the car, and the role of rational choice theory in explaining car use.

The Car and Political Economy

The period since the late 19th century, sometimes called the "Long 20th Century"[9], has been defined by the car. This century-and-a-half saw a massive transformation of much of the world according to the codes and rules of capitalism. Most of the industries instrumental in that transformation can be connected to the car in a complex network of resource extraction (ore for steel and aluminum, glass, petroleum and oil), production (engines, chassis, bodies,

[9] Arrighi, 1994, quoted in Walks, "Driving Cities; Automobility, Neoliberalism, and Urban Transformation," 3.

electronics), consumption (dealerships, financing), and disposal (car wreckers, recycling). The car has played a key role in processes of production but also of consumption culture: "the use-value of cars [permitted] extraordinary modes of mobility, new ways of dwelling in movement and the car culture to develop"[10].

Although different forms of self-propelled vehicles for individuals had been evolving since the 18th century, the first true cars were developed in the 1880s. The car was initially an expensive plaything of the rich, but with Henry Ford's use of the Taylorist production line and the development of the Model T, the costs of production and thus the price of the car dropped dramatically. The car rapidly went from a luxury item available only to the wealthy as a status symbol to an everyday consumer good[11]. The car was the number one manufactured object of the twentieth century, with an estimated 1 billion produced[12] and beyond housing, the car is still the most important household major item of expenditure. The economic policies pursued by most Western governments following the Great Depression had the goals of full employment and mass consumption: the family supportive wages created by these policies allowed for everyone, even working-class people, to be able to afford a car[13]. After the economic and oil crises of the 1970s, the car industry was a beneficiary of neoliberal policies, (e.g. flexible accumulation, deregulation, privatization, trade liberalization) which are in service to propping up the global car system[14]. This includes lowering costs of production through offshore manufacturing, enhanced resource extraction abilities, and global supply chains, but also consumption, with free trade agreements opening up lucrative new markets for car manufacturers.

So, since the invention of the car, its consumption and use has been encouraged by a relationship between industry and policy makers. Freund and Martin[15] call this the Auto-Industrial Complex. In the urban context, complex has presented itself in informal coalitions of members of the auto lobby, city businesses with an interest in circulation of car traffic in and out of the city, and public sector transportation and planning authorities. The interventions of automobility-based industry can be direct, as in the oft-cited example of GM and other car companies buying up American streetcar networks and dismantling them to replace them with buses[16]. Usually the interventions have not been as direct, however, and the argument is not that the auto-industrial complex is pulling the strings of the state, but that incremental changes and policy decisions over the course of the past hundred years has led to a widespread lock-in with the car on economic, social, and spatial lines. Freund and Martin call this *auto hegemony:*

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[10] Mimi Sheller and John Urry, "The City and the Car," *International Journal of Urban and Regional Research* 24, no. 4 (2000): 737.

[11] *Mobilities* (Cambridge: Polity, 2007).

[12] Urry, 115.

[13] Walks, "Driving Cities; Automobility, Neoliberalism, and Urban Transformation," 10.

[14] Walks, 11.

[15] Peter Freund and George Martin, *The Ecology of the Automobile* (Montreal: Black Rose, 1993), 133.

[16] Freund and Martin, 135.

> …the embeddedness of auto-centred transport is grounded in more than the auto-industrial complex. Automobility meshes well with the short-term economic rationality that is the strength of the market, which sets the price of everything but which does not reveal the value of anything. Additionally, automobility provides livelihoods for many people. In so far as any proposals to reduce auto use are advanced, the opposition of the working class cannot be considered irrational. It reflects well-grounded fears about the loss of jobs. It is another example of the contradiction between individual and collective interests in society.[17]

The public subsidizes a host of hidden economic, environmental, and social costs to private car use. Where for most forms of public transit, such as a light-rail transit project, the costs are all highly visible (substantial capital investment, delays and overruns, physical assets such as rails, cars, signals) and the personnel), the costs of car use are highly dispersed and spread across the public and private realms[18].

Table 1: Public costs of car use

Economic Costs	**Environmental Costs**	**Social Costs**
• Capital and operating costs of road infrastructure • Costs of car ownership for individual motorists, including debt from easy-to obtain car loans • Government subsidies of industrial sector e.g. oil and gas subsidies, car manufacturer bailouts	• Greenhouse gas emissions and air pollution • Impact of resource extraction e.g. oil industry, smelting for steel • Impacts of urban sprawl e.g. loss of natural areas, increased run off, noise and light pollution	• Public health threats from pollution, noise, and accidents • Increased inequality due to lack of access to needed services without a car • Reduced liveability in urban areas that are dominated by cars

The public subsidization of the car is in fact, directly tied to its rise to dominance. While Ford's Model T may have broken the mold for the car as a luxury item and made it available to the average consumer, for the first fifty years or so of the car's existence there were not actually many roads suited for driving on. Most rural roads were unpaved, and the streets in cities that were paved were usually done so with cobblestones, a recipe for a bumpy ride for motorists in the time before proper shock absorption. It wasn't until the 1930s that public authorities began providing infrastructure appropriate for cars to use at the speeds we are accustomed to driving at today: a perfect example is the autobahn system developed under the Nazi

[17] Freund and Martin, 139–40.

[18] Freund and Martin, 130.

regime in Germany[19]. The most pointed-to government intervention in promoting the use of the car is the United States Interstate Highway Act of 1956, which sped up he suburbanization of large swaths of the American countryside and encouraged commuting by car[20]. As the popularity of the car soared, the formalization of driving increased, including legal requirements for training and licensing for motorists, and "rules of the road" (both written and unwritten) developed that segregated road space and excluded pedestrians. The next section will address how the car has come to dominate public space in the city.

The Car and Space

The way we see and move through our spaces, especially in the city, has a direct relationship to the type of society we have. The division of public and private spaces has slowly increased to varying degrees since the time of Ancient Greece, where the *agora* was a simultaneously a space of commerce, politics, culture, and religion. As the world modernized, spaces slowly became more specialized: separate spaces were created for worship, for commercial activities, etc. In the twentieth century, the advent of the car and modes of instant communication (telegraph, telephone, radio, television, and now the internet) amplified this segregation and further limited the need for face-to-face interaction[21]. The movement from the public to the private has been a key aspect of liberal-democratic capitalism in the past two centuries, and the opposite, the making-public of traditionally private, domestic spaces like kitchens have been key tenets of anti-capitalist regimes[22]. Nevertheless, Sheller & Urry[23][24] argue that critical analysis of space has neglected the way that people move *between* the public and the private:

> Places are presumed to be relatively fixed, given, and separate from those visiting. The new mobility paradigm argues against this ontology of distinct `places' and `people'. Rather, there is a complex relationality of places and persons connected through performances…Thus activities are not separate from the places that happen contingently to be visited.[25]

Sheller and Urry argue that urban life has been completely reconfigured by the car, and that the binary view of the car as either an invader and destroyer of the urban fabric or a neutral catalyst for a natural societal progression is less useful than an approach that conceives of a

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[19] Urry, *Mobilities*, 114.

[20] Freund and Martin, *The Ecology of the Automobile*, 130.

[21] Ali Madanipour, "Why Are the Design and Development of Public Spaces Significant for Cities?," *Environment and Planning B: Planning and Design* 26, no. 6 (1999): 879–91, https://doi.org/10.1068/b260879.

[22] Eve Blau, *The Architecture of Red Vienna* (Cambridge: MIT Press, 1999).

[23] Mimi Sheller and John Urry, "The New Mobilities Paradigm," *Environment and Planning A: Economy and Space* 38, no. 2 (February 2006): 207–26, https://doi.org/10.1068/a37268.

[24] Sheller and Urry, "The City and the Car."

[25] Sheller and Urry, "The New Mobilities Paradigm," 214.

network of mobilities through "automobilized time-space"[26]. Cars allow but also force people to stretch out their lives across longer distances. Places of work are separated from places of residence, and in many places modern life is impossible without a car. The removal of spatial constraints from a person's daily journeys, epitomized by mass suburbanization and segregation of land-uses has simultaneously introduced new temporal restrictions and uncertainties. Car users have to live their lives in "spatially stretched and time-compressed ways"[27]. As compared with commuters on a train, who operate in temporal sync with each other and are mostly removed from the decision-making of their movement, car users are constantly juggling and managing tiny increments of time, having to update and react to new situations.

Cars become a background to everyday life, to the point that we just take their presence for granted; and we are constantly aware of them. Most of the light in a city, which in most metropolitan areas has long since rendered the stars invisible, comes from cars or their infrastructure: headlights, turn signals, streetlamps, and high-intensity stadium-style lights illuminating our highways and arterials[28]. Wherever we are in a city, the predominant player in the urban soundscape surrounding us is the car: the soft whoosh of tires along a quiet street; the hum of traffic whizzing along a nearby freeway; the beeping of gridlock under an office window; our next door neighbour roaring up his BMW convertible at six in the morning. As city-dwellers our senses have become so attuned to the presence of cars that we are constantly aware of them in our periphery, unconsciously shoulder checking for an oncoming vehicle before we enter their domain in the street - an inherent urban skill most people have yet to develop regarding cyclists. Even the smell of cars or their infrastructure is ingrained into city life: a smorgasbord of gasoline and diesel exhaust fumes, hot rubber and asphalt assault the nose as we step onto Yonge Street or Park Avenue or the Champs-Élysée. So, everyone who lives, works, and moves through the space of the car, whether or not they drive themselves, is sensorially reinforced and reminded of its presence and dominance.

The Street as Public Space

One of the fundamental debates that this paper is based in is on the role of the street as a transport corridor or a public space. The street as a place primarily for cars seems to be a basic truth in North American cities, but this was not always the case. Early in the life of the car, motorists were seen as nuisances, endangering other users of the streets and belching pollution. But gradually, deference to the "sovereignty of the auto"[29] grew, in part as a reaction to the dangers of mixed traffic, but also as part of a greater movement equating modernity and progress with the speed and autonomy of the car. Le Corbusier's idea for the

[26] Sheller and Urry, "The City and the Car," 738.

[27] Sheller and Urry, 744.

[28] Nigel Thrift, "Driving in the City," *Theory, Culture & Society* 21, no. 4–5 (October 2004): 41–59, https://doi.org/10.1177/0263276404046060.

[29] Freund and Martin, *The Ecology of the Automobile*, 112.

Ville Contemporaine called for segregation of traffic and people, seeing cars as the way forward for transportation and seeing no place for people in a street[30]. The spatial separation of uses that characterized modern planning is most evident in the central business districts of cities all over the world (but especially in North America), characterized by downtown high-rise offices, ample on- and off-street parking, and low residential density in the inner city surrounded by sprawling residential suburbs. This "corporate city emerged in the auto age and its mediums - expressways, parking lots, malls, and commercial strips - dominate land space" [31]. Toronto may have avoided a full transition to this type of urban structure, but in the 1970s there were still masses of parking lots filling the downtown core. This paradigm results in the creation of "dead spaces" that car commuters move through between the private spaces of work and home, without any opportunity for physical or social connection: "Sidewalks are viewed as "pedestrian movers" and many suburbs do not even build them. Even in areas where pedestrian travel is the dominant mode of transport, space is disproportionately allocated to auto use"[32].

Figure 2: Downtown Toronto as a parking lot in the 1970s (City of Toronto Archives)

City of Toronto Archives, Series 1465, s1465_fl0059_id0005

The lack of spaces for connection in modern cities has been decried by countless urbanists since the middle of the twentieth century. Jane Jacobs famously railed against the razing of New York neighbourhoods for expressways in the 1950s, arguing that streets and sidewalks serve many more purposes than simply for circulation[33]. Sidewalks, especially, are gathering spaces, spaces for commerce, for family life, and for political action. The street as a pre-twentieth century multi-use public space serves all these purposes, but the street as an auto space serves only one purpose: moving cars.

Public spaces can offer opportunities for passive social interaction as well. Jacobs argues that the activity of other people is an irresistible attraction that draws people into the street or encourages them to linger[34]. In observations of Strøget, the main pedestrian street in Copenhagen, Danish architect Jan Gehl found that when people stopped, it was primarily to take in other people's other activities on the street, rather than, say, to look in a shop window. Gehl says that "it was obvious that human activities, being able to see other people in action,

[30] Le Corbusier, *The City of Tomorrow and Its Planning*, trans. Frederick Etchells, 8th ed. (New York: Dover Publications Inc., 1929).

[31] Freund and Martin, *The Ecology of the Automobile*, 113.

[32] Freund and Martin, 113.

[33] Jane Jacobs, *The Death and Life of Great American Cities*, Modern Library Edition (New York: Modern Library, 2011).

[34] Jacobs, 47.

constituted the area's main attraction"[35] For example, he found that people would rarely stop to look at a half-built building but would stop to observe construction workers in action. Gehl conceives the built form of these spaces as "life between buildings". He describes these as places where incidental contact may happen, as opposed to grand destinations like Central Park where one's presence is intentional and deliberate. In these interstitial spaces, Gehl theorizes that one can have low intensity contact with other people, in an "undemanding way"[36]. Ray Oldenburg agrees and bemoans the disappearance of an "informal public life"[37] stemming from the segregation of land uses and suburbanization of America. As places of residence became more decentralized, people began to draw sharper divides between work and home, and the space between them, what Oldenburg calls the "third place"[38] disappears.

In the course of a century or so, the street, a space that for hundreds of years was the setting for public life, has been totally transformed into a space solely for movement, mostly in private cars. The spaces between our cities' buildings are divvied up, with the largest share going to motorists, and a small pittance thrown to pedestrians along the edge. The result is that being on foot in most places in a city is a stressful experience: navigating a narrow, crowded sidewalk while cars whip closely by at 40 to 50 kilometres per hour. This further drives people from the street and reinforces the idea that the street is a place for cars. Moreover, the negative experience as a pedestrian feeds the idea that the best way to experience the city might just be to get in a car ourselves.

The Car and the Individual

In this section I discuss the love affair we have developed with the car as a result of its pervasive presence in our political economy and space. The explosive growth of the car over the 20th century and our dependence on driving is intertwined with the development of an ideology that deifies the car as the ultimate emancipator. The speed, power and flexibility of the car has aided in a massive paradigm shift from societies who had nominally collective mobilities to ones with private transport, and in which the choice of when, where and how I get somewhere is my own. This ideology is highly tied to notions of freedom and liberty, particularly in the United States, as well as the idea of the body and autonomy. The car has become an extension of the self. Gorz[39] argues that the transcendence of time, space, and class that a personal vehicle offers is the ultimate social divider. Cars are intrinsically anti-social and must be enjoyed at the expense of others, a mobile version of the "commons"[40]. By each of us choosing to drive in our own self-interest (the car being in theory the fastest, most

[35] Jan Gehl, *Life Between Buildings* (Washington, D.C: Island Press, 2011), 29.

[36] 15–16.

[37] Ray Oldenburg, "The Problem of Place in America.," in *The Urban Design Reader*, ed. Michael Larice and Elizabeth Macdonald, Second (London: Routledge, 2013), 290.

[38] Oldenburg, 292.

[39] André Gorz, *Ecology as Politics* (Boston: South End Press, 1980).

[40] Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge: Cambridge University Press, 1990), 2.

direct way of getting from Point A to point B), we collectively make things worse for ourselves through increased congestion.

Freedom

At the time of its invention in the nineteenth century, urban areas were in the thick of the industrial revolution, driven by coal and steam, and much of an industrial city was not a nice place to live, particularly for the labourers working in the mills and factories (think of the soot-coated cobblestones of Dickensian London). The negative aspects of this situation were being addressed in many different ways, from the theorizing and writing of Marx and Engels to the housing reform movements and Garden City ideologues like Ebenezer Howard. Living conditions were crowded and unsanitary, but workers had little choice in their employment, lacking any real mobility. Enter the car, which many of its proponents argue offered economic emancipation[41]. While the division of labour and mechanization of modern industrial capitalism offered some new autonomy for workers, the ability to separate place of residence and place of work only took full force with the widespread availability of the car. This "dramatically extended the geographical radius of possible employment venues" and thus "the market for labour came more closely to approximate the economists' model of many sellers and many buyers"[42]. This is of course choosing to ignore state-provided mobilities that pre-dated widespread car use, such as streetcars, and is equating the choice of location with the choice of labour. Additionally, arguing that the car was a great social emancipator fails to account for the fact that in the early days of the car they were incredibly expensive, seen mostly as a luxury toy of the rich, and unlikely to afford new freedoms to an exploited steel mill worker. Nevertheless, the narrative of the car as the ultimate equalizer of labour has persisted, "a device that transformed the locally bound worker into a free yeoman"[43].

The freedom of mobility afforded by the car is also tied to the frontier ideals prevalent in North America, a motorized extension of manifest destiny. Freund & Martin argue that in the United States, geographic mobility is directly linked to social mobility, and that the car allowed for the transcendence of the hassles of urban life (poverty, congestion, pollution, violence, etc.) by those lucky enough to afford a private car[44]. Some supporters of the car argue that the explosion of suburban developments in the middle part of the twentieth century suburbia is proof that people began using the flexibility of the car to exercise these choices. Lomasky argues that critics of automobility fail to note that people *choose* to commute in traffic congestion, i.e. that the benefits of living in suburbia must outweigh the costs of commuting - "the more the critics emphasize the magnitude of the costs, the more these critics underscore, often unwittingly, the extent of the benefits"[45].

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[41] Loren E Lomasky, "Autonomy and Automobility," *The Independent Review* 2, no. 1 (1997): 5–28.

[42] Lomasky, 17.

[43] The Economist, "The Unfinished Revolution," *The Economist*, January 25, 1986.

[44] *The Ecology of the Automobile*, 83.

[45] Lomasky, "Autonomy and Automobility," 15.

The movement of the modern (mostly white) middle class to the suburbs in the mid twentieth century led to the centralization of the car in daily life, what Sheller & Urry[46] call "dwelling in mobility". The stretching of the distance between home and work for most people requires movement through spaces that are car-only, which motorists quasi-inhabit while sitting in traffic, "sites of pure mobility within which motorists are insulated as they "dwell within the car"[47]. It has been common practice for decades to advertise "the family car": a 1949 Ford advertisement espoused the virtues of the "living room on wheels"[48] and almost seventy-five years later we have doubled down on that idea, buying minivans with built-in WiFi. More importantly, perhaps, is the ability of the car to provide a sealed environment, protected from the noise and smells of the world outside, climate controlled and comfortable[49]. A myriad of services is also devoted to preventing a motorist from having to leave their vehicle. Want entertainment? Go to a drive-in movie[50]. Hungry? Thousands of fast-food restaurants exist with drive-thrus, even in dense urban centres. We live in a world where we can do our banking, get an oil change, pick up a prescription at a pharmacy, grab a coffee, have groceries loaded into our trunk, and even purchase alcohol (in some places) without ever having to leave our car. The blurring of lines between domestic life, mobility, and work life happens much more in the car than in other forms of transit: think of the "back-seat" driver or reliance on passengers for navigation[51]. For many commuters the car becomes an extension of the office: work starts while stuck in traffic, making calls, answering emails, etc.[52] Driving has become ubiquitous in our lives: TV and radio news provide updates on traffic conditions, and apps like Google Maps and Waze have mined enormous amounts of data in the service of improving the efficiency of car trips.

More than almost anything, the car has come to represent the "good life"[53]. Pop culture is riddled with car references from the Talking Heads ("You may find yourself behind the wheel of a large automobile") to Britney Spears ("You want a Bugatti? You want a Maserati? You better work bitch")[54]. Films and television shows are filled with cars, whether as background, or in title roles (*Drive, Baby Driver, and Ford v Ferrari* being recent high-profile examples). Car and motorcycle culture are massive: racing events like NASCAR, F1, and rally championships, clubs for every model imaginable, swap meets, memorabilia, kit cars, etc. Every year

[46] Sheller and Urry, "The City and the Car."

[47] Sheller and Urry, 746.

[48] Quoted in Freund and Martin, *The Ecology of the Automobile*, 83.

[49] Urry, *Mobilities*, 113.

[50] The author acknowledges that drive-ins have mostly gone to the wayside in the age of Dolby Digital Surround Sound and reclining stadium seating but respectfully requests you indulge the argument.

[51] Sheller and Urry, "The City and the Car."

[52] Eric Laurier, "Doing Office Work on the Motorway," *Theory, Culture & Society* 21, no. 4–5 (October 2004): 261–77, https://doi.org/10.1177/0263276404046070.

[53] Urry, *Mobilities*, 117.

[54] As I write this, I'm by chance listening to a song called "The End (Music for Cars)" by one of my favourite bands, The 1975.

thousands of people descend on car shows, including the Canadian International Auto Show in Toronto, to ogle new supercars and get a chance to try a new family SUV on for size. Car advertisements are everywhere, offering to solve most of life's problems by tossing a kayak on the top of a Mazda and driving out to a national park somewhere. A recent ad for the Subaru Impreza spoofs pharmaceutical ads, opening on a number of depressed looking millennials:

> VO: Are you binge-watching…everything? Have you reached the end of the internet? You may be experiencing symptoms of extreme boredom. Feel renewed with new fast-acting Impreza! Symmetrical all-wheel drive stimulates feelings of Whoohoo! Impreza is not for everyone: amazing fuel economy may cause road trips, Apple CarPlay has been known to lead to karaoke, LOL moments, and prolonged smiling. Cure boredom FAST, with new Impreza.[55]

The Car and the Body

The car allows for the unconstrained projection of oneself onto the world[56], and some theorists even conceive of a "car-driver" hybrid where the line is blurred between the two[57]. This idea is reinforced in the daily language we use in reference to cars: "There are so many cars on the road today" instead of "There are so many *drivers* on the road", or "A pedestrian was struck and killed by a car" instead of by "a motorist". We unconsciously perform a conversion in our heads whereby the car becomes an entity unto itself, and the driver becomes anonymous. This is not a phenomenon afforded to cyclists, by the way, who lack the 3000 pounds of climate-controlled metal and plastic shield: their humanity is as exposed as their bodies.

The extension of the self through the car is an extension of the body[58]. There is a physiological connection between the motions of the car and the emotions of the driver, both negative and positive[59]: the wind whooshing by an open window, the lurch of the stomach with swift acceleration or braking, or the calming hum of tires on highway asphalt. The car also has deep connections to sexuality, eroticism and power. The sensuality of a car's curving bodywork is emphasized in car ads, and the backseat is the quintessential scene of adolescent sexual experimentation. Much of this sexualization is highly gendered: according to Freund &

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[55] *New Fast-Acting 2020 Impreza [Commercial]*, 2020, https://www.youtube.com/watch?v=X3JJqAgCDbw&feature=emb_title.

[56] Freund and Martin, *The Ecology of the Automobile*, 87.

[57] Sheller and Urry, "The City and the Car"; John Urry, "The System of Automobility," *Theory, Culture, & Society* 21, no. 4–5 (2004): 25–39.

[58] Freund and Martin, *The Ecology of the Automobile*; Urry, "The System of Automobility"; Urry, *Mobilities*; Sheller and Urry, "The City and the Car"; Mimi Sheller, "Automotive Emotions: Feeling the Car," *Theory, Culture & Society* 21, no. 4–5 (October 2004): 221–42, https://doi.org/10.1177/0263276404046068.

[59] Sheller, "Automotive Emotions."

Martin[60], "the cultural values of automobility find their psychic analogue in a masculine psychology of mastery and control, which embodies the culture of speed, power, and the conquest of nature". The confluence of power and hyper-individualism is the perfect recipe for inflation of ego and acts of "road-rage": the driver, especially the male one, reacts with anger when their control over the road is challenged by rules and regulations or the actions of other motorists[61]. Moreover, the relationship of the body to the car may not even be one of control:

> The driver's body is itself fragmented and disciplined to the machine, with eyes, ears, hands and feet, all trained to respond instantaneously and consistently, while desires even to stretch, to change position, to doze or to look around are being suppressed.[62]

Individualism and Choice

This tension between the desire for control by the car-driver, insulated from social, spatial, and temporal constraints by the shell of the car, is reflective of the larger contradictions inherent in automobility. Rational choice theorists believe in the absolute importance of the individual over external forces, a concept of democracy as an endless sea of choices for the individual, unconstrained by place and schedule[63]. This fierce opposition to collectivism reflects a viewpoint that urban and exurban political landscapes are shaped by the rational choice of the individual, and that the state has little role in the process beyond getting out of the way. But while the low-density land use patterns that have characterized the past century may have been influenced by the wish to escape the congestion of the city and open up the freedom that the car offered, escaping city congestion has also locked us into lifestyles that require cars. In many places the freedom of choosing to drive is actually an illusion: one's hand is forced[64]. The car as a symbol of freedom from state intervention also disregards the many ways in which governments have subsidized car use: the construction and maintenance of roads which are, for the most part, free to use; the subsidization of petrochemical exploration and extraction; decentralized land use policies which encourage driving; bailouts of fiscally-irresponsible car companies; and the stagnation of public transportation within and between cities[65]. Additionally, for the individual, the car represents a slavish relationship with consumption. While the cyclist needs only a bicycle and a few tools, the public transit user a small user fee, and the pedestrian their own two legs, the driver must pay for the upfront cost of the car, then fuel, maintenance and repairs, and insurance, and oftentimes parking. Finally,

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[60] *The Ecology of the Automobile*, 92–93.

[61] Sheller and Urry, "The City and the Car."

[62] Urry, *Mobilities*, 44.

[63] Lomasky, "Autonomy and Automobility."

[64] Gorz, *Ecology as Politics*.

[65] Alan Walks, "Stopping the 'War on the Car': Neoliberalism, Fordism, and the Politics of Automobility in Toronto," *Mobilities* 10, no. 3 (May 27, 2015): 408, https://doi.org/10.1080/17450101.2014.880563.

in a cruel irony, many of the ills of the city that the car is sold as an escape from are direct results of car use: pollution, noise, and danger[66].

In debates on automobility, one of the common points from its proponents is that the private car empowers the free will of the individual. Loren Lomasky[67] argues that automobility is simply one aspect of a larger group of values surrounding free will and liberty, "such as freedom of association, pursuit of knowledge, economic advancement, privacy, and even the expression of religious commitments and affectional preference"[68]. Lomasky concentrates on *autonomy* and its relation to automobility: if autonomy is one's capacity to move independently towards one's goals, then the car is the logical choice for the physical extension of that movement. Lomasky argues that this benefit of automobility is so inherently good that critics of automobility must prove that its costs outweigh its benefits both in number and qualitatively.

The choice of the individual to use a car does not occur in an emotionless vacuum, however. Sheller argues that the rational choice perspective fails to account for a host of complex cultural factors influencing car use, and that human emotion plays a central role:

> Cars will not easily be given up just (!) because they are dangerous to health and life, environmentally destructive, based on unsustainable energy consumption, and damaging to public life and civic space. Too many people find them too comfortable, enjoyable, exciting, even enthralling. They are deeply embedded in ways of life, networks of friendship and sociality, and moral commitments to family and care for others.[69]

We need to face the facts: we're obsessed our cars.

We drive because it's easy and our spaces have been designed to let us whip through them at +50km/h.

We drive because it's fun, and you can't beat that new car smell (better than that musty old bus, right?).

We drive because dealerships offer 0% APR car loans for 36 months

We drive because the place we can afford to live has crappy transit access and the grocery store is a forty-five-minute walk away.

We drive because a complex system has grown over 150 years that ensures that every aspect of the modern city, from land use to car financing to parking policies, pushes us behind the wheel of the car.

It will take a push of pretty great magnitude to get us out of the car.

How do we change?

To sum up the argument that I have tried to build in the previous section, I see two goals that cities should be employing in their transportation planning.

A: Car use needs to be reduced. This is not revolutionary, and the following section will show that the City of Toronto like most municipal, regional, provincial, and federal governments, is well aware of this fact and is actively building reduction of car dependency into official policy.

B: Use of active and public transportation needs to be encouraged, and opportunities for public life need to be provided. Again, this is not rocket science, and one doesn't need a planning degree to come up the idea that walking and biking is good for cities.

What I hope that I have established so far in this paper is that it will be ***practically impossible to achieve A using B***. The car is so firmly entrenched in our cultural ideology, political economy, and our spaces that motorists will not relinquish space without a fight. The simple provision of efficient, fast, affordable public transit is essential to reducing reliance on cars and improving the economic vitality and social equity of our cities, and protected bike lanes and wide sidewalks are wonderful for pedestrians and cyclists. But unfortunately, the allocation of space in urban rights-of-way is a zero-sum game and trying to fit in space for active and public transportation while retaining existing networks for cars, thus pleasing everybody, is an impossible task. Until we actively remove space for cars, we will never succeed in the reduction, much less elimination in our city centres. But on the other hand, once we remove the assumption that cars (as opposed to people) need full access and mobility in our cities, the possibility for what we can do with all that car space is breathtaking.

How do we intervene?

I see three key points of intervention in an urban area for the reduction of private car use: land use planning, transport demand management policies, and urban design.

Land use

Firstly, land use is arguably the most impactful sector of planning in determining transport mode choice, as evidenced by the patterns of car-dependent urban sprawl that have characterized the past seven or eight decades in North America. If the end goal is building regions where the car is not the primary choice of moving around, land use tools are, to me, inarguably the best for the job. Mixing uses, intensification, dispersal of employment centres, and urban growth boundaries are all strategies that can work toward minimizing the need to travel far for services and move us toward public and active transport as the first choice when

leaving the house. We are actually not faring too badly in this category here in southern Ontario. The province has an established framework for "smart" growth, *A Place to Grow: Growth Plan for the Greater Golden Horseshoe,* which seeks to both curb further sprawl by drawing settlement boundaries around existing built-up areas in the Greater Golden Horseshoe, but also requires minimum levels of density in those existing areas, with high levels of intensification in designated Urban Growth Centres[70]. The official plans of all municipalities in the *Growth Plan's* boundary area must conform to it, including Toronto.

Policies and programs

Secondly, enormous potential exists for changing travel behaviour through policy, particularly through transportation demand management (TDM). Transport demand management policy approaches can take many forms, from employers offering more flexibility for working hours (allowing for travel during off peak hours) or working from home (eliminating the need for a trip altogether); congestion charges in city centres, such as has been implemented in London, UK, or Stockholm, Sweden; toll roads; disincentivizing car ownership through car taxes, such as existed in Toronto until 2011[71]; and making public transit cheaper than driving through subsidized passes or making parking more expensive. Policies can be effective when they affect people directly, either financially or through change in quality of life. The downside is that many of the above policies can be construed as punitive and are often wildly unpopular. TDM relies heavily on the private sector being willing to undergo massive change in its working habits, which may be difficult, even in a post-COVID19 world[72].

Urban design

Finally, we have urban design, and specifically, street design. Street design offers many opportunities for restricting or limiting car use, from traffic calming measures like speedbumps or bulb-outs to car-free pedestrian streets. As a point of intervention for a municipal government, street design is useful for a number of reasons:

- It's hard to argue with: urban design, if well done, makes moving through spaces intuitive, and requires little enforcement. You can ignore a "No Through Traffic" sign and drive straight through an intersection but you can't ignore a concrete planter or a bollard.

- Accentuating the positive: allocation of space in a right-of-way is a zero-sum game, but space taken from cars can be given to highly visible benefits like wider sidewalks, street furniture, cafés, public art and performance spaces, cycling lanes, and public transit.

[70] Province of Ontario, "A Place to Grow - Growth Plan for the Greater Golden Horseshoe" (2019).

[71] CBC News, "Toronto Councillors Kill Car Tax, Cut Budgets," December 16, 2010, https://www.cbc.ca/news/canada/toronto/toronto-councillors-kill-car-tax-cut-budgets-1.883783.

[72] The Great Pandemic of 2020 has led to that massive change by forcing thousands of people to work remotely, but it remains to be seen what the working world will look like once things go back to "normal".

- It's state-owned: land use planning and transport management policies both involve creating frameworks for the private sector to work within. Right-of-ways are completely under a city's control.

For these reasons, I am choosing to focus this paper on street design as an intervention point, specifically looking at the allocation of space to cars in Toronto's street network.`

A typical road classification system categorizes roads in a hierarchy from largest capacity (and highest speed) to lowest, generally in the following order:

- Expressway
- Arterial
- Collector
- Local
- Laneway/Alley[73]

All these typologies are found in Toronto, but I am targeting the first two types, Expressway and Arterial, since they carry the most vehicles per day in cities. I will be taking a systems or network approach, rather than a fine-grain one, focusing on how we could limit cars in the downtown by deliberately reducing the overall space allocated to them.

A concept I would like to introduce to my argument here is *induced demand*. Sometimes referred to as *generated traffic*[74], this is a bit of an umbrella term for a cluster of phenomena that occur around the provision of space for driving, particularly in expressways. When new roads are added to a network or lanes added to existing roads, for example the widening of a highway, instead of reducing congestion, the increased capacity often results in increased congestion[75]. Road capacities tend to be elastic, while daily average commute times tend to stay constant, meaning that increased capacity results in increased vehicle kilometres travelled (VKT) rather than time savings. The increased number of car trips on a road with increased capacity can generally be sorted into *diverted* (or *latent*) and *induced*. The former is the diversion of existing trips to the new road or lanes that may have already been by car but using other routes or travelling at off-peak times. The latter are trips that were made using other modes of transport or were not being made at all[76].

[73] Victor Dover and John Massengale, *Street Design: The Secret to Great Cities and Towns* (Hoboken: Wiley, 2014), 27.
[74] Todd Alexander Litman, "Generated Traffic and Induced Travel," Report (Victoria Transport Policy Institute, March 18, 2019).
[75] Benjamin Schneider, "You Can't Build Your Way Out of Traffic Congestion. Or Can You?," CityLab, September 6, 2018, https://www.citylab.com/transportation/2018/09/citylab-university-induced-demand/569455/.
[76] Litman, "Generated Traffic and Induced Travel."

Table 2: Types of Generated Traffic (Litman, 2019)

Type of Generated Traffic	Category	Travel Impacts	Cost Impacts
Shorter Route – Improved road allows motorists to use more direct route.	Diverted trip	Small reduction	Reduction
Longer Route - Improved road attracts traffic from more direct routes.	Diverted trip	Small increase	Slight increase
Time Change - Reduced peak period congestion reduces the need to defer trips to off-peak periods.	Diverted trip.	None	Slight increase
Mode Shift: Existing Travel Choices - Improved traffic flow makes driving relatively more attractive than other modes.	Induced vehicle trip	Increased driving	Moderate to large increase
Mode Shift: Changes in Travel Choice - Less demand leads to reduced rail and bus service, less suitable conditions for walking and cycling, and more car ownership.	Induced vehicle trip	Increased driving, reduced alternatives	Large increase, reduced equity
New Trip: No Land Use Changes - Improved travel time allows driving to substitute for non-travel activities.	Induced trip	Increase	Large increase
Car Dependency - Synergetic effects of increased car-oriented land use and transportation system.	Induced trip	Increased driving, fewer alternatives	Large increase, reduced equity

Whatever the reason for the generated traffic, in the long-term it fills up new road capacity and erases any short-term savings in travel time or costs. Induced demand has been observed across many jurisdictions, and yet has struggled to gain acceptance as a proven phenomenon, and roads continue to be widened. In the Greater Toronto Area, for example, the province of Ontario is spending over $600 million to widen an 18km stretch of Highway 401, touting "reduced traffic congestion" and "improved quality of life for commuters by reducing daily travel time" as benefits[77].

Just as increasing road capacity generates new demand and traffic, the opposite has also been shown to be true. Cairns *et. al.*[78] found in a landmark 1997 study that when car traffic is removed or reduced on a road or in an area, the overall traffic in the surrounding area also lessens. The study found that over half the cases examined saw a more than 11% reduction in traffic in the surrounding area after the reallocation schemes. The authors grant that every scheme is different and that local context needs to be taken into account but argue that the

[77] "Highway 401 Expansion Project," accessed May 30, 2020, https://www.infrastructureontario.ca/Hwy-401-Expansion/.

[78] Sally Cairns, Stephen Atkins, and Phil Goodwin, "Disappearing Traffic? The Story so Far," *Municipal Engineer*, no. 1 (March 2002): 13–22.

visible trend is that when traffic is removed from one area it does not become diverted to a different nearby area, it simply disappears. This is in contradiction to the pessimistic predictions that usually accompany traffic reducing schemes that side-streets will become more congested. In the short term there may be increased congestion[79] but in the long term, traffic is reduced due to behavioural change of motorists. When a road's capacity is lowered and the capacity of the surrounding road network is insufficient to compensate, motorists may choose one or more of the following responses:

- Taking a different route or travelling at a different time
- Using a different travel mode
- Changing their destination
- Travelling less often and/or consolidating trips
- Car-sharing
- Not journeying at all (e.g. working from home)[80]

Cairns et. al. point out that motorist behaviour is complex and subject to many factors outside of just road capacity or conditions, and that the above decisions are being made constantly anyway. So, it should perhaps not be surprising that when the capacity of a road network for cars is reduced, that traffic simply evaporates. Nevertheless, the authors warn that plans for traffic capacity reduction are more successful when they are implemented in a phased manner, with substantial consultation and buy-in from the public, to manage public and media perception of and reaction to the project[81]. This is reinforced by the experience of the city government of Budapest, Hungary in attempting to implement a pilot project to relocate car lanes for transit and cycling. The city wanted to examine the behaviour of motorists when their space was removed, but the plans were denounced in the media "as an 'experiment with artificial traffic jams'" and quashed by local opposition[82]. Thus, even with the well-established phenomena of induced demand and disappearing traffic, municipalities will see more success with road capacity reduction when matched with corresponding public realm improvements.

[79] European Commission Directorate-General for the Environment, "Reclaiming City Streets for People Chaos or Quality of Life?," accessed May 31, 2020, https://www.onestreet.org/images/stories/Reclaiming_City_Streets_for_People.pdf.

[80] Cairns, Atkins, and Goodwin, "Disappearing Traffic? The Story so Far."

[81] Cairns, Atkins, and Goodwin.

[82] "Piloting Motor Traffic Reductions with a Negative Focus (Hungary) | Eltis," accessed May 31, 2020, https://www.eltis.org/discover/case-studies/piloting-motor-traffic-reductions-negative-focus-hungary.

Toronto and the car

The City of Toronto's relationship with transportation is a weird one. The city didn't experience the same level of inner-city destruction that its counterparts in the United States did, and in mid-20th century was building subways in its downtown while many American cities were sprawling to their suburbs and disinvesting in their downtowns. On the other hand, in the 20th century Toronto had its own expressway-driven sprawl, and certainly succumbed to the draw of the suburbs. Newman and Kenworthy's landmark 1989 study of international car use[83] found that Toronto fell somewhere between the average American city and the average European city for its public/private/active transportation modal split for daily commuters. More workers in Toronto commuted by public transit than in cities like Chicago or even New York City, but far fewer than Vienna or Paris[84].

In the three decades since that study, though, while many American cities are getting their act together and working to get people out of cars, and European cities like Amsterdam continue to set standards for sustainability, Toronto has rested on its laurels, and very little has changed. With the exception of the little-used Sheppard line of the Toronto subway, and the modest increase of GO transit service, the rapid transit and commuter rail systems look largely the same as in 1989. Furthermore, the road system in Toronto has for the most part remained untouched for 60 years, since the creation of Metropolitan Toronto. Today 78% of all trips in the city are made by car[85]. In this section I try to sort out some of the reasons behind why Torontonians choose to or are forced to drive.

Historical context

From its in incorporation in 1834 onwards, the City of Toronto grew. Through the late 19th century, the population of Toronto ballooned, reaching over a half a million people by the early 20th century. The growth was mostly compact: at certain points Toronto had the highest population density in North America[86]. In addition to density, the lack of regulations governing development in the city at this time led to, highly diverse and overlapping land uses and residential populations. Toronto had periodically annexed existing towns or settlements on its edges, "Shacklands" that had sprung up just outside the city district to avoid city taxes and

[83] This was a study of over 30 cities in North America, Europe, Asia, and Australia, using data from 1980. See Peter Newman and Jeffrey Kenworthy, *Cities and Automobile Dependence: An International Sourcebook* (Aldershot: Gower Technical, 1989).

[84] Newman and Kenworthy, 36.

[85] Transportation Information Steering Committee, "Transportation Tomorrow Survey 2016," 2016, http://dmg.utoronto.ca/.

[86] Lawrence Solomon, *Toronto Sprawls: A History* (Toronto: University of Toronto Press, 2007).

regulations, and which had developed without any reference to the city's existing urban fabric[87]. The continuous adding on of these existing settlements resulted in a series of dense, vibrant, multicultural neighbourhoods that irked Toronto's Protestant elites[88]. Indeed, the series of annexations since 1834 had been a result of many of Toronto's leaders wish to avoid congestion, and in the 20th century they continued to look for ways of expanding outwardly rather than upwardly.

Toronto's cabal of reformers' dislike of dense inner-city neighbourhoods was reflective of an anti-urban sentiment that has prevailed in Canadian thought and literature since the nineteenth century and had a dramatic impact on the land use planning of Toronto[89]. After the Second World War, the federal government passed the *Veteran's Land Act*, which governed the provision of housing for returning Canadian members of the armed forces in WWII, was deliberately set up to guide their settlement in non-urban areas: grants were not given for housing in "cities whose population exceeded 5,000 [or] the outskirts of urban areas with more than 15,000"[90]. This bias to the non-urban could have been born out of a sentimental nostalgia for the agricultural roots of Canada, or the fear of labour unrest growing in a dense city. In any event, the federal government leaned on the "home of your own" adage to entice veterans to the suburbs, an aspiration of individualism which was tightly bound to the car. The federal government also established the Central Mortgage and Housing Corporation (CMHC) after World War II, which initially only built homes for returning veterans to rent[91] but quickly took to directly intervening in the housing financing process. Mortgage lenders at the time were highly reticent to grant risky loans for housing in the under-serviced, isolated outskirts of cities, so the CMHC intervened directly, guaranteeing the loans or even lending themselves in some cases[92]. In the decades following the war, the federal government engaged in a successful campaign of decentralization, resulting in the sprawling Greater Toronto Region we see today:

> Rather than have high population, compact communities abutting rural regions sprinkled with towns, the government homogenized the greater Toronto Area to make it more of a soup. Urban densities were reduced, and rural densities raised, giving much of both a suburban quality. We thus lost the traditional character of both city and rural lands.[93]

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[87] Solomon, 18.

[88] John Lorinc, "Introduction," in *The Ward: The LIfe and Loss of Toronto's First Immigrant Neighbourhood*, ed. John Lorinc et al. (Toronto: Coach House Books, 2015), 14–16.

[89] John Sewell, *The Shape of the City: Toronto Struggles with Modern Planning* (Toronto: University of Toronto Press, 1993), 9.

[90] Solomon, *Toronto Sprawls: A History*, 48.

[91] Richard White, *Planning Toronto: The Planners, The Plans, Their Legacies* (Vancouver: UBC Press, 2016), 51.

[92] Solomon, *Toronto Sprawls: A History*, 52–54.

[93] Solomon, 72.

This goal of decentralization was shared by regional planning authorities like the Toronto and York Planning Board, whose 1949 strategic plan called for low densities across the region[94], and in the decade following the war, the suburbs exploded. From 1945 to 1953 the suburban population of Toronto nearly doubled while the population of the inner city actually fell by 2 percent[95].

Many new developments were built following the fashionable new "neighbourhood unit" idea that Clarence Perry had articulated in 1929[96], most notably at Don Mills. Built in the early 1950s, Don Mills was designed almost as a giant superblock, with a ring road, discontinuous internal streets, and a shopping centre in its middle. The neighbourhood was immensely car-friendly: lots wider than they were long, leaving ample room for private driveways, as opposed to sharing narrow ones with neighbours as in the older city; grassy ditches replaced sidewalks in front of houses, creating a "rural" atmosphere that discouraged walking; and the enclosure by the ring road eliminated connections with the outside[97]. Don Mills was intended to be a true self-sustaining community along traditional Garden City lines, with half the residents working locally and a mix of land use and incomes, but both goals were not fulfilled: lower-income people were quickly priced out of the trendy subdivision, and by 1957, five percent, not fifty, of the population was working locally[98]. The latter point is especially important in my examination of car use in Toronto, because Don Mills was directly tied to another key factor in Toronto's car dependence: the city's expressways.

Metro builds a city for the car

The rapid federal-driven development of Toronto's outskirts in the immediate post-war period was not accompanied by transits or infrastructure planning, which began to have detrimental effects in its new suburbs. The low-density communities had much lower tax bases than in Toronto, the result being that new subdivisions in North York, Scarborough, and Etobicoke were severely underserviced for water and wastewater, and the new communities lacked good connections by road or transit with Toronto, where most of the employment opportunities were[99]. Calls for made for the full amalgamation of Toronto and the suburbs, which were bitterly opposed by the suburban municipalities, who were unwilling to relinquish their autonomy to the big city. The province of Ontario responded by creating Metropolitan Toronto, a partially amalgamated federation of Toronto and twelve surrounding municipalities. Responsibility for regional planning was uploaded to Metro, including the

[94] Sewell, *The Shape of the City: Toronto Struggles with Modern Planning*, 124.

[95] Solomon, *Toronto Sprawls: A History*, 57.

[96] Clarence Perry, "The Neighbourhood Unit," in *The Urban Design Reader*, ed. Michael Larice and Elizabeth Macdonald, 2nd ed. (London: Routledge, 2013), 78–89.

[97] Solomon, *Toronto Sprawls: A History*, 88–90.

[98] White, *Planning Toronto: The Planners, The Plans, Their Legacies*, 110.

[99] Solomon, *Toronto Sprawls: A History*, 58.

delivery of major road infrastructure[100]. Responsibility for key arterials within the City of Toronto was transferred to Metro, as well as the building of new roads and expressways for the ballooning suburban population. And build they did. The creation of Metro allowed for borrowing against the wealth of Toronto for expansion of infrastructure for the suburbs, and the regional municipality spent $200 million (approximately $1.7 billion adjusted for inflation) on roads in the first fourteen years of Metro. Much of this money was spent on expressways, but Metro also widened and straightened a number of arterials, including in the downtown core[101].

Like in much of the western world at the time, this initial period of Metro Toronto was one of heady high modernism, when many planners and city leaders advocated for the remaking of Toronto and its region in the modern style, demolishing large swathes old downtown low-rise buildings and replacing them with high-rises (both commercial ones with large plazas in the downtown and residential towers-in-the-park), expressways, and ample parking for commuters[102]. Since the late 1930s the city (and later Metro) had been planning an extensive network of expressways cutting into and across the downtown. The Lake Shore Expressway, later renamed the F.G. Gardiner Expressway after the first Metro commissioner, was completed in 1963, connecting the downtown to the Queen Elizabeth Way in the west [103]. The Don Valley Parkway (DVP), finished in 1964, had been advocated for by developers in the northern outskirts of the city, particularly brewing magnate E.J. Taylor, builder of Don Mills, who wanted a way for his residents working in the city to quickly commute to and from their new suburban enclave. When the DVP was first built there weren't many built-up areas in its catchment zone, but it drove significant suburban development in Toronto's northeast end, Scarborough, and Markham[104].

The other expressways in Metro's plans never materialized, due to a combination of public opposition and lack of funding. The fate of the Spadina Expressway, though, represents a key moment in Toronto's story where the city may have been saved from an even stronger dependence on private transportation. The expressway was to cut through the centre of the city from the 401 to south of Bloor Street West, and by the late 1960s construction on the segment north of Eglinton Avenue was underway[105]. As construction of the southern segment neared, however, a strong resistance movement to the project began to form. This was a semi-formalized coalition of students and academics from the Toronto's universities, young

[100] Frances Frisken, "The Toronto Story: Sober Reflections on Fifty Years of Experiments with Regional Governance," *Journal of Urban Affairs* 23, no. 5 (December 2001): 513–41, https://doi.org/10.1111/0735-2166.00104.

[101] Solomon, *Toronto Sprawls: A History*, 61.

[102] Sewell, *The Shape of the City: Toronto Struggles with Modern Planning*, 177–78.

[103] White, *Planning Toronto: The Planners, The Plans, Their Legacies*, 200.

[104] Jennifer Bonnell, "Highway to Nowhere: The Don Valley Parkway and the Development of Toronto's North-East," *NiCHE* (blog), May 14, 2014, https://niche-canada.org/2014/05/14/highway-to-nowhere-the-don-valley-parkway-and-the-development-of-torontos-north-east/.

[105] White, *Planning Toronto: The Planners, The Plans, Their Legacies*, 118.

downtown professionals, and upper-middle-class residents living in the older neighbourhoods of Forest Hill and the Annex, where the demolition of almost 1000 houses was planned to make way for the expressway. The coalition, which included high-profile Torontonians like Marshall McLuhan and Jane Jacobs, staged protests against the Expressway, and in 1971 the Ontario government cancelled the project. Then Premier Bill Davis summarized the province's position with the following:

> If we are building a transportation system to serve the automobile, the Spadina Expressway would be a good place to start. But if we are building a transportation system to serve people, the Spadina Expressway would be a good place to stop.[106]

I will return to the present state of Toronto's expressways later, but I am going to end this section here. I would argue that while Toronto has done a lot of growing up in the half-century since the Spadina Expressway was cancelled, most of the physical context for car use in Toronto was established in the 1950s and 1960s with the building of the Don Valley Parkway, Gardiner Expressway, and Allen Road, and the widening of key arterials running throughout the city. This era was the peak of the outward growth of Toronto that began in the 19th century. From the 1970s onward, while the rest of the GTA continued to sprawl, the street network of Metro Toronto (now the fully amalgamated City of Toronto) was pretty much set, and development has mostly been through filling in previously undeveloped holes or intensifying existing areas. Land use and urban form have changed dramatically, but the way Torontonians move around the city is relatively the same. Toronto relies on a transit system largely built 50 to 60 years ago which is near or at capacity and has a network of wide multi-lane streets with ample parking that makes it easier to drive than use any other mode.

Moreover, the incredible growth that Toronto has seen in the past 25 years has been within the physical context of its stagnated transportation system, which has further embedded the need for the car in daily life here. What city planners are now faced with is the monumental task of re-inventing the way we move in a city that relies on the car but does not have to, at least in its downtown and other dense areas. Next I want to turn the current planning policy context in Toronto and how it can help or hinder in this task.

Policy context

Official Plan

The use of the car in Toronto is affected by the city's urban structure, and urban structure is guided foremost by its Official Plan (OP) which is given legal authority by Ontario's *Planning Act*. Toronto's Official Plan[107] contains the policies that are interpreted to shape the city, but also has extensive non-statutory explanatory text that can be analysed to understand the city's

[106] Sewell, *The Shape of the City: Toronto Struggles with Modern Planning*, 180.

[107] City of Toronto, "Toronto Official Plan - Feb 2019 Consolidation," February 2019.

priorities. Regarding car use, the OP is explicit in outlining its principles in section 2.1 ("Building a More Liveable Urban Region) that "[reducing] auto dependency and [improving] air quality" is a key goal. The plan addresses car dependency in the three intervention points I have outlined above: land use, demand-based policies, and urban design. I will focus on the design-related policies.

The plan encourages the integration of transportation planning with land use and urban design, and generally balances out policies that could target car use reduction with ones that will encourage driving. For example, policies in s.2.2 introduce the idea that transit priority corridors could be implemented across the city, while also remaining committed to upholding the current system of expressways and major roads for freight movement across the city. Section 2.2.1 ("Downtown") contains policies that are more prescriptive towards the goal of the car being the least-used transport mode: s.2.2.1.(8) says "priority will be given to improving transit (TTC and GO) access to the Downtown while the expansion of automobile commuting and all-day parking will be discouraged." This is encouraging, but these policies are fixed to a radial view of the downtown, with a workforce that commutes in at the beginning of the day and out at the end of the day: they does not account for the use of cars for trips *through* downtown, *throughout* the day.

The most substantial part of Toronto's OP regarding reducing car dependence is in Section 2.4 ("Bringing the City Together: A Progressive Agenda of Transportation Change"). The non-statutory preamble of this section shows the attitude the City is taking toward the car:

> The Plan provides complementary policies to make more efficient use of this infrastructure and to **increase opportunities for walking, cycling, and transit use and support the goal of reducing car dependency throughout the City**…
>
> In a mature city like Toronto, the emphasis has to be on using the available road space more efficiently to move people instead of vehicles and on looking at how the demand for vehicle travel can be reduced in the first place. Reducing car dependency means being creative and flexible about how we manage urban growth. We have to plan in "next generation" terms to **make walking, cycling, and transit increasingly attractive alternatives to using the car** and to move towards a more sustainable transportation system. [*emphasis added*]

As outlined in the literature review of this paper, what makes the task of reducing car dependence so difficult, even in dense, walkable urban areas, is the car's dominating entrenchment in our cultural psyche and our space. The tactic that Toronto and many other cities are using to combat this obstacle is to make non-car transportation more available and more attractive. This is a supply-side approach, and its downfall is that as long as it is cheap and easy to drive in a city, the car will always be the most attractive choice, no matter how great the alternatives. The "progressive agenda" of s.2.4 is broad, including policies for TDM, integration of development and transit planning, encouraging more efficient use of off-street parking, building more capacity for cycling, improving accessibility, and introducing new

technologies, but nowhere is there a policy that states that space will be taken from private transportation to give over to its alternatives.

The Official Plan policies are representative of the compromise inherent in Toronto's approach to transportation, which to me just amounts to capitulation to the car. Section 3.1.1 ("The Public Realm") has the following policies:

> 5. City streets are significant public open spaces which connect people and places and support the development of sustainable, economically vibrant and complete communities. New and existing City streets will incorporate a Complete Streets approach and be designed to perform their diverse roles by:
>
> a) balancing the needs and priorities of the various users and uses within the right-of way, including provision for:
>
> i. the safe and efficient movement of pedestrians of all ages and abilities, cyclists, transit vehicles and users, goods and services vehicles, emergency vehicles, and motorists across the network…
>
> b) improving the quality and convenience of active transportation options within all communities by giving full consideration to the needs of pedestrians, cyclists and public transit users;

Toronto's Official Plan is not a transportation plan and must take into account countless other factors relating to the city's growth, but as the central planning document for Toronto, I don't think its language around car use provides a strong framework for reducing car dependence. The ongoing statutory review process has resulted in an Official Plan Amendment, OPA 456, which adds more specific language on prioritizing active and public transportation over private, but the amendment has yet to be approved by Toronto's Council and the Province of Ontario, and thus is not yet in force.

TOCore and the Downtown Plan

Toronto is taking a stronger stance on making the shift away from cars in the planning framework for its downtown. In 2014 the City of Toronto began a planning study of the downtown called TOCore, which was the first major update to planning frameworks specific to the downtown area since the 1970s and which led to the creation of a new secondary plan called the Downtown Plan[108]. The Downtown Plan is set up to deal with the enormous growth that Toronto expects in its city centre in the coming quarter-century and contains policies that are more specific to its nature. As an amendment to the city's Official Plan under Section 26 of the *Planning Act*, the Downtown Plan was subject to approval by the provincial Minister of Municipal Affairs and Housing. In issuing approval, the Minister made a number of policy changes that dilute the potential effectiveness of the plan, which are indicated below. These

[108] Toronto, "TOcore."

ministerial changes are not appealable, although the City has requested that the Minister revert back to the version originally approved by Council[109].

In Section 2 ("Vision") section, the plan is explicit that Downtown Toronto in 2041 (the extent of its reach) is a place where the public realm is vibrant, park space is abundant, with "public spaces that bring people together and serve as their outdoor living rooms" and where "downtown residents don't rely on private automobiles to get around"[110]. Section 3 contains a number of goals related to allocation of right-of-way space that are quite different from the status quo in downtown Toronto today. Policy 3.8 states:

> Downtown will **strive to** have more space within the street network allocated to sustainable modes of transportation, prioritizing high-quality, accessible and safe networks for pedestrians, cycling and surface transit.[additions by the province in blue]

The blue text in the above was added by the province, and unfortunately limits the power of the plan to reduce space given over to motorists. Another example is the changes made to policy 8.17 (additions by the province in blue, deletions in red):

> Priority for surface transit will be **encouraged and** implemented on **all** routes where appropriate **to favour public transit over private automobiles.**

Some policies remained unchanged, such as 8.2, which states that "Pedestrians, cyclists and public transit will be prioritized relative to private automobiles", but the weakening of policies directly related to road space will limit the ability of this secondary plan to direct a modal shift away from the car.

Downtown Plan: Infrastructure Strategies

Notwithstanding the dilution of the Downtown Plan's policies regarding relocation of right-of-way space and prioritization of active and public transportation, the infrastructure strategies accompanying the plan are highly innovative. These strategies are not binding policies but provide a framework for the implementation of the policies in the Downtown Plan. Of the five associated with the plan, the Mobility and Parks and Public Realm strategies (which are designed to work together) have the most potential impact on space for cars.

The Downtown Mobility strategy acknowledges that different users are competing for space in the ROWs and that streets can't be widened or expanded and calls for the re-allocation and prioritization of space to allow for "complete networks for all modes, encourage a shift toward

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[109] "Agenda Item History," accessed June 14, 2020, http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2019.CC9.8.

[110] City of Toronto, "Downtown Plan" (2019), 2, https://www.toronto.ca/legdocs/mmis/2019/cc/bgrd/backgroundfile-135953.pdf.

more sustainable travel modes"[111]. The strategy document outlines five "Priority Actions" to accomplish this:

- Complete Streets: studying and designing key downtown streets according to Toronto's Complete Streets guidelines and initiating a program to designate potential sites for "shared" streets, (which does not appear to have begun as of the writing of this paper).
- Walking: studying downtown streets through the lens of Vision Zero and pedestrians, with the eventual goal of creating corridors and areas where pedestrians are prioritized
- Cycling: continue implementation of the existing 10-year cycling network plan, renew existing pilots to make them permanent, extend existing bikeways, do a corridor study for an additional major north south route downtown, as well as developing a Bicycle Parking Strategy[112]
- Transit: examining lessons learned from the King Street Pilot Project, and establishing a Downtown Transit Study Area, with the goal of increasing service, changing transit structures, changing priorities in existing corridors, and adding new surface routes.
- Motor Vehicles: mostly focused on Curbside Management Strategy, which seeks to change delivery behaviour (different modes, different times, more consolidation of deliveries through depots, etc.)

The Downtown Mobility Strategy is an exciting read for those of us who are imagining downtown Toronto as a place where the car is not a dominant force. A promising underlying current throughout the list of priority actions is the implicit reduction of space for cars in the downtown, but this is never *really* spelled out clearly. This could well be deliberate: the city's planning department may just be choosing to focus on the positives of adding space for other modes rather than the negatives of removing space for cars. Considering the viciousness that has erupted in the face of any proposal to infringe on the car in Toronto, this may be prudent.

The Downtown Parks and Public Realm Plan offers an even more entrancing vision of the downtown. It envisions the downtown as a series of districts with parks at their hearts, a Core Circle of linear parks surrounding the downtown anchored by the ravine system, and twelve "Great Streets" which are targets for public realm improvement, focusing on adding more sidewalk space, cycling lanes, transit, tree canopies, and green infrastructure[113]. The Parks and Public Realm Plan is full of gorgeous renderings showing tree-lined streets, but these twelve Great Streets are still predominantly driving routes and are not pushing the envelope very far.

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[111] City of Toronto, "Downtown Mobility Strategy," April 2018, 8.

[112] Much of this was expedited in May 2020 as part of the city's ActiveTO program in response to COVID-19 , with Toronto's city council voting to implement the remaining projects of the 10-year cycling plan as soon as possible and adding 15km of new lanes.

[113] Toronto, Downtown Plan.

The planning framework for downtown Toronto provides a good if not great vision for how the city could reduce car dependence in its most dense area. It's now incredibly important that the city build on this framework and take bold steps to dramatically transform the downtown's transportation system to move people instead of cars.

Interventions

In this section I will tackle what I see as the two street typologies that contribute the most to Toronto's car addiction: the expressway, and the arterial. For each typology, I will outline its current context in Toronto, present case studies from around the world showing different approaches to the typology and suggest interventions in Toronto based on those case studies.

Typology One: Expressway

Toronto would look very different today if Metro's entire network of expressways had been built, and its failure probably saved the city from an even more slavish relationship to the car. Nevertheless, Toronto's transportation system is still very much defined by the two expressways that funnel traffic into its downtown's streets. The Don Valley Parkway is 15 kilometers long and carries 135,000 vehicles on an average weekday, more than double its original planned capacity of 60,000 per day[114]. The Gardiner Expressway is 18 km long and carries around 140,000 vehicles on an average weekday[115]. In recent years, there has been substantial debate around the Gardiner, particularly its 7-kilometre-long elevated portion, which cuts right through the downtown. Unlike the DVP, which was built mostly at grade through the Don River valley, the section of the Gardiner running through the downtown was elevated on massive concrete piers and girders.

By the early 2000s the Gardiner was nearing end-of-life, literally crumbling in some places, with degradation particularly bad in the section east of Jarvis Street. An Environmental Assessment (EA) process was launched to devise a list of options to address the ailments of the eastern Gardiner[116], and city staff returned in March 2014 with a list of four options: "Maintain" the expressway as is; "Improve" the public realm around and beneath the

[114] Toronto, City of, "Don Valley Parkway" (City of Toronto, February 8, 2019), Toronto, Ontario, Canada, https://www.toronto.ca/services-payments/streets-parking-transportation/road-maintenance/bridges-and-expressways/expressways/don-valley-parkway/.

[115] City of Toronto, "About the Gardiner Expressway," February 8, 2019, https://www.toronto.ca/services-payments/streets-parking-transportation/road-maintenance/bridges-and-expressways/expressways/gardiner-expressway/about-the-gardiner-expressway/.

[116] Elizabeth Church, "Clock Is Ticking for Decision on Gardiner Expressway, Official Says," *The Globe and Mail*, April 2, 2013, http://search.proquest.com/docview/2384101424/97C0AAA0E4E24193PQ/1?accountid=15182.

Gardiner; "Replace"; or "Remove" the eastern part of the expressway completely and realign Lake Shore Boulevard East as an eight-lane arterial[117]. The staff recommendation was the Remove option; the Public Works and Infrastructure Committee, however, voted to defer the decision for another year and directed city staff to study a fifth alternative that combined elements of the Maintain and Remove options[118].

In the spring of 2015 city staff returned once more to the PWIC, this time with an updated version of the EA that presented two options: Remove and Hybrid[119]. The EA process used four lenses to analyse the alternatives: Environment, Economics, Urban Design, and Transportation and Infrastructure[120]. Only the latter of those lenses found that the Hybrid option was superior, and only because of a projected three- to five-minute savings of time for commuters over the Remove option[121]. Despite this, and despite the fact the Hybrid option was significantly more expensive than both the Remove option and maintaining the existing expressway[122], in June 2015 city council approved the Hybrid option 24-21 votes. In 2016, the Hybrid plan was updated to change the alignment of the Gardiner's east- and west-bound ramps to the Don Valley Parkway, and now has a project total capital cost of $1.5 billion. Meanwhile, the rest of the Gardiner is undergoing rehabilitation work at a cost estimate of $2.1 billion, bringing the total costs of keeping the expressway to over $3.6 billion[123].

As far as my research could surmise, the idea of demolishing the entire elevated section Gardiner Expressway has never been floated, at least in a political forum like a committee or city council. But what would happen if the Gardiner was just removed completely? The next section will examine case studies in two cities (one Korean, one American) that have removed freeways, by choice or by force of circumstance.

Case Studies

Seoul, South Korea

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[117] John Livey, "Staff Report: Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study," Staff Report, February 21, 2014.

[118] Patrick G. Watson, "'Common Sense Geography' and the Elected Official: Technical Evidence and Conceptions of 'Trust' in Toronto's Gardiner Expressway Decision," *Canadian Journal of Sociology* 43, no. 1 (March 31, 2018): 49–76, https://doi.org/10.29173/cjs27058.

[119] John Livey, "Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study – Updated Evaluation of Alternatives" (Toronto: City of Toronto, May 6, 2015), https://www.toronto.ca/legdocs/mmis/2015/pw/bgrd/backgroundfile-79902.pdf.

[120] Dillon Consulting Limited et al., "Alternative Solutions Evaluation – INTERIM REPORT – ADDENDUM," May 2015, https://www.toronto.ca/legdocs/mmis/2015/pw/bgrd/backgroundfile-79867.pdf.

[121] Watson, "'Common Sense Geography' and the Elected Official."

[122] Dillon Consulting Limited et al., "Alternative Solutions Evaluation – INTERIM REPORT – ADDENDUM."

[123] John Livey and Roberto Rossini, "New Implementation Approach for the F.G. Gardiner Expressway Revised Strategic Rehabilitation Plan" (City of Toronto, November 23, 2016).

In the early 2000s policy makers in Seoul, the capital and largest city in South Korea, took the bold action of removing an elevated expressway. Since the 1980s, Seoul had been building dense, tower-in-the-park style "new towns" in the urban periphery, and suburban populations had boomed while central city population declined. There was a massive migration of residents to the suburbs in the 1990s, an estimated 2 million people between 1992-1999, and the lack of proper accompanying transit planning to the decentralized developments led to increased use of private transportation, congestion, and pollution[124]. As a reaction to the perceived failure of the new towns, a policy movement emerged in late 1990s to intensify the city and reverse the decentralization process through urban regeneration in the city proper. In 2001 Lee Myung-Bak[125], former chair of the conglomerate Hyundai Group, won the mayoral election on a campaign to re-energize the inner city and spur development. At the same time, the Cheonggyecheon expressway, a 5.8-kilometre expressway running through Seoul's centre[126], was nearing end-of-life and in need of serious repair. The expressway had been built in the 1950s over an existing stream that had become severely polluted by sewage and was covered. By late 1997 the infrastructure of the expressway had degraded to the point that heavy vehicles were banned, and while some rehabilitation was undertaken, experts concluded that the only viable alternative to a full reconstruction of the expressway was its demolition[127]. Lee's mayoral win came on a direct campaign to do just this, and the expressway came down in only six months in 2006, followed by the daylighting of the Cheonggyecheon stream and the construction of a linear park along its almost six kilometres[128]. The park now attracts 64,000 daily visitors and pedestrian travel is up by 76% in the area[129].

But where did the traffic go? The Cheonggyecheon expressway carried 168,000 daily vehicles, and there were serious concerns in Seoul concerning how to handle the displacement of that traffic. Several options were tabled, including burying the expressway, widening existing

Seoul: Lessons Learned

Seoul's experience with expressway removal shows that reducing car reliance does not have to be incremental. The demolition of car infrastructure and reallocation of auto space can open up opportunities for public realm beautification and can be balanced by increased provision and use of transit.

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[124] Robert Cervero, "Urban Reclamation and Regeneration in Seoul, Republic of Korea," in *Low Carbon Cities: Transforming Urban Systems* (London: Routledge, 2015), 225.

[125] Note: Lee went on to serve as President of South Korea from 2008 to 2013, and in 2018 he was convicted of charges of bribery, embezzlement and abuse of power and sentenced to 15 years in jail. See https://www.bbc.com/news/world-asia-45756561

[126] Global Designing Cities Initiative, "Global Street Design Guide," Report (New York City: NACTO, 2016).

[127] Cervero, "Urban Reclamation and Regeneration in Seoul, Republic of Korea," 228.

[128] Cervero, "Urban Reclamation and Regeneration in Seoul, Republic of Korea."

[129] Global Designing Cities Initiative, "Global Street Design Guide," 298.

streets nearby the expressway, or implementing a congestion charge[130], but in the end Lee and the Seoul government decided to heavily invest in transit expansion to carry the load. Over 50km of new subway line was built[131], but more importantly, the city's bus network was massively expanded from 219 to 380 kilometres, with 86 kilometres of median lanes built on existing roadways[132]. The results speak for themselves: a 45% reduction in vehicle volume, a 10.3% decrease in air pollution, and increases in ridership of 15.1% for buses and 3.3% for subways[133]. Seoul is continuing to demolish elevated highway structures: for example, the Ahyeon Overpass was demolished in 2014 and replaced with bus-only lanes[134].

San Francisco, California, USA

The twin freeway teardowns in San Francisco in the 1990s are stuff of urban planning legend and are generally held as the gold standard for urban expressway removal. Much like Toronto, San Francisco had been a mid-century battleground around elevated freeways, and a vocal grassroots movement had managed to halt the construction of a number of projects. The results were two incomplete freeways, the Central, aptly cutting across the centre of the City-by-the-Bay, and the Embarcadero, a double-decker monster running across the waterfront. Both freeways were critically damaged in the 1989 Loma Prieta earthquake that devastated the Bay area, leaving the City of San Francisco with a decision: spend millions of dollars to rebuild the infrastructure *and* make it more seismically resilient, or tear both damaged freeways down. The city went for the latter, replacing both freeways with large surface-level boulevards. In the case of the Embarcadero, the removal of the freeway enabled the "stitching" together of the downtown and the previously neglected waterfront. The addition of a streetcar line featuring historic vehicles from around the world on the boulevard has made the waterfront a popular tourist destination.

The impact of the removal of the Embarcadero and the Central on the traffic in their surrounding street network is starkly different. Both freeways carried around 100,000 vehicles per day before their demolition, and both saw a reduction in capacity of around fifty percent when converted to surface level boulevards. But while the major streets around the Central, daily traffic volumes fell by nearly twenty-five percent, the streets nearby the Embarcadero saw an explosion in volume. Three streets paralleling the new Embarcadero Boulevard more than doubled their annual average daily traffic (AADT) before demolition, with Freemont

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[130] Onesimo Flores Dewey, "Seoul: Transportation Reform as an Enabler of Urban Regeneration," Case study, Transforming Urban Transport – The Role of Political Leadership (Harvard University Graduate School of Design, 2016).

[131] Cervero, "Urban Reclamation and Regeneration in Seoul, Republic of Korea," 227.

[132] Dewey, "Seoul: Transportation Reform as an Enabler of Urban Regeneration."

[133] Global Designing Cities Initiative, "Global Street Design Guide."

[134] "Seoul's First Overpass to Be Demolished: City," accessed May 31, 2020, https://koreajoongangdaily.joins.com/2014/02/04/socialAffairs/Seouls-first-overpass-to-be-demolished-City/2984447.html.

Street nearly tripling its previous numbers[135]. Overall, the traffic in the street network surrounding the Embarcadero increased by around ten percent after demolition.

It would be easy to point to these traffic numbers and use them as proof of the claim that removing road capacity through freeway demolition will simply distribute the existing traffic into the surrounding network and cause further congestion. But in the case of San Francisco, the bigger picture is more complicated. The Embarcadero and Central freeways, now the poster children for freeway removal, were: 1. aborted versions of their original plans neither of which were designed as through corridors; 2. both freeways were mere distributors of car traffic from another freeway that still exists, Interstate 80, AKA the Dwight D. Eisenhower Highway, which cuts right into downtown San Francisco from the south and from across San Francisco Bay via a massive double-decker bridge. The San Francisco-Oakland Bay Bridge has an AADT of 125,000 westbound vehicles travelling from Oakland and Alameda County to downtown San Francisco[136], and is identified as the primary culprit for the increased traffic nearby the Embarcadero: two of streets that experienced the most significant increase in traffic after the freeway-to-boulevard conversion, Freemont and 1st street, are the north and south feeders, respectively, to I-80 and the Bay Bridge.

San Francisco: Lessons Learned

The opportunities that presented themselves from the opening up of the waterfront by removing the Embarcadero were incredible, and now the boulevard is one of the key tourist attractions of the city. Property values in the areas directly adjacent to the demolished freeways also increased post-demolition, part of a larger pattern of gentrification that has permeated San Francisco and the Bay Area since the 1990s[1].

But we can also see that the removal of the Embarcadero Freeway did little to reduce the overall traffic in downtown San Francisco because it main route that motorists used to enter the city, merely a distributor of motorists accessing the city centre using other freeways. This shows that if cities are serious about reducing the number of cars in their centres, they need to be brave and remove expressways that carry high volumes of traffic.

Vision for Toronto

Options Analysis

[135] Jason E Billings, "The Impacts of Road Capacity Removal" (Master's thesis, University of Connecticut, 2011).

[136] "San Francisco-Oakland Bay Bridge," Metropolitan Transportation Commission, November 4, 2015, https://mtc.ca.gov/about-mtc/what-mtc/bay-area-toll-authority/san-francisco-oakland-bay-bridge.

What would Toronto look like if we applied the lessons from these case studies to its downtown expressways? Two major highways lead into Toronto's downtown: the Gardiner Expressway, which has an AADT of approximately 140,000[137], and the Don Valley Parkway, which has an AADT of approximately 135,000[138], so about 275,000 vehicles use the expressways daily. Given that the Gardiner and the DVP connect with each other, there is the likelihood of double counting, e.g. for a trip by a motorist who uses both highways to access the city core. Nevertheless, an enormous number of vehicles use the two expressways: driven by around 10% of the population of the city, if each vehicle was single driver. To reduce the capacity of or even remove one or both of these routes would signal a massive shift in priorities. From an urban design and spatial allocation, perspective, though, San Francisco has taught us that if the source of the traffic is not tackled, design changes in the city centre will have little effect.

Implementation

In this alignment, the entire elevated section of the Gardiner from Dufferin Street in the west to Logan Avenue in the east is removed. The at-grade section of the expressway from Highway 427 to Dufferin Street remains, to be reduced in capacity over a second phase. The approach to the elevated section of the expressway between Dunn Avenue and Dufferin Street will also be removed, and the alignment changed so that the Gardiner feeds onto Lake Shore Boulevard just east of Jameson Avenue. Lake Shore Blvd. will continue along its present alignment along the waterfront, between the Canadian National Exhibition grounds and Ontario Place, and into the downtown core (See Figure 12 in Appendix A). In the wide right-of-way between Spadina Avenue and Cherry Street, where Lake Shore Boulevard currently runs beneath the Gardiner as a divided six-lane road, I imagine two options for realignment:

- Option A: Lake Shore Boulevard is realigned as an at-grade, tree-lined Grand Boulevard, with a central six-lane, two-way roadway, two medians of trees, bike lanes, and wide sidewalks.

- Option B: Lake Shore Boulevard is realigned as a six-lane, two-way boulevard on the southern side of the right-of-way, with the remainder of the right-of way given to cycling lanes and a linear park (See Figure 13 in Appendix A), with connections to other parks and public spaces including Canoe Landing Park, the Rogers Centre stadium and Roundhouse Park, and Maple Leaf Square, as well as future pedestrian connections to the Distillery District and Corktown development.

[137] Toronto, "About the Gardiner Expressway."

[138] Toronto, City of, "Don Valley Parkway."

In line with the "Remove" option for the Gardiner East originally developed in 2014[139], east of Cherry Street, Lake Shore Boulevard is realigned to cut through the lower West Donlands, instead of running along its current alignment beside the Keating Channel, opening up valuable land for development in the Keating Channel Precinct. New ramps would be built to connect the DVP and Lakeshore.

Outputs

- Removal of capacity for 140,000 vehicles to access the downtown daily, relieving congestion in the downtown street network, thus increasing safety and lowering emissions
- Increased connection between downtown and central waterfront
- Creation of brand-new fully public spaces with safe connections to existing parks and public spaces north and south of the corridor
    - Creation of new park land or public space in Toronto generally requires acquisition or conveyance of private land, usually under Section 42 of the *Planning Act*, which can be arduous and complicated.
- Opening up of new corridor for cycling infrastructure through the heart of the downtown
- Increased quality of life for residents and workers of the adjacent areas:
    - Cleaner air
    - Less noise
    - More opportunities for healthy living through active transportation
- Potential for additional development along the expressway's current corridor, particularly in the now-vacated section between Dufferin and Bathurst Streets and within the wide right-of-way east of Jarvis Street. The city will have many options, including:
    - Designating new, needed employment areas in the South Core
    - Building affordable housing under CreateTO's Housing Now initiative
    - Selling prime land for city revenue, and putting conditions for housing or employment on the sale

Challenge

Connection of the downtown and the Waterfront is difficult even with the removal of the Gardiner because of the train lines coming into Union station.

- **Strategies:**

[139] Livey, "Staff Report: Gardiner Expressway and Lake Shore Boulevard East Reconfiguration Environmental Assessment (EA) and Integrated Urban Design Study."

- The Parks and Public Realm infrastructure plan contained within the Downtown Plan outlines a list of strategies under the umbrella initiative "Shoreline Stitch" that seek to re-connect the downtown and the waterfront[140], including:
    - Rail Deck Park: a City of Toronto initiative which proposes to place a twenty-acre park on a deck built over the CN and Metrolinx rail corridor between Bathurst Street and Blue Jays Way. An Official Plan Amendment was passed in 2017 redesignating the land use of the railway lands from *Utility Corridor* to *Parks and Public Spaces,* and the project is currently in the concept development stage[141].
    - A number of development proposals are in the planning or construction stages that also utilize the air rights over the rail corridor and will stitch together the two sides
        - Union Park: a mixed-use development from Oxford Properties that will include a park covering the rail corridor between Blue Jays Way and John Street, eventually connecting with the rail deck park. The project is still in the early planning stages, and the proponents have yet to submit OPA or zoning by-law amendment applications[142]. It is unclear whether the park will be a privately-owned public space (POPS) or a parkland conveyance to the city.
        - CIBC Square: a two-phase development of two office buildings straddling the rail corridor adjacent to Union Station. The centrepiece of the project is a small park on a bridge across the corridor. How public this park will be remains to be seen, however. The advertising materials for the development highlight the luxury nature of the park, indicating that it may be an exclusive amenity for building tenants[143].

Challenge

Many buildings adjacent to the Gardiner/Lake Shore Boulevard downtown have no street frontage, which could lead to a poor public realm.

Strategies:

- Wide sidewalks along the new Lake Shore Boulevard open up many options for street life: food vendors, linear markets, performance spaces, street furniture.

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[140] City of Toronto, "Downtown Parks and Public Realm Plan," 2018, 127–47.

[141] City of Toronto, "Rail Deck Park Overview," November 16, 2017, https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/rail-deck-park/rail-deck-park-overview/.

[142] Oxford Properties Group, "Union Park," accessed June 21, 2020, https://www.unionparkto.com/.

[143] "CIBC SQUARE Park & Amenities," accessed June 21, 2020, http://www.cibcsquare.com/park-amenities/#park.

- Opportunity to commission public art to place in front of blank walls, or green infrastructure, e.g. trees or gardens.

Challenge

Path dependence of Gardiner Rehabilitation Plan: billions of dollars have already been allocated for the rehabilitation of the entire expressway, and some components have been completed, for example the new eastbound off ramp to Yonge Street.

Strategies:

- The Gardiner Rehabilitation plan is only in its first phase, the section between Jarvis and Cherry Streets, and no contracts have yet been awarded for subsequent phases.
- This plan offers the opportunity to save the City of Toronto hundreds of millions of dollars for the city. The city's Transportation Services division has nearly $2.2 billion earmarked in its 2020-2029 capital plan for the Gardiner's rehabilitation, more than half of which is due to be spent between 2025-2029.
- Even if cancellation costs of existing contracts and the cost of realigning Lake Shore Boulevard were to equal or exceed the costs of rehabilitating the expressway (which is unlikely given previous costs projections for removal), the benefits reaped from removal will outweigh the costs.

Challenge

Where will the 140,000 vehicles/day using the Gardiner go? Potential for Lake Shore Boulevard east of Dufferin to become impossibly congested, and for neighbourhoods in Toronto's west end to see increased road traffic.

Strategies:

- The phenomenon of disappearing traffic described earlier in this paper suggests that Lake Shore Boulevard will likely reach its capacity and then much of the excess traffic will simply disappear through motorists taking different routes, travelling at different times, choosing not to travel at all, or switching transport modes.
    - The GO Expansion (aka Regional Express Rail) initiative projects to add capacity for 55,000 new passengers on the Lakeshore West line by 2031[144].
- Pairing the removal of the Gardiner with traffic calming interventions in the west end will lessen the impact of increased traffic on neighbourhoods, and further increase obstacles for motorists. This added time on the journey could actually further disincentivize using a car to commute to the downtown from the west.

[144] Metrolinx, "GO Expansion Full Business Case," November 2018, 76.

Typology Two: The Arterial

The planning of Toronto's street system is a bit of an puzzle. Rectilinear but haphazard, the city sprawls out along the northern shore of Lake Ontario in a mostly horizontal and vertical fashion, until you hit the curvy cul-de-sac-ridden outer suburbs, of course. While the system is a grid, it differs from the centrally planned grids of Manhattan or Barcelona. The only true top-down grid planning in early Toronto was the concession system used in Upper Canada to divide townships into agricultural lots. In the Township of York, which Toronto would eventually grow to cover, the concessions were approximately two kilometres by two kilometres, leaving a large square to fill in[145]. These squares were not filled in any coordinated way, however. The way that Toronto grew after its initial incorporation in 1834, through a series of annexations, led to a fragmented street system, with many cross streets not meeting up at arterials. An example of this (see below) is Yonge Street between Queen Street and Bloor Street, where a map from 1902 shows only three through streets. In the twentieth century the City of Toronto and later Metro Toronto embarked on a campaign of aligning a number of cross streets to create more arterials across the city. For example, in 1917 Dundas Street was extended east from Ossington Avenue to Broadview Avenue across the Don River by merging several other east-west streets, resulting in a new thoroughfare across the downtown with a number of distinct "jogs", most notably where Dundas crossed both Bathurst and Yonge Streets. Later, in the early 1950s, Dundas was extended to connect with Kingston Road in the city's east end, cutting through a number of neighbourhoods to create a new route to the downtown from Scarborough to ease pressure on the existing routes[146].

All this is to say that Toronto's historical urban fabric was relatively unfavourable for motorists and required direct intervention to make it feasible to drive into and across the city centre on through streets. Today, Toronto is a mostly an open-access city for private vehicles, with few restrictions on where you can drive. Turns are prohibited at many intersections throughout the city, but generally only during rush hour[147]. For the most part, if you're in a car, you have access to anywhere in Toronto's downtown core. Understanding now as we do the phenomenon of induced demand, the *if-you-build-it-they-will-come* paradigm in downtown Toronto has become *we-built-it-and-they-came.* According to the *Transportation Tomorrow Survey, 2016*, twenty-two percent of all the trips made by private vehicle (car driver, car passenger, taxi, or ride-hail) to a location in the downtown also *originated* in the downtown[148].

It is important to note here that within the downtown core, data shows that far more people use active and public transportation than private transportation for getting to work and to

[145] Dylan Reid, "REID: Toronto Is Not a Grid," *Spacing Toronto* (blog), July 23, 2013, http://spacing.ca/toronto/2013/07/23/toronto-is-not-a-grid/.
[146] Chris Bateman, "The Oddities of the Dundas Street Extension," *Spacing Toronto* (blog), May 19, 2017, http://spacing.ca/toronto/2017/05/19/the-oddities-of-the-dundas-street-extension/.
[147] City of Toronto, "TORONTO MUNICIPAL CODE CHAPTER 950 §950-1322. SCHEDULE XXIII: PROHIBITED TURNS (SEE §950-504A)," May 5, 2020, https://www.toronto.ca/legdocs/municode/toronto-code-950-23.pdf.
[148] Transportation Information Steering Committee, "Transportation Tomorrow Survey 2016."

school (See Table 3). The intensification of Toronto's city centre over the past three decades has been successful in drastically reducing the distance downtown residents need to travel in their daily lives, and thus reducing the need to rely on a car: as of 2016, over 50% of households in the downtown do not own a car[149]. For the majority of trips to the downtown for work or school from places of residence outside the core, public transit is the first choice, but for nearly half trips to the downtown for reasons other than work or school (e.g. shopping, entertainment), private transportation becomes the primary mode (See Table 4**Error! Reference source not found.**).

Table 3: Trips *within* downtown Toronto by mode and purpose (Transportation Tomorrow Survey, 2016)

	Trip Purpose			
Mode of Transportation	**Home-Based Work**	**Home-based School**	**Home-based All Other Purposes**	**Non-home-based**
Public	27%	23%	23%	21%
Private	9%	4%	28%	27%
Active	**64%**	**73%**	**48%**	**52%**
Other	0%	0%	0%	0%

Table 4: Trips *to* downtown Toronto by mode and purpose (Transportation Tomorrow Survey, 2016)

	Trip Purpose			
Mode of Transportation	**Home-Based Work**	**Home-based School**	**Home-based All Other Purposes**	**Non-home-based**
Public	**55%**	**64%**	33%	30%
Private	23%	10%	**44%**	**39%**
Active	22%	26%	23%	31%
Other	0%	0%	0%	0%

No data exists to tell us how many trips are made *through* the downtown but we can conclude from this data that the centre of Toronto does not have to be a space for private transportation. Adjustments to the road network would be affecting at most 29% of trips to the downtown[150]. Despite this, downtown Toronto is incredibly easy to drive in. Within the boundaries of the Official Plan's Downtown and Central Waterfront area are sixteen major arterials and sixteen minor arterials (See Table 5)[151], by far the most dense grouping of them

[149] Transportation Information Steering Committee.

[150] Transportation Information Steering Committee.

[151] City of Toronto, "City of Toronto Road Classification System," 2013, https://www.toronto.ca/wp-content/uploads/2018/01/950a-Road-Classification_Summary-Document.pdf.

in the entire City of Toronto. According to the city's own classification system, both major and minor arterials have traffic movement as their primary function over property access (as opposed to collector or local roads, where traffic movement is of equal or subordinate importance to access to property)[152]. This system seems to run counter to common sense: shouldn't the downtown, as the densest area of both residential and non-residential uses in the city have streets whose primary purpose is accessing those uses, especially given that the majority of movement in that area is not by private transport? Granted, the city's transportation services division does note that the road classification system is for short-term management and that the long-term objectives of Toronto's street network should be shaped by its Official Plan (including the place of private transportation in the mobility hierarchy)[153], but number of streets in the downtown whose official role is as "car-terials" is telling for the policy priorities of the city.

Table 5: Major and Minor Arterials in Downtown Toronto

Major Arterials	Minor Arterials
Davenport/Dupont	Rosedale Valley Rd./Aylmer
Bloor	Hoskin/Harbord
College/Carlton (to Jarvis)	Wellesley
Dundas	Carlton (East of Jarvis)
Queen	Gerrard
Richmond	Shuter
Adelaide	Wellington
King	Front/Eastern
Lakeshore Blvd.	Bremner
Bathurst	Queen's Quay
Spadina	St. George/Beverley
University	York
Bay	Church
Yonge	Sherbourne
Jarvis	Parliament
Bayview	River

Options Analysis: Option 1 - Remove downtown through-trips

The first option I will examine is simply taking away the option of a through-trip in a car. Downtown Toronto has a surplus of roads primarily intended for car use, and as with the Gardiner, once restricting space for cars becomes a goal instead of a downside of a project, the breadth of options that present themselves is incredible. Space for cars can be reallocated for parks or public spaces, flexible spaces for community organization, extended outdoor

[152] Toronto.

[153] Toronto.

seating for cafes, bars, and restaurants, pop-up markets, urban agriculture, cycling facilities, and a host of other amenities for people rather than cars.

Next I examine case studies of four European cities that have taken aggressive steps to restrict through traffic in their city centres.

Case Studies

Groningen, The Netherlands

One of the most successful examples of a city aggressively restricting the ability of cars to navigate a city centre is in Grönigen, a municipality of approximately 200,000 in the Netherlands. Faced with increasing congestion, pollution, and loss of space to parking, in the 1970s a newly elected left-wing government decided to implement a bold new proposal for the city's central core, called the *Verkeerscirculatieplan* (VCP) or "Traffic Circulation Plan". The plan divided the inner city into four quadrants, and restricted the travel of motorists between the zones, instead forcing them out to a ring road to access other areas[154]. The plan sparked substantial outcry from central businesses, who claimed a massive loss of business in the first few months of the VCP's implementation. Municipal surveys did show a reduction in sales and visits for only shopping in the city centre but found a substantial increase in visits to the core for other reasons (e.g. recreation or visiting cafes or restaurants). More importantly, the goals of the plan were achieved: private car use intensity in the inner city dropped by 47%, bus passengers into the core increased by 12-17%, and air quality and noise levels saw substantial improvement[155]. In recent years, Groningen has doubled down on infrastructure for active transportation: cycling now accounts for 61% of all trips made in the city, and the municipal government has installed parking for thousands of bicycles, especially around transportation nodes like the central train station[156].

Grongingen: Lessons Learned

Lowering the number of cars in a city center can be achieved with the simple measure of removing through-route options, and the result can be increased interest from residents in spending time in the city centre, rather than simply getting in and getting out.

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[154] Michael Smith, "Limiting Cars, Privileging Bicycles: A History of the Traffic Circulation Plan in Groningen, Netherlands," CitySmiths, July 9, 2018, https://www.citysmiths.org/blog/2018/7/9/limiting-cars-privileging-bicycles-a-history-of-the-traffic-circulation-plan-in-groningen-netherlands.

[155] S Tsubohara, "The Effect and Modification of the Traffic Circulation Plan (VCP) – Traffic Planning in Groningen in the 1980s (1) –" (University of Gronigen, 2007).

[156] Renate van der Zee, "How Groningen Invented a Cycling Template for Cities All over the World," *The Guardian*, July 29, 2015, sec. Cities, https://www.theguardian.com/cities/2015/jul/29/how-groningen-invented-a-cycling-template-for-cities-all-over-the-world.

Ghent, Belgium

The government of Ghent, a medieval city of 260,000 in Flanders, Belgium, is currently implementing a Mobility Plan, which consists of a number of car-restricting measures directly influenced by Groningen. The Circulation Plan, put in place in 2017, expanded on an existing car-free zone in the centre of the city, creating six spoke-like zones surrounding the inner core between which motorists cannot pass. Car use in these zones is highly regulated, requiring specific permits and with speed limits of 30 kilometres per hour, and motorists, like in Groningen, must use a ring road to access the different zones, preventing cross-city travel. Cyclists, trams and buses, emergency vehicles, deliveries, and taxis are exempt from the restriction[157]. Additionally, Ghent has implemented an urban form that is already prevalent across Northern European cities, the "bicycle street". Rather than trying to squeeze bike lanes in next to car lanes, these streets are prioritized for cyclists: motorists can use them but are prohibited from passing bicycles.

Figure 3: A bicycle street in Ghent (Eltis.org)

Due to these measures, one key target of the Circulation Plan, of achieving a 35% modal share by bicycle share by 2030, was achieved by 2019, two years after the Circulation Plan's implementation [158]. Simultaneously to the Circulation Plan, Ghent is overhauling its parking policies, drastically reducing the availability of parking in the city centre and making it more expensive to park the closer to the core one gets, while also increasing the amount of parking outside the inner ring road to encourage visitors to park and use active or public transportation to access the city centre[159]. Like in Groningen, opposition to the city's plans was fierce in 2017 – Filip Watteeuw, the vice-mayor in charge of planning for the city, even received death threats! – but the success of its projects in a few short years in increasing the livability of Ghent's downtown core is undeniable[160].

Ghent: Lessons Learned

Massive shifts in modal share can happen quickly when car use is deliberately targeted. Ghent has not invested massively in infrastructure, simply closed off routes through the city centre. The backlash to the plan also shows us that European cities are not the meccas of car-free culture that we in North America imagine them to be. So, if it could succeed in Ghent it could succeed in Toronto too!

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[157] City of Ghent, "The Circulation Plan," accessed May 7, 2020, https://stad.gent/en/mobility-ghent/circulation-plan.

[158] Streetfilms, *The Innovative Way Ghent, Belgium Removed Cars From The City*, Short Film, 2020, https://www.youtube.com/watch?v=sEOA_Tcq2XA&t=4s.

[159] City of Ghent, "The Mobility Plan," accessed May 7, 2020, https://stad.gent/en/mobility-ghent/mobility-plan.

[160] Streetfilms, *The Innovative Way Ghent, Belgium Removed Cars From The City*.

Barcelona, Spain

These two examples from the Lowlands are relatively flat, mid-size cities with medieval forms, hardly sprawling metropolises, and so it may seem easy to argue that implementing anti-car measures and increasing cycling's modal share of transportation is much easier than a big city like Toronto. On the other hand, larger European cities are also stepping out of their car-filled comfort zones and making drastic changes to the mobility options for their residents.

Barcelona, the second-largest city in Spain at approximately 1.6 million people and the capital of the autonomous province of Catalonia, has made headlines in recent years for its bold plan to pacify traffic. The city has one of the highest densities in Europe at 16,000/km^2 and an easily recognizable urban form outside the bounds of its old Gothic city quarter. Barcelona's unique grid system, the result of the mid-nineteenth century *Eixample* ("extension") plan covers most of the city centre with regular blocks of 133 metres by 133 metres with distinct chamfered corners resulting in octagonal intersections [161]. According to at least one historian, these intersections were to allow for easier flow of traffic[162], but what is undeniable is that Barcelona's wide right of ways and regular blocks, while beautiful and distinct, are perfect catalysts for lots and lots of car traffic. As a pedestrian walking through Cerdà's Eixample, the tree-lined streets are gorgeous, but you feel dominated by the cars whizzing by and every octagonal intersection presents a challenge for crossing. Perhaps the most telling example of how car-oriented Barcelona has become is at the Placa des Glories, the intersection of the city's two diagonal arterials and the centrepiece of Cerdà's plan for the extension, has until very recently been occupied by a massive elevated concrete roundabout.

The car-gripped paradigm that Barcelona has found itself in at the outset of the 21st century has had dramatic environmental effects on the city. As of 2015, sixty percent of Barcelona's public space was devoted to the car: the city has some of the highest levels of air pollution in Spain and the considerable impermeable services have led to an extreme heat island effect to the point that the temperature in the city can be up to 7.5 degrees Celsius higher than the surrounding area [163]. To combat this and to help with climate change mitigation and adaptation, the city government of Barcelona has embarked on an ambitious journey to restructure the urban fabric of the city to reduce car use, open up more space for public life and green infrastructure, and thus increase its sustainability and liveability at the same time. Under its Urban Mobility Plan (initially from 2013-2018, recently updated for 2019-2024, the city wants to implement a series of "superblocks" (*superilles* in Catalan), groups of blocks –

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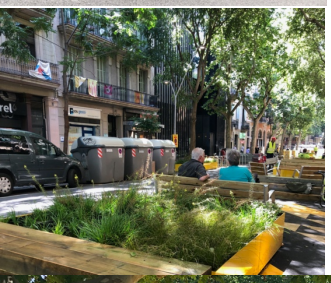
[161] Eduardo Aibar and Wiebe E. Bijker, "Constructing a City: The Cerdà Plan for the Extension of Barcelona," *Science, Technology, & Human Values* 22, no. 1 (January 1, 1997): 3–30, https://doi.org/10.1177/016224399702200101.

[162] Marta Bausells, "Story of Cities #13: Barcelona's Unloved Planner Invents Science of 'Urbanisation,'" *The Guardian*, April 1, 2016, sec. Cities, https://www.theguardian.com/cities/2016/apr/01/story-cities-13-eixample-barcelona-ildefons-cerda-planner-urbanisation.

[163] Iván López, Jordi Ortega, and Mercedes Pardo, "Mobility Infrastructures in Cities and Climate Change: An Analysis Through the Superblocks in Barcelona," *Atmosphere* 11, no. 4 (April 20, 2020): 410, https://doi.org/10.3390/atmos11040410.

generally nine of Cerdà's square chamfered ones – in which through-traffic is prohibited in the interior streets, and car speed limited to 10kilometres per hour. The limiting of traffic opens up space for pedestrians, public life, and green spaces for the neighbourhood within the superblock area[164].

Figure 4: Barcelona's Sant Antoni superblock *(Photos by author)*



When Barcelona first devised its *superilla* plans in the 2010s, there were already existing superblocks in the Gothic quarter and in the Gracia neighbourhood [165]. These projects were different from the new superblocks for a number of reasons: first, they are in areas that are much older than the 19th century Eixample, with an urban fabric already much more inclined to pedestrians than cars; second, they were built in 1993 and 2003, respectively, and were site-specific, not connected to a greater mobility vision for the city [166]. The new superblocks are completely tied into the larger Urban Mobility Plan and rely heavily on the existing urban form of the city's grid system. The *superilles* program as it looks now is the brainchild of the publicly-funded Barcelona Urban Ecology Agency, who recommend that around 500 be built throughout the city, in parallel with an overhaul of the city's bus network to remove even more cars from the road and offset the potential for increased traffic on the streets surrounding the superblocks. The overall plan is to reduce the area of the city given over to cars by 45% and increase the pedestrian space of the city by 270% [167].

The *superilles* program garnered considerable attention when it was first announced but has stumbled a little coming out of the block, largely for political reasons. The first superblock to be piloted under the Urban Mobility Plan was planned for the El Poblenou neighbourhood, a historically working-class district in the north-east end of the Eixample. Originally planned under a centre-right government in 2015, a progressive government newly elected in that same year changed the location and implementation of the Poblenou pilot, leading to confusion among residents of the neighbourhood. Lack of proper consultation before the rollout of the pilot meant that many people living within the bounds of the *superilla* were caught off guard when the roads were closed and found themselves navigating an unfamiliar network. A network of resistance formed between some residents and businesses in the superblock, and

[164] López, Ortega, and Pardo; David Roberts, "Cars Dominate Cities Today. Barcelona Has Set out to Change That.," Vox, April 8, 2019, https://www.vox.com/energy-and-environment/2019/4/8/18273893/barcelona-spain-urban-planning-cars.

[165] Christos Zografos et al., "The Everyday Politics of Urban Transformational Adaptation: Struggles for Authority and the Barcelona Superblock Project," *Cities* 99 (April 2020): 102613, https://doi.org/10.1016/j.cities.2020.102613.

[166] Roberts, "Cars Dominate Cities Today. Barcelona Has Set out to Change That."; Zografos et al., "The Everyday Politics of Urban Transformational Adaptation."

[167] López, Ortega, and Pardo, "Mobility Infrastructures in Cities and Climate Change"; Roberts, "Cars Dominate Cities Today. Barcelona Has Set out to Change That."

the new city government under novice mayor Ada Colau was accused of arbitrarily reorganizing the plans to create something "new" of their own and to mine political capital [168]. After about six months, however, the opposition to the project died down, likely owing to the city's undertaking proper consultation with the neighbourhood to decide what to do with the public space opened up within the superblock [169]. Now Poblenou is acting as a model for the next wave of superblocks: three more have been built since, and the city is employing a phased approach to their implementation: an initial tactical urbanist intervention, low budget and temporary, followed by consultation with local residents, and a more permanent (and expensive) infrastructural intervention[170] [171].

Whether Barcelona will be successful in the implementation of all 500 of its desired superblocks remains to be seen, but the ones they have built so far are beautiful. My wife and I visited Barcelona in 2019 and walked through the Sant Antoni superblock as its permanent features were being installed. I was struck by how quiet the neighbourhood was the second we entered, and how much more I noticed trees, buildings, and people without the constant motion of cars in my peripheral vision. I think one of the great aspects of this project is that the octagonal intersection, an urban form that is actually not great for pedestrians (every intersection is like crossing a roundabout) becomes an incredible new public space.

Barcelona: Lessons Learned

The *superilles* project shows that car-reduction measures can work in large, highly dense cities, although the initial backlash against them may be even more substantial than in smaller cities like Ghent and Groningen. Barcelona's experience also shows that planners can harness the unique characteristics of their cities (like Barcelona's orthogonal grid) when looking to make big transformations.

Amsterdam, The Netherlands

[168] Zografos et al., "The Everyday Politics of Urban Transformational Adaptation."

[169] David Roberts, "Barcelona Wants to Build 500 Superblocks. Here's What It Learned from the First Ones.," Vox, April 9, 2019, https://www.vox.com/energy-and-environment/2019/4/9/18273894/barcelona-urban-planning-superblocks-poblenou.

[170] This is similar to the phased process Montreal follows in implementing pedestrian spaces, which allows for cost-effective implementation and substantial public participation.

[171] López, Ortega, and Pardo, "Mobility Infrastructures in Cities and Climate Change"; Roberts, "Barcelona Wants to Build 500 Superblocks. Here's What It Learned from the First Ones."

Figure 5: The changes in Amsterdam's streetscape over a century. *(Fast Company)*

Amsterdam is often held up as the poster child of the car-free city, and anyone who has been there in recent years can vouch that the Dutch capital is certainly a special place where the bicycle is the main mode of transit. Like many European cities, the bike was the main way to get around Amsterdam in the early twentieth century, before the city underwent the same car-centric transformation that plagued many other cities around the world. Residents of Amsterdam soon revolted in the 1970s, however, beginning a movement to return road space to bicycles. Since the 1990s, in particular, cycling infrastructure provision has grown significantly, and with it bicycle ridership: as of 2017, 35% of trips within Amsterdam were made by bicycle[172]. It's worth noting that one study found that cycling ridership in Amsterdam was significantly weighted toward white, native Dutch residents living in the denser city centre, and that new immigrants, who generally lived further outside the city centre cycled far less. This suggests that "socio-spatial polarization contributes to strengthen the difference in cycling rates between the urban core and the surrounding periphery"[173] and merits consideration when looking at cycling rates in a city.

Amsterdam is about as friendly to active transportation (and public transportation, given its strong tram network) as a city can be, and yet a significant amount of space in Amsterdam is still given over to cars. One of the most visible manifestations of this is along the city's iconic canals, which is often given over to parking, making the canal hard to see from the street. The over-allocation of space to cars creates conflict between cyclists, who are forced to compete for the narrow remainder of the right of way, a very real problem for a city with so many on bikes. In Fall 2019, the city released a new plan for the city, *Agenda Amsterdam Autoluw* (Amsterdam Car-Free Agenda), which outlined a vision for 2040, when Amsterdam's metropolitan population is projected to be 1.1 million people[174]. The vision reads much like many similar plans around the world, including Toronto's Official Plan: it describes a city where the majority of trips within the city and greater region are made using public and active transportation, which are more convenient to use than a car, and where space for cars in the city centre has been replaced by green infrastructure, public space, and more bicycle parking. The plan contains twenty-seven short-term, medium-term, and long-term implementation

[172] Renate van der Zee, "How Amsterdam Became the Bicycle Capital of the World," *The Guardian*, May 5, 2015, sec. Cities, https://www.theguardian.com/cities/2015/may/05/amsterdam-bicycle-capital-world-transport-cycling-kindermoord; Samuel Nello-Deakin and Anna Nikolaeva, "The Human Infrastructure of a Cycling City: Amsterdam through the Eyes of International Newcomers," *Urban Geography*, January 5, 2020, 1–23, https://doi.org/10.1080/02723638.2019.1709757.

[173] Samuel Nello-Deakin and Lucas Harms, "Assessing the Relationship between Neighbourhood Characteristics and Cycling: Findings from Amsterdam," *Transportation Research Procedia* 41 (2019): 17–36, https://doi.org/10.1016/j.trpro.2019.09.005.

[174] City of Amsterdam, "Amsterdam maakt ruimte: Agenda Amsterdam Autoluw [Amsterdam makes space: Amsterdam Car-free Agenda]," January 23, 2020.

measures across three sections: creating more trips by sustainable transportation, reducing trips by car, and creating more space by eliminating parking. Notable measures include:

- Reducing the number of cars on streets by instituting various traffic calming interventions like one-way lanes, restricting side street access, or introducing *knips* (cuts). This will be undertaken in the short term on several streets with <5,000 vehicles per day, and a study will be started to explore the feasibility of these measures on streets with >5,000 vehicles per day.
- Piloting a *knip* (cut) on Weesperstraat to dissuade through traffic. Weesperstraat is one of the widest streets in Amsterdam's city centre, and part of a through route connecting with a tunnel running under the IJ, the large body of water separating central Amsterdam from its northern suburb, Amsterdam-Noord. The city plans to use the pilot project to study the effects on traffic on the street and in the surrounding area, principally to see if other nearby routes become more congested.
- Undertaking a study to explore how essential services (e.g. retail and package deliveries, construction vehicles, emergency services, waste management) can still be provided if car access is significantly reduced in the city centre. One option suggested for delivery logistics is to create distribution hubs on the outskirts of the city where shipments can transfer from larger trucks to smaller and lighter modes (including bicycles) that are more suitable to urban spaces.
- Placing a cap on number of on-street parking permits issued per year and reducing that cap gradually each year in parts of the city where public space is particularly stretched thin. The city estimates that this will free up around 7,000 parking spaces by 2025, whose space can be re-allocated for other uses, including much-needed bicycle parking.[175]

This plan is so new that few of the measures have been implemented yet, and so little empirical data to draw on, but it is illustrative of the vision a city can have in re-prioritizing non-car transportation in its city centre. Reaction to the plan has been positive, such as from groups who have advocated for *knips* on through-streets[176], and negative, as from residents who are worried that the implementation measures will divert more traffic to their streets[177]. The plan has generated some buzz worldwide[178] and is adding to Amsterdam's anti-car reputation, but what strikes me about this plan is that it is still relatively safe in how it

[175] Amsterdam.

[176] Residents' council Nieuwmarkt Groot Waterloo, "Knip Weesperstraat [Cut out Weesperstraat]," Bewonersraad Nieuwmarkt Groot Waterloo, June 22, 2020, https://www.bewonersraad1011.amsterdam/knip-weesperstraat/.

[177] Lars Duursma, "'Agenda Autoluw Is Uiterst Onrechtvaardig' ['Car Free Agenda Is Extremely Unfair']," Het Parool, January 21, 2020, https://www.parool.nl/gs-b49925994.

[178] Feargus O'Sullivan, "Street by Street, Amsterdam Is Cutting Cars Out of the Picture," Bloomberg.com, October 7, 2019, https://www.bloomberg.com/news/articles/2019-10-07/how-amsterdam-is-closing-the-door-on-downtown-cars.

challenges the car's place in the streets of the city. Many of the implementation measures proposed are five to ten years away

Amsterdam: Lessons Learned

Car space is so pervasive in cities worldwide that even in a city like Amsterdam where far more people in the city centre cycle than drive, most of the area of most streets are still given over to cars. Amsterdam's plan shows us that main thoroughfares can and should be targets for car-free measures.

Toronto: YongeTOmorrow

The City of Toronto is currently undertaking a Municipal Class Environmental Assessment called YongeTOmorrow to study options for transforming Yonge Street in the downtown core. Canada's "longest street", Yonge is the backbone of Toronto, running from Lake Ontario unbroken to the city's northern boundary (and then continuing north to Lake Simcoe). It is the location of three of the five "Centres" designated in Toronto's Official Plan (Downtown, Midtown, and North York), is also designated as an Avenue under the Official Plan[179], and within the downtown is designated as a Great Street, a Retail Priority Corridor, and Cultural Corridor under the Downtown Secondary Plan[180]. The portion of Yonge between Queen and Bloor Streets has one of the highest concentrations of commercial land uses in the city, with significant street front retail, the Eaton Centre shopping mall, restaurants, four spaces for live theatre (the Ed Mirvish, Elgin, Winter Garden, and CAA Theatres), a movie theatre, and Yonge-Dundas Square.

The YongeTOmorrow study is motivated by the imbalance in allocated space on Yonge Street between motorists and all other users. Depending on the time of day, as many as 75% of the users of the street are pedestrians, yet around 60% of Yonge's right-of-way is given to four lanes for motorists, forcing pedestrians onto narrow and increasingly crowded sidewalks. Based on projected growth scenarios, the experience for pedestrians on Yonge's sidewalks will be practically untenable by 2031. The YongeTOmorrow study has been progressing through several rounds of public and stakeholder consultation, beginning with developing design concepts for a first phase of transformation, on the portion of Yonge between Queen and College Streets. Early consultation established a strong public wish for more space for pedestrians, street life, and cyclists on Yonge, and little appetite for cars. A long list of design typology alternatives was developed, falling into five categories (Business-as-usual, car-free, one driving lane, two driving lanes, and three driving lanes), with three alternatives (one car-free, one single-lane, one two-lane) short-listed after further consultation. In the current

[179] Toronto, "Toronto Official Plan - Feb 2019 Consolidation."

[180] Toronto, Downtown Plan.

phase of consultation, multiple design options combining the three alternatives in different ways have been developed and are being shopped to the public and stakeholders[181].

The preferred design option that is emerging, as of a stakeholder advisory group meeting in March 2020, has the car-free "pedestrian priority" alternative applied to about a third of the stretch between Queen and College, but the street is open to cars, either in a single one-way lane or two lanes[182]. The rationale behind keeping the street open to cars in some places seems to be based in retaining access for deliveries for businesses with only front access, but I see inconsistency in this reasoning, given that the pedestrian priority portions also seem intended to be open for limited access to delivery vehicles[183]. Moreover, allowing traffic on blocks like between Dundas Square and Shuter Street, which is fronted by the Eaton Centre mall to the west and businesses that are served by a back lane to the east, seems to indicate that the sole reason for cars is passenger pick up and drop off, which is continuing to encourage car trips on Yonge Street. Finally, the provision of cycling facilities along the corridor in the preferred option is haphazard. The YongeTOmorrow process is promising for developing a path toward a more car-free downtown Toronto, and the level of consultation being undertaken is admirable, but it is showing strong signs of falling victim to the compromises that have plagued street space allocation throughout the city.

Vision for Toronto

To target car space on Toronto's downtown arterials and restrict easy through-trips across the downtown, I envision a strategy combining the "superblock" element of Barcelona's plans with the *knip* (street cut) tool from Belgium and the Netherlands. In a phased manner, most east-west arterials and north-south arterials within the boundaries of the Downtown Plan are "cut" at least once along their length, which would involve cars being banned for one or more blocks and all on-street parking removed. Selection of cut location and design of the new spaces resulting from car removal would incorporate community project leadership, to help ensure buy-in from local users, and develop streetscapes that serve the community's needs. Like in Ghent and Barcelona, there would likely *significant* blowback from motorists and business interests in the initial phase of implementation, meaning that what replaces the cars is critical in selling the project.

Street Cuts - Implementation

a) The street cut will consist of a closure of one or more blocks of an arterial to motorists, and the removal of all on street parking. When encountering a street cut, motorists will be forced to turn right or left.

[181] LURA Consulting and Toronto, City of, "Public Event #2 Downtown Yonge Street."

[182] LURA Consulting and Toronto, City of, "YongeTOmorrow Municipal Class EA – Yonge Street from Queen Street to College Street Stakeholder Advisory Group Meeting #5 Summary," March 2020.

[183] LURA Consulting and Toronto, City of, "Public Event #2 Downtown Yonge Street."

b) Cuts will be implemented gradually on a multi-year basis, with one or two new projects per year.
c) Cut locations will be chosen based on community consultation, keeping in mind a number of factors, including intensity of mixed-use development, proximity to institutional land uses like higher education or health care, high pedestrian traffic, proximity to existing or planned parks or public spaces, or presence of seasonal closures. See Figure 14 in Appendix B for some intervention sites I think have potential.
d) How the cut will look and operate will vary depending on its location. For example, a cut on a street with an existing streetcar or bus route will remain open to transit vehicles. Some cuts could become pedestrian only areas. Some could become shared streets, with cars allowed but limited to one-direction and pedestrians and cyclists taking precedent. See Figure 15 in Appendix B for an example of a street cut intervention.
e) Cuts will be clearly marked by signage and paint, and by physical elements such as bollards, curbs, street furniture, trees and planters, and (hopefully) by a high degree of foot traffic within the street.
f) Programming within each cut can be tailored to its specific neighbourhood: streets with high retail intensity could have places to sit and rest or for street performances; streets with a concentration of restaurants could have space allocated for patios; streets with high nearby residential populations could have flexible spaces well-suited for community organization.
g) The implementation of each cut will happen in two stages: in the first stage (approximately one year long), the cut will be piloted with temporary fixtures and programming based on community consultation. After further consultation on the effect of the cut, adjustments to the street plan and programming can be made and permanent fixtures can be installed.

Outputs

- Motorists will be forced to divert at cuts, resulting in longer, more circuitous, more frustrating routes through the downtown. The added time and inconvenience in driving into or through the downtown will act as a deterrent to motorists and hopefully encourage many to switch to public or active transportation.
- Each cut represents an increase in safe, quiet, flexible city-owned spaces, allowing for improved pedestrian experience and stimulation of public life. Given the difficulty of procuring new parkland and public space in the city, this is incredibly valuable.
- As cuts are added to the downtown street network, a system of pedestrian priority routes can be created, in line with policy 8.6 of the Downtown Plan.[184]

[184] Toronto, Downtown Plan, 34.

Challenge

Motorists diverted by street cuts may use quieter residential neighbourhood streets for through trips.

Strategies:

- In areas surrounding street cuts, traffic calming measures can be implemented in neighbourhood streets, so that increased congestion does not decrease safety of residents and other users of the street.
- Increased congestion on side streets would also likely act as a deterrent to motorists, and eventually the increased traffic would subside.

Challenge

Removing through options on arterials could make it more difficult for emergency vehicles like fire trucks to quickly get to their destinations.

Figure 6: A compact fire engine in Copenhagen. *By Mount73 - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=450910*

- In street cuts, clearways with enough room for emergency vehicles can be left in the centre of the right-of-way to ensure access for emergency vehicles.
- The city could procure smaller, more nimble emergency vehicles that can more easily maneuver tight urban spaces. These are widely used in more compact cities worldwide.
- The introduction of street cuts could actually make it easier for emergency vehicles to access their destinations: by removing cars as obstacles and ensuring clear passage, the cuts provide a quick route across city blocks.

Options Analysis: Option Two – Streetcar rights-of-way

Light Rail Transit (LRT) vs. Streetcars

Both LRT and streetcar (aka tram) systems can use the same vehicles. The difference between the two comes down to use:

LRT: High frequency, higher speed, wider stop spacing (generally 400m+), exclusive right-of-way.

Streetcar: Medium to high frequency, shorter stop spacing (<400m), generally operating in mixed traffic, leading to slower speeds.

One of Toronto's most special attributes is the network of streetcar routes that crosses its downtown. Unlike most cities in North America, Toronto managed not to lose all of its streetcars to buses, largely due to the concerted efforts of streetcar advocates in the 1970s[185]. The streetcar network is already an integral part of Toronto's public transit system and offers an enormous infrastructural opportunity, with hundreds of kilometres of track and brand new low-floor light-rail vehicles rolling on Toronto's streets. The potential of Toronto's streetcar network is being undermined, though, by having to compete with cars in most of the city.

The following case studies show different ways that light rail transit can operate in city centres.

Case Studies

Manchester, United Kingdom

Manchester, a city of just under a half a million people in the north of England, is a city that has been defined by industry. As one of the cities at the heart of the Industrial Revolution, the Manchester exploded in population in the late 19th century to become one of the densest and busiest cities in Europe. In the post-industrial world of the mid- to late- 20th century, however, Manchester saw steep economic decline and loss of population, particularly in the city centre[186]. Beginning in the 1980s, policy makers started to take an earnest look at finding ways of reinvigorating central Manchester, including solving an accessibility problem that plagued the city. While Manchester was served by a robust rail network, it lacked a low-headway, rapid transit system. Even with two large train stations, Victoria and Piccadilly, straddling the city centre, no direct transport connection into or through the city centre existed. To solve this problem, Manchester chose to retrofit a number of the heavy rail lines leading into "Vic" and "Picc" to light-rail transit lines, building a connection between the two stations through the old core. Today the LRT network, called Metrolink, is the largest in the

[185] Harold J. Levine, "Streetcars for Toronto Committee: A Case Study of Citizen Advocacy in Transit Planning and Operations," in *Light Rail Transit : New System Successes at Affordable Prices : Papers Presented at the National Conference on Light Rail Transit, May 8-11, 1988, San Jose, California* (National Conference on Light Rail Transit, Washington, D.C.: National Research Council (U.S.)., 1989), http://books.google.com/books?id=1jZSAAAAMAAJ.

[186] Richard J. Williams, "Manchester After Engels," *Places Journal*, June 30, 2020, https://placesjournal.org/article/manchester-after-engels/.

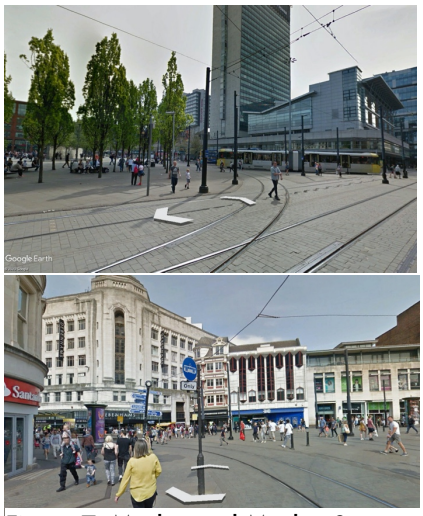


Figure 7: Market and Mosley Streets, Manchester. Sections of both streets are open only to trams and pedestrians (Google Earth)

UK, with seven lines, ninety-three stops, and nearly 100 km in length, with a ridership of around 45 million per year[187]. Travel into Manchester's city centre has steadily increased over the past two decades, with Metrolink handling much of the increase: between 2015 and 2018, the number of trips made by LRT rose by 65%, while trips by the car declined by 6%. Walking and cycling trips to the city centre increased by 19% and 29% respectively over the same 2015-2018 period, reflecting a general shift toward sustainable transportation in accessing central Manchester[188].

Manchester offers an excellent example of transportation adaptive re-use. Rather than spending billions on new light rail infrastructure and a tunnel across the city centre, Manchester repurposed existing heavy rail assets and placed trams on a surface level route. In 2017 the city opened a second crossing across the city centre and added a tram stop at Exchange Square, in the centre of one of the city's most popular tourist zones[189]. Notably, the Metrolink trams have a number of exclusive rights-of-way on streets that are closed to regular car traffic, and in a number of spots mix freely with pedestrians.

Manchester: Lessons Learned

Manchester shows that getting creative with existing assets can expedite the deployment of a rapid transit network across existing urban fabric at significantly lower costs than building new. Light rail has the ability to act as a true rapid transit network that can enable the transition from car to public transit. Metrolink's repurposing of street rights-of-way allow for the creation of car-free spaces that are still interconnected with other urban spaces. Toronto could undergo a similar creative repurposing to convert its slow streetcar network into a light rail transit system even more cheaply just by getting cars out of the way!

Calgary, Alberta

A great example of a light-rail transit system running through a downtown core can be found here in Canada, in Calgary, Alberta. Calgary's C-train is a radial LRT system that connects its Central Business District with a number of its far-flung suburbs. The C-train has among the highest ridership for an LRT network in North America, with a daily ridership of around 290,000

[187] Daniel Vaughan, "Metrolink Annual Performance Report" (Manchester: Greater Manchester Combined Authority, October 11, 2019), https://democracy.greatermanchester-ca.gov.uk/documents/s2484/07%20GMTC%2020191011%20Metrolink%20Annual%20Report.pdf.

[188] Manchester City Council, "Manchester's State of the City Report 2019," n.d.

[189] Daniel Vaughan, "Second City Crossing: A New Line through the Heart of Manchester City Centre," Railway Technology Magazine, May 8, 2017.

passengers[190]. The first C-train line opened in 1981 as a replacement to an existing express bus network called the Blue Arrow[191], and the current two-line system is a critical piece of Calgary's unique land use pattern. Downtown Calgary has an incredibly high employment density coupled with a relatively low residential density, a more than eight-to-one ratio as of 2011, and around a quarter of the city's population works in the CBD[192]. The rest of the city is sprawling and low-density, so the C-train is pressed upon to provide downtown transit access to suburbs through numerous park-and-ride facilities[193]. In recent years the city has added a bus rapid transit (BRT) network, and in June 2020 Calgary City Council voted to go ahead with the construction of a third C-train line to the city's southeast end[194]. The city's rapid transit system continues to be a radial commuter one in nature, however, and growing inner-city neighborhoods like the Beltline and Mission are not served by rapid transit.

The key feature of the C-train LRT system in Calgary's CBD is the Seventh Avenue transit mall. Running east-west across the core, Seventh Avenue is only open to the LRT, buses, and emergency vehicles, with stations spaced out along its length, and is a fare-free zone of the transit system. The idea for transforming a downtown avenue into a transit priority corridor seems to have originated from a 1963 proposal by Calgary architect Gordon Atkins, who would also be responsible for designing the Stephen Avenue pedestrian mall one block south of Seventh Avenue[195]. The transit mall has been successful from a transportation standpoint, providing an easy and quick way across the downtown, but has been the subject of criticism and dislike for its lack of vitality[196]. Having worked in downtown Calgary in 2017, I can attest to this: with the exception of a few blocks, Seventh Avenue is not overly attractive for a pedestrian. This is despite an initiative the city undertook in the early 2000s to revamp the LRT stations and beautify Seventh Avenue's public realm through the addition of linear parks paralleling the transit mall[197]. Calgary urbanist Richard White argues, though, that the lack of life along the corridor has little to do with the trains or lack of car access, and everything to do with urban form. Many buildings front onto the streets one block north or south of Seventh Avenue and treat the transit mall as a backdoor, including the downtown mall and the heritage

[190] Calgary Transit, "Statistics for 2019 | Calgary Transit," accessed June 29, 2020, /about-us/facts-and-figures/statistics.

[191] John Hubbell et al., "Light-Rail Transit in Calgary, 1981-1995: A Retrospective Review," in *Conference Proceedings 8*, vol. 2 (Seventh National Conference on Light Rail Transit, Baltimore, Maryland: National Academy Press, 1995), 15–26.

[192] Steve Lafleur, "The 30th Anniversary of the C-Train: A Critical Analysis of Calgary's Light Rail Transit System," in *POLICY SERIES NO. 104* (Frontier Centre for Public Policy, 2011).

[193] Hubbell et al., "Light-Rail Transit in Calgary, 1981-1995: A Retrospective Review."

[194] Sarah Rieger, "Calgary Council Votes to Build the $5.5B Green Line," CBC, June 17, 2020, https://www.cbc.ca/news/canada/calgary/green-line-vote-1.5615066.

[195] Stephanie White, *Unbuilt Calgary* (Toronto: Dundurn, 2012), 102.

[196] See White, *Unbuilt Calgary* and; City of Calgary and Graham Edmunds Cartier and Sturgess Architecture, "7th Avenue LRT Station Reconstruction and Pedestrian Environment Upgrades" (Calgary, October 2004).

[197] Calgary and Graham Edmunds Cartier and Sturgess Architecture, "7th Avenue LRT Station Reconstruction and Pedestrian Environment Upgrades."

Hudson's Bay building[198]. This dynamic could see a lot of change over the coming years however: a number of new high-rise office buildings have been or are being constructed along Seventh Avenue, including TELUS Sky, a high-profile mixed office-residential high-rise designed by Danish starchitect Bjarke Ingels, which is adjacent to an LRT station[199].

Calgary: Lessons Learned

The Seventh Avenue transit mall shows that surface corridors can be converted from car-use to LRT-use to create truly rapid transit across a busy downtown core. Calgary offers a cautionary tale, however, that transit-only corridors can become neglected spaces for pedestrians and public life if land-use and urban design policies are not coordinated to ensure connection between the street and the programming of adjacent buildings. Steps should also be taken to ensure that adequate space is made in the right of way of a transit corridor for a vibrant public realm.

Melbourne, Australia

Melbourne's tram system is an excellent case study because of its similarities to Toronto's streetcar system. Melbourne is of a similar age and size to Toronto and has had a continually-operating tram system since 1906, which today is the largest in the world[200]. The system has an extremely high ridership of 206.3 million per year, or

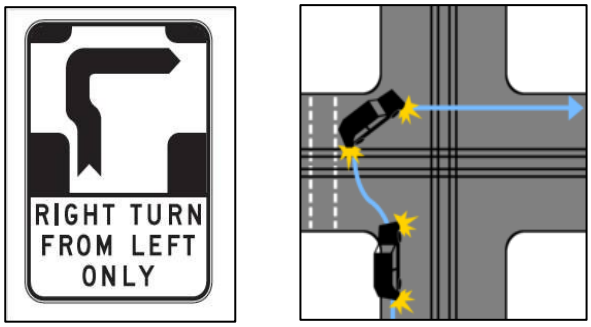


Figure 8: Hook Turns in Melbourne *(City of Melbourne*

To avoid blocking through traffic (particularly trams) while waiting to turn right, in many Melbourne intersections, motorists must pull into the far left lane in front of opposing traffic and wait for the light to change to proceed perpendicularly through the intersection.

[198] Richard White, "Calgary's 7th Ave. Transit Corridor: Better But Not Great," *Everyday Tourist* (blog), July 18, 2016, https://everydaytourist.ca/calgary-visitor-information/2016/6/28/calgarys-7th-avenue-better-but-not-great.

[199] "Home," Telus Sky, accessed July 1, 2020, http://telussky.com/.

[200] "Melbourne's Tram History - Yarra Trams," accessed July 4, 2020, https://yarratrams.com.au/melbournes-tram-history.

565,205 daily riders[201]. Like Toronto's streetcars though, most of Melbourne's trams operate in mixed-traffic, and have typically been plagued by the same problems: low average speeds, unreliable headways leading to "bunching", getting stuck behind right-turning cars (comparable to left-turning cars here in Canada), and poor accessibility. The latter problem is well on its way to being solved in Melbourne as in Toronto, with low-floor trams taking over on most routes. To try to address the former problems Melbourne has implemented a number of policy changes including proof-of-payment fare systems, increasing capacity through larger trams, signal priority for transit at intersections, and the Melbourne-specific "hook turn" (See Figure 8: Hook Turns in Melbourne)[202]. Trams still struggle with mixed traffic, however, and the average speed of a tram crossing the city centre of Melbourne has fallen to around 11 kilometres per hour, much slower than a bicycle. Melbourne is recognizing the potential of its trams to fill holes in its transportation network, however, and in its Transportation Strategy for 2030, passed by its city council in 2019, hints at the potential to transform the local tram network into a full light-rail rapid transit network[203]. One key step in this transformation, according to Currie & Shalaby[204], is to increase the distance between stops to cater to longer trips: Melbourne and Toronto both have average stop spacing below international best practices for light-rail rapid transit.

Like Calgary and Manchester, Melbourne has a number of streets where car traffic is prohibited, but trams, pedestrians, and cyclists are allowed. Most notable are Swanston and Bourke Streets in the downtown, both of which are lined with mixed uses and a high amount of retail. The prohibition of private vehicles (including taxis) from Swanston Street between allowed for the enlarging of sidewalks, improving the retail experience, and the addition of

Melbourne: Lessons Learned

Melbourne's tram network shows that Toronto's situation is not unique, and that light rail on-street transit has the potential to carry high ridership, but that operating light rail vehicles in mixed-traffic will always reduce its ability to operate effectively. Existing on-street rail networks are extremely valuable assets, and increasing stop spacing for trams or streetcars can bring the experience closer to light rail. Closing streets to cars but leaving them open to transit and active transportation can improve the pedestrian experience and increase viability of retail.

[201] Public Transport Victoria, "Annual Report 2017–18," 2018, https://static.ptv.vic.gov.au/PTV/PTV%20docs/AnnualReport/1537917277/2017-18-Annual-Report-accessible-version.pdf.

[202] Graham Currie and Amer Shalaby, "Success and Challenges in Modernizing Streetcar Systems: Experiences in Melbourne, Australia, and Toronto, Canada," *Transportation Research Record: Journal of the Transportation Research Board* 2006, no. 1 (January 2007): 31–39, https://doi.org/10.3141/2006-04.

[203] City of Melbourne, "Transport Strategy 2030," 2019.

[204] "Success and Challenges in Modernizing Streetcar Systems."

larger tram stops, enabling quicker alighting and lowering delays[205]. The two streets are still open to vehicles making deliveries to businesses, provided they get a permit[206].

Toronto: King Street Transit Priority Corridor

In November 2017, the City of Toronto embarked on a project to test the efficacy of a transit-priority corridor on King Street between Jarvis and Bathurst Streets. Born out of the TOCore planning study of the downtown, the King Street Transit Pilot sought to improve the experience for the roughly 65,000 daily riders on the 504 King streetcar, who were suffering decreasing average speeds and increasing unreliability on the route. The 504 is the third busiest route in the TTC network, behind only Lines 1 and 2 of the subway and ahead of Lines 3 and 4[207].

Figure 9: Typical block layout on the King Street Pilot (City of Toronto)

The pilot study introduced a number of changes to King Street between Bathurst and Jarvis Streets. At most intersections, through vehicle movements and left turns were prohibited. Motorists were required to turn right off of King Street. At Bathurst and Jarvis, the western and eastern end, respectively, of the pilot study area, motorists were permitted to turn left or right but were restricted from entering the pilot area.

- TTC vehicles, bicycles, emergency vehicles, and road maintenance vehicles were exempt from the above restriction. Ignoring the city planners' recommendations, Toronto City Council voted to exempt taxis from the restrictions from 10:00 pm to 5:00 am[208].
- Streetcar stops were moved from their typical place on the near side of intersections to the far side of intersections. Coupled with the prohibition of through traffic, this allowed for separation of streetcar boarding and right-turning vehicles.
- All on-street parking was removed, but some spaces were left for deliveries or loading and passenger drop-off.

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[205] Global Designing Cities Initiative, "Global Street Design Guide," 275.

[206] City of Melbourne, "Swanston Street and Bourke Street Mall Permits," accessed July 5, 2020, http://www.melbourne.vic.gov.au/parking-and-transport/parking/parking-permits/Pages/swanston-street-and-bourke-street-mall.aspx.

[207] Toronto, City of, "Proposed King Street Transit Pilot: Bathurst Street to Jarvis Street," June 9, 2017, https://www.toronto.ca/legdocs/mmis/2017/ex/bgrd/backgroundfile-104940.pdf.

[208] "City Council Consideration on July 4, 2017," accessed July 7, 2020, http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2017.EX26.1.

- Access to all existing driveways was maintained.
- New public spaces were created in the curb lane, allowing for the insertion of new amenities to the public realm like parklets, public seating, patios for cafes and restaurants, and bicycle storage

Initial reactions to the pilot ranged from elation to disgust, with particularly vehement opposition coming from a group of restaurant owners within the pilot study area, who claimed that their businesses were suffering from the lack of street parking on King Street[209].
City analysis of point-of-sale data over the course of the year-long pilot found that the study area had seen a decrease in restaurant spending year-over-year but concluded this was a trend observed across the entire city, and thus could not be specifically tied to the pilot. Moreover, retail and service spending saw increases, so that the overall year-over-year growth in the study area during the year of the pilot was comparable to the previous year before the pilot[210].

From a transit perspective, the original goal of the pilot study of increasing streetcar travel reliability and shortening trip times was successful. Headways and travel time became more predictable, and the slowest afternoon trip time in both directions from Jarvis to Bathurst improved by about five minutes. There was a seventeen percent increase in all-day weekday ridership on the 504 streetcar line, but equally as important, there was an eighty percent reduction in car traffic on King Street! Some of this traffic shifted to parallel routes north and south of King Street, but travel times were minimally affected, and on the six east-west streets running across the downtown between and including Front and Queen Streets, there was a seven percent reduction of car traffic overall[211]. This strongly suggests that the phenomenon of disappearing traffic is at work.

In April 2019 Toronto City Council voted to make the King Street Transit Pilot permanent, renaming it the King Street Transit Priority Corridor. Ongoing initiatives include a yearly parklet design competition and the piloting of "'raised transit stop platforms'" at a number of streetcar stops to enable level boarding[212]. Future improvements include installing more permanent streetcar stops with shelters and real-time information displays, and further improvements to the public realm like lighting, public art, and wayfinding.

Vision for Toronto

The above case studies show us that surface light-rail transit can easily operate in city centres, and that closing streets to cars can create true rapid transit corridors, as seen in Calgary and

[209] Edward Keenan, "King St. Middle-Finger Approach Seems like an Odd Way to Deal with Lost Business," thestar.com, January 18, 2018, https://www.thestar.com/opinion/star-columnists/2018/01/18/king-st-middle-finger-approach-seems-like-an-odd-way-to-deal-with-lost-business.html.

[210] Toronto, City of and Toronto Transit Commission, "KING STREET TRANSIT PILOT: Annual Summary," 2019.

[211] Toronto, City of and Toronto Transit Commission.

[212] City of Toronto, "Public Realm Transformation," November 13, 2017, https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/king-street-pilot/public-realm/.

Manchester, while also opening up space for improved public life, as in Melbourne. Toronto's King Street experience comes close, but the city could go much further.

We can harness the incredible asset we have in Toronto's streetcar system (see and simultaneously make it more difficult to drive in the downtown. The following are two examples of potential interventions that I believe the city should explore: King Rapid Transitway and Queen West Mall. While I use these two examples to provide a detailed picture of what a car-free Toronto would look like, I would like to see the ideas expanded across the city. In an ideal world, every streetcar line in the city would be on an exclusive right of way, with most on transit-only streets. I would also love to see heavily used bus routes get priority express lanes across the city.

Figure 10: Toronto's streetcar network (Toronto Transit Commission)

Implementation

King Rapid Transitway

King Street is upgraded to a full light-rail rapid transit corridor through the following amendments:

a) Rather than prohibiting left turns at intersections along the priority corridor, motorists are prohibited from driving on King Street at all.
   i) Exceptions to 1)a. are made for emergency vehicles, buses, vehicles making deliveries to businesses along the corridor who have a specific permit to do so, and vehicles with specific accessibility permits.
   ii) Where absolutely necessary, access to existing driveways will be maintained for motorists with specific permits to access said driveways. Motorists are forbidden to drive on King Street outside of the block needed to access their driveway.

b) The priority corridor is extended so that it runs east along King Street to Bayview Avenue, then continues east past where King Street ends along Queen Street to Broadview Avenue, then north along Broadview Avenue to Danforth Avenue and Broadview subway station (See Figure 16 in Appendix C).

c) Permanent cycling facilities are installed along the corridor with clear demarcation and signage where they overlap with streetcar platforms (See Figure 17 in Appendix C).

d) A number of streets crossing King Street are made cul-de-sacs, preventing through access across King Street for motorists (but remaining open to cyclists and pedestrians).
e) One-way streets that currently terminate at King Street are converted to both-ways shared streets.
f) New public spaces and parklets are created at terminuses of new cul-de-sac with space for plantings, street furniture or outdoor dining.
g) Stops between main arterials are removed in both directions between Broadview Avenue and Bathurst Street, to allow for rapid-transit appropriate stop spacing
h) Given higher speeds of 504 LRT vehicles, to increase safety, bollards are installed between LRT right-of-way and parallel cycling lanes, and right-of-way will be painted.
i) In a phased manner through planned track maintenance, natural plantings such as turf will be placed in the streetcar right-of-way to create a "green tramway" along the entire 504 route.

Outputs

- King Street is removed as a through option for motorists across the entire downtown area from Bathurst to the Don River.
- Toronto gets a much-needed light rapid transit route connecting subway Line 2 to the Financial District. This can reduce some of the strain on Lines 1 and 2, particularly at the Bloor-Yonge interchange station, which is continually over-capacity. Two projects are in the planning pipeline to address this. The Bloor-Yonge Capacity Improvements Project, which will enlarge the station and improve paths of connection between Lines 1 and 2, is slated to be complete in 2029[213]. The Ontario Line, a provincially led rapid transit project in the early planning stage, proposes to connect the upcoming Line 5 Eglinton Crosstown LRT via Line 2 to the downtown, but will not be completed until 2027 at the earliest[214].
- The cost of converting the 504 streetcar to a full LRT route would be astronomically lower than building a comparable new route from scratch, especially if that new route included tunnelling.
    - For comparison, the cost of the Eglinton Crosstown LRT is just over $280 million per kilometre [215]. The cost of implementing the King Street Transit Priority Corridor on a permanent basis was $1.5 million, or just over $580,000 per kilometre[216].

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[213] Gary Downie, "Bloor-Yonge Station Capacity Improvements - Procurement Amendment Authorization" (TTC Board, February 25, 2020), https://www.ttc.ca/About_the_TTC/Commission_reports_and_information/Commission_meetings/2020/February_25/Reports/5_Bloor_Yonge_Capacity_Improvements_Procurement_Amendment_Au.pdf.

[214] Metrolinx, "Ontario Line Initial Business Case July 2019," July 2019, http://www.metrolinx.com/en/regionalplanning/projectevaluation/benefitscases/20190725_Ontario_Line_IBC.PDF.

[215] Metrolinx, "Eglinton Crosstown Backgrounder," thecrosstown.ca, accessed July 22, 2020, http://m.thecrosstown.ca/sites/default/files/eclrt_backgrounder.pdf.

[216] General Manager, Transportation Services, Chief Planner & Executive Director, City Planning, and Chief Customer Officer, Toronto Transit Commission, "The Future of King Street: Results of the Transit Pilot" (Executive Committee, City of Toronto, April 2, 2019).

- Rapid transit connections are made available for the high-growth mixed-use neighbourhoods of Corktown and the West Don Lands, as well as two areas undergoing City of Toronto planning studies, King-Parliament, and East Harbour.

Challenge

More spacing between transit stops along the King Rapid Transitway may pose potential problems for accessibility.

Strategies:

- From Don River to Bathurst Street, local service on Queen Street is less than 400 metres from King Street, which is much closer than the closest parallel local services to the Bloor-Danforth subway line along the same distance.
- 504 streetcars could run express services from Broadview Station to Queen Street along a centre lane right of way, with local service being provided along Broadview by extending existing bus routes currently terminating at Broadview Station south to Queen Street in the curb lane.

Challenge

Transformation of 504 into an LRT will increase ridership on an already overcrowded route.

Strategies:

- Implementation measures allow for faster crossing for light-rail vehicles (LRVs), meaning lower headways and more vehicles per hour, allowing for higher capacity to offset increased ridership.
- Toronto's Flexity Outlook LRVs can be coupled in pairs to double their maximum capacity to 260 from 130 riders.
    - Single streetcars are 30 m long, making a coupled pair approximately 60 m long. This is well below the shortest block on the new corridor, especially with the closures of through streets, so the longer LRVs will not block any cross traffic.
    - Current capacity per hour on the 504 line is 2400–2900 riders. Not even accounting for the extra capacity afforded by the other implementation measures, if existing headways are retained, this would mean an increase to 4800-5800 riders per hour.

Queen West Mall

Queen Street West, one of the most popular retail and dining destinations in the city, is closed completely to motorists from Yonge Street to Bathurst Street.

1) Exceptions are made for emergency vehicles and TTC buses at all times of day, city services vehicles in specific windows of the day, vehicles making deliveries to

businesses along the corridor who have a specific permit to do so and are doing so within a specific time of day outside peak hours.

2) Through traffic is allowed on the following streets crossing Queen: Spadina Avenue, John Street, University Avenue, Bay Street.
3) Cross streets on which through trips are prohibited are closed to motorists one block north and south of Queen Street, but open to cyclists, pedestrians, and residents requiring access to laneways running parallel to Queen.
4) The mall will operate as a hybrid shared street/transit street. Along the length of the mall, pedestrians, cyclists, and streetcars will be intermixed.
5) Eventually, in line with scheduled track replacement, the entire right-of-way along Queen Street between Bathurst and Yonge Streets will be rebuilt at the same grade, using permeable materials like pavers or cobblestones, physically delineating the mall as closed to car traffic.

Outputs

- Queen Street West between Yonge and Bathurst, which has high pedestrian volumes, is removed as a through street across the downtown. It becomes an even more vibrant corridor with ample space for public life, connected to two current Line 1 subway stations (Yonge and Osgoode), both with future interchanges with the upcoming Ontario Line.
- Experience is vastly improved for pedestrians on Queen West with more space in front of businesses, constant cross-street connections, places to stop and rest, space for street vendors, buskers, public art, and trees (See Figure 18 in Appendix D). Noise levels are lower and air quality is higher from removal of cars.
- Pedestrian-priority corridor that connects with YongeTOmorrow pedestrian corridor on Yonge Street, creating a seamless link for pedestrians between the downtowns two largest retail areas.
- Opens up more public space in the Civic Precinct park district outlined in the Downtown Plan's Parks and Public Realm infrastructure strategy. Closing Queen Street to traffic in front of Toronto City Hall is aligned with the feasibility study being undertaken on closing the City Hall parkade entrance on Queen[217].
- Pedestrian connection with John Street Cultural Corridor mixed-use shared street project currently under development[218].

Figure 11: Rendering for John Street Cultural Corridor (Joe Cressy)

[217] Toronto, "Downtown Parks and Public Realm Plan," 101.

[218] City of Toronto, "John Street Corridor Improvements" (City of Toronto, November 23, 2017), Toronto, Ontario, Canada, https://www.toronto.ca/community-people/get-involved/public-consultations/infrastructure-projects/john-street-corridor-improvements/.

Challenge

Danger of losing vitality of street life on Queen Street as seen in Calgary's transit mall.

Strategies:

- Data from King Street Pilot in Toronto and Swanston Street in Melbourne shows that removal of cars from a street with already vibrant store front presence does not pose a threat to commercial vitality.
- Increased amenities for pedestrians in right of way will entice people to linger in the area, improving vitality of street life instead of decreasing it.
- Opportunity for city to engage with community, including businesses, to hear concerns and devise new ways of using new space available in right-of-way.

Challenge

Safety issues from intermixing of pedestrians, cyclists, and streetcars.

Strategies:

- Streetcar right-of-way could be indicated by paint or change in paving materials to indicate potential presence of streetcars to pedestrians.
- 501 Streetcars will operate at reduced speed of 20 kilometres per hour along the length of the mall from Yonge Street to Bathurst Street, mitigating the risk of accidents.
    - The increased travel time on the 501 Queen route will be made up for by the reduced travel times three blocks south on the King Rapid Transitway.

Challenge

Significant retail and restaurant presence on Queen Street West require vehicle access for deliveries.

- Delivery vehicles with specific permits will be allowed access during off-peak hours only. Delivery permits would be pegged to specific times to limit number of vehicles accessing the mall at any one time.
- Size of delivery vehicles would be restricted.
- Businesses could be encouraged to consolidate delivery orders.

The interventions I have presented here are only four of many that I would love to see implemented in Toronto. When I began this research, I hoped to devise a car-free plan for the downtown that addressed every street typology and spatial configuration that encourage driving. Through my review of the experiences in several cities worldwide, I have developed an extensive understanding of the potential actions that could be taken in Toronto to move toward an eventual car-free downtown. I truly wish I had more time and space to elaborate on all my ideas, but I will list them here.

Some other design interventions Toronto could try:

- Remove all on-street parking, as Amsterdam is gradually doing.
- Reduce all downtown arterials to one lane in either direction and replace curb lanes with cycling lanes or public space.
- Make side streets within arterial blocks shared streets with 10 kilometre per hour speed limits, with physical obstacles for through trips like planters and playgrounds, like in Barcelona.
- Turn certain streets into "bicycle streets" as in Groningen and Ghent, where cars are subordinate to cyclists and forbidden to pass cyclists.
- Prohibit cars from driving in streetcar lanes on all existing streetcar routes.
- Place street cuts at certain streets crossing the Don River and CP rail tracks, restricting entrance to the downtown for cars.
- Making streets adjacent to all schools pedestrian-only.

These interventions, and the ones I have outlined in detail earlier in the paper, would have greater chance of success if paired with policy and planning changes discouraging car use throughout the city, including:

- Removing parking minimums for new development from zoning by-laws.
- Implementing transport demand management policies encouraging the use of public and active transportation, e.g. granting tax breaks to businesses based on percentage of employees who bike, walk, or take transit to work.
- Lifting restrictions on mixed-use and employment uses in areas designated as *Neighbourhoods* in Toronto's Official Plan.
- Reinstituting the $60 vehicle registration tax scrapped by the City in 2010[219] as a disincentive to car ownership and source of revenue for transit investment.
- Implementing road tolls on the Don Valley Parkway, Allen Road, and western portion of the Gardiner Expressway (assuming the removal plan I have outlined above is implemented).

[219] CBC News, "Toronto Councillors Kill Car Tax, Cut Budgets."

Conclusion

I'd like to return to the scenario I presented in the introduction of this paper, where I detailed the easy car trip for myself and my wife to visit a friend downtown, using the Gardiner expressway, downtown arterials, and ample street parking. With the interventions I have suggested above, would making that trip by car be the easiest choice now? With no Gardiner Expressway, the downtown arterials narrowed and cut, and parking spots given over to sidewalks and bike lanes, the journey by car would be much longer, more complicated, and more annoying. On the other hand, if we leave the car at home and take public transit, we can be downtown just as quickly as in a car, this time taking subway Line 2 to Broadview Station and transferring to the new King Rapid Transitway, which takes us right to John and King Streets, a block from our friend's new place. We wouldn't have to worry about street parking, and once we're at our destination, we are drawn to the new public spaces nearby. We could go south and walk along the new linear park along Lake Shore Boulevard, now open to the sky without the Gardiner overhead. Or we could go north and walk east along the Queen West Mall and people watch, making our way to the new Yonge Street pedestrian mall. Why would we drive?

I have presented case studies in this paper to show that bold choices are being made all over the world, and they can work. But I don't think we need to see bold ideas tested in other cities first to try them here in Toronto. We have the all the tools to undertake cutting-edge transformations of our streets, our public transport, and our public spaces, we just need to have the guts to do it. I think the more that Torontonians see the incredible opportunities for placemaking that open up when you take away space from motorists, the more they will enthusiastically embrace restrictions on driving. I firmly believe that Toronto, especially its downtown, is a city that would thrive with fewer cars: we have the density, increasing every year; we have thriving mixed-use corridors just begging for public realm improvements; and we have all the infrastructure in place to have a state-of-the-art light rail transit network covering the downtown and reaching out to the rest of the inner city.

The interventions I have suggested here are just a few options of many that could be implemented to make Toronto a place where using a car is *possible* but not *preferable.* More people use cars in Toronto than use active or public transportation, but we have not created an even playing field where all the costs and benefits of each mode have been weighed. To readers of this paper who argue that I am proposing arbitrary obstacles to motorists just for the sake of making things more difficult, I am happy that you are getting my point. My vision for Toronto is not a car-free city, but a city where driving is going to be my last choice. It's true enough that making it take longer to drive will not make a subway train go faster or a cyclist be able to get downtown any sooner. But removing space for cars is safer for the cyclist and is more welcoming/rewarding for the subway rider when they emerge above ground to an

environment full of people, instead of cars. Removing space for cars allows for the creation of markets, of urban agriculture, of street life, of community gathering areas, and a plethora of uses of public space that I can only begin to imagine. It's time to undertake a radical transformation of the way we move in this city.

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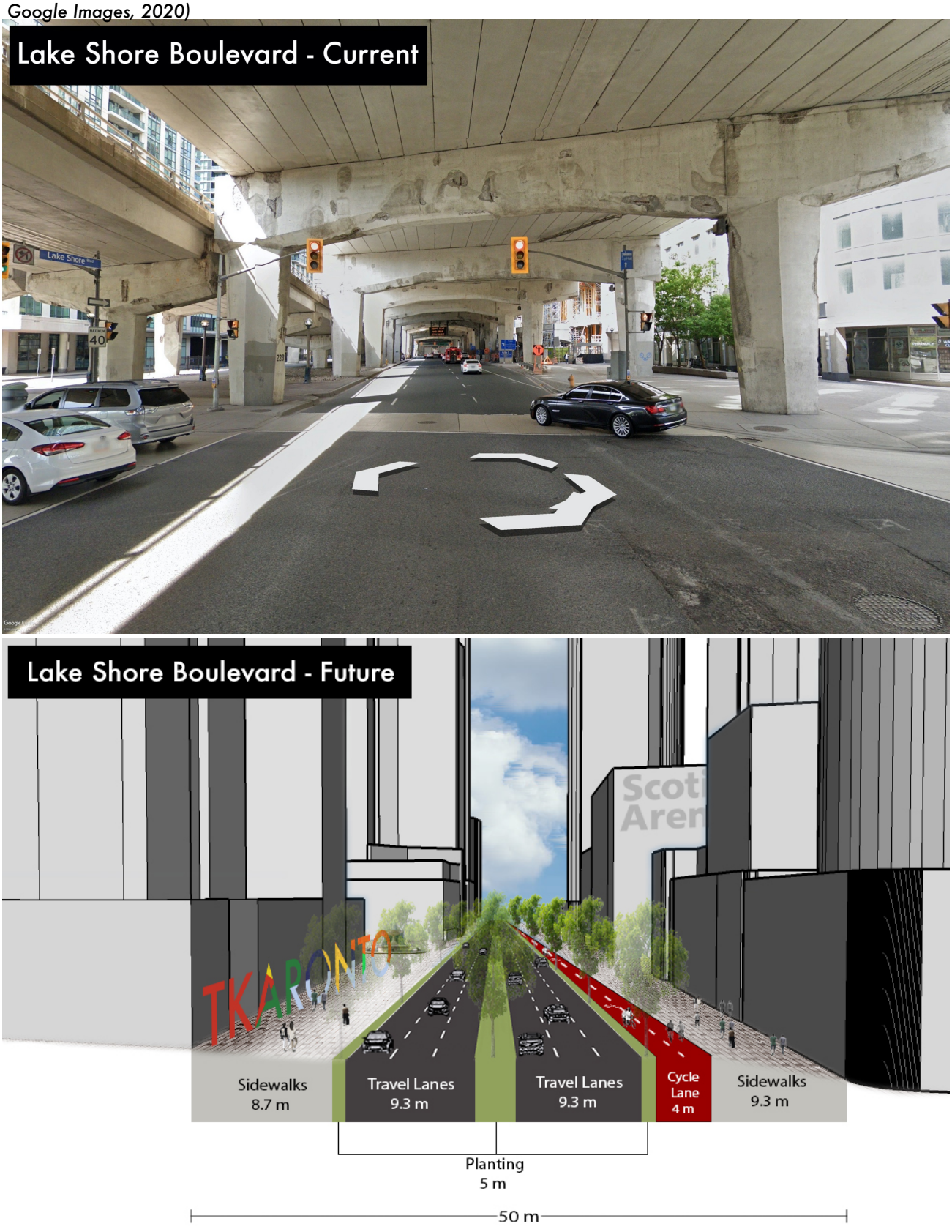
Appendix A - Gardiner Expressway Removal

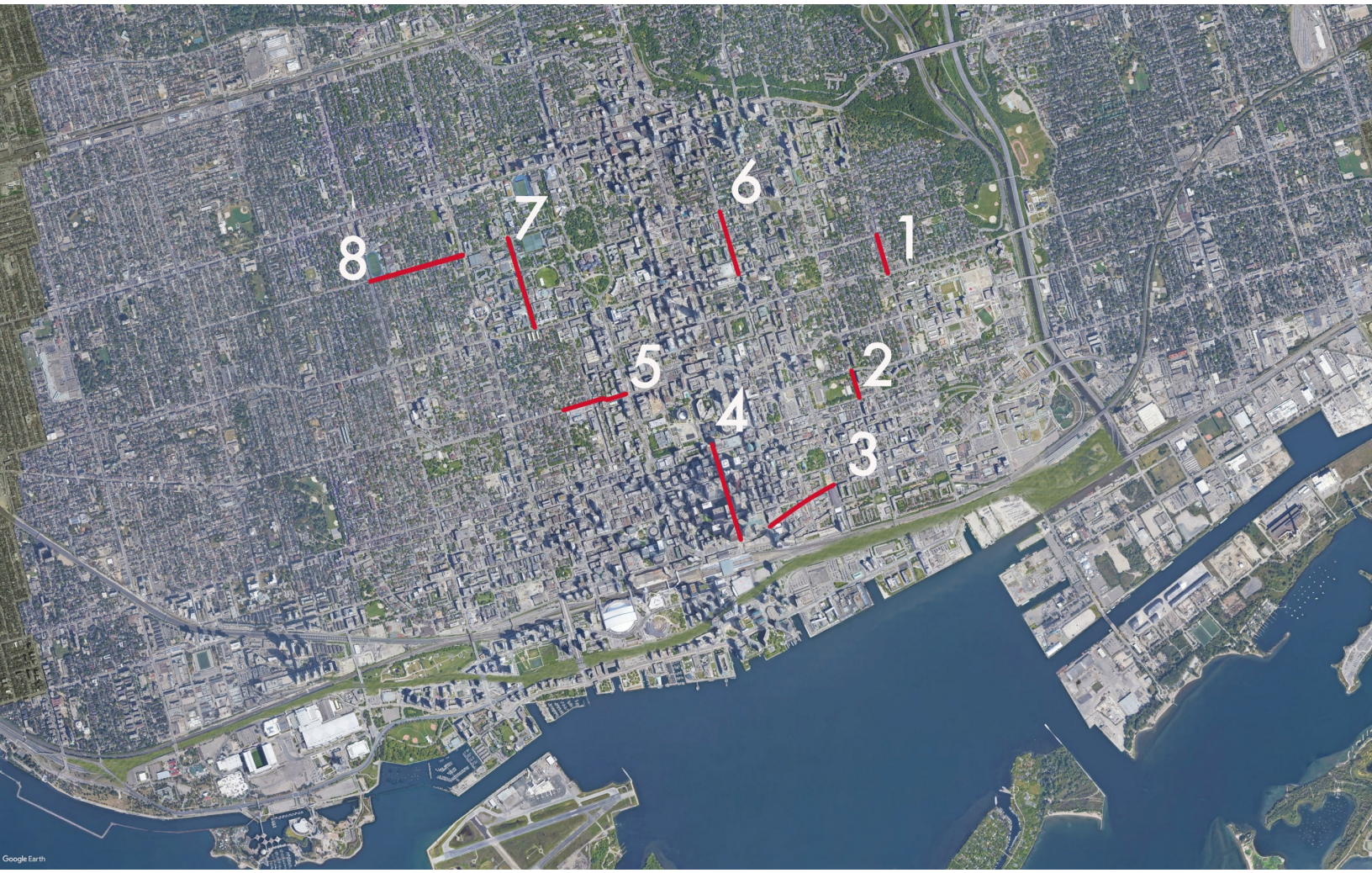
Figure 12: Realignment of Lake Shore Boulevard *(Base images, Google Earth, 2020)*

Figure 13: Lake Shore Boulevard before and after demolition of Gardiner Expressway *(Base images, Google Earth, Google Images, 2020)*



Appendix B Downtown Street Cuts

Figure 14: Potential locations of downtown street cuts *(Base image, Google Earth, 2020)*



1 Parliament Street, Carlton to Gerrard

2 Sherbourne Street, Shuter to Queen

3 Front Street, Jarvis to Yonge

4 Bay Street, Front to Queen

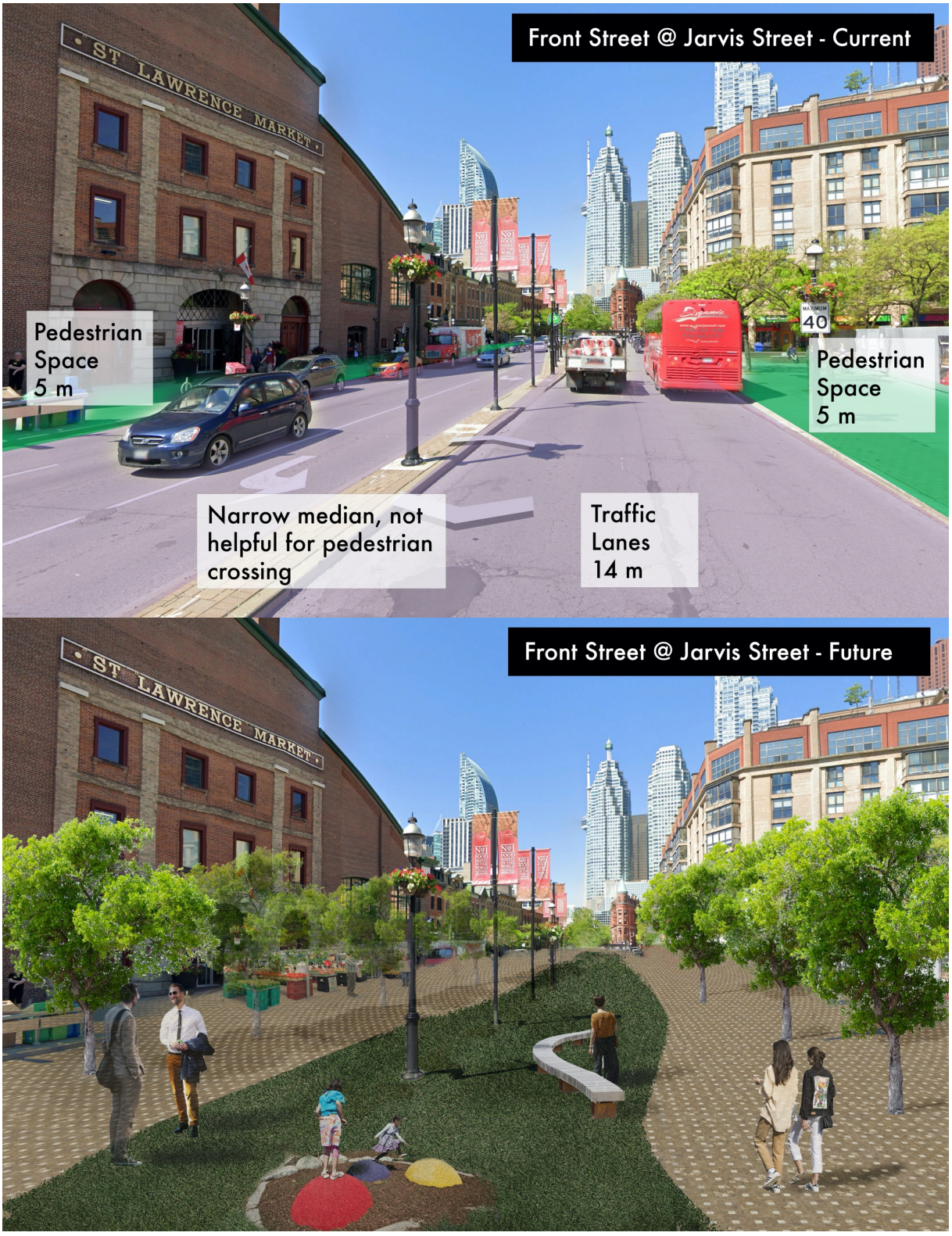
5 Dundas Street, Spadina to University

6 Church Street, Wellsley to Carlton

7 St. George Street, Hoskin to College

8 Harbord Avenue, Spadina to Bathurst

Figure 15: Street cut in St. Lawrence Market *(Base images, Google Images and Google Earth, 2020)*



Appendix C – King Street Rapid Transitway

Figure 16: Map of King Rapid Transitway and stations *(Base imagery, Google Earth, 2020)*

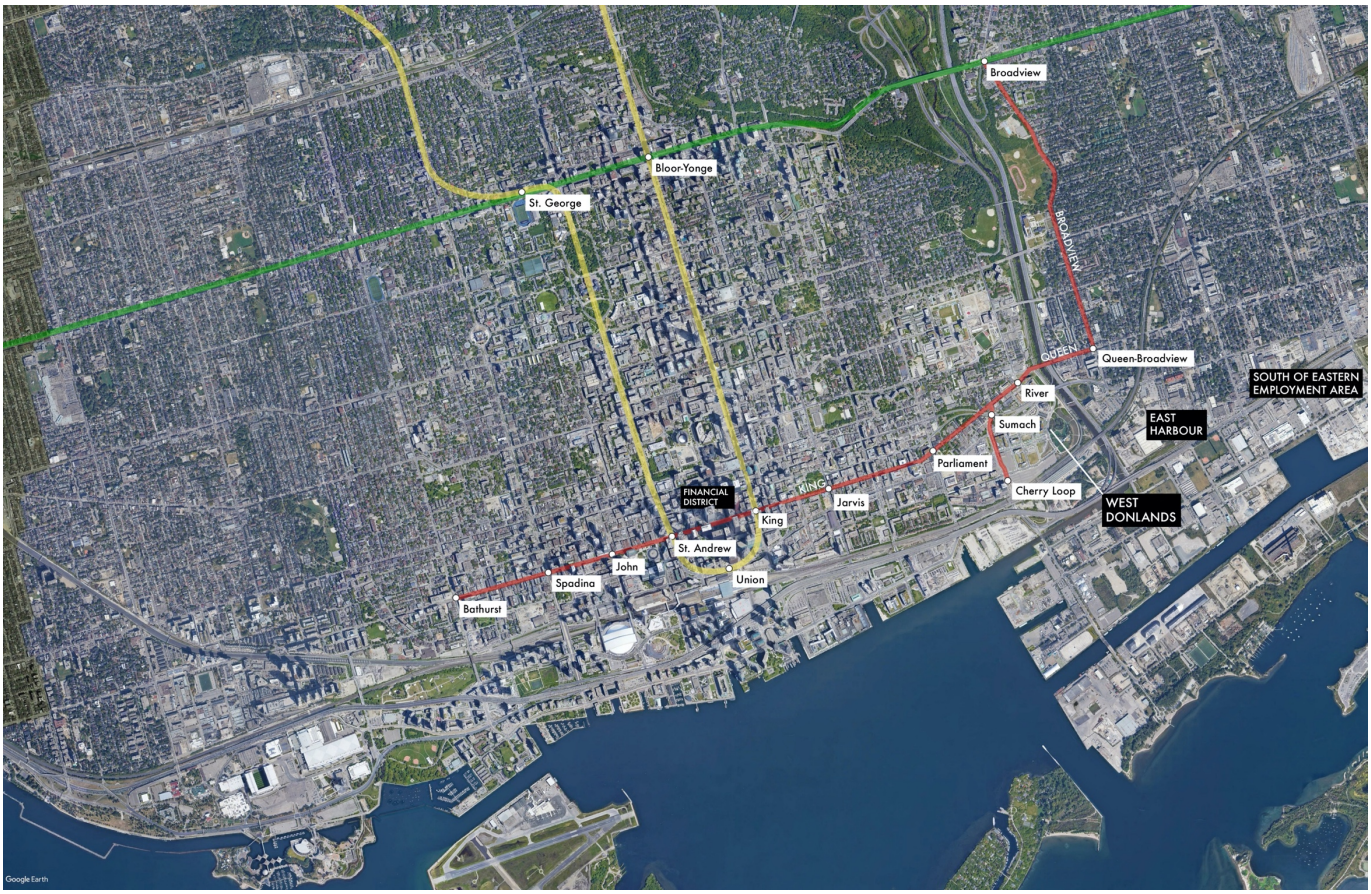
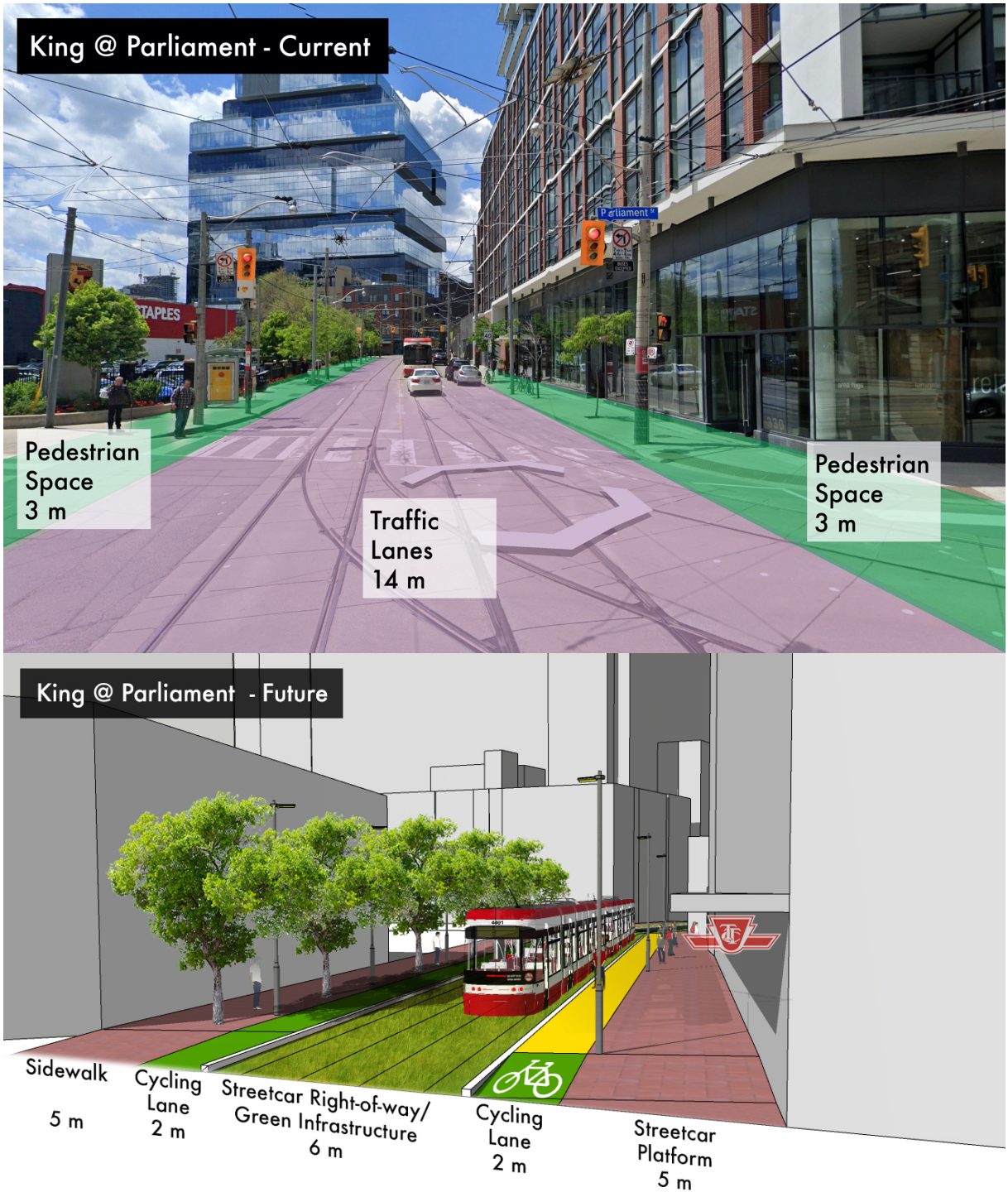


Figure 17: Imagining the King Rapid Transitway *(Base imagery, Google Earth, 2020)*



Appendix D – Queen West Mall

Figure 18: Imagining the Queen West Mall *(Base images, Google Images and Google Earth, 2020)*