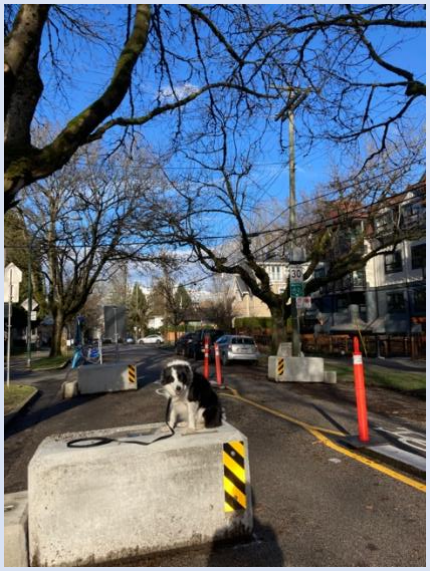
Making Space for Physical Distancing in Canada's Urban Centers:

A Case Study of Vancouver's *Slow Streets*



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Executive Summary

In March 2020, the World Health Organization (2020) declared COVID-19 to be a global pandemic. The effects of COVID-19 had an immediate impact on all facets of daily life as global efforts focused on slowing the spread of the virus. Emergency measures, such as travel bans, school and workplace closures, and limits on social gatherings, were ordered by governments around the world. Despite these orders, people still needed to access essential jobs, make essential trips, and engage in regular exercise to maintain their physical and mental health. To reduce the spread of the virus, health officials recommended physical distancing and limiting close contact with people outside of your immediate household. Specifically, the Government of Canada (2020) recommended keeping a distance of 2 metres apart when around other people.

Maintaining physical distancing presented major challenges for mobility, particularly in dense urban spaces like public transit, sidewalks, parks and plazas. For example, the sidewalk width of most streets in North America is less than 2 metres, thus making it challenging for people to pass one another safely. To address the challenge of inadequate space for physical distancing on sidewalks, cities across Canada implemented temporary interventions to make it easier for people to practice physical distancing while engaged in active transportation (e.g., walking, bicycling). Examples of rapid responses include temporary pedestrian and bicycle lanes, pedestrian waiting areas, and traffic diversion (Federation of Canadian Municipalities, 2020). This report focuses on one of these interventions, Slow Streets, using the City of Vancouver as a case study. The research was guided by the following research questions:

1. *What was the level of active transportation engagement in Vancouver prior to COVID-19?*
2. *Why, how, and where was the Slow Streets program implemented?*
3. *What were the challenges, successes, and impacts of the Slow Streets program?*

These questions were addressed using a mixed methods study design. Data was collected through a literature review, Census analysis, Trip Diary analysis, GIS mapping, document analysis, and key-informant interviews. The first research question was answered in Chapter 4 using descriptive statistics from the 2016 Census and TransLink's 2017 Trip Diary, as well as the City of Vancouver's Transportation 2040 Plan. It was found that active transportation rates were highest among children and varied only slightly by gender and household income. Chapter 5 focused specifically on the process of implementing the Slow Streets program, answering the second research question. Key findings included the Slow Streets' focus on recreation and

location on existing local bikeways. The areas with the highest rates of active transportation, downtown Vancouver and the West End, were not part of the Slow Streets network, while several neighbourhoods with the highest levels of deprivation, namely the Downtown Eastside and South Vancouver, were captured by the network. Chapter 6 addresses the third research question reflecting on the challenges, successes, and impacts of the Slow Streets program. Interview participants agreed that the main challenges were the barriers used to identify the Slow Streets and the impact of COVID-19 on the ability to conduct in-person public engagement. The Slow Streets received positive feedback in initial public surveys and interview participants praised the success of expanding the existing bikeway network and the traffic calming upgrades that occurred in later phases of the program.

The main recommendations that emerged from this research are the importance of investing in durable materials and prioritizing maintenance, being ambitious, trying and testing new projects, engaging the public, and prioritizing equity.

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Chapter 1: Introduction

General Problem

On March 11th, 2020, the World Health Organization declared a global pandemic caused by the novel coronavirus COVID-19 (CBC News, 2020). In order to contain the spread of the infectious virus, emergency measures were enacted by governments across the world, ranging from travel restrictions, closing schools and workplaces, and limiting large gatherings. Physical distancing, or limiting close contact with other people, has proven to be one of the most effective ways to reduce the spread of COVID-19 (BCCDC, 2020). The Government of Canada (2020) recommended keeping a distance of 2 metres apart when around people outside of your immediate household.

Maintaining physical distancing presented major challenges for mobility, particularly in dense urban spaces like public transit, sidewalks, parks and plazas, since the typical design of most North American streets prioritizes the vehicle, thus making it difficult for physical distancing. For example, the sidewalk width of most streets is less than 2 metres, making it challenging for people to pass one another safely. In response to this conundrum, cities across Canada implemented temporary interventions to make it easier for people to practice physical distancing while making essential trips, commuting to work and exercising. Examples of rapid responses included temporary pedestrian lanes, temporary bicycle lanes, pedestrian waiting areas, and traffic diversion initiatives (Federation of Canadian Municipalities, 2020).

Figure 1. Pop-up plaza in Cambie Village. (Lee, 2020)

Vancouver is the third most populous city in Canada, and has the highest population density at 5,492 people per square kilometre (Statistics Canada, 2016). Responding to public health orders, the City of Vancouver (2020) launched an ambitious recovery program to support residents and economic recovery. One of the major recovery initiatives was the *Making Streets for People Program*, which involved making temporary changes to streets and public spaces. Examples of these changes included temporary patios, referred to as pop-up plazas (Figure 1), making more room for walking and queuing along busy streets, while calming traffic to make Slow Streets (City of Vancouver, 2020). The Slow Streets program involved 40km of designated streets for walking, cycling and rolling that made it easier for residents to exercise and access businesses during the COVID-19 pandemic (City of Vancouver, 2020). The Slow Streets program began in May 2020 and is still in operation as of June 2021. The program ran every day of the week throughout all seasons. Centering on Vancouver's Slow Streets program, this research used qualitative and quantitative methods to investigate the pre-COVID-19 active transportation context, implementation of the Slow Streets program, and the anticipated and observed impacts of the program.

Research Questions

The research was guided by the following questions:

1. What was the level of active transportation engagement in Vancouver prior to COVID-19?
2. Why, how, and where was the Slow Streets program implemented?
3. What were the challenges, successes, and impacts of the Slow Streets program?

Report Outline

The scope, data collection and analysis methods, and limitations are described in *Chapter 2: Methodology*. *Chapter 3: Literature Review* sets the context for this study, describing the effects of COVID-19 on urban mobility and active transportation, the Slow Streets movement, and equity considerations. The literature review concludes with an examination of the research gaps and opportunities that lay the foundation for this project. Chapters 4, 5, and 6 present the key findings as they relate to the three research questions. Finally, Chapter 7 reflects on the lessons learned from the research, offers a series of recommendations for future improvements and active transportation pilot projects.

Chapter 2: Methodology

Chapter Overview

This chapter outlines the research scope, as well as the methods used for data collection and analysis. The chapter concludes with a discussion of research limitations.

Research Scope

This study focused on the City of Vancouver's Slow Streets program because Vancouver was one of the first cities in Canada to implement an ambitious plan to reallocate road space for pedestrians and cyclists in response to the COVID-19 pandemic. This case study employed a mixed methods approach, which involves combining "elements of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). This approach was chosen in order to provide a more holistic understanding of the case study and because the research questions chosen required multiple methods. For example, the first research question was primarily answered through analyses of Canadian Census and Translink Trip Diary data, while the third question was answered primarily through qualitative interviews. The data collection and analysis process occurred from June 2020 to March 2021, starting with a literature review, followed by quantitative analysis of secondary data, GIS mapping, and document analysis, and key informant interviews.

Literature Review

The purpose of the literature review (Chapter 3) was to explain the COVID-19 context and its impacts on active transportation, as well as to introduce the concept of Slow Streets. Both academic and grey literature was reviewed. Grey literature was included as this is an emerging area of study with few published, peer-reviewed sources to date. The search focused on publications and pre-prints released in 2020 due to the timeliness of the pandemic. The review was limited to English-language publications.

Information on the COVID-19 context was primarily established from public health sources including the World Health Organization and the BC Center for Disease Control. As the research focuses on Vancouver, local news and provincial public health directives supplemented

these sources. Academic literature was gathered from the Academic Search Complete database, accessed through Queen's University Library. Keyword searches included "COVID-19 AND urban planning", "physical distancing", "slow streets", "quiet streets", "shared streets" and "active transportation equity". Other notable sources included resources for urban planners responding to the pandemic such as the Federation of Canadian Municipalities (2020) *COVID-19 Street Rebalancing Guide* and the Canadian Urban Institute's (2020) *COVID-19 Signpost.*

Secondary Data Analysis

2016 Census Profile and TransLink 2017 Regional Trip Diary

The 2016 Census Profile and TransLink's 2017 Regional Trip Diary were used to explore the active transportation context in Vancouver prior to COVID-19. The Census Profile was accessed through the Ontario Data Documentation, Extraction Service and Infrastructure (<odesi>). The main variable of interest was 'main mode of commuting', which refers to "the main mode of transportation a person uses to travel between his or her place of work" (Stats Canada, 2015, para. 1). Cross-tabulations were performed in <odesi> between mode share and several other Census variables, including sex, age, visible minority status, low-income status and core housing need. The cross-tabulations were then transferred to Microsoft Excel to generate the tables used in the report. The geographic area of focus for the census analysis is the Vancouver Census Metropolitan Area (CMA), contiguous with the Metro Vancouver boundaries.

The TransLink 2017 Regional Trip Diary was used to supplement the Census analysis. The Trip Diary collects detailed information for a broad range of trip purposes, namely for escorting, grade school, shopping or personal business, social/recreation/dining, work/university and to home (TransLink, 2019). Results from the Trip Diary are aggregated into statistics that can be downloaded from TransLink's website as PDFs or images for public use. Images were extracted from the Trip Diary highlighting the graphs of interest regarding active transportation trends. While TransLink provides Trip Diary statistics for all member municipalities of Metro Vancouver, this research only drew on Trip Diary results for the City of Vancouver, since this is the area covered by the Slow Streets program.

GIS Mapping

GIS maps were created to show the spatial extent of the Slow Streets program and how the chosen streets spatially correspond to existing active transportation rates and to measures of deprivation. ArcGIS accessed through Queen's Information Technology Services was the mapping software used for this analysis. The map layer with the Slow Streets segments was created by referencing maps created by the City of Vancouver (2020). Line segments were added to Arc representing the Slow Streets routes.

For the map displaying the active transportation percentages by Census Tract, data for the main mode of commuting was downloaded from the University of Toronto's CHASS Data Centre Canadian Census Analyser (2017). The Census Tract data was downloaded as a CSV file which was then opened in Microsoft Excel. To derive the percentage of residents who use active transportation for the main mode of commuting, the columns for walking and cycling were added together and the percentage was rounded to the nearest whole number. Next, the Excel file was imported to ArcGIS. The file with the active transportation percentages was then joined to the base layer displaying the Census Tracts in Vancouver.

The final step in the GIS analysis involved relating the Slow Street locations to equity indicators. To do this, another layer was added to the map which drew from the Canadian Index of Multiple Deprivations (CIMD), a geographically-based index of deprivation and marginalization (2016). The CIMD was chosen for this analysis as it is a reputable measure for assessing deprivation and marginalization, relating to the study's focus on equity. The four dimensions of the index are economic dependency, situational vulnerability, residential instability and ethno-cultural composition (Stats Canada, 2019). The four dimensions chosen represent 17 variables selected because of their association with deprivation and marginalization and through consultations with experts in the field (Stats Canada, 2019).

Document Analysis

Document analysis is "a form of qualitative research that uses a systematic procedure to analyze documentary evidence and answer specific research questions" (Gross, 2018, p. 2). In this study, document analysis methods were employed for two purposes: 1) to understand the City of Vancouver's active transportation priorities prior to COVID-19; 2) to investigate the implementation of Vancouver's Slow Streets program in response to the pandemic. For the first

purpose, the City of Vancouver's Transportation 2040 Plan (2012) was analyzed to establish the urban planning context that preceded the COVID-19 pandemic. For the second purpose, eight documents were analyzed including a council presentation, council member's motion, staff report, supplementary design guide, policy document and an engagement summary. An Excel spreadsheet was created to log each document, including details such as the document title, authors, date, type of document, purpose, audience, Slow Streets relevance, context, explanation and Slow Streets description. From the spreadsheet, key themes were identified and explored in greater detail. These themes included: description of Slow Streets, coordination between Council and staff, alignment with plans and policies, public engagement and evaluation. Appendix B provides a comprehensive tabular summary of the elements that were extracted from each document for purpose two.

Key Informant Interviews

Key informant interviews were conducted to provide further insights as to the implementation and impacts of the Slow Street program. Specifically, two City of Vancouver planners involved in the Slow Streets program, as well as two active transportation advocates in Vancouver, participated in virtual interviews in January 2021. The purpose of these interviews was to gain a first-hand understanding of the process and rationale for implementing the Slow Streets as well as reflections on the successes and challenges of the program. The City planners were identified through an email address provided to the public for questions and concerns about the Slow Streets program. Active transportation advocates were identified through Google searches for "Vancouver cycling advocacy organizations" and "Vancouver pedestrian advocacy organizations".

Ethics approval was obtained from the Queen's University General Research Ethics Board prior to the interviews. An ethics application was submitted on July 24th, 2020 and clearance was provided on October 7th, 2020. A letter of information (Appendix A) was provided to interview participants prior to interviews and verbal consent was obtained at the start of each interview. All four interviews followed a semi-structured format. The semi-structured interview is a "qualitative data collection strategy in which the researcher asks informants a series of predetermined but open-ended questions" (Given, 2008, p. 2). An interview guide was developed for each interview and the questions varied depending on the participants' role in the Slow

Streets. Follow-up questions were asked for greater detail or clarification depending on participants' responses. All interviews were conducted through the videoconferencing platform Zoom. Interviews were audio-recorded and later transcribed using the transcription software Descript.

Limitations

One of the limitations for this study is the data sources chosen for the secondary data analysis. The 2016 Census analysis used the Vancouver Census Metropolitan Area (CMA) for the geographic area. The Vancouver CMA is larger than the City of Vancouver boundaries used in the TransLink 2017 Trip Diary. This makes it difficult to draw comparisons between the two data sources due to the differing geographic boundaries. For the Canadian Index of Multiple Deprivations (2019), a limitation is that the index was created through factor analysis of data at the national-level. This may mask spatial heterogeneity in the maps of Vancouver as the City is compared to national averages. For example, Vancouver is much more ethnically diverse than other areas in the country, which could magnify the maps for ethno-cultural composition.

Another limitation is the sample size for the key-informant interviews. Due to time and resource constraints, only four interviews were conducted for this research. Future research should seek to interview politicians such as councillors, more City staff and representatives of diverse Slow Streets "user groups" including older adults, children, people of colour, Indigenous peoples and LGBTQIA2S+.

A third limitation is that the research focused on a single case study. For the depth of analyses conducted and the nature of a Master's report, it was recommended for the researcher to examine a single case study. The sole focus on Vancouver's Slow Streets limits the generalizability of the study, particularly for the many small and mid-sized cities across the country. Future research projects could compare Vancouver's Slow Streets to other Canadian cities or international examples.

Chapter Summary

This chapter detailed the methods used for this report. A combination of qualitative and quantitative methods was used to provide a well-rounded analysis of the case study. Multiple methods were used to answer each research question. Quantitative methods included Census

analysis, GIS mapping and analysis of travel diary data. Qualitative methods included a literature review, document analysis and key-informant interviews.

Chapter 3: Literature Review

Chapter Overview

This chapter presents the findings from a literature review that sets the context for this research. It begins with a discussion of the COVID-19 context, and 'physical distancing' directives that have presented challenges for mobility and physical activity in urban contexts. The chapter then profiles the Slow Streets movement that has emerged as a response to physical distancing and active transportation needs, followed by a discussion of the equity considerations of these kinds of initiatives. The literature review concludes with an examination of the research gaps and opportunities that lay the foundation for this project.

COVID-19 and the Challenges of Physical Distancing

In December 2019, a new infectious coronavirus was identified in Wuhan, China (CBC, 2020). The virus spread rapidly across the globe via international transportation networks such as high-speed rail and intercontinental air travel (Budd & Ison, 2020). The incubation period of the virus is 2-10 days on average, which meant that travellers who carried the virus but did not yet show symptoms could easily pass through international borders undetected (Budd & Ison, 2020).

The first case was detected in Canada on January 25th, 2020 and on February 11th, the World Health Organization (WHO) named the respiratory disease caused by the novel coronavirus COVID-19 (CBC, 2020). The outbreak was declared a global pandemic by the WHO on March 11th, 2020, leading to emergency measures being enacted by governments across the globe to contain the spread of the virus. In British Columbia, emergency measures came into effect beginning March 16th, 2020 with the closure of schools, many workplaces shifting to remote work, and a ban on gatherings of more than 50 people (CBC, 2020). As of March 25, 2021, 93,969 residents in BC have contracted COVID-19, and 1,441 have died from the disease (BCCDC, 2021).

COVID-19 spreads between people through "direct, indirect (through contaminated objects or surfaces), or close contact with infected people via mouth and nose secretions" (WHO, 2020, para. 1). These secretions (see Figure 2) are released when an infected person coughs, sneezes, speaks or sings, and can be spread from person-to-person when infectious droplets get

into the mouth, nose or eyes (WHO, 2020). As such, physical distancing has proven to be one of the most effective ways to reduce the spread of COVID-19 (BCCDC, 2020). The Center for Disease Control (2020) defines physical distancing as "keeping a safe distance between yourself and other people who are not from your household" (para. 1). In order to minimize contact with others, the Government of Canada (2020) recommends avoiding crowded places and non-essential gatherings, avoiding common greetings like handshakes, limiting contact with people at higher risk, and keeping a distance of at least 2 metres from others.

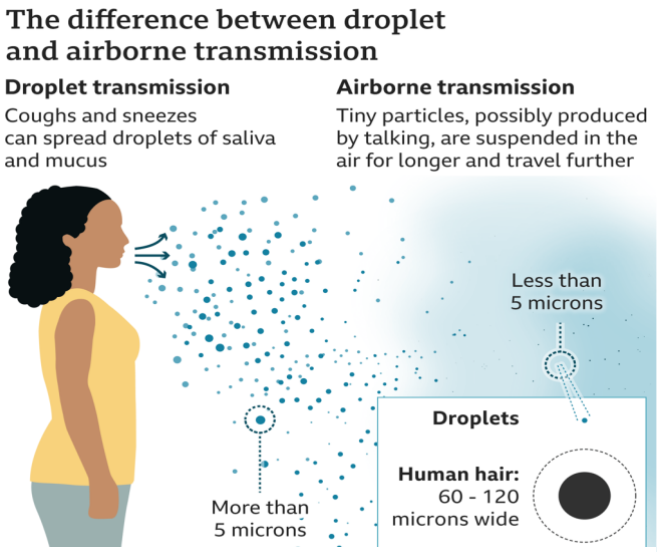

Figure 2. Transmission of COVID-19 (BBC News, 2020)

One of the biggest challenges related to physical distancing is mobility, or "the possibility of moving from one place to another" (Anciães, 2011, p. 1), particularly in dense urban environments in which maintaining 2 metres of separation from others is especially challenging. Studies have shown higher risks of transmission associated with indoor environments where it is difficult to maintain physical distancing such as on flights, rail and public transportation (Sharifi & Khavarian-Garmsir, 2020). Meanwhile, active transportation modes, defined as "using your own power to get from one place to another" (Govt. of Canada, 2014, para. 1), have been described as being more resilient to pandemics due to a lower risk of transmission (Sharifi & Khavarian-Garmsir, 2020).

Decreased motor vehicle traffic as a result of school, workplace and recreation/entertainment closures has created more favourable conditions for active transportation engagement. Indeed, rates of active transportation in many cities have increased since the pandemic was declared (Budd & Ison, 2020, p. 1), with residential streets, sidewalks, parking lots, and other spaces being repurposed for "active living, play, and sociability" such as the street closure in Banff in Figure 3 (Mehta, 2020, p. 1). These trends were reinforced by the WHO's (2020) recommendation to ride bicycles or walk whenever possible, as these modes "provide physical distancing while helping you to meet the minimum requirement for daily

physical activity, which may be more difficult due to increased teleworking, and limited access to sport and other recreational activities" (p. 1).

Despite decreased traffic, auto-centric development patterns, a lack of localized active transportation networks, and the separation of land uses have continued to present barriers for active transportation uptake during the pandemic (CUI, 2020). Former Chief City Planner for Vancouver, Brent Toderian, observed that "COVID has revealed how little space we give to people in our cities and how much space we give to cars" (from Gonchar, 2020, p. 15). Sidewalks on most streets are usually less than 2 metres in width, which makes it difficult to "practice physical distancing and ensure two people are able to pass one another safely" (FCM, 2020, p. 8). Stepping aside or passing others quickly can lead to the risk of being hit by vehicles if one needs to step into lanes of traffic (FCM, 2020).

Figure 3. Pop-up patios and street closure for pedestrians in Banff, AB. (Lee, 2020)

Working in tandem with public health officials, municipal governments around the world have been quick to respond to physical distancing requirements and mobility concerns with a wide variety of interventions. Rapid response strategies include, but are not limited to, temporary pedestrian and bicycling lanes, temporary parklets and patios, curbside queuing areas, priority loading areas, automated pedestrian pushbuttons, street closures, and shared streets (FCM, 2020). Many of these interventions are related to rebalancing streets to provide more space for people. This report focuses on one of these interventions: Slow Streets.

Slow Streets

Slow Streets, Quiet Streets, Shared Streets; the names vary by location but they essentially seek to achieve the same outcome. These interventions "emerged from a desire to give pedestrians and cyclists more space to practice social distancing while outdoors" (Glandorf,

2020, para. 1). Slow Streets programs can be found in cities across the world including: Oakland, Bogota, Colombia, New York, Boston, Minneapolis, Portland, Brussels and Toronto (Glandorf, 2020). As this report focuses on Vancouver's Slow Streets Program, the term 'Slow Streets' will be used.

One of the earliest and most cited examples is the Slow Streets program in Oakland, California, which began in early April 2020 (City of Oakland, 2020). It is one of the most extensive programs, covering almost 74 miles (or 10%) of the city's street network (Bliss, 2020). The Oakland program was led by the Department of Transportation with the purpose to "create space for physical activity for physical and mental health benefits for residents during the pandemic" (City of Oakland, 2020, p. 5). An interim study of the initiative in September 2020 revealed a decrease in vehicle volumes, no fatalities or severe injuries, and no issues with service delivery in relation to the slow streets (City of Oakland, 2020). The Oakland Slow Streets program is planned to continue through the next 1-2 years or until COVID-19 restrictions lift, at which point the focus will shift to "permanent capital improvements to corridors and intersections" (City of Oakland, 2020, p. 9). Many cities drew inspiration from the immediate success of Oakland's program to quickly implement similar programs in their jurisdictions.

Vancouver's Slow Streets program was announced in May 2020, following a successful pilot at Kits Point (Figure 4) in April (City of Vancouver News, 2020). As of March 2021, 40km of streets have been designated as Slow Streets (City of Vancouver, 2021). The City of Vancouver (2020) defines Slow Streets as "routes for walking, cycling, and rolling that make it easier to exercise and access businesses in your local neighbourhood" (para. 1). Vancouver's Slow Streets are identified by simple traffic barriers, cones, and signs placed at main vehicle entry points (NACTO, 2020). Slow Streets are not closed to cars, but motor vehicle access is limited to local traffic, emergency vehicles and waste/recycling collection. People may pass each

Figure 4. Kits Point Slow Street (Lee, 2020)

other using the roadway and drivers are encouraged to drive slowly and watch for people on the road (City of Vancouver, 2020).

Equity Concerns

Despite the success of programs like these, there have also been critiques related to how these programs address and implement equity concerns. Since COVID-19 has had a disproportionate impact on racialized, Indigenous, and low-income Canadians, critics contend that pandemic-based initiatives ought to help alleviate this disproportionate burden (CUI, 2020). Residents of lower-income neighbourhoods, in particular, tend to have less access to green spaces, recreation facilities and active transportation infrastructure such as bike lanes, and well-maintained sidewalks in comparison to residents of wealthier neighbourhoods (Honey-Rosés et al., 2020). Additionally, active transportation is "only an option for those who are able to self-mobilise and (in the case of cycling) those who are able and can purchase, maintain and securely store a bicycle" (Budd & Ison, 2020, p. 2).

Thus, Slow Streets programs have received mixed feedback. In the United States, Emiko Atherton (2020), Director of the National Complete Streets Coalition, argues that:

> while organizations are supportive of reclaiming space for people, many advocates have highlighted concerns about whether cities are implementing Open Streets equitably throughout their communities, whether people of all races feel safe in Open Streets and how the cities are engaging with their residents to plan and implement the streets closures. (p. 20).

Indeed, since many Slow Street programs were implemented quickly, the period of public engagement that is typical of most urban planning projects was missing. Without public engagement with communities, concerns have emerged that street redesigns may "deepen inequity and mistrust in communities that have been disenfranchised and underserved for generations" (Thomas, 2020, para. 2). Meaningful public consultation could have alleviated some of these concerns, but may not have been practical given the COVID-19 context and limits to public gathering. Many cities adopted virtual platforms for online engagement following the initial Slow Street roll-out.

Recognizing these concerns, the Federation of Canadian Municipalities (2020) states in their *COVID-19 Street Rebalancing Guide* that cities and communities should consider equity as a guiding principle when implementing any street rebalancing opportunities. Specifically,

"street rebalancing should centre on equity and prioritize treatments that support vulnerable populations most at risk of street-based violence, including traffic, gender-based, and racial violence" (FCM, 2020, p. 12). Some municipalities have directly stated that equity concerns have influenced what streets were chosen for slow streets. For example, Toronto's Quiet Streets Program states that quiet street locations were chosen by evaluating several factors including "population density, equity, access to greenspace, and traffic volumes" (City of Toronto, 2020). Drawing on these critiques, this report will examine the extent to which equity has been considered in Vancouver's Slow Streets.

Research Gaps and Opportunities

Given their novelty, there is a lack of evaluative research on Slow Streets programs in general and, at the time of writing, on Vancouver's Slow Streets specifically. This research will attempt to address some of these gaps by looking at the active transportation context in Vancouver prior to COVID-19, the process of implementing the Slow Streets and a discussion of perceived success, challenges and future impacts of the program. This research is especially timely and important as experts predict that physical distancing directives will be in place for the next 2-3 years and as such, local transportation authorities will continue to face pressure to facilitate residents meeting these directives through initiatives that support active transportation (Atherton, 2020; Jones, 2020).

Chapter Summary

The COVID-19 pandemic has radically changed how we live, work and move from place to place. In order to limit and prevent the spread of the infectious disease, cities across the globe have been instructed to introduce a "broad range of measures to limit physical contacts" (WHO, 2020) including physical distancing. Despite many people working from home and reducing their daily trips, the World Health Organization (2020) recognizes that "many people might still have a need to move around cities to reach their workplaces when possible, meet essential daily needs or provide assistance to vulnerable people". In order to complete these trips, bicycling and walking has been championed as the preferred mode of travel (WHO Moving Around, 2020). Within this context, it has been argued that "COVID-19 is an opportunity for city planners to liberate more street space for pedestrians and cyclists" (Honey-Rosés et al., 2020, p. 4).

Municipal governments across Canada have rapidly responded to this need by transforming existing streets and roadways to better support active transportation modes (see Figure 5). Slow Streets are one intervention that have been implemented to make more space for people and improve mobility for active transportation modes. This research seeks to understand the process and reasoning behind implementing the Slow Streets program in the City of Vancouver. The findings of this report will add to emerging literature on the "transformation of existing streets and roadways for active transportation" (Declaration for Resilience, 2020, p. 2) as a reaction to COVID-19.

Figure 5. Temporary bike lane on Beach Ave, Vancouver. (Lee, 2020)

Chapter 4: What was the level of active transportation engagement in Vancouver prior to COVID-19?

Chapter Overview

This chapter address the first research question, by describing the active transportation context in Vancouver prior to the COVID-19 pandemic. The 2016 Census Profile, TransLink's 2017 Regional Trip Diary and the Transportation 2040 Plan were used to outline active transportation patterns and the urban planning policy context.

2016 Census Profile

Description of Variables

The Ontario Data Documentation, Extraction Service and Infrastructure (<odesi>) was used to search the 2016 Census of Population Public Use Microdata File. <odesi> is a web-based data extraction and analysis tool that provides researchers the ability to search for survey questions across datasets (OCUL, 2007). The 2016 Census was used to analyze commuting patterns in Vancouver. The main variable of interest was 'main mode of commuting', which refers to "the main mode of transportation a person uses to travel between his or her place of work" (Stats Canada, 2015, para 1). Commuters were defined as "the employed labour force aged 15 years and over in private households with a usual place of work or no fixed workplace address" (Stats Canada, 2016). To understand how commute mode varies by demographics, the 'main mode of commuting' variables was cross-tabulated with sex, age, visible minority status, low-income status, and core housing need (Table 1). These variables were selected as they are often analyzed in transportation equity research (Lee et al., 2016).

Analysis

Main mode of commuting for the Vancouver census metropolitan area (CMA) was compared to the province of British Columbia. Most notably, Vancouver had a 6% lower mode share for private vehicle commuting, and a 7.7% higher public transit mode share, compared to the provincial average. The biggest differences between the sexes were for the vehicle driver and public transit variables. Driving rates were 10.8% higher for males and public transit rates were 7.2% higher for females. For active transportation, walking rates were higher for females while

bicycling rates were higher for males. This is consistent with trends at the national level. In a Stats Canada Health Report, it was reported that males were more likely than females to have cycled in the past year, regardless of age, income or education (Ramage-Morin, 2017). With respect to age, driving rates were considerably higher for the older age groups (35+), walking and public transit rates were highest for the 0-19 age category perhaps due to driving age requirements, and cycling rates were highest for the 20-34 year age category.

More than half of Vancouver's population identified as a visible minority in the 2016 Census, compared to 30% for the province and 22% for Canada (Carman, 2017). In terms of mode share, visible minorities had higher rates for vehicle passenger and public transit, when compared to non-minorities. In particular, public transit rates were 11.3% higher for visible minorities than non-minorities. This could be due to the high costs of vehicle ownership and the relative affordability of public transit for commuters. In a report on public transit use among immigrants, it was found that ridership is higher among recent immigrants in Vancouver and nationally (Heisz & Schellenberg, 2004).

The low-income variable used was the 'low-income cut-offs after-tax', which refers to households below thresholds at which "families or persons were expected to spend 20% or more of their after-tax income than average on food, shelter and clothing" (Stats Canada, 2017, para. 1). Vehicle driving rates were 20% higher for non-low income households when compared to low-income households, while public transit and walking rates were higher for low-income households. Related to low-income status is core housing need, which occurs if a household's "housing falls below at least one of the adequacy, affordability or suitability standards and it would have to spend 30% or more of its total before-tax income to pay the median rent of alternative local housing that is acceptable (meets all three housing standards)" (Stats Canada, 2017, para. 1). Households in core housing need had higher rates of public transit use and walking, similar to households with low-income status. Vehicle driving rates were higher for households not in core need.

Table 1. Summative Table of Census Data (figures are weighted percentages)

		Vehicle driver	Vehicle passenger	Motorcycle, scooter or moped	Public transit	Walk	Bicycle	Other	N =
Sex	Male	68	4.3	0.4	17.8	5.7	2.9	1	668,613.10
	Female	57.2	6.8	0.1	25	7.9	1.8	1.2	637,534.70
Age	0-19 years	25.2	26.5	0.2	32.6	12.4	1	1.4	66,602.00
	20-34 years	52	5.2	0.2	29.9	8.7	3.1	1	423,577
	35-54 years	71.2	3.8	0.3	16.3	5.2	2.4	1	545,520
	55+ years	68.4	10.1	2	12	4.9	0.7	2.1	264,442
Visible minority status	Not a visible minority	65	4.6	0.4	17.4	8.1	3.5	1	693,764
	Visible minority	55.3	6.4	0.2	28.7	6.7	1.6	1.2	588,968
Low Income Status	Non-low income	64.6	5.5	0.3	20.1	6.2	2.3	1	1,183,945
	Low income	44.6	5.5	0.2	32.5	12.7	2.8	1.7	119,535
Core housing need status	Not in core housing need	64.5	5.5	0.3	20.1	6.2	2.4	1	1,116,824
	In core housing need	51.6	5.4	0.2	29.4	9.6	2.3	1.5	141,983
CMA vs. Province	Vancouver (CMA)	62.7	5.5	0.3	21.3	6.8	2.4	1.1	1,306,147.80
	BC (Prov)	68.7	6.3	0.4	13.6	6.9	2.5	1.6	2,412,748.90

TransLink 2017 Regional Trip Diary

Description

TransLink is the transportation authority responsible for the regional transportation network of Metro Vancouver. Every five years, TransLink conducts a household travel survey or trip diary, collecting data on various types of trips. The 2017 Regional Trip Diary surveyed 28,000 households, or approximately 56,000 people, in order to gain a statistically representative sample of Metro Vancouver residents (TransLink, 2019). The results of the Trip Diary are available to the public and are commonly referenced by public and private sector planning organizations to inform decisions related to transportation planning and development (TransLink, 2019). The Trip Diary collects information on 18 municipalities comprising Greater Vancouver. The City of Vancouver was chosen for this section as it is the area covered by the Slow Streets program.

Analysis

Figure 6 shows the percentage of trips by mode in the 2017 Trip Diary compared to 2011. The percentage of driving trips, transit trips and bike trips have all decreased since 2011. The biggest change is for the walking mode, which increased by 6.9% from 16.5% in 2011 to 23.4% in 2017.

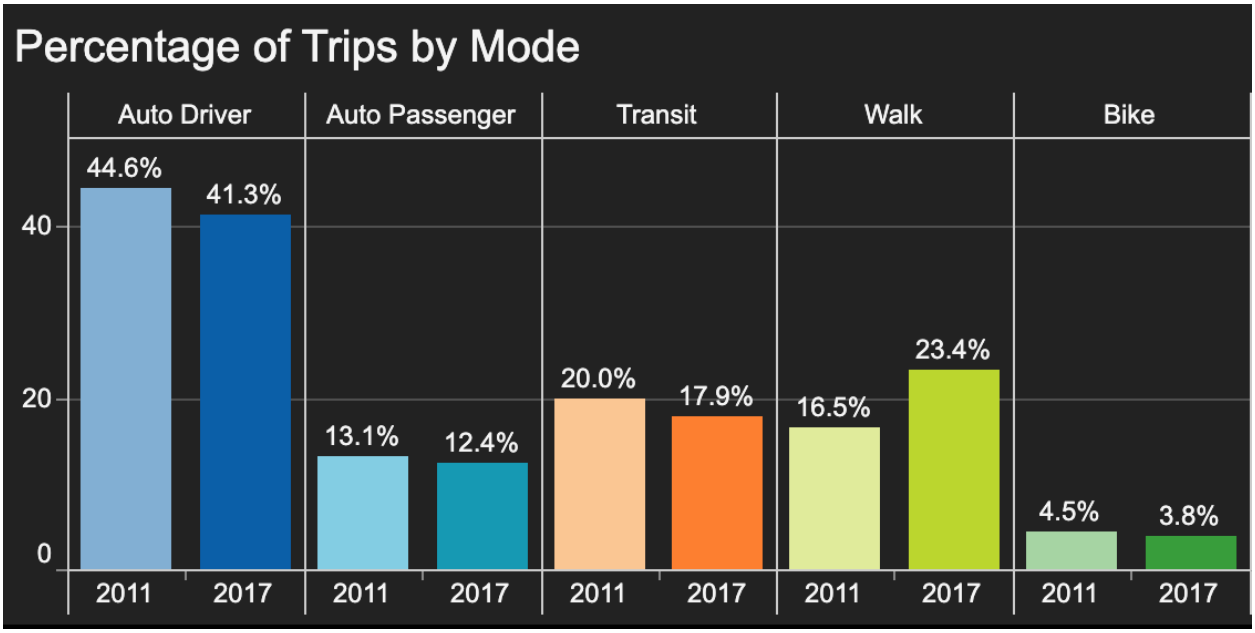

Figure 6. Percentage of Trips by Mode. (TransLink, 2019)

Mode share from the Trip Diary was also examined based on trip purpose, gender, age, and household income (Figure 7). In terms of trip purpose, the highest mode share of active transportation was going to grade school at 40%. This statistic is support by Vancouver School District (2020) policy, which has ensured that catchment boundaries have an established walk limit of no more than 4.0km for K-3 students and 4.8km for grade 4-12 students. The next highest trips by active transportation was social/rec./dining and shopping/personal business at 34% and 31% respectively. Escorting had the lowest percentage of trips by active transportation at 15%. Important to note is that trips to work for the Trip Diary differ from the Census due to different geographic catchments. The Census data looked at the Vancouver Census Metropolitan Area, a much larger area than the Municipality of Vancouver, which is the geographic area used in the Trip Diary.

Mode share was also examined by age group and gender. The 5-9 age group had the highest percentage of trips made by active transportation modes at 34% followed by 25-34 at 32% and 10-18 at 30%. The 19-24 age group had the highest percentage, by far, of trips made by

transit at 47%; the next highest was 25-34 at 22%. Active transportation rates were nearly even between females and males, though females made more trips by walking and males made more trips by cycling.

The Trip Diary data also revealed that mode share in Vancouver followed a clear income gradient, particularly for public transit and automobile use. Specifically, public transit ridership was highest for the lowest income group (27%), and lowest for the highest income group (13%), while vehicle driving and passenger rates had the opposite trend. The high costs associated with vehicle ownership and maintenance may explain why low-income residents made more trips by public transit (Amberber & Verlinden, 2020). Interestingly, active transportation rates were relatively similar across the income brackets.

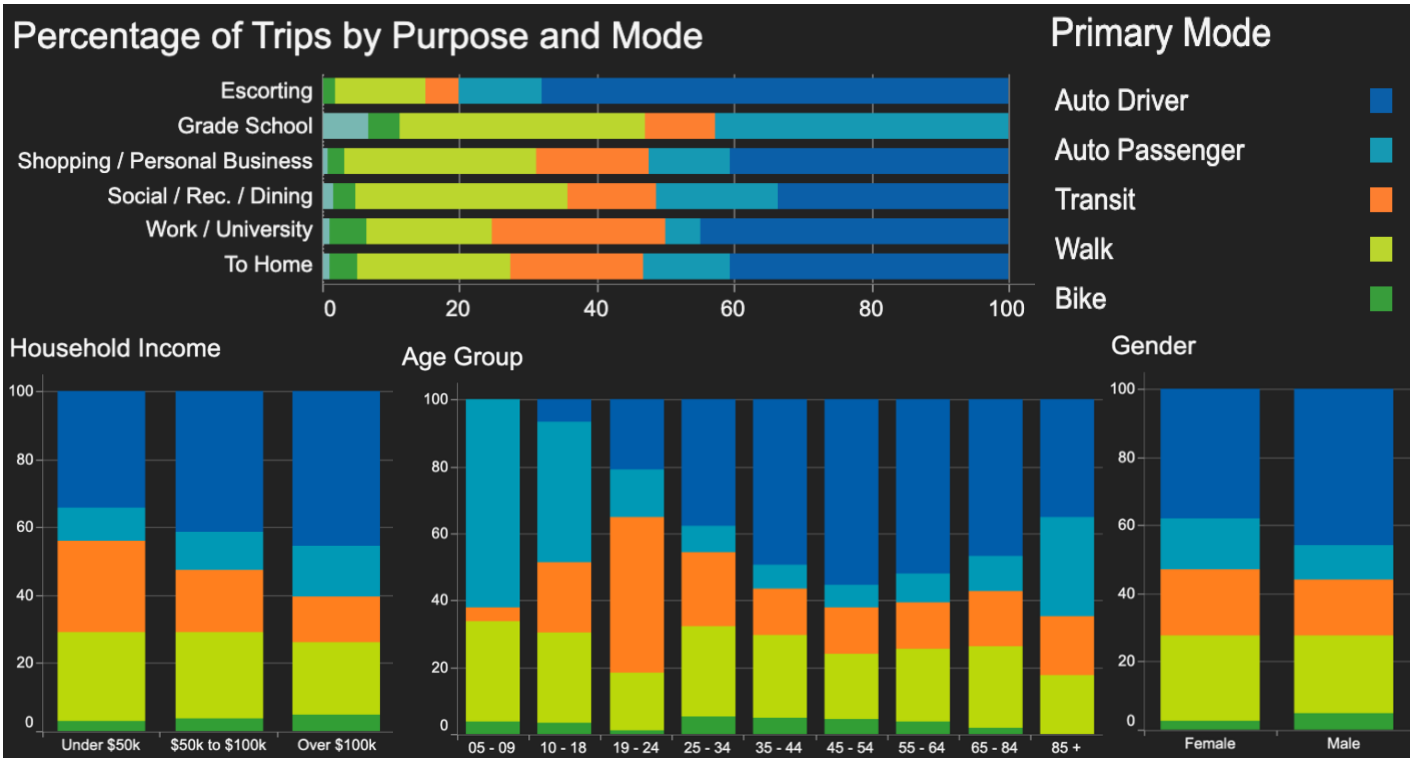

Figure 7. Percentage of trips by purpose, income, age group, and gender. (TransLink, 2019)

Urban Planning Context

City of Vancouver Transportation 2040 Plan

The City of Vancouver's Transportation 2040 Plan (2012) outlines the City's long term strategic vision that will help to "guide transportation and land use decisions and public investments for the years ahead" (p. 5). This Plan was analyzed to identify mode share targets

and planning directions for active transportation in Vancouver that were established by the City prior to the COVID-19 pandemic. Although it is not enforceable, the Plan outlines the City's long term strategic vision and goals for transportation investments.

Supporting active transportation is featured throughout the Plan. By 2040, the City of Vancouver aims to have at least two-thirds of all trips made on foot, bike or transit (Transportation 2040, 2012). The mode share target (Figure 8) was developed using data from TransLink's regional transportation model as well as a trend analysis of travel behaviour and active transportation trips (Transportation, 2040). To achieve the mode share targets, the City of Vancouver set goals for active transportation and outlined steps for implementation. Examples of actions include adjusting and extending curbs, adding traffic calming measures, providing opportunities for rest, reallocating road space for cyclists, and prioritizing cyclist movements on key routes amongst others (Transportation 2040, 2012). It could be argued that the COVID-19 pandemic has accelerated some of these actions by prioritizing roadways for pedestrians and cyclists, adding traffic calming measures, eliminating the need for push buttons and improving active transportation connectivity.

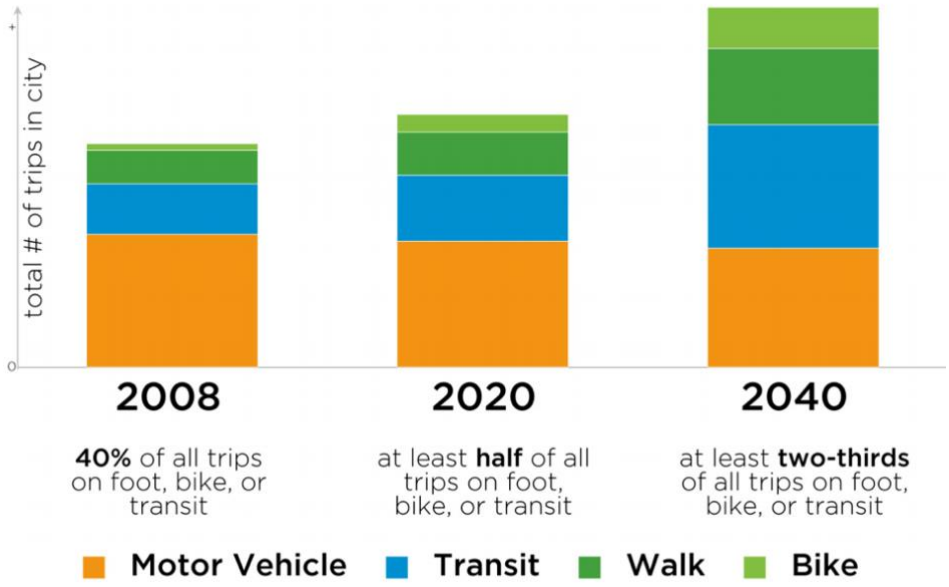

Figure 8. Mode Share Targets from Transportation 2040 Plan. (City of Vancouver, 2012)

The Plan's goal for walking is to "make walking safe, convenient, comfortable, and delightful" (Transportation 2040, 2012, p. 15). The goal for cycling is to "make cycling safe, convenient, comfortable, and fun for people of all ages and abilities" (Transportation 2040, 2012, p. 15). In support of these goals, the City has established a hierarchy of modes to guide transportation and land use decisions, from walking, to cycling, transit, taxi/commercial transit/shared vehicles, and lastly, private automobiles. This hierarchy is justified in the Plan to:

> *help ensure that the needs and safety of each group of road users are sequentially considered when decisions are made, that each group is given proper consideration, and that the changes will not make existing conditions worse for more vulnerable road users, such as people on foot, bicycle, and motorcycle* (Transportation 2040, 2012, p. 16).

These findings demonstrate that supporting active transportation was a priority for the City of Vancouver prior to the COVID-19 pandemic. Many of the barriers to active transportation and mobility that were noted in the Transportation 2040 Plan in 2012, such as busy sidewalks, pinch points, a lack of direct routes, and motor vehicle traffic became even more pressing during the COVID-19 pandemic with the added challenge of maintaining physical distancing. The already high rates of active transportation, as well as the supportive policy context, may help explain why Vancouver was so quick to implement the Slow Streets program when the pandemic hit.

Chapter Summary

This chapter drew on descriptive statistics from the 2016 Census and TransLink's 2017 Trip Diary, as well as the City of Vancouver's Transportation 2040 Plan to highlight the active transportation context in Vancouver prior to COVID-19. In general, public transit rates were higher for females, younger people, visible minorities, lower-income groups and those in core-housing need. Active transportation rates were highest among children under 10 years of age and varied only slightly by gender and household income. The Transportation 2040 Plan revealed that active transportation was a priority for urban planning and transportation investments prior to the pandemic.

Chapter 5: Why, how, and where was the Slow Streets program implemented?

Chapter Overview

Drawing from the key-informant interviews and document analysis, this chapter addresses the second research question, which sought to explain the implementation process for the Slow Streets program in Vancouver. The interviews and document analysis revealed why the Slow Streets program was chosen and how it was implemented, while GIS mapping was used to show where the Slow Streets were located. The socioeconomic profile of the communities in which the Slow Streets were introduced in Vancouver is highlighted by mapping the Slow Streets using ArcGIS and layering that map with the Canadian Index of Multiple Deprivations (CIMD).

Why was the Slow Streets program chosen?

Physical Distancing Requirements and Recreation

Seven of the eight documents that were analyzed (see Appendix B) mentioned physical distancing in their description as the primary reason for the Slow Streets. Recreation was also a big focus, listed in seven of the documents when describing Slow Streets. For example, the *Supplemental Design Guide* (2020) states that "Slow Streets provide opportunities for walking, rolling and cycling and make it easier for people to exercise and access businesses in their neighbourhoods" (p. 3). Interestingly, only three of the eight documents describe the importance of Slow Streets for active transportation and commuting to work (Figure 9). The focus on recreation over commuting could have negative impacts on active transportation equity for essential workers who may have wished to use Slow Streets as safer routes to work. While many were able to work from home during the

Figure 9. Cyclists on Heather St. Slow Street. (Lee, 2021)

pandemic, financially vulnerable workers such as those with lower levels of education and younger workers were less likely to have jobs that afforded the option of teleworking (Turcotte & Savage, 2020).

From the perspective of the City of Vancouver planners, the Slow Streets program was implemented in response to COVID-19 and provincial health orders requiring all British Columbians to maintain two metres of physical distance between themselves and people outside their household. The City recognized that people still needed to access essential services and be able to get outside. City of Vancouver staff described Slow Streets as traffic-calming measures to "make the streets more comfortable for walking, cycling and rolling". Interviewees also noted that Slow Streets were part of other City-led initiatives including Room to Move, Room to Queue, Room to Load and Pop-up Plazas.

Looking back to the start of the Slow Streets, Sandy James of Walk Metro Vancouver notes that the City of Vancouver was late in responding compared to other Canadian cities, including Calgary and Winnipeg. An active transportation advocate with a strong media presence, Sandy reported on the successes of other cities in newspaper publications and interviews with the intent of showing positive examples that would encourage the City to do the same (CBC News, 2020). In a similar vein, Jeff of HUB Cycling mentioned that he had informal conversations with connections at the City of Vancouver who asked if HUB Cycling would support the idea of Slow Streets. According to Jeff, HUB supported the City's efforts; "we wanted to make it possible for the City to get this done".

How was the Slow Streets program achieved?

Coordination between Council and Staff

The document analysis revealed how the Slow Streets program originated and the coordination between City Council and City of Vancouver Staff. On May 12th, 2020 Councillor Lisa Dominato put forth a motion '*Reallocation of Road Space'* asking for council to "direct staff to expedite efforts to identify and implement appropriate reallocations of road space to enable safe shared use and support physical distancing" (p. 1). The day after, City of Vancouver engineering staff gave a presentation to council, '*Mobility and Public Life Response'* (2020) pointing to proposed mobility recovery initiatives including Slow Streets. The presentation gave examples of other cities across the world that have implemented Slow Streets including Oakland,

Portland, Toronto, Seattle and Milan (see Figure 10). Slow Streets for Vancouver were introduced as part of the '*Room to Move'* COVID-recovery initiative. The purpose of the proposed Slow Streets was to provide local opportunities for exercise and "expand neighbourhood open spaces using streets adjacent to parks" (City of Vancouver, p. 32). The City of Vancouver staff verified that the Slow Streets program was initially started by the engineering department, which led the various COVID-19 recovery mobility and public space projects. The HUB Cycling representative corroborated this point that the project was a City staff-led initiative, rather than one led by the municipality's elected officials. City of Vancouver interviewees said that strong support was given from Council for all COVID-recovery initiatives.

Figure 10. Slow Streets in Oakland, CA. (City of Oakland, 2020)

Identifying the Slow Streets

The interviewees explained that the Slow Streets program began with a pilot launch in the Kitsilano neighbourhood in May 2020. Following the pilot, the Slow Streets were implemented in phases throughout the summer, and by August 2020, 40km were implemented (City of Vancouver interviewees).

Through the interview process it became apparent that numerous reasons contributed to the decision regarding the chosen streets. City of Vancouver interviewees identified the following reasons:

1. Existing local street bikeways where people were already using the street as a natural place to walk and bike.
2. Future priorities – extend the Slow Streets to include routes that have been established as future priorities for active transportation.
3. Geographic spread – the routes chosen were spread all over the city, trying to keep in mind equity considerations by including areas which were historically underserved.
4. Access to amenities and green spaces.
5. Providing better connections to local bikeways.

It was also revealed that there was a significant time pressure, and tactical choices had to be made; “we didn’t have months and months to pick out the best locations…we just identified as much as we could, trialled it and went from there” (City of Vancouver Interviewees).

Informing the Public

Informing the public was an important part of the Slow Streets program. Unlike most urban planning projects, public engagement began after the Slow Streets were identified by the City of Vancouver. Half of the documents from the document analysis (see Appendix B) were targeted to the public, showing the importance of online public engagement. Due to the COVID-19 pandemic, in-person engagement opportunities were cancelled. A webpage dedicated to the Slow Streets program was created on the platform Shape Your City to share information, answer questions and address concerns related to the Slow Streets. Informative signs were placed at various locations explaining the Slow Streets and providing information for sharing feedback (see Figure 11). The *Slow Streets Supplemental Design Guide* (2020) was posted on the webpage and as an educational resource that provides details about the Slow Streets including background context, location of streets, related initiatives and policies, and the types of upgrades. The *Engagement Summary* (2021) offers a summary of the online public engagement survey for Step 1 of the Slow Streets (May – Oct 2020).

Figure 11. Slow Streets sign at Heather St. (Lee, 2020)

Where were the Slow Streets implemented?

GIS Analysis

The following section uses GIS maps to convey the spatial extent of the Slow Streets program and shows how the chosen streets relate to existing active transportation rates and to measures of deprivation. Figure 12 shows where the Slow Streets were located in Vancouver as of January, 2021. As shown, most of the street sections are part of a network of connected streets. Small gaps in the network are usually due to large parks which do not have streets running through them. The street segments are spatially concentrated in central Vancouver and to the east. The Slow Streets do not extend to the west side of the city beyond Granville Street or into downtown.

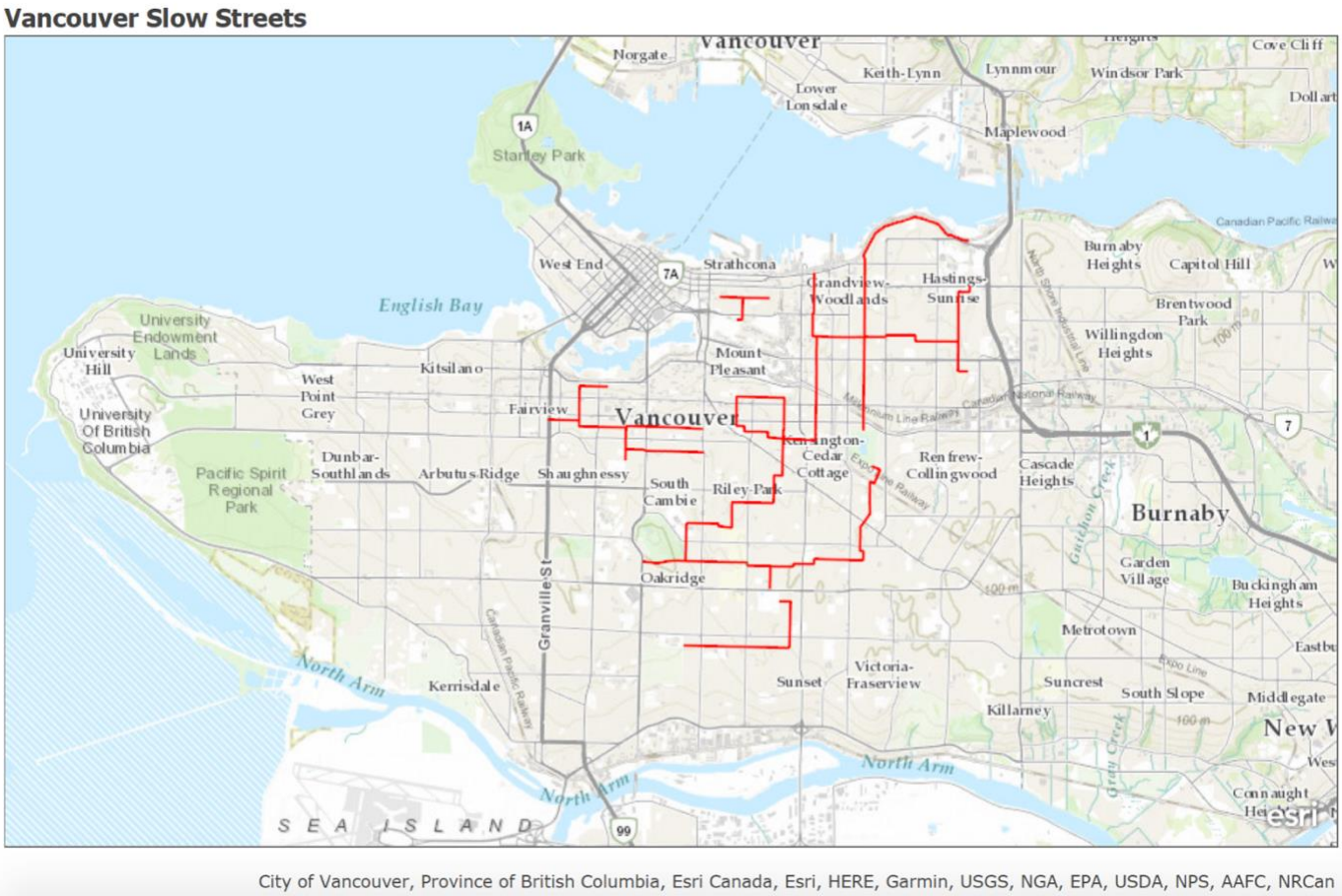

Figure 12. Map of Vancouver Slow Streets. (Lee, 2020)

Figure 13 shows how the Slow Streets relate to existing active transportation rates. The Slow Streets are shown in red and active transportation rates are displayed by the numbers within each Census tract. The numbers refer to the active transportation percentage (walking and cycling mode share) based on the 2016 Census for trips to work. No other trip purposes were included in the 2016 Census. The Slow Streets segments in southern Vancouver have lower rates of active transportation compared to central Vancouver and towards the waterfront. Active transportation rates tend to increase from the south to the northern half of the city. The areas with the highest rates of active transportation, downtown Vancouver and the West End near Stanley Park, are not part of the Slow Streets network.

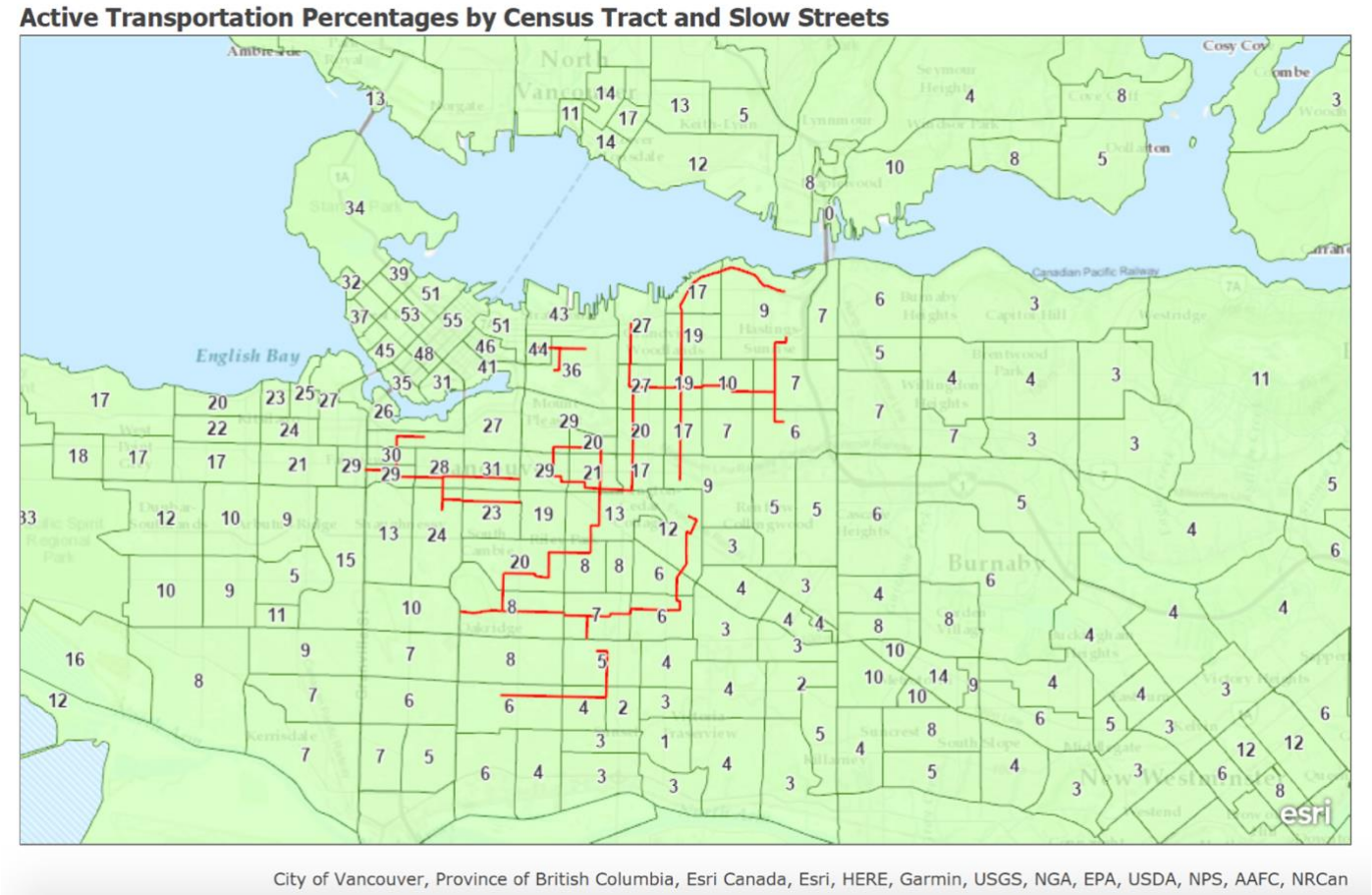

Figure 13. Map of Vancouver Slow Streets compared to active transportation rates by Census tract. (Lee, 2020)

The four maps in Figure 14 show how the Slow Streets network corresponds to spatial patterns of deprivation in Vancouver, drawing on the four dimensions of the CIMD. Similar spatial patterns were found with Economic Dependency, which is classified as "reliance on the workforce, or a dependence on sources of income other than employment income" (Stats Canada, 2019, p. 5), and Situational Vulnerability, which refers to "variations in socio-demographic conditions in the areas of housing and education, while taking into account other demographic characteristics such as Aboriginal identification" (Stats Canada, 2019, p. 6). As shown in Figure 14, there is a wide range of variation in economic dependency and situational vulnerability levels in the census tracts captured by the Slow Streets networks; higher levels of deprivation in these two domains were found at the southern and northern ends of the network, and lower levels of deprivation were shown in the central areas of these map.

The bottom left map in Figure 14 shows the Slow Street network in relation to Residential Instability, which speaks to "the tendency of neighbourhood inhabitants to fluctuate over time, taking into consideration both housing and familial characteristics" (Stats Canada, 2016, p. 5). Compared to the previous two measures, many census tracts in the Slow Streets network are in areas of dark green, the highest gradient of residential instability. Part of this can be explained by the high concentration of apartment buildings and rental units in Vancouver, two of the five variables comprising the dimension. For the Vancouver CMA, the percentage of those living in an apartment was 50.5% in 2016 compared to 35.7% for single-detached house (Stats Canada, 2016).

The bottom right map in Figure 14 shows the fourth dimension of deprivation, Ethno-Cultural Composition, which refers to the "community makeup of immigrant populations, taking into consideration the proportion of the population who are recent immigrants, who self-identified as visible minority, who were born outside of Canada, and who have no knowledge of either official language" (Stats Canada, 2016, p. 6). As shown, Vancouver as a whole has high levels of ethno-cultural composition. As such, the majority of the Slow Streets network is in areas of high-ethnocultural composition. There is variation between the four maps, but overall they show that the Slow Streets network does address active transportation inequities in segments of East Vancouver, South Vancouver, and Central Vancouver.

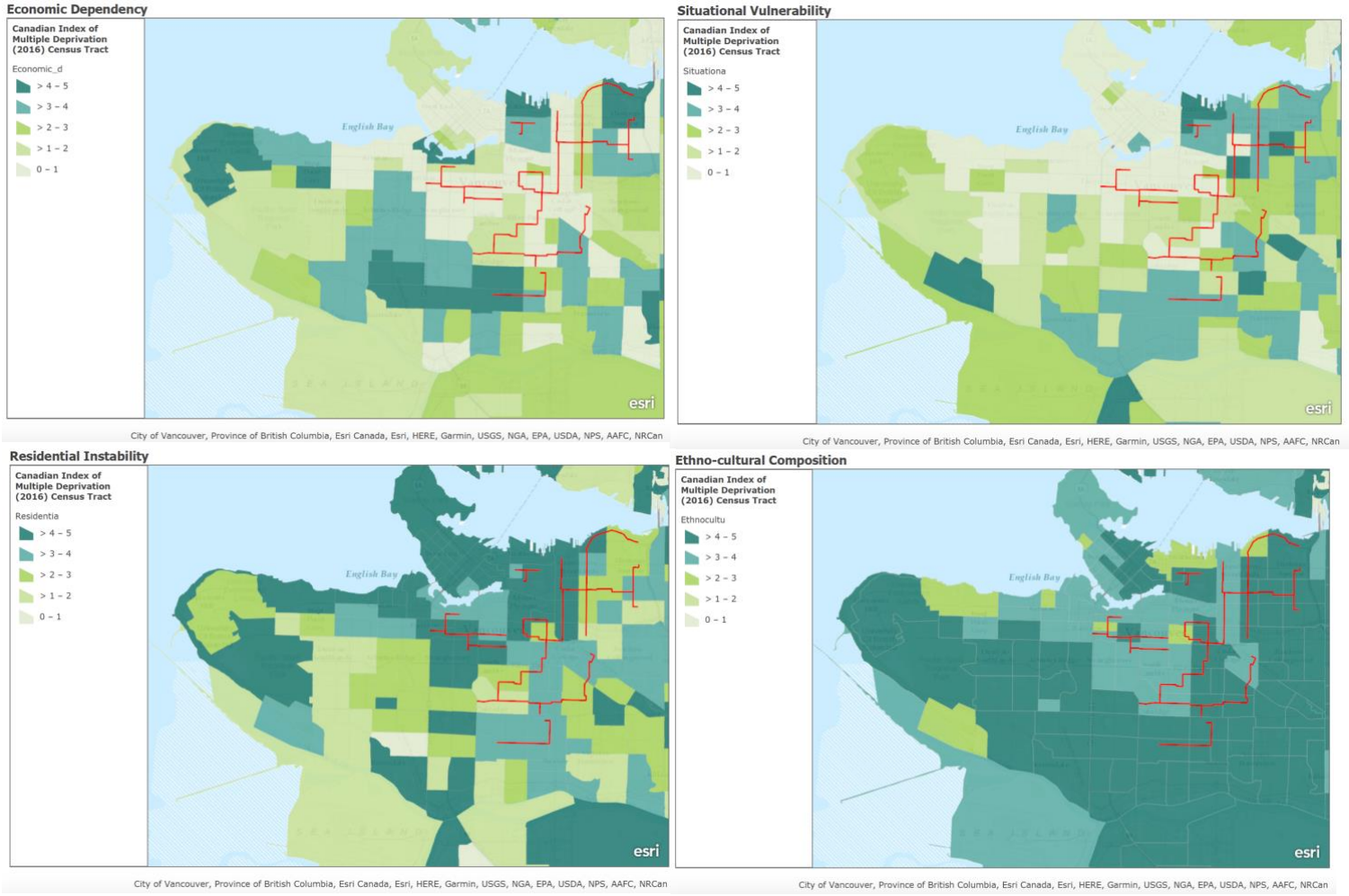

Figure 14. CIMD maps of economic dependency, situational vulnerability, residential instability and ethno-cultural composition in relation to Slow Streets. (Lee, 2020)

Document Analysis

Based on the document analysis, equity did not appear to be a major consideration in the location of the Slow Streets. Only one document, the *Engagement Summary* (2021), referred to spatial equity considerations. A few of the other documents mentioned equity as one of the criteria for selecting the Slow Streets but did not provide any further details as to how equity actually informed decisions. The *Engagement Summary* (2021) provides a map (Figure 15) showing disproportionately impacted populations in Vancouver and states that Slow Streets "installed as part of Step One, were informed by reviewing areas where concentrations of populations with intersecting identities are associated with systematic disadvantages, as well as proximity to parks

and park facility membership" (p. 6). This is the most detailed explanation of equity considerations found in any of the documents or in the key-informant interviews.

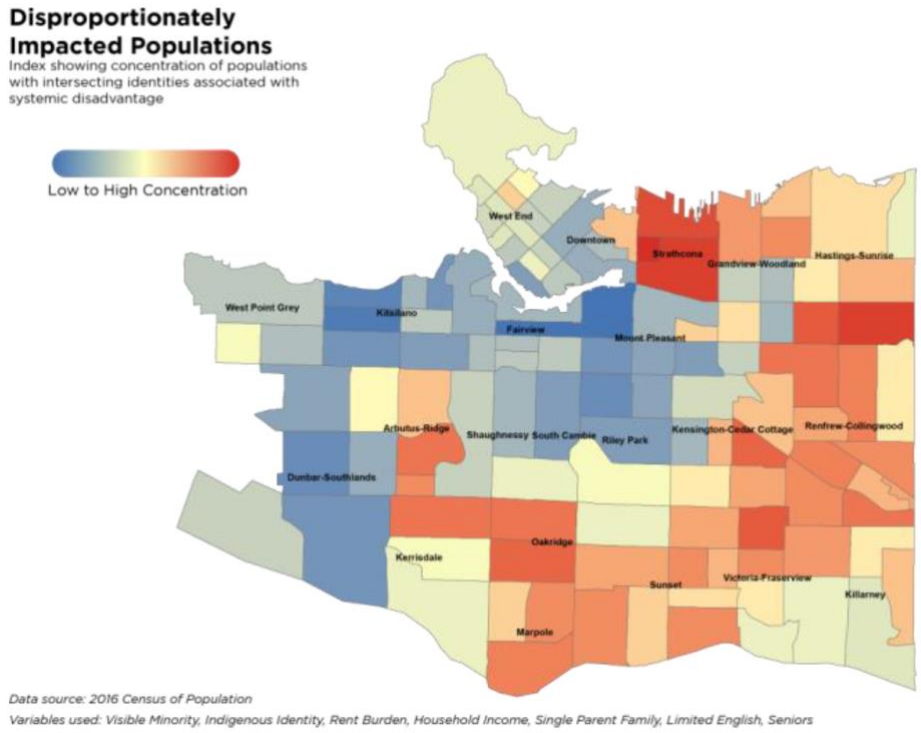

Figure 15. Map of Disproportionately Impacted Populations. (City of Vancouver, 2021)

Chapter Summary

Drawing from key informant interviews and document analysis, this chapter examined the processes by which the Slow Streets initiative was implemented in Vancouver. The primary reason for the Slow Streets was to make more space for recreation and safe physical distancing. Coordination between Vancouver City Council and staff led to the implementation of Slow Streets as part of the '*Room to Move'* COVID-recovery initiative. Forty kilometers of Slow Streets were implemented rapidly, following a successful pilot project at Kits Point.

GIS mapping was also used in this chapter to show the spatial extent of the Slow Streets network, as well as the active transportation and deprivation profiles of the census tracts captured by the network. The areas with the highest rates of active transportation, downtown Vancouver and the West End, were not part of the Slow Streets network, while several neighbourhoods with the highest levels of deprivation, namely the Downtown Eastside and South Vancouver, were captured by the network. Equity considerations could have been furthered by extending the Slow Streets further into South and East Vancouver and into the employment hub of downtown.

Chapter 6: What were the challenges, successes, and impacts of the Slow Streets program?

Chapter Overview

Document analysis and key-informant interviews were also used to address the third research question on the challenges, successes, and impacts of the Slow Streets program. Discussions of impacts tended to focus on the challenges and successes encountered with the Slow Streets program. Commonly identified challenges included the materials used for the barriers, maintenance issues the location of streets, and a lack of public engagement, while indications of success were more mixed.

Challenges

Materials and Maintenance

All of the interview participants identified the chosen street closure barriers as a challenge and pointed to issues regarding maintenance. The barriers used for the Slow Streets were plastic gravity barriers (Figure 16). These barriers were chosen by the City of Vancouver as they were affordable and easy to set up (City of Vancouver interview participant). However, they are also designed to be filled with water or sand, to prevent them from being moved and to deter theft. Unfortunately, as the City neglected to complete this important step in the equipment set-up. As such, the barriers were often moved or stolen, leading to complaints from the public. Walk Metro Vancouver representative Sandy James emphasized the importance of maintenance:

Figure 16. Gravity barrier. (Lee, 2020)

"By caring for the barriers you're telling the public, you care about them walking, biking, and rolling. Letting them get to the stage they did, the City should have quickly done a triage to find a way to respond to it. And they didn't."

The City of Vancouver interviewees also mentioned maintenance issues and challenges of responding to numerous public complaints about the plastic barriers being moved or stolen.

More City staff were needed to respond to complaints and deal with the maintenance. HUB Cycling representative, Jeff Leigh, noted that members of HUB Cycling also stepped up to try to help with some of the maintenance issues, by biking around and moving the barriers back into the street multiple times a day.

Location of Streets

Another shortcoming brought up by the active transportation advocates was the location of the Slow Streets network. From HUB Cycling's perspective, the City took the easy path when choosing the Slow Streets. As the majority of the Slow Streets were on local bikeways in 30km/h speed zones, he states that "one could argue they were already closed". Another point emphasized by HUB Cycling's representative was discrepancies between the "official" Slow Streets and other related projects like the Beach Avenue temporary bike lane and later upgrades (see Figure 18). He argued that Beach Avenue is the best example of a Slow Street, even though the City does not call it a Slow Street. Sandy James also found some of the routes to be odd, wishing that they "circled through more commercial areas" which would allow more people in the street.

Figure 17. Beach Avenue temporary bike lane. (Lee, 2020)

Lack of Public Engagement

Another significant challenge brought up by all of the interviewees was the lack of public engagement. The City planners noted that the Slow Streets program was "not a normal project where we have months to plan and consult". There was pressure on staff to be quick and responsive, but also create an engagement plan during the onset of a global pandemic. Without conventional open houses or in-person engagement, one of the City planners noted that the City was missing a "broader and more diverse perspective".

The HUB interviewee noted that a lack of formal consultation also contributed to more grounds for complaints, ultimately leading to the removal of the Slow Streets on Wall Street. The

letter *Re: Removing the Wall St. Barrier* (2020) explains how the City responded to public concerns about the temporary vehicle closure citing public concerns about traffic circulation changes, non-compliance with people driving through the closure and limited public consultation around the changes (Engineering Services, 2020). The HUB representative emphasized that because there was no formal consultation (due to the pandemic), people could say "you never asked us". In the case of Wall Street, negative feedback led to the City taking down the barriers; as noted by the HUB interviewee, "even when they did get brave, they didn't have resolve to stick".

The Walk Metro Vancouver interviewee pointed to equity issues regarding the lack of consultation. However, she did acknowledge that proper consultation was "missing because of the pandemic and the fact that it was an emergency response". In the future, she suggested that the City should strive for ground-truthing and getting feedback from citizens to create something that is less prescriptive and more "flowing with what people were thinking".

Successes

Feedback on the success of the Slow Streets was mixed. To gauge the success of the Slow Streets, the City of Vancouver launched an online public engagement in the Fall of 2020 with several rounds of surveys. Results from the initial *Slow Streets Step One General Survey* (2021) were relatively positive. Of the 1942 survey responses received, 71% reported liking the initiative. As of March 2021, public feedback was still being collected. Accordingly, one City of Vancouver interviewee noted "as we

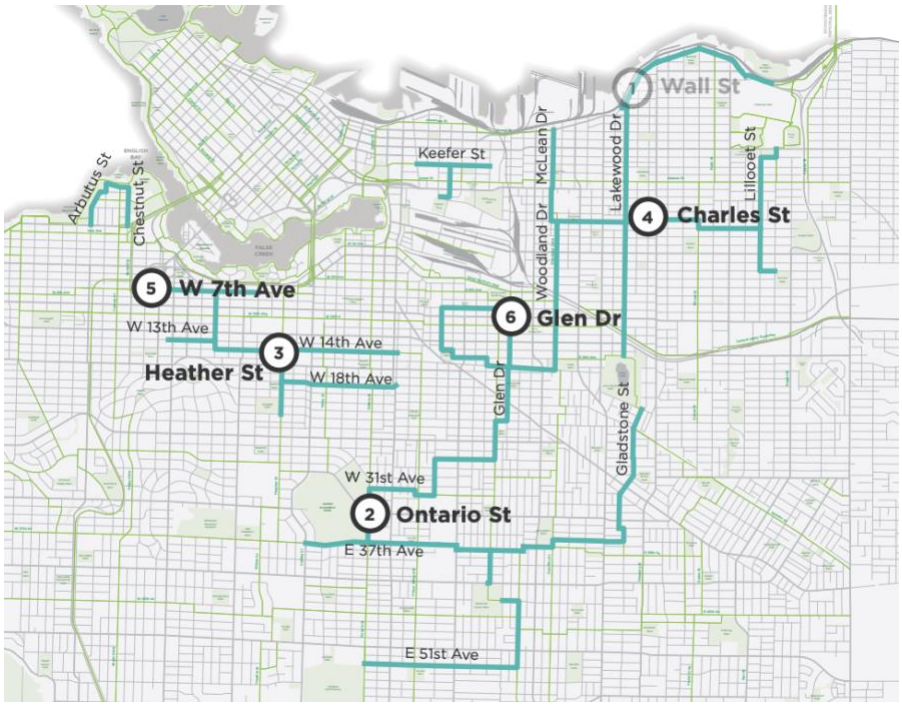

Figure 18. Location of Traffic Calming Upgrades. (City of Vancouver, 2021)

review the feedback and the monitoring results, then we can make a decision of whether or not the interventions are doing what we hope them to do".

Perceptions on the success of the Slow Streets program were more mixed among the active transportation advocates that were interviewed. Overall, Sandy James described the Slow Streets as an "effective response". Jeff Leigh thought certain parts of the Slow Street network were commendable, particularly the section along Lillooet Street in Vancouver. He praised this street as it "was the only one that wasn't already a local street bikeway" and it "looked braver". He also pointed to the success of connecting Slow Street segments and the traffic calming upgrades launched in later phases, particularly the diversions at Ontario Street and Charles Street (noted by number 2 and 4 in Figure 19 above).

Impacts

The Slow Streets have been in place since May of 2020 and the program is still running as of March 2021. Thus, the interviews concluded with a discussion of the overall impacts, observed and anticipated, of the Slow Streets program in Vancouver.

One of the City of Vancouver interviewees stated that the City "chose locations strategically to help us plan for the future". Many of the streets chosen were identified as future bike routes or locations that have been on the radar due to past complaints. The Slow Streets have also enabled the City to target locations that are not meeting the standards for AAA (all ages and abilities) bike routes by acting as a trial for more permanent improvements providing a new data set of traffic counts and public feedback (see Figure 19). For example, the Slow Street on Wall Street enabled the City to quickly collect data, which could guide future decision making as Wall Street is slotted to become a Greenway in the future.

Figure 19. Traffic calming upgrade on Heather St. bikeway. (Lee, 2021)

Similarly, Sandy argued that the pandemic has simply "accelerated something that was going to happen in the next 30 years anyway" in relation to improving active transportation

networks. Jeff Leigh of HUB Cycling emphasized that the Slow Streets have also reinforced that Vancouver lacks a North to South active transportation route and shows the potential of more permanent improvements. By thinking creatively, the City can "use what they have on the shelf and address the resource conflict".

Chapter Summary

This chapter focused on evaluation of the Slow Streets program, exploring the perceived challenges, success, and impacts. Using findings from the key-informant interviews and document analysis, common themes were identified with regards to the challenges of materials, maintenance and a lack of public consultation. Feedback on the success of the program was mixed. A public survey for Step One of the Slow Streets reported a majority of respondents liking the Slow Streets. Interview participants praised the Slow Streets program for the focus on East Vancouver connections and the traffic calming upgrades that were installed in Wave 6 and 7 (September 2020 – Spring 2021) of the program (City of Vancouver, 2021). The Slow Streets program also enabled the City to fast-track improvements in areas that were already identified as future bike routes or greenways and provided a new set of data for more permanent active transportation infrastructure investments.

Chapter 7: Recommendations and Lessons Learned

Chapter Overview

This chapter presents recommendations and lessons learned from a mixed methods case study analysis of the City of Vancouver's Slow Streets program. Key lessons include the importance of investing in durable materials and prioritizing maintenance, being ambitious, trying and testing new things, and prioritizing public engaging and equity. The chapter concludes with a discussion of future research directions.

Recommendations and Lessons Learned

Invest in Durable Materials and Prioritize Maintenance

One of the biggest lessons learned from the Vancouver Slow Streets is the importance of materials and maintenance. All of the interview participants emphasized the drawbacks of the gravity barriers that were chosen. The barriers were lightweight and easy to move which created maintenance challenges as they were frequently moved to the side of the road, vandalized or stolen (see Figure 20). The City of Vancouver staff that were interviewed noted that the materials were chosen as they met the requirements of being "quick, easy and cheap, but in the long-term they became a maintenance liability". Filling the barriers with water or sand, or investing in more durable materials from the start would potentially reduce the unforeseen maintenance costs and staffing pressures from responding to complaints about the barriers being moved.

Figure 20. Gravity barrier moved to the side of the street. (Lee, 2021)

Related to the barriers is the issue of maintenance. Both of the active transportation advocates stressed that the Slow Streets needed better maintenance. Jeff Leigh noted that crews of cyclists from HUB Cycling moved the barriers back to their proper positions several times a

day. Sandy James stressed that maintenance should have been the number one priority for the Slow Streets as it shows that the City cares about those who use the Slow Streets.

Be Ambitious

Another recommendation is to be ambitious. It can be argued that the City of Vancouver was ambitious in the scale of the initiative, designating 40km of Slow Streets, but not in the locations or routes. Most of the Slow Streets were located on existing local street bikeways and residential streets where traffic was already somewhat calmed. It would have been much more ambitious, although more challenging to implement, if sections of busy commercial streets such as Robson, Cambie, Broadway, or Commercial were designated as Slow Streets, even if it was just on a temporary basis such as on weekends. Or, if Slow Streets provided better connections to these transit corridors and to major transit stations. Creating safer connections to transit corridors and stations could have benefited the essential workers who still needed to commute to work during the pandemic. As shown in Chapter 5, pre-existing public transit rates were considerably higher for marginalized groups, many of whom may not have been able to work from home. This point was also made in the interviews by the active transportation advocates who questioned the "easy" route choices and emphasized the Slow Streets that were not already local street bikeways. The six-lane street closure in downtown Madrid, as shown in Figure 21, is one example of an ambitious Slow Street initiative.

Figure 21. Castellana Avenue, downtown Madrid. (Luca from Katz, 2020)

Try, Learn, Adjust

'Try, learn and adjust' was the phrase used to describe the planning process for the Slow Streets. Unlike conventional planning approaches, the pandemic meant that the planning team did not have the time or ability to hold in-person public engagement sessions or go through a long design phase. The planners were directed to move quickly and make adjustments where

needed (interview with City of Vancouver planners, 2020). It is recommended that cities continue to experiment with active transportation pilot projects and prototypes. The pandemic has created an opportunity to experiment with temporary measures that can be "deployed quickly to address long-standing gaps—demonstrating value, building support for permanent installations, and providing a foundation for more walkable, livable cities across Canada" (Federation of Canadian Municipalities, 2020, para. 4). Oakland, California's Director of Transportation Ryan Russo emphasizes the importance of pilot projects for public engagement saying "in essence, the best way to get public engagement on an idea is to test it" (from Bliss, 2020). When people are able to see and use road reallocations, it may help to envision a future that is less car-dependent.

Public Consultation and Ground-Truthing

Even when implementing temporary interventions, the value of public consultation and ground-truthing cannot be understated. The public must be aware of what is going on, educated on why the implementation was chosen, and feel empowered to share feedback. To compensate for the inability to host in-person events due to COVID-19 public health orders, the City of Vancouver focused efforts on online engagement. A dedicated webpage like the City of Vancouver created with all of the information about the Slow Streets is helpful for sharing information and responding to public concerns. The City also placed educational signs near some of the Slow Streets and provided contact information for public questions and concerns. To provide an opportunity for people to give input without needing to go online or call, comment boxes could have been placed near the signs for written feedback. Demonstrating responsiveness, the City removed the Wall Street temporary traffic diversion when multiple concerns were expressed.

For future phases of the Slow Streets, in-person public engagement supplemented by ground-truthing is recommended. Ground-truthing is "the practice of using field observations to interpret, analyze, and verify remotely sensed information about physical features of an area" (Carp, 2008, p. 129). Former City of Vancouver planner and pedestrian advocate, Sandy James, recommended ground-truthing to learn more about how the space is working and how people experience the Slow Streets. Ground-truthing can provide another data source to inform future improvements and long-term infrastructure investments. If COVID-19 restrictions lift before the

Slow Streets program is over, it is recommended that the City of Vancouver host a range of public engagement events in-person to learn more about how the program is working and what could be improved.

Prioritize Equity

Equity should be a top priority when making investments in active transportation infrastructure, public spaces, and recreation. Lee et al (2017) note that "pedestrian and bicycle equity impacts often go overlooked, which has resulted in an inequitable distribution of active transportation costs and benefits" (p. 211). Specific to Slow Streets, some critics have highlighted the problematic notion of "open streets" for people of colour, pointing to "Black men killed by police or white vigilantes while on foot and bike in public rights-of-way" (Bliss, 2021). Thomas (2020) stresses that violence could be heightened in spaces like Slow Streets where understandings of personal safety center on vehicle traffic, as opposed to racism, xenophobia and transphobia.

To ensure that road reallocations such as Slow Streets do not compromise the safety of people of colour and other marginalized groups, it is recommended that decisions be made in consultation with communities and guided by evidence-based data. For example, Vancouver's Parks and Recreation Plan analyzed both spatial and demographic data to understand where there are unmet needs, allowing planners to "ask better questions, to ensure these voices are heard, their needs acknowledged and additional resources are provided" (VanPlay, 2018, p. 15). A similar framework could be applied to future active transportation improvements.

Another aspect of equity is increasing access and removing barriers for active transportation uptake. The Census and TransLink Trip Diary analysis in Chapter 4 showed that while active transportation rates in Vancouver were comparable across groups, the public transit mode share was significantly higher for marginalized groups. Recognizing the well-known saying "all transit users are pedestrians at some point in their trip" (Gatien & Mas Baghaie, 2019, p. 59), it could be beneficial to prioritize active transportation improvements near transit corridors and connections. For longer distances, it may not be practical to walk or bike when there is a time pressure to get to work, make essential trips and performing caring duties. Public transit is often more efficient and time-saving.

To reduce the cost burden of purchasing a bicycle (or scooter, skateboard etc.), it is recommended that the City of Vancouver invest in programs that offer bicycles, gear and maintenance at a reduced cost or free and reduce fees for bike and scooter shares for marginalized and transportation deprived populations. For example, supporting non-profit organizations such as PEDAL Society (2021) who refurbish bikes for low-income and marginalized people for free or by donation, offer free repairs, host bike maintenance workshops for marginalized communities, and run various youth programs in Vancouver's Mount Pleasant neighbourhood.

Another focus is making routes safer for users of all ages and abilities (AAA). The Province of British Columbia (2020) states that the main barriers to increasing active transportation use are inclement weather, age and disability, transporting children and distance to destinations. It is recommended that the City of Vancouver should continue to focus efforts on developing the AAA bike network and prioritizing pedestrian safety improvements. Other focus areas could include increasing active transportation education and safety training in order to further equity and meet the mode share targets established in the Transportation 2040 Plan.

Future Research

As this is an emerging field of research, there are numerous avenues for future work, including investigating public perceptions and behaviors related to Slow Streets, comparing Vancouver's Slow Streets to other cities, and analyzing the post-pandemic state of active transportation and public space use.

Due to research constraints, only planners and active transportation advocates were interviewed for this research. It would be valuable to conduct interviews or focus groups with "users" of Slow Streets to gain a better understanding of how people perceived and used the Slow Streets. Conducting field observations at multiple locations, at different times of day would supplement other research methods.

Another research opportunity is comparing Vancouver's Slow Streets to other Canadian cities or international examples, since the focus on Vancouver's Slow Streets program limits the generalizability of this study's findings. Road reallocations have been implemented in cities

across Canada and internationally as a strategy to create more space for physical distancing, recreation and active transportation (Figure 22). Multiple study areas could be chosen for comparison including examining the planning process, how routes were chosen, key priorities, impacts on equity etc. Drawing comparisons between different cities can further knowledge on road reallocations and provide a learning opportunity to explore what worked and what did not work in different contexts.

Figure 22. Quiet Streets in Toronto. (Toronto Star, 2020)

A final suggestion for future research is to explore the impact of COVID-19 recovery efforts in a post-pandemic world. It will be interesting to see if recovery initiatives like Slow Streets, pop-up bike lanes, plazas and patios have lasting impacts on how public space is used. There are countless questions to be asked such as, will active transportation rates increase following the pandemic? Is there a potential for reduced vehicle kilometers traveled? Will people be more likely to exercise and seek recreation opportunities outdoors? Will temporary interventions like Slow Streets lead to more political will for permanent active transportation investments such as separated bike lanes and sidewalk improvements? In the post-pandemic context, it will be critical to answer questions like these in order to inform urban planning, public health and design as we work to build healthier cities (Honey-Rosés et al., 2020).

Conclusions

Adding to emerging research on the impacts of COVID-19 on urban life and mobility, this report examined the City of Vancouver's Slow Streets program. Slow Streets were one of many design interventions that were implemented in many Canadian cities to give people more space to maintain physical distancing while accessing recreation opportunities, making essential trips and commuting to essential jobs. In Vancouver, 40km of streets were designated as Slow Streets as part of COVID-19 recovery efforts (City of Vancouver, 2021). Slow Streets were

installed with traffic barriers and signs with later phases introducing temporary traffic calming upgrades.

This study employed a mixed-methods case study design to comprehensively investigate Vancouver's Slow Streets program. The pre-COVID active transportation context was established in Chapter 4 using descriptive statistics from the 2016 Census and TransLink's 2017 Trip Diary, as well as the City of Vancouver's Transportation 2040 Plan. It was found that active transportation rates were highest among children and varied only slightly by gender and household income. Chapter 5 focused on the Slow Streets program, answering the question why, how, and where was the Slow Streets program implemented. Key findings included the Slow Street focus on recreation and location on existing local bikeways. The areas with the highest rates of active transportation, downtown Vancouver and the West End, were not part of the Slow Streets network, while several neighbourhoods with the highest levels of deprivation, namely the Downtown Eastside and South Vancouver, were captured by the network. Chapter 6 reflected on the challenges, successes, and impacts of the Slow Streets program. Interview participants agreed that the main challenges were the barriers used to identify the Slow Streets and the impact of COVID-19 on the ability to conduct in-person public engagement. The Slow Streets received positive feedback in initial public surveys and interview participants praised the success of expanding the existing bikeway network and the traffic calming upgrades that occurred in later phases of the program.

The main lessons learned from this research was the importance of investing in durable materials and prioritizing maintenance, being ambitious, trying and testing new projects, engaging the public, and prioritizing equity. Future research could include investigating public perceptions and behaviors related to Slow Streets, comparing Vancouver's Slow Streets to other cities, and analyzing the post-pandemic state of active transportation and public space use. The COVID-19 pandemic has exposed how little space we give to people in our cities, and presents an opportunity to re-think and re-plan what modes we prioritize as we transition into the post-pandemic era.

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Appendix A – Letter of Information

Study Title: Making Space for Physical Distancing in Canada's Urban Centers: A Case Study of Vancouver's Slow Streets

Name of Principal Investigator: Claire Lee, School of Urban and Regional Planning, Queen's University
Name of Supervisor*:* Dr. Patricia Collins

The purpose of this study is to understand the process and reasoning behind implementing the *Slow Streets* Program in Vancouver as a rapid response to COVID-19. As part of this study, I am inviting city planners and active transportation advocates who have been involved in Vancouver's *Slow Streets* program to participate in an interview.

If you agree to take part, I will interview you remotely via Zoom or Microsoft Teams. The purpose of the interview is to gain a first-hand understanding of the perceived success and/or challenges of the Slow Streets program from the perspective of active transportation advocates.

The interview will be a maximum of 30 minutes long. With your permission, the interview will be audio-recorded and later transcribed. There is low/minimal risk of being identified. There are no direct benefits to you as a participant. Study results will contribute to emerging literature on the urban planning response to COVID-19 and transforming existing streets for active transportation.

There is no remuneration for taking part in this study. There are no plans to commercialize the research findings and there are no conflicts of interest.

Participation is voluntary. You do not have to answer any questions you do not want to. You can stop your participation at any time by telling the researcher. You may request to have your data withdrawn from the study up until April 1st, 2021 by contacting the researcher at claire.lee@queensu.ca.

If you wish, your identity can remain confidential to the extent permitted by applicable laws. I will do this by replacing your name with a pseudonym in all publications and a study ID number in all study records. The study data will be stored on the researcher's password protected computer. The code file that links real names with pseudonyms and study ID numbers will be stored securely and separately from the data on an encrypted USB key. Access to study data is limited to the researcher and her supervisor, as well as the Queen's General Research Ethics Board (GREB) may request access to study data to ensure that the researcher has met or are meeting her ethical obligations in conducting this research. GREB is bound by confidentiality and will not disclose any personal information. The de-identified data set will be made freely accessible in the Queen's University's Institutional Repository after a 5-year embargo period. The code file identifying your pseudonym and study ID number will be permanently erased from the encrypted USB key five years after study closure.

The final report from this work will be posted on the Queen's Department of Geography and Planning website. The results of this study might also be published in academic journals and conferences. Subject to your approval below, these publications may include quotes from your interviews. Unless approval is given, I will never include any real names with quotes, and I will do my best to make sure that quotes do not identify participants. It is important to note, however, that the content of your quotes may identify you, and as such, your confidentiality cannot be guaranteed. If you so choose, you can review potential quotes prior to publication.

If you have any ethics concerns please contact the General Research Ethics Board (GREB) at 1-844-535-2988 (Toll free in North America) or email chair.GREB@queensu.ca.

If you have any questions about the research, please contact my supervisor, Dr. Patricia Collins at patricia.collins@queensu.ca.

This Letter of Information provides you with the details to help you make an informed choice. All your questions should be answered to your satisfaction before you decide whether or not to participate in this research study.

You have not waived any legal rights by consenting to participate in this study.

Appendix B – Document Analysis Table

Document Title	Authors	Type of Document	Date	Purpose	Audience	Slow Streets Relevance	Context of Document	Explanation	Slow Streets Description
COVID-19 Mobility and Public Life Response	City of Vancouver Engineering Services	Council Presentation	13-May-20	Presents proposed mobility and public life responses to the pandemic.	Vancouver City Council	First mention of Slow Streets. Presented Oaklands, Portland, Seattle, Milan and Toronto as examples.	Opportunity to reallocate road space, part of 'room to move'.	Supports physical distancing while exercising, essential workers accessing employment, the public returning to work.	Reduce/slower traffic on busy greenways. Local opportunities for exercise. Expand neighbourhood open spaces using streets adjacent to parks.
Council Member's Motion: Reallocation of Road Space	Councillor Dominato	Council Member's Motion	12-May-20	Council member's motion to reallocate road space as a COVID-19 pandemic response.	Vancouver City Council	Does not explicitly mention Slow Streets. Focus on reallocations of road space for safe physical distancing.	Motion to expedite efforts to identify and implement reallocations of road space.	8 points of justifification given including, physical distancing mandates, state of emergency, examples of other cities in Canada, other COVID-19 initiatives.	Enable safe shared use of streets and support physical distancing.
Staff Report, Places for People: Downtown Public Space Strategy	General Manager of Planning, Urban Design and Sustainability & General Manager of Engineering Services	Staff report	01-Jun-20	Presents 3 recommendations, for council to approve the *Downtown Public Space Strategy*, for staff to apply the principles of the *Strategy* to pandemic recovery initiatives and for staff to adapt the Strategic Directions to city-wide policy.	Vancouver City Council	Does not explicity mention Slow Streets but refers to transforming of street right-of-way to allow for physical distancing.	Provides an overview of the *Downtown Public Space Strategy* and connections to public use during the pandemic.	Points to the urgency and relevance of the *Public Space Strategy* during COVID-19.	"Supporting residents to maintain their strong sense of community and social ties, and to spend time outdoors with safe physical distancing." "Recent Council motions have provided direction to transform street right-of-way to allow for physical distancing, while walking, exercising, queuing, dinning, socialising, gathering and accessing essential services – reallocating at least 11% of existing road space for people-friendly
Slow Streets Supplemental Design Guide	Slow Streets Team (City of Vancouver staff)	Design Guide	N.D.	Supplements the Slow Streets initiative, provides detail about each traffic calming measure and the rationale.	The public	Explains the Slow Streets iniaitive and provides details for the general public.	Posted on the City of Vancouver's Shape Your City online platform as an educational resource for the public.	Gives details about the Slow Streets initiative, background, location of streets, related initiatives and policies and types of upgrades.	Designed to help residents physically distance and mitigate the risk of COVID-19. "Slow Streets provide opportunities for walking, rolling and cycling and make it easier for people to exercise and access businesses in their neighbourhoods" (p. 3).
Slow Streets FAQs (webpage)	Slow Streets Team (City of Vancouver staff)	Webpage answering FAQs	N.D.	Public engagement strategy to answer questions about the Slow Streets.	The public	Answers commonly asked questions about the Slow Streets.	Online public engagement for the Slow Streets initative.	Answers 7 questions about the Slow Streets.	Response to physical distancing orders from the BC Public Healath Officer. "This initiative will limit large gatherings and help people keep two metres away from others while providing opportunities for walking, cycling and rolling and making it easier for people to exercise and access businesses in their neighbourhoods" (para. 3).

Places for People Downtown Public Space Strategy	City of Vancouver Staff	Public space strategy document	2020	Explains the public space strategy and policies.	Vancouver City Council, City Staff, the public	Mention of Slow Streets as part of COVID-19 response.	First initiative to come out of the *Places for People Downtown*.	Provides a framework to shape the public realm in Vancouver over the next 30 years.	Mentions Slow Streets at the end of document in 'COVID Recovery Response' section. Described as "tactical traffic calming to reduce motor vehicle volumes on existing routes" (p. 51).
Letter re: Removal of temporary vehicle closure on Wall St	City of Vancouver Engineering Services	Letter	02-Nov-20	Explains why Wall St. closure was removed	Residents and business owners	Letter informs the public as to why the Wall St. temporary traffic calming closure was removed.	Temporary traffic closure installed, negative feedback from public, subequently removed.	Removed due to public concerns about traffic circulation changes, people driving through the closure and limited public consultation.	Traffic calming - motor vehicle volumes exceeded the City's AAA guidelines by up to 6X what is expected for a local street and designated bikeway.
Slow Streets Step One Engagement Summary	City of Vancouver Staff	Summary of survey results for Step 1 of the Slow Streets (May - Oct 2020)	Feb, 2021	Provides summary of online public engagement survey.	The public	Evaluation of Slow Streets	Findings from online public engagement survey for Step 1 of the Slow Streets.	1942 survey responses, key findings: 56% of survey participants "really liked" and 15% "liked" the initiative. 16% "really disliked" and "6%" disliked (p. 15).	"Slow Streets is one initiative that provides opportunities for walking, rolling and cycling and makes it easier for people to exercise and access businesses in their neighbourhoods" (p. 2).