Planning for Commuters: An Evaluation of Transit Oriented Developments in the Greater Golden Horseshoe

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Abstract

Urban sprawl has been at the forefront of the planning discussion for a long time, and rightfully so. It is an inefficient way of building out communities that only contribute to the auto-dependency that Canadians have. Transit-oriented developments (TOD) have been proposed as a way to combat urban sprawl by building communities that are compatible with high-order transit. The province of Ontario has made this way of building one of the key pillars in municipal growth through its Major Transit Station Areas (MTSA). Municipalities must conform to these provincial plans, so every municipality that is situated on a current or future GO rail line needs to build these communities. While there are policies that the province has provided, there are stark variations between municipalities when it comes to building these MTSAs. Furthermore, the province is using a one-type-fits-all approach to MTSAs, resulting in communities that do not complement the overall municipality or transit modes. In this paper, I explore these differences between municipalities for commuter TODs. A comparative case study of four different municipalities that are all building TODs around GO stations and all have high proportions of commuters. Mount Pleasant GO, Kitchener GO, Milton GO, and Whitby GO are used for this analysis. Within these case studies, a policy analysis, development review, and regression analysis using the Transportation Tomorrow Survey were completed to inform an evaluation of the sites. Each site is evaluated on three criteria: if it is a utopian TOD, a commuter TOD, and if it succeeds in the provincial policies. The findings are then used to inform policy recommendations for the future Caledon Station GO within Caledon and the province.

Foreword

This major paper closely aligns with my Plan of Study (PoS) which was created at the start of my MES. While my PoS, *Planning Car-Free Communities with Public Transportation*, was originally based completely on TODs, this shifted after my internship at the Town of Caledon. I found that most information about TODs is from the perspective of large municipalities such as Toronto, while little about the small communities that house commuters. If we genuinely want to have a car-free community, we need to look at who is using the highways. This shifted my thinking from traditional TODs to commuter TODs, and what makes them different. This major paper fulfils all three of my areas of concentration outlined in my PoS: Land-use planning, Transportation, and Transit-oriented developments. Through evaluating each case study and applying the findings to Caledon, I will meet the three learning objectives in my PoS:

1. To gain a deep understanding of past and current transit-oriented developments in the world, and look at their success and ramifications of them, to avoid historical mistakes and implement the success strategies.
2. To gain a deep knowledge of the current Canadian perspective on transit hubs through Major Transit Station Areas (MTSA) in order to understand how to navigate the policy framework in Ontario.
3. To gain a deep knowledge of the current criticism that these developments face, in order to help develop potential solutions.

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I would also like to thank my family who have supported me and my friends who have given me enough of a distraction to stay sane throughout this journey.

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Chapter 1: Introduction

1.1 What is the Problem?

North America has a long-standing relationship with personal vehicles; it is ingrained into our lives as something we are expected to own. This expectation has bled into the way we live our lives, the way we complete daily tasks, and the way we build communities. Along with personal vehicles, another expectation is to live in a single-detached house (Frank et al., 2022). This is a major financial goal for most young Canadians and is often considered a benchmark for success. The fault is not on the people who desire it, but the communities we live in that demand it. This way of building heavily contributes to climate change as well. Building communities to continue the trend of auto-dependency only exuberates the already large transportation sector for greenhouse gas emissions (Ali et al., 2021). Simply living in alternative communities can reduce the average family emissions by 40 percent (Ali et al., 2021, p. 11). Continuing to build the same communities will continue to make climate change worse, and communities less livable for young Canadians.

Urban sprawl is a concept often thrown around. It has become a buzzword that has populated news articles, policies, and conversations. Generally framed as a negative way of building, urban sprawl is only the response to peoples' desires (Filion, 2001). But the consequences of this are building barriers for alternative ways of transporting people. Public transportation is largely not used in most cities in Ontario; even in cities with high-order transit, such as Toronto, 61% of the population uses a personal vehicle to get to work. Even with rail transit, people don't use it (Statistics Canada, 2021). This is primarily the fault of the disconnect between transit lines and neighbourhoods. Most people in Toronto do not live within a realistic

distance of a high-order transit station but are still expected not to use a car (Akbari et al., 2018). Further, if someone must get in their car to drive to a station, then they might as well drive to where they need to go (Basheer et al., 2019). The solution is to build houses and the uses people need around higher-order transit. Transit-oriented development (TOD) is a direction that the Ontario government has taken steps to promote through their Major Station Transit Areas (MTSA). These areas are designed to promote a combination of public transportation and active transportation to complete daily needs, such as commuting to work or going to the grocery store. TOD works well in a city like Toronto, as it has two heavy rail lines and one light rail line, with a multitude of additional lines planned. Building higher densities is simple around these stations. But what about the people who do not live in the city, but work there? Either they drive, or they can take commuter rail.

In Ontario, GO Transit has multiple commuter rail lines that service most municipalities within the Greater Golden Horseshoe (GGH). These serve a similar purpose as a subway line does; it moves people to where they need to go, which in most commuters' cases is Toronto. All GO transit lines run through Toronto's Union Station, in the heart of Downtown. While TODs around subway stations are becoming a reality, we are still seeing stretches of surface parking lots surrounding these commuter rail stations. Most municipalities have been slow to react to commuter TODs, but the trend is starting to catch on. Within this paper, I will examine the variations in policy implementation at a municipal level and identify what is needed for commuter TODs. Case studies will be evaluated on their success in the eyes of the Provincial, as a *utopian* TOD, and as a commuter TOD. This will be done through a policy and statistical comparative case study of four commuter TODs of various scales: Mount Pleasant GO, Kitchener GO, Milton GO, and Whitby GO. These findings will then be applied to the Town of

Caledon's proposed Bolton GO. These sites were chosen because each of them offered a distinctive style of TOD, complete with different challenges and contexts. The size of the site, the existing population, and the proximity to Toronto all vary.

1.2 Location

The GGH refers to the region that wraps around the western edge of Lake Ontario and its surrounding areas. This spans from Niagara to Peterborough and everything in between. It houses almost a quarter of the population of Canada and five million jobs, and it is still growing (Ontario, 2020). The economic center is Toronto, leading to mass commuting from these surrounding regions. This is not a one-way street, as recent years have shown an increase in commuting trips originating from Toronto and going to the surrounding regions. The primary mode of transportation for these trips is personal vehicles, making up 58% of the modal share, while transit only makes up 13% (Ontario, 2022). The area is serviced by 1,500 km of 400-series highways connecting most of the communities in the area. Regional transportation is run by GO Transit, which has eight rail lines and thirty-nine bus lines. Individual municipalities have transit systems, but only Toronto, Kitchener-Waterloo, and Ottawa have high-order transit. Beyond regional transit, VIA rail also connects these municipalities but has much higher fares and less frequency. Transit improvements, such as the Eglinton Crosstown, Finch LRT, Ontario Line, Bloor–Danforth Line extension, Hamilton LRT, and the Hazel McCallion LRT, are currently being planned and built. There are also extensions to many of the GO rail lines and various BRT systems being planned in the surrounding municipalities. The contentious Highway 413 is currently in the planning stages and will run north of Brampton and Vaughan, connecting to Highway 400. The Provincial government expressed a desire to increase the transit modal share, but many areas of the GGH are still not serviced by high-order regional transportation. The

planning of a new highway, whose effectiveness is doubtful, is completely contradictory to increasing transit use.

1.3 Policy Context

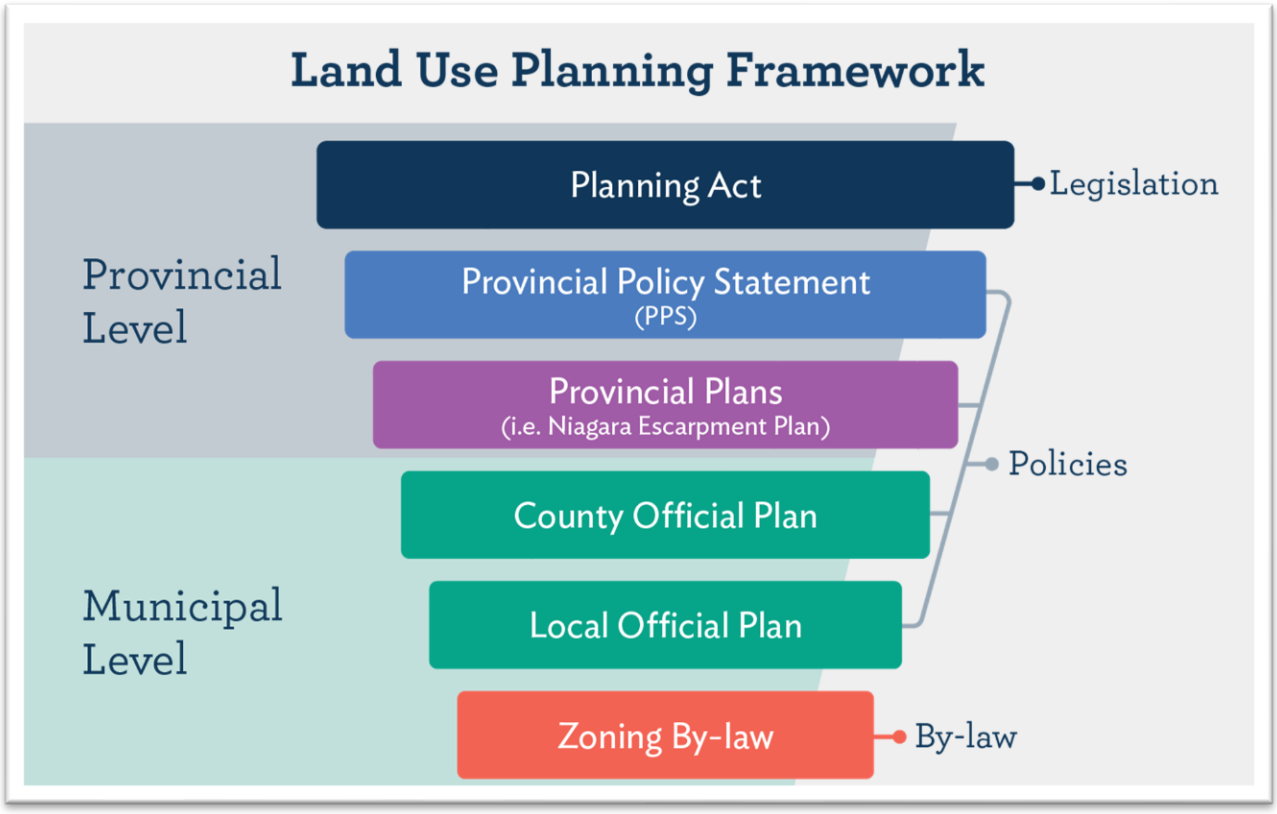

Figure 1. Planning framework in Ontario, displaying the upside-down pyramid. (Bruce County, n.d.)

All municipalities in Ontario follow the same planning framework. This framework is set by the provincial government. The framework is an upside-down pyramid and can be split into provincial and municipal sections (See Figure 1). At the top is the Planning Act, which sets out the provinces' and municipalities' powers and responsibilities. All other policies must have regard to this Act. Below this is the Provincial Policy Statement (PPS), a set of land-use policies that all plans below it must be consistent with. The PPS is enacted through the Planning Act. Underneath these are any provincial plans, such as the A Place to Grow: Growth Plan for the Greater Golden Horseshoe, which was enacted through the Places to Grow Act. This plan

outlines the provinces' vision for the GGH, which is the core policies that reinforce the development of TODs through MTSAs. All other provincial plans, such as the Greenbelt Plan, Oak Ridges Moraine Conservation Plan, and Niagara Escarpment Plan, operate like the Growth Plan. Provincial plans are only for specific locations of the province, and municipalities outside of the plan are not held to the plan.

The second section of the Ontario planning framework consists of municipal actions. Municipal policies are found in their official plan, which outlines the land-use policies for the municipalities to ensure growth and development are done in an orderly and efficient way. Single Tier, Upper Tier, and Lower Tier municipalities all have official plans, but they will differ depending on the type as they need to address their responsibilities. Official plans enable secondary plans, which are similar to official plans but are for a specific area of the municipality. Secondary plans help allow municipalities to shape the community in much more depth than they would be able to with just the official plan. All these plans lead to the main implementation tool that municipalities have, which is zoning bylaws. Zoning bylaws are bylaws that control where uses are, what uses are permitted, and the features of the building itself. Zoning bylaws are the main implementation tools at the disposal of municipalities that allow them to apply the vision found in the official plans.

TODs have been primarily enabled through the Growth Plan for the Greater Golden Horseshoe. The plan's main purpose was to allow the communities in the GGH to grow sustainably. This is achieved through the promotion of complete communities and TODs. A goal of the plan is to make sure the transportation network is integrated to allow public transit to be efficient and a practical choice for travel (Ontario, 2020, pp. 2–3). Through the designation of MTSAs, intensification will create TODs. MTSA in the GGH consists of high-order transit, such

as subway, LRT, BRT, or GO Transit, and will have targeted densities of 150 to 200 residents and jobs combined per hectare (Ontario, 2020, pp. 16–17). Further, all MTSA are to be planned for multimodal transportation, as well as providing both local and regional transit connections. These areas are supposed to build the infrastructure to support active transportation, such as bicycle lanes and adequate walking facilities. Lands surrounding MTSA are to be zoned as mixed-use and transit-supportive (Ontario, 2020, pp. 17–19). Municipalities must support development in these areas; specifically, development that is mixed-use and includes affordable housing. These projects are meant to be joint ventures between private and public entities in the hopes of providing alternative standards, such as a reduction in the amount of parking required (Ontario, 2020, pp. 18–19). Municipalities are required to guarantee the use does not negatively affect transit or promote personal vehicle use. To ensure that these lands are used to their full potential, municipalities can protect these lands until they are ready for proper development. For lands outside of the GGH, the provincial government passed the Transit-Oriented Communities Act in 2020, which allows the Ontario Minister of Transportation to designate land as a Transit-Oriented Community (Transit-Oriented Communities Act, 2020). Between these two pieces of legislation, there is enough legal authority to develop TODs throughout the province.

1.4 Methodology

The methodology that I implement to answer my questions as outlined in 1.1 is threefold. First, I conduct a comparative case study for Mount Pleasant GO, Kitchener GO, Milton GO, and Whitby GO. This consists of mainly policy analysis from each municipality's Official Plan, Transportation Master Plan, Active Transportation Plan, Housing reports, and Secondary Plans. From these plans, the policies that shape and guide their MTSA's are analyzed. This includes evaluating land use, transportation, and urban design policies, as well as visions and guidelines.

This is done for both municipal-wide and MTSA-specific policies. I then analyze the transit options and infrastructure available in the area. Finally, I review and evaluate the current and proposed development around each MTSA.

The second analysis that I will use is a regression analysis using the Transportation Tomorrow Survey results. This is done using a Poisson Regression, which is a generalized linear model that uses log transformation. With this model, it is assumed that the dependent variable, which in this case is always going to be the *Number of Transit Trips Taken*, is assumed to be count data. I am aware of the limitations of using a Poisson regression, but there is inconsistency in the data provided across the years used from the TTS. This regression follows equation (1).

$$(1)\ \log(\mu_i) = \beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} \cdots \beta_k x_{ik}$$

Where μ_i is the expected count of the dependent variable, which in this case is the Number of Transit Trips Taken. x_{ik} are the independent variables, which are various results from the Transportation Tomorrow Survey. And β_k is coefficients to be estimated, which inform us on how well correlated the variables are. This equation is then transformed to fit regression as seen in equation (2).

$$(2)\ \mu_i = e^{\beta_0 + \beta_1 x_{i1} + \beta_2 x_{i2} \cdots \beta_k x_{ik}}$$

This equation is then adjusted when there are multiple variables, for situations such as the number of transit trips taken, and dwelling type as seen in equation (3).

$$(3)\ \mu_{i1} = e^{\beta_{01} + \beta_{11} x_{i1} + \beta_{21} x_{i2} \cdots \beta_{k1} x_{ik}}$$

$$\mu_{i2} = e^{\beta_{02} + \beta_{12} x_{i1} + \beta_{22} x_{i2} \cdots \beta_{k2} x_{ik}}$$

Using these regression models, I can identify which factors affect the amount of transit trips a person will make. This is then applied to the policies found in analysis one, to provide a better evaluation.

When testing a large number of variables, multicollinearity could be present. This occurs when multiple of the variables have correlation with each other (James et al., 2021, p. 102). To ensure validity of the data, the variance inflation factor (VIF) was tested using equation (4).

$$(4)\ VIF\left(\hat{\beta}_{x_i}\right) = \frac{1}{1 - R^2_{\mu_i \mid \mu_{-i}}}$$

The variance must not be above 5, or it will have exhibited multicollinearity (James et al., 2021, p. 102). All of the statistically significant variables do not have a VIF value above 5, indicating that there is minimal multicollinearity present.

The final method that I use is to evaluate each municipality's MTSA. When evaluating, I use the policies and development patterns to identify how successful this MTSA will be. I then use the regression data to identify which factors should be considered when developing a commuter TOD, and if each municipality is putting its resources into the most effective factors. The evaluation of each MTSA is measured by whether each fits within the *utopian* definition of TOD, if it fits into the *commuter* definition, and if it follows the provinces' guidelines. Each criterion is outlined in Section 2.4. From these evaluation methods, I identify what each MTSA is doing right, and what they need to improve on. I then provide policy recommendations based on these findings.

Chapter 2: Literature Review

2.1 The Origins of TOD and the Ontario Context

Transit-oriented developments have a long history in planning, being traced back to the Garden City Movement of planning city centers around rail transit (Ibraeva et al., 2020, p. 110; Jamme et al., 2019, p. 411). The first major step in modern TODs comes from American urbanist Peter Calthorpe's book *The Next American Metropolis: ecology, community, and the American Dream*. Early in the book, Calthorpe proposes that "the alternative to sprawl is simple and timely: neighbourhoods of housing, parks, and schools placed within walking distance of shops, civic services, jobs, and transit – a modern version of the traditional town" (Calthorpe, 1993, p. 16). Since Calthorpe's work, there have been hundreds of articles outlining every aspect of TODs, and this research is not slowing down (Ibraeva et al., 2020, p. 111). What Calthorpe proposes is quite simple; TODs, when broken down into their parts, are not complicated. So why is it so hard to build these communities within North America? Despite this concept gaining traction and increasing in popularity since its inception in 1993, we are still seeing sprawl take over municipalities throughout North America. Even before the publishing of Calthorpe's book in 1993, Canadian planners had been adopting these ideals. Since the early 1970s, planners within large municipalities such as Toronto, Vancouver, and Calgary have been promoting compact urban form, intensification, mixed-use and -housing types (Grant & Scott, 2012, p. 133). But still, these ideas have not gained enough traction, and cities that are not restricted in space are seeing extreme sprawl that only promotes the auto-oriented lifestyle Canada has been characterized by.

There are two main reasons for this lack of urban progression: zoning regulations and lifestyle differences. When comparing our cities to those found in Europe, there is a stark

difference in the built environment (Kubina et al., 2021). In North America, we often see swathes of single-use developments dominating a street or area of town, and swathes of single-detached housing neighbourhoods (Hirt, 2012, p. 388). These neighbourhoods are often characterized by the meandering street network, often resulting in cul-de-sacs and inefficient loops. Commercial development in North America is typically within a large complex of other single-use buildings and large surface parking lots that often stay empty other than a few exceptions throughout the year such as Boxing Day (Trautvetter, 2018). In contrast, European cities have vastly different development forms. Often there are small blocks featuring medium-height large buildings, whose use is not obvious from a satellite view. Despite this, most European cities still use zoning regulations with the main difference being what is focused on. Within North American cities, zoning is primarily about use; while there are plenty of technical provisions and regulations on built forms such as setbacks and heights, land use is the focus. But in most European cities, the focus is on the built form, while the use is not as important (Hirt, 2012, p. 389). For a city like Paris, France, the majority of the city is zoned for mixed-use, but within Canadian cities, mixed-use zones have only recently become common zones (Hirt, 2012, p. 383). These zones are also often characterized by mid- or high-rise towers which create a specific type of neighbourhood.

It is evident that North America is extremely auto-dependent reflected in the amount of personal vehicle infrastructure, the layout of neighbourhoods, and how commercial space is planned. In the time of Calthorpe and the wave of new urbanism, building communities like TODs was intended to be the solution to auto-dependency (Calthorpe, 1993, pp. 18–20). Despite this being a common thread within academia, provincial and municipal policies continue to promote the opposite. Within the post-war growth era, government agencies promoted single-

family ownership and massive expansion of personal vehicle infrastructure (Jamme et al., 2019, p. 417). This planning mindset continues to hold today, through expansions such as Highway 413 and the Bradford Bypass at the provincial level, and difficulty in reducing parking at a municipal level (see Chapter 3 for detailed information).

Differences in lifestyle between North America and Europe not only include auto-dependency but also the living desires of the city inhabitants. Property ownership is ingrained into North American culture and ideology (Hirt, 2012, p. 389). Not only is a house viewed as somewhere you live, but it is also an integral investment for the future. There is also a sense of attachment to the property itself, rather than the community. This can be seen in the sheer number of single detached homes in North America, with this ownership trend bleeding into all economic situations with condominiums. Most people are not willing to give up their single detached home for a better community (Frank et al., 2022, p. 580). Apartment-style condominium popularity has grown substantially in this era of sprawling communities; it is looked at as a bridge between renting and ownership (Grant & Scott, 2012, p. 137). This trend of condominiums likely will continue, as many of the TODs in the GGH are predominantly condominium developments, with few purpose-built rental apartment buildings. TODs can address some of these issues, but a greater societal shift in lifestyle and values is required to see the full benefits of them.

Shortly after Calthorpe published his book, Robert Cervero and Kara Kockelman started to build out the concept of TODs through a statistical lens. With this they develop the 3 Ds; three factors of the built environment that influence travel demand (Cervero & Kockelman, 1997, p. 199). The 3 Ds proposed are density, diversity, and design. Density is an increase in housing and employment closer to transit will increase transit usage. Diversity is achieved by providing an

adequate mix of uses that are within walking distance from transit. Design is specifically the integration of pedestrian-oriented design that allows for efficient and enticing travel for pedestrians. The 3 Ds have been the basis for TODs since their creation, but they have been expanded upon by other scholars. Three more Ds were added to this through further work from Cervero: Destination accessibility, which focuses on how easy it is to get to the destination; Distance to transit, which is simply how far from the nearest transit stop; and Demand management, which focuses on the reduction of parking near transit (Ewing & Cervero, 2010, p. 267). While many authors have continued to add Ds to this list, the original six are comprehensive enough to create a valuable framework for TODs.

The work from above was at a high level focusing mainly on the US. However, there have been many case studies conducted for Canadian municipalities. The majority of these are conducted in Toronto or Vancouver, with a focus on the issues that can be caused by TODs (see Section 2.3). It is not just about building density within Canadian cities to achieve TODs, but the type of density that is being sought out. During the late 1990s and early 2000s, municipal policies were meant to promote the tower-in-the-park model (Filion et al., 2006, p. 1371). This model, which predominates throughout the suburbs of Toronto, causes the creation of large blocks of high-density development that are not integrated into the existing built form. These are not TODs, and while they might look like it on the outside, the lack of connectivity produces an environment that is not conducive to increased public transit usage (Filion et al., 2006, pp. 1387–1389). While Toronto and surrounding municipalities feature many of the late 20th-century tower-in-the-park communities, not all communities have adhered to this trend. The North York City Center (NYCC) has become one of the most prominent examples of TODs within Toronto since the Line 1 subway extension brought rapid transit to North York. A study evaluating how

successful this development has been by using largely Transportation Tomorrow Survey (TTS) data found that between 1986 and 2001, both population density, as well as dwelling unit density, increased by 24 and 32 percent respectively (Crowley et al., 2009, p. 104). During this increase period, there was a significant decrease in the number of personal vehicles within a household, as well as a decrease in auto usage, specifically in commuter traffic. The catchment area, the optimal distance from a subway station to maximize walking, was also found to be 400 meters; down from the standard 800 meters for TODs (Crowley et al., 2009). While the findings from NYCC differ in the transportation mode and typology of TOD, lessons can still be applied to this research. There is a clear demand for TODs in Toronto from the commuter population, and those who would benefit most from these TODs are those who would be commuting to and from Downtown Toronto.

This therefore raises the question of how effective TODs around commuter rail stations can be. One perspective is from Metrolinx, which is the body that oversees building these commuter rail stations, Metrolinx holds different views on how to build which often results in conflicts with the municipality. For example, because Metrolinx has control of a certain amount of developable land surrounding stations, and because their goal is to maximize transit usage as a whole, they opt to build large parking lots at GO stations for commuters to drive, park, and then ride the train to Toronto. The park-and-ride model is less desirable from a land value lens than having more density, as it still includes wasted space (Duncan, 2011, p. 121), yet Metrolinx continues to build large surface lots to fit this model. This has consequently ruptured the relationship between Metrolinx and the municipalities, as municipalities want to develop this land, but are being restricted (Switzer et al., 2013, p. 1167). While Metrolinx is more open to the development of these large surface lots, the fracturing of the communication and trust between

agencies has already occurred. Small parking lots within the GO stations' lands are not entirely negative, but they need to be limited, or built underground. Parking lots boost ridership to an extent, however, there is a turning point where an increase in parking starts to lead to a decrease in ridership (Chan & Farber, 2020, p. 2174). Alternatively, one of the best strategies to boost ridership for GO trains is by promoting active transportation. While Chan and Farber (2020) did not find that land use had much of an effect on active transportation, they found that population density in relation to distance from the station had a large influence on active transportation usage (Chan & Farber, 2020, p. 2172). The most significant factor that affects active transportation is the number of parking spaces, which means that an increase in parking spaces will lead to a decrease in active transportation usage. However, this also results in a decrease in population density, as the space that dwellings would be is being used for parking. Commuter TODs can work but require collaboration between the provincial agencies and the municipalities to be successful.

2.2 Key Terms and Goals

There are several planning buzzwords used in media, provincial and municipal government through legislation and policy. The two that are most common within the planning space are complete community and intensification. The Province of Ontario defines Complete Communities as:

> Places such as mixed-use neighbourhoods or other areas within cities, towns, and settlement areas that offer and support opportunities for people of all ages and abilities to conveniently access most of the necessities for daily living, including an appropriate mix of jobs, local stores, and services, a full range of housing, transportation options and

> public service facilities. Complete communities are age-friendly and may take different shapes and forms appropriate to their contexts. (Ontario, 2020, p. 73)

While this definition is set by the province, the municipalities that must adhere to this plan have similar definitions. But what is defined by the word *complete*? Complete to one person holds different meanings which vary from person to person. However, the vagueness of the word *complete* does lend to its flexible use in policy; it can fit into various Canadian contexts (Grant, 2023, p. 4). In the context of a housing crisis and sprawling suburbs, complete communities are synonymous with density; yet the dream for many Canadians is to achieve property ownership of a single-detached home (Grant & Scott, 2012, pp. 150–152). A community cannot be *complete* if it seeks to promote high density, which in theory should make market housing more affordable. While municipalities claim they are building complete communities, they are just building communities that are complete for some; and until there is a societal shift in the view of home ownership, that will not change.

Another key component of complete communities within the Ontario context is intensification. It is the engine that powers the complete communities that the province wants to build. The province describes intensification as:

> The development of a property, site or area at a higher density than currently exists through: a) redevelopment, including the reuse of brownfield sites; b) the development of vacant and/or underutilized lots within previously developed areas; c) infill development; and d) the expansion or conversion of existing buildings. (Ontario, 2020, p. 73)

The promotion of intensification supersedes complete communities, but as complete communities started to become prevalent within policy documents, intensification became less of a buzzword and more of a common planning tool (Grant & Scott, 2012, p. 133). The province's

all-encompassing use of intensification within policy poses significant problems for Ontario municipalities. This does not work as there are factors such as built environment, demographics, policies, and transportation that all need to be considered when planning for density (Filion et al., 2010, pp. 556–557). It is difficult to take the policies for intensification that are designed through a Toronto-centric lens and place them within a town such as Caledon, a largely agricultural community spread out over 700 square kilometres and home to 65 thousand residents. While intensification is a basic idea, the policies that enable it need to be nuanced.

A key component of any TOD is the station itself, and not all stations are the same. It is important to adjust the policies for a TOD to match the context of the community and station (Higgins & Kanaroglou, 2016, p. 71). Higgens and Kanaroglou (2016) have established a typology for stations (Figure 2). This paper applies their typology to Ontario GO stations, examining each as case studies: Mount Pleasant GO is an *outer suburban neighbourhood*; Milton GO is a *suburban centre*; Whitby GO is a *suburban neighbourhood*; and Kitchener GO is an *Urban mixed-use core*. While this typology helps categorize these stations, they are not perfect as these categories have the underlying assumption that a traditional TOD is built around them. This is not the case as the goal is to optimize the community for commuter rail; and the only typology present that considers commuter rail is Mount Pleasant

Table 5
Station type definitions.

Station type	Definition
1. Urban commercial core	Stations are located in the downtown core of the City of Toronto and served by high-capacity subway and commuter rail rapid transit. Primarily commercial and institutional land uses with some residential development and mixing of uses at very high population and employment densities. One other station of this type can be found in downtown Hamilton.
2. Urban mixed-use core	Stations with very high population and employment densities and a high mixing of uses. Generally located just outside the urban commercial core in the City of Toronto and at key regional intensification hubs.
3. Inner urban neighbourhood	Stations with high-density residential, commercial, and mixed uses with high levels of accessibility to employment and jobs due to their location close to the urban core. A grid street pattern ensures good pedestrian accessibility.
4. Urban neighbourhood	Rapid transit stations located in predominately residential neighbourhoods that feature higher densities and some commercial activity and land use mixing. Station areas are older and well-established, feature a grid street pattern, and have good access to population and employment.
5. Suburban neighbourhood	Predominately residential areas with some commercial and institutional development but lower overall population and employment densities. Located farther from employment centres and increasing use of cul-de-sac street layout. Important trip origins along future rapid transit lines.
6. Outer suburban neighbourhood	Low-density residential suburban or exurban areas with some commercial and industrial development. Many stations are located along CRT corridors. Low pedestrian accessibility due to automobile-oriented urban design. Large proportions of vacant land provide opportunities for future intensification.
7. Suburban centre	Station areas oriented to employment with high levels of commercial, industrial, and institutional land uses, but lower overall development intensity. Stations are important secondary destinations along present and future rapid transit lines.
8. Outer suburban commerce park	Low-density and automobile-oriented suburban and exurban areas with high proportions of commercial, institutional, and industrial land uses, which may present opportunities for future intensification. They are however important trip attractors.
9. Outer suburban industrial park	Predominately automobile-oriented suburban and exurban industrial areas that feature low overall development intensity and low levels of pedestrian accessibility. Stations are located along CRT corridors and future rapid transit lines.
10. Airport	LRT stations that service Lester B. Pearson International Airport and its surrounding environs. Stations feature low employment densities, but exist as important regional trip destinations.

Figure 2. TOD station typology (Higgens and Kanaroglou, 2016)

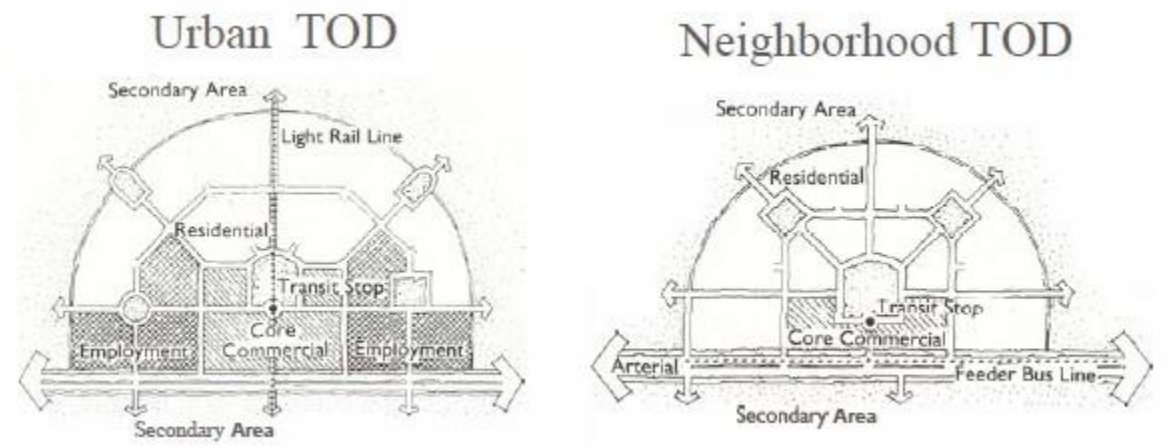

Figure 3. Diagram of the two TOD types. (Calthorpe, 1993)

GO (Higgins & Kanaroglou, 2016, p. 70). The basis for the analysis of commuter TODs presented in this paper is from Calthorpe's original definition of TODs; where he splits TODs into two types: urban and neighbourhood. While not explicitly relating commuter rail to neighbourhood TODs, his definition is still relevant. He mentions, "Neighborhood TODs should have a residential and local-serving shopping focus at densities appropriate for its context and lesser transit service level" (Calthorpe, 1993, p. 57). Within Figure 3, the main difference between the two types of TODs is the amount of employment-focused land. Calthorpe (1993) understands that these suburban neighbourhoods have a low likelihood of further developing into major economic centres in the near future, thus it is crucial to examine the aspects of TOD that are beneficial rather than the aspects that do not support the neighbourhood.

2.3 Critiques and Debates

This paper would be incomplete to discuss TODs, in which housing is a major factor, without affordability. Policy documents from municipalities, legislation from the province, and news stories, all discuss housing affordability. From their inception, TODs were thought to be a way to create affordable communities (Calthorpe, 1993, p. 57), but literature has suggested the

opposite. The initial logic is that an increase in density creates more housing, and this combined with a mix of housing types for all household structures will ultimately lower prices. Where this idea falters is in its lack of recognition of the demand for this type of community. If TODs were as prevalent as suggested by Calthorpe (1993), where they are spaced in a way to optimize walkability and transit, there might be enough housing to eventually lower prices (Calthorpe, 1993, p. 67). Calthorpe's hypothesis is difficult to evaluate, as the influx of TODs within Ontario is recent. What Calthorpe did not consider regarding affordability is the ancillary costs, such as transportation. TOD households do on average spend more on transit, they also own fewer personal vehicles and drive fewer kilometres (Dong, 2021, p. 6). In total, TOD households spend 40 percent less on transportation costs than non-TOD households; and when taking into account the household demographics, a TOD household will save on average $1232 per year (Dong, 2021, p. 7). These savings are not substantial when considering housing costs, there are still aspects of TOD that are already contributing to a more affordable lifestyle.

Currently, TODs are rarely observed in North America; despite being a desirable location that people are willing to pay more money to live in. From a study of San Diego, there are TOD premiums; but this is not necessarily a bad thing, as it signifies a healthy market demand (Duncan, 2011, p. 121). Residents want to live in areas that are walkable and nearby transit. This trend is not exclusive to California. A study in the Waterloo region found that more residents wanted to live in a walkable neighbourhood, but 64 percent live in a neighbourhood that satisfies their walkability needs (Frank et al., 2022, pp. 578–579). Condominiums consistently have a higher value in TODs than near park-and-ride stations (Duncan, 2011, p. 121). The same findings were also observed in Atlanta, Georgia, where housing prices are higher around TODs (Zhang et al., 2021, pp. 404–406). While increases in prices translate to housing unaffordability,

within Atlanta it was shown that TODs are much more resilient to economic recessions compared to transit-adjacent developments (TAD), developments that are not built to enhance walkability (Zhang et al., 2021, p. 406). As seen with the recent COVID-19 pandemic, it is important for communities to not only be economically resilient but also socially resilient (McClelland et al., 2022). The case of rising property prices is not exclusive to North America. For example, China, which has had extreme growth in its rail network, has seen an increase in prices within areas that are near transit stations and mixed-use (J. Li & Huang, 2020, p. 10). Pure housing prices increased within TODs, but in terms of land value, the increase is not consistent. Along the ION LRT in the Region of Waterloo, there has been an increase in the land value of single-detached homes near the LRT stop, but there has not been a significant increase for existing multi-dwelling homes (Huang et al., 2024, p. 10). It is important to note that TODs do not affect housing prices homogenously, as different housing types are more desirable.

Gentrification has been thoroughly studied in its relationship to TODs and is the greatest consequence of TODs. Similar to price effects, the amount of gentrification that occurs when a TOD is built is variable, depending on location, socioeconomic factors, and development patterns. This has been studied within Vancouver, where before the development of the SkyTrain there were affordable units within the transit corridor, but these units were old and would require substantial investment to upkeep them, so the economically viable thing to do was to tear them down (Jones, 2023, p. 547; Jones & Ley, 2016, p. 19). While Vancouver did relocate these units, the TOD was still the cause of gentrification (Jones, 2023, p. 546). The City of Vancouver was convinced that constructing a TOD would solve the problem of the lack of affordable housing; it would add new dwelling units of various types, there would be environmental benefits, and the increased density would generate more income for the city. The thought was that more money

would mean more investment into social infrastructure, but this would mean not building any new affordable housing within the transit corridor as it has already been taken up by new development. This TOD-induced gentrification did not stop in the original development of the SkyTrain, as from 2014 to 2019, 60% of the purpose-built rental units were lost (Jones, 2023, p. 547). While there is controversy surrounding the downsides to single-detached homes, many of the affordable units within the SkyTrain corridor were of this typology (Foth, 2010, p. 48). Along with the low-density residential, light industrial uses were also redeveloped within this area, thus removing the employment areas within proximity to those who might work there (Foth, 2010, p. 48). This is not to say that cities should keep single-detached residential communities and light industrial lands, but rather to acknowledge that the good of building rapid transit and TODs does not benefit everyone equally. While not within the scope of this paper, it is important to achieve a solution that is equitable for everyone.

2.4 Framework for Evaluating Effective TODs

The definition of a TOD and the factors that make it work have shifted throughout the years. While the essence is still what Calthorpe (1993) proposed, there have been changes to better fit within the Ontario context. The case studies in this paper will be evaluated based on three criteria:

1. Is it a *utopian* TOD?
2. Does it adhere to the *neighbourhood TOD* guidelines as found in *The Next American Metropolis*?
3. Does it succeed in the Province of Ontario's definition?

The first criterion, is it a *utopian* TOD follows the basic principles of a TOD: growth is transit-supportive; commercial, housing, jobs, parks, and civic infrastructure are within walking

distance; a mix of housing, densities, and prices; a pedestrian-friendly street network; the preservation of the natural environment and a high-quality open spaces; public spaces for neighbourhood activity; and intensification within neighbourhoods (Calthorpe, 1993, p. 43). A TOD should feature all of these to be considered a *utopian* TOD. Calthorpe's principles have stayed consistent throughout the years of study when defining TODs. Moreover, when evaluating TODs, there needs to be a distinction between a TOD and a TAD; is the development creating a community that is supportive of the transit, and the transit is supportive of the community? Or is it simply just a dense use located near transit?

USE	NEIGHBORHOOD TOD	URBAN TOD
Public	10% - 15%	5% - 15%
Core/Employment	10% - 40%	30% - 70%
Housing	50% - 80%	20% - 60%

Figure 4. Percentage of uses found in the two types of TODs (Calthorpe, 1993)

The second criteria are entirely based on Calthorpe's definition and differences for a Neighbourhood TOD (See Figures 3 and 4). In the public eye, TODs are often thought to be one form, that of Calthorpe's *Urban TOD*. However, a neighbourhood TOD is also a commuter TOD, and should have a higher amount of public space and housing, and less employment than an urban TOD. While evaluating the case studies using percentages is outside of the scope of this paper, using a 75/15/10 guideline simplifies it. The 75/15/10 guidelines that are being used are: 75 percent housing; 15 percent public space; and 10 percent commercial/employment.

The final criterion is if the TOD succeeds in meeting the Province of Ontario's definition. At a basic level, these TODs need to have at least 150 residents and jobs combined per hectare and be a complete community (Ontario, 2020, p. 17). Within Ontario, a complete community should consist of the following: have a diverse mix of uses, including residential and employment; be livable for all people; a mix of housing types including affordable units; have

convenient access to multiple modes of transportation, including active transportation; access to civic infrastructure; access to open space and parks; and healthy, local, and affordable food options (Ontario, 2020, p. 14). While not all complete communities are TODs, all TODs are intended to be complete communities. The TODs should be transit-supportive and multimodal. While transit-supportive is defined by the province, it is still quite vague, "[transit-supportive] often refers to a compact, mixed-use development that has a high level of employment and residential densities" (Ontario, 2020, p. 86). TODs should consist of a diverse mix of uses including affordable housing, using the provincial definition of affordable, reduced parking, and no auto-oriented uses. Any major office development should be directed to TODs, regardless of type, and retail should be directed here as well; both of these uses must support active transportation (Ontario, 2020, p. 19).

Each case study within Chapter 3 will be evaluated by these three criteria, with the evaluation provided in Section 4.1. Not every TOD is meant to succeed in every criterion; what works for one type of TOD might not work for the others. If a TOD fails to meet one of the three criteria, that does not mean it is bad. It is also important to note that the municipalities are required to adhere to the third criterion, but not the first two. The differences between the first two criteria are slight, but the difference it makes in creating an efficient TOD around a commuter rail station is large. The third criterion, while required to adhere to, is much more general and is applied to all types of TODs within the Greater Golden Horseshoe.

Chapter 3: Comparative Case Study

The following chapter is composed of four sections for each of the case studies. The first section will be on the Mount Pleasant GO station in Brampton on the Kitchener Line. The second section will be on the Kitchener GO station in Kitchener on the Kitchener Line. The third section will be on the Milton GO station in Milton on the Milton Line. The final section will be on the Whitby GO station in Whitby on the Lakeshore East Line. Each of these locations provides unique opportunities and challenges for building a commuter TOD. All the stations have one factor in common: they all have most of their commuters going to Toronto. Brampton and Kitchener were chosen due to their similar size and progress. Both are large municipalities with already established TODs. Milton and Whitby were chosen due to both being growing municipalities that are still in the early stages of the TOD development. The combination of multiple types of sites will provide a robust set of challenges and opportunities that could be used to learn from. Each section will further be split into four sub-sections. The first will be a policy analysis. This will initially start at a high level, identifying official plan policies relating to TODs, but will become more targeted towards the area around the station. The area's recent, active, and future developments will be analyzed. Following will be the regression analysis for the location, where the results will be displayed and what they represent. Lastly, the findings will be synthesized and their context within the broader landscape will be discussed.

3.1 Mount Pleasant GO

The Mount Pleasant GO station is situated on the west side of Brampton between Mount Pleasant Village to the North and Spring Valley to the South. The station is a medium-sized station, with three platforms and 1486 surface parking spaces. The station, which opened in 2005, is one of the most used stations both on the Kitchener Line and in the entire GO Transit

Figure 5. Map of the Mount Pleasant GO TOD. Each numbered dot corresponds to an image. (figure by William Overholt)

ecosystem. As of 2019, Mount Pleasant GO had an average of 3300 daily riders, making up around 23% of the daily ridership on the entire Kitchener Line. Not only does the station have high ridership, but it also has one of the largest increases in ridership, with an increase of 17% from the year prior. The station is also responsible for a GO transit bus route, thirteen Brampton Transit routes, with two of them being Züm BRT routes. The station being located on the western edge of Brampton, is subject to intense development, but currently, the site is dominated by low-density residential, with some sections of medium-density townhouses (See Figures 5 and 7). The station runs along a Regional major arterial, Peel Regional Road 107, which is designed to carry substantial amounts of traffic. Currently, the area is not serviced by any highways, but the current route planned for Highway 413 will be around two kilometres northwest of the station, with an interchange planned at Peel Regional Road 107. At first glance,

the station is a prime candidate for a TOD, being well-serviced by transit and already having a high ridership.

3.1.1 Policy

The planning framework in Brampton is composed of the overarching Brampton Official Plan (referred to as OP), which was created in 2006 and consolidated in 2020. Beneath that are various plans and policy documents that guide development at a more specific level. There are clear visions found in the Brampton OP that promote the reduction of personal vehicle use (City of Brampton, 2020, p. 27). While the OP does briefly outline the reasons for this vision, it is not stated very clearly, but instead there are many mentions of building *sustainable* communities that are sensitive to the natural environment (City of Brampton, 2020, pp. 40, 56, 57, 59). While the OP states this vision in various ways, it can be boiled down to the vision for Brampton to "Develop healthy, sustainable complete communities that are compact, transit-oriented and pedestrian-friendly with a mix of uses and a variety of housing choices, employment, and supporting services and facilities" (City of Brampton, 2020, p. 57). This is not the only time that *transit-oriented* and *pedestrian-friendly* make an appearance within the OP, it is mentioned throughout. There is a particular emphasis on the downtown core, but specific areas of Brampton that are serviced by high-order transit are also included in this vision (City of Brampton, 2020, p. 41). In the OP alone, there is a vision for TODs throughout, and pedestrian-oriented communities where transit might not be a viable option.

Brampton has published a separate vision document, Brampton 2040 Vision, which was endorsed by Brampton Council in 2018. This document includes seven vision statements that apply to the entire city, as well as specific visions for the downtown, uptown, and town centers (which include Mount Pleasant GO). The first vision is for Brampton to be a sustainable

community, which includes amenities such as *greenway boulevards* and parks (City of Brampton, 2018, p. 22). The second and third vision is for Brampton to be a polycentric city that offers complete communities within each town centre while maintaining neighbourhoods that have character (City of Brampton, 2018, pp. 27–58). This is an ambitious vision that most municipalities have but has rarely come to fruition. The utopian vision is a worthy goal, but as will be displayed further on, there is always going to be a disconnect between the vision and the policies.

The fourth vision is for Brampton to have an integrated, multimodal transportation system (City of Brampton, 2018, p. 59). While ambitious, this vision is a completely reasonable one. The actions recommended are initiatives that are not as reliant on outside organizations, but on the city and their development. The creation of *complete streets*, efficient transit, and active transportation are acts that can be completely done by the city, many of which are already being implemented. Action #4-5 does endorse the adoption of free transit by 2040, and while it is not the focus of this paper, is important to note (City of Brampton, 2018, p. 68). Brampton is the only municipality in this comparative case study that truly acknowledges the equity issues within transit through a realistic lens. The Brampton 2040 Vision makes it clear that transit might not be able to be free for everyone but proposes a "phased approach starting with the least advantaged and those who do not enjoy the option of private mobility" (City of Brampton, 2018, p. 68).

The sixth vision is for Brampton to have a cultural mix that enables everyone to live the best life they can. This is primarily done through housing, which is addressed in action #5-2, to adopt a comprehensive housing strategy (City of Brampton, 2018, p. 76). This action has already been completed and will be reviewed later. The vision also promotes social hubs, which is vital to complete communities and TODs. The sixth and seventh visions are to promote health and

well-being as well as arts and culture throughout Brampton. While these aspects are important to a healthy community, they are outside of the scope of this paper.

The bulk of any official plan is the policies, which are what guide development at a high-level, and allow the implementation of more focused tools such as zoning and secondary plans. The objectives of the policies found in the OP are extensive and specific, but summarized in Objective 2-a, "Maximize the City's strategic position within the GTAH by developing, managing and enhancing our environmental, cultural, social and economic links with the balance of the GTAH including the development of sustainable infrastructure and a multi-modal transportation system of transit, roads and pathways" (City of Brampton, 2020, p. 40). This includes specific objectives such as promoting diversity within the land use, building transit and pedestrian-oriented communities, and increasing Brampton's place within the GGH. The most important policy that guides the development of TODs is 3.2.1.1, which directs growth to areas within an MTSA. It is within the OP that these areas must have a mix of uses and accommodate *significant* portions of the population and employment (City of Brampton, 2020, p. 63). As with most policy documents, there is a level of interpretation involved, and it is no different in Brampton's OP, as significance is not defined within the context of development. There is a myriad of problems associated with leaving this up to the developer. Is it significant relative to the entirety of Brampton, or the neighbourhood? What type of employment growth? Not every type of employment is compatible with a mixed-use community. While some of the concerns are answered throughout other policies, there is still a lack of clarity found throughout policy documents that adds another barrier to entry into development and building communities. Within Policy 3.2.1.1 is for development in MTSA to be transit and active transportation supportive, and compact form (City of Brampton, 2020, p. 63). These are both key policies that are the baseline

requirements for any type of TOD. From the initial general policies, Brampton laid the foundation to enable the development of well-designed TODs.

Figure 6. Mount Pleasant GO station, featuring electric bus charging station. Image 2. (photo by William Overholt)

MTSAs within Brampton are generally going to allow 100 residents per hectare to fit within buildings of three to ten stories tall (City of Brampton, 2020, p. 67). This general provision is quite low in the greater context of TODs, but the provision is the baseline for all designated MTSAs in the City. Not every location is suitable for high-rise buildings, so having a lower baseline allows development to still fit the character of the neighbourhood without specific official plan amendments, thus speeding up the development process. Being able to tailor densities to specific areas is more acceptable in a secondary plan or block plan, which will be examined later. Within policy 3.2.9, the goal of the Northwest Brampton Urban Development Area (Mount Pleasant GO) is defined. The area "is planned to be a compact, complete and connected community that is centred around a multi-modal transit node" (City of Brampton, 2020, p. 74); within this policy, there is a direct reference to the area being planned to be a *transit-oriented community*. Figure 6 shows the connections between the high-order transit station and low-order transit. The city does define *Transit-Oriented Development,* not community, but it is a safe assumption that the definition is relevant. Their definition is vague but does tackle all of the major aspects of TODs, including proximity to a transit station, higher densities, compact development form, mixed-uses, and a pedestrian-friendly environment (City of Brampton, 2020, p. 411). There are no specific values for densities

and proximity, but that does not pose an issue when those are prescribed in secondary plan policies.

General residential policies are supportive of the efforts to develop more TODs. The goal is to promote sustainable communities with a mix of uses through intensification (City of Brampton, 2020, pp. 85–86). While policy 3.2.1.1 prescribes a maximum density of 100 residents per hectare for MTSAs, it also states that they should be of *higher density* built form. This does conflict with policy 4.2.1.2, which states that high-density residential, which includes townhouses, duplexes, maisonettes, and apartments, shall have a maximum density of 200 residents per hectare (City of Brampton, 2020, pp. 87–88). As a common theme throughout this policy analysis, the importance of consistency can not be understated. With consistent policies, community building would be more efficient. The City also encourages affordable housing and will prioritize these applications (City of Brampton, 2020, p. 103). The City also commits to supporting and approving social housing projects and ensuring they are within proximity of transit (City of Brampton, 2020, p. 104). The housing policies within the Brampton Official plan do enable to development of TODs, they are not without issues.

Within the Mount Pleasant Secondary Plan are policies and recommendations that will shape the community to be a TOD. Early in the planning process, this area was identified as having potential for a TOD, and it was recommended that the City and developers invest in this area (City of Brampton, 2011, p. 10). This is featured throughout the secondary plan in the form of planning principles that will guide development. The first principle of the area create a transit-oriented development that encourages compact communities that enable live-work situations (City of Brampton, 2013, p. 46). The following pillars build onto the first, with specific pillars on transit and pedestrian-oriented communities, compact built form with a mix of densities and

housing types, as well as developing an efficient and safe transportation network (City of Brampton, 2013, pp. 46–47). Specific policies are in place to implement these pillars. The immediate area around Mount Pleasant GO station is zoned as mixed-use, which will allow residential and commercial uses. This development is also designated as cluster and high-density residential. The estimated density for this area is 124 people per hectare in the high-density area, and 100 people and jobs per hectare within the mixed-use zones (City of Brampton, 2013, p. 7, 2013, p. 57). To enhance transportation connectivity within this area, allowing it to achieve true transit-oriented designs, the road system must provide bus routes within 400 meters of all residential development (City of Brampton, 2013, p. 24). Allowing residents to reach a transit stop within a 5-minute walk is a crucial policy for TODs. Combining low-order transit like bus routes with higher-order transit such as the GO train or BRT allows commuters to efficiently cut out any need for a personal vehicle. In the event that development cannot provide the road network to be within 400 meters of a transit route, they must create through-block walkways that will create these connections (City of Brampton, 2013, p. 24). This provision reinforced the idea of building communities for people and pedestrians first, and vehicles second. This relativity minor change is something that could be implemented into any subdivision regardless of the proximity to higher-order transit. This is necessary specifically for suburban road networks that are severely lacking in connectivity, which provides a barrier to an efficient bus route.

Figure 7. Mixed-use low-density development directly across from the station. Image 3. (photo by William Overholt)

Other policy documents that shape the landscape of Mount Pleasant are Housing Brampton, the Transportation Master Plan, and the Active Transportation Master Plan. Within the Housing Brampton Plan, some policies promote intensification in MTSAs and discourage the *downsizing* of land (City of Brampton, 2021, p. 103). Further, Brampton commits to creating policies that enable mixed-use lands, which could create housing in places that previously did not have it (City of Brampton, 2021, p. 105). This development form is seen in Figure 7, which features ground-level retail and residential above. Brampton has created multiple avenues for achieving TODs within the city, displaying their commitment to these developments, and ensuring they close any potential loopholes. There is a prioritizing of reduced parking close to high-order transit, as well as providing new routes and stops before development is approved (City of Brampton, 2021, pp. 110–115). Understandably, municipalities do not want to bring transit to areas before development occurs, as running transit is expensive. But transit often follows a build-it-and-they-will-come pattern and people have a desire to live near transit (Champagne et al., 2022). Once there is transit in an area, the development policies change. Where a developer might be able to build a sprawling subdivision of single detached homes, the presence of transit will enforce density and housing options. Within the Transportation Plan, there are several recommendations to improve service within the Mount Pleasant GO Station area, as well as increasing active transportation links (City of Brampton, 2015, pp. 17–28). Throughout the Active Transportation Master Plan, various policies encourage active transportation through development and infrastructure as well as outreach education programs. There are also various short-term projects to create new cycling and multi-use trains in the Mount Pleasant GO area (City of Brampton, 2019, p. 73). Policies and recommendations

throughout these ancillary documents continue to reinforce Brampton's stance on commuter TODs.

3.1.2 Development

Currently, the Mount Pleasant GO area is subject to three active developments, two recently approved, and three either built or under construction. These developments range from low-density townhouses to high-density towers. In total, there will be approximately 361 townhouses built of various types consisting of 744 units. This includes back-to-back, stacked, rear-lane, and street townhouses. In addition, seven towers are proposed, ranging from six to thirty-four storeys in height. Of the seven towers proposed, one of the six-storey towers is intended to be a purpose-built rental. Seven of these applications are within Zoning Bylaw Applications to change the zoning for mixed-use. In addition to the residential focus development, there is also an application which is within the mixed-use zoning application that looks to build two one-storey and one three-storey commercial buildings. With the amount of residential development in the area, amenities will need to be increased. There has been a catholic secondary school built within the last 10 years, and a public secondary school is currently under construction to ensure the area is adequately serviced.

The lands that are being proposed for development are agricultural lands or the redevelopment of large surface parking lots, aligning with the city's goals of intensification (see Figure 8 to see the redevelopment of surface lots). The

Figure 8. High density development as seen from Mount Pleasant Village Square. Image 4. (photo by William Overholt)

housing diversity of the area will also contribute to Brampton's goals. Among all the proposed developments, the lowest-density residential dwelling type is street townhouses. Within the stacked townhouses will be multiple units. While not explicitly stated within the development application, the low-density commercial building of three storeys is to be within the mixed-use zoning, allowing for apartment units above commercial storefronts. The towers will include units of one, two, and three bedrooms.

3.1.3 Regression Analysis

The Transportation Tomorrow Survey (TTS) data from 1986 to 2016 for Brampton residents was used in a Poisson Regression analysis which follows equations (1) and (2). In total, 123 variables were tested against the same dependent variable, the number of trips on transit. It is important to note that due to the limitation of the TTS, the regression analysis is for the entirety of Brampton, not just the Mount Pleasant GO area. While I do not think this will affect the usability of the data, it should be noted that any results could also apply to Bramalea GO and Brampton GO as well. The goal of this analysis was to see what factors led to both the largest increase in transit usage and the largest decrease. Out of the 123 variables tested, 90 of them were statistically significant, while 33 were not statistically significant. A variable being statistically significant means that the p-value is below 0.05, meaning that the null hypothesis is rejected. If the p-value is greater than 0.05, any correlation is likely due to chance, and the results can not be used. The cause of a variable being statistically insignificant could also be due to a smaller sample size, which is the case for many of the tested variables.

The output for the regression analysis is in the form of a coefficient; when the coefficient is higher, there is a positive correlation between the dependent variable, the number of transit trips, and the independent variable. When the coefficient is a negative number, there is a negative

correlation. Due to the Poisson regression model being in logarithmic form, to find the actual value for the coefficient, the natural logarithm (*e*) of the coefficient must be taken. The actual value is the factor which the independent variable increases when the dependent variable is increased by one. The nature of logarithms means that the negative coefficients' actual value will not be a negative number, but a number less than one. A full summary of the results is in Figure 9, where the size of the bubble is determined by the actual value of the variable. For the full regression analysis table, see Appendix A.

Figure 9. Stacked bubble chart for Mount Pleasant GO. The size of the bubble corresponds to the effect the variable has on the amount of transit trips. (figure by William Overholt)

The first section of variables is those relating to households. This includes the dwelling type, number of vehicles, and presence of a transit pass. The three dwelling types that are present

in the TTS are apartment, townhouse, and house. While all three dwelling types had close coefficients, houses had the highest. On average throughout the years tested, for every resident that lived in a house resulted in an increase in transit trips by ~2.6. Townhouses were just slightly behind, and apartments behind by ~0.1. This value was consistent throughout the years tested, with slight changes but no overall trend. There does not seem to be a strong advantage for any dwelling type to increase transit in Brampton. The number of vehicles was only statistically significant for 2016, with the rest being statistically insignificant. For 2016, the number of personal vehicles that a household owns is negatively correlated with the amount of transit trips. For every increase in personal vehicles, there is a decrease in transit trips by a factor of ~0.7. Out of all the significant variables tested for Brampton, the number of personal vehicles in a household has the lowest coefficient. A household owning multiple vehicles has the greatest negative effect on the amount of transit trips in Brampton. Surprisingly, owning a transit pass does not mean that more trips are taken, it is the opposite. Not having a transit pass is correlated to higher amounts of transit trips than owning a transit pass; with an average factor of ~2.6 transit trips for not having a pass, versus an average factor of ~1.9 transit trips for having a pass. There is also no significant change over time in the correlation between transit trips and owning a transit pass of any kind. Of the household variables for Brampton, only the number of personal vehicles is the most valuable in policy discussions.

The second section of variables that have been tested are related to trips. These include the mode of transportation for a trip, the presence of free parking at work, the number of trips made by a person, the purpose of the trip, and the location of work. The way people make their trips is crucial and directly related to the built environment around their starting point and ending point. People who take public transportation, expectedly, also increase the amount of transit trips

in total. The increase is by a factor of ~2.7 over the study period, with no significant change over time. Active transportation results in an increase of ~2.4, and private vehicles have the smallest effect on transit trips. While using private vehicles for trips is significantly smaller than transit, it still has a positive correlation with transit trips. This means more people do not decrease the amount of transit trips, but just do not have as large of an impact.

Interestingly, the presence of free parking at work did not differ much between the two. Regardless of free parking, the amount of transit trips does not change much. Meaning that this is not a huge factor when deciding mode of transportation to work. The number of trips is positively correlated with transit trips. While the amount that it increases transit trips is not as high as other factors, sitting at an average factor of ~1.4 over the study period, there is an increase over time, with a rate of change in the factor by 0.006 year over year. There was also a spike in 1986, with a decrease the following study year, then a progressive increase from 1991 onwards. Where people work is the largest factor in their decision to take transit. Those who work in Brampton increase transit trips by a factor of ~2.6 over the study period. Those who do not work in Brampton have a negative effect on the amount of transit trips, by an average factor of ~0.73 over the study period. There is no significant trend throughout the study period, it is consistently negative throughout.

The final category of variables that were tested is related to transit. This includes how many transit links and what mode those links use. The number of transit links used has an average factor of ~2.2 over the study period. As the amount of transit links increases, so does transit, but this increase is not as high as some of the other variables above. The mode for the transit links is revealing in transit choices, and how those have changed over time for Brampton. The lowest average factor is for local transit links. For Brampton, this is Brampton Transit and

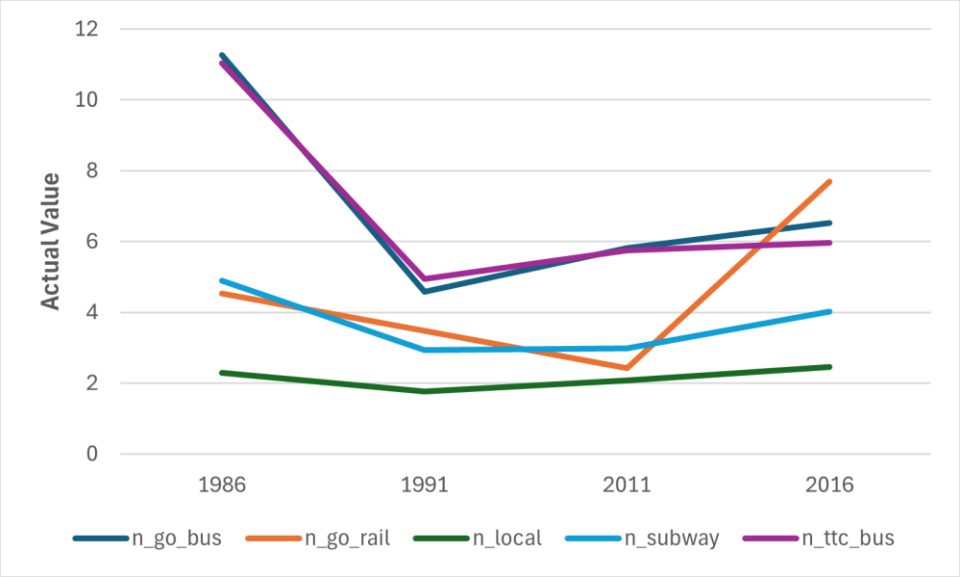

Figure 10. Actual value of transit mode for Brampton (figure by William Overholt)

Züm. As seen in Figure 10, local transit, while still positive, had consistently the lowest factor. While both the GO bus and TTC bus started with an extremely high factor, to then dropped and stayed consistent. The GO train did start high, but then had a drop by 2011 (the data for 1991 was not significant), but by 2016 had the highest factor. The exact reason for this increase is unknown, but the Mount Pleasant GO station did open in 2005, and by 2016 there was significant emphasis on TODs.

3.1.4 Synthesis

Brampton had made a strong effort throughout its policy documents. The official plan holds visions of traditional TODs; being built up by the common new urbanist buzzwords. While these visions are found in most policy documents throughout the GGH, the policies in Brampton are supportive of them. While housing is a crucial ingredient to building TODs, from the regression it is found that the housing type might not be as important in the Brampton context as previously thought. Housing is important in the context of equity and affordability, but from a purely transit perspective, the proximity and mode of transit are much more important. Active

transportation is consistently one of the greatest factors in increasing transit usage. Active transportation, being a main pillar of TODs, is justified in the Brampton context. Brampton has reinforced its commitment to bringing active transportation corridors to every corner of the municipality through policies in the official plan, transportation master plan, and active transportation master plan.

In the past couple of decades, there has been a strong decrease in the relationship between bus usage, both GO and TTC, and transit usage. There is a strong desire for high-order transit, which can be seen in the increase of TTC subway, GO train, and local transit in the past six years. For local transit, there has been a slight increase in the relationship with transit usage, which for the case of Brampton includes both lower-order (Brampton Transit buses) and higher-order (Züm BRT) transit. Brampton and Metrolinx have made it clear that it is their goal to bring more higher-order transit to Brampton. This is through the improvement on the Kitchener Line, as well as the Hazel McCallion LRT, Züm extensions, and planned rapid transit along Queen St.

The other major factor in transit usage in Brampton is where people work. From the regression, it is clear that when residents work outside of Brampton, they will drive. This is largely due to the lack of convenient options other than personal vehicles (see Figure 11 for a view of a parking lot at Mount Pleasant Station). There is a good chance that the residents do not live near one of the three GO stations within Brampton, and buses are often not ideal for commuting. This is the crux of the issue, and why TOD is needed in the currently commuting

Figure 11. View of Mount Pleasant GO from the parking lot. Image 6. (photo by William Overholt)

landscape. It is unreasonable to expect most people to live directly beside their place of work, which is why it is crucial to evaluate commuter TODs differently than traditional TODs. We can see the policies in action already through the development that has either started building or is through the review process in the Mount Pleasant Area. While there is a zoning bylaw amendment to convert the area to mixed-use, most plans are not for mixed-use, but purely residential. When evaluating this through the traditional TOD lens, this would be a poor example, but through the commuter TOD lens, it presents strengths and opportunities such as increased housing with an adequate mix and daily uses that enhance livability. The lack of employment frees up space for more housing which benefits commuter TODs.

3.2 Kitchener GO

Figure 12. Map of the Kitchener GO TOD. Each numbered dot corresponds to an image. (figure by William Overholt)

The Kitchener GO station is located in downtown Kitchener at the intersection of Weber and Victoria St. This station is small with only one platform but is well-used (see Figure 13). While the Kitchener Line reached this station starting in 2011, the station has been used since the early 1900s and is still used by VIA rail. GO Transit brought Kitchener into its service in 2011 as the terminus station on the Kitchener Line. The goal was to allow easier commuting from Kitchener to Toronto, which ranges from an hour and forty minutes to two and a half hours during rush hour. The train takes around an hour and forty-five minutes, allowing a consistently faster commute to Union Station during rush hour. As of 2019, the ridership of the Kitchener GO station has been at 328 average daily riders. While the daily ridership is not particularly impressive, it has had the largest ridership increase by 40% since the year prior. This increase is not only the largest for any station on any of the GO Transit lines but also around 20% above the

second highest. There is a clear demand for commuter transit from Kitchener, and this could be connected to the local transit system which opened that same year. There are two ION LRT stations within a 10-minute walk from the Kitchener GO station, Central Station and Kitchener City Hall Station. The immediate surrounding landscape is predominantly low-rise residential, but south of the station is Downtown Kitchener, which consists of low to mid-rise mixed-use and residential buildings. The area is serviced by a walkable grid road network, with two east-west backbones in Weber St W and King St W. There on major north-south arterial in Victoria St N, which along with King St W, leads to Regional Highway 7 and 8. The area is well-serviced in transportation and infrastructure, and much of the area is already built up, making Kitchener GO station a good candidate for a commuter TOD.

Figure 13. Kitchener GO boarding area. Image 1. (photo by William Overholt)

3.2.1 Policy

The main policy documents that guide development in Kitchener are the City of Kitchener Official Plan, Transportation Master Plan, Cycling and Trails Master Plan, and the Urban Design Manual. While those documents cover most of the policies and plans, there are broader vision documents that guide development at a higher level. The Housing For All is the housing strategy emphasizing homelessness reduction, and the Kitchener Growth Management Strategy provides the framework for long-term growth. Within the Growth Management Strategy, there are six overarching goals, one of which is to “ensure greater transportation choice” (City of Kitchener, 2009, p. 6). Throughout this document, there are visions for

Kitchener that align with TOD principles. The most prevalent being intensification; there is a priority on intensification in both the Urban Growth Centre, which is where the Kitchener GO station is located, as well as in the rapid transit corridors (City of Kitchener, 2009, p. 11). This sentiment of intensification along transit corridors is echoed throughout the Transportation Master Plan as well. To achieve this goal, there will be minimum densities within these major intensification areas enforced through the zoning bylaw. The City has a vision to include all land-use types in new development, with priority to those in the Urban Growth Center (City of Kitchener, 2009, p. 19). The focus on targeting intensification in the Urban Growth Center of Kitchener is a common theme throughout all the policy documents. The official plan's vision for Kitchener is to direct "growth to the Built-Up Area will make efficient use of land, existing physical infrastructure, transit, and community infrastructure" (City of Kitchener, 2014, p. 27). While the Urban Growth Center is the main focus of intensification in Kitchener, the OP does identify other areas, both built-up and greenfield, that are applicable for intensification of various degrees (City of Kitchener, 2014, p. 27). There is a clear priority on targeted intensification in Kitchener, which will help the city reach the intensification and density targets outlined by the Province in the Places to Grow Plan.

The vision for intensification outlined in multiple documents is well suited to enable policies that put that vision in place. Intensification policies are the primary focus of Section 3: Kitchener Structure in the OP. One of the first policies in the entire OP is to meet or exceed both the Provincial and Regional density and intensification targets, in appropriate locations (City of Kitchener, 2014, p. 28). While the specific policy does mention *when feasible*, it is beneficial to have the provision to exceed the targets. The allowance of higher densities promotes a better environment for building *utopian* TODs, as opposed to conforming with the province and

building communities that have the bare minimum densities. For this increase in density, policy 3.C.1.10. states that “The majority of residential growth in the Built-Up Area will occur within Intensification Areas” (City of Kitchener, 2014, p. 29). Further, when within walking distance of a transit stop, the densities must be higher than the surrounding area (City of Kitchener, 2014, p. 34). The vagueness in this policy is beneficial; it would benefit from some specifics, nonetheless, there is little wrong with it. The vagueness benefits TODs in the lack of specificity in the phrase *transit stops*. This policy does not specify the need for high-order transit. There are many more bus stops than ION or GO stations, which allows for more intensification corridors and areas, regardless of how small they might be. Regarding specific growth targets, the intensification target for Downtown Kitchener, where the Kitchener GO station is located, is to be 225 residents and jobs combined per hectare (City of Kitchener, 2014, p. 36). This is significantly higher than the provincial required density targets as well and includes jobs to create a true TOD within this area. This higher-than-required density target is crucial for the City to reach their residential intensification target of 60% by 2031 (City of Kitchener, 2014, p. 29). Based on the many visions and policies, Kitchener is well-placed to be a leader in intensification for commuter TODs in the GGH.

Beyond intensification, Kitchener has put a focus on MTSAs, with their largest one being Downtown Kitchener. MTSAs are a primary focus of the entire OP, using the definition of a ten-minute walk from a rapid transit station stop (City of Kitchener, 2014, p. 36). Policy 3.C.2.17 designates MTSAs to have four planning functions: accommodate growth that is supportive of rapid transit, provide greater mode choice, provide an adequate mix of uses, and create pedestrian and transit-oriented streets (City of Kitchener, 2014, p. 37). To accomplish these goals, policy 4.C.1.13 commits that the City will work with the development industry to provide

housing that is supportive of complete communities and transit (City of Kitchener, 2014, p. 47). Within these communities, the city will ensure that basic amenities, services, and infrastructure are accessible via active transportation (City of Kitchener, 2014, p. 134). While the provision directly encourages pedestrian connections within a community, it also encourages more building of basic community amenities. This policy would not be useful if it was left vague as most official plans do, but there is a definition for what Kitchener considers community infrastructure: lands that support the quality of life for the residents and the community through public services (City of Kitchener, 2014, p. 297). The examples that are included in the definition are institutional uses, community centers, sports fields, and libraries. While not explicitly stated, this policy enforced the building of complete communities through the complete community definition, which includes "providing convenient access to an appropriate mix of jobs, local services, a full range of housing, and community infrastructure including affordable housing, schools, recreation and open space for their residents" (City of Kitchener, 2014, p. 297). While redundancy can often be framed in a negative view; making applications more complicated than they have to be, it is also a tool that can be utilized by the municipality.

Housing policies in Kitchener are aimed directly at increasing affordability and combating homelessness. Priority three in the Housing For All plan is to "Help End Homelessness"; and priority four is to "Help Secure Community, Affordable Rental and Affordable Ownership Housing" (City of Kitchener, 2020, p. 7). The need for affordable housing is displayed in Figure 14, where an encampment can be seen across from a new tower that is being developed. For priority three, the target is to create 450 new units of supportive housing, this will be done through mainly advocating to the region and non-profits (City of Kitchener, 2020, p. 14). While these actions do help, they are largely passive actions and do not create more

supportive housing. Priority four will be achieved through policy decisions, such as identifying lands for affordable housing near MTSAs (City of Kitchener, 2020, p. 15). In terms of policies, the first housing policy in the OP is to "provide for an appropriate range, variety and mix of housing types and styles, densities, tenure and affordability to satisfy the varying housing needs of our community through all stages of life." (City of Kitchener, 2014, p. 45); a key aspect of this policy is a mix of housing types and affordability. The former is a key component to any TOD; while not every community with a mix of housing is a TOD, you cannot have a TOD without it. The latter is the key issue that is common in any discussion around land-use planning, and affordability. However, the problem with the term *affordability* is that municipalities define it differently from each other, the province, and the public. In the case of Kitchener, *affordability* is when the annual accommodation costs, either mortgage or rent, do not exceed thirty percent of the household's annual gross income (City of Kitchener, 2014, pp. 294–295). While it is not within this paper's scope to dissect the definitions' efficacy, it is not controversial to operate under the assumption that the fluidity of the definition makes affordability challenging.

Figure 14. View of construction from the Kitchener GO parking lot. Image 3. (photo by William Overholt)

As discussed in Chapter 2, it is generally accepted that TODs do not increase affordability, but I do believe it is moving in the right direction by offering more options to accommodate different household compositions. It is also within the Kitchener housing policies

to enable active transportation and live/work situations. Policy 4.C.1.37 allows live-work units to be permitted in all residential land-use designations (City of Kitchener, 2014, p. 51). This policy is not the only housing policy that aims to increase affordability while being a key pillar in TOD design; the city encourages affordable housing in areas that are close to transit (City of Kitchener, 2014, p. 48). Within the same policy, policy 4.C.1.19, the city will encourage develop of non-residential uses and community infrastructure to be convenient to access. While *convenient* is not defined in the OP, it is referred to in five additional policies within the OP when referring to a location being accessible via active transportation or public transit (City of Kitchener, 2014, pp. 130, 137, 138). Policy 4.C.1.13 commits to the City collaborating with developers to create innovative housing types and designs; while innovative housing types are not explicitly defined, in the context of Kitchener it is assumed to be non-single residential homes. The development community can create these innovative housing types as long as they support complete communities and are transit oriented (City of Kitchener, 2014, p. 47). Affordability and transit-supportive development are deeply intertwined and the policies in Kitchener aimed to increase affordability are examples of that. While TODs do not increase affordability, they might have more to do with their scarcity and demand of them, rather than the inherent design.

Due to the MTSA being in downtown Kitchener, the majority of the location-specific policies are located in the OP, as opposed to a secondary plan. The goal for MTSA is to "create and maintain a lively and liveable Downtown" (City of Kitchener, 2014, p. 162), which will primarily be done through "[supporting] and [strengthening] the Urban Growth Centre (Downtown) as a city, regional and provincial transportation hub with an integrated transportation system" (City of Kitchener, 2014, p. 163). The density target for Downtown

Kitchener is 225 residents and jobs combined per hectare, which exceeds the required target set by the Province; making it the highest density target of any of the case studies within this paper (City of Kitchener, 2014, p. 163). All the above policies relating to a mix of housing types are still enforced in the MTSA, with more policies ensuring the uses are transit supportive. Policy 15.D.2.10 restricts the development of auto-oriented uses such as drive-throughs, gas stations, mechanics, and car dealerships; if a developer wants to build a similar use, it must go through an official plan amendment for the specific site (City of Kitchener, 2014, p. 164). While initially, keeping the door open for auto-oriented uses in a dense mixed-use community does not seem progressive, there is a requirement that the use must be located within a mixed-use building. This is not a perfect solution, but restricting uses that residents have been so accustomed to is a much harder pill to swallow. At a minimum, these uses are not displacing more residential units, which is the lesser of two evils. In addition to this, large retail facilities that often come with massive swaths of surface parking are restricted to 2,500 square meters within the MTSA (City of Kitchener, 2014, p. 190). Once again, restricting these uses completely would be the best course of action, this is at least a step forward. In terms of parking within the MTSA, the Kitchener Growing Together plan that was approved in March 2024, abolished parking minimums and density maximums (City of Kitchener, 2024). This is a massive step forward in ensuring that the MTSA will be as dense as possible with as little wasted space. While there will still be parking that is proposed, the City will encourage that parking to be integrated, and not within the streetscape; the City also discourages new surface lots (City of Kitchener, 2014, p. 166). While the abolishment of parking minimums is good, allowing surface lots in the MTSA is a step backward. Kitchener will discourage these lots, but that does not mean they are not permitted, it just might be a little harder for developers to get them built. It would not be unreasonable to

prohibit surface lots within Downtown Kitchener, requiring underground lots that are much more efficient and allow the density of the community to continue.

The City of Kitchener is in an advantageous position to be a leader in building commuter TODS, but they are not without faults. Having the highest density target of any of the four being looked at in this case study, combined with the recent Kitchener Growing Together plan that will abolish density maximums, will allow Downtown Kitchener to become extremely dense for a commuter TOD. In addition to this, they have made steps to increase affordability, and while they are not going to immediately relieve the issue, they will contribute to a more affordable community eventually. Where Kitchener is making a misstep in their policies is in parking; while they have made steps in the right direction by abolishing parking minimums, this change is largely useless. As the proposed Bill 185, the "Cutting Red Tape to Build More Homes Act, 2023", will prohibit parking minimums in MTSA anyway. The lack of definitive action in their OP regarding parking is disappointing. Overall, Kitchener is in a good place, but there is still policy work to be done to enable Downtown Kitchener to be the best TOD it can be.

3.2.2 Development

Four major developments have recently been approved in the MTSA, as well as two that were refused by the Kitchener council. In total, the approved developments will add five high-density towers resulting in 2403 residential units. The first is a block south of the GO station; the 55-storey mixed-use tower will house 622 residential units and ground floor commercial housed in its six-storey podium. The developer has emphasized promoting transit, by having only 0.29 parking spots per unit, and no parking spots for non-residential units. A 45-storey mixed-use building is currently being built beside the 55-storey tower. This tower is planned to have 532

Figure 15. Newly constructed mixed-use tower and construction of a new tower. Image 4. (photo by William Overholt)

condominium units (see Figure 15). The next high-density application is east of the GO station, on the outskirts of Downtown. This development consists of three towers ranging from 18 to 40 storeys in height. In total 1073 residential units will be added to the housing stock, and ground floor commercial space. Disappointingly, this development does propose a significant amount of parking, with 916 parking spaces located in only one level of underground parking, and the rest in parkades within the podium of the towers. Both a 44-storey residential building next to the 55-storey building, and a 19-storey residential building east of the GO station were refused. The former was refused due to the cost of the project, and the latter was sent to the OLT and closed there.

Two medium-density developments have also been approved. The first is an 8-storey residential building north of the GO station consisting of 172 dwelling units. This will include underground parking, as well as extensive indoor bicycle parking. The building will have 1.25 parking spaces per unit. The second development is a 13-unit stacked townhouse. While this development pales in comparison to the others, it is important to have a mix of housing types. The benefit of smaller developments such as this one, is they are much easier to pass; generally, residents do not have as many issues with this as opposed to a high-density tower. In total, 1883 new residential units are being added to the housing stock within Downtown Kitchener, contributing to the ambitious density goals.

3.2.3 Regression Analysis

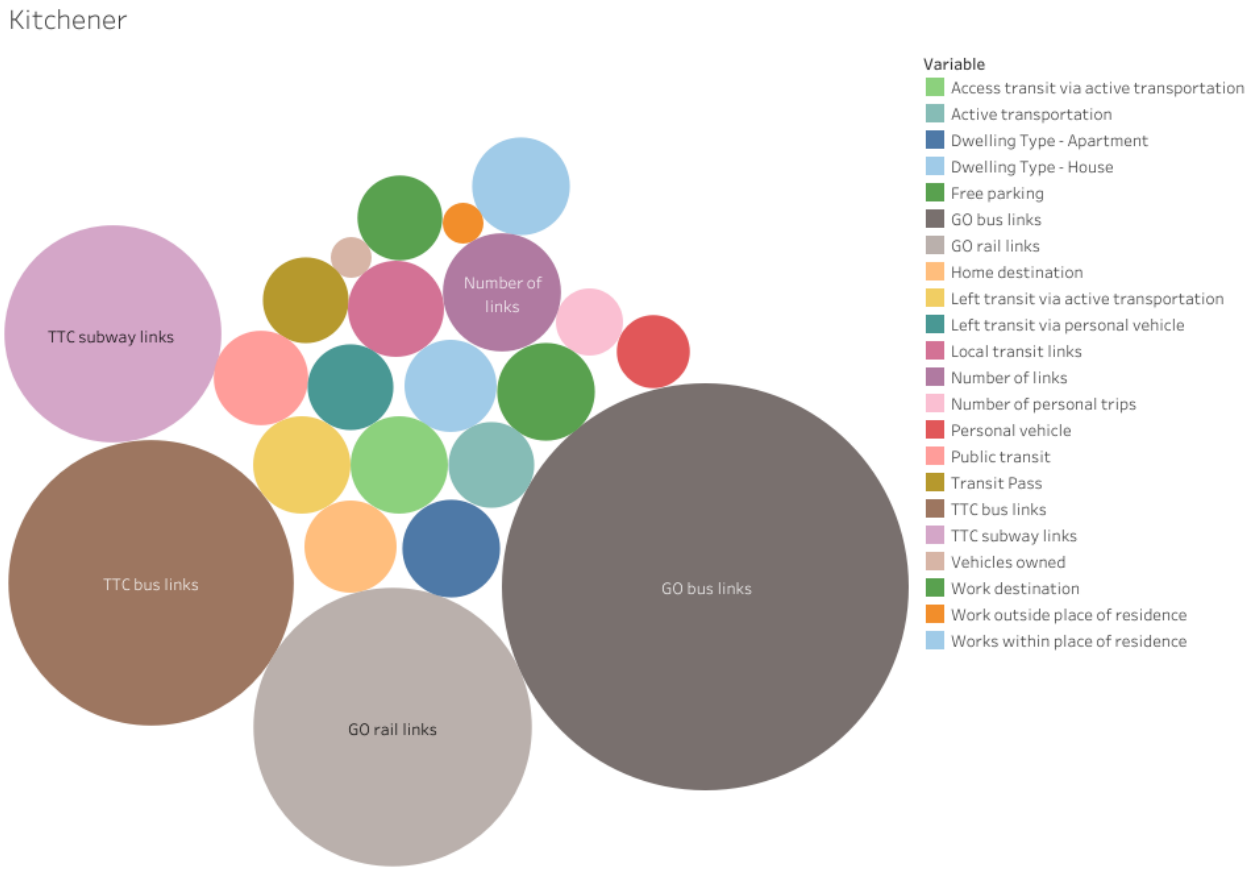

Figure 16. Stacked bubble chart for Kitchener GO. The size of the bubble corresponds to the effect the variable has on the amount of transit trips. (figure by William Overholt)

The methodology for the regression analysis is the same for all the case studies, which can be found in Sections 1.4 and 3.1.3. This outlines the regression model used as well as the practical results and what they mean. For the Kitchener GO station, there are fewer variables to use, as the data collection for the TTS only started in 1996. The result of this is the total variables tested for Kitchener is 73, with 54 of them being significant.

The first group of variables are related to the household, including the dwelling type, number of vehicles, and presence of a transit pass. The dwelling type for Kitchener does have a substantial impact on the number of transit trips taken by a household, with apartments having a value of ~ 2.9, and single-detached homes of ~2.6. While both dwelling types have a positive

impact, and increase the amount of transit trips taken, apartments are significantly higher, resulting in people who live in apartments generating ~0.3 times more transit trips than someone who lives in a single-detached home. For both dwelling types, there was no notable change over time. Interestingly, there was a peak in the coefficient for 2006 apartments, which was significantly higher than any coefficient for both. The number of vehicles that a household has in Kitchener has the consistently lowest coefficient of any of the significant variables; even lower than working outside of Kitchener. The average value for the number of personal vehicles owned is ~0.49, meaning that for every vehicle that a household has, it affects the number of transit trips by a factor of 0.49, essentially cutting the transit trips in half. Personal vehicles have a stronger impact on transit in Kitchener than Brampton, as Brampton was only ~0.7. This could be a result of the lack of transit options within Kitchener, especially considering most of the TTS predates the ION LRT. When a bus is the only transit option, people will often drive. The final variable was the presence of a transit pass, which did not affect the amount of transit trips much. The difference between having a transit pass and not is only a value of ~0.2, with not having a transit pass being higher. This again could be due to the lack of transit options within the study period, resulting in people not caring about getting a transit pass; potentially only using transit as it arises, not for repeatable activities.

The second group of variables is related to trips. This includes the mode of transportation for a trip, the presence of free parking at work, the number of trips made by a person, the purpose of the trip, and the location of work. To be expected, the transportation mode that had the most impact on transit trips is using public transportation. Close behind it is active transportation, which is not far off. The lowest was using a private vehicle, but this was still a positive value, meaning it does not decrease the use of public transportation, only does not increase it as much

as the other modes of transportation. For both active transportation and public transit, there was a decrease over time in how much it impacts transit usage. This could be attributed to the creation of the ION LRT, making transit more convenient for those who might not have taken transit before. While this does seem counterintuitive; people are more willing to take transit on higher-order transit for non-essential trips, and drive to essential trips. Those who take transit for their essential trips will not be deterred from buses. While the opening of the ION LRT increased transit ridership, it might have decreased the amount of trip generation from public transit trips as a whole.

As the number of trips a person takes daily increases, so do the transit trips. While the coefficient is not as large as other variables, there is still a slight increase. This increase has consistently grown over the study period, potentially due to the presence of higher-order transit. The purpose of the trip does not change the amount of transit trips generated. Both work and home-destined trips increase transit trips, with home destinations having a slightly higher value. What does affect transit trips is where the workplace is. When the resident worked in Kitchener, it increased the transit trip value by a factor of ~2.9 on average. However, for the residents who work outside of Kitchener, there is a significant decrease in transit usage by an average factor of ~0.5. this is to be expected, but there also was a slight increase over the years. While this increase was not large, it is still evident that commuter transit usage is growing. However, the minor increase shows that there is still a lot of work to be done in the realm of commuter transit options. The presence of free parking at work did have a positive coefficient, meaning it does not seem to increase personal vehicle usage, but due to the lack of significance from there not being free parking at work, it is difficult to compare the results and get usable information.

The third group of variables looks at transit. This consists of how many transit links and what mode those links use. As the number of total transit links a person takes increases, so does the amount of total public transit by an average factor of ~4.2. For every one additional link in transit, it generates four transit trips. Beyond this, there was a significant jump in this between 2006 and 2011. This coincides with GO transit extending the Georgetown Line to end at Kitchener; and because the ION did not open until 2019, I can confidently assume that this increase in transit usage from transit links is largely due to the GO train. This can also be confirmed by the fact that commuter rail is often not a one-link transportation mode and is normally combined with another mode such as other public transportation or active transportation. This is evident from the data and Figure 17, which shows people lined up to board the GO bus. This is further reinforced by the effect on the number of GO bus and GO train trips and how they affect public transportation. In 2011 the GO bus had a value of ~86, meaning that a one-trip increase on the GO bus would lead to an 86-fold increase. This drops down to a factor of ~15 by 2016. In 2011, GO train had a factor of ~22, which by 2016, raised to ~24. This steep decrease in GO buses and a slight increase in GO trains displays how much of an impact the GO train had, and that it did take a couple of years to start.

Figure 17. People waiting to board the GO bus from the GO station. Image 2. (photo by William Overholt)

3.2.4 Synthesis

The City of Kitchener has put a strong emphasis on intensification and housing. While there are mentions of complete communities and TODs, they are not nearly as prevalent as other municipalities. This could be due to their proximity to Toronto and emphasis on the Growth Plan. While Kitchener is included in the GGH, it is not the GTA, and might not feel the pressure to include these buzzwords as other municipalities. However, not mentioning these phrases does

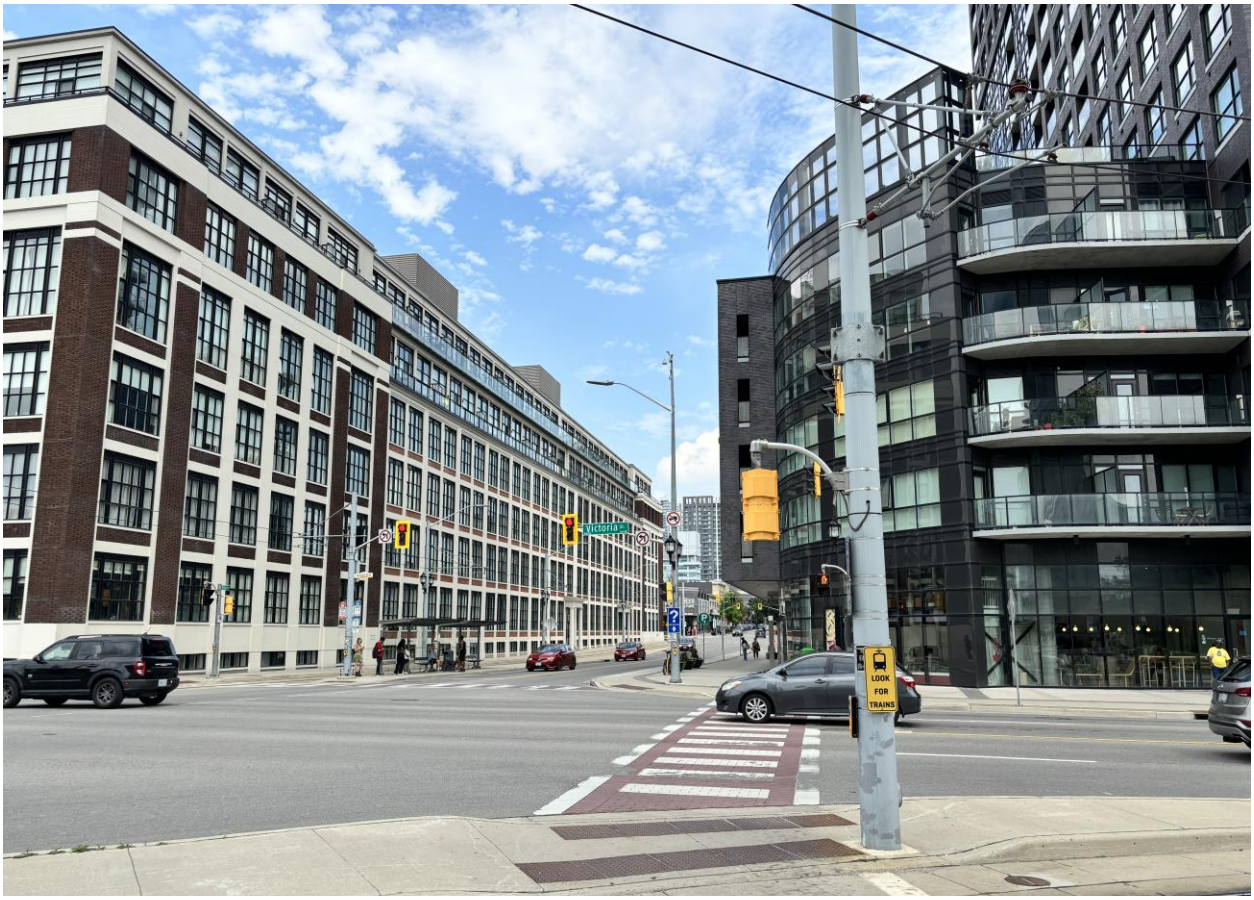

Figure 18. Mixed-use buildings along the ION LRT. Image 5. (photo by William Overholt)

not equate to building inefficient communities. It is evident in both the Downtown Kitchener policies as well as in the data that Kitchener's emphasis on intensification has paid off and will continue to grow (see Figure 18). The Kitchener line being one of the fastest growing transit lines in the GO system, combined with by far the highest coefficient for GO rail and GO bus transit links in the regression analysis, shows that the City is doing something right.

The prescribed density that is found in downtown Kitchener is the highest of any of the case studies; and while this can partly be attributed to the size of Kitchener, it is also due to the ambitious nature of the policies. Despite the density minimum being removed from the recent Kitchener Growing Together Plan, it is still clear that Kitchener is trying to make a dense, livable TOD in their downtown core. One of the key pillars of TOD is to have transit options, and while Brampton includes their Züm BRT in the plan for Mount Pleasant MTSA, it is not nearly as efficient or attractive as an LRT. There is a clear long-term commitment to building downtown Kitchener as a TOD, which is clear in the development activity. While there are not nearly as many applications for downtown Kitchener compared to Mount Pleasant, the applications are good. Large high-density towers in the heart of downtown combined with smaller medium and low-density apartments radiating out from the core create an efficient and TOD-style community. And while it would be good to have more applications, it is generally more onerous to build in already built-up areas, such as downtown Kitchener, compared to greenfields like Mount Pleasant.

Kitchener has also done an excellent job at ensuring that these new communities are adequately serviced by community infrastructure. As discussed extensively, vagueness is a problem within municipal policy documents, and while policies could use more specifics, Kitchener has ensured adequate definitions for many of the terms used in policies. However, the lack of a secondary plan for this area leads to some of the specific metrics that would normally be in a secondary plan being absent. The high-level policies provide a vision for the Downtown and zoning and the urban design manual will give the technical and architectural metrics, few policies deal with individual cases and locations. While one less document might provide an

expedited development process, there is the potential to miss opportunities to ensure that the community is built for the future.

3.3 Milton GO

Figure 19. Map of the Milton GO TOD. Each numbered dot corresponds to an image. (figure by William Overholt)

The Milton GO station is the terminus station on the Milton GO line. The line starts at Union Station in Toronto, services Mississauga, and continues onto Milton. This small station was opened in 1981, consisting of one platform and a surface parking lot; this station sees a lot of use from commuters driving from rural Halton, parking, and taking the train into Toronto. The Milton Line is the third most used line based on average daily users, with 2.4 thousand average daily users of Milton Station, making it the fourth busiest station on the line (excluding Union). This is impressive considering it is a terminus station, in a small municipality that does not have an extensive local transit network. Due to the location of the station, I am assuming that most of the ridership is purely for commuting. The Milton GO station is located in Downtown Milton, at the corner of Main St E and Thompson Rd S. Beyond the GO train, it is serviced by local bus routes, with all routes originating at the GO station. It is also home to two GO bus routes, route

21 which runs along the same corridor as the GO train, and route 27 which runs to Finch Station in North York. The development along the station is standard for the 1980s surrounding rail uses. To the south of the station is a corridor of industrial, then a row of commercial that separates the industrial from single-detached residential. The north of the station is large commercial uses, with massive surface parking lots that connect to Main St E, which houses smaller commercial, mostly auto-oriented uses, and smaller surface lots. It is not until about one and a half kilometres west of the station along Main St E that the historic downtown is found that features traditional street wall commercial and some apartments above. The intersection of Main St E and Ontario St S features the majority of medium-density housing found in Milton. The Milton GO station area is the least TOD area of all the case studies, but Milton has developed policies to guide development and help turn this area into a commuter TOD.

3.3.1 Policy

The main goals of the Milton Official Plan include building a safe, livable, and healthy community while being sustainable and efficient (Town of Milton, 1996, p. 2). Later in the plan, this is expanded upon to include the wording *complete community*; which then leads to the vision of "[Making] the Central Business District the main focal point of the community" (Town of Milton, 1996, pp. 28–29). This is all to say that the main goal for Milton's OP is to develop the Central Business District, the MTSA, into a complete community; one that is livable, has a mix of uses, and has a safe and efficient transportation system. While not explicitly stating the Central Business District is planned to be a TOD, the visions for the area align with the requirements for one. Milton makes clear when it was specified that most of the intensification will be directed to the MTSA, which will include higher-density mixed-use development (Town of Milton, 1996, pp. 30–31). This is further echoed in Direction One in the Region of Halton's

Comprehensive Housing Strategy, which features two actions to achieve the goal of having "complete and healthy communities" (Region of Halton, 2019, p. 13). Providing an adequate mix of housing as well as having housing and human needs met will be completed through policies and initiatives at the upper and lower tiers. In theme with other municipalities' policy documents, these are vague statements that do little to make any change happen. While the creation of policies is what would make change happen, these policies would be created without this document. It is within the PPS and Growth Plan to include policies such as the ones the Comprehensive Housing Strategy is referring to. The initiatives that are referenced are not expanded upon, which leads to few concrete actionable measures.

Creating a livable community is worth little if no one can afford to live there. Milton is striving to build an ambitious target of non-traditional housing (non-single-detached), which is outlined in policy 2.7.3.1, which commits that the urban area will have at least 50 percent new housing be townhouses or multi-storey buildings, and 30 percent of the new units will be affordable (Town of Milton, 1996, p. 91). In the OP, affordable is defined as "housing with market price or rent that is affordable to households of low and moderate-income spending no more than 30 percent of their gross household income" (Town of Milton, 1996, pp. 310–311); while the definition is problematic, and been outlined already in this paper, the inclusion of it is at least in the correct direction. Within the Comprehensive Housing Strategy, Direction Two is to "encourage and protect affordable housing" (Region of Halton, 2019, p. 14); which includes three actions. Similar to the previous direction, the actions consist of a lot of encouragement to lower-tier municipalities to create policies. Beyond words of encouragement, Halton has committed to creating an annual State of Housing Report, which outlines the trends of the housing market and housing affordability and mix target status. Helping achieve the goals set out

in the Comprehensive Housing Strategy; Milton commits to expediting assisted, affordable and shared housing applications. This strategy is an efficient form of incentives without emptying the town's coffers, while still providing a solution to an established problem in the development industry. While Milton's policies have the potential to be effective, their actual effectiveness will be reviewed in section 3.3.2.

Originally a secondary plan, the Central Business District has been incorporated into the OP in Section 3.5, which outlines the vision and policies specific to the area, including the MTSA. It is the vision of the MTSA to support the GO station with active transportation that ensures connections to trip generators are made (Town of Milton, 1996, p. 155). Further, the MTSA is planned to be a major employment center, with a density of 200 residents and jobs per hectare. It is clear from the OP policies that Milton strives to not be a commuter TOD, but a traditional one. While this is ambitious, it is a misstep that might result in the TOD not being as efficient as it could be. As of 2021, only 38 percent of residents in Milton worked in Milton, and 50 percent have a commute longer than 30 minutes (Statistics Canada, 2021). With such a strong emphasis on employment, Milton might be spreading itself too thin to adequately provide enough housing and community services to sustain the area. In addition to this, there could be an extended period before the area fully develops as many developers and companies are often not willing to move into an area that is not already established (Champagne et al., 2022). The MTSA will feature its densest buildings nearest to the GO station, with the highest gradually tapering down. The specific heights of the MTSA can be found in Schedule C.7.A.1, which has a maximum height of 33 storeys, with most of the land around being from 8 to 27 storeys (Town of Milton, 1996). The heights will be tapered down as they approach the historic section of Main St E, consisting of 3 to 4 storeys on Main St, with some exceptions made for surrounding lots.

Policy 3.5.3.47 sets provisions on the amount of parking in the area stating that “surface parking lots should be minimized” (Town of Milton, 1996, p. 170). The Town encourages “existing surface parking lots [to] be replaced with compact, mixed-use and transit-supportive developments” (Town of Milton, 1996, p. 170); which is a needed policy considering how much of the lands surrounding the GO station are large surface parking lots (see Figure 20). While vagueness has consistently been a negative throughout this paper, it works in favour of this policy. Leaving where these surface lots can be redeveloped open, allows for more development applications to come through and expedites the process of intensification as there will be no need to go through the process of displacing people. Where the parking policies fall short is in the lack of encouragement to surface lot alternatives; in other municipalities OP there would be the discouragement of surface lots but the encouragement of underground lots, which are a much more efficient use of land. There is also no mention of removing parking minimums for this area (as of writing, Bill 185 which will remove parking minimums in MTSAs, has not been passed), which will result in developers going with the cheapest option for parking, which is surface lots. There is an encouragement of underground lots specifically for mixed-use and residential redevelopment, and it is only in the Milton Mobility Hub Study: Urban Design Guidelines (Town of Milton, 2020, p. 32). While this encouragement is better than nothing, excluding it from the OP only allows developers to

Figure 20. Large commercial plaza across from the GO station. Image 1. (photo by William Overholt)

circumvent it more easily. Oddly, the provision is only encouraged for redevelopment, not development as a whole.

Milton has put a lot of thought into the built form of the Central Business District, which is largely found in section 3.5 of the OP and the Milton Mobility Hub Study: Urban Design Guidelines. In broad policies, they want the built form to be pedestrian-oriented and have a mix of uses that can utilize and enhance the pedestrian experience while keeping the distinct character found in Downtown Milton (Town of Milton, 1996, p. 159, 2020, p. 29). Where parking is needed, street parking will be encouraged; if that is not enough larger parking must be placed at the rear of the building to ensure the street wall is continuous. When developing the tallest buildings in the area, they need to serve as landmarks and need to be close to the GO station (Town of Milton, 2020, p. 23). There are multiple policies relating to ensuring the Central Business District is a pedestrian-first environment; restriction vehicles from blocking pedestrian movement and creating vehicle entrances that can be used for multiple buildings in the block (Town of Milton, 2020, p. 32). The create the desired street wall, policy 3.5.3.23 states that "buildings shall be oriented towards the street and positioned to create a sense of enclosure along the street" (Town of Milton, 1996, p. 162); which will encourage retail activity. Creating smaller blocks with short frontages not only stimulates the commercial potential and benefits pedestrians, but it also creates more connectivity for these pedestrians, which has been a core focus of the Milton MTSA. Milton's commitment to shortening pedestrian connections goes as far as requiring large buildings to create midblock connections where possible, or pedestrian-friendly lobbies that can serve as these connections (Town of Milton, 2020, p. 23). For connections that cannot be made via walking, development is required to include bicycle parking and access to public transit (Town of Milton, 1996, p. 163). If personal vehicles must be used,

Milton is encouraging electric vehicle charging stations both in on-street parking as well as in lots. This allows for these developments to promote active transportation, and if that cannot be achieved at least electric vehicles, which is the lesser of two evils.

Creating the pedestrian connections is great for the areas north of the GO station; most developers would not have many issues with creating these mid-block connections and ensuring adequate connectivity. However, the rail line creates a large barrier to the connectivity of the area, and the lands south of the rail line are still included in the MTSA lands. Policy 3.5.3.24 states that "A pedestrian linkage across the rail line to connect Nipissing Road and Childs Drive to the GO Station and Main Street will be encouraged." (Town of Milton, 1996, p. 164), which simply is not good enough. Creating pedestrian connections across large infrastructure corridors like a rail line can be extremely expensive, and encouragement is not going to be persuasive enough for developers to build it. There is also a slim chance that a developer would be building the area both north and south of the rail line at the same time. This connection should be built by Milton, and it should be built soon. It is much easier to build a connection like this before large intensification projects have started; building it into the plan will allow for a much more efficient and appropriate planning process of the lands to ensure development can get the most out of a crucial connection.

3.3.2 Development

Within the Milton GO MTSA, there are two large developments currently being built and four more under review. All of which will be very dense, with the smallest building being 15 storeys in height. In total, there will be 3928 residential units. Four of the developments are mixed-use, while two are exclusively residential. The first of the under-construction

development are three towers of 31, 29, and 27 storeys in height around 350 meters directly east of the GO station (see Figure 21). This development will have at-grade retail and a total of 802 condominium units. This development is being advertised as *luxury* units; presumably, these will not be affordable.

Figure 21. Active development of luxury condominiums beside the GO station. Image 4. (photo by William Overholt)

The second development under construction is three towers of 19, 15, and 15 storeys in height, with a total of 677 units (see Figure 22). These will not be mixed-use and are around 500 meters west of the GO station. While this development is within the standard catchment area of a higher-order transit station, it is across the rail corridor. Without a pedestrian connection across this corridor, the distance from the GO station triples, resulting in wasted density.

The four developments that are actively under review make up most of the new housing stock being added to the Milton GO MTSA. The first application is two towers of 17 and 19 storeys in height on a six-storey podium around 550 meters east of the GO station, north of the rail corridor. This will consist of 588 residential units and ground-floor commercial space. Currently, the types of units are not determined. The second development under review is a 19-storey mixed-use building, consisting of 271 units. This is located east of the GO

Figure 22. Active development across the rail corridor. Image 5. (photo by William Overholt)

station, but like the building under construction above, it is on the south side of the rail corridor, thus limiting the connectivity. This building is a purpose-built rental building, with the units being market-rate rentals. The third development, located directly beside the previous, is two towers of 23 and 19 storeys. This will be exclusively residential with 677 condominium units. The final development application is a mixed-use set of three towers consisting of 27, 25, and 23 storeys 300 meters northeast of the GO station. This will include residential, commercial, and a Privately-Owned Publicly Accessible Space (POPS). This is a space that could be a plaza, park, or other green space that is not owned and kept by the municipality, but by the owner of the property. But these spaces are open to the public to utilize and enjoy. This development will include 1009 residential units, but the type of unit is not yet determined.

There is intense residential development being built around the Milton GO MTSA, with a clear priority on getting the greatest number of units possible. It is good to have this influx of units close to the station, while not having too much commercial space. Milton will experience what most other municipalities with density, and that is not having an adequate mix of housing. All the current developments near the MTSA are medium to high-rise primarily residential buildings. There are few smaller-scale apartments or low-density non-single detached housing options. In addition to this, only one of the developments is a purpose-built rental building, the rest being condominiums. In terms of development patterns, Milton is falling into the trap of building more housing but not paying attention to who can live in them. There is a clear disconnect between the housing strategies and the development process.

3.3.3 Regression Analysis

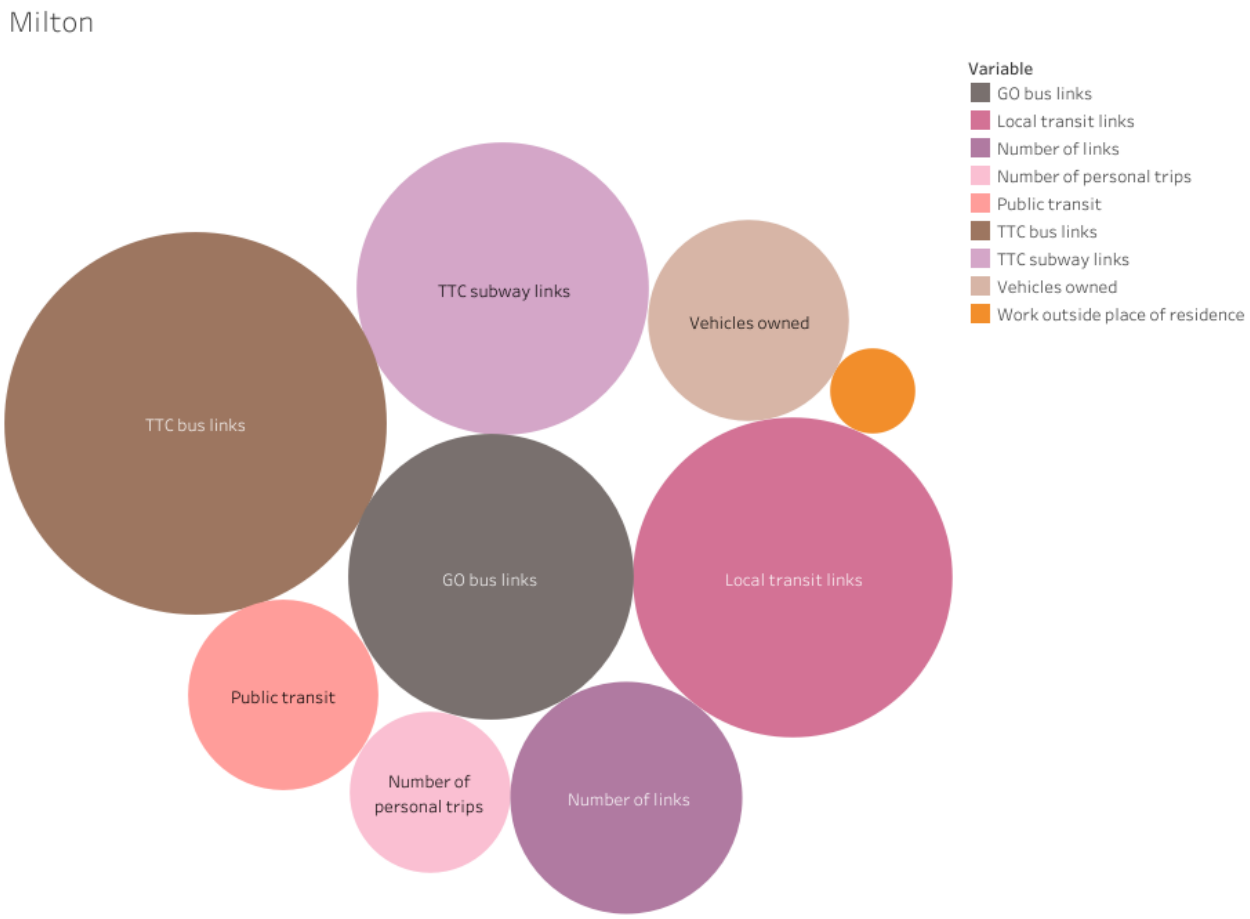

Figure 23. Stacked bubble chart for Milton GO. The size of the bubble corresponds to the effect the variable has on the amount of transit trips.

The methodology for the regression analysis is the same as above; for a more detailed explanation of the methodology see sections 1.4 and 3.1.3. Milton had significantly less significant variables than the other three case studies with only 22 significant variables out of a total of 101. The exact cause for this is unknown, but regardless, it means that the implications of the regression analysis are not as great. Most of the significant variables relate to trip and transit usage, while households' variables were not significant. The only household variable was the number of personal vehicles in the household, which surprisingly did not hurt transit usage. The

cause could be attributed to the lack of transit in the area regardless, so there is little choice for the resident. The location of employment had a consistent decrease in the amount of transit usage in Milton for residents living outside of Milton. While the coefficient of this variable never was positive, there was a consistent increase in the variable (See Figure 24). In 1991 the actual value of was 0.15, meaning that for every increase in one resident working outside of Milton, it will decrease transit usage by a factor of 0.15. But by 2016 this value raised to 0.54. While this is still a negative number, the increase in this variable could be synonymous with an increase in GO

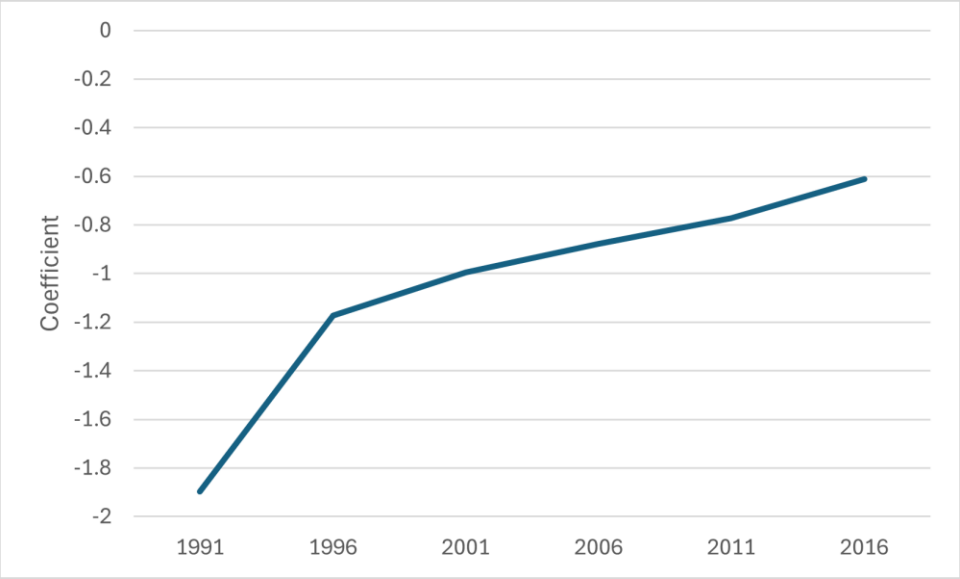

Figure 24. Coefficient of commuting via transit over time in Milton. (figure by William Overholt)

transit. Sadly, the GO transit variables are not significant, so there is no chance to gain definitive results from the data alone.

The rest of the significant variables are related to transit. Similar to the previous case studies, these variables all had a positive effect on transit usage as a whole. Having the least effect on transit of this set of variables is the number of transit links someone takes. The actual value of this was a factor of ~2.8, and it was consistent throughout the study period. The number of local transit trips had a sharp decrease in its effect on transit usage through the study period, with the factor dropping from 6.6 in 1986 to 4 in 2016. Still a positive impact on transit usage,

the cause of this could be attributed to transit being more common in Milton and the residents taking it more often. When transit is scarce, the only people taking it are those who will need to take it for everything. Whereas when it is more accessible, residents will take it for non-essential trips but still take other modes of transportation. The variables that had the greatest effect on transit were the number of links on both the TTC bus and the TTC subway. The TTC subway had a factor of ~4.4 while the TTC bus had a factor of ~7.6, making it the most impact variable for Milton. For a resident of Milton to take the TTC they need to either drive or take the GO train or GO bus. If we assume they are taking the GO train or GO bus, they will be in terminal stations that are usually connected to a subway or streetcar, which will then connect to buses. For someone to take the TTC bus, they would most likely need to be taking multiple forms of transit in different links, resulting in the greatest positive impact on transit usage as a whole.

3.3.4 Synthesis

Milton has developed their policies to build the Milton MTSA into a traditional TOD, with a strong emphasis on housing policies to ensure affordable housing, Milton has made the same error that most municipalities have made, which is in their definitions of affordable. While most of the housing policies are empty commitments with few actionable items, they have found a strategy that is efficient in the current financial landscape of municipalities, which is promising to expedite development applications for affordable housing. The trends for the housing policies bleed into the MTSA policies, with promises of creating *complete communities* with few specific policies to achieve this goal. Milton has tried to create policies to support the growth of the MTSA with little effort in the context of the area. Many of the policies are supportive of a traditional TOD that would fit into Toronto, but with the lack of multimodal transit and proximity of economic centers, this plan will not work. The policies have a strong emphasis on

not just increasing housing density, but also increasing the amount of employment opportunities. For a commuter TOD, there is a need to emphasize housing first and foremost, then auxiliary commercial uses that supplement the livability of the area. For a TOD found in an economic center, large-scale employment opportunities work, but for a town that is far from becoming a major economic centre, creating a TOD to supplement one is a misstep.

The data from the regression analysis reinforces the recommendation to focus on commuter living rather than traditional forms as the impact that commuting has had on transit has substantially increased over the study period, while local transit usage has decreased. But Milton continues with its emphasis on traditional TOD. These policies have already been put into action through the development of the MTSA, but there is a clear disconnect between the policies and what is being built. This is especially evident in the housing policies, where many of the large-scale developments are hitting or exceeding the density targets set by the town but are only building luxury condominiums. This disconnect is furthered by the lack of housing options. All the developments currently are mid to high-rise, with no smaller apartments or townhouses. This goes directly against the policies within the OP that commit to a gradual decrease in heights. The lack of options also decreases the livability of the area, as not all household structures fit within a one-, two-, or three-bedroom unit in a high-rise. Milton is letting development proceed on the south side of the rail corridor before there are any plans to create at least a pedestrian connection across; without this connection, the development in this area is essentially not part of the TOD and merely a standalone set of high-rise towers within an industrial area. While Milton is in a good position to create a commuter TOD, the policies are promoting the wrong type of development. But none of the policies matter if developers can build whatever and wherever they want with little regard for these policies.

3.4 Whitby GO

The Whitby GO station is in the southern end of the town, in the Port Whitby area. The station is located directly south of Highway 401. The station is small, with only one middle platform that is reached via a pedestrian bridge across the tracks. On the north side of the station is a small surface lot, while the south side consists of the majority of the parking. A large parking complex featuring three surface lots and one multistorey parkade (see Figure 26) makes up most of the three thousand parking spaces. The Whitby GO station sees the most daily riders on the Lakeshore East line, which is the second most used line in the GO transit portfolio. While having the most daily riders, Whitby GO station has also seen the least growth of any station on the line. The current land use of the Port Whitby area is largely low-density residential. There are three large condominium buildings, twelve-row townhomes, one commercial plaza, and one

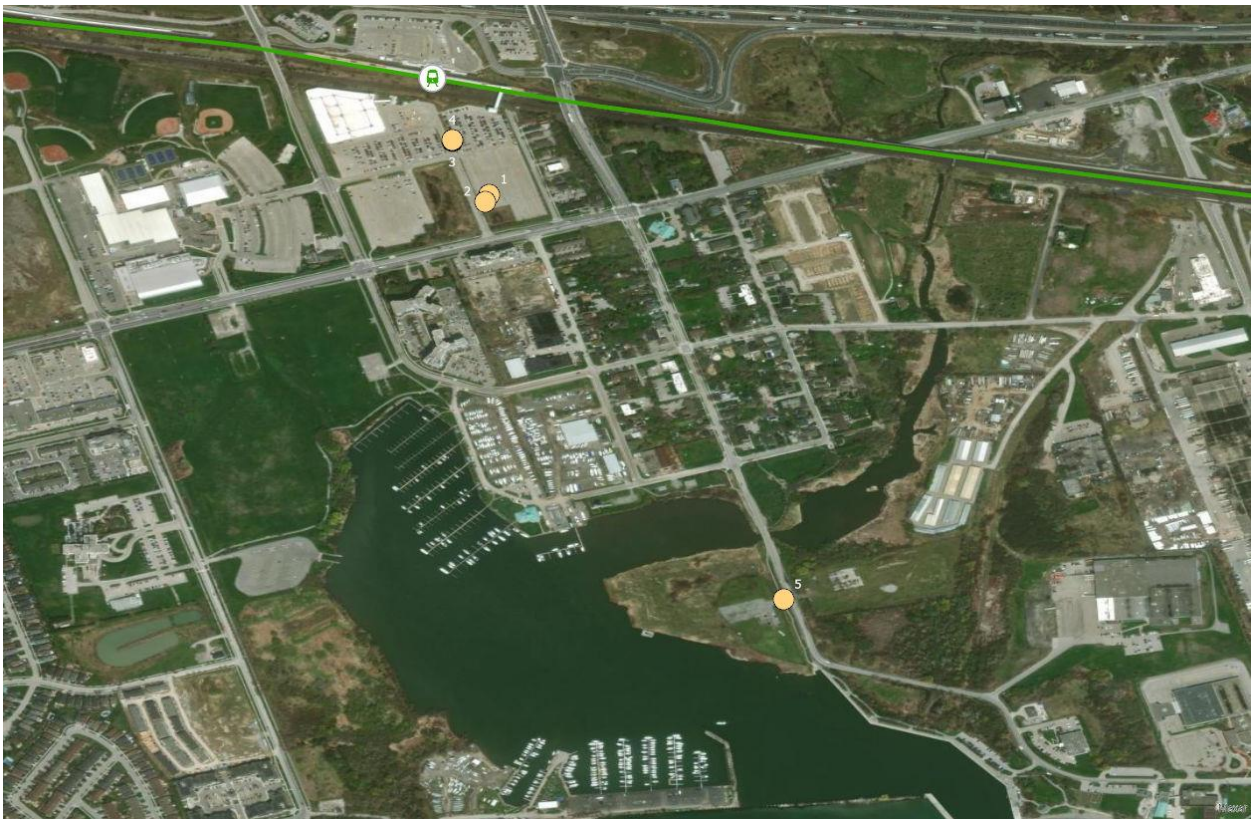

Figure 25. Map of the Whitby GO TOD. Each numbered dot corresponds to an image. (figure by William Overholt)

large sports complex. The rest of the area surrounding is greenfield. The station is serviced by one GO bus and six Durham Region Transit bus lines. Within one connecting bus line is the PULSE BRT system to provide more efficient bus services. The demand for a TOD around the Whitby GO station already exists, with high ridership and proximity to other transportation modes. The area has already seen some intensification and will continue to grow and become a desired neighbourhood due to the proximity to the water.

Figure 26. Parkade for Whitby GO station. Image 3. (photo by William Overholt)

3.4.1 Policy

The policy documents in the Town of Whitby are not nearly as fleshed out as the other municipalities within this paper, with the majority of the policies coming from the OP. The vision for Whitby is similar to the vision for any municipality within the GGH; to be "a healthy, sustainable and complete community" (Town of Whitby, 1995, p. 3). To achieve this, guiding principles are established, with five of them relating directly to building a TOD. The intensification will be directed to specific corridors, and the Port Whitby area is one of those intensification locations (Town of Whitby, 1995, p. 3). New development should be integrated into transportation systems that allow for multi-modal transportation, including active transportation (Town of Whitby, 1995, p. 4). All new urban developments are to be compact and include a mix of uses while keeping the character of the existing build form. New development should be *livable* and walkable. As with most policy documents being reviewed, there is a level

of vagueness that only allows developers to take advantage of the municipality; with livable not being defined many questions are raised. Does livable mean the bare minimum of shelter, which in this case the lack of housing strategy for Whitby does not contribute to the lack of basic shelter for residents? For whom is it livable? If condominiums and single-detached housing are the only forms of housing being built, then many household structures are left out and either must compromise for a dwelling that does not fit them or be left out. Then question of affordability comes into the conversation of who are these homes being built for. The definition of affordable housing that is used in Whitby is that the annual housing cost must be lower than 30 percent of the annual household income (Town of Whitby, 1995, p. 163).

Within the housing policies section of the Whitby OP, some policies are set to answer some of these questions, but there is still the lingering vagueness that plagues these plans. Policy 7.2.2 ensures that there will be housing opportunities for all residents (Town of Whitby, 1995, p. 123). This is further expanded upon in policy 7.4.1, which commits the Town to encourage a range of housing "type, tenure, size, location, density, and affordability to meet the Municipality's housing needs" (Town of Whitby, 1995, p. 124). The provision of meeting the Municipalities' housing needs is reinforced by Policy 7.8.2 which outlines the monitoring plan for the town's housing needs (Town of Whitby, 1995, p. 126). Policy 4.4.3.4.1, 4.4.3.5.1, and 4.4.3.6.1 outline the housing forms that are permitted within low-, medium- and high-density residential areas. Within low-density residential areas, only single-detached, semi-detached, and duplexes are allowed with a maximum density of 30 units per hectare (Town of Whitby, 1995, p. 37). Within medium-density residential areas, street and block townhouses and apartments with a maximum height of four storeys, and a maximum density of 65 units per hectare (Town of Whitby, 1995, p. 37). For high-density residential, all forms of housing are acceptable with no

stated height maximum in the OP, but with a maximum density of 135 units per hectare (Town of Whitby, 1995, p. 38). In these areas, development can exceed the density maximum if they are within a mixed-use building and an intensification corridor. While initially, this seems like a good incentive to get dense housing options within appropriate areas, the policy still required a zoning bylaw to allow anything exceeding the maximum density. While this is a good solution for the OP, it displays a disconnect between policy documents which is a sign to update the Zoning Bylaw. Within the Region of Durham's OP are provisions that require 25% of new residential units to be affordable to low- to moderate-income households (Regional Municipality of Durham, 1993, p. 30). The myriad of problems with affordable housing have been explored, and clarifying who the units are affordable for is a step in the right direction. From the Whitby OP, low and moderate households refer to "households with incomes in the lowest 60 percent of the income distribution for the regional market area" (Town of Whitby, 1995, p. 163), which still sets the upper limit too high, but it is better than not answering the question of who.

Policy 7.2.3 commits to assisting residential intensification and affordable housing in Whitby; this can be achieved through mixed-use development where appropriate. Further policies on intensification are found through policy 4.2. Policy 4.2.3 discourages the building of surface parking within intensification areas but does encourage parkades or underground lots (Town of Whitby, 1995, p. 25). While in a perfect world, there would not be a need for much parking at all within intensification corridors, underground parking is the next best thing. It is a much more efficient use of land while still providing parking needs for residents. It is more expensive to create underground lots but has been the standard for dense urban areas for years. While surface lots are the worst parking solution, parkades are not much better. They do allow for more parking per unit of land, but they are still taking up valuable land for the housing of

personal vehicles. To not only allow these inefficient structures, but encourage them, and place them before underground parking is a misstep which will hopefully be remedied in the next OP update. These poor parking policies are furthered in policy 4.4.3.9.2 which only allows for medium- and high-density residential development outside of intensification areas if there is adequate parking (Town of Whitby, 1995, p. 39). Policy 4.4.3.12.2 considers the reduction in parking minimums, high-density residential outside of intensification corridors is not included (Town of Whitby, 1995, p. 41).

The Port Whitby MTSA is planned to be the least dense of all the case studies despite having the highest average daily ridership on the highest ridership GO line of the four studies. It is planned to have a minimum density of only 60 units per hectare. The policies that direct the overall design of the MTSA are found in the Port Whitby Community Secondary Plan. The area has four basic guidelines that will guide the built form; the buildings that are in this area should create a street wall, with no parking in front of the buildings; these buildings should enhance the pedestrian environment (Town of Whitby, 1995, p. 183). While these design choices are similar for all TODs, one specific policy to Whitby is to ensure the view of the harbour is unobscured. This provides another barrier to building dense residential development, as it is restricted to only the north and east sides of the streets, to not block the view. Low-, medium-, and high-density residential developments must adhere to the same policies found in section 4.4 of the OP. The maximum height for high-density residential is six stories, which is significantly shorter than what would traditionally be considered high-density. The high-density residential mixed-use designation has a maximum height of eighteen storeys, with a minimum density of 75 units per hectare and a maximum of 300 units per hectare (Town of Whitby, 1995, pp. 187–188). Most of the land within the MTSA is designated to be high-density residential mixed-use as seen in

Figure 27, which does lead to some confusion as to why the minimum density target was set so low. There are some policies around commercial development, specifically in the lands north of the rail corridor, where the current GO station is, that will specifically allow businesses such as professional offices, hotels, and convention centers (Town of Whitby, 1995, p. 188). It is reasonable for there to be some commercial exclusive land in a TOD, even for a commuter TOD, and Whitby has done a sufficient job at focusing their efforts on building residential first, with commercial development that will supplement the daily needs of the residents. From the policies of the Port Whitby MTSA, it is clear that they are not trying to create another economic center, but instead are trying to enhance the lives of what they already have, a strong commuter population.

3.4.2 Development

Despite having the lowest density target, the Port Whitby MTSA has the most development of the four case studies. There are six large-scale developments under review and one under construction. In total, there will be 4052 units being added to the MTSA, with six of the seven developments being mixed-use. The development under construction is located 400

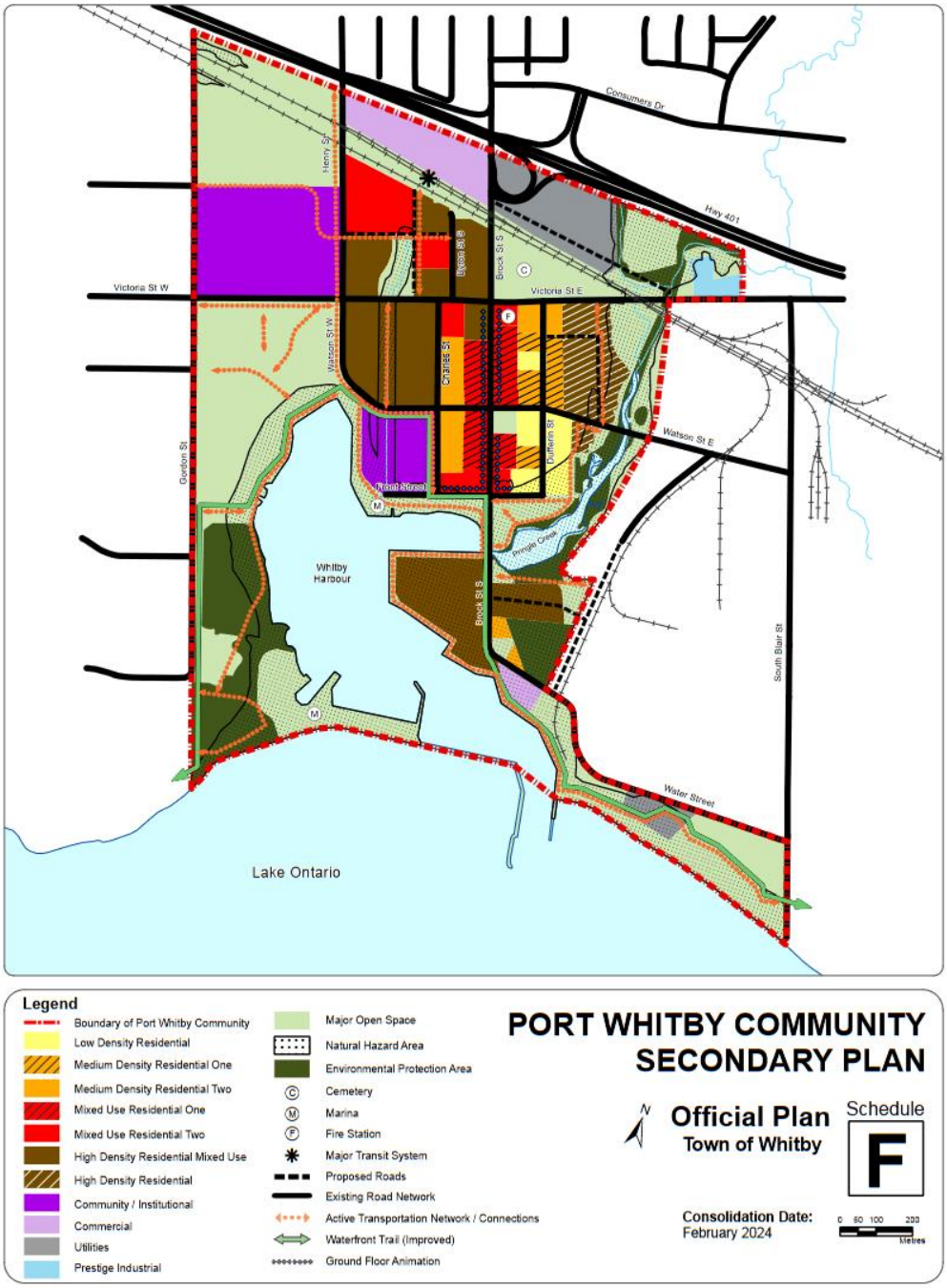

Figure 27. Land-use plan for the Port Whitby Secondary Plan area (Town of Whitby, 1995).

meters south of the GO station and includes six residential buildings of 18, 5, 5, 5, 5, and 5 storeys in height (see Figure 28). In total 346 condominium units will be added; this development is the only development that is not mixed-use. The only development north of the GO station, across Highway 401, is a smaller-scale mixed-use development. It is an 8-storey

mixed-use building consisting of 92 condominium units. The commercial in this building is to be retail development. While this development is only 350 meters away, due to the highway, it is raised to a 500-meter distance; this increase is still a reasonable walking distance. The second smaller-scale development is located 700 meters south of the GO station and consists of one 5-storey mixed-use building and two 3-storey semi-detached dwellings. In total there will be 32 units added; while low, it increases the housing options and diversity of housing types.

The two closest developments to the GO station are at the north and south sides of the Victoria St W and Brock St S intersection. The northern development is located 200 meters south of the station and consists of an 18-storey mixed-use building. This will add 238 residential units, including both market-rate rental and affordable rental units. The commercial will be retail. The southern development is located 300 meters south of the station and consists of a 12-storey mixed-use building with 157 condominium units. The next development, located 500 meters south of the GO station, is four towers to continue building out the existing high-density block. These towers will be 36, 32, 32 & 28-storey in height and will be mixed-use and a public park. There will be 1639 new units, including some affordable units, and retail commercial. The final development is the largest, located 900 meters south of the GO station, and will include six mixed-use buildings. These will be 33, 33, 33, 21, 15 & 12 storeys in height, and will have at least 1500 condominium units (the exact number of units is not available). The commercial will be retail development and a public

Figure 28. Recently built and currently under construction condominiums across from Whitby GO station. Image 2. (photo by William Overholt)

park will be developed. In total, there will be at least 4052 new residential units split between seven new developments. Of this, two of the developments have been confirmed to include affordable units, and one of the developments includes lower-density housing options.

3.4.3 Regression Analysis

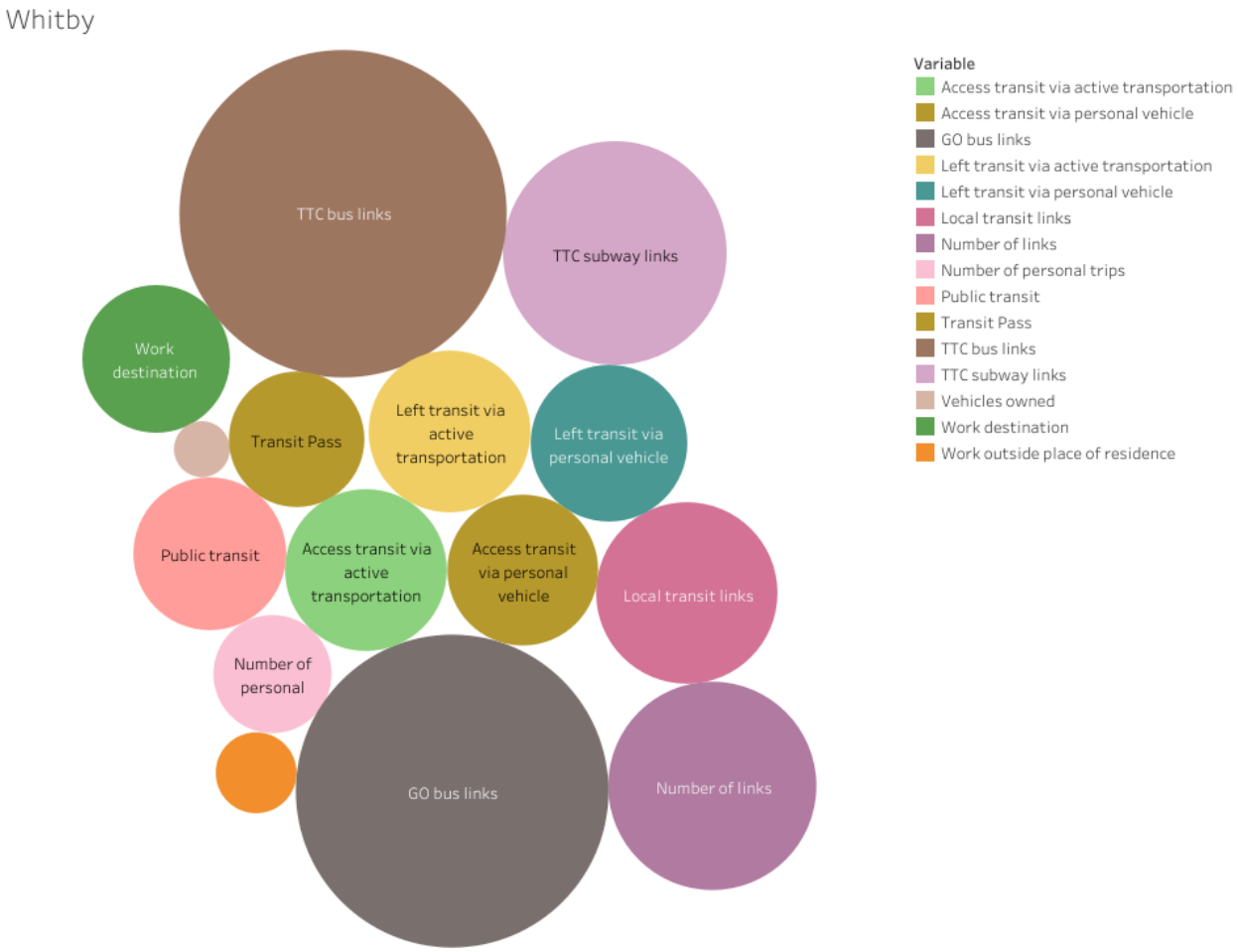

Figure 29. Stacked bubble chart for Whitby GO. The size of the bubble corresponds to the effect the variable has on the amount of transit trips. (figure by William Overholt)

As with the previous three case studies, the methodology for the regression analysis has stayed the same; this can be found in sections 1.4 and 3.1.3. Whitby had the second least number of significant variables, but still a substantial amount more than Milton. Of the 115 variables that were tested, 46 were significant, making a 40% significance rate. The first group of variables are related to households, including the number of vehicles and the presence of a transit pass.

Similar to the above case studies, the number of vehicles that a household owns has the largest average decrease in transit usage. The average factor in transit usage is ~0.3, meaning that for every one increase in vehicles owned, it will result in a decrease in transit usage by a factor of 0.3. While this value slightly increases over time, it is very little and stays as the most negative variable. The second household variable is the presence of a transit pass, which does increase transit usage but only slightly, and stays consistent throughout the study period. The absence of a transit pass was not a significant variable, diminishing the usefulness of the presence of a transit pass variable as it cannot be compared to anything.

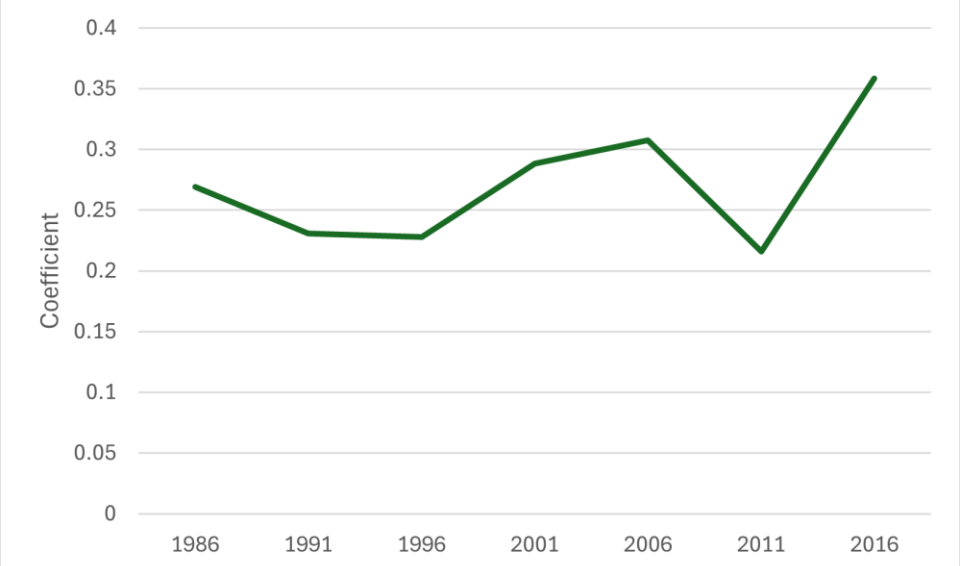

Figure 30. Coefficient of number of trips made over time for Whitby. (figure by William Overholt)

The second group of variables relate to trip characteristics, including the mode of transportation for a trip, the number of trips made by a person, and the location of work. To be expected, people who use public transportation for a trip will have a positive impact on transit usage; the actual value of this stayed consistent at an average factor of ~2.2. The mode of transportation used to access public transit is interesting, with active transportation having an average increase in transit usage by a factor of ~2.45; auto-related transportation modes used to access public transportation had an average factor of ~2.14. While both do complement public

transportation, those who use active transportation in combination with public transit result in a larger increase in transit usage. The number of trips made by a person does increase the amount of transit usage, but not by very much. On average it increases transit usage by a factor of ~1.3, with a very slight increase over the study period (see Figure 30). While the exact reason for this being low is undeterminable, it could be due to a lack of transit options in Whitby. If someone is taking multiple trips in a day, there is a high chance that most of the trips are non-essential. For non-essential trips, there is less of an incentive to take transit as there is not as much pressure to take the trip at busy times. Working outside of the municipality has been a consistent negative variable for each case study; this is no different for Whitby. While working outside of Whitby does hurt transit usage, it is not, on average, the most negative variable; in 1991 the actual value of the factor was ~0.45, but throughout the study period there has been a significant rise in that value. As seen in Figure 31, there is a yearly increase of 0.02 over 20 years. This could be attributed to the increase in commuter transit usage in the Whitby GO station; only justifying the need to build a TOD.

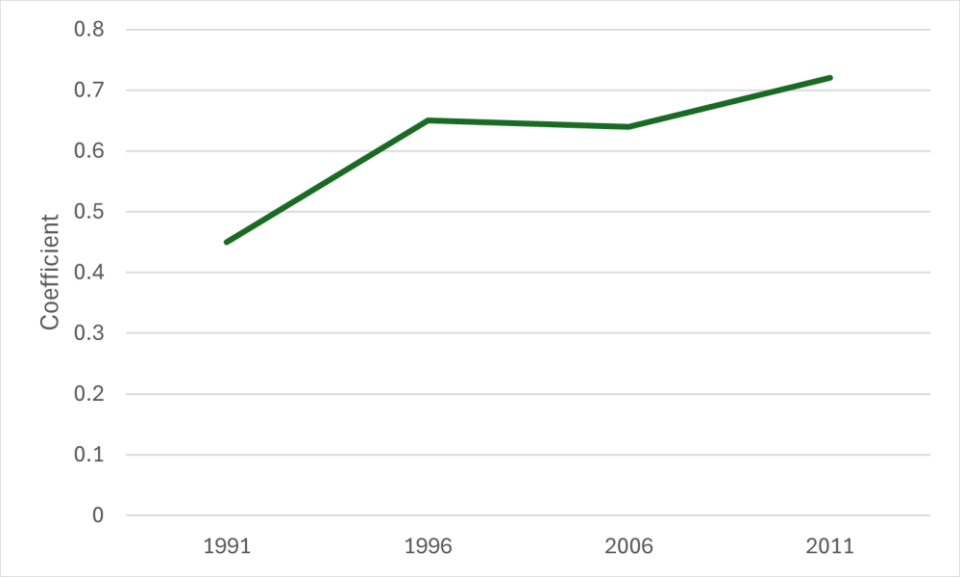

Figure 31. Coefficient of commuting via transit over time in Whitby. (figure by William Overholt)

The final group of variables looks at transit and consists of the number of transit links and what transportation mode those links used. The number of transit links taken does increase the amount of transit usage. On average, an increase in one transit link on a trip will result in an increase in transit usage by a factor of ~4. This value does not change much throughout the study period. For the mode of transportation, sadly the GO train was not significant, but from what was significant, we can see that the mode of transportation that had the greatest impact on transit usage was the TTC bus, at an average factor of ~10. This value also significantly increases over time. The potential reason for this is the same as Milton, which can be found in section 3.3.3. GO bus usage was very impactful on transit usage as well, with an average factor of ~9.2. Interestingly, GO bus usage had a significant increase of ~0.4 throughout the study period. This could be due to a strong demand for commuter transit that is not going to Downtown Toronto. TTC Subway's effect on transit usage has stayed consistently high, with an average factor of 5.5. The least impactful transit link mode was local transit, in this case, Durham Region Transit. This result is expected, as Whitby does not have an extensive transit system and very few rapid transit options.

3.4.4 Synthesis

Throughout the policy documents for the Town of Whitby, there has been a theme of more open-ended policies that allow for more interpretation. When compared to the other case studies, the policies on housing, density, and design are much less strict. While there are policy decisions that would be expected from any municipality within the GGH, Whitby does not go above and beyond. Many of the policies relating to housing, in particular affordability, are through the Region of Durham. It is clear from the policy decisions, especially regarding density and parking, that Whitby is much more conservative within the TOD landscape. While this

initially might seem to have been a negative, the amount of development within the MTSA is high. Considering the Port Whitby MTSA is targeted to be the least dense, it is impressive the amount of density that has been proposed by developers in the area. This might not be due to policy decisions, or lack thereof, but rather due to location and demand. Compared to Mount Pleasant, Milton, and Kitchener; Whitby is a paradise for commuters. Not only is it located on a desirable piece of land, the waterfront, but it also is situated on the second busiest GO line. This results in more service, and potentially better service. Whitby GO is also the second shortest time to get to Union, only eight minutes slower than Mount Pleasant GO, which is the fastest. The existing demand also plays a role in where developers are deciding to build. It might not be the work of the Town that can be attributed to the Port Whitby GO MTSA, but rather external factors.

From the development that is occurring, there is a clear emphasis on building many residential units. Whitby is creating a good commuter TOD, as the focus is on residential. There are few policies and developments that are for non-retail commercial as they know that Port Whitby will not become a major economic center any time soon and are building to its strengths. The only non-retail development that is allowed within the MTSA are uses such as hotels, which will be used for commuting anyway. While the majority of the new residential units are in high-density buildings, there are plans for some lower-density residential options. There should be more of this type of housing to be able to accommodate all household structures, but the policies are in place to have this type of development on the outskirts of the MTSA borders. It is only a matter of if the Town will not cave under the pressure of developers. Two of the seven development applications for the MTSA include public parks, which have been absent from most other MTSA. A key component of a TOD is to have the amenities that people need, which public

spaces are one of them. While Kitchener had public spaces as the MTSA was in its Downtown core with space already built up, Mount Pleasant and Milton have missed the opportunity to have more public space. Due to the existing demand for a commuter TOD within the Port Whitby area, Whitby merely needed to approve the development applications to get it built. It is evident from those policies that there was not nearly as much thought put into them compared to other municipalities. While this seems like it is a bad thing, it has worked out for Port Whitby. This does not mean what the other municipalities are doing is wrong, only that it will take longer to build as the demand was not already there.

Chapter 4: Discussion

This chapter is split into six sections and will bring the four case studies together, evaluating and extracting policy implications from them. These implications will be applied to the future Bolton GO station as well as high-level policy suggestions. The first section will evaluate the four case studies using the criteria outlined within Section 2.4. The next section will outline the Bolton GO station. This will include the policies already in place, regional context, and development in the area. Then I will create a high-level framework for commuter TODs, outlining what works and what does not work when compared to traditional TODs using the findings from above. I will then apply all these findings to the Bolton GO station. From the Bolton GO station, I will zoom out to give generic policy suggestions for municipalities and the province.

4.1 Evaluation of Case Studies

All four case studies found in Chapter 3 will be evaluated using the criteria from Section 2.4. First, the location will be evaluated on whether it is a utopian TOD; second, if it fits into a commuter TOD framework derived from Calthorpe's neighbourhood TOD; and lastly if it is aligned with the province's requirements for TODs. While succeeding in criteria one or three is optimal, criteria two is what each TOD should strive to be if the municipality wants to optimize the commuter nature of the stations.

4.1.1 Mount Pleasant GO

For the first criterion, Mount Pleasant GO is successful in most of the factors. The growth of the station area is transit-supportive; it is building the highest densities closest to the station and radiates outwards. Within walking distance of the station, there is housing throughout the

area, commercial found along Commuter Drive which provides retail employment opportunities, and civic infrastructure is well done. There is Mount Pleasant Public Village Public School, Mount Pleasant Library, childcare, a mosque and a non-denominational Christian Church. The mix of housing is adequate; with large mid- to high-density towers found directly south of the station. Further out medium-density apartments and low-density mixed-use buildings surround the northern section of the station. Townhouses and semi-detached homes buffer the area between the higher-density and the single-family homes. In terms of prices, while there is a variation due to the size of the units compared to full homes, there are not many affordable units. This will be a constant for each of the case studies, speaking to a larger issue of affordability that cannot be solved with TODs alone. The street network is very pedestrian friendly; with large sidewalks, plenty of safe crosswalks, and small blocks and cut-throughs to prioritize active transportation. Where Mount Pleasant station falters are in its open space. While there are public spaces, the parks and natural heritage are minimal. Instead of natural areas, Brampton opted for more public spaces which can be found in the large Mount Pleasant Village Square north of the station. While this area has not gone through intensification, that is acceptable as it was previously largely undeveloped. Mount Pleasant GO is successful in many avenues, but the lack of affordable housing that plagues Ontario is the greatest barrier to a truly utopian TOD.

Many of the factors in the first criteria are valuable when evaluating how good of a commuter TOD it is; with the main difference being the ratio of uses. Mount Pleasant GO does a particularly good job; with the majority of the land dedicated to housing. The second largest amount of land is for public space as seen in Mount Pleasant Village Square and the civic uses such as schools and libraries. The employment that exists there is minimal, consisting of everyday uses such as restaurants, convenience stores, and medical uses. The lack of grocery

stores is problematic, as the only way to currently access one is to drive or take the bus, which will discourage many people with high-volume grocery needs from using them. Parking within the neighbourhood largely consists of underground and street parking, the large parking lot for the GO station is not optimal. Much of this parking could be redeveloped, and what is needed should be located underground to make more efficient use of the land. However, due to the nature of a commuter station, there will be a need to keep some parking, but minimizing it should be Metrolinx's priority. Overall Mount Pleasant GO is a highly successful commuter TOD which is evident through the regression analysis which has the smallest adverse effect on transit for those working outside of Brampton.

Due to the leniency of the province's definition, Mount Pleasant GO does succeed in almost every metric. The planned density does meet the provincial minimum of 150 residents and jobs per hectare; and because the province does not specify how much employment is needed, the amount found here is not a problem. The province does encourage office employment uses which is not found in Mount Pleasant but is also not needed there. There is access to open space and parks, and despite not being a naturalized area, the TOD still succeeds. There are some food options, many of which are somewhat local to the GGH, but not healthy. There is a fast-food restaurant, a sushi restaurant, and a bubble tea cafe. Nevertheless, there is a lack of grocery stores, and no community garden within 800 meters of the station; the options for local food, both pre-made and not are very limited. Mount Pleasant GO does succeed in most criteria for a provincial TOD, but the province does not set the bar very high.

4.1.2 Kitchener GO

Kitchener GO is in an odd position; while it is largely a commuter rail station, Kitchener is also a growing municipality and economic center, with many technology employment

opportunities. Kitchener GO does not need to follow the same criteria for a commuter TOD, but rather something in between that of a traditional TOD and a neighbourhood TOD. For the first criterion, Kitchener GO is somewhat successful; the growth is transit-supportive but more for the ION LRT. The highest densities are not placed around the GO station but the LRT stations, which are still within the catchment area of the GO station. All major uses are in this area, and civic infrastructure is very present. Kitchener City Hall, community center, multiple schools and churches are all within the Kitchener GO area. There is an adequate amount of mixed density; the north of the station is largely single-detached with two medium-density apartments, and in the south, it is almost exclusively high-density towers. There is at least one development that will contain affordable units, but as with most locations in Ontario, this is not enough. The street network consists of small enough bocks and large sidewalks, but many of the streets are very high traffic that often feel unsafe to walk through around the GO station. The environment is very pedestrian-friendly in the south of the station in the downtown core. There is almost no natural heritage preserved within the area; while that is expected in a downtown core, the lack of green space is disappointing. There are some public spaces, many of which are plazas surrounding high-density towers. There are few parks in the downtown core but a couple east of the station. Due to this area already being built up, there has been a significant amount of intensification taking place. Not explicitly in the criteria is parking, but Downtown Kitchener has a lot of surface parking lots that are ripe for redevelopment to increase the housing density or for the creation of new parks and open spaces.

Kitchener does not succeed in the second criterion, but unlike the other three case studies, that is not an issue. There is a substantial amount of housing, but there is also a lot of employment such as the Google Canada Office west of the station. There is plenty of retail

within the area, ranging from restaurants to specialty stores that do provide some employment, but more importantly, improve the livability of the area. The increased amount of employment is a non-issue, the amount of open space is lower than what is required for a commuter or utopian TOD. The amount of parking for the GO station specifically is minimal, much of the land south is being used by rarely full surface lots. Now that the ION LRT is servicing the GO station and downtown, all the surface parking should be removed, and only underground parking should be permitted. Overall Kitchener GO fails this criterion, but the circumstances of the area do not make that a negative.

Kitchener is not successful for a provincial TOD, hitting all but one of the major factors. There is a mix of uses and housing types, with plenty of employment opportunities. It is connected to multiple modes of transportation, and the downtown core itself is walkable enough to facilitate active transportation, with multiple proposed separate bike lanes. The civic infrastructure is mediocre, with a lack of schools and non-Christian places of worship in the area. There are some open spaces and parks, but not nearly enough for the number of residents that are being planned for the area. There are plenty of food options, but a lack of grocery stores in the area. Most of the food options are fast food or sit-down restaurants which are not economically accessible for everyone. Overall Kitchener succeeds in land use and transportation but is lacking in its services that increase livability.

4.1.3 Milton GO

For the first criterion, Milton GO is unsuccessful in most of the metrics. Milton has prioritized density over everything else, and while the development that is currently taking place is transit-supportive in terms of use, the nuances within the development display that use is not the only thing that makes a TOD. There is a mix of uses, with some of the large towers having

ground-floor retail; but there is not a mix of housing types or prices. All the active developments are mid- to high-rise buildings, with most of them being luxury condominiums. The street network that exists is not pedestrian-friendly, but there are policies in place to minimize block lengths and increase walkability. Encouraging development on the other side of the rail corridor before creating the infrastructure to allow a convenient pedestrian connection is a major misstep.

There is plenty of open space and parks on the northeast side of Thompson Rd S, but currently, it is difficult for pedestrians to cross. There are no new parks within the TOD lands, and the only planned public space is a POPS in one of the developments. The only metric that Milton truly exceeds in is intensification, but not all intensification is for the betterment of the community.

Milton is very much a commuter TOD as seen from the regression analysis (see Section 3.3.3), but from the proposed development and policies, there is an emphasis on office employment. If the policies align with development, there would be much more than 10 percent employment and much less than 15% public space. Currently, there are no plans to redevelop the large commuter parking lot around the GO station, which is just under 44,000 square meters of parking. This is Metrolinx land, so there would be barriers to redevelopment. But the large commercial plaza north of the station also has no current plans for redevelopment despite being the largest section of land and the closest. The lack of connectivity across the rail corridor will force residents to drive. Despite having a high population of commuters, Milton has failed the second criterion, and the policies do not point to that changing.

Similar to the first criterion, Milton fails by the provincial metrics for a TOD. While Milton is planning for a mix of uses, there is not a mix of housing types; this decreases the livability of the area. Milton is building for a specific family structure, those that can afford

luxury condominiums that are okay living in smaller apartments. Milton does have access to multiple modes of transportation, with the GO line and local transit being accessible. The northern side of the rail corridor is planned to be walkable with policies ensuring cut-throughs and small block lengths, but the south side is currently going to be completely cut off from the station for non-auto users. The civic infrastructure is lacking, with no public schools within the area. There is a sports complex and recreation center, and there are churches on the southern side. Where Milton excels is in its food options; with one major grocery retailer, and multiple local grocery stores, the TOD is well situated to be successful in this metric. Overall, Milton does not meet many of the province's metrics and is developing into a poorly planned TOD that does not consider community context at all.

4.1.4 Whitby GO

Despite having the lowest required density and least strict policies, Whitby GO is successful for the first criterion. The growth around the GO station is largely transit-supportive, with no auto-oriented uses. There is not a focus on density closest to the GO station, but rather an inconsistent development pattern that will create a variation in heights which clearly shows the development industry is in charge of this community. Houses and retail are all within walking distance; office space is not permitted except in the area west of the station, allowing most of the land to be for mixed-use residential. There is a lack of schools, and nothing is currently planned, but they will be needed when the population rises; there is one place of worship; and a large community center and sports complex. Beyond this, there is the main hospital in Whitby located just outside of the catchment area of the GO station. While lacking in schools and places of worship, the most expensive civic infrastructure buildings are already present. The housing mix is adequate, with plenty of lower-density housing options as well as high-density; as with the

other case studies, affordable housing is lacking. Due to the nature of Whitby having less strict policies, the street network might suffer. The current network is not pedestrian-friendly and only a few new roads are being proposed, leaving much of it up to the developers which might create a very disconnected community. There is a large multi-use path at the southern end that could be continued north. Where Whitby truly excels is in its preservation of natural space, with the TOD being in the Whitby Shores area, on the northern shore of Lake Ontario. Much of this land is not changing and already hosts existing parks and public spaces. Considering the current land is predominantly single-detached housing, the area is going to go through a lot of intensification. Overall Whitby is set to be a highly successful utopian TOD.

For the second criterion, Whitby has done a good job of balancing both employment and housing. The final TOD should be close to the 75/15/10 criteria, with one small section of major employment that is in an undesirable location. The employment is meant to be unique trip generators such as hotels and conference centers. These business types will allow for some employment but also many non-residents using the GO train and increasing demand for daily needs such as coffee shops and restaurants that fit well in a commuter TOD. There is currently minimal parking being planned for the active developments despite Whitby's parking policies not being good enough for a commuter TOD. The amount of parking for Whitby GO is the largest of any of the case studies; with 55,000 square meters of surface lots and one four-storey parkade. From the regression analysis (see Section 3.4.3), Whitby is primarily a commuter community, but the Municipality should be working with Metrolinx to redevelop most of this parking. There is not much public space being planned, but the existing is already enough for to satisfy the criteria. Overall, Whitby is planned to be a very good commuter TOD, and if most of the existing surface parking was removed, it would be the gold standard.

Lastly, Whitby is successful in the view of the province. The mix of uses is the best of the four case studies, and the mix of housing types is adequate. There could be lower-density residential such as townhouses, but what is planned will still provide a diverse mix of dwellings. There are some proposed affordable units; not enough but that speaks to the larger issue of affordability. The mix of uses and housing does provide a livable community, however, there is a lack of multimodal transportation options that will lower livability. Active transportation and GO transit are somewhat planned for, but there is no local bus route that runs south of Victoria St W, nor is there one planned to. The civic infrastructure that exists is very high quality, and what would be needed for the community is the least onerous to build. Whitby has the highest quality and amount of open space of the four case studies, with the TOD on the waterfront. Just outside of the catchment area is a large grocery store and there are a couple of restaurants within the area. Other than those, there are no food options for the area, making this by far the weakest metric for Whitby. Overall, Whitby is successful for the third criterion, and because most of the development has yet to be built, there is a chance to remedy the final metric.

4.2 Bolton GO

Bolton is the largest community within the Town of Caledon. Caledon is a small rural town within the Region of Peel, north of Brampton. As of 2021, the population of Caledon was 76,581; a 15 percent increase from 2016. While Caledon is home to ten communities, Bolton alone accounts for 35 percent of the population. The planned GO station in Bolton is located in the north end of the community, on Humber Station Rd north of King St. The current use of the land is dry industrial, with a rail corridor already existing. The station is proposed to be on the new Bolton GO line, which would run from Union, through the community of Woodbridge, and terminate at the proposed Bolton GO station. While initially proposed in 2007 and featured in

Metrolinx's *The Big Move* plan as a 15-year action, it was subsequently downgraded to a 25-year action in 2013 (Metrolinx, 2008, 2010). Metrolinx did this after the findings from the feasibility study concluded that the ridership forecast was too low for the 2031 date. As of the date that this feasibility study was reviewed, the population forecast for Caledon was completely different. The Region of Peels OP estimates that Caledon is expected to grow to 300,000 residents and 125,000 jobs by 2051. The majority of this growth is planned to take place in Bolton.

As of March 19th, 2024, the Town passed their new OP, which is under review by the province. Within the new OP are updated policies that align better with the Growth Plan and are more conducive to building TODs. Most of the policies that would be used to guide the MTSA are not yet complete, as the Town is currently in the process of consolidating the older Bolton secondary plans; but many of the policies that are being developed come from recently completed MTSA study, as well as working with the developer who is building a master-planned community in the MTSA. A strong theme throughout the new OP is intensification, which aligns with the province's objectives. Policy 4.2.2 enforces that 5 percent of new residential development must be within the delineated built-up area, while policy 4.2.3 encourages intensification to occur in both redevelopments of lower-density uses and infill development (Town of Caledon, 2024, pp. 44–45). Where residential intensification occurs, employment intensification is encouraged, including the building of mixed-use development.

The housing policies within Caledon's new OP are robust and progressive. Policies that are found in most other GGH OP's are also found in Caledon, with one of the housing objectives being that the communities around higher-order transit stations are "efficient, walkable and transit-oriented" (Town of Caledon, 2024, p. 95). Where Caledon is innovative is in its housing types. Policy 9.2.6 requires 50 percent of all new residential units to be a housing form other than

single- and semi-detached homes (Town of Caledon, 2024, p. 96). This policy alone is much more progressive than the housing policies of the case studies, but Caledon expands this policy to include apartments as well, requiring 50 percent of new residential apartments to be a mix of two- and three-bedroom units (Town of Caledon, 2024, p. 97). For rental housing, there is a goal that 25 percent of all new housing development be purpose-built rentals; of this housing, 30 percent of all new housing development must of affordable (Town of Caledon, 2024, pp. 97, 101). Where most municipalities will discourage the conversion of rental housing to condominiums, Caledon does not permit it (Town of Caledon, 2024, p. 98). There are caveats to this policy, allowing this conversion only if the same number, size, affordability, and type of units are replaced, and there is a tenant relocation and assistance plan in place. Lastly, a policy that has not been addressed within any of the above municipalities is single-room occupancy housing. The City of Toronto is only now finalizing its bylaw for single-room occupancy housing, while policy 9.10.3 in Caledon's new OP allows for single-room occupancy housing in all residential designations. This includes new buildings built for this purpose, or the addition to existing buildings (Town of Caledon, 2024, p. 104). Within the Future Caledon Official Plan are the most progressive housing policies that have been reviewed in this paper.

The *Town of Caledon Major Transit Areas Study* is not a policy document, it does have recommendations for policies, and the Town of Caledon will be using this document to inform their policy decisions. Many of the recommendations are standard for an MTSA, including a higher-density mixed-use community that combines multiple non-personal vehicle modes of transportation. A key focus of the recommendations is creating a space that is a destination; this includes amenities such as "entertainment, leisure and civic activities… a variety of experiences, niche market retail, arts, entertainment and restaurant uses" (Meridian Planning Consultants,

2024, p. 31). While compatible with commuter TODs, it is a feature that should be in all TODs, one that has not been in any of the case studies. Within the recommendations are the inclusion of permitting office developments. It is not a negative to include these as being permitted, for the Bolton MTSA to build to its strengths, there should not be any emphasis on office-related commercial space. Commercial space should be for amenities and daily needs; there is an emphasis on encouraging small businesses which will help build the community into a unique place. The parking recommendations within this study should not be adopted; they are not strict enough. The recommendation is to require 80 percent of required parking must be underground or within above-ground structures (Meridian Planning Consultants, 2024, p. 32). There should not be surface parking within this area, and allowing even 20 percent of the parking to be surface could result in large surface lots. This recommendation also hinges on parking minimums being allowed within an MTSA area, which should not be the case. Regardless of parking minimums, no surface lots should be allowed within the MTSA. The planned density for the MTSA is 150 residents and jobs per hectare, which is standard for commuter MTSA (Meridian Planning Consultants, 2024, p. 32). The minimum height is four storeys and the maximum is 20 storeys (Meridian Planning Consultants, 2024, p. 32). The minimum height will be very conducive for missing middle housing options while ensuring the density is not too low, but the maximum should be higher than 20 storeys within the densest center of the MTSA. Not all the recommendations within the study should be adopted, but the majority of them should be and will create a very good commuter TOD.

The development within the Bolton GO MTSA is a master planned community called the Caledon Station. The development is planned to have 10,000 residents and 2,600 jobs by 2031. Directly west of the station is the densest area, with mostly high-density mixed-use along a

walkable corridor that runs parallel to the rail corridor. Radiating outwards are larger medium-density buildings, then a mixture of laneway townhouses, back-to-back townhouses, and standard townhouses. Outside of the MTSA lands, but within the community are a mixture of single detached and townhomes. In total, there will be 6,871 residential units created. Running perpendicular to the station is a boulevard that contains a large park lined with medium-density apartments on the corners. There is a small section south of the station that is primarily commercial, with options for mixed-use, where office employment would be housed. The Bolton MTSA is not going to be the densest TOD, but it is being planned to have all the amenities of a traditional TOD while still emphasizing the key factors of a commuter TOD. The housing within the MTSA does have an adequate mix of housing, with large buildings, stepping down into medium-density housing, and then several types of townhouses. The area will be walkable, as it aligns with the Town of Caledon's newly passed Active Transportation Master Plan. While there is currently no public transit within Caledon, hopefully with the increase in population and density it will be developed to better serve the MTSA.

4.3 What Can Be Applied from the Case Studies to Bolton GO?

The future Bolton GO station needs to be built with the local context being considered. The existing and future community will consist of mainly commuters, as even with the substantial population growth, the area will still not be a large economic center. Ignoring the community context and using generic TOD principles results in a community that does not take advantage of the transit, a TAD. This is what is happening in the Milton MTSA, where development is being placed around the GO station with little thought to how it will interact with the transit. Three principles can be derived from the case studies and applied to Bolton: employment amount and type; types of density; and community space.

The most important differentiating factor between an urban TOD and a commuter TOD is the employment, both the type and the amount. From the second criterion, there should be no more than 10 percent of the land within 800 meters of the TOD dedicated to employment. This employment includes all types of employment such as retail and office space as long as the retail is compatible with the community. This is due to the variation in employment types and the understanding that not all TODs are economic centers, and they should not be planned to be. While out of the scope of the paper to measure the exact proportions of land uses, it is easiest to estimate and make sure that employment is the smallest land use. For Bolton GO, there should be no blocks dedicated to exclusively employment; mixed-use employment and residential should be the main form of employment within the TOD. Not only is Bolton already on the periphery of the major economic center of Ontario, but the location of the station is on the periphery of Bolton's economic centre. To ensure that this area is not prioritizing the transformation into an economic centre, the type of employment must be monitored. Large office uses that are associated with downtowns are not compatible with a commuter TOD and should not be in the Bolton GO lands. The policy direction used by Whitby is the most appropriate for a commuter GO station; uses such as conference centers and hotels would provide locations that are not needed to be within an economic center but still benefit from being within a TOD. These types of uses would drive up demand for retail commercial uses and help shape the area into a unique space.

The second principle that should be applied to Bolton GO is understanding the types of density. Within policy documents from all levels of government, density and intensification are heavily included; but it is not good to allow any amount of density in every location. This is the mistake that is clear within Milton, where a region of primarily existing low density is now home

to a neighbourhood of buildings forty times their height. Not only does this create a less visually appealing neighbourhood, but it does not provide housing options for all household structures. This does not mean that the alternative is single-detached housing, but rather that there should be options such as townhouses at the low-density end, and a gradual increase in density towards to center. Filling in this section between the low- and high-density should be low- to medium-density apartments of varying prices and sizes. Not every household can fit into a three-bedroom condominium. Mount Pleasant GO has done a good job of this, with some larger towers close to the station, medium-density apartments of six storeys, then townhomes radiating outwards. Much of this can be regulated through land-use designations and zoning, but this does not stop developers to come in and ask for amendments. There need to be requirements for the proper densities within policy, but Caledon also needs to work with developers when the inevitable amendment applications start to flow.

The final principle that should be applied to the Bolton GO TOD is the need for adequate open and public space. The principle is twofold: it is about the preservation of the natural heritage and the creation of high-quality open space that is public. Both can and should exist within the same space; naturalized areas should also be public spaces. Without preserving the natural space, a community resembles that of Milton GO and Kitchener GO, with large spaces of concrete filled in with towers, which are not livable areas (Parker & Simpson, 2018). While preserving natural space can be difficult for intensification within urban areas, for the Bolton GO area, this challenge is nonexistent. Public spaces are a crucial pillar of all TODs, and this does not change in the Bolton context. Without places for the community to use, these locations become developed around transit, not a community that is integrated into the transit. As outlined above, these amenities can be integrated into the natural environment, like Port Whitby; or they

can be integrated into other civic infrastructure, like Mount Pleasant Village Square and the library. Ensuring these spaces are high-quality and unique will help in Caledon's goal of making the MTSA a unique place. The creation of these public spaces also increases their resiliency, as we have seen during the COVID-19 pandemic, when residents relied on these spaces (W. Li et al., 2024). Public spaces are often left to the developer to create in partnership with the municipality, but Caledon should not make that same mistake; they should take the initiative to ensure these spaces exist with concrete policies and requirements.

By following the three principles outlined above, Caledon Station would be able to leverage its location to allow for a livable community where commuters of all households could reside. The competing interests of developers and Caledon need to be recognized and the Town should do everything within its power to work through the issues with the residents, and commuters who would want to live there, best interests in mind.

4.4 Provincial Policy Recommendations

The Government of Ontario's priority on building complete communities and TODs works for municipalities such as Toronto, which have the luxury of a rapid transit system, but for all other municipalities that do not have the luxury, these complete communities do not work. The province has gone with a catch-all attempt to implement TODs, but this is not the method they should be using. Two major changes should be made to the province's requirements for TODs: specificity and context.

The province should be more specific in their requirements for a TOD. As it stands, the metrics are vague with the only concrete metric being a minimum density of 150 residents and jobs per hectare. Based on the criteria used in Section 4.1, more emphasis, with specific metrics, should be placed on public space and community cohesion. Communities should not be a

patchwork of competing towers as this only hurts the public amenities. There should be policies that require the municipality to complete more upfront planning of the open space and public amenities. I acknowledge that it can be difficult to acquire the funds required to implement these amenities, but the plans for them must be in place before development applications start passing. The staff who review these applications must know about the amenities and open space of the area when reviewing the application.

The second change that the province should make to their policies on TODs is to consider the community context. A TOD that is built around a TTC subway station in the economic centre of Ontario should look vastly different than one around a commuter rail station in a town of 100,000 residents. At a minimum, there should be less emphasis on providing employment opportunities such as office spaces for these commuter TODs. There should also be a higher emphasis on civic infrastructure and public space specifically for the commuter TODs. The commercial that is required for these areas should be specific to the area and should complement and enhance both the livability and walkability of the area. All parking in the TOD should be minimized, but for commuter TODs, there is still a need for some. The parking should be realistic and done efficiently. Municipalities should be prohibited from allowing and encouraging any surface or above-grade parking surrounding the station. Parking is going to be necessary for some of the stations that do not have adequate transportation options, but these should be below grade. Street parking, which is typically allowed within these municipalities, should be limited to local streets so long as it does not impede active transportation corridors (e.g., bike lanes). Providing specificity and adjusting metrics to fit the context of the community and transit options will create better, more efficient, TODs in Ontario.

4.5 Conclusion

This major paper addresses how the current TODs that are being built within the GGH align with commuter TOD practices. From the literature, an evaluation criteria was developed consisting of three main criteria: does the TOD align with a utopian TOD as informed by Calthorpe; is the TOD being planned to be a commuter TOD; and is the TOD following the provincial mandates for MTSAs. Four sites were chosen as case studies to complete this evaluation where a policy analysis, development review, and regression analysis using TTS data were used. The policy analysis and development review were similar for each site, the regression analysis varied in their usefulness due to the number of significant variables. For all the sites, affordable housing was the most difficult to achieve. While some sites might be considered a success, there is still a lack of affordable housing. This is due to a larger issue that is not exclusive to these sites. Not all the criteria are weighted equally; hitting the provincial mandates is least valued due to their looseness, being a utopian TOD is in the middle, and being a commuter TOD is the most valuable in this analysis.

Mount Pleasant GO station in Brampton was successful in all three criteria, but specifically as a commuter TOD. There has been a focus on residential and public space, with an adequate mix of densities and uses. Kitchener GO station is a different case, as it is the only site that does have the potential to be an economic centre, but also a commuter TOD. It is largely unsuccessful in all three criteria due to one major factor: a lack of public space. Many surface lots and large towers are being built to support both the GO station and the ION LRT, but there are few public spaces and little plans for new ones. The Milton GO station is also unsuccessful in all three criteria. The policies in place are not the reason for this, the active development is. There is too much parking, little planned public space, no emphasis on housing over

employment, and connectivity across the rail corridor is poor. Lastly, the Whitby GO station is successful in all three criteria, despite having the least strict policies and lowest prescribed density. While Whitby GO is not perfect, the housing mix, employment and public space are well planned. Where Whitby is lacking is in connectivity, which is largely being left to the developer. Overall, Mount Pleasant GO is the most successful commuter TOD, while Milton GO is the least successful.

Policy recommendations both for the future Bolton GO station and for the province were made. For Caledon, there should be a focus on public space and housing, while not prioritizing employment-specific uses. Density should be considered in depth for Caledon Station, and there should not be the highest densities placed wherever; it should be thought out and ensure that it is compatible with the community. Two policy recommendations are made to the province. There should be more specific metrics on both public space and community cohesion. The development in each MTSA should be built as a community, not just dense development situated near a transit station. The second recommendation is to consider the community context; there should not be policies desiring employment lands in an MTSA like Milton. This is not just for commuter TODs, but considering the community context will allow for all types of TODs to be unique and benefit from the municipality they are in.

What was particularly surprising was how successful Whitby is as a commuter TOD. While most municipalities have extensive policies on many aspects of the community, Whitby had one of the least strict. Initially, I had speculated that this would lead to a disjointed collection of towers, but this is not the case. Port Whitby is being built with enough thought that it is creating a community. Whitby is not perfect, as there are clear issues with this area being primarily a developer-driven community. This is seen in the lack of connectivity, as it is left to

the developers to create these connections within the large blocks that they own. But what has started as the least dense community of the four, has turned into one of the densest, with the most development activity. This is due to the demand. There are a lot of commuters in Whitby, the GO station is one of the most used, and combining it with the public appeal of the harbourfront creates demand for housing in this area. Residents want these communities, and while the other locations must create the policies and drive development, it is the other way around for Whitby. This does not mean that having strict policies is a bad thing, however, demand is just as important, if not more, for creating these communities.

The clearest avenue for the future of this research is to check up on these locations once they have been built up. The data for these areas would be much better and the regression analysis would be much more robust. Comparing these sites to TODs in employment centers such as Toronto would allow for a better analysis of what factors work for both sites. The most interesting avenue would be to analyze the difference between developer and municipally led communities after what was discovered about Whitby GO. Understanding where each of these groups can best be utilized will be key to developing the best communities as quickly as possible.

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Appendix A: Regression Output

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Brampton	1986	dwell_type_Apartment	0.6931	1.9999	Not Significant	0.028
Brampton	1991	dwell_type_Apartment	0.8755	2.4001	Significant	0.002
Brampton	1996	dwell_type_Apartment	0.4055	1.5001	Not Significant	0.321
Brampton	2001	dwell_type_Apartment	0.6931	1.9999	Not Significant	0.028
Brampton	2006	dwell_type_Apartment	0.9163	2.5000	Significant	0
Brampton	2011	dwell_type_Apartment	0.9163	2.5000	Significant	0
Brampton	2016	dwell_type_Apartment	0.9163	2.5000	Significant	0
Brampton	1986	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Brampton	1991	dwell_type_House	0.9163	2.5000	Significant	0
Brampton	1996	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Brampton	2001	dwell_type_House	0.9163	2.5000	Significant	0
Brampton	2006	dwell_type_House	0.9163	2.5000	Significant	0
Brampton	2011	dwell_type_House	1.0986	3.0000	Significant	0
Brampton	2016	dwell_type_House	0.9163	2.5000	Significant	0
Brampton	1996	dwell_type_Townhouse	0.4055	1.5001	Not Significant	0.321
Brampton	2001	dwell_type_Townhouse	0.9808	2.6666	Significant	0
Brampton	2006	dwell_type_Townhouse	0.9808	2.6666	Significant	0
Brampton	2011	dwell_type_Townhouse	0.9163	2.5000	Significant	0
Brampton	2016	dwell_type_Townhouse	0.9163	2.5000	Significant	0
Brampton	1991	free_park_n	0.9163	2.5000	Significant	0
Brampton	1996	free_park_n	0.4055	1.5001	Not Significant	0.321
Brampton	2001	free_park_n	0.6931	1.9999	Not Significant	0.028
Brampton	2006	free_park_n	0.9163	2.5000	Significant	0
Brampton	2011	free_park_n	0.4055	1.5001	Not Significant	0.321
Brampton	2016	free_park_n	0.6931	1.9999	Not Significant	0.028
Brampton	1991	free_park_y	0.6931	1.9999	Not Significant	0.028

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Brampton	1996	free_park_y	0.6931	1.9999	Not Significant	0.028
Brampton	2001	free_park_y	0.6931	1.9999	Not Significant	0.028
Brampton	2006	free_park_y	0.9808	2.6666	Significant	0
Brampton	2011	free_park_y	0.9808	2.6666	Significant	0
Brampton	2016	free_park_y	0.9163	2.5000	Significant	0
Brampton	1986	mode_accs_ACTIVE_TRANSPORT	0.9163	2.5000	Significant	0.004
Brampton	1991	mode_accs_ACTIVE_TRANSPORT	1.2528	3.5001	Significant	0
Brampton	2011	mode_accs_ACTIVE_TRANSPORT	1.1896	3.2858	Significant	0
Brampton	2016	mode_accs_ACTIVE_TRANSPORT	0.9651	2.6251	Significant	0
Brampton	1986	mode_accs_AUTO_RELATED	0.8267	2.2858	Significant	0.001
Brampton	1991	mode_accs_AUTO_RELATED	0.8109	2.2499	Significant	0.015
Brampton	2011	mode_accs_AUTO_RELATED	0.7621	2.1428	Significant	0.003
Brampton	2016	mode_accs_AUTO_RELATED	0.8210	2.2728	Significant	0
Brampton	1986	mode_egrs_ACTIVE_TRANSPORT	0.9163	2.5000	Significant	0.004
Brampton	1991	mode_egrs_ACTIVE_TRANSPORT	1.2528	3.5001	Significant	0
Brampton	2011	mode_egrs_ACTIVE_TRANSPORT	1.1896	3.2858	Significant	0
Brampton	2016	mode_egrs_ACTIVE_TRANSPORT	0.9651	2.6251	Significant	0
Brampton	1986	mode_egrs_AUTO_RELATED	0.6061	1.8333	Not Significant	0.044
Brampton	1991	mode_egrs_AUTO_RELATED	0.6931	1.9999	Significant	0.016
Brampton	2011	mode_egrs_AUTO_RELATED	0.7621	2.1428	Significant	0.003
Brampton	2016	mode_egrs_AUTO_RELATED	0.6931	1.9999	Significant	0.006
Brampton	2011	mode_prime_ACTIVE_TRAVEL	0.8109	2.2499	Significant	0.001
Brampton	2016	mode_prime_ACTIVE_TRAVEL	0.4855	1.6250	Not Significant	0.08
Brampton	1986	mode_prime_PRIVATE_VEHICLE	0.3795	1.4616	Not Significant	0.098
Brampton	1991	mode_prime_PRIVATE_VEHICLE	0.2877	1.3334	Not Significant	0.25
Brampton	2011	mode_prime_PRIVATE_VEHICLE	0.6242	1.8668	Significant	0.001
Brampton	2016	mode_prime_PRIVATE_VEHICLE	0.5878	1.8000	Significant	0
Brampton	1986	mode_prime_PUBLIC_TRANSPORTATION	0.9163	2.5000	Significant	0

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Brampton	1991	mode_prime_PUBLIC_TRANSPORTATION	1.0361	2.8182	Significant	0
Brampton	2011	mode_prime_PUBLIC_TRANSPORTATION	1.0460	2.8462	Significant	0
Brampton	2016	mode_prime_PUBLIC_TRANSPORTATION	0.9904	2.6923	Significant	0
Brampton	1986	n_go_bus	2.4214	11.2616	Significant	0
Brampton	1991	n_go_bus	1.5230	4.5860	Significant	0
Brampton	2011	n_go_bus	1.7609	5.8177	Significant	0
Brampton	2016	n_go_bus	1.8758	6.5260	Significant	0
Brampton	1986	n_go_rail	1.5116	4.5340	Significant	0.001
Brampton	1991	n_go_rail	0.1772	1.1939	Not Significant	0.685
Brampton	2011	n_go_rail	0.8872	2.4283	Significant	0.007
Brampton	2016	n_go_rail	2.0408	7.6968	Significant	0
Brampton	1986	n_local	0.8295	2.2922	Significant	0
Brampton	1991	n_local	0.5697	1.7677	Significant	0
Brampton	2011	n_local	0.7347	2.0849	Significant	0
Brampton	2016	n_local	0.9012	2.4626	Significant	0
Brampton	1986	n_pers_trip	0.3420	1.4078	Significant	0
Brampton	1991	n_pers_trip	0.2956	1.3439	Significant	0
Brampton	1996	n_pers_trip	0.2979	1.3470	Significant	0
Brampton	2001	n_pers_trip	0.3318	1.3935	Significant	0
Brampton	2006	n_pers_trip	0.3239	1.3825	Significant	0
Brampton	2011	n_pers_trip	0.3656	1.4414	Significant	0
Brampton	2016	n_pers_trip	0.4634	1.5895	Significant	0
Brampton	2011	n_route	0.7036	2.0210	Significant	0
Brampton	2016	n_route	0.8952	2.4478	Significant	0
Brampton	1986	n_subway	1.5877	4.8925	Significant	0
Brampton	1991	n_subway	1.0796	2.9435	Significant	0.002
Brampton	2011	n_subway	1.0947	2.9883	Significant	0
Brampton	2016	n_subway	1.3910	4.0189	Significant	0

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Brampton	1986	n_ttc_bus	2.4018	11.0430	Significant	0
Brampton	1991	n_ttc_bus	1.5979	4.9426	Significant	0
Brampton	2011	n_ttc_bus	1.7492	5.7500	Significant	0
Brampton	2016	n_ttc_bus	1.7871	5.9721	Significant	0
Brampton	1986	n_vehicle	-0.0033	0.9967	Not Significant	0.983
Brampton	1991	n_vehicle	-0.0427	0.9582	Not Significant	0.809
Brampton	1996	n_vehicle	0.0157	1.0158	Not Significant	0.93
Brampton	2001	n_vehicle	-0.3495	0.7050	Not Significant	0.031
Brampton	2006	n_vehicle	0.0886	1.0926	Not Significant	0.384
Brampton	2011	n_vehicle	0.0374	1.0381	Not Significant	0.204
Brampton	2016	n_vehicle	-0.4634	0.6291	Significant	0.004
Brampton	1991	pd_emp_35	0.4055	1.5001	Not Significant	0.321
Brampton	1996	pd_emp_35	0.6931	1.9999	Not Significant	0.028
Brampton	2001	pd_emp_35	0.6931	1.9999	Not Significant	0.028
Brampton	2006	pd_emp_35	0.9808	2.6666	Significant	0
Brampton	2011	pd_emp_35	0.9808	2.6666	Significant	0
Brampton	2016	pd_emp_35	0.9163	2.5000	Significant	0
Brampton	1991	pd_emp_COMBINED	-0.1201	0.8868	Not Significant	0.41
Brampton	1996	pd_emp_COMBINED	-0.3930	0.6750	Significant	0.004
Brampton	2001	pd_emp_COMBINED	-0.2107	0.8100	Not Significant	0.058
Brampton	2006	pd_emp_COMBINED	-0.1859	0.8304	Not Significant	0.073
Brampton	2011	pd_emp_COMBINED	-0.2816	0.7546	Significant	0.01
Brampton	2016	pd_emp_COMBINED	-0.2683	0.7647	Significant	0.01
Brampton	1986	purp_dest_H	0.6931	1.9999	Not Significant	0.028
Brampton	1991	purp_dest_H	1.0986	3.0000	Significant	0
Brampton	2011	purp_dest_H	1.0986	3.0000	Significant	0
Brampton	2016	purp_dest_H	0.9163	2.5000	Significant	0
Brampton	1986	purp_dest_WORK_RELATED	0.6931	1.9999	Significant	0.002

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Brampton	1991	purp_dest_WORK_RELATED	0.9555	2.6000	Significant	0
Brampton	2011	purp_dest_WORK_RELATED	0.9808	2.6666	Significant	0
Brampton	2016	purp_dest_WORK_RELATED	0.9163	2.5000	Significant	0
Brampton	1996	tran_pass	0.4700	1.6000	Significant	0.021
Brampton	2001	tran_pass	0.6650	1.9445	Significant	0
Brampton	2006	tran_pass	0.7655	2.1501	Significant	0
Brampton	2011	tran_pass	0.6665	1.9474	Significant	0
Brampton	2016	tran_pass	0.6650	1.9445	Significant	0
Kitchener	1996	dwell_type_Apartment	1.0986	3.0000	Significant	0
Kitchener	2006	dwell_type_Apartment	1.2528	3.5001	Significant	0
Kitchener	2011	dwell_type_Apartment	0.9808	2.6666	Significant	0
Kitchener	2016	dwell_type_Apartment	0.9163	2.5000	Significant	0
Kitchener	1996	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Kitchener	2006	dwell_type_House	0.9163	2.5000	Significant	0
Kitchener	2011	dwell_type_House	0.9808	2.6666	Significant	0
Kitchener	2016	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Kitchener	1996	dwell_type_Townhouse	0.6931	1.9999	Not Significant	0.028
Kitchener	2006	dwell_type_Townhouse	0.6931	1.9999	Not Significant	0.028
Kitchener	2011	dwell_type_Townhouse	0.6931	1.9999	Not Significant	0.028
Kitchener	2016	dwell_type_Townhouse	0.6931	1.9999	Not Significant	0.028
Kitchener	1996	free_park_n	0.4055	1.5001	Not Significant	0.321
Kitchener	2006	free_park_n	0.6931	1.9999	Not Significant	0.028
Kitchener	2011	free_park_n	0.6931	1.9999	Not Significant	0.028
Kitchener	2016	free_park_n	0.4055	1.5001	Not Significant	0.321
Kitchener	1996	free_park_y	0.9163	2.5000	Significant	0
Kitchener	2006	free_park_y	1.3122	3.7143	Significant	0
Kitchener	2011	free_park_y	0.6931	1.9999	Not Significant	0.028
Kitchener	2016	free_park_y	0.9163	2.5000	Significant	0

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Kitchener	2011	mode_accs_ACTIVE_TRANSPORT	1.1632	3.2002	Significant	0
Kitchener	2016	mode_accs_ACTIVE_TRANSPORT	0.9445	2.5715	Significant	0
Kitchener	2011	mode_accs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.05
Kitchener	2016	mode_accs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.05
Kitchener	2011	mode_egrs_ACTIVE_TRANSPORT	1.1632	3.2002	Significant	0
Kitchener	2016	mode_egrs_ACTIVE_TRANSPORT	0.9445	2.5715	Significant	0
Kitchener	2011	mode_egrs_AUTO_RELATED	0.8109	2.2499	Significant	0.015
Kitchener	2016	mode_egrs_AUTO_RELATED	0.5596	1.7500	Not Significant	0.139
Kitchener	2011	mode_prime_ACTIVE_TRAVEL	0.9163	2.5000	Significant	0
Kitchener	2016	mode_prime_ACTIVE_TRAVEL	0.6931	1.9999	Significant	0.003
Kitchener	2011	mode_prime_PRIVATE_VEHICLE	0.3795	1.4616	Not Significant	0.098
Kitchener	2016	mode_prime_PRIVATE_VEHICLE	0.4855	1.6250	Significant	0.013
Kitchener	2011	mode_prime_PUBLIC_TRANSPORTATION	1.0561	2.8751	Significant	0
Kitchener	2016	mode_prime_PUBLIC_TRANSPORTATION	0.9383	2.5556	Significant	0
Kitchener	2011	n_go_bus	4.4497	85.6013	Significant	0
Kitchener	2016	n_go_bus	2.7212	15.1985	Significant	0
Kitchener	2011	n_go_rail	3.1229	22.7121	Significant	0
Kitchener	2016	n_go_rail	3.1982	24.4884	Significant	0
Kitchener	2011	n_local	0.7339	2.0832	Significant	0.001
Kitchener	2016	n_local	1.2637	3.5385	Significant	0
Kitchener	1996	n_pers_trip	0.2050	1.2275	Significant	0
Kitchener	2006	n_pers_trip	0.3312	1.3926	Significant	0
Kitchener	2011	n_pers_trip	0.3381	1.4023	Significant	0
Kitchener	2016	n_pers_trip	0.3777	1.4589	Significant	0
Kitchener	2011	n_route	1.3136	3.7195	Significant	0
Kitchener	2016	n_route	1.5640	4.7779	Significant	0
Kitchener	2011	n_subway	3.0494	21.1027	Significant	0
Kitchener	2016	n_subway	2.0232	7.5625	Significant	0

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Kitchener	2011	n_ttc_bus	3.2102	24.7840	Significant	0
Kitchener	1996	n_vehicle	-0.6592	0.5173	Significant	0
Kitchener	2006	n_vehicle	-0.9960	0.3694	Significant	0
Kitchener	2011	n_vehicle	-0.5628	0.5696	Significant	0.002
Kitchener	2016	n_vehicle	-0.2600	0.7711	Not Significant	0.127
Kitchener	1996	pd_emp_64	0.9163	2.5000	Significant	0
Kitchener	2006	pd_emp_64	1.3122	3.7143	Significant	0
Kitchener	2011	pd_emp_64	0.6931	1.9999	Not Significant	0.028
Kitchener	2016	pd_emp_64	0.9163	2.5000	Significant	0
Kitchener	1996	pd_emp_COMBINED	-1.0234	0.3594	Significant	0
Kitchener	2006	pd_emp_COMBINED	-0.3761	0.6865	Significant	0.011
Kitchener	2011	pd_emp_COMBINED	-0.7091	0.4921	Significant	0
Kitchener	2016	pd_emp_COMBINED	-0.7230	0.4853	Significant	0
Kitchener	2011	purp_dest_H	0.9808	2.6666	Significant	0
Kitchener	2016	purp_dest_H	0.9163	2.5000	Significant	0
Kitchener	2011	purp_dest_WORK_RELATED	0.7472	2.1111	Significant	0.001
Kitchener	2016	purp_dest_WORK_RELATED	0.8210	2.2728	Significant	0
Kitchener	1996	tran_pass	0.9163	2.5000	Significant	0
Kitchener	2006	tran_pass	0.8109	2.2499	Significant	0
Kitchener	2011	tran_pass	0.7691	2.1578	Significant	0
Kitchener	2016	tran_pass	0.7178	2.0499	Significant	0
Milton	1986	dwell_type_Apartment	0.5108	1.6666	Not Significant	0.253
Milton	1996	dwell_type_Apartment	0.5108	1.6666	Not Significant	0.253
Milton	1991	dwell_type_House	0.0000	1.0000	Not Significant	1
Milton	1996	dwell_type_House	0.5596	1.7500	Not Significant	0.139
Milton	2001	dwell_type_House	0.5596	1.7500	Not Significant	0.139
Milton	2006	dwell_type_House	0.4055	1.5001	Not Significant	0.321
Milton	2011	dwell_type_House	0.4055	1.5001	Not Significant	0.321

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Milton	2016	dwell_type_House	0.4055	1.5001	Not Significant	0.321
Milton	1996	free_park_n	0.5596	1.7500	Not Significant	0.139
Milton	2006	free_park_n	0.4055	1.5001	Not Significant	0.321
Milton	2011	free_park_n	0.4055	1.5001	Not Significant	0.321
Milton	2001	free_park_y	0.5596	1.7500	Not Significant	0.139
Milton	2016	free_park_y	0.4055	1.5001	Not Significant	0.321
Milton	1986	mode_accs_ACTIVE_TRANSPORT	0.6931	1.9999	Not Significant	0.09
Milton	1991	mode_accs_ACTIVE_TRANSPORT	0.4055	1.5001	Not Significant	0.483
Milton	2011	mode_accs_ACTIVE_TRANSPORT	0.6931	1.9999	Not Significant	0.09
Milton	2016	mode_accs_ACTIVE_TRANSPORT	0.6931	1.9999	Not Significant	0.05
Milton	1986	mode_accs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.166
Milton	1991	mode_accs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.166
Milton	2011	mode_accs_AUTO_RELATED	0.5878	1.8000	Not Significant	0.078
Milton	2016	mode_accs_AUTO_RELATED	0.5108	1.6666	Not Significant	0.106
Milton	1986	mode_egrs_ACTIVE_TRANSPORT	0.6931	1.9999	Not Significant	0.09
Milton	1991	mode_egrs_ACTIVE_TRANSPORT	0.4055	1.5001	Not Significant	0.483
Milton	2011	mode_egrs_ACTIVE_TRANSPORT	0.6931	1.9999	Not Significant	0.09
Milton	2016	mode_egrs_ACTIVE_TRANSPORT	0.6931	1.9999	Not Significant	0.05
Milton	1986	mode_egrs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.166
Milton	1991	mode_egrs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.166
Milton	2011	mode_egrs_AUTO_RELATED	0.8473	2.3333	Not Significant	0.025
Milton	2016	mode_egrs_AUTO_RELATED	0.5108	1.6666	Not Significant	0.106
Milton	1986	mode_prime_ACTIVE_TRAVEL	-1.0986	0.3333	Not Significant	0.272
Milton	1991	mode_prime_ACTIVE_TRAVEL	-1.0986	0.3333	Not Significant	0.272
Milton	2016	mode_prime_ACTIVE_TRAVEL	-0.2877	0.7500	Not Significant	0.618
Milton	1986	mode_prime_PRIVATE_VEHICLE	-0.2877	0.7500	Not Significant	0.481
Milton	1991	mode_prime_PRIVATE_VEHICLE	-0.1542	0.8571	Not Significant	0.706
Milton	2011	mode_prime_PRIVATE_VEHICLE	-0.2513	0.7778	Not Significant	0.506

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Milton	2016	mode_prime_PRIVATE_VEHICLE	0.0741	1.0769	Not Significant	0.782
Milton	1986	mode_prime_PUBLIC_TRANSPORTATION	0.6061	1.8333	Not Significant	0.044
Milton	1991	mode_prime_PUBLIC_TRANSPORTATION	0.5108	1.6666	Not Significant	0.253
Milton	2011	mode_prime_PUBLIC_TRANSPORTATION	0.6286	1.8750	Significant	0.015
Milton	2016	mode_prime_PUBLIC_TRANSPORTATION	0.5390	1.7143	Not Significant	0.062
Milton	1986	n_go_bus	1.1035	3.0147	Not Significant	0.177
Milton	1991	n_go_bus	1.2982	3.6627	Not Significant	0.261
Milton	2011	n_go_bus	1.4403	4.2220	Significant	0.013
Milton	2016	n_go_bus	0.7590	2.1361	Not Significant	0.055
Milton	1986	n_go_rail	-0.7213	0.4861	Not Significant	0.308
Milton	1991	n_go_rail	0.2877	1.3334	Not Significant	0.753
Milton	2011	n_go_rail	0.1122	1.1187	Not Significant	0.841
Milton	2016	n_go_rail	0.6092	1.8390	Not Significant	0.312
Milton	1986	n_local	1.8880	6.6061	Significant	0.008
Milton	1991	n_local	0.3368	1.4005	Not Significant	0.68
Milton	2011	n_local	1.0731	2.9244	Not Significant	0.051
Milton	2016	n_local	1.3807	3.9777	Significant	0
Milton	1986	n_pers_trip	0.1847	1.2029	Not Significant	0.031
Milton	1991	n_pers_trip	0.1706	1.1860	Not Significant	0.161
Milton	1996	n_pers_trip	0.2658	1.3045	Significant	0
Milton	2001	n_pers_trip	0.1806	1.1979	Not Significant	0.026
Milton	2006	n_pers_trip	0.2990	1.3485	Significant	0
Milton	2011	n_pers_trip	0.2398	1.2710	Significant	0.01
Milton	2016	n_pers_trip	0.3666	1.4428	Significant	0
Milton	2011	n_route	1.0571	2.8780	Significant	0
Milton	2016	n_route	0.9929	2.6991	Significant	0
Milton	1986	n_subway	-0.0132	0.9869	Not Significant	0.985
Milton	1991	n_subway	1.2028	3.3294	Not Significant	0.188

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Milton	2011	n_subway	1.4532	4.2768	Significant	0
Milton	2016	n_subway	1.5200	4.5722	Significant	0
Milton	1986	n_ttc_bus	2.1329	8.4393	Not Significant	0.048
Milton	1991	n_ttc_bus	1.2982	3.6627	Not Significant	0.261
Milton	2011	n_ttc_bus	2.0004	7.3920	Significant	0
Milton	2016	n_ttc_bus	2.0474	7.7477	Significant	0.004
Milton	1986	n_vehicle	0.1414	1.1519	Not Significant	0.474
Milton	1991	n_vehicle	-0.2056	0.8142	Not Significant	0.697
Milton	1996	n_vehicle	0.0813	1.0847	Not Significant	0.729
Milton	2001	n_vehicle	0.8976	2.4537	Significant	0
Milton	2006	n_vehicle	0.1722	1.1879	Not Significant	0.469
Milton	2011	n_vehicle	0.5466	1.7274	Significant	0.001
Milton	2016	n_vehicle	-0.1317	0.8766	Not Significant	0.641
Milton	1996	pd_emp_38	-0.6931	0.5000	Not Significant	0.488
Milton	2001	pd_emp_38	0.5108	1.6666	Not Significant	0.253
Milton	2016	pd_emp_38	0.0000	1.0000	Not Significant	1
Milton	1991	pd_emp_COMBINED	-1.8971	0.1500	Significant	0.001
Milton	1996	pd_emp_COMBINED	-1.1727	0.3095	Significant	0
Milton	2001	pd_emp_COMBINED	-0.9954	0.3696	Significant	0
Milton	2006	pd_emp_COMBINED	-0.8786	0.4154	Significant	0
Milton	2011	pd_emp_COMBINED	-0.7732	0.4615	Significant	0
Milton	2016	pd_emp_COMBINED	-0.6109	0.5429	Significant	0
Milton	1986	purp_dest_H	0.4055	1.5001	Not Significant	0.321
Milton	2011	purp_dest_H	0.4055	1.5001	Not Significant	0.321
Milton	2016	purp_dest_H	0.4055	1.5001	Not Significant	0.321
Milton	1991	purp_dest_WORK_RELATED	-0.2231	0.8000	Not Significant	0.655
Milton	2011	purp_dest_WORK_RELATED	0.4520	1.5715	Not Significant	0.134
Milton	2016	purp_dest_WORK_RELATED	0.4520	1.5715	Not Significant	0.134

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Milton	1996	tran_pass	0.1335	1.1428	Not Significant	0.706
Milton	2001	tran_pass	-0.5108	0.6000	Not Significant	0.376
Milton	2006	tran_pass	0.1671	1.1819	Not Significant	0.547
Milton	2011	tran_pass	0.1671	1.1819	Not Significant	0.547
Milton	2016	tran_pass	0.1671	1.1819	Not Significant	0.547
Whitby	1986	dwell_type_Apartment	0.5596	1.7500	Not Significant	0.139
Whitby	1991	dwell_type_Apartment	0.5596	1.7500	Not Significant	0.139
Whitby	1996	dwell_type_Apartment	0.6931	1.9999	Not Significant	0.028
Whitby	2001	dwell_type_Apartment	0.6931	1.9999	Not Significant	0.028
Whitby	2006	dwell_type_Apartment	0.5596	1.7500	Not Significant	0.139
Whitby	2011	dwell_type_Apartment	0.6931	1.9999	Not Significant	0.028
Whitby	2016	dwell_type_Apartment	0.6931	1.9999	Not Significant	0.028
Whitby	1986	dwell_type_House	0.5596	1.7500	Not Significant	0.139
Whitby	1991	dwell_type_House	0.4055	1.5001	Not Significant	0.321
Whitby	1996	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Whitby	2001	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Whitby	2006	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Whitby	2011	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Whitby	2016	dwell_type_House	0.6931	1.9999	Not Significant	0.028
Whitby	2006	dwell_type_Townhouse	0.5596	1.7500	Not Significant	0.139
Whitby	2011	dwell_type_Townhouse	0.6931	1.9999	Not Significant	0.028
Whitby	1996	free_park_n	0.5596	1.7500	Not Significant	0.139
Whitby	2011	free_park_n	0.4055	1.5001	Not Significant	0.321
Whitby	2016	free_park_n	0.6931	1.9999	Not Significant	0.028
Whitby	1996	free_park_y	0.4055	1.5001	Not Significant	0.321
Whitby	2001	free_park_y	0.6931	1.9999	Not Significant	0.028
Whitby	2006	free_park_y	0.6931	1.9999	Not Significant	0.028
Whitby	2011	free_park_y	0.6931	1.9999	Not Significant	0.028

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Whitby	2016	free_park_y	0.6931	1.9999	Not Significant	0.028
Whitby	1986	mode_accs_ACTIVE_TRANSPORT	0.8473	2.3333	Not Significant	0.025
Whitby	1991	mode_accs_ACTIVE_TRANSPORT	0.9163	2.5000	Significant	0.004
Whitby	2011	mode_accs_ACTIVE_TRANSPORT	0.9163	2.5000	Significant	0.004
Whitby	2016	mode_accs_ACTIVE_TRANSPORT	0.8755	2.4001	Significant	0.002
Whitby	1986	mode_accs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.028
Whitby	1991	mode_accs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.05
Whitby	2011	mode_accs_AUTO_RELATED	0.8267	2.2858	Significant	0.001
Whitby	2016	mode_accs_AUTO_RELATED	0.6931	1.9999	Significant	0.006
Whitby	1986	mode_egrs_ACTIVE_TRANSPORT	0.8473	2.3333	Not Significant	0.025
Whitby	1991	mode_egrs_ACTIVE_TRANSPORT	0.9163	2.5000	Significant	0.004
Whitby	2011	mode_egrs_ACTIVE_TRANSPORT	0.9163	2.5000	Significant	0.004
Whitby	2016	mode_egrs_ACTIVE_TRANSPORT	0.8755	2.4001	Significant	0.002
Whitby	1986	mode_egrs_AUTO_RELATED	0.8109	2.2499	Significant	0.015
Whitby	1991	mode_egrs_AUTO_RELATED	0.5108	1.6666	Not Significant	0.253
Whitby	2011	mode_egrs_AUTO_RELATED	0.8650	2.3750	Significant	0
Whitby	2016	mode_egrs_AUTO_RELATED	0.6931	1.9999	Not Significant	0.028
Whitby	1986	mode_prime_ACTIVE_TRAVEL	-1.0986	0.3333	Not Significant	0.272
Whitby	1991	mode_prime_ACTIVE_TRAVEL	-0.2877	0.7500	Not Significant	0.618
Whitby	2011	mode_prime_ACTIVE_TRAVEL	0.1823	1.2000	Not Significant	0.655
Whitby	2016	mode_prime_ACTIVE_TRAVEL	0.4855	1.6250	Not Significant	0.08
Whitby	1986	mode_prime_PRIVATE_VEHICLE	0.0953	1.1000	Not Significant	0.752
Whitby	1991	mode_prime_PRIVATE_VEHICLE	0.3185	1.3751	Not Significant	0.291
Whitby	2011	mode_prime_PRIVATE_VEHICLE	0.0953	1.1000	Not Significant	0.752
Whitby	2016	mode_prime_PRIVATE_VEHICLE	0.3054	1.3572	Not Significant	0.183
Whitby	1986	mode_prime_PUBLIC_TRANSPORTATION	0.8267	2.2858	Significant	0.001
Whitby	1991	mode_prime_PUBLIC_TRANSPORTATION	0.7472	2.1111	Significant	0.001
Whitby	2011	mode_prime_PUBLIC_TRANSPORTATION	0.7885	2.2001	Significant	0

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Whitby	2016	mode_prime_PUBLIC_TRANSPORTATION	0.7885	2.2001	Significant	0
Whitby	1986	n_go_bus	0.4893	1.6312	Not Significant	0.36
Whitby	1991	n_go_bus	2.1454	8.5455	Significant	0
Whitby	2011	n_go_bus	1.9576	7.0823	Significant	0
Whitby	2016	n_go_bus	2.4881	12.0384	Significant	0
Whitby	1986	n_go_rail	0.6363	1.8895	Not Significant	0.234
Whitby	1991	n_go_rail	-0.8076	0.4459	Not Significant	0.118
Whitby	2011	n_go_rail	0.7163	2.0468	Not Significant	0.101
Whitby	2016	n_go_rail	0.2159	1.2410	Not Significant	0.626
Whitby	1986	n_local	-0.1891	0.8277	Not Significant	0.784
Whitby	1991	n_local	0.6044	1.8302	Not Significant	0.09
Whitby	2011	n_local	1.2053	3.3378	Significant	0
Whitby	2016	n_local	1.0531	2.8665	Significant	0
Whitby	1986	n_pers_trip	0.2693	1.3090	Significant	0
Whitby	1991	n_pers_trip	0.2309	1.2597	Significant	0
Whitby	1996	n_pers_trip	0.2280	1.2561	Significant	0
Whitby	2001	n_pers_trip	0.2882	1.3340	Significant	0
Whitby	2006	n_pers_trip	0.3075	1.3600	Significant	0
Whitby	2011	n_pers_trip	0.2160	1.2411	Significant	0
Whitby	2016	n_pers_trip	0.3583	1.4309	Significant	0
Whitby	2011	n_route	1.2166	3.3757	Significant	0
Whitby	2016	n_route	1.5694	4.8038	Significant	0
Whitby	1986	n_subway	0.7771	2.1752	Significant	0
Whitby	1991	n_subway	1.9383	6.9469	Significant	0
Whitby	2011	n_subway	1.1495	3.1566	Significant	0
Whitby	2016	n_subway	1.8801	6.5542	Significant	0
Whitby	1986	n_ttc_bus	1.5819	4.8642	Significant	0
Whitby	1991	n_ttc_bus	1.9407	6.9636	Significant	0

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Whitby	2011	n_ttc_bus	2.4805	11.9472	Significant	0
Whitby	2016	n_ttc_bus	2.8111	16.6282	Significant	0
Whitby	1986	n_vehicle	-0.1206	0.8864	Not Significant	0.623
Whitby	1991	n_vehicle	-1.7267	0.1779	Significant	0
Whitby	1996	n_vehicle	-0.8859	0.4123	Significant	0
Whitby	2001	n_vehicle	-0.4348	0.6474	Not Significant	0.052
Whitby	2006	n_vehicle	0.0948	1.0994	Not Significant	0.584
Whitby	2011	n_vehicle	-0.1642	0.8486	Not Significant	0.39
Whitby	2016	n_vehicle	-0.1927	0.8247	Not Significant	0.279
Whitby	1996	pd_emp_22	0.4055	1.5001	Not Significant	0.321
Whitby	2001	pd_emp_22	0.0000	1.0000	Not Significant	1
Whitby	2006	pd_emp_22	0.0000	1.0000	Not Significant	1
Whitby	2016	pd_emp_22	0.6931	1.9999	Not Significant	0.028
Whitby	1991	pd_emp_COMBINED	-0.7985	0.4500	Significant	0.001
Whitby	1996	pd_emp_COMBINED	-0.4308	0.6500	Significant	0.007
Whitby	2001	pd_emp_COMBINED	-0.3302	0.7188	Not Significant	0.025
Whitby	2006	pd_emp_COMBINED	-0.4463	0.6400	Significant	0.002
Whitby	2011	pd_emp_COMBINED	-0.3277	0.7206	Significant	0.022
Whitby	2016	pd_emp_COMBINED	-0.2877	0.7500	Not Significant	0.035
Whitby	1986	purp_dest_H	0.5596	1.7500	Not Significant	0.139
Whitby	1991	purp_dest_H	0.6931	1.9999	Not Significant	0.028
Whitby	2011	purp_dest_H	0.6931	1.9999	Not Significant	0.028
Whitby	2016	purp_dest_H	0.6931	1.9999	Not Significant	0.028
Whitby	1986	purp_dest_WORK_RELATED	0.3365	1.4000	Not Significant	0.373
Whitby	2011	purp_dest_WORK_RELATED	0.6931	1.9999	Significant	0.002
Whitby	2016	purp_dest_WORK_RELATED	0.7472	2.1111	Significant	0.001
Whitby	1996	tran_pass	0.1542	1.1667	Not Significant	0.564
Whitby	2001	tran_pass	0.3254	1.3846	Not Significant	0.167

Location	Date	Variable	Coefficient	Actual Value	Label	P>|z|
Whitby	2006	tran_pass	0.3254	1.3846	Not Significant	0.167
Whitby	2011	tran_pass	0.4990	1.6471	Significant	0.008
Whitby	2016	tran_pass	0.5947	1.8125	Significant	0.001

Appendix B: Additional Photos

Mount Pleasant (photos by William Overholt)

Kitchener (photos by William Overholt)

Milton (photos by William Overholt)

Whitby (photos by William Overholt)