

University of British Columbia

Social Ecological Economic Development Studies (SEEDS) Sustainability Program

Student Research Report

Implications of the COVID-19 Pandemic on UBC Employee Commuting

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SEEDS Project

Implications of the COVID-19 Pandemic on UBC Employee Commuting



Final Report

Submitted by:

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Executive Summary

The objective of this report is to assess the impact of the COVID-19 pandemic on the work commuting patterns of UBC employees and to understand the factors that influence their transportation choices.

We referenced the UBC 2017 Vancouver Transportation Survey, UBC Workplace Preferences Survey and UBC Transportation Plan as well as external information and case studies from broader British Columbia and overseas. In addition, we designed a dedicated project survey to build on the existing frameworks and database and develop further understanding of the work commute preferences of UBC employees.

The objective of the survey was to identify the work commuting patterns and choices of UBC employees before, during and after the Covid-19 pandemic, as well as to understand the factors which will influence their transportation choices post-pandemic. The majority of respondents indicated that they would not change their commute pattern. However, a minority indicated that they would take public transit less, while increasing the use of personal vehicles, cycling or walking.

After analysing survey results, we developed a range of short-term projections, as well as mid to long-term scenarios and projections for commute patterns to UBC. In the short-term, if employees return to work for an average of 3 to 4 days a week, the total number of daily single-occupant vehicle (SOV) trips will reduce by 18% as compared to pre-pandemic, even as the proportion of SOV trips may increase from 24 to 28%. In the long-term, we project that UBC will only be able to achieve its transportation targets if flexible WFH policy reduces the total number of trips to less than 75% of pre-pandemic levels, and there is a sustained shift in travel preferences away from SOV towards transit, cycling and walking.

Finally, we developed the following recommendations that may help UBC and its partners better achieve the targets in the UBC Transportation Plan in the mid to long-term, post-pandemic future. The following action steps are recommended:

- Encourage remote work policy
- Support walking and cycling
- Rebuild transit ridership
- Monitor
- Build back better

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1 Introduction

Since March 2020, the transportation sector in British Columbia has seen a severe disruption and shock from the COVID-19 pandemic following the stay-at-home orders from BC’s Provincial Health Officer. The decline in transportation demand differed across groups - most employees transited to primarily working from home while those with jobs that require physical presence still need to travel to work. The drop in transportation has also been associated with reduced air pollution and reduced traffic accidents. Cities all over the world have seen a similar phenomenon, as they all likewise try to grapple with the pandemic.

While the hope is that the ongoing vaccination exercise will be able to inoculate the population from the COVID-19 virus, the effect of the pandemic on the future of work and subsequently the transportation demand for the commute from home to work remains inconclusive. Much will depend on longer-term factors such as pandemic control, human resource policies and personal preferences.

It is critical for transport and urban planners to have insight into the potential scenarios which may play out, so that they can anticipate and develop creative and effective measures and policies to ensure transportation commute needs continue to be met in the post-pandemic longer-term, in accordance with sustainable transportation targets. This applies to UBC and its planners as well – UBC employs close to 19,000 employees at its Vancouver and Okanagan campuses.

	Vancouver	Okanagan	Total
Faculty	5,711	571	6,282
Staff	10,736	953	11,689
Total	16,447	1,524	17,971

Source: UBC Overview and Facts (UBC, 2021)

2 Project Background

2.1 Objective

The objective of this project is to assess the impact of the Covid-19 pandemic on the work commuting patterns of UBC employees and to understand the factors that influence their transportation choices. The research findings will help improve the planning, delivery, and communication of transportation services by UBC Campus and Community Planning and other UBC departments, as well as external partners of UBC that are involved in transportation to/from UBC, such as BC Ministry of Transportation and Infrastructure, TransLink and Modo.

2.2 Scope

The scope of the project also includes the following deliverables:

- Develop post-pandemic transportation scenarios for UBC – this will cover the impact of employer policies regarding ‘work from home’ on commuting patterns and choices
- Assess the potential impact of the Covid-19 pandemic on the relevant targets in the *UBC Transportation Plan*
- Develop recommendations to help UBC and its external partners achieve the relevant targets in the *UBC Transportation Plan*

2.3 Approach & Methodology

UBC Campus and Community Planning are our key clients for the project. We scoped the project’s objective and scope together with them, consulted and incorporated their feedback at the key stages of the project. Figure 2.1 summarises the key stages of the project.

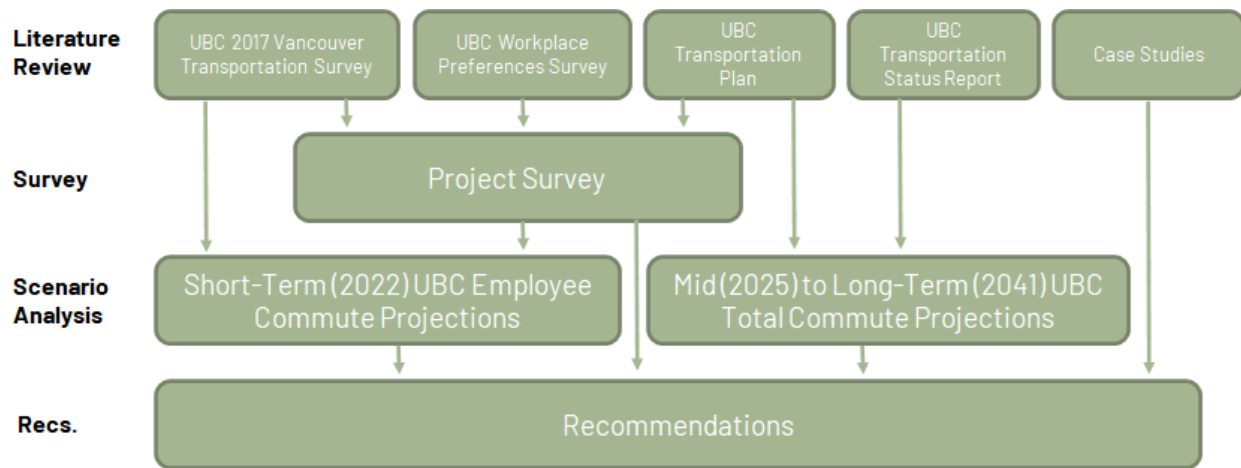


Figure 2. 1 Key project stages

For the literature review, we reviewed key UBC documents recommended by our clients, as well as external information and case studies from broader British Columbia and overseas. We referenced the *UBC 2017 Vancouver Transportation Survey*, *UBC Workplace Preferences Survey* and *UBC Transportation Plan* in designing our dedicated project survey – to build on the existing frameworks and database and develop a further understanding of the work commute patterns and preferences of UBC employees moving forward.

The project survey was distributed online through the administrative teams of various UBC faculties as well as contacts of the team members. The objective of the survey was to identify the work commuting patterns and choices of UBC employees before, during and after the Covid-19 pandemic, as well as to understand the factors which will influence their transportation choices post-pandemic.

Next, we developed a range of short-term projections, as well as mid to long-term scenarios and projections for commute patterns to UBC. For the short-term, we relied on data from *UBC's 2017 Vancouver Transportation Survey* and our project survey, to project the likely commute mode of UBC employees in 2022. For the mid to long-term, we relied on data from *UBC's Transportation Status Reports* to develop 2025 and 2041 scenarios for commuting to and from UBC campus by all persons (not limited to UBC employees). For each scenario, we projected the resulting commute volume and mode, and how these would fare against the sustainable transport targets in the *UBC Transportation Plan*.

Finally, we galvanized the findings from the literature review, our survey and scenarios, to develop recommendations that may help UBC and its partners better achieve the targets in the UBC Transportation Plan in the mid to long-term, post-pandemic future.

2.4 Limitations

Given time and resource constraints, we have made scoping decisions for the project which has resulted in the following limitations:

- Survey limitations – Due to time and accessibility constraints (as only virtual distribution was possible given the pandemic), we were unable to hit our target of 300 respondents, which would have given us a 95% confidence level based on the total employee population of 17,971. The virtual mode of survey distribution may also have resulted in selection bias towards employees more au fait with working digitally. The 172 responses we received nevertheless represented a meaningful figure. It would be useful if the findings of the project can be validated in the future with a larger sample size. There are other survey-related limitations which we explain in the specific sections of the report.
- Recommendation limitations – In alignment with the scope and findings from the study, we have kept to broad, top-line policy recommendations without going into any significant detail for each. The policy details are critical for implementation and should be studied in separate follow-on studies.

3 Literature Review

3.1 UBC Transportation Plan

UBC is dedicated to promoting sustainable transportation options for the university community, in support of its commitment to combating climate change and improving the well-being of the community. The *UBC Transportation Plan* consolidates existing transportation policies and actions that reside in UBC's *Land Use Plan*, *Vancouver Campus Plan*, and *Strategic Transportation Plan*, identifies gaps in these existing plans and provides new policies and actions to achieve aspirational long-term targets in shifting trips to sustainable travel modes such as transit, walking and cycling.

3.1.1 Transportation Targets

The *UBC Transportation Plan* (2014) states the following targets to ensure accountability, shape decision making and inspire the community to act in ways to achieve UBC's campus vision:

- By 2040, at least 2/3 of all trips to and from UBC will be made by walking, cycling or transit
- Maintain at least 50% of all trips to and from the campus on public transit
- Maintain at least 30% reduction from 1997 levels in daily SOV trips per person to and from UBC
- Reduce SOV travel to and from UBC by 20% from 1996 levels

3.1.2 Policies & Actions

The policies and actions cover areas for which UBC has direct control, e.g. regulating campus streets and parking; building, and maintaining campus roads, sidewalks, and public spaces; and empowering the campus community to make sustainable transportation choices. They also cover areas that fall under external control, such as public transit under TransLink or car-sharing under Modo, for which UBC functions as a partner, stakeholder, and advocate for the campus community.

3.2 Current Situation – Workplace Survey and Current Commuting

3.2.1 UBC Transportation Status Report

Every fall since 1997, UBC has monitored travel patterns of all trips to and from campus to evaluate progress towards its sustainable transportation targets. This is reported annually in the *Transportation*

Status Report. The report also identifies key factors that have affected travel patterns to UBC over time. These include:

- Population – The daytime population at UBC has increased by over 73% since 1997 – from 42,300 in 1997 to 73,300 in 2020. This includes increased student enrolment and associated increases in faculty and staff.
- Compass Card (U-Pass) – One of the most significant changes affecting travel patterns at UBC has been the student U-Pass, which was introduced in September 2003. The U-Pass is a universal transportation pass that is mandatory for students at a cost to students of \$41 per month.
- Increased transit service – In conjunction with introduction of the student U-Pass, TransLink has substantially increased the level of transit service provided to UBC and continues to make service improvements annually.

Based on the *2019 UBC Transportation Status Report*, transit and driving are the two primary transportation modes of choice (see Figure 3.1). In comparison to faculty and staff, students account for higher proportion of public transit usage. The contributing factors for this may include student’s income level and the provision of U-Pass for students (Campus and Community Planning, 2020).

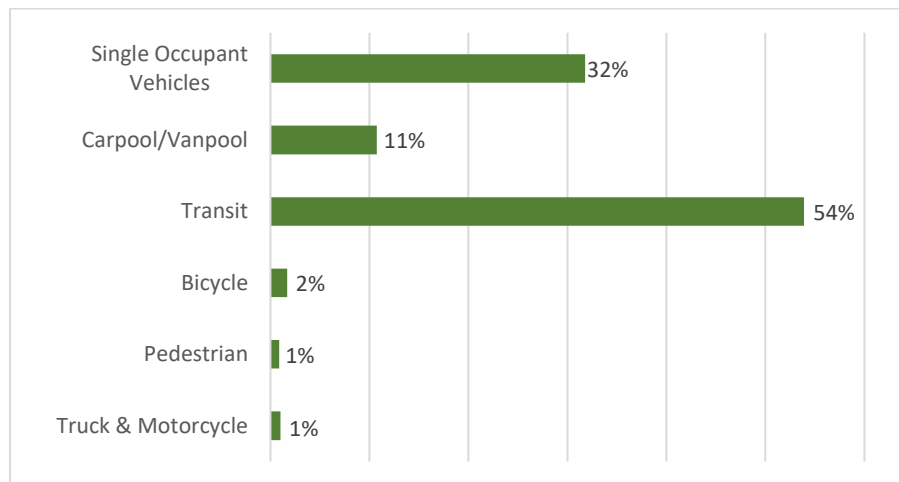


Figure 3. 1 All trips to/from UBC in 2019

The *2020 Transportation Status Report* collected transportation data in October and November of 2020 during the pandemic, when the number of daily new cases of COVID19 in BC was between three to five hundred. The table below reflects how the commuting data in 2019 and 2020 fared against UBC’s targets.

UBC Transportation Targets	2019	2020
At least two-thirds of all trips to and from UBC will be made by walking, cycling or transit	☒	☒
Maintain at least 50% of all trips to and from the campus on public transit	☑	☒
Reduce single occupant vehicle trips to and from UBC by 20% from 1997 levels	☒	☑
Reduce single occupancy vehicle trips per person to and from UBC by 30% from 1997 levels	☑	☑
Maintain daily private automobile traffic at or less than 1997 levels.	☑	☑

The data from 2020 marked the first time that the target for reducing single occupant vehicle trips by 20% from 1997 levels has been achieved. However, the achievement is anticipated to be temporary – a result of the dramatic drop in overall commuting volume during the pandemic due to online learning and remote work policy. Upon closer scrutiny of the commuting mode, it is observed that the proportion of trips made by single occupancy vehicle increased significantly, from 32% in 2019 to 49% in 2020 (see Figure 3.2). If overall commute volume reverts to pre-pandemic levels, and commuter preference in terms of mode remains as per 2020, UBC will be confronted with severe parking shortage and roadway congestion.

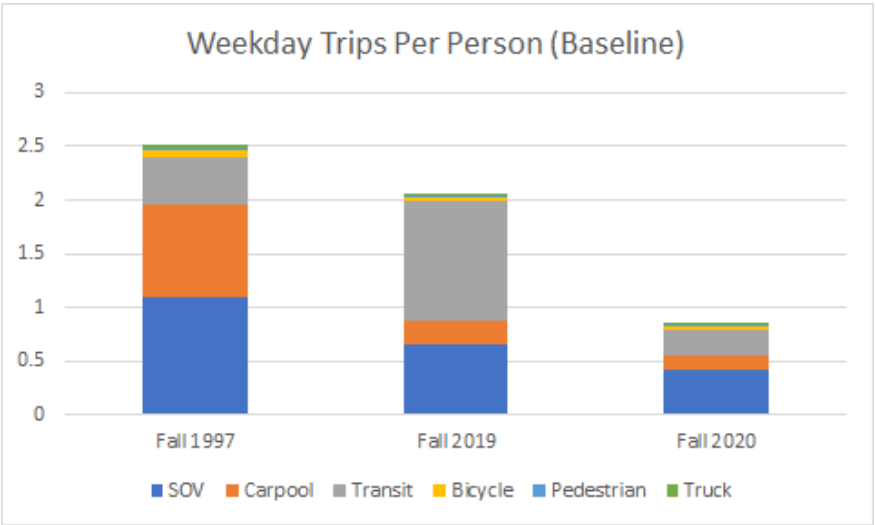


Figure 3. 2 Weekday trips per person by commute mode

The 2020 Transportation Status Report also observed a change in the hourly distribution of person trips to/from UBC. In 2020, the morning commute peak has completely disappeared. The afternoon peak still occurred but at a less elevated level and more prolonged. This trend is an important consideration in transportation service design as traditionally the daily peaks put the highest strain on the transportation system resulting in congestion and overcrowding on the transit system.

3.2.2 Workplace Preferences Survey

In Summer 2020, UBC Human Resources engaged UBC employees to understand the commuting pattern of employees' pre-pandemic and their commuting expectation post pandemic. The survey garnered 4,878 responses and can be deemed as representative. As shown in Figure 3.3, prior to the pandemic, 38 percent of surveyed employees indicated they drive/carpool/car share to work on-site. Another 46 percent stated they use public transit for part of or their entire trip (UBC Human Resources, 2020).

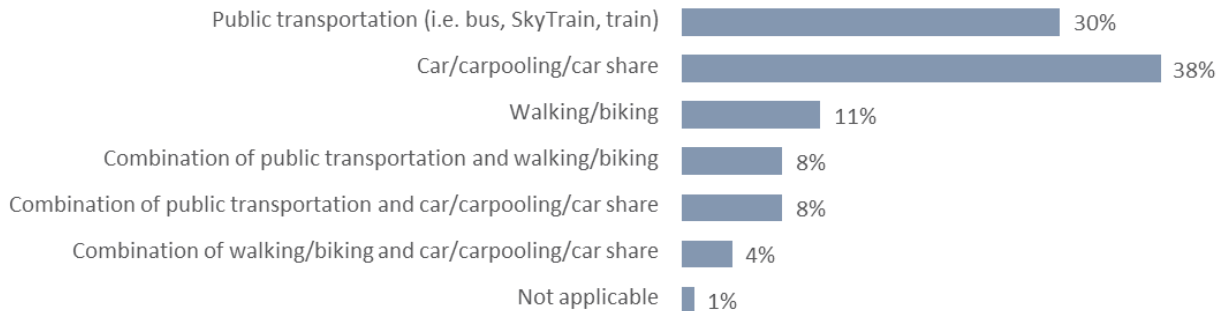


Figure 3.3 Employee commute mode pre-pandemic

The survey asked about whether their travel mode would change if they travelled to campus during the pandemic. The respondents indicated strong likelihood to increase usage of car, walking and biking (see Figure 3.4). Most notably, most of the shift occurred from previous transit users (UBC Human Resources, 2020). The reduced attractiveness of public transit is understandable as personal space is highly valued to reduce the risk of transmission. A subsequent survey was conducted in March 2021. It indicated a similar trend of lower public transit demand. The preference remains using the car, walking, and cycling (UBC Human Resources, 2021). The decisions of individuals and the factors influencing them, such as transmission rates, vaccination rates, and availability of private vehicles, may continue to shift over time.

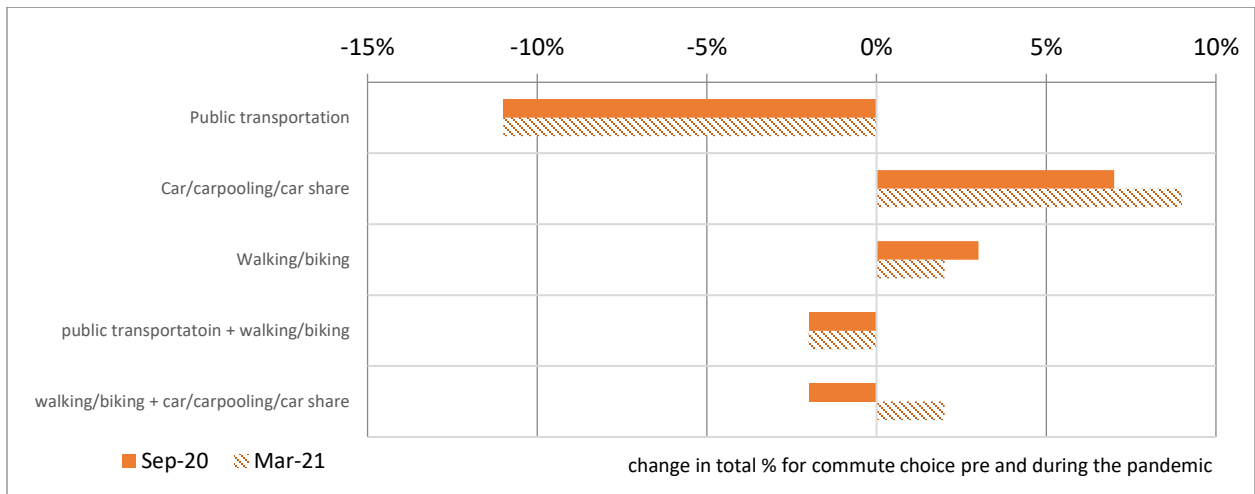


Figure 3. 4 Hypothetical behavioural change during the pandemic (UBC Human Resources, 2021)

In Fall 2020, a follow-up survey was conducted by UBC Human Resources for a comprehensive study on remote work. The survey result indicated 97 percent of respondents can do all or some of their work remotely, including 71 percent indicating all their work could be conducted remotely (see Figure 3.5). Just over half (or 52 percent) of respondents indicated they would prefer to work remotely all the time (Buchholz, 2020)(see Figure 3.6).

The findings on the level of comfort and preference for remote work may have a significant impact on the transportation demand post-pandemic. If most staff continue to primarily work from home or conduct a hybrid version of working from home and on-site, the demand for transportation can be reduced significantly. This will contribute positively towards UBC achieving its sustainable transportation targets and lead to the reduction of greenhouse gas emission.

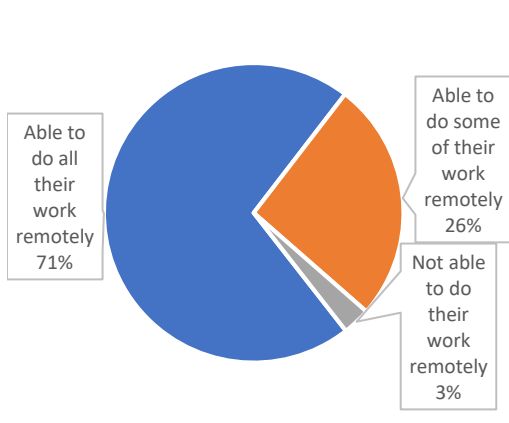


Figure 3. 6 UBC Employee's ability to work remotely

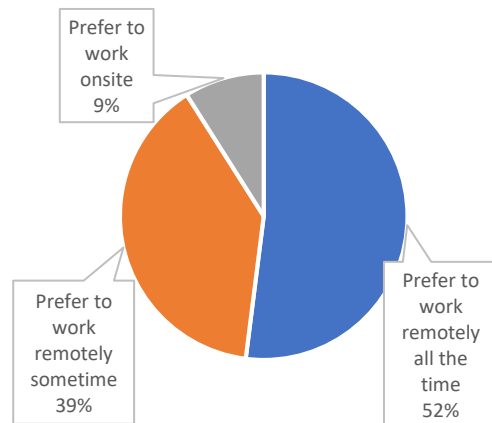


Figure 3. 5 UBC Employee's Preference on remote work

The workplace preference survey conducted by UBC Human Resources also provided insight on the home to work distance for UBC employees (see Figure 3.7). The distance information is helpful as commute distance is an important factor in mode choice, which will be elaborated in the ‘Recommendations’ section.

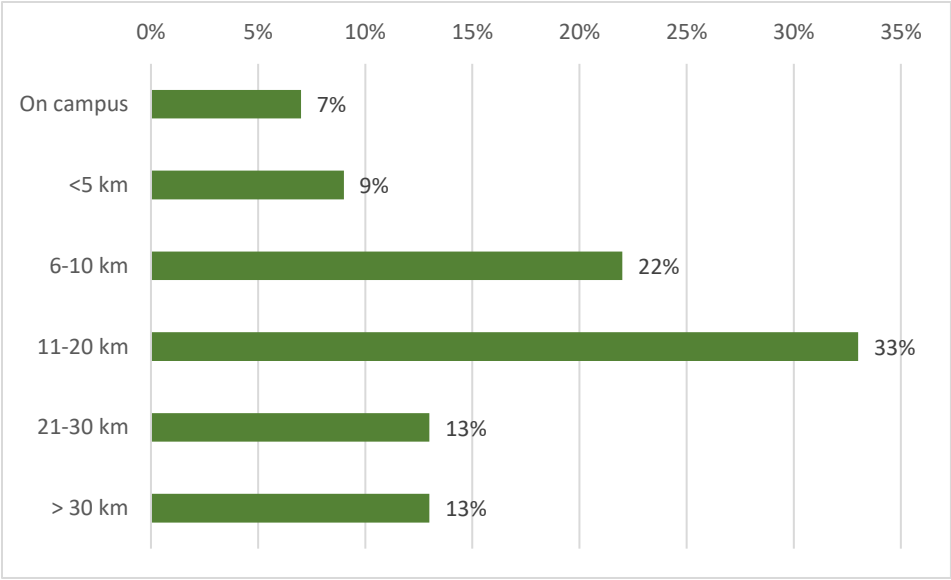


Figure 3. 7 Distance Between Home and On-site Work Location (UBC Human Resources, 2021)

3.2.3 Metro Vancouver Transportation Status

TransLink, Metro Vancouver’s regional transportation authority, reported a 60 percent drop in ridership during Covid compared to pre-Covid level. The lowest level of ridership was recorded in April 2020 where the system carried less than 25 percent then pre-Covid periods. Ridership recovered to 40 percent of pre-Covid level through the summer of 2020 and has hovered at the same level over the last 12 months (see Figure 3.8).

The reduction in transit ridership has put significant financial strain on TransLink. TransLink noted seven significant uncertainties that will affect the region’s transportation network in the coming years: work from home, employment, distance learning, willingness to share rides, strength of economy and disrectional spending, auto ownership and fuel prices (Translink, 2021).

In the same time frame, TransLink has reported the traffic volume on three bridges in Metro Vancouver has returned to more than 80 percent of pre-COVID level (see Figure 3.9). This may signal a potential for worsened congestion as the economy reopens.

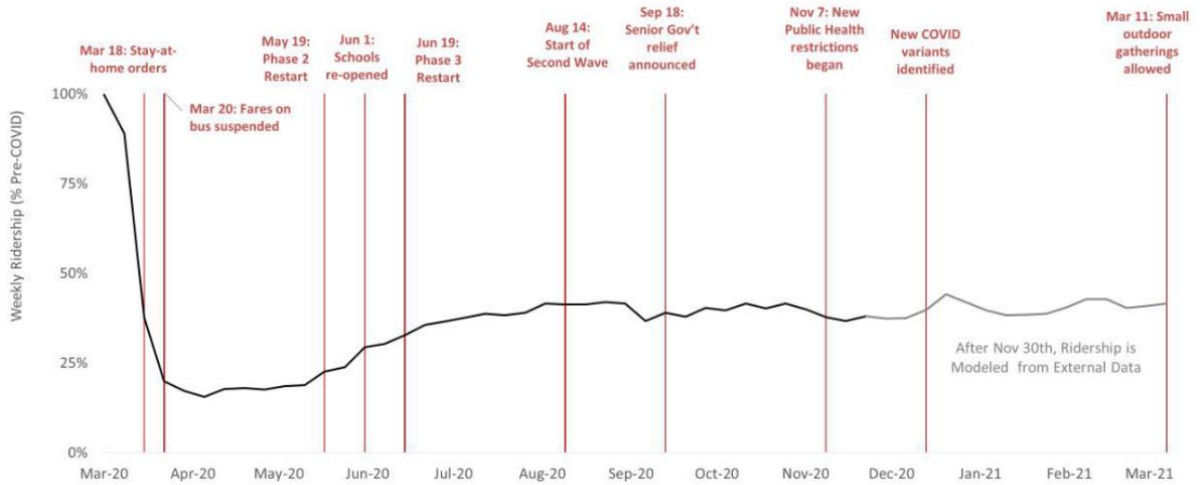


Figure 3. 8 Transit Ridership April 2021 Mayors' Council Report Source: (TransLink, 2021)

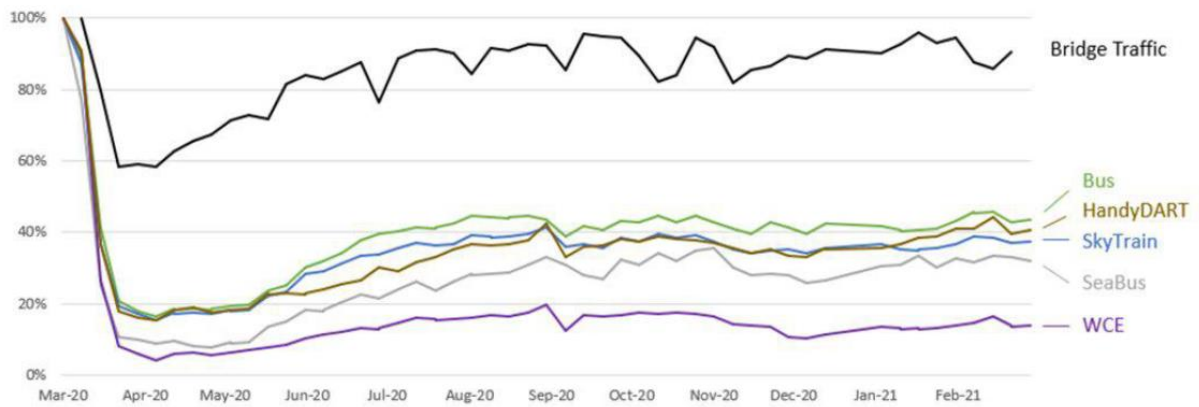


Figure 3. 9 Transportation Status April 2021 Mayors' Council Report Source: (Translink, 2021)

To forecast transit ridership, TransLink conducted a scenario analysis and provided three ridership scenarios till the end of 2021 (see Figure 3.10). The key factor which would influence the scenarios was the progress of the vaccination program in terms of vaccination rate and vaccine efficacy. A TransLink representative indicated high confidence that ridership will return to 70 to 91% of pre-COVID levels by 2022, depending on whether the 'High Demand' or 'Medium Case' scenario plays out.

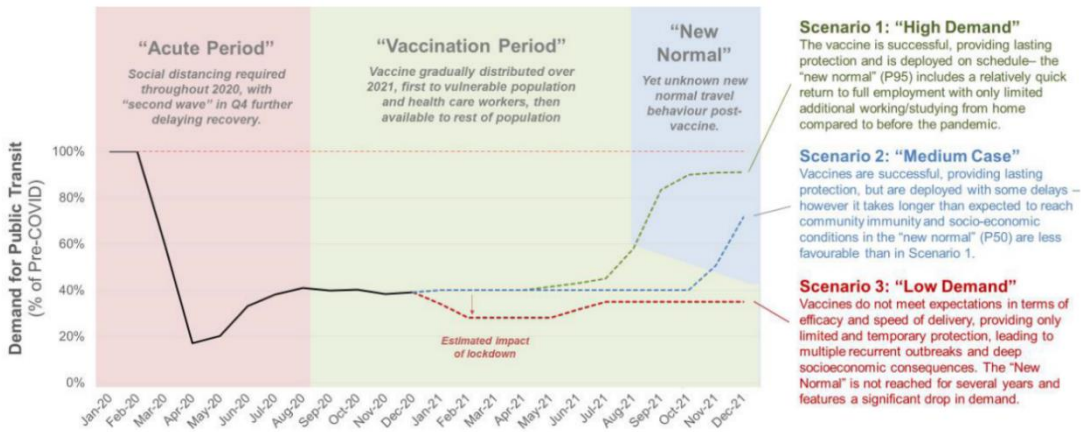


Figure 3.10 Transit Ridership Scenarios Projection April 2021 Mayors' Council Report Source: (TransLink, 2021)

3.3 Case Study on Post Pandemic Commuting Pattern

3.3.1 Stantec Survey

In 2020, Stantec, an international consulting firm, completed a study of how commuting patterns would change due to COVID-19. A 5-minute travel behavior survey was done by 3,552 respondents during the period between April 6, 2020 to May 8, 2020. Over 90% of responses were from Stantec employees, and the external responses were mostly from other professional services firms. One of the key findings was that the attitudes towards working from home are shifting (see Figure 3.11). Before COVID-19, 77% of respondents said they work from home less than once a week, while only 40% of respondents said they would work from home less than one day a week after COVID-19 (Gobeille & Raque, 2021).

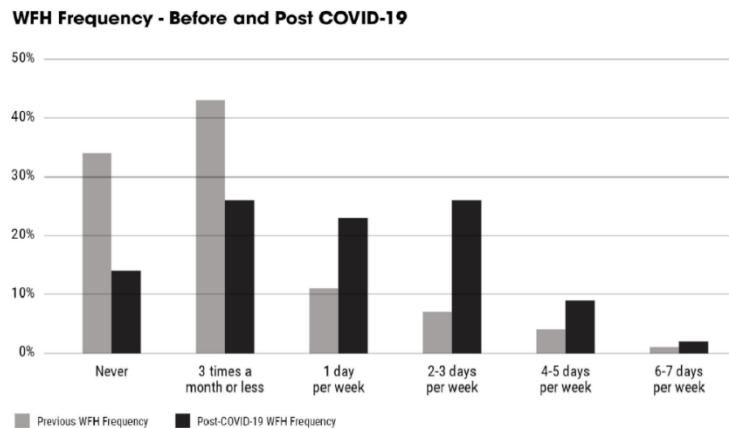


Figure 3.11 Working from Home Frequency - before and post Pandemic

The survey also showed a change in commuting patterns for a minority of respondents' post-pandemic (see Figure 3.12). In particular, 29% of frequent public transit users said they would decrease their frequency of transit use post-pandemic, as compared to 4% who said that they would increase use.

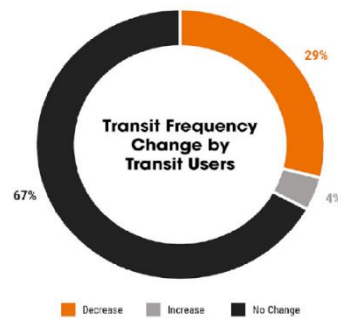


Figure 3. 12 Transit Frequency Change by Transit Users – Before and Post pandemic

3.3.2 Study from Rates.ca

In June 2020, Leger Marketing on behalf of Rates.ca conducted a digital survey of 817 working Canadians aged 18 years older on commuting pattern before and after COVID 19. According to the survey, 28% of respondents will continue to work from home post COVID-19, which represents a 19-percentage point increase from before the pandemic (see Figure 3.13). In terms of commuting behavior, 53% of respondents plan to drive to work post-pandemic, an 8-percentage point reduction from before the pandemic. Public transit saw the largest fall in percentage, with only 7% of respondents choosing it, as compared to 17% pre-pandemic (Lahey, 2021).

In summary, both studies suggest that if employment policies or choices allow, a larger proportion of employees will choose to work from home more post-pandemic, and that a change in the frequency of having to go to the office may also impact the mode of commuting for a minority.

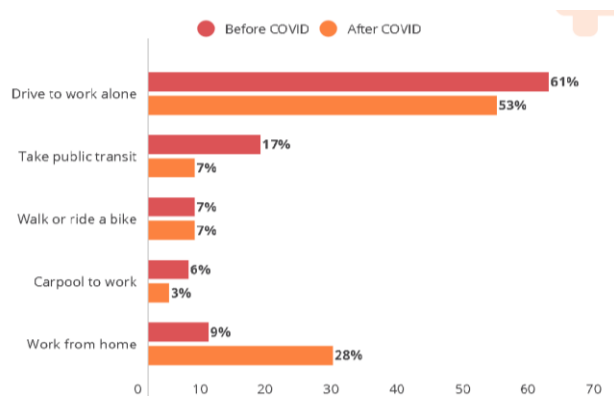


Figure 3. 13 Commuting to Work – Before and Post pandemic

4. Survey

4.1 Methodology

The Questionnaire

The questionnaire had 15 general questions and was designed to identify the work commuting patterns and choices of UBC employees before, during and after pandemic and to understand the factors that influence transportation choices.

The questions were organized along three thematic blocks. The first four questions investigate demographic information of respondents; the second section focuses on the commute patterns prior to the COVID-19 pandemic, during pandemic; and post- pandemic; the last section focuses on factors that impact commuting choices. The questionnaire combined open-ended questions and multiple-choice questions. A copy is attached in Appendix A.

Survey Distribution & Sample Size

The survey was conducted online. We contacted the administrative teams at 12 different faculties within UBC for their assistance in distributing the survey. The survey was also distributed by the Campus and Community Planning. The survey was hosted on the Qualtrics platform to comply with the BC Freedom of Information and Protection of Privacy Act. The survey was launched on March 6 and terminated on April 10. The survey results were cleaned. There were 3350 responses and 172 recorded as valid responses. The remainder were assessed to be bots or persons who were not UBC employees.

	Before data cleaning	After data cleaning
<i>Sample size</i>	17,971	17,971
<i># of Responses</i>	3,350	172

4.2 Survey Results

Profile of Respondents

In the first block of questions, respondents were asked to indicate employee category, work location, age group and first three letters of postal code. With reference to Figure 4.1, Graph 1 indicates that 66% of

the respondents are full time staff and 24% of the respondents are full time faculty. 88% of total respondents are from UBC Vancouver Point Grey Campus.

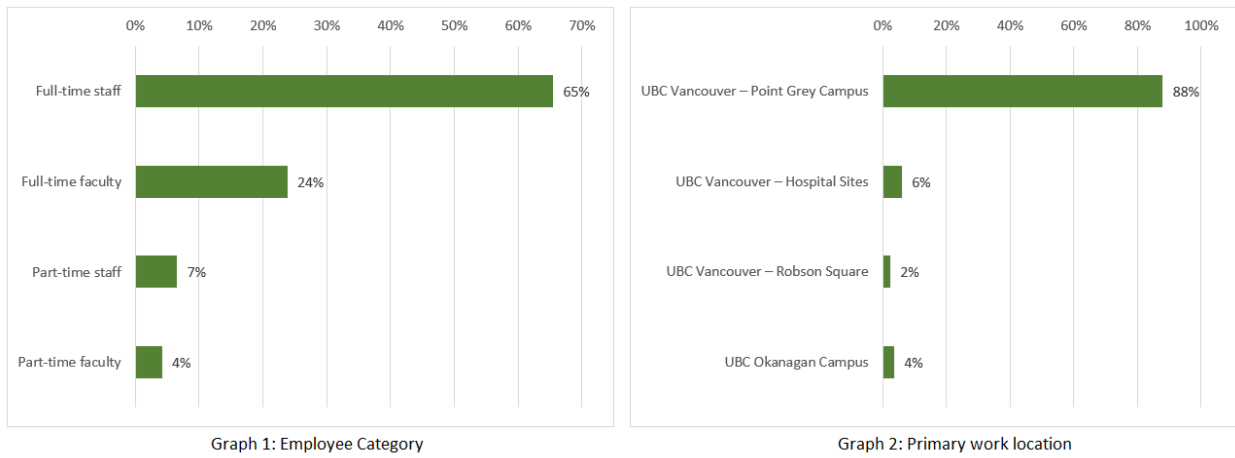


Figure 4. 1 Breakdown of survey respondents by employment type and work location

When looking specifically at the individual groups (see Figure 4.2 below), the age groups (respondents under 35 and between 45 to 54) are almost evenly distributed. The second group (age of 35-44) is 34% of total sample size.

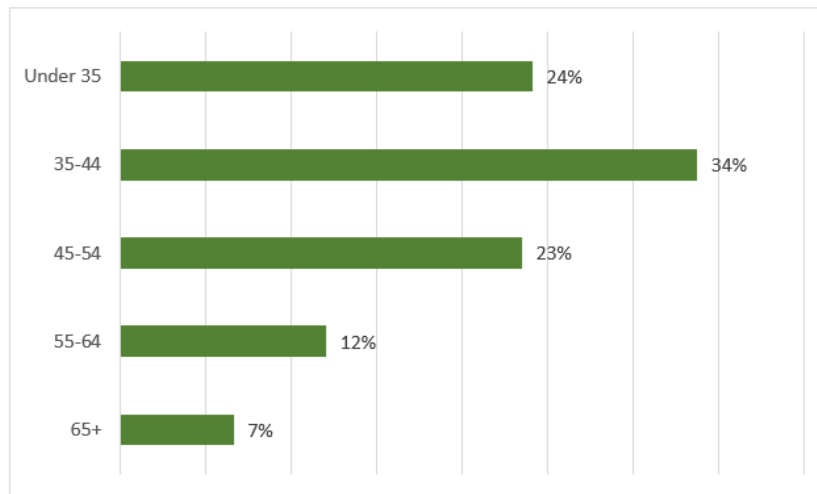


Figure 4. 2 Breakdown of survey respondents by age group

Respondents were also asked for the first three letters of their postal code. Figure 4.3 below illustrates the areas of employee’s home locations. As shown, most of the respondents live in Vancouver area. There are a minority of employees from Delta, Surrey, Port Coquitlam, Burnaby and North Vancouver.

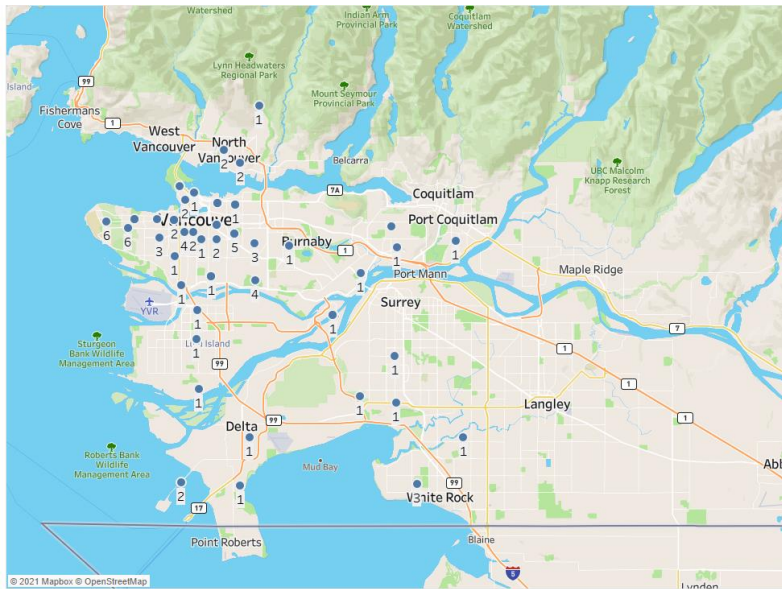


Figure 4. 3 Map of home locations of respondents

Commute pattern

In this section, respondents were asked to indicate their commute pattern before pandemic, during pandemic and post pandemic. Figure 4.4 illustrates the commute pattern comparison prior to pandemic and during pandemic. There has been a sharp drop across all commute modes during the pandemic, as most respondents did not need to commute to work given the work from home policy.

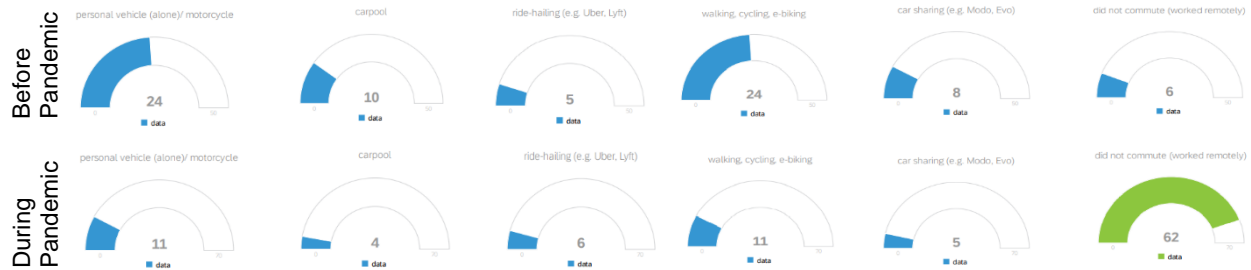


Figure 4. 4 Commute patterns of respondents prior to and during pandemic

Respondents were also asked to rate their satisfaction with current commuting arrangements. 47% of the respondents were satisfied; 33% were dissatisfied and 20% were neutral. This suggests that if given a choice, respondents may make changes to their work from home practices or commuting mode. When asked for their preference if given a choice, 41% of respondents would like to work 1 to 2 days a week and 34% of them would like to work from home 3 to 4 days a week (see Figure 4.5). This is a marked change from the pre-pandemic activity, where 64% indicated that they went to work in the office 5 days a week.

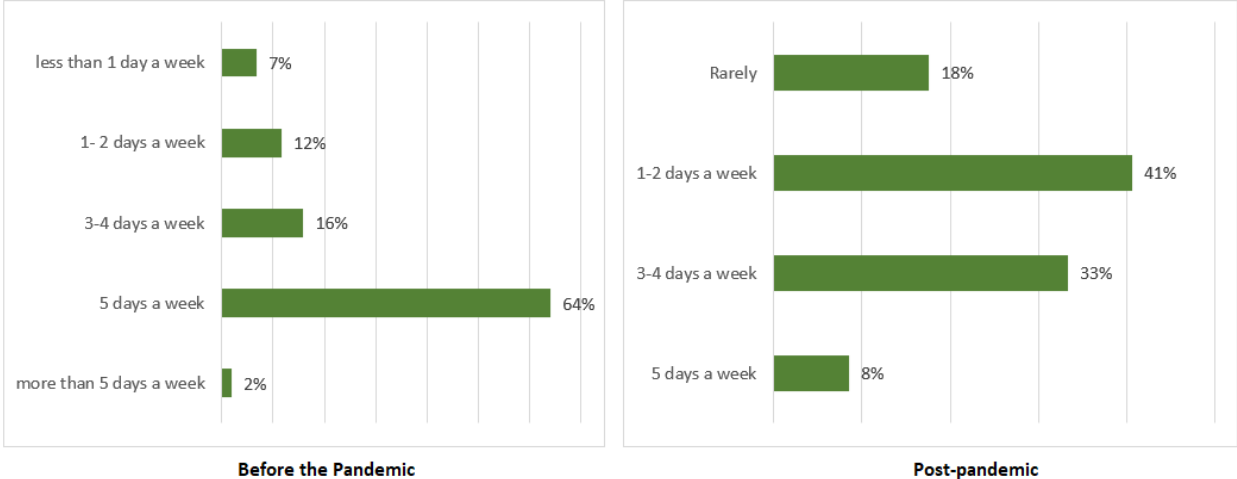


Figure 4. 5 Number of days respondents went to work in office pre-pandemic vs preferred number of days post-pandemic

Finally, respondents were asked the mandatory question of how they would change their commute pattern post pandemic. The majority of respondents indicated that they would not change their commute pattern. However, a minority indicated that they would take the public transit less, while increasing the use of personal vehicles, cycling or walking (see Figure 4.6).

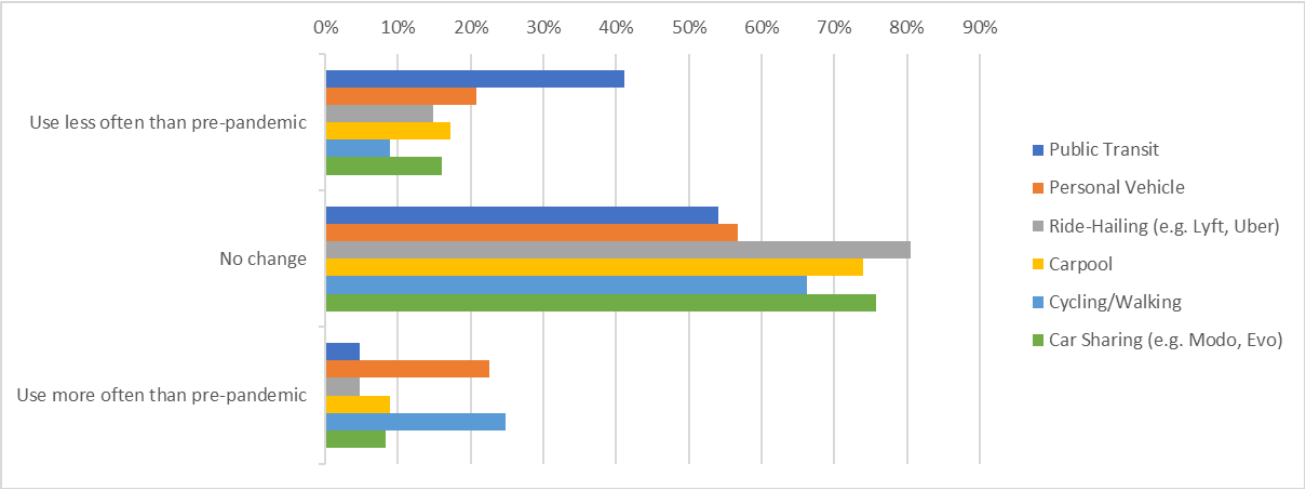


Figure 4. 6 Post-pandemic commute preferences of respondents

Factors impacting commute choices

In this section, the survey is designed to identify the factors that can help motivate employees towards more sustainable commute modes. First, employees were asked which factors would influence their decision on commute mode. Figure 4.7 indicates the overall factors impacting commute choices. 21% of respondents feel safety (social distancing considerations) is the primary concern. 18% of them will be influenced by frequency of commute. Convenience and local COVID infection rate also feature importantly. Affordability is relatively less of a factor.

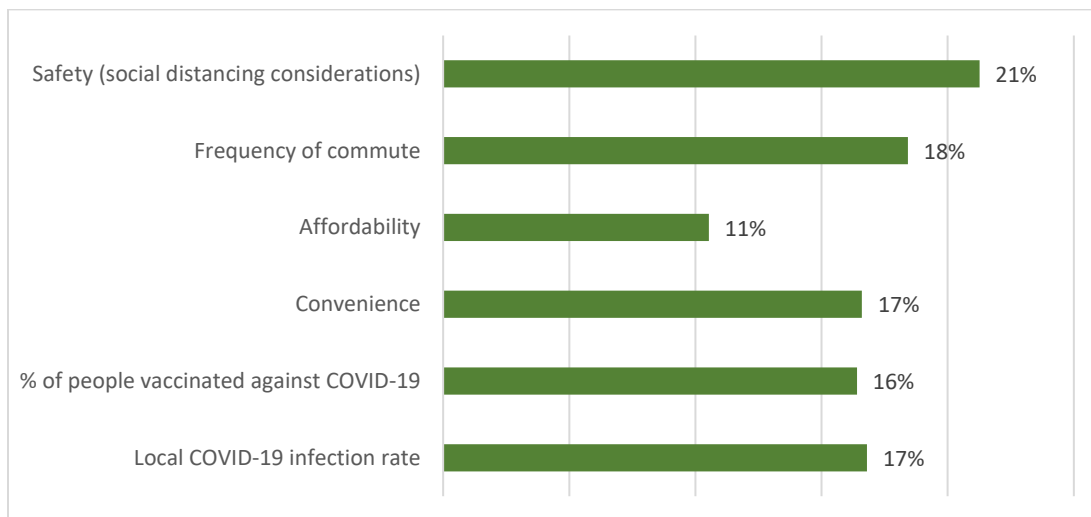


Figure 4. 7 Factors influencing commute choices

Public Transit

The continued use of masks and social distancing on transit was considered the most important factor in influencing the use of public transit (see Figure 4.8). Fully or moderately discounted employee transit passes, as well as more frequent bus services to UBC were also attractive.

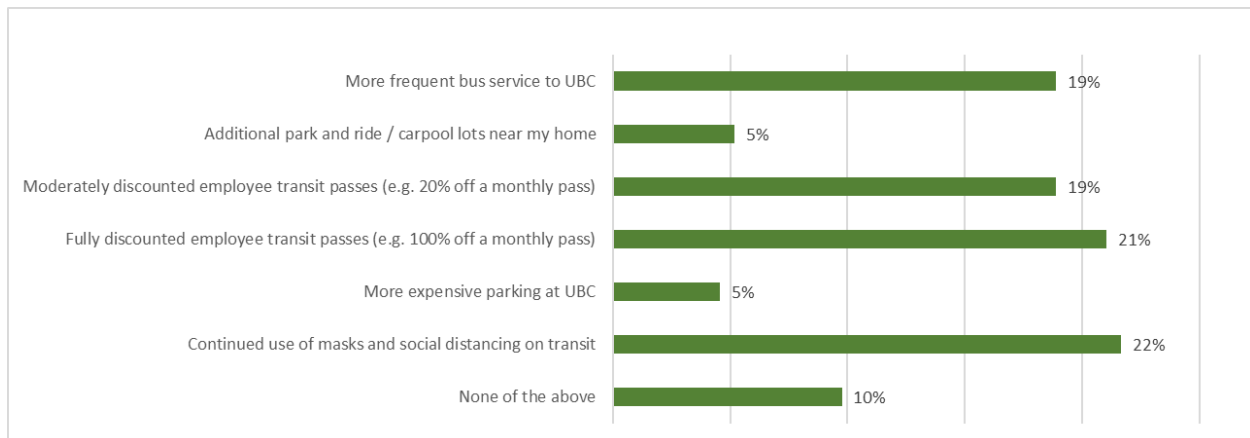


Figure 4. 8 Factors that will encourage the use of public transit

Car-Pool or Ride-Share

The majority of respondents did not think the listed incentives would encourage them to use car-pool or ride-share (see Figure 4.9). Among the incentives, the most popular was greater flexibility in work hours to accommodate coordinating carpool/ride-share. Similar to WFH policy, this reflects the impact of HR policies on commute choices.

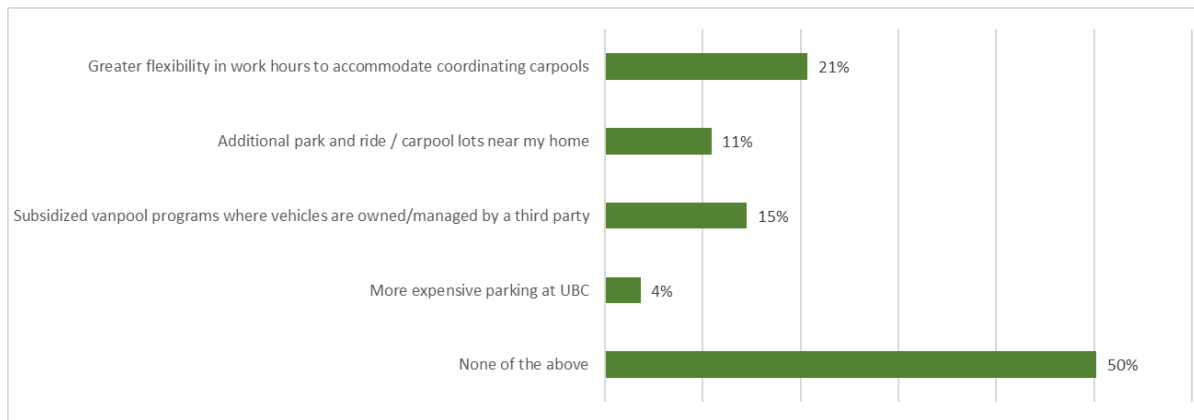


Figure 4. 9 Factors that will encourage the use of car-pooling and ride-sharing

Cycling & Walking

Finally, the incentives of cycling and walking as shown in Figure 4.10 below. Improved cycling facilities including more secure bike parking, end of trip facilities and projected bike lanes were popular factors which would encourage more cycling and walking.

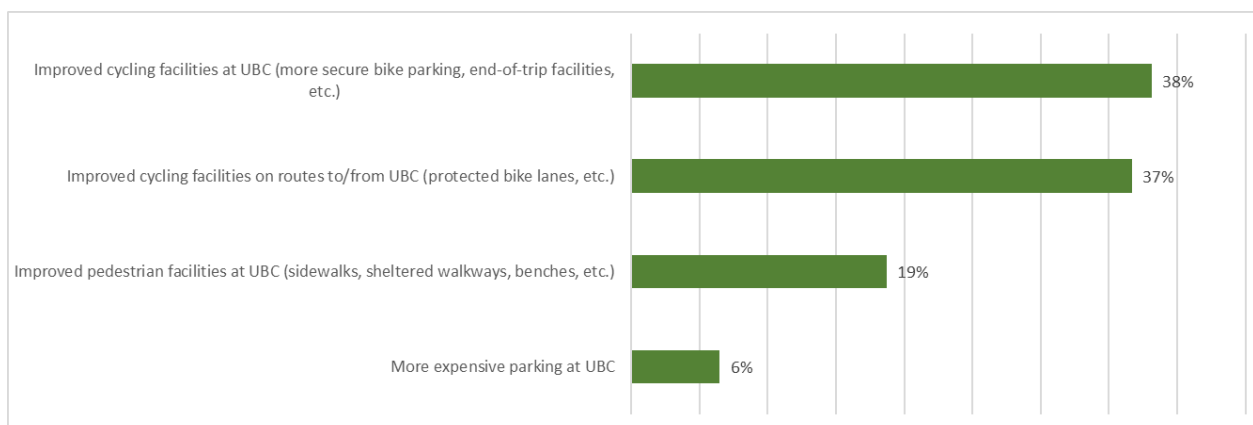


Figure 4. 10 Factors that will encourage cycling and walking

5. Scenario Analysis

5.1 Short-Term (2022) Scenarios & Projections for UBC Employees

5.1.1 Baseline

To establish a baseline for the projections, data on UBC faculty and staff (i.e., employees) from UBC's 2017 Vancouver Transportation Survey were used. Employees had been asked to indicate what was their main mode of commute to and from campus. In 2017, 43% of employees selected public transit as their main mode, 17% selected cycling or walking, and about 35% selected Single Occupant Vehicles (SOV).

The research built on the 2017 baseline by establishing 2019 pre-pandemic levels based on data from our project survey. Respondents had been asked to indicate the percentage of their commute made by commute mode. Based on the data, 44% of employees said their main mode was public transit, 19% said cycling or walking, and about 24% said Single Occupant Vehicles (SOV). This represented a slight 3-percentage point increase in proportion of trips by the sustainable modes of transit, cycling and walking, as compared to the 2017 baseline, but a sharp 11-percentage point decrease in SOV trips.

5.1.2 Scenarios

Three scenarios for the short-term were developed, based on on the average number of days a week that employees go back to campus for work. The scenarios were developed based on insights drawn from our project survey – we had observed a different pattern in post-pandemic commute mode preferences based on the frequency respondents wished to return to the office post-pandemic.

As can be seen in Figure 5.1, the majority will not change their commute choices post-pandemic. This is especially so for those that anticipate returning to work 5 days a week. However, for those who prefer to work fewer days a week, there is clear minority who will prefer more cycling, walking and use of personal vehicles, and a reduction in use of public transit.

Given this, the research team inferred that there may be a difference in commute mode decisions based on the number of days a week that employees are required to return to the office for work. Hence, three scenarios for the short-term in 2022 were developed, based on the average number of days a week that employees are required to return to the office, i.e., 1 to 2 days, 3 to 4 days, or 5 days.

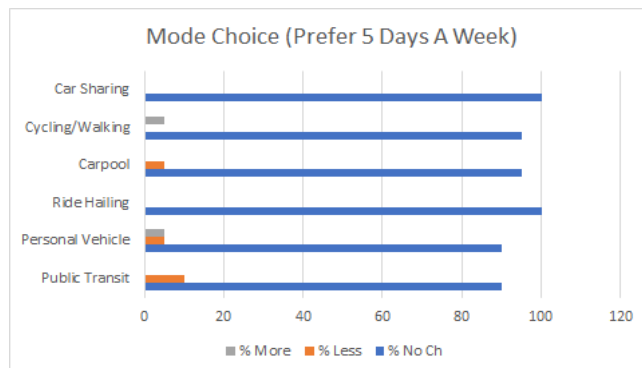
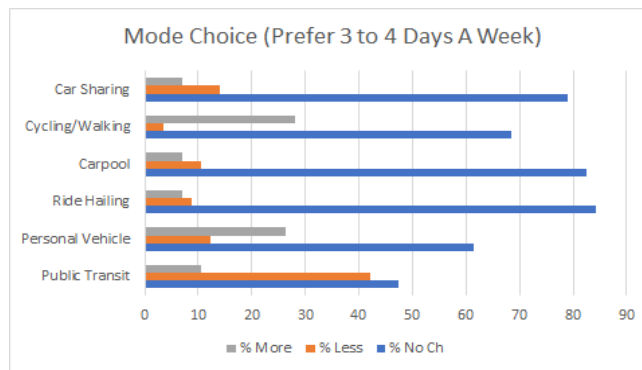
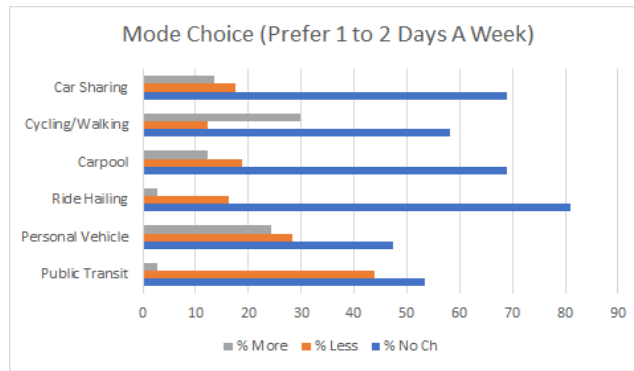


Figure 5. 1 Post-pandemic commute preferences broken down by WFH preferences

5.1.3 Projections

The objective of the projections is to calculate how the proportion of each commute mode as the main mode will shift in 2022 under each of the 3 scenarios, as compared to 2017 and 2019. The survey did not include a specific question in our survey on what the main mode of commute for each respondent post-pandemic would be. Hence, we had to make best-possible assumptions based on the dataset, which had asked respondents how they would shift their usage of each commute mode post-pandemic.

It is assumed that the preferences of the respondents for each frequency category (i.e., preferred frequency of going back to the office) would be representative of employees as a whole, in the event that they are required to return for the same number of days a week. In other words, we assumed that if an employee is required to return to the office for 3 to 4 days a week, his commute mode preferences would be similar to a respondent who indicated that he preferred to work 3 to 4 days a week.

For each commute mode under each frequency, we calculated the net proportion of respondents who said they would change their commute pattern. For example, among respondents who preferred to return to work 1 to 2 days a week, 53% said they would make no change to their use of public transit, 44% said they would use it less, and 3% said they would use it more. We deducted 3 percentage points from 44% and assumed therefore that in the scenario where employees returned to the office 1 to 2 days a week on average, the net effect was that 41% would use public transit less.

Next, to translate this net reduction in public transit by 41% of employees, into the impact on the proportion of public transit as the main mode of commute, we applied a factor of 0.3. We assumed that for each employee who would reduce his use of public transit, 0.3 employees would shift away from public transit as his main mode of commute. In this case, we projected that 12.3% of employees who selected public transit as their main commute mode prior to the pandemic would no longer do so post-pandemic.

The projection is shown in Figure 5.2. If employees go back to the office 5 days a week post-pandemic, the analysis does not anticipate any change in majority mode share as compared to 2019. If employees return 3 to 4 days on average per week, the total daily SOV trips will decrease by 18% even as the proportion of SOV trips will increase slightly from 24 to 28% (i.e., the 20 to 40% reduction in total trips due to reduction in days returning to office will be partially offset by an increase in the proportion of SOV trips). There will be a decrease in the proportion of public transit trips, but this will partially be offset by an increase in the proportion of cycling/walking trips. The net impact is that proportion of trips by these sustainable modes will decrease slightly from 63% to 60%.

	2017	2020	2022 (1-2 D)	2022 (3-4 D)	2022 (5 D)
% Trips (Transit)	43	44	32	35	41
% Trips (Cyc/Walk)	17	19	24	26	20
% Trips (SOV)	35	24	22	28	24
% Change in Total Daily Trips (SOV)	-	Base	-72%	-18%	No change

Figure 5. 2 Short-term projections for commute mode share of UBC employees

5.2 Mid (2025) & Long-Term (2041) Scenarios & Projections for All Commute to UBC

5.2.1 Baseline

The data from the project survey is not suitable for making longer-term projections as there are insufficient historical data points. However, it was found that *UBC's Transportation Status Reports* to be most useful for this purpose. It contains data on all travel to and from UBC from 1997 (which is the baseline year for the targets in the *UBC Transportation Plan*), pre-pandemic in 2019, and during pandemic in 2020. The data was used to develop scenarios and assess the projected outcomes vis-à-vis the targets. The baseline data for 2019 and 2020 are shown in Figure 5.3 below – the cells highlighted in green reflect the target being met.

	1997	2019	2020
% Trips (Transit)	17.9	53.9	26.7
% Trips (TCW)	21.5	56.3	32.6
Total SOV Trips	46107	47652	30786
Total SOV/Person	1.09	0.66	0.42

Figure 5. 3 Commute mode share for all trips to and from UBC campus

5.2.2 Scenarios

To project how UBC may perform on the targets post-pandemic, we conducted another Scenario Analysis (see Figure 5.4). For the two axes, the research team selected the two factors that impact commute patterns the most – one, WFH policies, and two, personal preferences in favor of single occupant vehicles (SOV) or sustainable modes (transit, cycling, walking, or 'TCW'). The dotted line below indicates the total trips in 2019 pre-pandemic. This is a realistic baseline as the total trips had remained stable for almost a decade before 2019. The dotted line above indicates total trips at 75% of 2019, which can be realistic in a post-pandemic future with more flexible WFH policies.

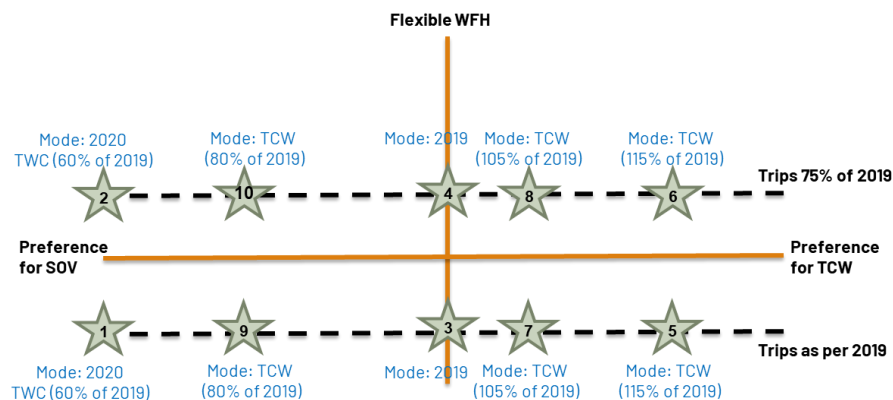


Figure 5. 4 UBC Commute Scenarios for Mid to Long-Term

For each of the scenarios, the research team projected the weekday trips per person for each of the commute modes – with reference to the 2019 and 2020 trip rates:

- Scenarios 1 and 2 – assume the same commute mode proportions as during the pandemic in 2020 (see Figure 28). This results in a sharp decline in the sustainable modes of transit, cycling and walking to only 60% of pre-pandemic levels in 2019.
- Scenarios 3 and 4 – assume the same commute mode proportions as in 2019, before the pandemic. Scenario 3 is the pre-pandemic status quo scenario, while Scenario 4 assumes a 25% reduction in overall trip volume (but with the same mode proportions).
- Scenarios 5 and 6 – assume that the number of SOV trips per person remains low at 2020 pandemic levels, and that the sustainable modes make up the gap. This results in transit, cycling and walking increasing to 115% of pre-pandemic levels.
- Scenarios 7 and 8 – assume that the number of transit trips per person return to pre-pandemic 2019 rates, while the higher proportion of cycling and walking trips from 2020 are retained. This results in the proportion of transit, cycling and walking increasing to 105% of pre-pandemic levels.
- Scenarios 9 and 10 – assume that the proportion of SOV trips is higher than pre-pandemic, and the proportion of sustainable trips is at 80% or pre-pandemic levels in 2019.

The weekday trips per person for the baseline years and each of the scenarios is shown in Figure 5.5.

Mode	1997	2019	2020	Scn 1	Scn 2	Scn 3	Scn 4	Scn 5	Scn 6	Scn 7	Scn 8	Scn 9	Scn 10
SOV	1.09	0.66	0.42	1.01	0.75	0.66	0.50	0.42	0.32	0.59	0.44	0.86	0.65
Carpool	0.86	0.22	0.14	0.34	0.25	0.22	0.17	0.27	0.20	0.22	0.17	0.27	0.20
Transit	0.45	1.11	0.23	0.55	0.41	1.11	0.83	1.23	0.92	1.11	0.83	0.86	0.65
Bicycle	0.06	0.03	0.04	0.10	0.07	0.03	0.02	0.08	0.06	0.10	0.08	0.03	0.02
Pedestrian	0.03	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Truck	0.02	0.02	0.02	0.05	0.04	0.02	0.02	0.04	0.03	0.02	0.02	0.02	0.02
Total/Person	2.51	2.06	0.86	2.06	1.55	2.06	1.55	2.06	1.55	2.06	1.55	2.06	1.55

Figure 5.5 Projection of weekday trips per person

5.2.3 Projections

To calculate the overall number of weekday trips in 2025 and 2041, a factor based on the projected UBC campus population size was applied. For 2025, it assumed the same campus population size of 73,300 as in 2020. For 2041, it assumed an increase in campus population size to 93,000 – this was calculated by extrapolating the projected student population size of 60,294 in 2041 from the UBC Transportation Plan and assuming a proportionate increase in staff and faculty. The projected total number of weekday trips in 2025 and 2041 is shown in Figure 5.6.

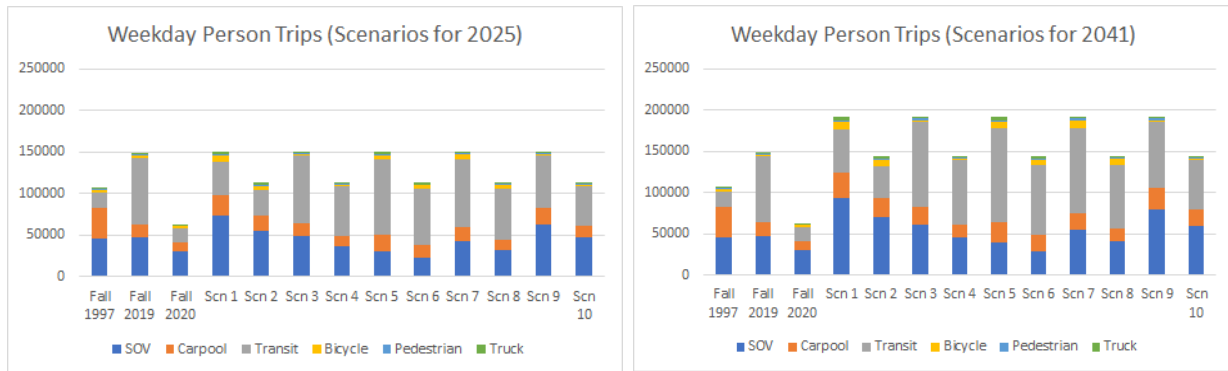


Figure 5. 6 Projected weekday person trips for 2025 and 2041

Based on the projections above, we assessed the impact on UBC’s transport targets for each of the scenarios. The results are shown in Figures 5.7 and 5.8 below. The boxes in green are those which meet the target. As can be seen, in 2025, scenarios 5 and 6 will meet all targets. Scenario 8 comes next closest by meeting three. The hardest target to achieve is about 65% of trips by transit, cycling or walking. However, in 2041, because of the increase in population, the total SOV trips target now becomes the hardest target to hit. In fact, only scenario 6 can achieve the target at this point.

	2019	Scn 1	Scn 2	Scn 3	Scn 4	Scn 5	Scn 6	Scn 7	Scn 8	Scn 9	Scn 10
% Trip(Transit)	53.9	26.7	26.7	53.9	53.9	59.7	59.7	53.9	53.9	41.7	41.7
% Trip(TCW)	56.3	32.6	32.6	56.3	56.3	64.6	64.6	59.7	59.7	44.2	44.2
Total SOV	47652	73743	55307	48378	36284	30786	23090	43247	32435	63038	47279
Total SOV/Pax	0.66	1.01	0.75	0.66	0.50	0.42	0.32	0.59	0.44	0.86	0.65

Figure 5. 7 Projected mode share in 2025

	2019	Scn 1	Scn 2	Scn 3	Scn 4	Scn 5	Scn 6	Scn 7	Scn 8	Scn 9	Scn 10
% Trip(Transit)	53.9	26.7	26.7	53.9	53.9	59.7	59.7	53.9	53.9	41.7	41.7
% Trip(TCW)	56.3	32.6	32.6	56.3	56.3	64.6	64.6	59.7	59.7	44.2	44.2
Total SOV	47652	93562	70172	61380	46035	39060	29295	54870	41153	79980	59985
Total SOV/Pax	0.66	1.01	0.75	0.66	0.50	0.42	0.32	0.59	0.44	0.86	0.65

Figure 5. 8 Projected mode share in 2041

The projections in the Scenarios Chart are represented (see Figure 5.9 below). The first red line separates the scenarios in 2025 which achieve at least 3 out of the 4 UBC targets, from those that do not – scenarios that fall within the red shaded area are good. Based on the earlier short-term analysis, it is concluded that the range between Scenarios 4 and 8 is most probable in the mid-term come 2025. The intent therefore should be to implement measures to push towards Scenario 8 – to sustain the gains from cycling and walking during the pandemic, and help transit build back to pre-pandemic levels.

The second red line separates the scenarios in 2041 which achieve at least 3 out of the 4 UBC targets from those that do not. Only Scenarios 5 and 6 now remain in the green shaded area. Hence, from 2025 to 2041, UBC will need to continue to grow the proportion of sustainable trips, especially by public transit, to achieve Scenario 6, and meet the longer-term targets.

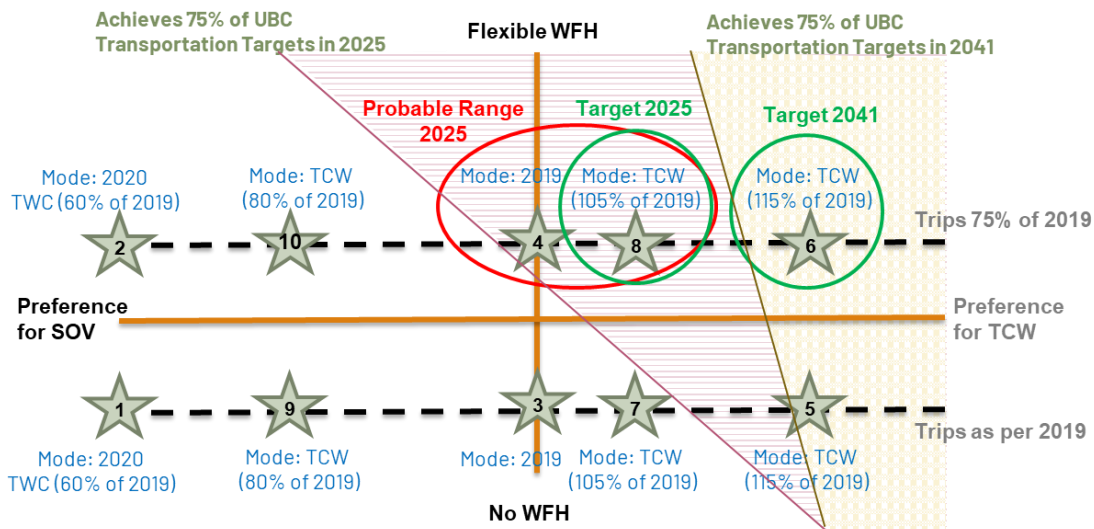


Figure 5. 9 Scenario analysis for mid and long-term post-pandemic commute to UBC campus

6. Recommendations

6.1 Response #1 Encourage remote work policy

Intent: To meet target of maintain daily private automobile traffic at or less than 1997 levels.

Rationale: Telecommuting will reduce the total volume of trips made to and from UBC for employment purpose. In the September 2020 workplace preference survey conducted for UBC faculty and staff, 97 percent of respondents indicated they can do all or some of their work remotely. Staff and faculty also indicated a strong preference to work remotely some or all of time (Buchholz, 2020). The primary survey conducted by the student research team indicated similar responses.

Strategies:

- Work with UBC Human Resource Department to support and advocate for remote work policies post-pandemic
- Identify and address policy barriers to support remote work
- Assess reallocation of underutilized office space

6.2 Response #2 Support walking and cycling

Intent: To meet target of at least two-thirds of all trips to and from UBC will be made by walking, cycling or transit by 2040.

Rationale: Walking and cycling are active modes of transportation with environmental, physical, economic and social benefits. Both modes are sustainable and does not generate any local greenhouse gas emission. Walking and cycling have physical and mental health benefit for the commuter. Both modes are low cost for the user. Walking and cycling create calmer and safer streets and reduce congestion. Through the primary and secondary data research, there is an increased propensity for walking and cycling for UBC employees since the beginning of the pandemic. In addition, approximately 14 percent of UBC employees live within five kilometers from UBC, an additional 21 percent live within 10 kilometers from their respective UBC campus (UBC Human Resources, 2021). For commuting distance under 10 kilometers, it is considered ideal for cycling (McLeish, 2017).

Strategies:

- Improve cycling facilities on UBC such as AAA routes,
- Survey availability of shower facility at employment sites,
- Survey usage and quality of bike storage facility on campus,
- Coordinate with adjacent municipality to advocate for cycling facilities to and from UBC campus,
- Provide e-bike training and education,
- Provide e-bike charging stations on campus,
 - *E-bike is effective to increase the feasible commute distance and help riders conquer the 'hill'.*
- Raise awareness of the Emergency Ride Home program as a safety net for alternative transportation mode,
- Invest in data collection tool to track use of walking and cycling to and from UBC at a more granular level,
- Apply for federal and provincial active transportation funds to support relevant initiatives from the above.

6.3 Response #3 Rebuilding transit ridership

Intent: To meet target of at least 50 percent of all trips to and from campus on public transit

Rationale: Prior to the pandemic, more than a third of UBC employees commuted via public transit. Fifty-four percent of all trips to and from the campus were made by transit in 2019. However, the mode choice precipitously dropped to 26 percent in 2020. For UBC employees a third of previous transit riders indicated they would not take public transit to UBC during the pandemic and will be less likely to take transit post-pandemic (UBC Human Resources, 2021). The aversion towards public transit was witnessed throughout Metro Vancouver where Translink recorded steep ridership decline. There is public anxiety towards transit as there are challenges related to social distancing (Translink, 2021). However, recovering transit usage is important for continued growth of the community as well as accessibility and equity concerns.

Strategies:

- Advocate Translink for continued mask usage on public transit,
- Provide employee transit pass subsidy on Compass card,

- Support bus priority projects to improve competitiveness of transit against other modes of transportation
 - *including bus priority lanes, bus bulbs, and bus stop balancing* (Translink, 2021)
- Advocate Translink to maintain pre-Covid transit service level,
- Continue planning work on Millennium Line extension to UBC main campus.

6.4 Response #4 Monitoring

Intent: Provide UBC Community Planning team with accurate and up-to-date data on the needs and preferences of the community to develop supporting policies.

Rationale: The ‘new normal’ continues to evolve from the length and intensity experienced by each community. The behaviour of UBC employee’s post-pandemic is also evolving. Planning professionals have depended on scenario planning for future forecasts. UBC Community Planning team need to make decisions based on accurate forecasts.

Strategies:

- Develop direct channels of communications with UBC faculty and staff,
- Coordinate with UBC Human Resources to include additional transportation related questions in future Workplace Preference Surveys,
- Invest in technology for automated transportation data recording for vehicle traffic, truck traffic, pedestrians, and cyclists,
- Continue to support SEEDS projects.

6.5 Response #5 Building Back Better

Intent: Catalysing on the opportunity for change to build a durable and resilient community, and mobility system (ITE, 2021).

Rationale: The Build Back Better recovery framework is commonly used in natural disaster recovery such as hurricane, earthquake and flooding event to increase the resilience of the community and reduce the risk for future disasters (UNISDR, 2017).

Strategies:

- Incorporate ability for flexibility and adaptability of capital investments and daily operation (ITE, 2021),
- Agile decision-making process,
- Lead by partnering with the public to envision a new transportation system to support a mobility system that is inclusive, resilient, and environmentally friendly (ITE, 2021).

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Appendix A Survey Instrument

UBC Employees Commuting Patterns Survey

Hello,

We are graduate students of Master of Engineering Leadership at UBC. In partnership with SEEDS Sustainability Program, we are studying how the COVID19 pandemic has affected UBC employee's commuting pattern to work and to gain an understanding of its long term impact post-pandemic. The result of our findings and analysis will be provided to UBC's Transportation Planning department for their considerations.

We appreciate your time, the survey should take no longer than 3 minutes to complete and your response is completely anonymous. You may choose to enter your email address at the end for a chance to win a \$25 gift card.

Should you have any questions about this survey, please contact Dr. Martino Tran at martino.tran@ubc.ca. If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Ethics at 604-822-8598 or if long distance e-mail RSIL@ors.ubc.ca or call toll free 1-877-822-8598.

By completing the questionnaire, you are consenting to participate in this research.

UBC Employees Commuting Patterns Survey

Which category of employee do you belong to?

- Full-time staff
- Full-time faculty
- Part-time staff
- Part-time faculty

What is your primary work location?

- UBC Vancouver - Point Grey Campus
- UBC Vancouver - Hospital Sites
- UBC Vancouver - Robson Square
- UBC Okanagan Campus

1/5

What is your age group?

- Under 35
- 35-44
- 45-54
- 55-64
- 65+

What is the first three letters/digit of your home postal code? (optional)

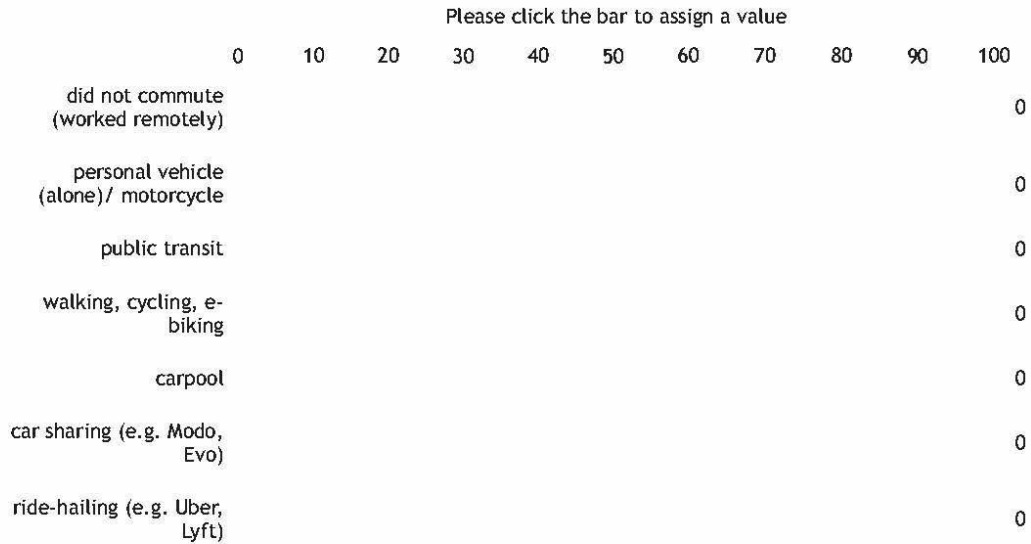
Prior to the COVID-19 pandemic, how did you typically commute to work? (Please assign a percentage to the listed travel mode)

	0	10	20	30	40	50	60	70	80	90	100
personal vehicle (alone)/ motorcycle											0
ride-hailing (e.g. Uber, Lyft)											0
public transit											0
walking, cycling, e- biking											0
carpool											0
car sharing (e.g. Modo, Evo)											0
did not commute (worked remotely)											0

Prior to the COVID 19 pandemic, how often did you typically commute (by car, bus, bicycle, walking) to work?

- less than 1 day a week
- 1- 2 days a week
- 3-4 days a week
- 5 days a week
- more than 5 days a week

During the COVID-19 pandemic, how did you typically commute to work?



How satisfied are you with your current commuting arrangement?



Post pandemic, if given the choice, how often will you like to commute to work?

- Rarely
- 1-2 days a week
- 3-4 days a week
- 5 days a week

Post pandemic, how do you think your commute pattern for EACH of the following mode would change? (please evaluate each of the choice below)

Mode	Use less often than pre-pandemic	No change	Use more often than pre-pandemic
Public Transit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Personal Vehicle	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ride-Hailing (e.g. Lyft, Uber)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Carpool	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cycling/Walking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Use less often than pre-pandemic	No change	Use more often than pre-pandemic
Car Sharing (e.g. Modo, Evo)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

What factors do you think will impact your commute choices after the pandemic? (select all that applies)

- Safety (social distancing considerations)
- Frequency of commute
- Affordability
- Convenience
- % of people vaccinated against COVID-19
- Local COVID-19 infection rate

What would encourage you to commute by PUBLIC TRANSIT more often post-pandemic?

- More frequent bus service to UBC
- Additional park and ride / carpool lots near my home
- Moderately discounted employee transit passes (e.g. 20% off a monthly pass)
- Fully discounted employee transit passes (e.g. 100% off a monthly pass)
- More expensive parking at UBC
- Continued use of masks and social distancing on transit
- None of the above

What would encourage you to commute by CARPOOL/RIDE-SHARE more often post-pandemic?

- Greater flexibility in work hours to accommodate coordinating carpools
- Additional park and ride / carpool lots near my home
- Subsidized vanpool programs where vehicles are owned/managed by a third party
- More expensive parking at UBC
- None of the above

What would encourage you to commute by CYCLING/WALKING more often post-pandemic?

- Improved cycling facilities at UBC (more secure bike parking, end-of-trip facilities, etc.)
- Improved cycling facilities on routes to/from UBC (protected bike lanes, etc.)
- Improved pedestrian facilities at UBC (sidewalks, sheltered walkways, benches, etc.)
- More expensive parking at UBC

None of the above

Do you have any additional comment/feedback for the project team?

Block 2

If you would like to participate in the gift card draw, please enter your email below:

Powered by Qualtrics