# Permitted Subsidies: The Costs of Subsidizing Private Automobile Storage in Public Space

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Abstract

This major research paper aims to understand how the City of Toronto administers its residential on-street permit parking program and asks what costs; economic, environmental, social, or otherwise, the city incurs through the operation of the program. This research paper approaches the question through a mixed methods methodology foregrounding a quantitative data analysis to draw associations between permits per person and other variable such as income and mode share through a quantile regression analysis. The research was further supplemented by interviews with professional planners and engineers working both in private and public sector to provide a framework of the current state of on-street parking and residential on-street permit parking programs (ROPPPs). The findings from this research make methodological, empirical, and theoretical contributions to the existing literature that can aid in a better understanding of the challenges facing ROPPPs. The quantile regression analysis found that the effect of median income, public transit mode share, and active mode share varies across quantiles of permits per person with public transit mode share having the strongest effect on permits per person. Participant interviews provided an outline of the challenges facing ROPPPs and on-street parking policy more generally along with the myriad solutions municipalities are implementing to mitigating these challenges. The conclusion puts forth three policy pathways with increasing emphasis on the reallocation of space on the street for those outside of motor vehicles.

**Keywords:** Transportation Planning Policy, Auto-Dependency, Residential Permit Parking, Parking Policy, Public Space

## Foreword

This Major Research Paper was completed in fulfillment of the requirements for the Master of Environmental Studies (MES) in Planning program at York University. At the beginning of the MES degree, I was primarily interested in researching the social and political perceptions of who is a valid user of active transportation infrastructure stemming from my time working in a Toronto City Councillor's office. The goal of this research would have been to speak with food delivery couriers who primarily use bicycles and e-bikes as part of their job and understand what barriers they feel as an active transportation user in the City of Toronto. What became clear, however, is that data on these food delivery apps is immensely difficult to obtain and in order to properly portray the experiences of food couriers, extensive investment would have been required to complete interviews and provide proper compensation for their time. This process would have exceeded the capacity and scope of a major research paper.

Instead, I turned to a topic that I also found very interesting during my time working at city hall; permit parking. Over my three years working as a constituency assistant and transportation policy advisor, I came across only a handful of topics that were as intensely debated as permit parking. I wanted to understand how this system, that tens of thousands of Torontonians rely on, actually functions and the city is missing in its current implementation. Choosing Toronot as my case study was a deeply personal choice as I had invested countless hours during my time working at city hall solving problems, providing information, and proposing solutions to improve the residential on street permit parking system. Throughout this research, I have fulfilled specific learning objectives from my Plan of Study including:

- *Objective 2.4 To develop a basic understand of the principles of safe street design and urban design in order to put forward policy alternatives that prioritize those outside of private automobiles.*
- *Objective 3.1 To develop a basic understanding of the legal conceptions of public space and the public right-of-way in the Canadian context.*
- *Objective 3.3 To develop a basic understanding of urban land economics and its impact on publicly owned land.*
- *Objective 3.4 To gain an in-depth understanding of automobile parking policy in the City of Toronto in order to provide concrete policy recommendations that are rooted in political and financial reality.*

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# 1 Introduction to the Research

This research was undertaken to understand the ways the City of Toronto's Residential On-street Permit Parking program (ROPPP) is impacting its ability to plan for and invest in sustainable modes of transportation and adapt to the changing supply and demand of curb space, with a focus on the city's urban core. The City of Toronto's ROPPP has operated for nearly sixty years, originally intended as a temporary solution to the issue of increasing car-ownership in the downtown core in the face of an older, denser urban form that could not accommodate the spatial demands of private motor vehicles. The program has now developed into a permanent staple of Toronto's downtown streets, issuing on average, 54,000 permits per year since 2010 (City of Toronto, 2026a).

Downtown transportation patterns have changed drastically, with a growing number of communities relying on alternative modes such as walking, cycling, or public transit. According to the Transportation Tomorrow Survey, the average auto mode share for downtown wards in 2006 was 52% while the average non-auto mode share for the same wards was 45% (Data Management Group, 2006). However, in the intervening fifteen years, auto mode share in 2021 has decreased to an average of 34% with non-auto mode share forming the majority of trips in downtown wards at 63% (Data Management Group, 2022). However, as Torontonians turn to other methods of transportation, there has also been a rise in the number of permits issued through the ROPPP — indicating an increase in the rate of vehicle ownership within downtown neighbourhoods.

These trends raise several questions about what constraints the ROPPP puts on the city when it comes to planning and designing safer streets, encouraging the use of sustainable modes shares, and allowing for the construction of denser housing on local streets — all of which are stated goals in the City of Toronto's *Official Plan* and *Transform TO Net Zero Strategy* (City of Toronto 2026c, City of Toronto, 2021). The increase in permits also poses a challenge to the changing role that curbside parking spaces need to play on local streets. While the initial intention of the ROPPP was to have residents vacate a parking spot on their street during the day, creating occupancies for temporary uses, the introduction of remote work and the increase in the use of algorithm-based delivery apps such as Amazon Prime and Uber Eats providing same-day service has led to more spaces being occupied by residents throughout the day, cutting supply, while demand for that constrained curb space has increased (Altenried, 2019). The main question of this research is to understand the following: "What opportunity and mobility costs, does the City of Toronto incur through the administration of its ROPPP?".

I used a mixed-methods approach, combining quantitative spatial and statistical data analyses with interviews with transportation planners and engineers from both the public and private sectors. Data was obtained through the Statistics Canada census data portal, available through York University, and a request to the City of Toronto's On-Street Permit Parking division. The date range for permits issued by permit area was between 2010 and 2026 while the available date range for census data that fit within that time frame was 2011, 2016, and 2021. As such, the time frame of 2011 – 2021 is established as the study period, with 2011, 2016, and 2021 being the study years.

The research makes empirical, methodological, and theoretical contributions to the existing literature on ROPPPs and on-street parking. As there is minimal published research on Toronto's ROPPP, quantitative or otherwise, this research closes an existing gap in the literature by using the dependent variable of permits issued per person and is applied across all permit areas in each study year. The use of a quantile regression analysis shows that income and mode share operate differently across the permit-demand distribution. The findings show that areas with a high rate of permits per person are sensitive to income and non-auto mode share while low permits per person areas are not. The findings also indicate that Toronto differs from other jurisdictions with ROPPPs as this research shows that areas with higher public transit mode shares reduces the number of permits issued in a given permit area.

Interviews with transportation planners and engineers provided further insights as to how municipalities and developers view the role that both over-night and short-term parking plays in the development of local streets. Participants offered a range of feedback on the challenges of administering an ROPPP, opportunities for improvement, and how a program can mitigate negative impacts related to residential intensification. Interviewees acknowledged that the use of curb space for the storage of private motor vehicles can have negative spill-over effects on other modes, uses of street space, and seasonal maintenance of roads. However, several solutions were offered that either they, as planners, engineers or program managers, are implementing with relative success such as providing a free-floating carshare program, automated enforcement technology, or the introduction of a graduated fee schedule based on the weight or size of vehicle.

The City of Toronto's ROPPP currently operates with the assumption that it is providing a service to residents and is not intended to be used as a revenue tool, nor a method for rebalancing the space on local roads. However, the findings in this research suggest that the current state of the City of Toronto's ROPPP is benefiting some permit areas more than others by maintain an artificially low price of permits. This research is grounded in the work of Donald Shoup (2004, 2006, 2017), with specific contributions from Guo & McDonnell (2013), Guo (2013), de Groote et al. (2016), and Bondemark & Merkel (2023) comparing their findings from New York City, Amsterdam, and Stockholm with Toronto's ROPPP over the course of my study. As Shoup (2017) has established and corroborated by Maas & Watson (2018) and Taylor (2020), under-priced parking, whether for residential or commercial use, provides a subsidy to those with higher incomes and/or a higher willingness to pay by. Although this subsidy can reduce the barrier of entry for lower income households to have access to a motor vehicle, it still disproportionately benefits higher income households (Okashita & Wilson, 2019). Analysis of the City of Toronto data reveals that a majority of permit parking areas that fell within the top quartile of median income, also fell within the top quartile of permits per person This research corroborates previous findings that ROPPPs with artificially low prices for permits tend to benefit wealthier households while also inducing a higher auto mode share (Maas & Watson, 2018; Guo, 2013).

While quantitative approaches to these issues can reveal a lot about the challenges facing a municipality's residential parking supply, it is also important to acknowledge the socio-ecological approaches that influence these dynamics. The works of Ian Walker et al. (2022) provide a unique lens through which to view the ownership, use, and storage of private motor vehicles as rooted social and cultural bias that has been dubbed "Motonormativity" (p. 1).

Further research into the cultural bias toward private motor vehicles and its impact on the ability of municipalities to envision and design different uses for streets has been discussed by others but remains peripheral to the scope of this research (Appleyard, 1980; Blomley, 2007; Bruntlett & Bruntlett, 2021; Enright, 2019; Goodyear & Gordon, 2025; Mandhan & Gregg, 2023; Marshall et al., 2017; Marshall, 2024; Walker & Brömmelstroet, 2025; Wild et al., 2018). Ultimately, this research provides an empirical grounding as to the challenges and opportunities presented by ROPPPs to rebalance the space afforded to motor vehicles on local streets.

# 2 Jurisdictional Context

The jurisdictional context for this research is the City of Toronto – the largest municipality in Canada and the fourth largest in North America (City of Toronto, 2021a). The city first implemented its on-street permit program in the late 1960's and early 1970's as a temporary solution to the issue of growing private motor vehicle ownership and limited off-street options. In a 1968 report, the City of Toronto Planning Committee contemplated several solutions including acquiring the rear of properties in the downtown core open rights-of-way and allow for laneway access, although that plan in practice was deemed too expensive (City of Toronto, 1968, p. 5). Ultimately, the city opted for an on-street parking program, acknowledging that: "By far the greatest amount of potential parking space in the City is on the street itself and it is futile not to recognize that the street is (…), and will continue for some time to be the only means by which existing levels of car ownership may be accommodated" (City of Toronto, 1968, p. 15). This system has since grown to cover most of the old cities of Toronto, East York, and York with 57,104 permits issued in 2025 (City of Toronto, 2026b).

### 2.1.1 Toronto's Residential On-Street Permit Parking Program

Toronto is unique in its ability to amend public right of ways under its delegated authority through the *City of Toronto Act* (2006) and the creation of the *City of Toronto Municipal Code* in 2006. Chapter 925 of the *Municipal Code* governs the on-street permit parking system applying to "Roads, local streets, collector and minor arterial roads, (…) where sufficient off-street parking (is) not available and where the introduction of permit parking will not adversely affect roadway capacity, snow removal operations, or public safety" (City of Toronto Municipal Code, 2025, p. 6). This system allows residents to apply for permits, thus allowing them to park their motor vehicle on a residential street overnight, where non-permit holders would otherwise be prohibited. To ensure permit holders are prioritised, the city creates a parking prohibition on a permitted street/permitted zone generally between the hours of 12:01 AM and 7:00 AM, though timing varies depending on requests from residents and other factors. As of 2026, permits are issued based on a tiered system where residents with no alternative access to an off-street spot classified as first priority, those who may have technical access to a spot but access is not feasible are given second priority, and those who have requested a permit for their convenience given third priority. (City of Toronto Municipal Code, 2025, p. 10). While there is no limit to how many permits a resident may obtain, there are difference in permit pricing where Priority 1 and Priority 2 applicants are required to pay approximately twice the price of the original permit for each subsequent permit while Priority 3 applicants pay a more expensive, flat rate for their first and subsequent permit (**Error! Reference source not found.**). It should be noted that Toronto's system differs from other North American cities where the goal is not to prioritize overnight resident access, but rather, to keep non-residents *out* of a neighbourhood, or at the very least, ensure that there is enough non-resident turnover such that residents are able to find a spot.

The differences between these two types of ROPPPs and the problems they attempt to solve is further developed in 5.1.1.

*Figure 1: City of Toronto Permit Parking Fees 2026 (City of Toronto, 2026)*

| Description | Fee Basis | Permit Fees |
|---|---|---|
| No access to on-site parking for resident's first vehicle permit | Per month | $23.08 + HST |
| No access to on-site parking for resident's second and any subsequent vehicle permits | Per month | $67.02 + HST |
| Resident does have access to on-site parking (permit is for convenience) | Per month | $93.33 + HST |
| Reissues | Per reissue | $10.40 + HST |

### 2.1.2 Provincial Context

While the City of Toronto has delegated authority to create and amend by-laws regarding its public rights-of-way, recent actions by the provincial government have raised concerns as to how much longer this might be the case. On November 25, 2024, *Bill 212, Reducing Gridlock, Saving You Time Act* (2024) received royal assent. This bill, put forward by the Progressive Conservative government of Ontario, amended the *Highway Traffic Act* (1990) requiring all municipalities to request permission and approval from the Minister of Transportation to install bicycle lanes and demanded the removal of three existing bicycles lanes in the City of Toronto (*Reducing Gridlock, Saving You Time Act*, 2024). Although the latter amendment of the bill was struck down in provincial court, the former has led to significant constraints as to how the City of Toronto can design its streets. More recently, on November 27, 2025, *Bill 60, Fighting Delays, Building Faster Act* (2025), received royal assent, further restricting how municipalities govern their public rights-of-way. Of importance is Schedule 5, stating that “a municipality shall not reduce or permit a reduction in the number of lanes that are available for use by motor vehicles

and makes changes to the related regulation-making powers." (Fighting Delays, Building Faster, Act 2025). These moves by the provincial government exhibit a trend of continuous encroachment on municipal transportation policy and should be viewed as a potential obstacle to effectively assessing and reforming Toronto's on-street permit parking policy.

# 3 Literature Review:

## 3.1 Transportation Planning and Parking Policy

The challenge of how best to manage and store private motor vehicles is one that has plagued transportation planners since the early 20th century. Through the trial and error of a variety of policy solutions, it has become widely accepted among transportation planners that a society that relies primarily on private motor vehicles for its transportation is one that is more dangerous, unhealthier, and socially fractured, particularly for those outside of motor vehicles (Marshall, 2024; see also Nieuwenhuijsen, 2024; Triplett, 2015; Bruntlett & Bruntlett, 2021). This has led researchers and policymakers to seek solutions that do not involve private motor vehicles, or at the very least, motor vehicles that do not emit as many pollutants.

These policies have first and foremost, sought to rectify past harms due to infrastructure projects, many of which had and continue to have negative impacts on racialized and low-income communities. The vast majority of the scholarship has focused on examples from the United States (Triplett, 2015; Goodyear & Gordon, 2025; Marshall, 2024), with research into the history of Canadian infrastructure projects being limited, particularly in the context of infrastructure as a form of urban renewal. However, Cleveland (2018) highlights a Canadian example in the case of Africville, an Afro-Canadian community in Halifax's North End that

withstood decades of policies of environmental racism such as locating heavy industry nearby and the construction of Highway 111. This omission of Canadian examples is a theme that remains constant as the scholarship focuses further on parking policy and road design.

Through efforts to right past infrastructure wrongs, transportation planning professionals and scholars alike have provided several important frameworks through which this research engages. The works of contemporary scholars has engaged with the paradox of "green gentrification" and how the benefits of investment in transportation infrastructure is not always reaped by those it was intended to help (Checker, 2011). Or how advocacy for a more equitable public transportation system can link itself to broader causes of social equity (Enright, 2019). However, at their core, these analyses focus solely on the *movement* of people and goods through a city, omitting a crucial aspect of the equation. As Donald Shoup (2017) rightfully points out; "Regardless of how fuel efficient our cars are or how little pollution they emit, we will always need somewhere to park them, and the average car spends about 95-percent of its life parked" (p. 6). Although a parked vehicle is stationery and transportation planning largely deals with the movement of motor vehicles, the two are inextricably linked by their shared interest in reducing dependency on motor vehicles.

## 3.2 Technical/Economic Approaches

The works of Shoup (1995, 2004, 2006, 2017) provide an important basis for understanding the connection between parking policy and transportation planning; grounding the scholarship in an approach that is largely based on a technical and economic understanding of parking. This approach views on-street parking and private motor vehicle ownership as related problems through the lens of economics and seeks to find technocratic solutions that better

reflect the market price of a parking space. Shoup's writings on the relationship between parking and non-residential uses follows a similar line throughout his career; the way in which parking, on-street or off-street, is priced provides an unfair subsidy to motorists to the detriment of non-motorists. This subsidy is the result of a longstanding tradition in transportation planning to rely on policies such as minimum parking rates which Shoup (2017) describes as "perfectly circular and wholly unscientific" (p. 87). Shoup's writing identifies this subsidy in almost all facets of transportation planning, whether it's the provision of free parking for employees at their place of work (1995) or the under-pricing of on-street parking on commercial streets to lower the barrier to access shops (2006). In all cases, Shoup identifies an economic opportunity cost to prioritizing the storage of motor vehicles over other uses. Although his work focuses primarily on parking for non-residential uses, his critiques can be applied to residential cases. In Shoup's seminal work, *The High cost of Free Parking* (2017), he discusses how minimum off-street parking requirements can add up to 20 percent to the cost of each unit, "(…) forcing developers to build parking that people cannot afford" (p. 167). For on-street parking he (2006) also raises the issue of 'cruising' for parking, where the individually rational decision to search for cheaper or free on-street parking options compared to a paid off-street option can have catastrophically negative effects on adjacent neighbourhoods by adding to traffic congestion, worsening road safety, and more pollution (p. 479). While Shoup's original analysis of 'cruising' focused on its impacts to commercial streets, this has been identified as an issue on residential streets in cities such as New York City (Guo & McDonnell, 2013), and Stockholm (Bondemark & Merkel, 2023).

The scholarship on ROPPPs is mixed in its view of long-term solutions to motor vehicle storage. A consequential portion of the scholarship finds that ROPPPs often require a fine balance between many criteria such as pricing, spillover effects, enforcement, and demand

management that some municipalities do not have the technical expertise to oversee (Moylan et al., 2014). Furthermore, the process of implementation poses questions about its impact on low-income households as it introduces an additional financial barrier to motor vehicle ownership where previously there was none before. Research on low-income households in Los Angeles found that private motor vehicle ownership predicted a 9% increase in the likelihood an individual would be employed when compared to those without access to a motor vehicle (Ong, 2002). A longitudinal study also in Los Angeles found that the length of minority worker's commute in Los Angeles decreased significantly between 1977 and 1985 due in large part to the growth in motor vehicle ownership, giving these communities better options for employment (Taylor & Ong, 1995). Other research still, establishes that "access to a car has disproportionately large effects on the employment rates of workers that are spatially isolated from employment opportunities" (Raphael, 2001, p. 132), although they do caution that expanding access to motor vehicles does come with additional negative externalities. In the specific context of a low-income household being part of an ROPPP, Okashita & Wilson (2019) find that these households "bear the largest percentage increase in household transportation expenditures if a market-rate priced residential parking permit (system) is implemented" (p. 652) but highlight that there are sufficient policy tools in use that redistribute the burden placed on these households. There is a tendency in contemporary transportation planning scholarship and practice to downplay the role that private motor vehicles play in many urban residents' lives. However, there is significant scholarship showing that motor vehicles are important connectors of people to opportunities, communities, and income, and any research on parking policy must operate from the basis that private motor vehicles are a necessary part of urban living whose negative externalities should be mitigated.

The administration of ROPPPs have been the subject of significant scholarly output over the past two decades. The use of off-street parking spaces, high housing costs, vehicle ownership, and gentrification of poorly served neighbourhoods have all been cited as challenges impacting the administration of programs (Okashita & Wilson, 2019; Taylor, 2020; van Ommeren et al., 2011). The on-street crowding caused by these factors have knock on effects such as disruptions for business-to-home delivery vehicles or inducing illegal parking (Chen et al., 2017; Ostermeijer et al., 2022).

While municipalities attempt to react to these challenges, the scholarship underlines issues on the horizon for ROPPPs specifically as electric vehicles becomes more common. Research into the impact that an ROPPP can have on a permitholder's willingness to purchase an electric vehicle has shown that the lack of on-street charging spaces is a significant barrier to making the switch from an internal combustion engine to an electric vehicle (Guerra & Daziano, 2020). However, research has shown a 65% decrease in the odds of a permitholder switching to an electric vehicle when the cost of installing the necessary on-street charging equipment increases the cost of a permit (Guerra & Daziano, 2020, p. 6). Guerra and Daziano's (2020) research does, however, find that those in denser, more centrally located neighbourhoods are willing to pay more for a permit if it means less cruising/searching time indicating that permitholders prioritize their own time over the cost of a permit (p. 8). Should municipalities take advantage of this willingness to pay more, is earnestly debated as it can have significant welfare impacts to those with a lower willingness and/or ability to pay (Maas & Watson, 2018). However, when considering higher permit prices, Guo & McDonnell (2013) posit that the parking spaces left empty due to higher prices present "the opportunity cost of (…) what could otherwise occupy that space, e.g. extended sidewalks, pocket parks, bike lanes etc., available to

everybody." (p. 187). It is this opportunity cost that presents a salient point for policymakers and researchers as there are different ways of measuring the productivity and utility of an on-street parking space.

Due to the financial programming that goes into the creation and management of an ROPPP, it is easy to assume that cost is the main lens through which these programs are evaluate. However, the provision of on-street parking on local roads can have a significant impact on how roads are (re)designed as well. Guo & Schloeter's (2013) investigation into the relationship between road design and parking policy points out that, in the United States, there is a discrepancy between the physical space that on-street parking occupies on North American roads but there is relatively little space given over to discuss how this impacts street design and parking policy. Although parking policy was not intentionally connected to street design, Guo & Schloeter (2013) argue that traffic engineers operating under the assumption that street parking demand is fixed and nonnegotiable, led to the requirement of dedicated parking lanes on most residential streets (p. 459). With the reality of on-street parking being a given in most urban street designs, this has led to the literature requiring a deeper understanding of how on-street parking not only impacts street design but also traffic movement, safety of vulnerable road users, the pricing of these spaces, and other costs associated with reserving a lane of the right-of-way for the storage of private motor vehicles.

An important conclusion drawn by the literature is that the benefits and costs are not borne equally in most ROPPPs, particularly in those where the permit fees are subsidized. As Guo & Schloeter (2013) have shown, demand for on-street parking is often a nonnegotiable factor in parking policy and street design (p. 459). This assumption has allowed for higher-income

households to reap the benefits while low-income households continue to bear the costs. This dynamic has been observed in Melbourne, Australia (Taylor, 2020), Fort Collins, Colorado (Maas & Watson, 2018), and in Amsterdam (De Groote et al., 2016) where higher-income households are able to take advantage of the subsidized on-street permit at a greater rate than those without a car, and specifically those without pre-existing access to an off-street parking spot.

# 4 Qualitative and Quantitative Methodology:

## 4.1 Methodology Overview

This research used a mixed methods approach to investigate the opportunity costs associated with the City of Toronto's administration of its ROPPP, contrasted against similar programs in other North American cities, to see how the City of Toronto can best manage its curb space and reduce auto dependency. I establish the ratio of "permits per person" as the dependent variable, as it measures how many permits have been issued in each permit area proportionate to its estimated population. This decision also provides a sufficient proxy for estimating the number of cars parked on the street in relation to the population, and in turn, how this use of public space impacts alternative approaches to local street design.

The permits per person ratio is not used often in the literature for two main reasons; First, Toronto is one of very few municipalities with an ROPPP that monitors exactly how many permits are issued per year and maintains an inventory of how many on-street spots there are in a given area; second, little, if any research on Toronto's ROPPP exists. While other research on ROPPPs has employed a quantitative methodology, this has largely been in the form of assessing

the length of an ROPPPs waiting list, measuring the price of an ROPPP on home value, or using Google street view to count how many cars were parked on a street (De Groote et al., 2016; Maas & Watson, 2018; Guo, 2013). This makes this research an important contribution to the current scholarship as it closes gaps in the academic literature while also providing an empirical basis for policy alternatives.

## 4.2 Qualitative Methodology: Participant Interviews

Interviews were conducted over the course of four months between January and April 2026 online via Zoom. Participants were contacted via email with contacts collected from the professional and personal networks I cultivated through experiences at the City of Toronto and the City of Ottawa. Participants were asked to sign a consent release form that allows for the use of their testimony in this report. Participants primarily had experience in a Canadian, specifically Ontarian context and worked in the private sector either in Toronto or Ottawa or for the two cities' respective public services. A third public sector employee from the City of Seattle's Department of Transportation was sourced through professional connections. The selection of participants supplemented the interviews with sufficiently unique jurisdictional contexts, while still working within the constraints of a typical North American city where decades of transportation planning centring the private motor vehicle had a prominent impact on each city's built form.

Interviews were based on a set question list that, depending on the time available or depth of conversation, was followed. Discussion length ranged between 35 minutes to 80 minutes depending on the availability of the participant and aimed to produce a baseline understanding of the participant's interaction/dealings with parking policy on a regular basis in their position moving onto their opinions on the current challenges facing ROPPPs parking policy. Interviews

concluded with a short discussion on the feasibility of implementing one of the three policy options presented in Section 6. All three public sector employees interviewed either held or currently hold director/manager positions within their respective municipality's parking and/or transportation services department and have had significant experience dealing with technical issues pertaining to parking, city councillors, and the public.

Similarly, private sector employees were also recruited through my own professional networks and were largely transportation engineers, not planners. The reasoning behind recruiting engineers is due to the fact that in the province of Ontario, professional engineers are the main authority when it comes to street design and transportation planning policy. These participants, while not as familiar with ROPPPs, provided extensive background on design guidelines and standards for local streets and how an ROPPP can change or constrain these standards. Additionally, their experience and exposure to developers provided valuable insight into how municipalities can maintain a balance of modes on local streets, especially as downtown neighbourhoods experience intensification. Prior experience with private and public sector employees informed the questions posed to interview participants. Prior held beliefs included public sector employees hedging criticisms of their municipality's ROPPP while private sector employees would be focused on the "red tape" that municipalities put in place to slow down the development process. Furthermore, there was an expectation that public sector employees would be less amenable to reducing the amount of space for vehicles to a certain extent. Comparisons of these priors and details in conversations is discussed below in Sections 5.1.1 and 5.1.2.

## 4.3 Quantitative Methods

### 4.3.1 Data Sources

Quantitative methods were used to analyze the statistical correlation and covariance between the ratio of permits per person in a permit area and income as well as auto-related versus non-auto related mode shares. Data was obtained through a variety of sources and therefore required extensive additional processing in GIS, Microsoft Excel, and R. The basis of the data was the number of permits issued between 2011 and 2025, obtained through a data request from the City of Toronto's Permit Parking Office in January 2026. This data was delivered in the form of an Excel file and contained three columns, "Permit Area", "Permits Issued", and "Year". The main points of reference to compare population, income, and mode share with permit data, were 2011, 2016, and 2021. This establishes the study period as 2011-2021 with an interim year in 2016. Through the City of Toronto's Open Data portal, a shapefile outlining all permit parking areas was obtained to generate a spatial component for the census data. The University of Toronto's "Canadian Census Analyser" was accessible through York University's resources allowing for a precise filter to be applied and extract the necessary data. Further detail on the source and format of obtained is shown below in Table 1.

*Table 1: Quantitative Data Name, Source, and Format*

| Data | Source | Format |
|---|---|---|
| 2011 Census Tracts | Canadian Census Analyser | shapefile |
| 2016 & 2021 Census Tracts | | shapefile |
| 2011 Population by census tract | | csv file |
| 2011 median income by census tract | | csv file |
| 2011 mode share by census tract | | csv file |
| 2016 population by census tract | | csv file |
| 2016 median income by census tract | | csv file |
| 2016 mode share median census tract | | csv file |
| 2021 population by census tract | | csv file |
| 2021 median income by census tract | | csv file |
| 2021 mode share by census tract | | csv file |
| Toronto Permit Parking Areas | City of Toronto Open Data Portal | shapefile |
| Toronto parking permits issued | City of Toronto, Permit Parking Division | csv file |

### 4.3.2 GIS Programming and Processing

Once collected, the data was spatially process through GIS for further analysis. A ratio of permits issued per person in each permit parking area was derived by calculating the proportion of each census tract within a permit area and applying that percentage to the population within a census tract. All census tracts were aggregated based on the common attribute of which census

tract each piece fell into, providing a population estimate for each permit parking area. A similar process was undertaken for estimating mode share for each permit area. Median income was averaged across all census tract proportions in each permit parking area rather than being aggregated.

### 4.3.3 Data Limitations

As the data was processed, several inconsistencies were discovered, leading to the omission of some data points. The City of Toronto's ROPPP is a program in flux, as permit areas can be added through resident petition to their local councillor. This means that throughout the study years, certain areas only began issuing permits in 2016 or 2021. Alternatively, permit parking staff will periodically conduct reviews of permit areas to assess how they are performing in providing parking to residents. This review can result in staff recommending the amalgamation of two or more permit areas to allow for the demand to be more evenly distributed across a neighbourhood. As a result, some permit areas cease to exist between study years, but the number of permits issued still exist, albeit in a larger permit area. To better understand which permit areas were created or amalgamated during the study period, I requested the information from the same City of Toronto staff member who provided me with the data regarding permits issued and was alerted to several permit parking areas that had changed throughout the study year as illustrated in Table 2 below. As will be discussion further in Section 5.2, data on mode share for the 2021 census is anomalous given the recency of the COVID-19 Pandemic.

*Table 2: Permit Areas Excluded from Analysis Due to Inconsistencies in their Boundaries*

| Permit Area | Status Change | Year | Notes |
|---|---|---|---|
| 9F | Dissolved | Between 2016 and 2021 | Amalgamated into Permit Area 9A |
| 9G | Dissolved | Between 2016 and 2021 | Amalgamated into Permit Area 9A |
| 9H | Dissolved | Between 2016 and 2021 | Amalgamated into Permit Area 9A |
| 9J | Dissolved | Between 2016 and 2021 | Amalgamated into Permit Area 9A |
| 12B | Created | 2016 | N/A |
| 13A | Created | 2016 | N/A |

### 4.3.4 Statistical Methodology

The statistical analysis of the data positioned the ratio of permits per person as the dependent variable in all cases, with an interchangeable independent variable rotating between average income for each permit area, auto mode share for each permit area, public transit mode share for each permit area, and active transportation mode share for each permit area. For each variable, a descriptive statistics analysis was conducted on the entire data set to establish a rudimentary statistical profile, including a mean value and the standard deviation for each study year. A regression analysis was also conducted between permits per person and the four distinct independent variables to determine the direction and strength each independent variable had on ratio of permits per person for each study year. High-level conclusions were drawn from this analysis to establish which independent variables have the strongest effect on permits per person and investigate those effects further in the quartile analysis.

For a more granular analysis, the dataset for each study year was categorized by quartile, ranked based on permits per person. Once ranked, a difference in means analysis was conducted

between the first and fourth quartiles to determine the strength of the statistical difference between the means of the first and fourth quartiles of each year and to highlight the distribution between the quartiles across the study period. Next, a quantile regression analysis was conducted in R to determine the individual relationships between the dependent variable - permits per person and the independent variables – median income, public transit mode share, and active mode share, at the 10th, 25th, 50th, 75th, and 90th percentile of the dependent variable in each year. A detailed description of the value of each percentile in each study year is shown in Table 3. Quantile regression analysis is a type of regression analysis that looks at the effect of a variable across the dataset's entire distribution. While Ordinary Least Squares regression analysis is a useful tool, it can only explain so much as it focuses on the average effect of a variable. In the context of this research, investigating areas with extreme values in relation to the dataset is a key component to understand how areas with high versus low occupancy are effected by different variables. See Figure 2 for quantile regression formula.

*Figure 2: Quantile Regression Formula*

$$\mathbb{Q}(\tau|x) = \beta_0(\tau) + \beta_1(\tau)x_1 + \beta_2(\tau)x_2 + \beta_3(\tau)x_3$$

Where:

$Q(\tau|x)$ = Estimated number of permits per person at the $\tau$th percentile

$\tau$ = The target percentile

$\beta_0(\tau)$ = The baseline intercept for the target percentile

$\beta_1(\tau)x_1$ = The effect of median income on the target percentile of permits per person

$\beta_2(\tau)x_2$ = The effect of public transit mode share on the target percentile of permits per person

$\beta_3(\tau)x_3$= The effect of active mode share on the target percentile of permits per person

*Table 3: Percentile Values of Permits Per Person for all Study Years*

| Year | Percentile | | | | |
|---|---|---|---|---|---|
| | 10th | 25th | 50th | 75th | 90th |
| 2011 | 0.07 | 0.11 | 0.16 | 0.23 | 0.31 |
| 2016 | 0.05 | 0.10 | 0.17 | 0.23 | 0.31 |
| 2021 | 0.05 | 0.09 | 0.17 | 0.24 | 0.33 |

A delimited comma separated value (csv) file was created to be processed by R with the data manipulated to ensure the dependent and independent variables were measured at the similar scales. With both mode share values and permits per person expressed as a decimal, median income for each permit area was transformed using the natural logarithm as the income variables were right-skewed and its effect on permits per person is proportional rather than linear. This allows for estimated coefficients to be interpreted in percentage terms rather than absolute dollars change. Therefore, the interpretation of the effects of income on permits per person is that a one percent increase in income is associated with approximately a $\frac{\beta}{100}$ change in permits per person, holding all other variables constant. The output table produce a coefficient of correlation showing the direction and strength of the association between the dependent variable and independent variables, a standard error value, and an asterisk showing the statistical validity of each model.

# 5 Findings

## 5.1 Participant Interviews

Participant interviews yielded a wide array of opinions, feedback, anecdotes, and experience with ROPPPs but also regarding on-street parking more broadly. Prior to conducting the interviews, I had pre-conceptions of how public and private sector employees would view the issues that they face in their positions. I believed that public sector employees would caution against a wholesale change of the current system and provide a more balanced view of the issues of the ROPPP they oversee. Conversely, I believed that private sector employees would advocate for more aggressive changes to status quo, particularly surrounding the impact that parking can have on the viability of a development, or mandates surrounding parking minimums versus maximums. However, in both groups, each participant provided nuance. Public sector employees readily called out facets of their municipality's ROPPP that wasn't working or wasn't equitable and private sector employees advised against more foundational/systemic reforms, instead providing solutions that lay the groundwork for long-term change rather than immediate wholesale change.

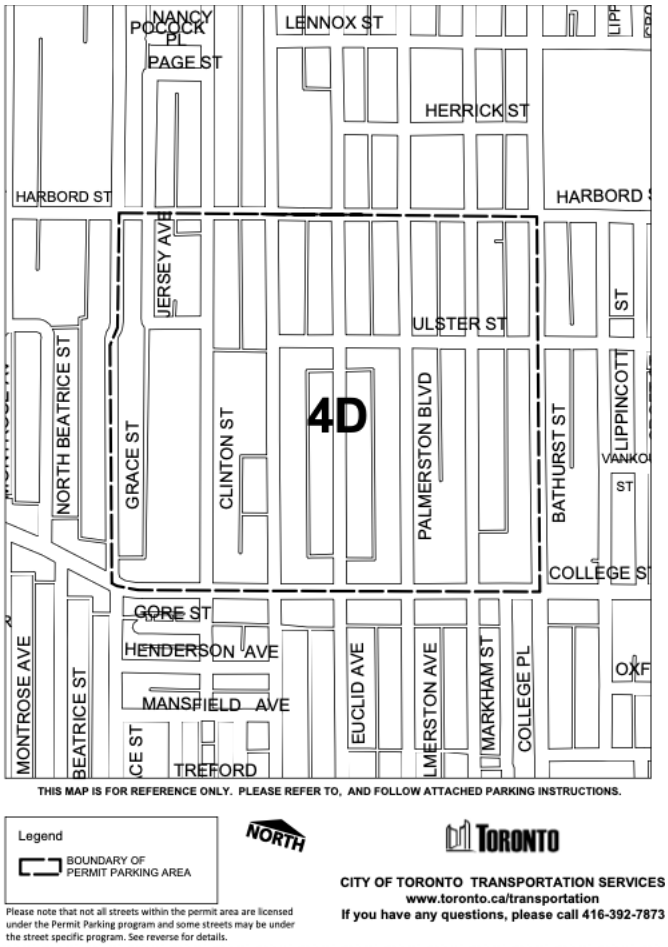
### 5.1.1 Public Sector Employees

As has been established in 3.2, ROPPPs, though not perfect, represent an effective policy tool to combat the issue of limited off-street residential parking options, particularly in denser downtown neighbourhoods. This was an issue that all three public sector employees identified as to why ROPPPs were created and how its mandate is evaluated today. Public Sector Employee #1 emphasized that, at its core, the City of Toronto's ROPPP is a *service* available to residents,

that, while voluntary, should be seen as something that provides a basic quality of life. Public Sector Employees #2 and #3 echoed this sentiment that this is the prevailing understanding of their respective municipalities' programs by both residents and staff.

All three programs are organized around specific permit areas, within which residents can park on their own street or on any street within the surrounding area. Figure 3 shows an example of a permit parking area map in the City of Toronto. Residents pay for their permits on a set term which differs depending on municipality and can range from a consistent monthly basis or a two-year term. Residents are issued physical decals to be displayed on their windshields. Additionally, each municipality has constraints as to which vehicles are eligible to receive a permit as Public Sector Employee #1 shared, "this is to make sure that larger commercial vehicles like pick-up trucks and panel vans aren't on streets where the size of the vehicle would be incompatible with a local street long-term".

*Figure 3: Sample Permit Parking Area Map (City of Toronto, 2026)*




During the interviews, what became clear is that not all ROPPPs are created to solve the same problem. While the City of Toronto's ROPPP seeks to provide positive rights to residents, a "freedom to" park on the street overnight, the other two municipalities, Seattle and Ottawa, set

their ROPPPs up to enforce a system of negative rights, or rather a "freedom from" non-residents taking parking away from residents. Due to the topic of this research, the City of Toronto became a reference point for understanding other ROPPPs and how other municipalities evaluate and resolve challenges in their own contexts. The differences range significantly but can broadly be categorized as the creation of permit areas, the administration and management of permit areas, and challenges facing the ROPPP.

**Creation of Permit Areas:**

In the City of Toronto, a permit area can only be created at the request of residents in the form of a petition submitted to their city councillor. Public Sector Employee #1, who had 15 years of experience running the City of Toronto's ROPPP, shared that staff will receive a request from a councillor with an attached petition from residents to begin the process of creating a new permit area. The city clerk's office prepares ballots to be mailed out to area residents requesting their direct vote on whether or not a permit area should be created, with a minimum response rate required for any poll to be deemed valid. A simple majority (50% +1) is required for staff to begin plotting out the area, measuring curb space to see how many spots can be accommodated, and the hours between which permit parking enforcement would be in effect. Staff then prepare a report which goes to one of the area-based committees with delegated decision authority for approval. Post-approval, signage is installed and enforcement hours are discussed and finalized with Toronto Police Services parking enforcement division. If any changes are to be made either by way of excluding future higher-density developments to avoid parking spillover or including a new street, a vote is required at one of the area-based committees through a staff report.

The City of Ottawa creates permit parking areas through a similar process, though the criteria/threshold for concurrence within a community is far less stringent than Toronto, with a

request being sent by a local councillor and a report being prepared for city council with no voting from residents required. Public Sector Employee #3 from the City of Ottawa advised that if a councillor wishes to add a street or even a single home to a parking area, they are able to do so on an ad hoc basis as they can update their internal tracking system that communicates with Ottawa Police Services parking enforcement unit, alerting them that a new street or group of homes have now been included in the permit parking area.

Alternatively, the City of Seattle, while allowing for a resident-initiated process, also creates permit areas proactively when a new vehicle trip generator is anticipated in a neighbourhood, whether it is a hospital, university, or new rapid transit station. This is due to the kinds of issues that the City of Seattle's ROPPP has been set up to solve. Public Sector Employee #2 advised that the main goal Seattle's ROPPP is "ensuring local streets do not become commuter parking lots". This is evident in the kinds of restrictions that the City of Seattle imposes on streets in their permit areas, allowing for short term parking but restrict anyone other than permit holders from parking for longer than the posted limit. While Seattle undertakes proactive steps to introduce new permit areas, resident-initiated processes do exist but the reasoning behind the requests can vary as Public Sector Employee #2 told me that "people will ask for a zone to be created because of the dance studio down the street".

**Administering and Managing the Program:**

The administration of each municipality's program varies drastically and can largely be traced back to the problem the municipality aims to solve. In the case of the City of Toronto, its ROPPP was set up for the express purpose of allowing for residents without access to off-street options to park their motor vehicles while they were not in use. This has led to an enforcement regime where permit holders are prioritized, for the most part, during the evening, with many

permit parking areas have signage showing “No Parking 12:01 AM to 7:00 AM except by permit”. Public Sector Employee #1 did inform me that there are approximately 67 different enforcement hours throughout the City of Toronto’s ROPPP. In some cases, with a street that is just off of a commercial street, visitors to the street will elect to park for free on the side street while running errands in the evening making it difficult for residents to find parking when they return home. This has led to some streets also having a permitholders only times between 4:00 PM and 6:00 PM. To this end, however, the City of Seattle and the City of Ottawa’s enforcement model could provide some insights for the City of Toronto.

In both the City of Seattle and Ottawa, their program is set up to allow for short term parking at all times, unless the vehicle being parked belongs to a permitholder. There are no restrictions as to how long a permitholder may park. While this does solve the issue of ensuring turnover, in high-traffic areas where parking spillover occurs often, the enforced turnover does not necessarily provide the same effects. Public Sector Employees #2 and #3 raised the issue of large hospitals in Seattle and Ottawa respectively, both situated in residential neighbourhoods and experience parking overflow consistently. In the case of Ottawa’s hospital, there is no surrounding permit parking area and the community has to contend with patients and staff parking on local streets for the duration of their appointments or shifts, making it incredibly difficult for visitors and other services to access residences. The problem became so acute that when the hospital undertook an extensive renovation with the construction of a new campus approximately 500 metres to the east, the hospital elected to construct a brand new 2,500 space above ground parking garage for $135 million (Egan, 2021). Public Sector Employee #3 and Private Sector Employees #2 and #3, transportation engineers working in Ottawa have cited this specific case as a growing challenge. In the City of Seattle’s case, the hospital does have a

surrounding permit area that only allows permitholders to park beyond the 3-hour maximum. However, as Public Sector Employee #2 added, the hospital has bought permits for their staff in bulk, thus defeating the purpose of having the ROPPP around the hospital in the first place. They further added that universities and other large institutions make similar decisions.

**Challenges and Potential Solutions:**

Toronto, Seattle, and Ottawa differ from each other in many important ways that impact how they make policy decisions. For example, the City of Ottawa is known for its more intense snowfall when compared with most cities. The city has taken extensive steps to combat this environmental challenge and the disruptions it can cause to their respective transportation network by *removing* the snow from the right of way, as opposed to the City of Toronto that only *clears* the snow to another part of the public right-of-way. While the City of Ottawa does perform clearing, once these operations are complete, municipal trucks collect the snow and transport it to disposal centres to be melted and/or store until the end of the season. Public Sector Employee #3 confirmed that in order to support snow removal the City of Ottawa charges a higher price for permits during the winter months.

A second challenge that Public Sector Employee #3 raised is that parking strategies in areas not covered by the City of Ottawa's ROPPP are not keeping up with the rate of growth in certain neighbourhoods. Public Sector Employee #3 clarified that some neighbourhoods, that are currently seeing residential intensification on local streets, are not part of the City of Ottawa's ROPPP and new developments within these communities do not provide the same rate of off-street parking as they once did due to changes to the Zoning By-law. This has led to new residents parking on street overnight and, due to hybrid work, also parking on the street during the day, limiting turnover and access to other services on the street. Public Sector Employee #3

further shared that city staff, and local councillors, have raised the idea of introducing the ROPPP, but local residents rejected the idea as they did not believe that paying for parking on their own street was fair.

The City of Seattle deals with challenges of equity as well, as Public Employee #2 told me that there are a few permit areas in their ROPPP that, at one point, qualified for permits to be subsidized below the current $95 rate, but due to demographic changes and displacement, the current residents would not qualify for such subsidies. It has led to a highly politicized situation that no councillor has the political appetite for. Additionally, they argued that Seattle's current process of renewing permits is antiquated and leads to significant confusion. As it stands, each permit area has its own renewal schedule on a two-year cycle with a permit lasting for those entire two years. Importantly, permits are not interchangeable between permit areas meaning if a resident were to move zones in the middle of the two-year term, they would have to get a new permit with the old permit becoming a sunk cost. Public Sector Employee #2 acknowledged that this is a severe constraint on the system that needs to be fixed but would likely require years of study to bring all permit areas in line to the same schedule.

The City of Toronto's challenges, in comparison to Seattle and Ottawa do not strike me to be as fundamental, in that the challenges raised by both Public Sector Employee #1 and those I have witnessed primarily have to do with the functioning of the street as both a space for the storage of motor vehicles as well as a thoroughfare. The main challenge that Public Sector Employee #1 raised is the current issues with deliveries and trades workers contravening parking by-laws by mounting the curb while they're making a delivery or working. While this behaviour has an out-sized impact on pedestrians, particularly those with mobility issues, it can also block through traffic, leading to an unsafe situation for all road users. Public Employee #1

acknowledged this but qualified it by saying “these infractions are shorter term and don’t really make that much of a difference in the overall functioning of a street”.

All three Public Sector Employees emphasized that there are solutions being explored and communication between different municipalities for policy exchange is an underlying strategy that they each look to. For example, the City of Ottawa, when dealing with densifying neighbourhoods, has explored Transportation Demand Management (TDM) strategies, to change the way residents travel in the city, whether by providing more than the required bicycle parking or providing new residents with a year’s-worth of monthly transit passes. A salient example of TDM in the context of on-street parking is the role that car-sharing services play. Whereas now, all car sharing vehicles must be parked in an off-street parking spot, Public Sector Employee #3 advised that in summer 2026, the City of Ottawa is piloting free floating carshare spots in several neighbourhoods around the city, not just in already existing permit areas, but in neighbourhoods where the lack of a permit area has been an issue, such as Hintonburg or Westboro.

The City of Toronto, in its bid to handle the over-crowding on streets in permit areas is preparing a report that will likely recommend raising the price of permits for larger vehicles and create a subsidized class of permits for smaller and/or electric vehicles to encourage more efficient uses of residential curb space. Public Employee #1 stated that due to the controversial nature of some of the anticipated recommendations, the report is forthcoming with an expected release to city council in 2027, once the 2026 municipal election has concluded. Additionally, for the purposes of enforcement, Public Sector Employee #1 advised that the city is looking into emergent technologies such as automatic license plate readers to enforce some of the more minute infractions such as blocking a lane of traffic or mounting the sidewalk. However, due to

recent provincial legislation, banning the use of automated speed enforcement cameras, it remains to be seen what the impact could be on this kind of enforcement technology.

### 5.1.2 Private Sector Employees

As private sector transportation planning work involves a variety of subject matters from highly technical process of engineering and designing roads to municipal policy consulting, the subjects of the interviews with Private Sector Employees varied greatly. Conversations primarily focussed on the pressures that new developments, whether multi-plex or high-rises can place on a neighbourhood's already scarce parking supply. Although not directly making policy related to ROPPPs, these private sector experts work within the constraints of the system and raised important strategies for new developments to avoid contributing to existing strains on the parking supply.

**New Developments:**

The most common aspect of parking policy that was repeatedly raised by private sector employees was TDM strategies and their impact on reducing new residents' reliance on on-street parking. Private Sector Employee #2 provided the definition of TDM as "a set of policies a developer will enact to create a culture that is less reliant on cars". These policies can range from a developer entering into a contract with a carsharing company to host vehicles on site or providing residents with a year's worth of transit fares on a pre-loaded transit card. Private Sector Employee #3 added that while the strategies can be explicit, sometimes TDM policies are also implicit, as a development can brand itself to a certain audience who would prioritize a car-free lifestyle. Private Sector Employee #1 corroborated this, advising that many developments make it explicitly clear that a lease or purchase of a unit in their building will not result in a

guaranteed parking spot, or a parking spot at all, thus letting prospective residents self-select out of living in that particular development.

These strategies, according to Private Sector Employee #1 go a long way in alleviating the concerns of councillors and residents alike as to the possibility of parking spillover impacting on-street supply, especially if the neighbourhood is within a permit parking area. The City of Toronto allows councillors to exclude a new development from accessing the permit parking area to further allay community concerns as an externally enforced TDM strategy (Wener, 2026)

While the community and councillors may place a lot of concern on high-rise developments and their potential to impact on-street parking, I was also curious to know about the effects that multiplex housing can have on on-street supply. This housing type is one that municipalities across Canada, and particularly Ontario, are encouraging. Legalizing the ability to construct four to six units where previously only one would have been allowed, helps to maintain a stable population and administer services to more people over a smaller geographic area (City of Toronto, 2021a). However, this housing type proves challenging, if not impossible, to accommodate off-street parking, according to Private Sector Employee #1. They cited the lack of design standards for off-street parking and the physical constraints of a multiplex site. While there is the possibility of waiving mandated drive aisle widths from six metres to four-metres, Private Sector Employee #1 mentioned that even this policy was waived, it is still taking away curb space from the on-street supply. Private Sector Employee #2 did identify requiring TDM strategies even for multiplexes, should they fall within specific areas designated under their official plan or zoning by-law. However, they added that in the case of Ottawa, where they work, multiplex construction has not reached the level where they could definitively say if this approach was effective.

Shifting focus away from the infrastructure of ROPPPs, Private Sector Employee #1 provided further details on municipalities' approaches to the issues that on-street parking poses. They have produced two policy reports for two separate municipalities in the Greater Toronto Area, examining solutions for on-street parking. In their findings, they mentioned that on-street permit parking, when compared to an off-street option, allows for the operator to recoup on the capital costs in approximately one year, compared to the twenty-eight it takes for an off-street parking garage. This relationship is one that the City of Toronto (1968) makes clear as the report recommending the establishment of the city's ROPPP only contemplated the program to run until such a time that the city could afford to acquire land to construct new parking garages. However, as Private Sector Employee #1 pointed out, transportation planning has evolved to the point where no municipality would elect to construct a new parking garage, many municipalities are now pre-emptively implementing ROPPPs to get ahead of the anticipated problem of parking spill-over.

Across all participant interviews, one of the main themes that appeared throughout was the acknowledgement that transportation planning is and should move away from planning for private motor vehicles. However, there remains differences as to how fast this shift should take and what policy tools can be leveraged to encourage this change. My expectations prior to conducting the interviews were that there would be a more decisive split between public sector and private sector employees as to how best to deal with the challenges that come with parking policy and ROPPPs. To my surprise, there was little consistency in what approach each interview advocated for or what opinion they shared as some public sector employees agreed with ambitious policies from other municipalities while private sector employees were cautious to say that more radical change was the best way to go.

ROPPPs, being the geographically bound programs that they are, are created and altered based on the specific context in which they exist. Interviews provided the basis of two different ROPPP systems, each set up to solve a different and prioritize a different user. The City of Seattle and the City of Ottawa's systems seek to prioritize residents over non-residents at all times by granting permitholders special rights outside of short-term parking, this does run the risk of keeping out a certain level of acceptable traffic infiltration that would otherwise benefit local businesses or increase transit ridership. Moreover, when permits are able to be purchased by non-residential uses such as hospitals or universities as is the case in Seattle and Ottawa, the ROPPP can be taken advantage of as the purchasing power of a large institution will inevitably outweigh a single household. Factors impacting permits per person in systems like that of Seattle can vary drastically given the ability of a wide variety of users to purchase permits. But, in the case of Toronto, where only residents are able to access a system that is set up to prioritize their access to curb space over others, can provide a more concise analysis as discussed in the quantitative analysis below.

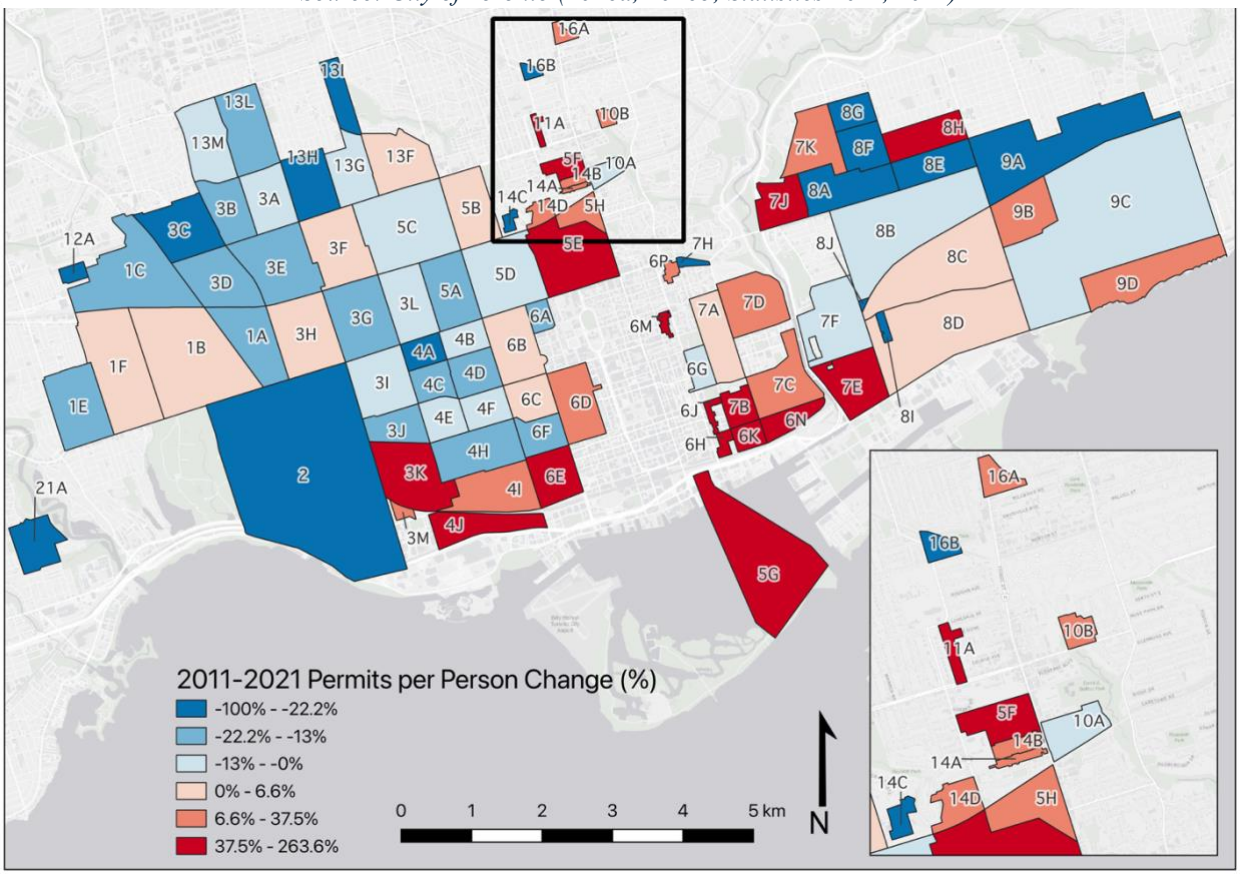
## 5.2 Quantitative Analysis

### 5.2.1 Spatial Exploration

GIS analysis revealed a high-level understanding of the spatial trends of the change in permits per person, mode share, and permits per person. As Figure 4 illustrates, most permit areas saw a decrease in permits per person, with specific areas such as East York and west

*Figure 4: Percentage Change in Permits Per Person for All Permit Areas (2011-2021)*

*Source: City of Toronto (2026a, 2026b; Statistics 2011, 2021)*

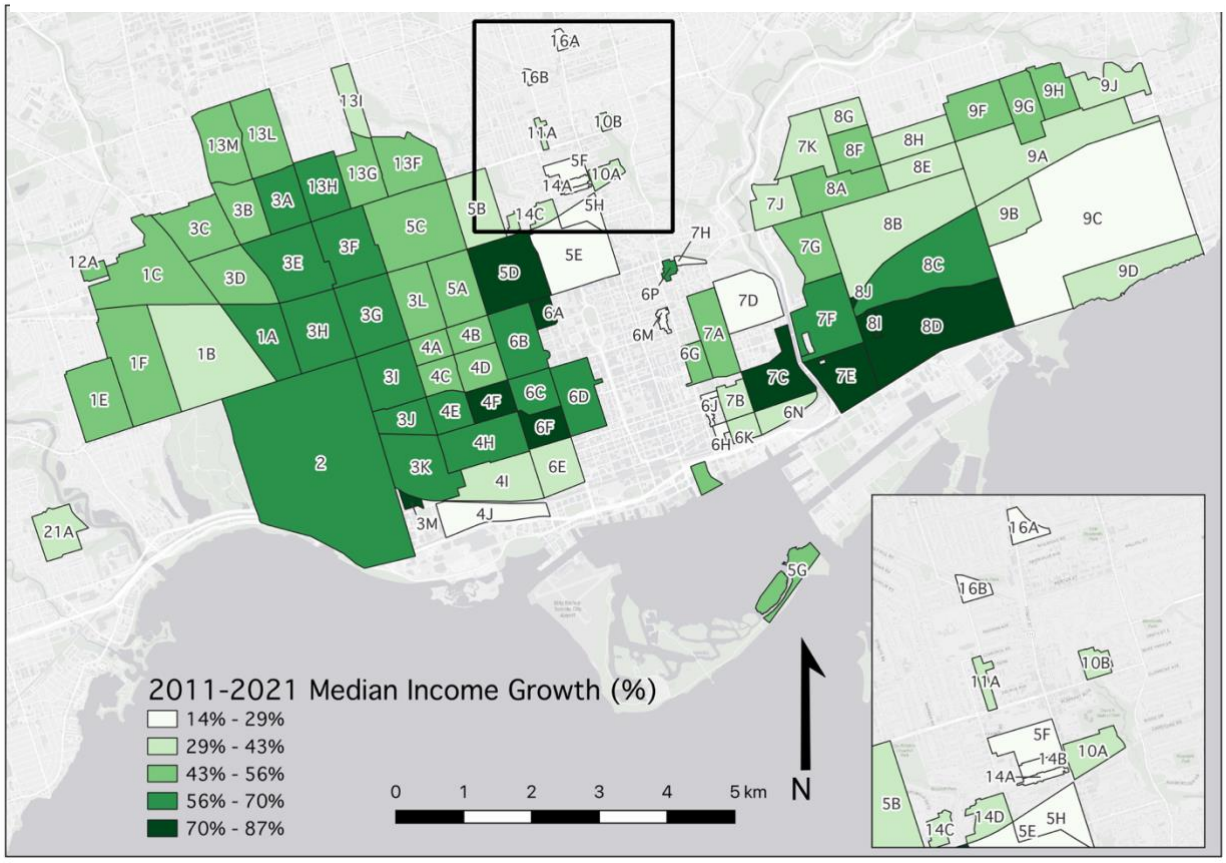



downtown having clusters of permit areas with a decrease in permits per person. Conversely, the areas where permits per person are largely concentrated in midtown and the south core, show a spatial stratification as to which areas are seeing an increase in demand for curb space.

Income grew across all permit areas throughout the study period. Although it should be noted that the rate of growth and which permit areas saw such growth was not distributed evenly as shown in Figure 5. Of note is with except of 7E, all permit areas that saw extensive growth in median income also experienced a minimal if not a loss of permits per person.

*Figure 5: Median Income Growth by Percentage for All Permit Areas (2011-2016)*

*Source: (City of Toronto, 2026a, 2026b; Statistics Canada, 2011, 2021)*




A dominant mode share analysis was conducted for 2011 and 2021 to visualize what the dominant mode share was in each permit area was throughout the study period. Of note in Figure 6 and Figure 7 a near-inversion of auto mode share and public transit mode share. It is highly likely that the reason for this drastic shift from public transit to driving is due to the COVID-19

Pandemic when the TTC saw a 71% drop in total ridership (Chen 2024). However, the drop in ridership was not spread evenly among all types of trips within the TTC with the subway and streetcar network seeing the largest decrease in ridership with routes that are clustered in the downtown core where all permit parking areas are located (Du & Haider, 2025)

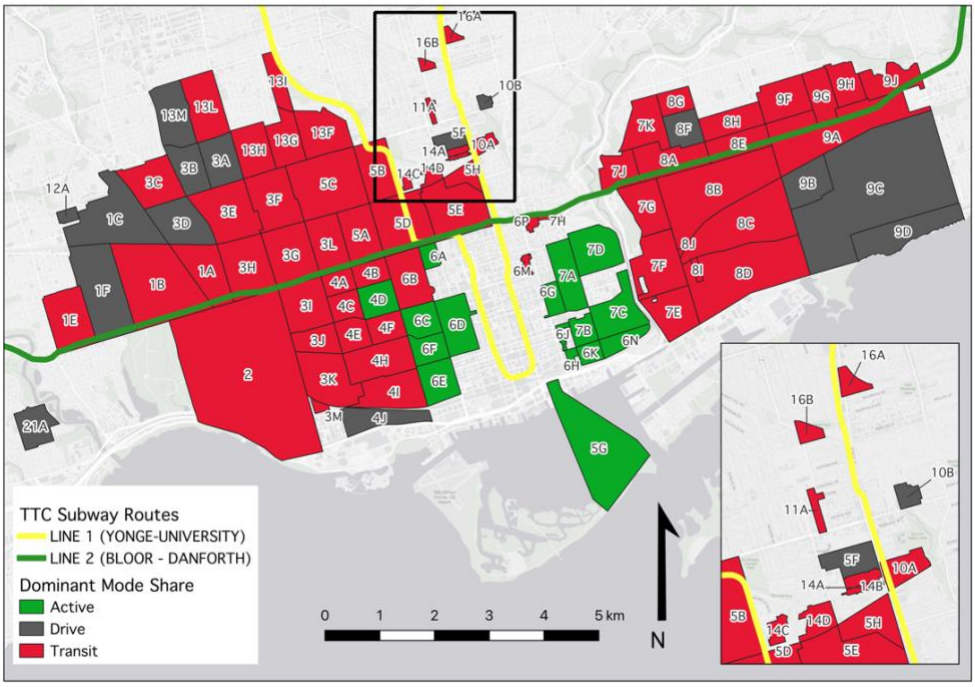



*Figure 7: 2011 Dominant Mode Share by Permit Area*

*Source: (City of Toronto, 2019, 2026a, 2026b; Statistics Canada, 2011)*

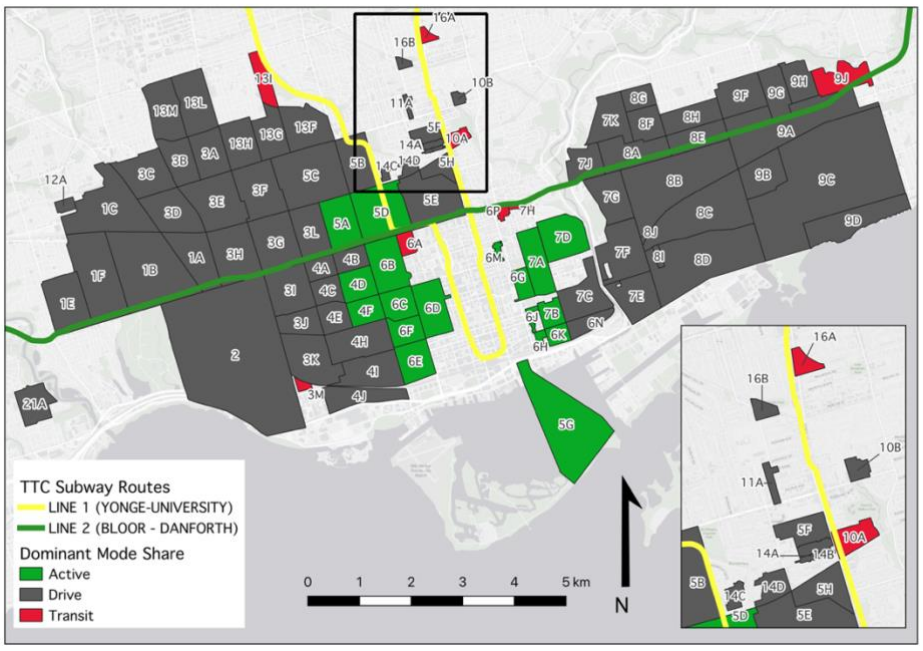



*Figure 6: 2021 Dominant Mode Share by Permit Area*

*Source: (City of Toronto, 2019, 2026a, 2026b; Statistics Canada, 2021)*

### 5.2.2 Descriptive Statistics

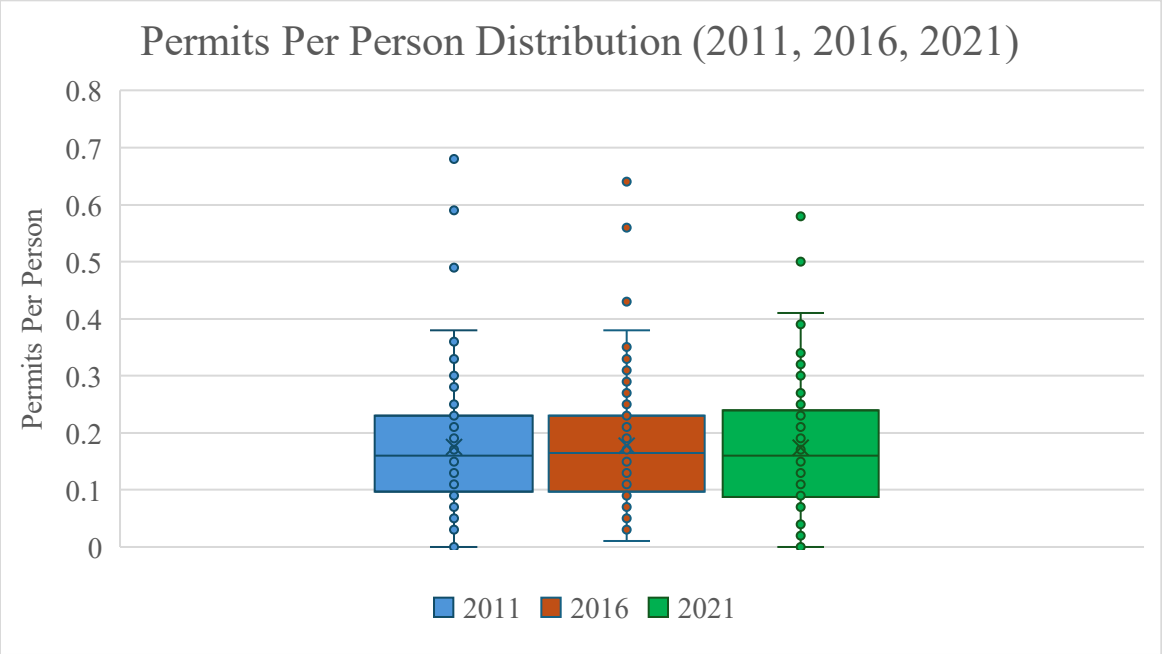
A summary of descriptive statistics for the dependent variable, permits per person for the entire study period (2011-2021) is shown for each study year below in Table 4. Furthermore, Figure 8 illustrates the distribution of permits per person for each year in the study period. As shown, the distribution of the dataset remains constant throughout the study with moderate growth in the in the fourth and first quartiles in 2021.

*Table 4: Descriptive Statistics Summary of Permits Per Person for All Study Years*

| Year | Mean | Median | Standard Deviation | Minimum Value | Maximum Value |
|---|---|---|---|---|---|
| 2011 | 0.179 | 0.16 | 0.1147 | 0.01 | 0.68 |
| 2016 | 0.179 | 0.17 | 0.1101 | 0.03 | 0.64 |
| 2021 | 0.184 | 0.17 | 0.1146 | 0.02 | 0.58 |

*Figure 8: Distribution of Permits Per Person Across All Permit Areas for Each Study Year*

*Source: (Statistics Canada, 2011, 2016, 2021)*

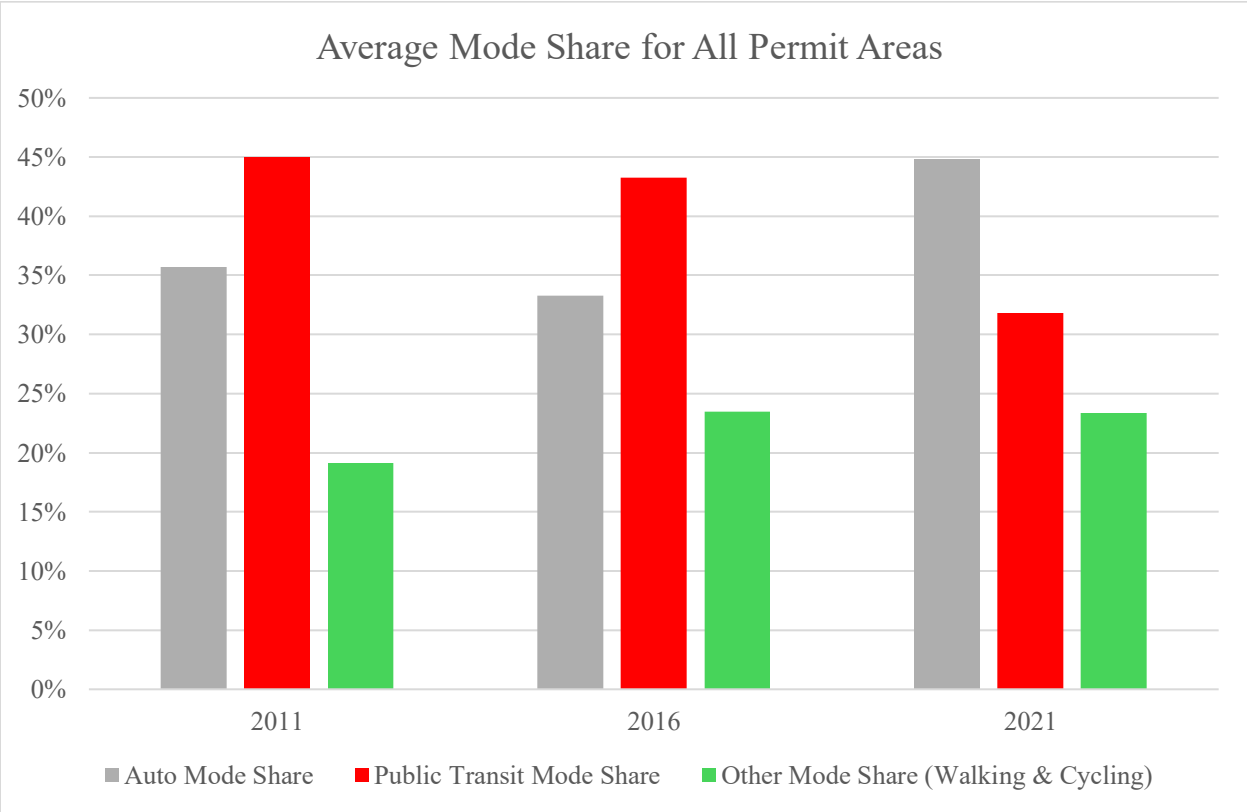



As illustrated in Figure 9, mode share remained constant between 2011 and 2016 but saw an inversion between public transit users and drivers, with driving overtaking public transit use

in 2021 and small growth in active mode share such as walking and cycling between 2016 and 2021. This trend can be attributed to the COVID-19 pandemic that saw a significant decrease in public transit ridership while significant investment in active transportation infrastructure along major arterial roads such as Bloor Street/Danforth Avenue and Yonge Street where many of the permit parking areas are clustered (Chen, 2024; Wilson & Mitra, 2020).

*Figure 9: Dominant Mode Share for All Permit Areas in Each Study Year*

*Source: (Statistics Canada, 2011, 2016, 2021)*

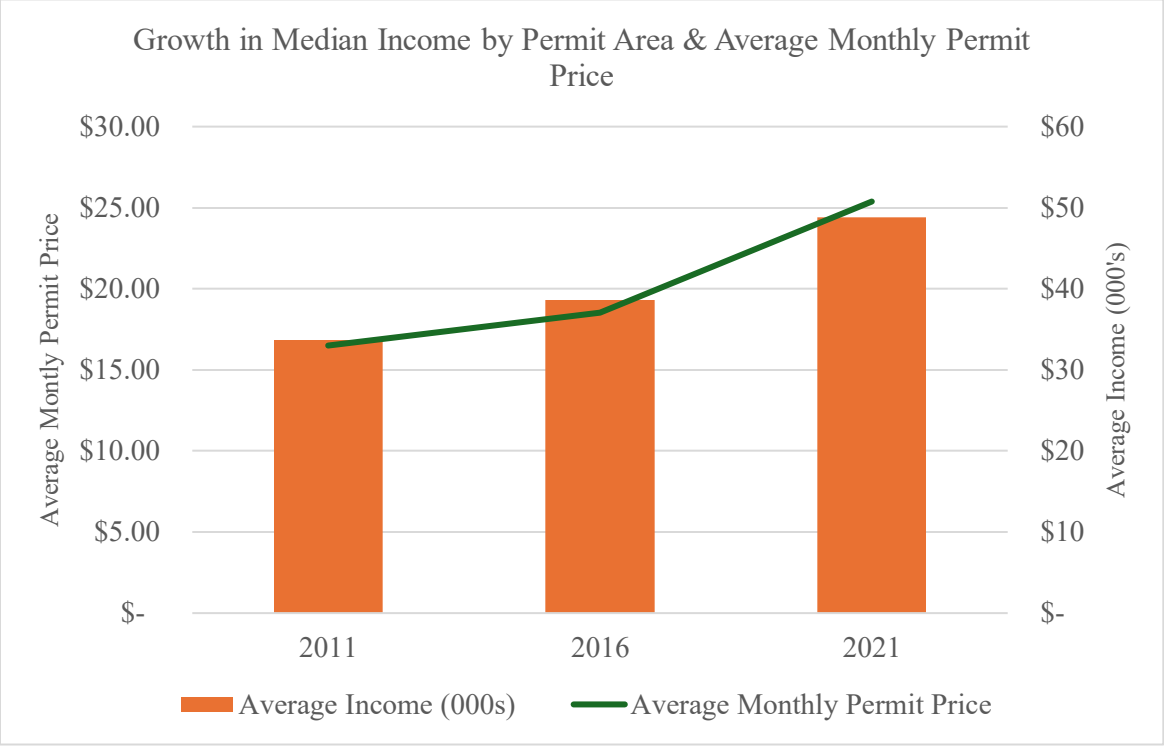



Income across all permit areas grew considerably throughout the study period with a compounded annual growth rate of 3% from $33,700 in 2011 to $49,000 in 2021. As shown in Figure 10, when compared with the average monthly price of a permit, a similar compounded annual growth rate of 4% was observed, indicating that permits are a relatively inelastic good with room for a moderate price increase. This is supported by the scholarship as those with

higher-incomes are more likely to have a higher willingness-to-pay even when they have an off-street parking space available to them (Taylor, 2020; Maas & Watson, 2018).

*Figure 10: Growth in Median Income for All Permits Areas & Average Monthly Permit Price*

*Source: (City of Toronto, 2026b; Statistics Canada, 2011, 2016, 2021)*




### 5.2.3 Quartile Analysis and Quantile Regression Analysis

Quartile analysis revealed that there is a statistically significant difference between the first and fourth quartiles in each study year and further develops on the trends established in the descriptive statistics of the entire data set. The difference in means analysis (t-test) compared the means for the first and fourth quartiles for each year ranked by permits per person. A summary of this difference in means analysis is shown below in Table 5.The resulting analysis confirmed not only that the quartiles' means are statistically different from one another but also that the first

and fourth quartiles are becoming further polarized. The growing gap between the first and the fourth quartiles indicates that areas with high permits per person are further entrenching the subsidy provided by the city's ROPPP while areas with low permits per person are able to opt out of the program. Given the costs of under-priced parking and curb space overcrowding such as increased traffic congestion and search times for parking established in the literature (Shoup, 2006; Guerra & Daziano, 2020), it can be assumed that areas in the fourth quartile have borne these costs at an uneven rate compared to other permit areas.

*Table 5: Difference in Means Test for Permits Per Person (First and Fourth Quartiles)*

| **Year** | **Quartile Means** | | **P(T<=t) two tail** |
|---|---|---|---|
| | First Quartile | Fourth Quartile | |
| 2011 | 0.06 | 0.33 | 0.0101 |
| 2016 | 0.06 | 0.33 | 0.0027 |
| 2021 | 0.05 | 0.35 | 0.0004 |

It is important to note in the table above that although the averages in the first and fourth quartiles remain the same in both 2011 and 2016, the difference in standard deviations between the two years creating the deepening differences observed in the p-value. Upon establishing that there is a statistically meaningful difference between the first and fourth quartiles in each study year, the quantile regression analysis was able to provide further insights as to the unique relationship the highest and lowest quartiles have with the independent variables. A summary of this quantile regression analysis is illustrated below in Table 6,

Table 7, and Table 8.

*Table 6: 2011 Quantile Regression Analysis Output for Permits Per Person*

| **2011** | Percentile | | | | |
|---|---|---|---|---|---|
| Independent Variable | 10th | 25th | 50th | 75th | 90th |
| Median Income | *0.048*<br>(0.046) | *0.072**<br>(0.042) | *0.135***<br>(0.058) | *0.285****<br>(0.057) | *0.328****<br>(0.112) |
| Public Transit Mode Share | *-0.215*<br>(0.135) | *-0.017*<br>(0.1932) | *-0.159*<br>(0.1854) | *-0.333*<br>(0.241) | *-0.275*<br>(0.396) |
| Active Mode Share (Walking & Cycling) | *-0.072*<br>(0.059) | *-0.134*<br>(0.087) | *-0.041*<br>(0.099) | *-0.098*<br>(0.1271) | *-0.004*<br>(0.283) |

*Regression Coefficient* (Standard Error)
*Statistically valid at $p \leq 0.1$
**Statistically valid at $\leq 0.05$
***Statistically valid at $\leq 0.01$

*Table 7: 2016 Quantile Regression Analysis for Permits Per Person*

| **2016** | Percentile | | | | |
|---|---|---|---|---|---|
| Independent Variable | 10th | 25th | 50th | 75th | 90th |
| Median Income | *-0.004*<br>(0.035) | *0.030*<br>(0.053) | *0.1374****<br>(0.041) | *0.233****<br>(0.037) | *0.225***<br>(0.1101) |
| Public Transit Mode Share | *-0.156*<br>(0.189) | *-0.369*<br>(0.2298) | *-0.285***<br>(0.142) | *-0.221*<br>(0.162) | *-0.425*<br>(0.421) |
| Active Mode Share (Walking & Cycling) | *-0.101*<br>(0.1201) | *-0.261***<br>(0.123) | *-0.036*<br>(0.076) | *-0.027*<br>(0.107) | *-0.118*<br>(0.2596) |

*Regression Coefficient* (Standard Error)
*Statistically valid at $p \leq 0.1$
**Statistically valid at $p \leq 0.05$
***Statistically valid at $p \leq 0.01$

*Table 8: 2021 Quantile Regression Analysis for Permits Per Person*

| **2021** | Percentile | | | | |
|---|---|---|---|---|---|
| Independent Variable | 10th | 25th | 50th | 75th | 90th |
| Median Income | *-0.0861** (0.0510 | *-0.0488* (0.058) | *0.007* (0.051) | *0.209*** (0.064) | *0.188* (0.183) |
| Public Transit Mode Share | *-0.149* (0.1581) | *-0.493*** (0.201) | *-0.527**** (0.134) | *-0.508*** (0.248) | *-0.729* (0.657) |
| Active Mode Share (Walking & Cycling) | *-0.128* (0.099) | *-0.319**** (0.104) | *-0.172**** (0.048) | *-0.226** (0.130) | *-0.477* (0.322) |

*Regression Coefficient* (Standard Error)
*Statistically valid at $p \leq 0.1$
**Statistically valid at $p \leq 0.05$
***Statistically valid at $p \leq 0.01$

**Median Income:**

Median income's effect on permits per person is not evenly distributed across the data set's distribution. Permit areas with higher rates of permits per person are observed to be very sensitive to income while those with lower permits per person appearing to be relatively insensitive to income. This means that two permits areas that differ in their permits per person but see the same growth in median income would result in the higher permits per person area adding more permits while the area that already has a low permits per person remaining relatively the same. This trend is most prevalent and statistically significant through all study

years at the 75th percentile as a one percent increase income is associated with a 0.003, 0.002, and a 0.021 increase in permits per person across all study years while maintaining statistical validity at $p \leq 0.01$.

This association can be explained by several factors, some of which are not included in the scope of this research but still warrant brief consideration. The first explanation is that areas with high permits per person lack alternative transportation options other than a motor vehicle and therefore car ownership is high. Conversely, areas that have lower permits per person have ample alternative transportation options and don't need a car. A second explanation, although varying from the former, does incorporate the possibility of a lack of options for transportation. It could be the case that the high sensitivity to income of high permits per person areas is due to the built form and availability of off-street options.

It has been established in the literature that higher income tends to encourage higher car ownership (Guo, 2013, p. 41) which would explain the sensitivity in the higher percentiles but does not explain the effect in the lower percentiles. From the interview with Public Sector Employee #1, they outlined Toronto's tiered permit issuance system that charges progressively more for a monthly permit based on the needs of the applicant (see Figure 1). They added that the criteria of the third priority permit is that the application for a permit is out of convenience rather than necessity, usually indicating that they already have access to an off-street parking space but are either using that space for storage/non-parking purposes or the permit is for their second vehicle. This lack of sensitivity could be due to the model not capturing the amount of houses in a permit area already have access to an off-street spot and don't need access to the ROPPP. Data on the inventory of on street and off-street parking spaces in each permit area as

well as the breakdown of first, second, and third priority permits was not made available by the City of Toronto.

**Public Transit Mode Share:**

Given the overall trends observed in the entire dataset, specifically with the inversion of auto mode share and public transit mode share inverting between 2016 and 2021, due in large part to the COVID-19 pandemic, a similar relationship can be observed in the quantile regression analysis. As such, analysis of 2011 and 2016 are considered part of a trend while 2021 is understood to be anomalous. The association between public transit mode share and permits per person is the most consistent and strongest association of any of the three independent variables. While the strength of the association varies in the lower percentiles, the higher permits per person areas (in the $75^{th}$ percentile) are significantly impacted by a mode share shift from auto mode share to public transit. A one percent increase of public transit away from auto mode share is associated with a greater than 0.002 decrease in permits per person in all study years when income and active mode shares remain constant. This association has the highest impact and statistical significance in 2021 as a one percent shift from auto to public transit mode share results in a 0.0052 and 0.0051 decrease in permits per person in the $50^{th}$ and $75^{th}$ percentiles with the model statistically valid at $p \leq 0.01$ and $p \leq 0.05$ respectively.

This reveals an interesting break from the existing literature that is critical to the findings of this research. Guo & McDonnell (2013) found that residents in close proximity to public transit and those who are frequent users of public transit not only buy more permits but also are willing to pay more for those permits (p. 195). Additionally, Bondemark and Merkel (2023) found that public transit mode share had minimal, if any, impact on demand for permits from residents who lived within close proximity to a metro or light rail station (p. 8). A possible

explanation for this diversion from previous findings can be drawn from interviews with public sector employees. As outlined in 3.2.1, there is a fundamental difference between the kinds of rights granted to permitholders in Toronto's ROPPP when compared to other municipalities. From a jurisdictional scan, it appears that a negative rights system is the most common, where a permitholder is granted a "freedom from" non-residents parking in their neighbourhood usually to take advantage of nearby trip generators such a hospital or a rapid transit station. This is in contrast to Toronto's system which grants permitholders a "freedom to" to park in their respective permit parking areas overnight with some areas including a rush hour "permitholders only" time period.

As shared by Public Sector Employee #2, Seattle explicitly creates permit parking districts around light rail stations to avoid adjacent streets from becoming commuter parking lots. Bondemark & Merkel (2023) also cite the deterrence of non-resident parking around metro stations as a reason for setting up the permit parking areas under investigation in their research. It is through this lens that we can see why the literature observes transit as a permit accelerant as those in a negative rights system, regardless of if they use transit, require a permit to compete with parking infiltration. The effect observed in Toronto, however, provides the ROPPP with a unique opportunity to close the gap between the fourth and first quartiles of permit areas by using revenue from permits to invest in public transit.

**Active Mode Share:**

Similar to public transit, a one percent increase in active mode shares such as walking or cycling is associated in a decrease in permits per person across almost all percentiles in all study years. This association is not statistically valid in 2011 but sees increasing validity in 2016 and 2021. The percentiles where this association is consistently the strongest is the 25$^{th}$ and 50$^{th}$

percentiles where a one percent increase in active mode shares away from auto mode share is associated with a 0.003 and 0.002 decrease in permits per person respectively. This association is statistically valid at $p \leq 0.01$ for both observations.

The quantitative analysis establishes several trends in the City of Toronto's ROPPP namely that there are costs associated with the current ROPPP that are distributed unevenly across permit parking areas. The growing gap between permit areas with the highest permits per person and those with the lowest indicates that the subsidy provided to permitholders is only impacting areas that are already auto dependent and over-subscribed and getting worse. This uneven distribution of permits produces an opportunity and mobility cost to residents of these high permits per person areas as there is dwindling curb space available for other uses such as short-term delivery and visitors. Income does not have a uniform effect across the dataset's distribution with higher permits per person areas observed to be highly sensitive shifts in median income versus the relative insensitivity when it comes to lower permits per person area. While further explanations of this observation require a broader analysis of variables not available in this paper, this trend presents significant opportunity costs to areas with high permits per person as this relationship implies there is a risk that these areas will continue to entrench their auto-dependency. Public transit mode share, however, provides an intriguing solution as it is shown to be a strong depressor of permits per person across all percentiles. Toronto's current revenue neutral system presents serious mobility and opportunity costs when a method to stabilize the observed polarization between the lowest and highest permits per person areas is available – funding public transit.

# 6 Discussion and Policy Recommendations

## 6.1 The Costs

The City of Toronto's ROPPP provides an important service to residents who own a motor vehicle and who would otherwise be unable to legally store their motor vehicle. This program, while helpful to permit holders presents several costs to residents of permit areas both permitholders and non-permitholders alike. These costs can broadly be defined as opportunity costs and mobility costs.

Opportunity costs, in the context of this research can be understood through Guo & McDonnell's (2013) definition "What is more, the opportunity cost of this (parking) space is what could otherwise occupy that space, e.g. extended sidewalks, pocket parks, bike lanes etc, available to everybody." (p. 187). While there is a financial aspect to this cost, as will be discussed below, the lens through which the opportunity costs of Toronto's ROPPP is interrogating what else could take the place of a parking spot.

Mobility costs, cover a broad array of impacts of residents but primarily involve entrenching a system the prioritizes those inside a private motor vehicle over people outside of a vehicle. Overcrowded curb space often results in negative outcomes for all involve from the person trying to park their vehicle taking longer to find a parking space to inability of a courier opting to block a sidewalk because there aren't any convenient parking spaces. Mobility costs pertain to the conditions that create these negative externalities.

### 6.1.1 Opportunity Costs

The strongest indicator of opportunity costs present in Toronto's ROPPP is the sensitivity that higher permits per person areas have in relation to income. This association indicates that in higher permit areas, there is a higher willingness to pay than in other, less subscribed permit areas and that residents are more likely to be able to bear an increase in the price of an average monthly permit. By maintaining a flat fee for all Priority 1 permits, regardless of location and permit area subscription, the City of Toronto is opting to allow already high permits per person areas to continue experiencing the negative externalities that come with overcrowded curb space. This process is also cyclical, by entrenching high permit areas with a growing share of the permits, future infrastructure projects that may come at the expense of removing parking becomes a highly politicized process.

*Figure 11: GMC Pickup Truck with Permit Decals Parked Illegally Over a Crosswalk on Roxton Road, Toronto (Wener, 2023)*




As Public Sector Employee #1 shared, the City of Toronto's ROPPP is a revenue neutral program where revenue collected from the cost of permits is used to fund the salaries of staff who administer the program, the placement/maintenance of signage, and street cleaning. While this indicates a successful and well-run program, it does not cover the additional maintenance cost of the wear-and-tear on roads, especially as the average size and weight of a motor vehicle increases (Marshall, 2024). While it is important that, as Public Sector Employee #1 shared, certain classes of vehicles are prohibited from

obtaining an on street permit due to their size being incongruous with the local character of the street, this does not account for the fact that permissible vehicles are growing to be as large as a non-permissible vehicle (Figure 11). It is the increasing size of vehicles that poses a risk to the financial viability to the ROPPP as owners of larger vehicles would be paying the same amount for a permit as the owner of a compact vehicle or a resident who does not own a vehicle at all. Under the current revenue neutral program, those with smaller vehicles or who do not own any vehicle will be paying a disproportionate amount of their municipal taxes toward the repair of an amenity that they do not use to the same severity as those with larger vehicles.

As these heavier and larger vehicles become common place, the expected life cycle of road repairs will likely change as well. As Public Sector Employee #1 and #3 advised this is something that their respective infrastructure services departments do take into consideration. In the case of the City of Toronto, a local is expected to provide approximately 100 years of service with three or four resurfacing treatments every 20-30 years (Gray, 2021). At present, the City of Toronto estimates, depending on the scope of the work, a resurfacing project costs approximately \$75-\$90 per $m^2$ for smaller resurfacing jobs while a full road reconstruction involving sidewalk and curb reconstruction costs approximately \$1,000,000 per kilometre (City of Toronto, personal communication, 2026). While the city assumes a current rate of reconstruction twice to three times during a local road's life cycle, allowing heavier and larger vehicles to park and use the street at the same rate as medium or compact vehicles, may results in this estimation being a conservative projection.

### 6.1.2 Mobility Costs

Perhaps the most tangible cost revealed through this research is the cost to a resident's mobility. While it has already been established that the under-pricing of permit parking induces

auto-dependency (Guo, 2013; Shoup, 2017), this cost has often been considered through the lens of what this does to those driving. While it is important to note that overreliance on motor vehicles make their drivers unhealthy (Goodyear & Gordon, 2025; Nieuwenhuijsen, 2024) it is the impact those around and outside motor vehicles, whether moving or parked, who bear a far greater risk.

The empirical findings of this research back up that this mobility cost is a growing concern in Toronto's ROPPP. The findings produced in the quartile analysis showing that the first and fourth quartiles of permit areas are diverging in terms of permits per person indicate a future where residents in high permits per person areas come across blocked sidewalks. Other permit areas' curb space is able to accommodate the wide array of short term and long term uses that residents require. The association between public transit mode share a reduction of permits per person also presents a quantitative grounding of this mobility cost. Areas with high permits per person under the current revenue neutral program see their monthly payments go toward the maintenance of the system that is actively making it more difficult to walk or cycle around their neighbourhood when it could be used to fund better alternative transportation options.

With the concomitant rise of remote working arrangements and algorithm-governed door-to-door delivery services such as Uber Eats or Amazon Prime, local streets are forced to perform several functions at once, many of which they were not constructed to do. As remote workers are

not vacating their on-street parking spots on as consistent of a basis, delivery drivers, and other short-term visitors to the street are forced to park illegally for the duration of their visit. These infractions include stopping in the middle of the street, halting vehicular traffic, or mounting a curb and blocking a sidewalk to pedestrians (Figure 12). Regardless of how short these infractions last, they should be considered an unnecessary risk for all road users, particularly for those with mobility issues who may not be able to step off a curb and walk around a vehicle. Furthermore, as discussed by Guo and Schloeter (2013), the non-negotiable nature of on-street parking as a component of street design means forgoing alternative uses for this space.

*Figure 12: Delivery Truck Blocking Sidewalk on Crawford Street, Toronto (Wener, 2023)*



## 6.2 Policy Recommendations

This research illustrates a situation where permit areas currently experiencing overcrowding will continue to experience a shrinking supply of curb space, while permit areas with low permits per person will continue to reap the benefits of subsidized motor vehicle storage on public streets. While a main goal of this investigation was to understand the costs that the current administration bears, it was also provide policy alternatives rooted in the empirical evidence that the analysis produced along with feedback from industry professionals both in the private and public sector. I present three potential policy pathways that, based on this analysis, the City of Toronto should consider ensuring a more equitable use of road space on local roads

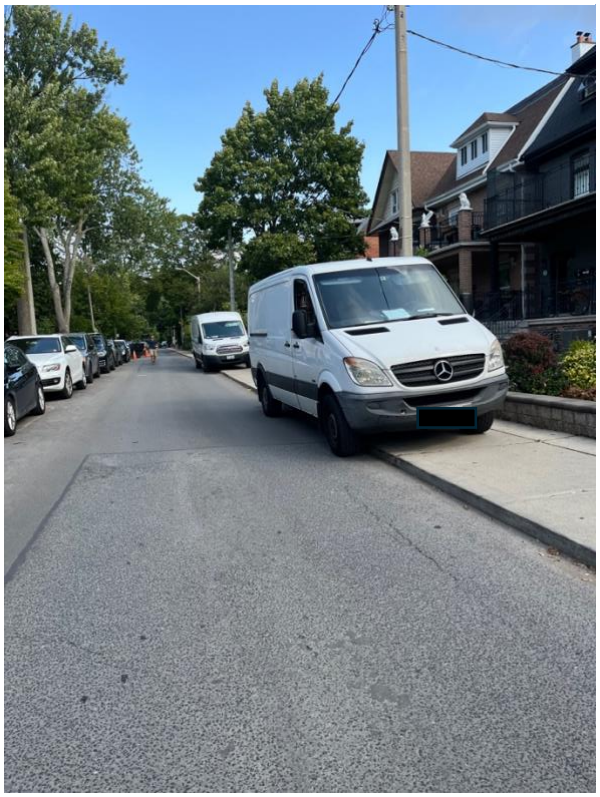
that builds safer and more sustainable streets for all road users. They range in their depth of change required from a "Do Nothing" scenario to a complete overhaul of how the City of Toronto organizes its ROPPP.

### 6.2.1 Status Quo

As a base scenario, a "business as usual" approach would maintain the ROPPP's role as a basic service to residents, providing space to store private motor vehicles on public roads. The average monthly price of a permit would be managed by the City of Toronto as to ensure it is not cost-prohibitive to lower income users and that revenue collected remains at a level to maintain staff responsibilities such, writing policies, amending by-laws, and repairing/installing signage as needed.

This policy presents several challenges for a city that intends to grow in the way the Toronto does. These costs are illustrated throughout this major research paper and can be expected to work until such time that the converging trends of residential intensification on local roads and the growth of algorithm-based delivery services make curb space scarce enough that alternative solutions need to be implemented anyway (City of Toronto, 2026c; Altenried, 2019). As the city prices its permits at a flat rate, regardless of size or weight, there is the risk that greater damage could be made to local

*Figure 13: Two Sprinter Vans Blocking Sidewalk on Grace Street, Toronto (Wener, 2025)*



roads leading to repairs of a larger scope and frequency and pedestrians will continue to face barriers on local streets as overcrowded curb space forces delivery drivers on to the sidewalk (Figure 13). While the status quo pathway does not in any way present an existential issue to Toronto's local residential streets, but within the context of the City of Toronto's climate goals as laid out in its "TransformTO Net Zero Strategy" (City of Toronto, 2021a) and its road safety aspirations highlighted in the "Toronto Complete Streets Guidelines" (City of Toronto, 2019), rethinking the role that a local street can play should be implemented in the future of Toronto's ROPPP.

### 6.2.2 Moderate Reform

This policy pathway would see the City of Toronto's ROPPP shift away from a revenue-neutral program to a revenue-generating program that would reinvest funds into improvements to public transportation and active transportation infrastructure as well as subsidize permits for low-income residents and those with mobility challenges. The city would price permits based on weight or size, while also maintaining its priority system, charging progressively more if a household already has one permit or access to an off-street parking space. This would allow for the price to accurately reflect the amount of space a motor vehicle is taking up on a street and act as a deterrent to purchasing larger vehicles that are incompatible with local roads. This policy has also been pursued in cities such as West Vancouver and in the Montréal borough of Rosemont-La Petite Patrie. In both cases, there are specific carve outs designated for low-income households with Vancouver charging half the price of a market rate permit and Montréal charging approximately 80% of their average vehicle weight permit (City of Vancouver, n.d.; Ville de Montréal). Montréal also provides a specific reduced permit fee for those with limited mobility at the same reduced rate as a low-income permit (Ville de Montréal, 2026).

Toronto's unique "positive rights" system puts it in an advantageous position to leverage potential permit funds for public transit investment. Whereas other cities have implemented their ROPPPs explicitly for the purpose of discouraging the use of local roads as a commuter parking lot, the rights granted to a permitholder don't discourage transit use. The quantile regression analysis shows a pre-determined path for the funds that this policy pathway would collect – public transit. As the quantile regression model shows, a one percent increase in public transit mode share is associated with a decrease in permits per person across all percentiles in all study years. Although the strength of this association varies between percentiles, the use of additional revenue collected through the graduated permit system toward public transit investment can provide much needed relief for the constrained curb space in these permit areas.

This kind of policy pathway and funding source can run the risk of being a victim of its own success wherein investment in public transportation causes enough a reduction in permits purchased that the funding stream for public transit runs out. It should be noted that these kinds of policy decisions should not be understood in a vacuum but rather in a transportation ecosystem that will inevitably draw on other funding sources and revenue streams to ensure the financial stability of a public service such as funding from other levels of government or a congestion pricing plan for the downtown core.

### 6.2.3 Radical Change

The radical change policy pathway incorporates the intent of moderate reform in making the City of Toronto's ROPPP into a revenue-generating program but emphasizes the reallocation of space on local roads from parking to other uses. In this policy pathway, the city may, through attrition, reduce the number of permits given out on a given street or permit area. At no point will the city take away active permits, but instead, as residential turn over occurs, the amount of

permits the ROPPP will reissue diminishes over time. Over time, as the number of permits decreases, the city will accumulate curb space that, in the interim can be used for short term uses such as deliveries or tradespeople who are working on the street. When the amount of frontage accumulates to a predetermined measurement, the city will reengage with residents through a participatory budgeting process to determine what alternative uses the residents would like to see. These uses could range from additional tree planting, a bicycle coral for parking, public seating, or electric vehicle charging equipment. Figure 14, Figure 15, Figure 16, and Figure 17 illustrate how these uses have been implemented on local streets in other cities around the world. These projects can be funded through various policy levers available to the City of Toronto such as amending the scope of the City Building Fund Levy as has been done before (Tory, 2019), Community Benefits Charges under Section 37 of the *Ontario Planning Act* (1991), and through revenue generated from the increase permit fees.

*Figure 14: Local Street Cross-Section in Amsterdam with Public Garbage and Recycling Bins, Bicycle Parking, Tree Planting, and Motor Vehicle Parking (Wener, 2024)*



*Figure 15: Local Intersection with Expanded Sightlines for Motorists and Pedestrians and a Pollinator Garden, Montreal (Wener, 2025)*



*Figure 16: Boulevard Tree Planting and Expanded Bicycle Parking, Montreal (Wener, 2024)*



*Figure 17: Electric Vehicle Charger Built to Resemble a Bollard, London, England (Wener, 2024)*



This policy draws on the work of Donald Appleyard (1980) who first posited "A Street Dweller's Rights", advocating for local streets, particularly in the North American context, to be transformed in places of play, community and respite. Through the participatory budgeting process, residents will come together with the city to create a new charter of "Street Dweller's Rights", physically inscribing the priorities of a neighbourhood in the right-of-way.

## 6.3 Further Research

This research, while providing an in-depth investigation as to the opportunity and mobility costs of Toronto's ROPPP, leaves several important analytical approaches out of scope. Future research should aim to incorporate a wider array of dependent variables and test for two-way relationships/associations. For example, while it has been established through document review of the City of Toronto's ROPPP and the interview with Public Sector Employee #1, the City of Toronto is explicitly clear that a permit does not guarantee the exact same on-street parking space each time a permit holder parks their motor vehicle. Nonetheless, this mindset still exists as there is an expectation that a certain spot is "attached" to a permitholder's home. Drawing on the work of van Ommeren et al., (2011), Maas & Watson (2018) and Bondemark & Merkel (2023) research into how a property's eligibility to purchase a permit affects the price of a house depending on how high permit issuance is in their permit area. This approach can provide further information to estimate the actual market value of an on-street permit parking spot, depending on geography and lead to critical comparisons with how much the City of Toronto is charging for this permit.

The trends found in this research establishing that there is a growing discrepancy in where permits are being purchased, with permit areas in the lower percentile seeing a decrease in permits per person while the inverse is occurring in permits areas with a high permits per person

ratio, future research should investigate the proportion of first, second, and third priority permits issued in each permit area as another variable. Further considering should be given to the proportion of households in each permit area that have access to an off-street parking space combined with a survey of these households and what they use this space for. This will provide further clarity as to how much the ROPPP is providing a service to residents who have no other option versus those who are using the service as a subsidy to increase the utility of their home.

# 7 Conclusions

This research investigated the opportunity and mobility costs associated with the City of Toronto's residential on-street permit parking program (ROPPP) and how it impacts the city's ability to plan for and invest in sustainable modes of transportation. The findings conclude that a revenue neutral ROPPP ends up subsidizing vehicle storage for areas that are least likely to change while concentrating the negative externalities such as overcrowded curb space into areas with already high permits per person. This is an active decision that the City of Toronto is making and until changes are undertaken to rebalance how the ROPPP operates, the inequitable trends are likely to get worse.

A mixed methodology approach was used, foregrounded by a quantitative analysis including a quantile regression analysis with permits per person as the dependent variable and a spatial analysis and supplemented by qualitative interviews with transportation planning professionals. Participant interviews ended with a pitch of three policy pathways to established transportation planning professionals. While many of them agreed that the moderate reform pathway was the option most likely to be accepted by policymakers, decisionmakers and residents, their feedback did not preclude the efficacy of the radical change pathway from being an option that could be

attractive to many communities who wish to see a rebalancing of space on their local street for people over motor vehicles.

The set of opportunity and mobility costs presented are grounded in the empirical findings and interviews conducted with transportation planning and engineering professionals. The quantile regression analysis revealed that the same factors causing the polarization between low and high permits per person areas are also keeping low permits per person areas insensitive to changes in income. Existing auto-dependency, location, and access to alternative modes of transportation are all potential factors contributing to this divergence between low and high permits per person areas and presents an opportunity cost to the City of Toronto. By maintaining the status quo, the City of Toronto opts for a sub-optimal state of affairs, allowing for areas with high permits per person to continue to lose flexible short-term curb space, an asset that is becoming increasingly valuable as households continue to depend on algorithm-based delivery platforms. These areas will have a harder time accommodating vital services, on-street parking, and maintaining pedestrian accessibility. Interviews with public sector employees highlight that municipalities, while aware of the negative externalities that come from overcrowded curb space, prioritize the affordability of their ROPPP to residents over the potential to rethink what role local roads and their curb space can play. As confirmed by Public Sector Employee #1, the City of Toronto is looking to alter the pricing structure of their ROPPP, pricing certain classes of vehicles higher than others, but the reception of this proposal by residents and decisionmakers remains to be seen.

However, the quantile regression analysis did produce a promising pathway to address the City of Toronto's current challenges – utilizing the revenue from the ROPPP to fund public

transit infrastructure due to its strong effect as a depressor of permits per person. Contrary to other municipalities, the City of Toronto's ROPPP is unique in the kind of rights it grants to permitholders when compared to other municipalities, providing a "freedom to" store one's vehicle overnight rather than granting a "freedom from" non-resident parking infiltration due to local trip generators. Interviews revealed that cities, such as Seattle, specifically cite the deterrence of public transit-related parking as a reason for the implementation of their ROPPP, it stands to reason that those who take transit are more likely to buy a permit to ensure they are able to park near a transit station. In Toronto, however, the inverse is true as the quantile regression found that, across all percentiles, a one percent increase in public transit mode share is associated with a reduction in the number of permits in a given permit area, keep all other variables constant. This association has a strong statistical validity in the 75$^{th}$ percentile of permits per person areas, indicating that investment in public transportation is a feasible way to reduce these high permits per person areas' reliance on auto mode shares.

This major research report concludes with an outlining of three potential policy pathways grounded in the empirical findings; a status quo scenario, a moderate reform scenario, and a radical change scenario. The status quo policy pathway further entrenches the challenges raised by public sector employees and the costs highlighted by the quantile analysis. A continuing polarization of low and high permits per person areas, greater auto-dependency and higher costs for maintenance of the system in these high permits areas, and significant barriers to future plans for redesigning local streets as parking becomes too important to remove. The moderate reform pathway builds on the findings from the quantile regression that an increase in public transit mode share is associated with a decrease in permits per person, with a particularly strong association in higher percentiles of permits per person. This policy pathways proposes shifting

the current revenue-neutral status of the program to a revenue-generating program and using the revenue collected to fund public transit infrastructure around permit areas, particularly those that have higher permits per person. It should be noted that this funding strategy has the challenge of being too successful by investing in public transit to the point that permits no longer become a viable funding source. Further research should investigate how this reform pathway could be further supplemented with policy strategies that cover the entire transportation network such as a congestion pricing strategy for Toronto's downtown core. The radical change policy pathway represents an aspirational vision for local roads and permit parking in the City of Toronto but has proof of concept in other cities around the world. Reducing the overall number of permits eligible to be issued in a given permit area frees up curb space and physically reveals the space taken up by private motor vehicles making it easier for residents to envision what else could occupy that space.

The status quo of the City of Toronto's ROPPP presents several costs that requires a significant shift in how the city prices its permits and views the space that private motor vehicles occupy. Strategies to address these costs should first and foremost centre the priorities of residents, understanding that there is a necessary role that private motor vehicles play in an urban setting. However, this process should also acknowledge that the physical space that private motor vehicles take up on a road is not proportionate to the importance it has in the minds of its residents. Providing communities with more and better options for alternative transportation can help break the cycle that Toronto's current ROPPP places high permits per person areas in and build safer, sustainable, and accessible streets for everyone.

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