MARCH 2020

ENVISIONING 2050

EXPLORING UBC'S FUTURE TRANSPORTATION OPTIONS

PLAN 526 | PRESENTED BY

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1. PROJECT OVERVIEW

EXECUTIVE SUMMARY

Located on the western edge of Metro Vancouver, the University of British Columbia's (UBC) Vancouver Campus has seen tremendous growth since its establishment in 1908. At present, it supports a total daytime population of nearly 80,000 staff, faculty and students. As the community continues to grow and evolve over the coming years, it is anticipated that land use on campus and the associated mobility needs will undergo significant changes. While recognizing the major uncertainties of the year 2050, the objective of this project was to envision potential transportation network options that can help inform the long-range planning activities of the UBC Vancouver Campus.

To initiate thinking on how to address these challenges, the UBC Department of Campus and Community Planning (C+CP) enlisted the SCARP Studio Team (Project Team) to creatively explore and evaluate potential suggestions. Building upon the studio work presented in this report, the Project Team developed the following "Big Move Recommendations":

- Enhance Pedestrian Priority Areas
- Increase Active Transportation Infrastructure
- Strengthen Intra-Campus Transit Network
- Expand Street Network Connectivity
- Develop Broader TDM Program

The Project Team's methodology was divided into three key phases: *Information Gathering and Analysis*, *Development of 2050 Transportation Networks* and *Transportation "Big Move" Recommendations*. The Project Team began by assessing the state of mobility and land use on campus today and conducting stakeholders interviews. Through work in partnership with C+CP, the Project Team then conducted a workshop to brainstorm hypothetical, yet plausible, transportation networks for the year 2050. These proposed networks were developed to adhere to the various planning goals and objectives of the UBC Vancouver Campus. These networks were then used as a tool by the Project Team to help identify various opportunities, barriers and potential policy considerations that may emerge in the future.

Looking ahead, the results of this report are intended to inform C+CP's ongoing land use and transportation planning activities, including the UBC Land Use Plan Update, UBC Transportation Plan Update and SkyTrain extension planning efforts.

PROJECT UNDERSTANDING

Understanding the wider context and potential scenarios of UBC's future development and mobility needs is critical for guiding long-range planning and decision-making. Responsible for overseeing UBC's long-range planning, C+CP considers the broader Vancouver Campus needs by incorporating land use strategies that aim to create accessible and livable communities. In alignment with Metro Vancouver's Regional Growth Strategy, C+CP's integrated transportation and land use objectives envision that future growth on campus will further support a sustainable live - work - learn community. In addition, C+CP envisions that the Vancouver Campus will become increasingly connected and integrated with the rest of the region.

To better inform future campus planning activities, C+CP tasked the Project Team to explore potential transportation network options for the 400-hectare UBC Vancouver Campus, for the year 2050. Applying a scenario-based planning approach, potential transportation networks were developed for a series of differing campus land use scenarios that also considered varying outlooks for the proposed SkyTrain extension. These multiple scenarios were then used to assess and determine what actions may be required for the University, regardless of the final land use and station patterns that emerge in the future. This work also considered other various future uncertainties associated with UBC's 2050 long-range policy and planning activities.

PROJECT APPROACH

The Project Team developed a work plan based on C+CP's project objectives that were outlined in the Request for Proposals (RFP). This process was further guided by discussions with C+CP and SCARP staff, a preliminary review of literature, and from the experience of the Project Team elsewhere and with their familiarity of the local UBC context.

Through an approach of continuous dialogue and collaboration with C+CP staff, the Project Team committed to the consistent communication of issues and needs, and then refined tasks accordingly. This approach also applied theory to practice as the current state of research was gauged and integrated to create new insights and methods. The Project Team was also advised to begin by thinking through a scenario-based approach to transportation planning and to review other types of network planning exercises to develop a range of plausible future considerations.

While this project was an 'academic and theoretical exercise', the proposed approach was to include that of a typical long-range transportation and land use planning process. This includes data analysis, policy review and consultation to develop a vision and hypothetical network alternatives that informed the Project Team's final Big Move recommendations.

To uphold the client's quality control standards the Project Team approached the studio with a high level of professionalism, taking the necessary steps to handle sensitive material and/or proprietary information in accordance with C+CP's protocols.

Quality Control

With guidance from C+CP, the Project Team engaged with internal stakeholders, C+CP and UBC staff. To mitigate potential risks, the Project Team strategized with C+CP staff and sought pre-approvals prior to engaging with the identified project stakeholders.

Per the client's request, the illustrative land use scenarios provided by C+CP have not been included in public-facing deliverables so as to preserve the integrity of future planning processes. Working under the oversight of SCARP studio instructors and C+CP staff also helped ensure quality.

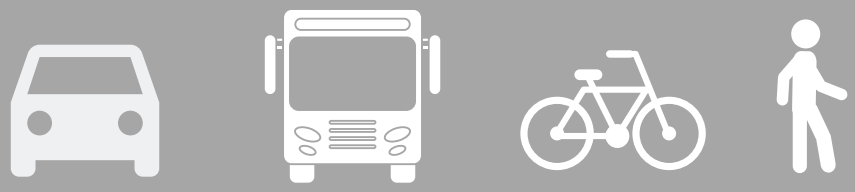
2. INFORMATION GATHERING AND ANALYSIS

To gain a better understanding of mobility on campus today, as well as how broad mobility trends may evolve by 2050, the Project Team began with an 'Information Gathering and Analysis' phase. This phase consisted of a 'Campus Transportation Assessment' that reviewed current transportation data and policies for UBC, followed by interviews with various campus stakeholders, which provided greater contextual information. These interviews also explored how transportation demands and needs may change in the future for UBC.

To build on this, research was undertaken on new mobility trends which may become more established by 2050, including the challenges and opportunities they may contain. In addition, a framework used by Metro Vancouver and TransLink for their 2050 planning processes was adapted to the UBC context and utilized to assess how different societal futures could develop in the future and further influence mobility on the campus.

CAMPUS TRANSPORTATION ASSESSMENT

Transportation planning at UBC is guided by the *2014 UBC Transportation Plan*, along with the *UBC Strategic Plan, UBC Land Use Plan* and *Vancouver Campus Plan*. The policies outlined in these plans have informed UBC's transportation targets, which focus on reducing the amount of automobile travel to and from campus, while increasing the share of transit, cycling, walking and other sustainable modes. Since 1997, UBC has monitored travel patterns to and from campus, including mode shares and traffic volumes. As of Fall 2018, there are 145,700 daily weekday trips amongst students, faculty, and staff (1). These trips are currently split between single occupancy vehicles (SOVs), high occupancy vehicles (HOVs) or carpooling, public transit, cycling and walking.



DRIVING

SINGLE OCCUPANCY VEHICLES

11% of intra-campus trips (2)

3,400 intra-campus trips per day (2)

34% of trips to/from campus (1)

48,100 trips to/from campus per day (1)

HIGH OCCUPANCY VEHICLES

5% of intra-campus trips (2)

1,400 intra-campus trips per day (2)

11% of trips to/from campus (1)

16,700 trips to/from campus per day (1)

Automobile travel amounts to 26% of intra-campus trips and 45% of daily trips to and from UBC (1). UBC is determined to reduce this number, as represented in two of the three targets identified in the 2014 Transportation Plan. These include increasing the sustainable mode share to two-thirds of all trips by 2040 and reducing SOV travel by 20% from 1996 levels (3). In an effort to discourage driving, UBC has increased parking rates and reduced the commuter parking supply on campus by approximately 25% since 1997 (3). In addition, car-share vehicles, such as those provided by Evo and Modo, are readily available on campus and UBC is currently piloting a vanpool program for staff (4). Further, UBC supports individually-organized carpooling and facilitates access to various ride-matching services (5).

CAMPUS TRANSPORTATION ASSESSMENT

TRANSIT

5% of intra-campus trips (2)

1,500 intra-campus trips per day (2)

53% of trips to/from campus (1)

76,600 trips to/from campus per day (1)

Public transit is by far the most popular way to get to UBC, representing 53% of daily trips to and from campus (1). A TransLink shuttle bus also serves the campus and 5% of intra-campus trips are conducted by transit (2). The overall high ridership can be attributed to the introduction of the student U-Pass program in 2003, increasing parking costs on campus and continued improvements in transit service. UBC is currently served by 13 bus routes from across Metro Vancouver, including the 99 B-Line, which has the highest ridership of all bus routes in the TransLink network (1). In January 2020, TransLink introduced a new RapidBus service along the 41st Avenue corridor, connecting UBC, the Canada Line, and the Expo Line.

CYCLING

14% of intra-campus trips (2)

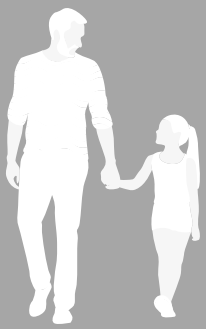
4,200 intra-campus trips per day (2)

1.4% of trips to/from campus (1)

2,100 trips to/from campus per day (1)

UBC's relatively large campus and gentle topography makes cycling an ideal transportation mode. 14% of intra-campus trips (2) and 1.4% of trips to and from campus are done by cycling (1). There has been a general increase in the number of bicycle trips to and from campus since 2010, which is likely correlated with continued improvements to cycling infrastructure at UBC and in the City of Vancouver, as well as the rise in popularity of biking across the region (1). In 2018, UBC launched a bike share pilot program on campus (1). As the program's service area covers only the campus, it is not used for trips to/from campus, but may play a role in attracting transit trips by serving as a first and last mile connection between the bus exchange and destinations across campus.

WALKING



65% of intra-campus trips (2)

19,500 intra-campus trips per day (2)

0.5% of trips to/from campus (1)

700 trips to/from campus per day (1)

Due to the location of UBC's campus at the western edge of Metro Vancouver, along with the distances to where the majority of the campus population is living, the share of walking trips to and from campus has remained relatively low. However, within UBC the walking network is well developed, with a vehicle-restricted core and established pedestrian priority zones. For intra-campus trips, walking has the highest mode share at 65% (2). The public realm has undergone significant changes since the adoption of the *2009 Public Realm Plan*, including the buildout of the Main Mall Greenway (6)

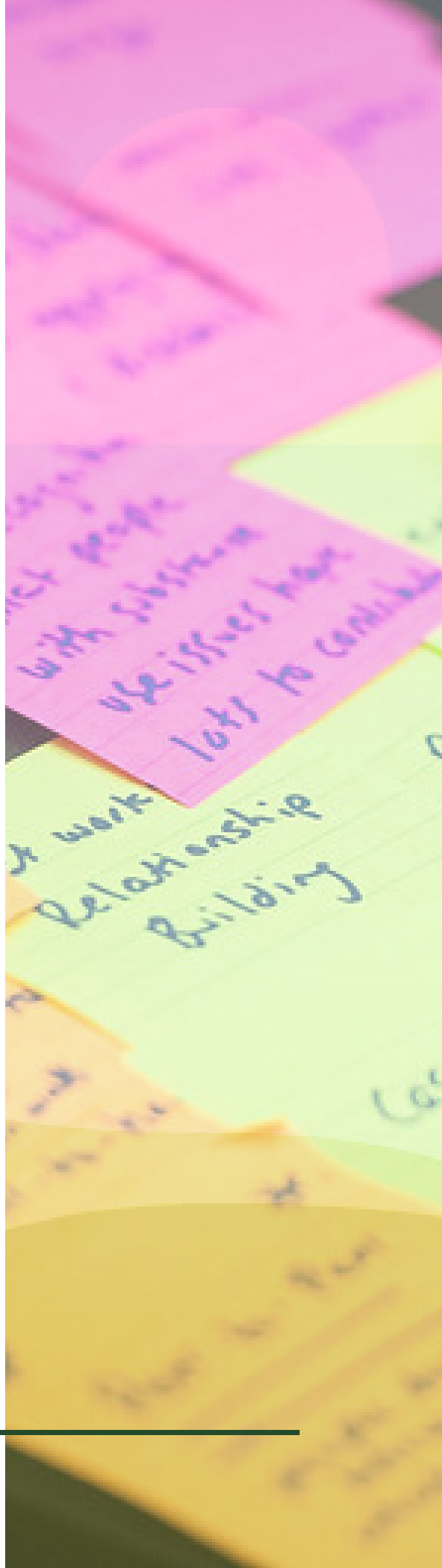
STAKEHOLDER INTERVIEWS

To gain better insight and context on the current state of mobility on campus, the Project Team conducted internal stakeholder interviews with UBC staff to guide preliminary research and scoping activities. These interviews were also intended to gather input from stakeholders on what they believe the future may hold for transportation trends, and the implications this may have for UBC's Vancouver Campus.

With guidance from C+CP staff, the project team selected eight UBC faculty members to participate based on their expertise in various fields such as, scenario-based planning, new mobility and resilience research and long-range land-use planning. Utilizing the "SWOT" (strengths, weaknesses, opportunities and threats) methodology, the following section has been organized to provide a high-level summary of the themes and broad-ranging insights harvested from each stakeholder interview.

The detailed information and data gathered in these interviews (see **Appendix A**) was utilized to help inform the project team's continued analysis and final report.

It is important to note, the following SWOT summary information is not organized to suggest a hierarchical ranking and/or prioritization.



STRENGTHS

Focus shifting toward moving more people, not vehicles which will be vital to resilience planning

Accessibility standards in place

Public transport is the most economical way to move around a lot of people

Existing U-Pass BC program

Uniquely positioned to learn from previous successes and failures of other global cities

C+CP ensure slope is less than 5% on the pedestrian core and other commitments to retrofitting public realm for accessibility

AVs more likely to be deployed in a targeted fashion for citizens more in need.

Positioned with unique research, data capabilities, and governance structure to assess and address potential built environment and/or wellness challenges and trade-offs.

Multi-mobility can have positive effects on physical, mental health, and well-being

Strong history of integrated land use and transportation planning

UBC has good transportation policies in place that promote sustainable transportation

Increasing/improving bicycling infrastructure and end of trip facilities

Increasing proportion of UBC faculty, staff & students living on campus

WEAKNESSES

Do not have a detailed understanding of mobility/user needs

Elimination of surface parking with infill makes accessibility harder for people with mobility issues, wheelchair users' vehicles often don't fit in parkades

On campus accessibility issues with pedestrian spine and bus loop on the perimeter of campus

Bus transit to/from is at capacity so until rapid transit arrives it will be difficult to encourage major shifts away from automobile travel

Constant construction means perpetually changing landscape that is hard to navigate for disabled users

Navigating transition from “dumb” mobility to AV could result in potential safety concerns

Inability to balance the need to provide additional transportation infrastructure while still reducing emissions

Lack of willingness to prioritize alternative transportation approaches when the mode split is already impressive

If land-use decisions are not made with consideration of the transportation network, it can have profound implications on future mobility (i.e. building setbacks, development patterns)

UBC’s transportation and land-use policies are lagging behind current technology

Campus growth and transportation growth are not aligned

Safety issues in pedestrian spine with cyclists and delivery vehicles

Inadequate planning and infrastructure on campus to accommodate higher energy consumption

OPPORTUNITIES

Introducing an integrated rapid transit system on campus could adequately accommodate future demand

On demand services could further support mode integration and influence travel behaviors

Improved wayfinding software and geospatial data could make personalized routes more possible to meet individual mobility needs

We can accommodate an increase in curbside demand through either charging it at its full cost, or pedestrianizing local streets that still allow for delivery and pick up

Adapting the built environment to accommodate various mobility modes (micro-mobility, active transportation and AVs)

Need to better incentivize the travel we want and penalize the travel we don't want
Potential for U-Pass for faculty/staff at UBC

Retrofit our built form around an expansion of sustainable modes

Rise of AVs/ride-hailing can free up former parking spaces on campus for additional active transportation uses/infrastructure

Possible LEED standard for accessibility on campus might be adopted

Evenly distributing the volume of travelers to/from campus (shifting class start times)

Reducing the need to move through encouraging telecommuting, or shifting more travel to off-peak

Leveraging micromobility for people living near campus

Implementing mobility pricing could have major impacts on influencing travel behaviors and/or demand

Increasing demand for carpooling and/or ridesharing

THREATS

Rise of delivery means more pressure on road network/loading zones along campus peripheral

A shift towards AVs and mobility on demand may increase congestion

Mass movement by active transportation is limited by UBC's geography, weather and land-use surrounding campus

Mobility security concerns

Growing lobbying power of private tech/ mobility companies

NIMBYISM and politics

Rise of delivery means more service drivers on campus who aren't trained to respect accessibility reqs and aren't accountable as independent contractors

Rise of AVs/ride-hailing leading to more single occupancy vehicle trips to campus

Getting to campus with crowding on transit. Current lack of capacity, especially for those with disabilities (visible and invisible)

Less funding from senior government could mean more partnerships between local government and private sector, exposing local governments to risk

Reliance on private vehicle use that is likely to increase in the future

Due to AVs current technological limitations (i.e. predictability), various safety challenges and/or implementation barriers remain related to integrating AVs into the built environment and/or mixing modes.

Tech companies' resistance to sharing data

AV fleets will not reduce the need for parking as they still need to be maintained and charged

NEW MOBILITY RESEARCH | INTRODUCTION

As signified through these stakeholder interviews, the state of mobility is in a period of transition, as new technologies and business models are changing how people and goods move. This transition is expected to continue into the future, with implications for UBC. While there is considerable uncertainty over what the future might hold for mobility exactly, and the wider repercussions that may unfold, there is relative certainty that mobility will trend towards a future that is more shared, electric and autonomous.

There are various drivers that will influence how the adoption of these new mobilities and others will project into the future. The adoption that results will likely have a wide range of impacts on our environment, society, and economy.

DRIVERS

- Changing Attitudes and Preferences
- Affordability of travel options and inequality
- Digital connectivity
- Degree of climate change urgency
- Prioritization of safety standards
- Real estate market dynamics
- Infrastructure funding
- Regulation of the gig economy
- Importance and trade-offs of convenience
- Corporate power
- Development of articifical intelligence
- Harnessing and sharing of big data

IMPACTS

- Climate emissions
- Physical and mental health
- Design of the built environment
- Transportation-related expenses
- Levels of noise
- Congestion
- Accessibility
- Privacy
- Conflicts along street-edges and sidewalks
- Safety risks
- Levels of social interaction
- Use of alternative modes

Of the new mobilities that are emerging today, there are several that are believed will endure and become more established over the long-term, with some form existing by 2050. In addition, in the future, these may overlap or combine to create new ways of movement. However, separate, each of these may offer various opportunities and challenges, which could influence the direction of future transportation planning and policy for UBC. For these reasons, the Project Team decided to research and explore these new mobilities in more depth.

MICRO-MOBILITY | Recent growth in e-bikes, scooters, skateboards and other electronically propelled self-devices.

Several municipalities in Metro Vancouver have municipally-administered bike-share systems operating, including UBC (200 bikes) and the City of Vancouver (1,800+ bikes) (7,8), however none of these systems currently offer e-bikes. Beyond e-bikes, scooters and many other electronically propelled self-devices are not currently permitted on public roads in the B.C. under current legislation. Thus, despite scooter companies, such as Bird and Scoot, now operating in many cities around the world, none of these companies are currently permitted to operate in Metro Vancouver. However, private sales of micro-mobility devices in the region are said to be strong (9).

Challenges

- Desire for parking space can create conflicts along sidewalks and/or curbspace
- Companies reluctant to share data with local governments
- Difficult to regulate and licence effectively due to variations in technologies and power
- Wide range of abilities and speed between users can result in safety risks
- Shared vehicles tend to have a short life-span
- Expanding the infrastructure required to accommodate these devices

Opportunities

- Emits zero-emissions during use, providing climate and health benefits
- Promotes exercise
- Provides a level of comfort and ease for those not used to cycling
- More affordable means of urban transportation
- Convenient for short trips and in dense urban settings, particularly first last mile trips

RIDE-HAILING | Internet-based services that connect passengers with drivers, who then transport the passengers to their destination in the drivers' personal vehicle

Since the end of 2019, ride-hailing companies have been permitted to operate in British Columbia. Until that time, Metro Vancouver was the largest major city in North America without ride-hailing (10). Since Uber started in 2009, ride-hailing services have grown substantially globally, now becoming a daily travel mode for many commuters. As of 2017, 21% of adults in U.S. major cities use ride-hailing services, with 24% of those users doing so on a weekly or daily basis (11). The market value of the ride-hailing industry is expected to increase until at least 2030 (12).

Challenges

- Competes with public transit for users, reducing ridership (13)
- In coordination between drivers results in a high-level of deadheading (14)
- Can increase vehicle kilometres travelled and congestion in urban areas (13, 17)
- Can increase emissions, resulting in climate and health effects (16)
- Safety concerns can exist for drivers and riders (17)
- Tends to reduce the number of accessible taxis available (18)
- Need for pick-up/drop-off space may create conflicts along street-edges
- Companies reluctant to share data with local governments

Opportunities

- As a result of current subsides, more affordable means of urban transportation
- Can be more convenient, comfortable and flexible than other means of urban transportation
- Could substitute more private motor vehicle trips than public transit trips (19, 20)
- Could reduce motor vehicle ownership (21).
- Could be effective in moving riders from sparsely-populated areas to high-capacity transit (22).

AUTONOMOUS VEHICLES |

Motor vehicles that can drive themselves from origin to destination with the intervention of a human driver.

While motor vehicles have been gaining more autonomous features over previous years, such as automatic braking, blind-spot detection and self-parking (23) fully autonomous vehicles are not currently permitted on public roads within B.C. (24). In the U.S., it is estimated that over 1,400 fully autonomous vehicles are being tested across 36 states by over 80 companies (25), which includes Uber, Google and Tesla (23). Despite the current challenges and uncertainties with the technology, it is estimated that fully autonomous vehicles could range between 20% - 80% of the total motor vehicles on the road by 2040 (26).

Challenges

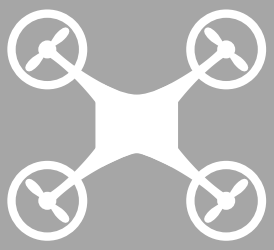
- Technical challenges exist that may prevent wide-spread adoption
- With dead-heading, search for parking and goods-pick-up, number of vehicles circulating on roads may increase (27)
- Could incentivize longer commutes, an increase in vehicle kilometres traveled and urban sprawl (28)
- Could compete with public transit for users, reducing ridership
- Could compete with walking and cycling
- Need for pick-up/drop-off space may create conflicts along street-edges
- With AV's risk-aversion, pedestrian priority may be reduced to protect movement of vehicles (27)

Opportunities

- Can provide improved mobility to those unable to drive themselves (29).
- Reduced parking use could result in more infill development (13).
- Route choices could be planned for vehicles collectively, reducing travel times (30)
- Improved safety-records could result in the narrowing of motor vehicle lanes
- Increased speeds could result in a reduction of motor vehicle lanes (27).
- With AV's risk-aversion, more pedestrian-oriented streets may emerge (30)

DRONES |

Drones are unpiloted aerial vehicles that can be either remotely controlled or autonomous, and used to conduct services or transport goods or passengers.



As of 2019, there are over 28,000 registered drones in Canada (31) and 1.59 million registered drones in the U.S., of which 23% are used for commercial purposes (25). Today drones are primarily used for recreation, research, photography, inspecting infrastructure, surveillance, mapping and search and rescue (32). However, many companies are testing the delivery of small parcels, with some of these services beginning to enter commercial operation (33; 34). No passengers drones are currently in operation, however the concept is being explored by several companies, including Intel and Uber (35).

Challenges

- Privacy and unauthorized surveillance concerns (36)
- Noise-related effects on people and wildlife (36)
- Possible safety risks with carrying parcels or passengers overhead
- Risk of collisions, including with aerial vehicles, people, buildings and wildlife (accidental or Intended) (36)
- Navigation of air-space with an increasing number of drones (36)
- Regulating and policing usage (36)
- Landing areas, surrounding built form and infrastructure required for take-off/landing

Opportunities

- Increased, and possible lower-cost, capabilities for surveillance, surveying, monitoring and inspection (37, 38)
- Ability to disperse materials that may be harmful to humans (e.g., pesticides for agriculture) (37, 38)
- Ability to move products across space more quickly (e.g., medical supplies) (39)
- Possible ability to move people across space more quickly (35)
- Design innovations for buildings and neighborhoods to receive goods in new ways independent of road networks (e.g. all residential units have balconies for delivery)

E-COMMERCE | The buying and selling of goods or services online, that are then often delivered by the third party.

In 2019, e-commerce represents 3% of total retail sales in Canada, up from 2% of total sales in 2016 (40). As of 2019, e-commerce represents over 11% of total retail sales in the U.S., (41) and nearly 20% of total retail sales in China (42). E-commerce sales in Canada are expected to grow by over 38% between 2018 and 2023 (43). In Canada, online shoppers are also increasingly expecting faster delivery speeds (44). This growth is expected to result in a heightened number of delivery vehicles circulating in the future.

Challenges

- Need for pick-up/drop-off space may create conflicts along street-edges
- Reduced social interaction (45)
- May increase motor vehicle travel, with increased shopping frequency, and/or distance of purchases (45, 46)
- Possible reduction in physical exercise (45)
- Possible safety risks with increasing number of large delivery vehicles on roads
- Faster home delivery expectations could result in more inefficient routes and low loading factors (46)
- Long-term spatial redistribution and/or economic impacts on local retailers (46)

Opportunities

- May decrease motor vehicle kilometres traveled, as provider-supplied deliveries can be more efficiently organized than consumer-supplied deliveries (45, 46)
- Consumers may be able to access a wider selection of goods (45)
- Price of goods and cost of searching is likely to be lower (45)
- Consumers may be able to access more information on available goods and services (45)
- Selection of goods and services can be more personalized/optimized (45)
- Can offer a higher-level of convenience for consumers (45)
- Could contribute to a reduction in motor vehicle ownership (46)

ZERO-EMISSION VEHICLES |

Motor Vehicles that are powered from either battery electric, plug-in hybrid electric and hydrogen fuel-cells.

As of 2019, approximately 1% of all passenger vehicles, and 10% of all passenger vehicle sales, in B.C. are zero-emission vehicles (ZEV) (47). Earlier in the year, the provincial government passed the Zero Emission Vehicle Act, which mandates that by 2040 all new light-duty motor vehicles will have to be zero emission (48). More municipalities within the province are starting to require and implement infrastructure for charging electric vehicles. One of the most aggressive policies has been enacted by the City of New Westminster, that now requires all residential parking spaces in new multi-unit buildings to have chargers. (49)

Challenges

- Expanding the availability of charging infrastructure
- Demand on the electrical grid and generating capacity
- Vehicles appear more environmentally-friendly then they may be in reality
- Current lack of battery recycling options

Opportunities

- Emits zero-emissions during use, providing climate and health benefits
- Tend to emit lower levels of noise
- Could store and provide energy to the grid, improving resilience

CAR-SHARE |

Car-share is a membership-based system, where members can have access to a common pool of vehicles

Vancouver has been referred to as the "car-sharing capital of North America" as it has more vehicles per capita than any other city on the continent. As of 2018, the car-share companies Car2Go, Evo, Modo and ZipCar operate at UBC and in the City of Vancouver, offering over 3,000 vehicles between them. This is higher than Montreal (2,080), Seattle (1,900), Toronto (1,650), San Francisco (1,500) and Portland (1,060). However, these numbers may be higher for Vancouver partially because ride-hailing does not currently operate in the City (50).

Challenges

- Competes for limited street-parking (51)
- Competes with public transit and micro-mobility for users
- Vehicles appear more environmentally-friendly then they may be in reality
- Companies reluctant to share data with local governments

Opportunities

- Low-cost alternative to motor vehicle ownership
- Better utilization of motor vehicles and parking
- Can reduce motor vehicle use and ownership (23)
- Can be more convenient, comfortable and flexible than transit

POTENTIAL MOBILITY FUTURES

While specific technologies and methods of travel may become more or less prominent in the future, the type, amount, and distance of travel will be shaped by wider societal trends and factors, as well as how these interact with each other. Because many factors in the future are unknown, organizations have increasingly moved towards planning for several different scenarios, instead of one projected future. This approach is called exploratory scenario-planning, and can help decision-makers navigate uncertainty.

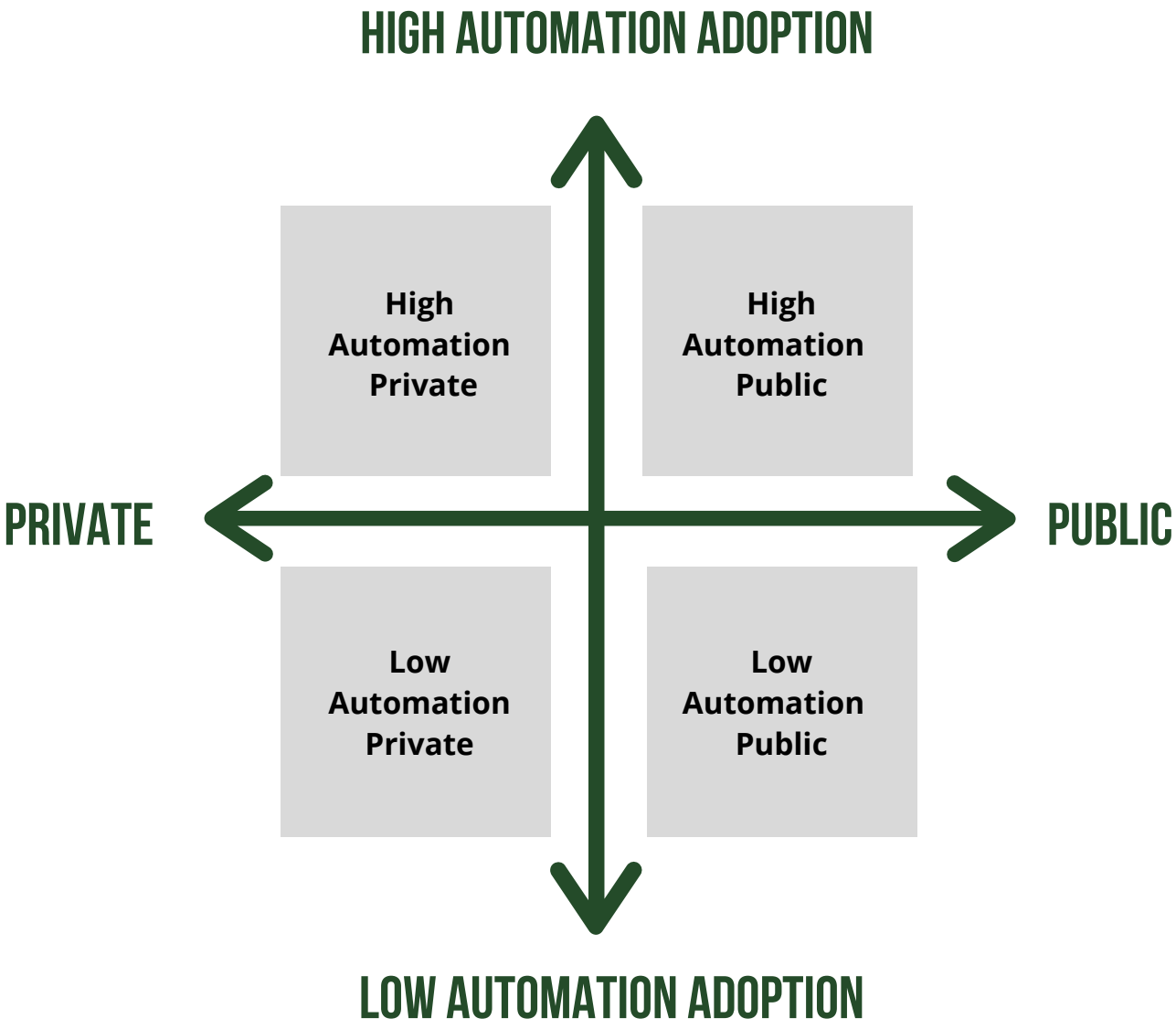
Typically, this approach begins by identifying possible factors that could cause challenges or exert influence in the future. From this list of factors, "driving forces of change" can be distilled and used as a framework for creating different, but plausible futures. Responses to these different futures can then be generated. Responses can either work across all scenarios (robust responses) or only for certain scenarios (contingent responses). Contingent responses should identify possible "tipping points" that indicate when a certain future may be being entered, and the response may be warranted (52).

To prepare for their upcoming long-range planning processes (which focus on the year 2050), Metro Vancouver and TransLink co-developed "Regional Long-Range Growth and Transportation Scenarios" as a tool to better account for uncertainty and to help identify land use and transportation strategies. After considering 25 external forces, forces were then grouped together within larger categories that were deemed to possess the highest impact and highest degree of variability.

These two categories were "Automation & Technology" and "Economy & Trade." These were then used as a framework to create four different, but plausible futures: "Trend Forward", "Automation-Driven Decline", "Self-Sufficiency" and "Automation-Driven Boom" (53).

To reflect the work that these two regional-bodies have conducted and to better understand the wider UBC planning context, the Project Team incorporated and adapted this model. Based on this model, as well as the research and analysis that was conducted, the Project Team reviewed various external factors that could influence mobility to/from/around UBC, and then subjectively identified the two external factors that may impact campus mobility trends the most by the year 2050. These two factors were the level of autonomous vehicle adoption and the role government vs. private sector influences.

These factors were then used as a framework to envision four different, but plausible high-level futures for mobility on campus in the year 2050. The Project Team used this as a tool to better understand the conditions and uncertainty that UBC may be planning within. At a high-level, this model aided the Project Team in exploring how the wider future for UBC may develop, which would help inform the later steps of policy and action development.



HIGH AUTOMATION PRIVATE

Private sector driven highly autonomous mobility trends with legislative impacts

HIGH AUTOMATION PUBLIC

Public sector driven highly autonomous mobility trends with legislative impacts

LOW AUTOMATION PRIVATE

Current mobility trends continue with increasing private sector influence on legislation

LOW AUTOMATION PUBLIC

Current legislation and mobility trends continue

NARRATIVES | POTENTIAL MOBILITY FUTURES

Building upon the framework, the four scenarios were developed in greater detail. These were intended to provide a high-level narrative envisioning how larger societal trends may impact mobility for the year 2050. For more details on the characteristics of these scenarios, please refer to **Appendix B.**

HIGH AUTOMATION PRIVATE

Due to weak legislative oversight, the private sector drives highly autonomous mobility trends. Due to the high number of AVs being adopted, the price has dropped, incentivizing individual ownership. Increased private sector lobbying power has resulted in further prioritization of vehicles over active transportation. This future leads to the rise of aerial vehicles and AR/VR utilization, which results in greater dispersal of regional housing and decline in transit ridership.

HIGH AUTOMATION PUBLIC

Due to strong legislative oversight, the public sector regulates highly autonomous mobility trends and increases public infrastructure spending. This prioritizes the movement of people over vehicles, resulting in high transit ridership, shared ownership models and prioritization of active modes. The efficiency of AVs has resulted in a reduction of motor vehicle infrastructure. TOD policies and mobility pricing encourages concentrated development nodes; however, the adoption of higher speed/higher capacity transit enables more travel across longer distances.

LOW AUTOMATION PRIVATE

Legislation is being more influenced by the private sector while current mobility trends continue. The high cost of AVs has prevented mass adoption and greater income inequality has encouraged individual ownership. Weak public oversight and infrastructure funding has resulted in low public transit funding and utilization. However, private sector financing has led to an increase in ride-hailing and micro-mobility options, further impacting curb-space management demands.

LOW AUTOMATION PUBLIC

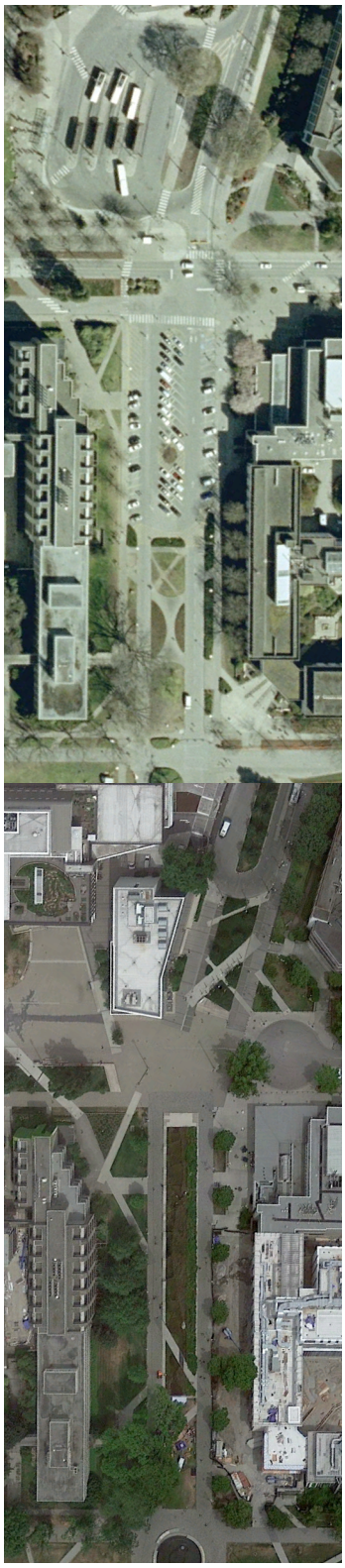
Current legislation and mobility trends continue, the high cost and low adoption of AVs has encouraged shared-use. Mobility pricing has discouraged the prioritization of motor vehicle use and ride-hailing, while increasing public transportation funding and utilization. This has resulted in an additional higher-capacity rapid transit line, connecting UBC with the greater region. These have contributed and reinforced TOD policies with more concentrated housing and infill, and further impacting curb-space management demands.

3. DEVELOPMENT OF 2050 TRANSPORTATION NETWORKS

While the objective of this project is to determine what "big moves" may be required to meet the transportation needs for the UBC Vancouver Campus in 2050, due to the uncertainty of future land use and transportation (e.g., SkyTrain and mobility trends), the Project Team conducted an exercise to develop hypothetical, yet plausible, transportation networks that could be used as a tool to better inform high-level recommendations. These networks were further assessed by the Project Team to help identify various opportunities, barriers and potential policy considerations that may emerge in the future.

Guided by a set of distilled planning goals and objectives for UBC, as well as hypothetical land use and SkyTrain scenarios created by C+CP for this report, the Project Team conducted an internal stakeholder workshop. The stakeholder materials and insight generated during the workshop were used to inform the Project Team's Big Move recommendations.

GOALS & OBJECTIVES



Based on a review of the goals and objectives outlined in the UBC Land Use Plan, Vancouver Campus Plan, and Transportation Plan, the Project Team identified overlaps and common themes to develop goals and objectives for this project. These would be used to guide the workshop's conceptualizing of future transportation networks and the project team's recommendations for the UBC campus:

The UBC Land Use Plan (2010) presents the vision of a compact, complete community that provides daily needs within walking distance and a university community that integrates academic, neighbourhood and natural spaces. The plan identifies three fundamental considerations against which future planning and development decisions are to be evaluated – ecology, economy, and community. Under ecology, the plan states that interrelated land use and transportation systems should be managed to mitigate any adverse impact on adjacent areas. With regards to economy, the goal is to develop and deliver local public services to support residential development. Lastly, the goal for community is to facilitate the creation of complete communities, with retail that supports local activities and a mix of housing appropriate for the area.

The Vancouver Campus Plan (2010), which falls under the UBC Land Use Plan, outlines UBC's academic, social, and ecological goals. The first goal is to create a compact campus to increase interaction between allied disciplines. The second goal is to foster more interaction between students and faculty. The third goal is to protect the open space network with focused investment. Lastly, the fourth goal is to support a pedestrian and bicycle friendly campus that fully uses existing facilities and infrastructure.

The UBC Transportation Plan (2014) focuses on improving the campus transportation experience and lays out three commuting target areas for 2040 – sustainable transportation, single occupancy vehicles, and daily private automobile traffic. Under sustainable transportation, UBC has set the target that by 2040, at least 66% of trips and from UBC will be made by walking, cycling, or transit. With regards to single occupancy vehicles, the plan identifies the targets of reducing SOV travel to and from UBC by 20% from 1996 levels and maintaining at least a 30% reduction in daily SOV trips per person to and from UBC from 1997 levels. In terms of daily private automobile traffic, UBC's target is to maintain daily private automobile traffic at less than 1997 levels.

GOALS & OBJECTIVES

Following an analysis of UBC's existing plans and policies, the Project Team created the following list of goals and objectives to help guide the planning activities of the workshop and inform this report's Big Move recommendations.

PLAN FOR COMPLETE COMMUNITIES

Design compact urban/mixed use development
Balance stakeholder needs and desires

FINANCIAL FEASIBILITY

Maximize past investment delivery
Promote cost efficiency in future investment

CONNECTIVITY

Intra-campus connection
Regional connections

SUSTAINABILITY

Prioritize sustainable transportation options
Limit SOV usage on campus
Promote climate change resilience

LIVABILITY

Protect open space networks
Create sense of place
Support all ages and abilities accessibility

LAND USE & SKYTRAIN SCENARIOS

To provide a foundation for the conceptualizing of possible transportation networks for the UBC Vancouver Campus in the future, C+CP provided the project team with three illustrative long-range land use scenarios for the year 2050. These three scenarios, which depict broad land use and number of SkyTrain stations, were configured to display a diverse, yet plausible set of land use assumptions including growth distribution and station arrangements, that would allow for a varied set of networks to be developed. These networks could then be assessed to determine where commonalities, differences and decision-points may emerge in the future.

It should be cautioned that these scenarios were created for the purposes of this academic exercise, and that any decisions regarding alterations to long-range land use will be subject to future campus planning processes (e.g., UBC Vancouver Campus Plan and Land Use Plan updates) that are yet to be initiated.

For this project, the three long-range land use scenarios all assume an extension of the Millennium Line SkyTrain from its planned terminus at Arbutus to the UBC Vancouver campus, with at least one station near University Commons, to at most three stations, including near Lelәm̓ as well as between the Stadium and Wesbrook Village neighbourhoods. While each scenario also contains a different land use configuration, they all assume approximately the same total population, employment, students, and student bed growth for the campus as a whole.

The following three high-level illustrative scenarios were utilized to envision how future campus growth may be configured:

Scenario 1: Build Up Three Neighbourhood Areas I 3 SkyTrain Stations

Scenario 1 has a higher share of future growth concentrated in the three neighbourhoods of Acadia, the new Stadium neighbourhood, and Wesbrook Village. This scenario has three Skytrain stations located on campus, near Lelәm̓, at University Commons, and between Stadium Neighbourhood and Wesbrook Village.

Scenario 2: Distribute Neighbourhoods I 1 SkyTrain Station

Scenario 2 will continue with the planned build-out of Stadium Neighbourhood and Wesbrook Village until 2035, with new growth and development afterwards being distributed across campus. This scenario assumes that only one SkyTrain station will be located on campus, at University Commons.

Scenario 3: Intensify Acadia I 2 SkyTrain Stations

Scenario 3 will continue with the planned build-out of Stadium Neighbourhood and Wesbrook Village until 2035, with a higher share of new growth and development afterwards occurring in the Acadia neighbourhood. This scenario has two SkyTrain stations located on campus, near Lelәm̓ and at University Commons.

STAKEHOLDER WORKSHOP

In collaboration with C+CP staff, the project team conducted an internal C+CP stakeholder workshop on February 11, 2020. Facilitated by the Project Team, the workshop included fifteen interdisciplinary participants from C+CP's staff and SCARP.

The half-day workshop was designed to meet the following objectives:

1. Generate and explore a range of transportation networks for the illustrative 2050 land use scenarios (provided by C+CP in Term 1) within the context of the broader new mobility trends researched by the Project Team.

2. Create a list of potential transportation network options and high-level policy considerations to be evaluated following the workshop.

3. To inform the Project Team's final recommendations, identify high-level opportunities and barriers associated with each proposed 2050 land use scenario and transportation network solution.

STAKEHOLDER WORKSHOP

After receiving an overview of the Project Team's Term 1 findings, the workshop attendees were broken into three small groups to participate in the following facilitated exercises. The package that participants received for the workshop is located in **Appendix C**.

Exercise One | Transportation Network Options
Design a high-level transportation network to serve the given land use patterns and determine how trips generated can be absorbed by the network.

Exercise Two | Land Use Implications
Brainstorm potential decision-making opportunities and barriers influencing each proposed 2050 land use scenario and transportation network options to inform future recommendations that may be more resilient to unknown planning and mobility trends.

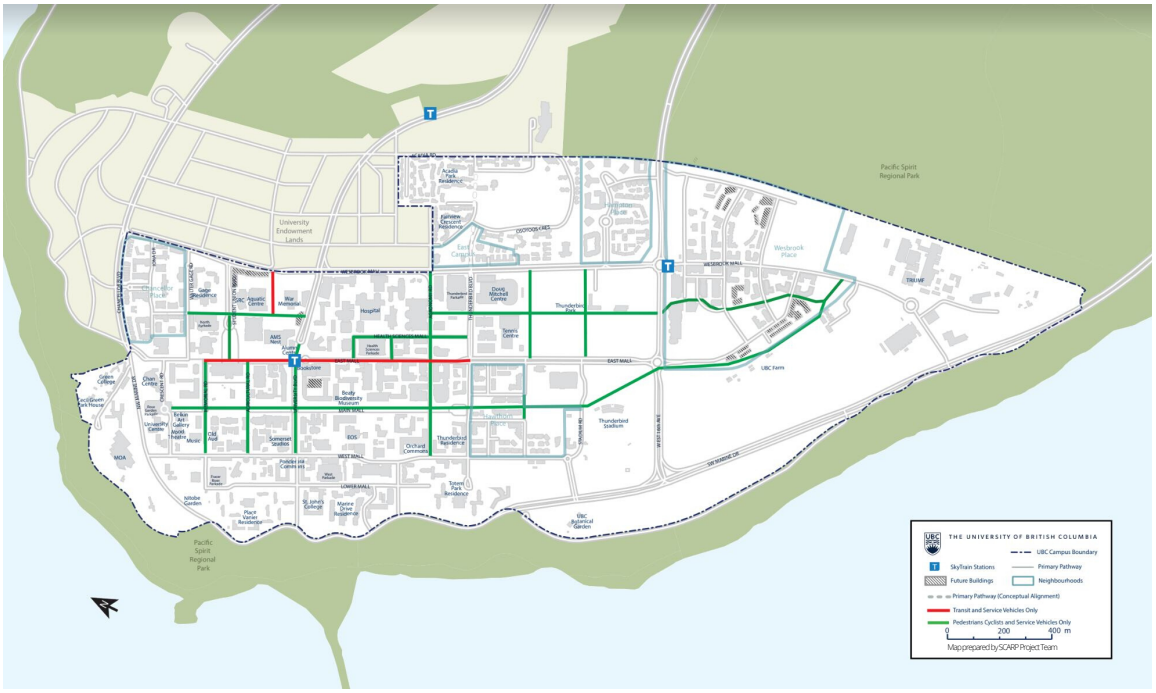
Following the break-out exercises, the project team guided debrief sessions with the goal of collectively reporting back the ideas generated from each group and soliciting additional input.

In collaboration with C+CP staff, the feedback and materials produced during the workshop were then further analyzed by the Project Team to help inform the proposed Transportation Network Maps (p. 27-29). These networks were then used to determine what mobility commonalities may exist and be likely for the future, regardless of the future land use and Skytrain patterns. Ultimately, this was used as a tool to help determine the final 'Big Move Recommendations' (p 31-36) presented in this report.

WORKSHOP RESULTS | PROPOSED NETWORKS

Scenario 1: Build Up Three Neighbourhood Areas | 3 SkyTrain Stations

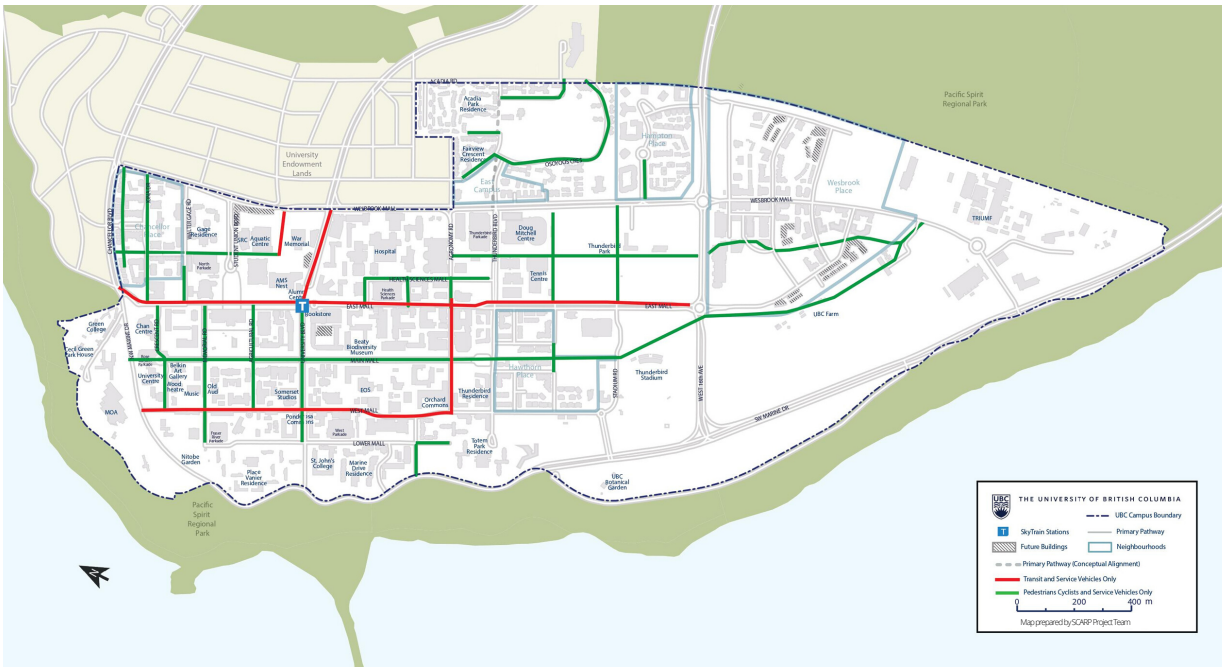
Scenario 1 has an east-west and a north-south rapid shuttle service that connects SkyTrain, academic facilities, and the built-up Acadia, Stadium, and Wesbrook neighbourhoods. East Mall, between Memorial Rd and Thunderbird Blvd, is converted into a 'linear transit plaza', a corridor open to only transit and service vehicles. The north-south shuttle would operate along this between Memorial Rd and W 16th Ave. Thunderbird Blvd was extended through the Acadia neighbourhood allowing the east-west shuttle to directly connect Lelə̓m with Lower Mall West. In addition, the pedestrian core of campus is expanded to include Health Sciences Mall and Agronomy Rd.

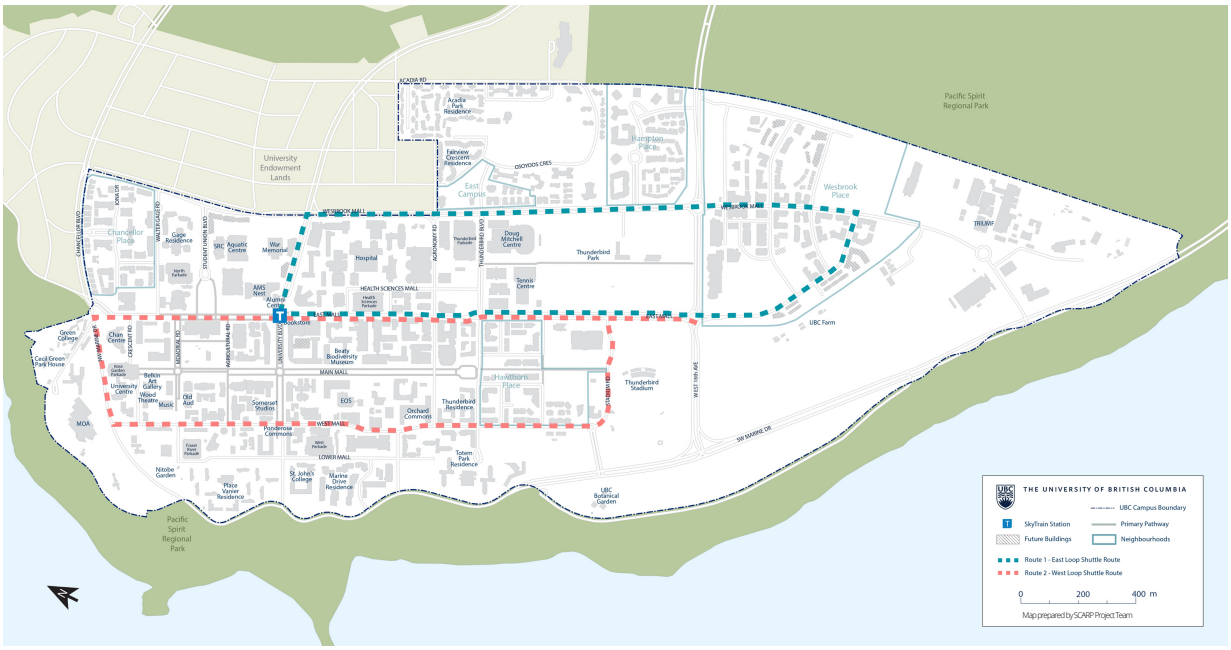


WORKSHOP RESULTS | PROPOSED NETWORKS

Scenario 2: Distribute Neighbourhoods | 1 SkyTrain Station

Scenario 2 has an extensive network of transit and pedestrian corridors. East Mall, between Chancellor Blvd and W 16th Ave, is converted into a route for transit and service vehicles only. West Mall, between Marine Dr and Agronomy Rd, and Agronomy Rd, between West Mall and East Mall, are converted into similar corridors. This allows two rapid shuttle loops to operate, connecting the built-up neighbourhoods distributed around campus. The pedestrian core is also expanded, including the areas of Chancellor Place, Health Sciences Mall, and the Acadia neighbourhood.

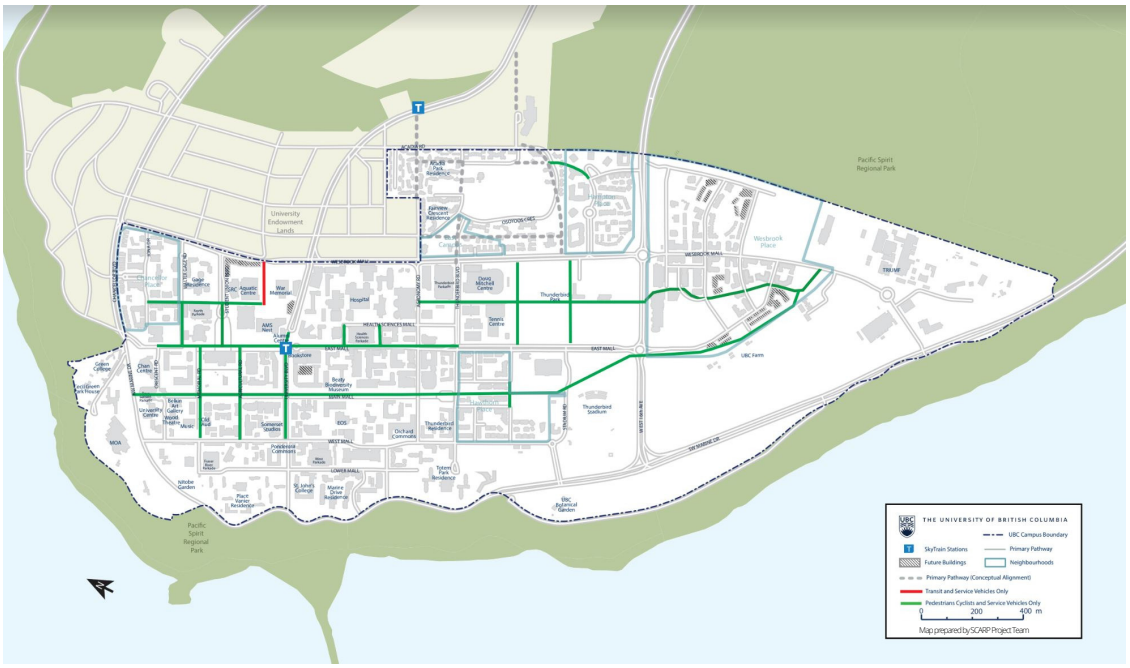




WORKSHOP RESULTS | PROPOSED NETWORKS

Scenario 3: Intensify Acadia | 2 SkyTrain Stations

Scenario 3 has a network that leverages an intensification of Acadia to create a new street grid in the neighbourhood. This grid allows for greater permeability between the SkyTrain station at Lelə́m̓ and the southern campus neighbourhoods, shifting some ridership demand from the UBC commons station. From the Lelə́m̓ SkyTrain station, there would be a rapid shuttle service that would connect the station and Acadia neighbourhood with Westbrook Village, the Stadium neighbourhood and core campus academic facilities. The UBC Commons station is to largely serve northern academic facilities. The pedestrian core would be expanded to include East Mall, between University Blvd and Agronomy Road.



WORKSHOP RESULTS | EMERGING THEMES

The information highlighted below is intended to offer an overview of the themes that emerged from the workshop exercises. The Project Team then further analysed the workshop results (**Appendix D**) to further inform the development of high-level recommendations.

Enhance Pedestrian Realm

Build out Cycling Network

Expand Intra-Campus Transit Network

Modify Road Network

Broaden TDM Programming

Explore Weather Design Guidelines

Manage Parking Demand

4. TRANSPORTATION 'BIG MOVE' RECOMMENDATIONS

Building upon the previous work conducted, the Project Team collaborated with C+CP to develop the proposed “Big Move” recommendations for UBC’s Vancouver Campus. These recommendations were created after analyzing the commonalities and differences between the proposed transportation networks, which were based on a differing set of land use and Skytrain assumptions. The recommendations were created at a relatively higher-level as opposed to the specific actions discussed through the workshop, to ensure that they are resilient, likely, and/or required, regardless of the future land use and Skytrain configuration that arises.

The Project Team also took into consideration how these “Big Moves” may be resilient to the potential mobility futures that were explored in Phase 1. Recognizing these future unknowns may influence C+CP’s upcoming planning activities, the Project Team also identified potential UBC land use and transportation initiatives that could benefit from the research and recommendations presented in this report.

BIG MOVE | RECOMMENDATION #1

ENHANCE PEDESTRIAN PRIORITY AREAS

Recommendations

- Convert more streets to pedestrian-only
- Leverage mixed-use redevelopment to improve interaction between built-form and pedestrian areas (e.g., outdoor patios, ground floor retail, active storefronts, open windows)
- Enhance pedestrian experience through public realm beautification and/or activations (e.g., placemaking, plantings, flexible seating etc.)
- Install weather protective infrastructure

Opportunities

- Existing pedestrian-priority network to build upon
- Majority of trips on campus are by pedestrians
- Leverage UBC's existing plans and policies (e.g., Public Realm Plan) to help create new Pedestrian Priority Areas
- New mixed-use construction and/or older buildings retrofitted to add more pedestrian-friendly amenities

Challenges

- Managing vehicle restrictions
- Preserving parking ingress and egress
- Maintaining service vehicle access and accessible parking spaces in close proximity to destinations

BIG MOVE | RECOMMENDATION #2

INCREASING ACTIVE TRANSPORTATION INFRASTRUCTURE

Recommendations

- Adding infrastructure to physically separate active transportation users (e.g. pedestrians, cyclists, micro-mobility and etc.)
- Improve end-of-trip facilities
- Expand weather-protected and longer-term parking options
- Manage curb space to accommodate micro-mobility parking corrals

Opportunities

- Bike and pedestrian trips accounts for over 2% of all trips to/from campus
- Planned new construction and retrofits of existing buildings
- Growth in popularity of e-scooters/bikes
- Use infrastructure investment to support wayfinding and route choices that minimize pedestrian/cyclist conflicts

Challenges

- Uncertainty of future mobility trends (e.g. micro mobility) and/or emerging new technologies (e.g., AV)
- Tends to be dependent on weather and route geography
- Adoption rate lower amongst longer distance commuters
- Corridor/space limitations for an increasing number of competing uses (e.g., transit priority, active modes traveling at various speeds and etc.)

BIG MOVE | RECOMMENDATION #3

STRENGTHEN INTRA-CAMPUS TRANSIT NETWORK

Recommendations

- Explore ways to strengthen local transit service on campus
- Implement new high-frequency, high-capacity rapid transit service to compliment existing/future transit service (e.g., Skytrain)
- Study the potential for dedicated transit right-of-ways on campus
- Focus new development/growth near transit

Opportunities

- Existing local transit service on campus that can be modified/expanded
- High-capacity, high-frequency rapid transit service will connect to campus (e.g., SkyTrain)
- Growing campus population that would support increase in local transit ridership
- Development of complete community allows for high-ridership throughout operational hours

Challenges

- Requires coordination with other agencies (e.g. TransLink, MoTI)
- Uncertainty in timeline around the introduction of SkyTrain
- Possible high capital and high operating cost of new services
- Allocation of pedestrian-priority zones could restrict routing

BIG MOVE | RECOMMENDATION #4

EXPANDING STREET NETWORK CONNECTIVITY

Recommendations

- New neighbourhood-scale development should incorporate connected network of small blocks
- Prioritize design of connected street grid in new developments
- Implement strategies to encourage safe streets (e.g. lower speeds)
- Explore opportunities to better connect on-campus neighbourhoods and/or off-campus routes

Opportunities

- New neighbourhoods being planned
- Leverage UBC's existing plans and policies (e.g. UBC neighborhood plans, UBC Land Use Plan, etc.)

Challenges

- Coordination with private sector and MOTI
- Cost of right-of-way and construction
- Potential for increased stakeholder opposition

BIG MOVE | RECOMMENDATION #5

DEVELOP BROADER TDM PROGRAM

Recommendations

- Increase funding and staffing resources to expand UBC's TDM Program
- Explore new technologies to better manage curb-space demands
- Implement new policies and/or incentive programs to discourage SOV trips
- Investigate further opportunities for staff teleworking and/or student online learning

Opportunities

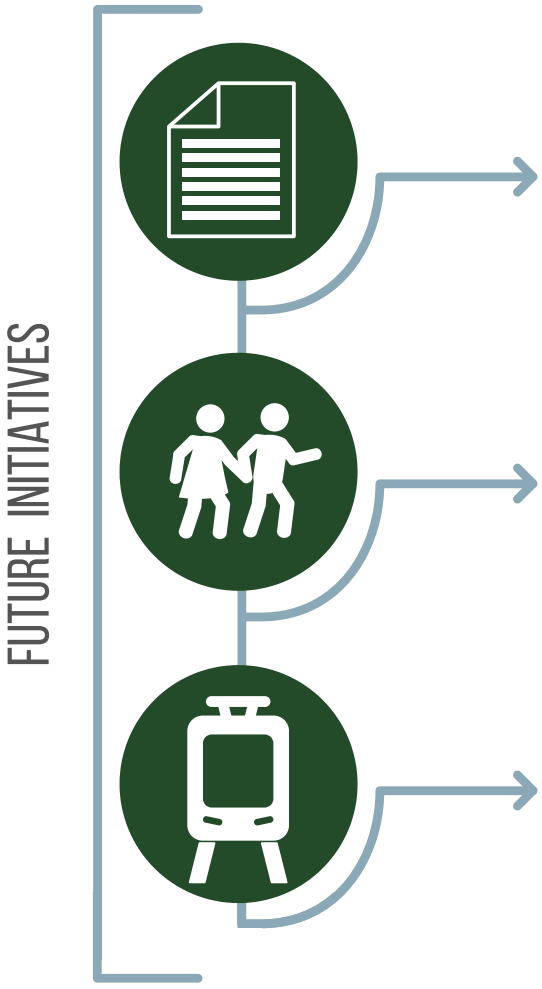
- Transportation infrastructure in place to support desired mode shifts
- UBC's current parking costs/policies already discourages SOV use
- TDM Programming can be tailored to meet UBC's desired policies and long-term goals
- Existing U-Pass program that could potentially be expanded upon

Challenges

- Reallocation of budget and staff resources may limit TDM programming
- Limitations to shifting current travel behaviors

C+CP'S FUTURE PLANNING INITIATIVES

Looking ahead to UBC's proposed planning activities, the Project Team intends for this report to help inform C+CP's future land use and transportation planning initiatives. As UBC's Vancouver Campus continues to grow and evolve in the coming years, it is anticipated that land use on campus and the associated mobility needs will undergo significant changes. Recognizing that these unknowns may influence the recommendations presented in this report, it will be vital for C+CP's efforts to remain flexible and resilient while navigating the uncertainties associated with planning for the year 2050.



UBC LAND USE PLAN UPDATE

Anticipated to launch in 2020/2021

UBC TRANSPORTATION PLAN UPDATE

Anticipated to launch in 2020/2021

UBC SKYTRAIN EXTENSION

Ongoing Coordination

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6. APPENDICES

APPENDIX A: INTERVIEW SUMMARIES

INTERVIEW ONE

Interviewers: Allison Henry, Henry Kosch and Kevin Luzong
Interview Date: November 15, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
Focus shifting toward moving more people, not vehicles which will be vital to resilience planning. Positioned with unique research, data capabilities, and governance structure to assess and address potential built environment and/or wellness challenges and trade-offs. Uniquely positioned to learn from previous successes and failures of other global cities.	Inadequate planning and infrastructure to accommodate higher energy consumption. Tech companies resistance to sharing data.	On demand services could further support mode integration and influence travel behaviors. Adapting the built environment to accommodate various mobility modes (micro-mobility, active transportation and AVs).	Mobility security concerns. Navigation transition from “dumb” mobility to AV could result in potential safety concerns. Potential for increased privatization of transportation.

Interview Summary

Interview Question	Response
What should the UBC network strive to offer or be? (e.g., goals, values, etc.)	UBC’s diverse stakeholders will have varied travel/mobility needs. Most on-campus residents will desire open space and active transportation options. Alternatively, commuters will desire easy, accessible and convenient mobility options to campus. CCP’s planning efforts will help direct UBC’s future population growth, land-use and mobility patterns on campus. Their efforts will primarily focus on best serving the needs of UBC’s key stakeholders.
How can we plan for a network that is resilient to different kinds of futures?	Omar highlighted the following considerations: ● CCP’s land-use should inform future transportation patterns. ● With skytrain implementation on campus, more students/faculty may want to live off campus to have greater Vancouver experience. ● Future sustainable transportation efforts may include, increased active transportation, shuttles onto campus, concentrated

	parking/dynamic parking spaces and connecting energy with buildings with transportation options.
What are the current challenges and/or network gaps for UBC's transportation system across each mode? (e.g., walking, cycling, transit, driving, over-sized vehicles)	In the future, transportation will transition towards on-demand services. The goal will be to move more people and goods, not more vehicles, safety and conveniently from point A to B. This shift in transportation planning and mobility will be vital to help address climate change and adapt to emerging AV technologies. UBC's challenges will also include the following: ● Safety navigating the transition from "dumb" to AV dominate mobility ● Mitigating mobility security concerns ● Adapting the built environment to accommodate various mobility modes (micro-mobility, active transportation and AVs)
How will new mobility/technology impact the built environment and/or wellness?	Research and data will become critical to address potential built environment and/or wellness challenges and trade-offs. *Example – A future with increase AV mobility and decrease active transportation, could result in negative health implications. We will need to be mindful of how we design our cities to accommodate on-demand services.*
How could federal funding and private-public partnerships influence future mobility?	It is important to learn from the previous successes and failures of other global cities. Restricting certain mobility options can significantly impacts travel behaviors and help prioritize modes. *Example – Restricting rideshare factored into Vancouver becoming North America's largest carshare fleet. In the future, rideshare and carshare could combine.* As tech companies further influence mobility, it will be critical for governments to explore increased data sharing and/or collaboration opportunities. *Example - Rideshare and micro-mobility companies should be required to share data. This data could help cities improve future transit ridership and network systems.* In the future, transit agencies will want to play a bigger role in mobility. The industry is moving towards viewing "mobility as a service" by allowing riders to seamless switch between various modes utilizing one integrated payment system.
What emerging transportation trends should UBC consider when planning for 2050?	New technologies trends may influence the following: ▪ Introducing flying mobility devices could require new air-right and land-use considerations to accommodate flying and landing zones ▪ Transition towards electric mobility fleets would require sustainability more energy than we are currently able to produce. *Example - Omar*

	noted, electrifying everything could require approximately 60% more energy than we are currently able to produce. ▪ Freight delivery could transition towards large AV trains, which could only require one driver to manage fleet. ▪ Small parcel deliveries could transition towards drones, which could increase privacy concerns. ▪ Flying pods shutting students/faculty between North Van and UBC. ▪ BY 2050 AV will be mainstream, vehicles are already moving in that direction. Automation will be a slow progress in cities ▪ First autonomous vehicle deployed on UBC campus will be first in Canada o Tech is limited right now with response times/sluggish o All AV is based on surrounding
How could emerging mobility trends impact UBC's on-campus population growth projections?	UBC's on-campus population could decline if mobility accessibility, reliability and convenience to/from campus was improved. *Example – More students may prefer living off-campus to have a true "Vancouver experience". This decline could also impact UBC's housing affordability and/or supply demands.*
What are the potential gaps with UBC's current transportation policies?	UBC is not adequately prepared to address increased energy consumption. They are not planning for future "peak electricity demand" and/or adequate energy sources (i.e. charging stations).

Additional Notes:

- Hydrogen Parking | Thing Omar is the most excited about "energy as energy" Bidirectional charging
    - Part of this are being modeled in other countries, but bidirectional charging would be the first in the world.
- AV Shuttle | East Mall route is being considered. Krista F helped select the route because of planning for stadium neighborhood and it's meeting network demand. They want to connect this to 5G network to help AV understand it's surroundings.
- 5G interactions with transportation and information sharing. It's a data/communication platform. 5G security concerns (China spying) and more dynamic heat/power not impacting other factors "more data".
- Today, the amount of people purchasing vehicles in Vancouver is declining with raise of rideshare (expensive, storage and maintenance).
- China and Europe have done great work in transportation advances (top down planning).

INTERVIEW TWO

Interviewers: Henry Kosch and Rose Southard
Interview Date: November 18, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
Public transport is the most economical way to move around a lot of people Multi-mobility can have positive effects on physical, mental health, and well-being	Reliance on private vehicle use that is likely to increase in the future Do not have a detailed understanding of mobility/user needs	Need to better incentivize the travel we want and penalize the travel we don't want AVs more likely to be deployed in a targeted fashion for citizens more in need. Can retrofit our built form around an expansion of sustainable modes (e.g., Europe). Can accommodate an increase in curbside demand through either charging it at its full cost, or pedestrianizing local streets that still allow for delivery and pick up (e.g., superblocks in Barcelona) Reducing the need to move (TDM) through encouraging telecommuting (with AR/VR), or shifting more travel to off-peak	Need to provide additional transportation infrastructure while still needing to reduce emissions. NIMBYISM and politics Less funding from seniors government could mean more partnerships between local government and private sector, exposing local governments to risk A shift towards AVs and mobility on demand may increase congestion AV fleets will not reduce the need for parking as they still need to be maintained and charged

Interview Summary

Interview Question	Response
What are the current challenges and/or network gaps for UBC's transportation system across each mode? (e.g., walking, cycling, transit, driving, over-sized vehicles)	Major problem is the reliance on private vehicle use. That is going to increase in most scenarios with population growth, etc. For campus, there are a lot of unknowns in terms of how the surrounding neighborhoods will develop over time and the type of transportation infrastructure that will be needed to support them.

	The campus will need to provide additional transportation infrastructure for this residential growth while trying to adhere to campus emission targets. The campus will also need to determine how to move more people to and from campus from outlying areas, while reducing single vehicle occupancy.
How can we plan for a network that is resilient to different kinds of futures?	FIrst you need to tackle the question of uncertainty - Need better data collection and to understand what the baseline is. In local context we don't have a detailed understanding of what the mobility needs are for each demographic group - Needs to be a much more comprehensive travel survey implemented. Details in travel surveys that aren't captured include linked trips, long distance trips. Most of the focus is on routine travel patterns during the week. What about weekends? Non routine travel? How do we link it to user needs? - Then you determine what are the needs and how are they going to change in the future Need to better incentivize people to get out of single occupancy vehicles. Why isn't more expansion of rapid transit happening? Especially to UBC? The rest of the region is connected but there is currently a huge gap with UBC. Part of this is that this is one of the wealthiest areas of UBC. Equity** Overall, we need to gain a much better understanding of user needs, and then develop better incentives to encourage multi-modal travel.
What gaps do you see possibly emerging in the future with respect to UBC's current transportation policies?	Believes that autonomous vehicles are over-hyped, and that even for our axis it might be better to have multi-modality, than autonomy. It is unclear if AV tech will be able to clear the tech, policy, and legal hurdles. The idea that UBC will be fully autonomous is highly unlikely. More likely that AVs will be deployed in a targeted fashion for citizens more in need. We should be thinking about further investment in extending public transportation, and reinvesting in the current network to ensure that it is maintained. If you want to move the most amount of people in the most economical way, it has to be public transport There needs to be stronger incentives and penalties to get people out of private vehicles and on to transit. 'Disruption' in the future is more likely to be around penalties and incentives policy. E.g., putting a price on transport carbon, taxing fuel consumption. We will need some sort of mobility pricing in the future. Based on current trends in demand for transport services, driven by population growth, the network will be seized up by 2050.
How will new mobility/technology impact the built environment and/or wellness?	It depends on which way we go - there is a lot of potential with the bright scenario, where we tax behaviour and the mobility that we want to see less of and we incentivize the behaviors we want to see more of.. As for how new mobility could impact the built environment, health and wellbeing, there is evidence that it could have a great effect

	- For the built environment, look at europe. There is an advantage in having existing infrastructure rather than retrofitting a car based system. But there is no reason why we can't investment into retrofitting and expanding multi mobility modes. - There is evidence of the positive effects that multi-mobility can have on physical, mental health, and well-being. - There is also anecdotal evidence of the major mental health challenges that develop from having people being disconnected from community and family. Often due to a lack of connection and the barriers that prevent people from connecting to opportunities. The transport network is not conducive to connecting people to community.
How could federal funding and private-public partnerships influence future mobility?	Through the 60s,70s,80s there was a higher degree of risk sharing on transportation infrastructure between the providencial, federal, and local governments. The risks then started to be pushed towards municipalities with less federal funding Cities don't want to take the risk, and as a result, current infrastructure is not being reinvested into. As that role is abdicated by the federal government, municipalities are more likely to enter into P3 partnerships with private companies. Today there are a lot of new mobility services are being tested/deployed by companies that are getting a lot of the upside, which municipalities aren't getting. - E.g. companies approach the city to trial tech - but if the company folds or leaves, the data is owned by vendor. Also the municipality is then dependent on the company Feds and province need to share risk if cities are to invest in new technology. Municipalities need to take a stronger line on insuring that the proper policy governance structures are in place to fully benefit from new tech and services coming from the private sector Private companies are legally mandated to make a return on investment for shareholders, public sector services have a completely different mandate, social contract under a democratic process that there needs to be a safety net in place to take care of the most vulnerable. H: Future where fed govt is less involved - more PPP? More risk? Not necessarily, the fed gov't should provide oversight in the case where they don't share risk. Constrain the private sector to make sure the technologies are tried and true, sharing agreements in turns of IP. Some plan in place that accounts for future impacts on the private sector that aren't forseen
How will new mobility/technology impact curbspace management?	There is a lot of uncertainty, but there are examples of what could be done - if one starts with the premise that we want to increase the livability and the walkability of neighborhoods. - You both reduce the amount of curbside parking while at the same time charging for it in a way that accounts for the full cost of it.

	- Superblock in Barcelona is another example. These are zones of 3-6 blocks at a time that restrict private vehicle use, except for delivery vehicles. This creates a walkable area with access for emergency vehicles and the delivery of goods and services still prioritized. Not convinced that AV fleets will massively reduce the need for parking. They will still need to park somewhere, and if they are electric, then they will need to park all in the same area for charging (both for technical and economic reasons). A shift towards AVs and mobility on demand may increase congestion.
What emerging technologies could become more established as long-term mobility options. Could these influence these current transportation priorities? How can we plan for these?	Reducing the need to move is not talked about. This includes both routine moves (e.g., work, school) and non-routine (e.g., vacationing). - There are now some companies that mandate people not to come to work 2-3 days/week, and provide no desk space for them. - There is a massive group of users currently not tapped into who don't have to travel to work or could work totally different hours. How do we move people off of peak hours? More research needs to be done into lifestyles and daily scheduling, and how this is changing. There is the idea in transport planning that everyone has the same schedule, and that demand profile is what all of public transport has been based on for 40 years. But in reality, this demand profile can be far more heterogeneous. - With augmented reality you can be in the room and interact with anyone remotely. Larger umbrella of enhanced communication technologies - extent to which we need human interaction will change over time and how we do that will change. - The Swedeish government is incentivizing people to take planes and stay in the country instead.
If housing and jobs were to be more distributed across the region, what would this mean for commuting to and around UBC? People commuting longer distances? How would this affect the regional and campus transportation network?	Two things can happen - build a satellite campus or improve transport. But education is changing too, with the lecture-hall style learning beginning to be disrupted. What is the nature of the future of education going to be? How is that going to influence the need for travel? Can a lot of work be done online, or can universities offer shorter, more focused courses? The idea of these current mobility needs of students and faculty are that fit into demand profile estimations.
What should we be thinking of, looking for, and planning for? (can be as simple as emergency vehicles and cyclists, doesn't need to be emerging technologies)	How will lifestyles, education, and work change in the future, and what impact will this have on travel. How do we reduce the need to travel and how do we shift peak demand? How do we incentivize people to use electricity off-peak?

INTERVIEW THREE

Interviewers: Rose Southard and Kevin Luzong
Interview Date: November 19, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
Rise of AVs/ride-hailing can free up former parking spaces on campus for additional active transportation uses/infrastructure UBC has good transportation policies in place that promote sustainable transportation	Campus growth and transportation growth are not aligned Bus transit to/from is at capacity so until rapid transit arrives it will be difficult to encourage major shifts away from automobile travel Sustainable cycling network gap	Evenly distributing the volume of travelers to/from campus (shifting class start times) Creating high speed bike lanes within campus Carpooling apps/technology Micromobility for people living proximal to campus (5 - 10 km)	Rise of AVs/ride-hailing leading to more single occupancy vehicle trips to campus If land use decisions are not made with consideration of the transportation network, it can have implications for future mobility (i.e. building setbacks, development patterns)

Interview Summary

Interview Question	Response
1. What are the current challenges and/or network gaps for UBC's transportation system across each mode? (e.g., walking, cycling, transit, driving, oversized vehicles)	transportation to/from UBC - roads are not UBC owned, all ministry or CoV roads bigger gaps is we can do what we can on campus, but not on the way to campus marine drive, intimidating - university is ok, chance to make a better bikeway to the campus sustainable cycling network gap No creation of opportunity because we are so close to the border where residential starts again - biggest thing to add for commuting to UBC is a bike highway, 2 for north and south of campus Marine dr, chancellor are big because there were supposed to be ferry terminals, overbuilt Passenger ferry? Ferry to north van? Could be poss, but not a ferry terminal on the scale of horseshoe
2. What gaps do you see possibly emerging in the future with respect to UBC's current transportation policies?	Policy is good - targets aside - supporting sustainable transpo Setting targets is random - growth targets etc, where does the number come from? Opportunity - transit flatlined - until rapid transit no more bus capacity. Biggest opportunity is high occupancy vehicle modeshare. fluctuates, very volatile,

	how to make carpooling more of an option for people? Challenges are flexibility and connected trips Different providers of apps - pilot going with USB staff, 10 vans operating right now. Extension of the transit network because staff work in abbotsford and langley and chilliwack - realistic about transit related trips to campus. Opportunity to reach our sustainability goals for off campus policy Transit flatlined a few years ago - same number of trips, but trying to shift the arrival and departure from campus so transit can be enjoyable. Improve level of service by reducing peaks, few years ago had an ability to shift class start times more, less starting at 9 or 10, staff students and faculty all to UBC for 9 am. Talk to UBC - challenge is level of growth so they don't have the flexibility to do that with classes anymore. Discouraging bc we have become peaky again after curving out for a few years.
3. What emerging technologies could become more established as long-term mobility options. Could these influence these current transportation priorities? How can we plan for these?	Ride hailing is coming, sceptical as to whether or not thats actually a sustainable transportation option. Concerned about people getting rides to campus who alternatively would have driven to avoid fees - same number of trips. Moving forward cautiously on how we work with providers. See it to collect data and see what happens. Count all traffic every fall, next fall maybe higher numbers for traffic and single occupancy vehicles? Micromobility - cover bigger distances to get people in the 5 - 10 km radius to get to UBC. Barrier of the hill, ebikes scooters opportunity to overcome Support people bringing more expensive bikes to campus, CCTV, bike cages to keycard access… AV tech, growth report has a similar idea where more sustainable but if it does become AV share technology is the same as ride hailing. Same amount of trips. no sharing vehicles. Sky Train - big opportunity, bus exchange project and one of the things in terms of building capacity is understanding that rapid transit will come but only replaces one bus route - 99, bus loop will still be a hub. Not freeing up space
4. How might climate change influence transport network planning? (e.g., adaptation)	Enough of a threat now that it should be doing something but its not, what do we as policy planners have the ability to do to put a hard foot down? Encourage better behaviour or anger people?? Could take aggressive steps to incentivize more sustainable transpo - significantly incentivize people who bike to work? Taxable benefit ideas People should be rewarded, easier to reward than penalize Ride hailing - incentives to have people join who are in a green vehicle UBC should do something bigger and bolder - to deter single occupancy trips from occurring on campus. Geography is a big reason why people do drive, wealthy students, staff and faculty where our cost structure doesn't make them hesitant. Need to start putting pressure. Caution in huge jump in fees is what are you expecting people to do instead? No where to put them - carpooling? Not a total solution? Rapid transit needs to happen to provide an enjoyable option. Parking rates increase 20% per year

5. Do you see a future need for additional storage or even maintenance facilities on campus? (e.g., for transit, campus service vehicles, or other modes)	by 2050 tech will be more advanced - automated bike parking - does not allow everyone to be in the same room to store our bikes. Similar to car valet - put it into a garage and it goes into a tower. Not achievable at the moment, by 2050 it will be more common and easy. LOcations all over campus to accommodate need across campus. Could be underground Campus policy of getting rid of all surface parking - every parking lot is a development site. Modes of transpo so less people are driving. University drive is to accomodate a different kind of trip Replacing some of our big parkades? Maybe. 5 different parkades near campus, some never get rid of because of event locations. All need to be rebuilt in 15 - 25 years. reduce from 1000 to 4-500 spots and put an academic building in the rest of it. Use that development site in a more efficient way. Parkades designed to be retrofitted? Health sciences has been built to add more on top? Also already 15 years old… spend money on another level esp with rapid transit? Ex of centralized location where we might not even want traffic going thru. Just use thunderbird as in a better location and out of the way. HS is an opportunity site A lot more opp for mixed use of land with the rise of new tech
6. How do we manage increasing volumes and mode interactions/conflicts?	with rise in tech, are our classrooms going to be necessary? Will ppl need to come to campus? Rise of VR.. Already talking about providing tools for professors during this transit strike. Sign in for classes so they don't miss them. Most meetings are video conference, conferences are video, Not coming to class could really change our campus. People could live further distances for affordability if they didn't have to come. FLight to campus? Less and less people being able to commute to campus with current trajectory. Reality of what ppl are going to be able to do. TEch is a huge factor on how people might come to campus. All changed should start thinking about creating an environment where students don't actually come to class. MWF is class time, TTh is a lot of labs. FLuctuation day to day for demand for trips. Less trips on TTh than MW, F is even less.
7. How can we plan for a network that is resilient to different kinds of futures?	During development and site selection process it needs to be a factor in our decision matrix. Not thinking about preserving right of way, front and center is squeezing most development on site. Transpo is not in there as a factor. Buildings will have to come down in the future, think about frontage and setbacks and how those can change. Difference is setback, new building is 2.5 m from roadway, constrained without room - what can we do with that? University goals are growth and accommodating growth on campus - not about how ppl move and how they will move in the future. Widen the roadway to create the space for vehicles, pedestrians, cyclists. Change the designation of the roadway to allow room. Past it didn't matter as we didn't see a lot of traffic, mow a lot of drop off traffic that will be exacerbated with the introduction of ride hailing. Increase in curbside drop offs, creates hazards for cyclists and congests our roadway. Maybe restrict main mall to no bikes just for safety, education campaign for safety on main mall not working. High

	speed bike lanes on west mall and main mall for safety. Take lane back for bikes on WM. East mall is more challenging as its not a through and through. Frontage on EM is an issue - engineering design, quantum matter all right on sidewalk - a little bit more space we could have bike lanes. Threshold for space needed to accomodate bikes and other modes? sidewalk with around 3 m - goal. On campus 3 m minimum and then bike lanes are 2 m. Gives people freedom and space to pass. Travel lanes for vehicles should be in the range of 3 m, more at intersections. Standard vehicle is anywhere from 2.6 - 2.8 m wide - so 3- 3.3 meters per lane. 8 m per side so 16 m right of way is minimum for all modes. Roads are 7 m on west mall - with 2 m sidewalks. More space than 16 m would be preferred to allow for biffers. Westbrook construction phase 1 is done - phase 2 is university to agronomy. Continuing bike facility is struggle because it is right where trees are. Trying to be cost effective and reuse the existing space. Removing trees is not an option. Trees and safe cycling facility? Other projects - small improvements. One is looking at west mall to try to make bike facilities. Try a pilot before putting in the infrastructure. Year with soft delineators before putting in permanent infra. Totally feasible. Vancouver - closed dunsmuir for deadpool.

Additional notes:

Hope that wave of climate crisis concerns and actions continue because we can do more here

INTERVIEW FOUR

Interviewers: Rose Southard and Kevin Luzong
Interview Date: November 19, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
	lack of funding for additional cycling improvements lack of willingness to prioritize alternative transportation approaches when the mode split is already impressive	increasing/improving bicycling infrastructure and end of trip facilities (i.e. secure bike parking) potential for u-pass for faculty/staff at UBC	campus transportation is not prepared for unexpected shocks (i.e. transit strike) roadway congestion that is unrelated to the movement of people; if freight/delivery services increase then a reduction in personal auto use could still not result in less traffic

Interview Summary

Interview Question	Response
What are the current challenges and/or network gaps for UBC's transportation system across each mode? (e.g., walking, cycling, transit, driving, over-sized vehicles)	he is bike share/active transportation coordinator, works on micro mobility/active transportation on campus redesigning west mall/secure bike parking/e-bike program for staff cycling is what he's most familiar with connections to campus are just OK major challenge is lining up with UEL, metro van, CoV to provide a more cohesive connection into campus (largely out of our control) gap in good cycling infrastructure to campus/around campus funding is largest challenge when it comes to cycling infrastructure on campus
What gaps do you see possibly emerging in the future with respect to UBC's current transportation policies?	secure bike parking is a huge gap on campus e-bikes are taking off, biggest barrier is lack of secure parking for $$$ e-bikes gap in programming options for encouraging HOVs
How has thinking evolved around end-of-trip facilities for active transport? What current policies are in place	logistics/payment structure needs to be figured out depends on whether board determines something is a priority

on campus and is there a need for new types of or evidence of emerging facilities?	we have targets but we get direction from the "top" which ripples down into funding
What do you think these MetroVan scenarios would mean for regional mobility patterns? Campus land use and mobility patterns? (Get them to review before hand)	skytrain biggest thing that will change - we'll hit all targets when skytrain happens and we will not hit them until then Targets still need to hit: ⅔ all trips will be made by wa SOV should be 20% below 1997 levels Potential: U-pass for staff would have a huge effect
Do you see a long-term future for micro-mobility? What would be the potential, application, and impacts? How do we plan for this?	e-bikes transformational as to how people get to campus regional e-bike share system ability for average person to purchase e-bike at a reasonable cost
Thoughts on autonomous vehicles and other emerging technologies?	AVs can utilize roadspace more efficiently mobility pricing in the region can be a really good thing, it can decrease VKT and increase average occupancy of vehicles, increase money we have to improve transit service, but we need a shift in attitudes for that shift to happen MaaS can improve feasibility of using different modes to/from campus urban freight (amazon packages), doordash, fedora, if you have a certain amount of road space and less is being used to move people, the last mile for freight is extremely important (congestion pricing)
How will new mobility/technology impact curbspace management?	don't know if it will have huge impact to/from UBC since not many people already park on the street allocating road space for ride hailing so they have pickup/dropoff on campus curbspace management is a driver for "around campus" use general delivery/service pickup is significant
What should the UBC network strive to offer or be? (e.g., goals, values, etc.)	Resilience of the network, ability for it to overcome huge shocks (transit strike) Ability to telecommute/virtually attend class Obviously sustainability - need to shift away from SOVs Sustainable network is by default a healthy network Healthier well-being component Affordable - if you want to build a road or have manual labor on campus its charged at a premium
Potential Question | Has on-campus travel monitoring improved since the adoption	on campus cycling nice to carve out desire lines to determine behaviors and potentially shift behaviors

of the Transportation Plan. If so, do you know what data is monitored regularly? Would we be able to access this? (E.g., volumes, mode share, injuries/collisions)	to/from campus (Stanford TDM plan is good reference - they did big review of how people are getting to campus and investigated how to shift behaviors) testing interventions and see what might work, but also need funding, capacity, and will to implement changes biggest barrier to monitoring/data collection - resourcing, many other priorities on this campus, especially when we already have exceptional mode splits to campus; need to big a really big drive Stanford built shuttle from regional transit facility to campus Stanford has stronger regulatory environment (requirement - no new net vehicular trips) 155k trips to/from campus at UBC

Additional notes:

interesting to have a shift in assumptions as to where people live and impact on cycling/walking to campus

new mobility means different things for different communities - “how people get served” should be the ground level thinking

microtransit - ability to bring people to other modes

INTERVIEW FIVE

Interviewers: Henry Kosch and Alli Henry
Interview Date: November 19, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
UBC is uniquely positioned to plan and prioritize transportation modes to manage their desired capacities and influence travel behavior.	UBC's transportation and land-use policies are lagging behind current technology. Mass movement by active transportation is limited by UBC's geography (hill), weather and land-use surrounding campus.	Implementing mobility pricing could have major impacts on influencing travel behaviors and/or demand. Introducing an integrated rapid transit system on campus could adequately accommodate future demand.	Due to AVs current technological limitations (i.e. predictability), various safety challenges and/or implementation barriers remain related to integrating AVs into the built environment and/or mixing modes. Growing lobbying power of private/tech mobility companies.

Interview Summary

Interview Question	Response
How can we plan for a network that is resilient to different kinds of futures?	What we plan/build will impact travel behaviors. Factors to consider: - Mobility pricing will have a major impact on travel behavior and demand. UBC should support regional pricing policies. - Automation of elevators historically changed the transportation/building industry. - Climate change/natural disasters/weather events likely will only have minor impact on UBC's planning. - Reducing travel lanes and parking capacity on campus, will help move UBC towards their sustainability goals. - AV won't have a major impact on future mobility. - UBC can plan and prioritize modes to manage their desired capacities. - The region and UBC's future transportation planning will impact housing affordability. - Better regional transportation connectivity could help UBC. - UBC is considering short-term approach (housing subsidies) and long-term approach (development of "affordable" faculty housing on UBC's land).
What are the current challenges and/or network gaps for UBC's transportation system across each mode? (e.g., walking,	UBC's current transportation systems three main functions: 1. Circulation campus (peak periods) a. Movement from new station/transit hubs will need to be considered. Light mobility will need to be provided. These

cycling, transit, driving, over-sized vehicles)	modes won't be as helpful in addressing peak commute times. b. Shuttle service to/from transpo hubs could be helpful. c. Micromobility increases could increase pedestrian conflicts (i.e. perception and comfort, not safety) d. CCP doesn't prefer to separate modes and facilities. 2. Internal movements in respect to populations within campus 3. Limited transit service within campus / regional transportation infrastructure a. Impacts livability, recruiting/retention of faculty b. Housing affordability A future that prioritizes personal vehicles won't work due to sustainability, economic and built environmental challenges. Transit needs to be the preliminary transpo mode to accommodate future demand. Must be true/integrated rapid transit. Mass movement by active transportation is limited by the hill to UBC, weather and land-use surrounding campus. Regional Transportation Coordination - Need for more collaboration between UBC, city, provincial networks and land-use.
(Levels of service) If this high number of people are getting off here, and needing to walk/move there, what should we think about?	In a future with rapid transit stations, safe and comfortable pedestrian design will need to be prioritized. Design should minimize pedestrian conflicts arriving and departing from the stations. Encourage biking on campus, by building large-scale bike parking facilities to provide folks with more active transportation mobility on campus. If rapid transit increases on campus, bus service will decrease. In the future there may need to be shuttles running within campus to improve circulation on campus. When planning for vehicles, you want to encourage a mix of shared vehicles, rideshare/hired and private vehicles. All private vehicles would be in parking garages. Curb-space could offer loading/unloading zones for rideshare and carshare. Need for more AAA networks to/from and within campus.
What gaps do you see possibly emerging in the future with respect to UBC's current transportation policies?	Policy is already lagging technology. BC has benefited from delaying allowing new tech to operate. Now they're able to learn from other cities. At a provincial level, would they mandiate adoption of AV? AV won't be adopted until the technology is able to address ped/bike predictability issues. It normally takes 15 years to adopt new vehicle trends. Keeping this in mind, we could have 80% AV adoption. Travel behavior could limited "shared" AV usage.

	AV tech won't have a big impact on private vehicle vs. shared use.
Will autonomous vehicles lead to an increase or decrease in active modes of transport?	AV won't be huge impact. People are less comfortable. Vehicles will be driven more safely. They're going to stop at stop signs, which would be more comfortable for cyclists. Automotive industry has strong lobbying power. A lot of government rolls over very quickly for industry. To increase sales of AV, it is possible that they could convince government.

INTERVIEW SIX

Interviewers: Rose Southard and Henry Kosch
Interview Date: November 20, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
C+CP ensure slope is less than 5% on the pedestrian core and other commitments to retrofitting public realm for accessibility Accessibility standards in place	Getting to campus with crowding on transit. Current lack of capacity, especially for those with disabilities (visible and invisible) On campus issues with pedestrian spine and bus loop on the perimeter of campus Safety issues in pedestrian spine with cyclists and delivery vehicles Inconsistent wayfinding on campus	Possible lead standard for accessibility on campus might be adopted Accessibility shuttle pilot Improved wayfinding software and geospatial data could make personalized routes more possible to meet individual mobility needs	Rise of delivery means more "service" drivers on campus who aren't trained to respect accessibility reqs and aren't accountable as independent contractors Rise of delivery means more pressure on road network/loading zones along campus peripheral Elimination of surface parking with infill makes accessibility harder for people with mobility issues, wheelchair auto often don't fit in parcades Constant construction means perpetually changing landscape that is hard to navigate for disabled users

Interview Summary

Interview Question	Response
What do you think are some of the key accessibility challenges on campus?	getting to campus - crowding on current transit, lack of capacity, mobility disability - wheelchair users - get passed up at bus stops People that need a seat - difficult to get a seat even with designated seats, disability not obvious. Crowding - people with certain mental health concerns. being that close to people is hard Push away from traffic on campus - not a lot of services, handy dart is unreliable for timing so not good for students.

	Bus loop on perimeter - doesn't get you to academic core, issue is getting to the pedestrian core of the campus. Academic core is pedestrian-only zone. Safety perspective - no vehicles on some parts of main mall anyway. Accessibility shuttle created for people that can't walk long distances to get people into core. Not door to door, still challenges for getting around on campus. Biggest in canada, one of the biggest in north america. If you can't walk it is not ideal. too big. Need for large classrooms, cannot count on just having classes in one precinct. Timing between classes. To be really effective - provide people with timely transpo that would allow them to go where and when they want. Would need to be a circuit with more shuttles. currently on demand, call ahead, runs on designated stops - can't drop off anywhere. Get to stop to use. 3rd year of pilot - different scenarios tried, on demand was tried but difficult. 5 days a week, sometimes weekends for events. safewalk takes over after hours. Gaps in terms of hours, gaps in terms of pedestrian core, PC is difficult to tackle.
How would you describe the current state of trip facilities/amenities on campus? (e.g., lighting, weather protection)	Positive - public realm - helpful C+CP ensure slope is less than 5% on the pedestrian core. Coming from 1st year residences is a hill - redone public realm to ensure a lower grade. manual wheelchair users can get up hills, plus seating along all the pedestrian pathways. as the crow flies pathways, cut across space - can't walk long distances identified shorter ways to go intuitively. Challenges - vehicles in pedestrian core. if you can't see or hear. relying on it to be a safe zone and it isnt always. bicylces, long boards, cause safety concerns. Higher speed than foot traffic and hard to get out of the way for some poeple. Sometimes tensions between what works for one community and what works for another Wayfinding consistency - tactile notification at curb cuts. Great for people that can't climb a step. Wheelchair, stroller - good. Doesn't give tactical notification for blind/low vision. Can't tell between sidewalk and road. Wayfinding/mobility training would be easier over time. inconsistency from different approaches over time. Best practice in accessibility is color contrast but doesn't work for everyone with low vision
What gaps do you see possibly emerging in the future with respect to UBC's current transportation policies?	Esp with infill - brock, ponderosa commons - huge benefit but take away all surface parking. If you can't rely on pub transit or walk long distances then being able to park close is essential. Wheelchair users vehicles wont fit in parcade. Fill in more and more - simple things like parking become an issue. Flip is more people living on campus and more people not traveling to campus. Priority placement for people with disability, housing on campus. Low barrier to participation. Construction not improving in future - creates transpo challenges with changing routes and travel routes are switched overnight paved to gravel, potholes.

	Continue down path to improving public realm and campus navigation, this is improving. Better maintained - tree roots. There will be a need for more of an integrated transpo service in the pedestrian core - AVs, car to go,
How will new mobility/technology impact the built environment and/or wellness?	Wayfinding software- improved tech means better data around geospatial data, big improvement is tech or apps allowing you to plan a taylored route to your needs. Wheelchair accessible, low stair, grade, etc. No capacity for people to design that route for themselves, exhausting for people to find what they need. Washrooms even - shortest route, hours, etc. Geospatial data is currently housed in multiple systems that don't speak to one another and is owned by different people/departments. Private buildings have their own data as well. Apps that do that rely on good data and we don't have it.
Thoughts on autonomous vehicles and other emerging technologies?	*interesting possibilities in terms of transpo in the pedestrian core. How to navigate people? Allow a lot more independence for people with disabilities who can't drive. A lot of the reliance on supports would disappear.*
How will new mobility/technology impact curbspace management?	One challenge building student housing so close to the pedestrian core. Ex brock annex coming down for brock commons with housing food services, etc like ponderosa and orchard. More in pedestrian core so it doesn't allow for delivery and uber etc. Pushed to outer core of campus leads to frustration or too many vehicles. Courier vehicles are service - don't have an understanding of accessibility. Block accessibility infra. Going to get worse with development. Owner operated services - uber etc - no employer that is training the drivers. Increasing demand for those services and no accountability for drivers in the pedestrian core. Contract drivers have no ID, accountability. How to hold company accountable? Clear addresses another issue - no proper canada post address so people can't get packages.
What long term goals are set for the campus in future? (e.g., 0 emissions by 2050, we can then backcast)	Recanson foundation? and canadian builders - create lead standard for accessibility. Looking at whether or not UBC should adopt. Commitment to universal design. Group of architects looking at cost of doing that - how many things are just thoughtful design that don't cost anything? Audited 10 buildings using that standard - how they rank and what needs to be done. May not be a way to address accessibility without tearing down the building. Historic buildings - cecil green, no elevator. Math building.
Potential Question |What are, or should be, planning aspirations for the UBC campus?	*Design the campus so that all members can get where they need to be independently with dignity. Design takes into account all of those needs. Would involve more robust way to move about the pedestrian core if you can't walk long distances.*

Additional notes:

Broadway extension - if accessible will allow for more regular schedule, allow for people to more easily get to campus when they need to. Less pressure for living on campus. Traffic is bad and buses can't run on schedule. Same issues around crowding as bus.

INTERVIEW SEVEN

Interviewers: Allison Henry, Henry Kosch
Interview Date: November 25, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
The current structure of the table could make it relatively easy to create objectives and an evaluation framework, including for land use The current table has around 10 objectives, as the optimal number is between 6 - 10	The project team might not be best suited to determine scale of impacts within matrix	Ask C+CP which criteria are important, and how would they rank these Ask C+CP whether objectives should be brought to the workshop, or if stakeholders should develop their own there Having stakeholders develop their own objectives can create a sense of ownership To make small, incremental changes that either allow course to still be changed orcan build enthusiasm, which is needed for big changes	Not having UBC stakeholders develop their own list of objectives with weighting Assuming that Metro Vancouver and UBC have the same objectives Scenarios have uncertainty as they are based on external drivers

Interview Summary

Interview Question	Response
Review and provide feedback on draft scenarios and/or graphics?	The current table of the different scenarios and their characteristics looks like a consequence table, which are related to objectives. For instance, we want short trip lengths and equality. In theory you would want to make sure that the UBC stakeholders come up with this list of objectives, or at least can agree upon it. The project team needs to make clear that this has been adapted from Metro Vancouver and is not their own. The project team will need to say we took this and added this. Wouldn't assume that UBC has the same objectives as Metro Vancouver. So you could either 1) Say here are the Metro Vancouver objectives, do we like them? Would we add or subtract something?

	SDM talks about the importance of making sure the indicators are being driven by the stakeholders, and that the results in the matrix are then informed by the experts. In this case, the project team are the experts, but you might not necessarily know the results. The project team needs to ask C+CP if these criteria are appropriate. Tell C+CP where these came from, making sure that these are the objectives that you care about. This should be done before the workshop. At the mini-pre-workshop, C+CP staff can be asked how they want to rank these objectives, and/or possibly place weights on them.
When planning for uncertain futures, suggested structure decision making approaches, tools and/or software? *Example - SCARP faculty is planning for an uncertain future, any tools/activities you've found useful at TLC?* Suggestions and/or feedback on potential workshop tools/activities. *Example - Exercise to prioritize mode share under each scenario?* *Example - Exercise to create and/or provide feedback for proposed draft networks.*	Part of the way to handle uncertainty is to be clear that these are best guesses. Why is it uncertain? Because of these external drivers that you then show. If one of these drivers were to change, it would mean these other factors then may change. The downside is, the more we go in that direction, the less value there is to plan for the long-term. But then the value might be to get people together and to agree on a set of objectives. Need to get people to put in time to ranking these objectives. This would help get them to think that they had a piece in it. Need to think about uncertainty, and if this thing happened that we didn't expect, then that might shift us from this scenario to that scenario. An option is to ignore these objectives, and come to some process as to how they want to evaluate these scenarios. The project team would then provide an example of criteria. Ask the client if they think it would be better to come in with a draft set of objectives for people to react to, or if people should come up with objectives themselves. Ask the client which approach would work better. Alli: Is there a benefit in having people at workshop grouped? For instance, maybe one group reacts to existing list of objectives, and another group develops their own? The option partly depends on how many different stakeholder perspectives you have in the room (e.g., students, faculty).
How do we create an evaluation framework that is appropriate to compare these four scenarios against each other?	Part of me thinks that an objective might be to "increase active transportation" then for each of the scenarios you might have low, moderate, or high. If we rank or prioritize objectives, then that would help create the evaluation framework. For land use, you would want to know which of these objectives impacts land use, and if so, how and in what way. Then you would have a better sense of how these objectives would be relevant to land use. This option is to add more rows for each objective and have them related to land use. For instance, if private vehicles were to go up, what would this mean for land use?

	Or, you might need a separate set of land use objectives that could then be evaluated against each scenario. Also be mindful of the total number of objectives. You probably want to have between 6 - 10. Depending on which approach is taken, some of the current objectives could be dropped. But we are not in a position to do this, since we're not the stakeholders. We're not in a position to say what matters.
How can we plan for a network that is resilient to different kinds of futures?	What is C+CP's concern of what would happen if they didn't do this work now? They have mandate, but why do we think we have to? The answer to this question might be that we make plans so we can be less unresilient, but we can never guarantee that work is relevant. The more uncertainty there is, the wider the range of outcomes, the more you need to make small incremental changes, try them out, see how they work and what happens, then respond and shift as needed. This allows yourself to be adaptable, avoiding mistakes that you cannot undo. Need to focus on changes that have high feasibility, best bang for your buck, easy to do, and you get a lot out of it. Once you get something small done, it then builds the enthusiasm that's needed before taking on the more difficult stuff.

INTERVIEW EIGHT

Interviewers: Rose Southard, Alli Henry, Henry Kosch
Interview Date: November 26, 2019

Interview SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
UBC is uniquely positioned to holistically plan for future transportation and land-use needs. UBC's long-range planning efforts can help influence travel behaviours and/or help prioritize modes.	Current levels of transit funding and capital improvement spending are limiting service to/from campus. Spending would significantly need to increase in order to meet UBC's projected future demands.	Transition UBC's Vancouver Campus to a "whole community" rather than a "commuter campus" by promoting mixed-use developments. The introduction of Sky Train on campus will help address UBC's current capacity and transit network to and from campus.	Uncertainty of federal funding sources could impact future transit utilization and/or public infrastructure spending. Due to AVs tech limitations, pedestrian safety will need to be further addressed and/or modes may need to be physically separated.

Interview Summary

Interview Question	Response
What are the current challenges and/or network gaps for UBC's transportation system across each mode? (e.g., walking, cycling, transit, driving, oversized vehicles)	The biggest gap currently is capacity of transit network to and from campus - hopefully being addressed by sky train extension By 2050, there will be a fundamental shift in what ubc is as a community,l transitioning from a commuter campus to a mixed-use community, that is also activated 24/7 and has travel in both directions.. Transport needs are going to shift towards meeting daily needs.
What gaps do you see possibly emerging in the future with respect to UBC's current transportation policies?	infrastructure and investment gap - we will be thinking of ourselves increasingly as a city, with city transportation challenges. The line is going to increasingly blur between academic and neighborhood areas. Different policies won't be possible.
How will new mobility/technology impact the built environment and/or wellness?	Movement in the shared mobility space and automation space are going to blur together. All of these new modes will need space to operate and be stored, which also does not fitour current mold of space allocation. The scale is going to be much bigger in the future - automation, more vehicle types, and range continuing to grow.

	We will need to figure out how to manage space in a dynamic way while also mitigating impacts, which will be challenging
Thoughts on autonomous vehicles and other emerging technologies?	The near term opportunities are automation of specific corridors , with people on transit, moving in a controlled environment that easy to program. Due to AVs tech limitations, pedestrian safety will need to be further addressed and/or modes may need to be physically separated.
Beyond Millennium Line Extension and RapidBus, could you foresee any other large capacity transit infrastructure in the distant future?	yes - reality of challenges is that the level of investment in transit needs to be much higher. Our investment in transit infrastructure needs to triple. Within the 2050 timeframe, LRT on 41st is within the realm of possibilities.
Possible Question: How could different levels of federal funding affect the future transportation network?	There is a positive trend with the recent election. It's hard to know, but transit investment is likely to move forward, with greater potential for a transit investment fund, instead of the current process of project by project investment

APPENDIX B: CHARACTERISTICS OF POTENTIAL MOBILITY FUTURES

The chart below was developed to help describe and identify the divergent but plausible scenario characteristics that may influence mobility trends for the year 2050. Within a subjective UBC context, the information presented below was adapted from Metro Vancouver and TransLink's Regional Long-Range Growth and Transportation Scenarios, and informed by the project team's consultative stakeholder interviews as well as preliminary research and analysis.

This chart is not intended to offer a preferred future and/or suggested hierarchical ranking. The Project Team used this as a tool to better understand the conditions and uncertainty that UBC may be planning within. It was intended that at a high-level, this model could aid the project team in our understanding of how the wider future for UBC may develop, which may help inform the later steps of policy and action development.

	HIGH AUTOMATION/ PRIVATE	HIGH AUTOMATION/ PUBLIC	LOW AUTOMATION/ PRIVATE	LOW AUTOMATION/ PUBLIC
income inequality	worsens	improves	worsens	no change
daily travel demand	high	high	low	low
trip length	high	high	low	low
level of autonomous passenger vehicles	high	moderate	moderate	low
mode share: private motorized	high	low	moderate	moderate
mode share: public transit	low	high	low	high
mode share: active transportation	low	high	moderate	low
federal government funding	low	high	low	high
regional distribution of housing	more dispersed	more concentrated	no change	more concentrated
campus distribution of housing	more dispersed	more concentrated	no change	more concentrated

APPENDIX C: WORKSHOP PACKAGE FOR PARTICIPANTS

Modes	Current Data	2050 Targets	Capacity / Levels of Service	Public Realm Implications
Walking	65% of intra-campus trips[1] 19,500 intra-campus trips per day[1] 0%[1] - 0%[2] of trips to/from campus 400[1,3] - 700[2] trips to/from campus per day ● AM Peak Hour[2] ○ WB: 51 ○ EB: 26 ● PM Peak Hour[2] ○ WB: 59 ○ EB: 50	At least 2/3 of all trips to/from campus made by walking, cycling, transit; maintain at least 50% of all trips to/from campus on public transit[4]	Pedestrian Levels of Service[5] A: <16 ped/min/m B: 16-23 ped/min/m C: 23 - 33 ped/min/m D: 33 - 49 ped/min/m E: 49 - 75 ped/min/m F: >4,500 ped/hr/m OR A: <960 ped/hr/m B: 960-1,380 ped/hr/m C: 1,380-1,980 ped/hr/m D: 1,980-2,940 ped/hr/m E: 2,940 - 4,500 ped/hr/m F: >4,500 ped/hr/m	● Safety (Real and Perceived) ● Prioritization of Active Transportation Modes (walking, cycling and transit) ● Directness between origin and destination ● Connections to key activity centers and transportation nodes

Modes	Current Data	2050 Targets	Capacity / Levels of Service	Implications for Public Realm
Cycling	14.0% of intra-campus trips[1] 4,200 intra-campus trips per day[1] 1%[2] - 4%[1] of trips to/from campus 2,100[2] - 6,400[1,3] trips to/from campus per day ● AM Peak Hour[2] ○ WB: 307 ○ EB: 26 ● PM Peak Hour[2] ○ WB: 46 ○ EB: 310	At least 2/3 of all trips to/from campus made by walking, cycling, transit; maintain at least 50% of all trips to/from campus on public transit[4]	N/A	● All ages and abilities network (physical separation preferred) ● Prioritization of Active Transportation Modes (walking, cycling and transit) ● Directness between origin and destination ● Connections to key activity centers and transportation nodes ● Minimizing gradient changes

Modes	Current Data	2050 Targets	Capacity / Levels of Service	Implications for Public Realm
Transit (including paratransit)	4.9% of intra-campus trips[1] 1,500 intra-campus trips per day[1] 46%[1] - 53%[2] of trips to/from campus 75,400[1,3] - 76,600[2] trips to/from campus per day ● AM Peak Hour[2] ○ WB: 5,809 ○ EB: 763 ● PM Peak Hour[2] ○ WB: 1,708 ○ EB: 6,001	At least 2/3 of all trips to/from campus made by walking, cycling, transit; maintain at least 50% of all trips to/from campus on public transit[4]	Millennium Line capacity: 7,500[6] - 26,000[7] passengers per hour per direction (pphpd) LRT capacity: 3,600[7] - 7,200[7] pphpd BRT capacity: 3,000[7] - 4,400[8] pphpd Articulated bus capacity: 120 persons[9] (e.g., 15 min headway = 480 pphpd) Standard bus capacity: 80 persons[9] (e.g., 15 min headway = 320 pphpd) Community shuttle capacity: 24 persons[9] (e.g., 15 min headway = 96 pphpd)	● Prioritization of active transportation modes ● Presence of bus loading/unloading zones ● Presence of layover facilities for busses and drivers ● Pedestrian and cycling-supporting facilities ● Stop placement and spacing (coverage and accessibility vs. speed) ● Directness between origin and destination ● Connections to key activity centers ● Minimize noise pollution and air quality impacts

Modes	Current Data	2050 Targets	Capacity / Levels of Service	Implications for Public Realm
Micro-mobility	30,000 trips using bike-share (Aug. 2018 - Jun. 2019)[10] ● Equivalent to approximately 98 trips per day University Neighbourhood residents usage of bike-share[11]: Never: 81% 1-3 times/semester: 9% 1-4 times/month: 7% 1-4 times/week: 3%	N/A	N/A	● Prioritization of Active Transportation Modes (walking, cycling and transit) ● Curbspace Management (corrals, dock vs. dockless stations etc.) ● All ages and abilities network (physical separation from pedestrians preferred) ● Directness between origin and destination ● Connections to key activity centers and transportation nodes ● Minimizing gradient changes

Modes	Current Data	2050 Targets	Capacity / Levels of Service	Implications for Public Realm
High Occupancy Vehicles (including carpooling, car-share and ride-hailing)	5% of intra-campus trips[1] 1,400 intra-campus trips per day[1] 10%[1] - 11%[2] of trips to/from campus 16,700[2] - 16,800[1,3] trips to/from campus per day ● AM Peak Hour[2] ○ WB: 545 ○ EB: 365 ● PM Peak Hour[2] ○ WB: 417 ○ EB: 1,083	N/A	N/A	● Prioritization of Active Transportation Modes (walking, cycling and transit), over HOV and SOV ● Encourage HOV vs. SOV (priority parking and TDM strategies) ● Safety (real vs. perceived) ● Minimize noise pollution and air quality impacts

Modes	Current Data	2050 Targets	Capacity / Levels of Service	Implications for Public Realm
Single Occupancy Vehicles	11% of intra-campus trips[1] 3,400 intra-campus trips per day[1] 34%[2] - 40%[1,3] of trips to/from campus 49,600[2] - 66,000[1,3] trips to/from campus per day ● AM Peak Hour[2] ○ WB: 2,956 ○ EB: 1,310 ● PM Peak Hour[2] ○ WB: 1,558 ○ EB: 2,416	Reduce SOV travel to/from campus by 20% from 1996 levels; maintain at least 30% reduction from 1997 levels in daily SOV trips per person to/from campus[4]	N/A	● Prioritization of Active Transportation Modes (walking, cycling and transit), over HOV and SOV ● Discourage SOV (parking limitations and TDM strategies) ● Safety (real vs. perceived) ● Minimize noise pollution and air quality impacts

[1] TransLink, 2017 Trip Diary (to/from UEL)
[2] UBC Vancouver Transportation Status Report, 2018 (to/from UBC Vancouver)
[3] Inter-campus trips doubled as TransLink Trip Diary Data omits trips to UEL. Assumed non-campus residents only take single trip to and from campus. All other UEL to UEL trips are done by campus residents.
[4] UBC Transportation Plan (2014)
[5] U.S. Department of Transportation, Capacity Analysis of Pedestrian and Bicycle Facilities. 1998
https://www.fhwa.dot.gov/publications/research/safety/pedbike/98107/section3.cfm
[6] Expo and Millennium Line Upgrade Program, TransLink https://www.translink.ca/Plans-and-Projects/Rapid-Transit-Projects/Expo-and-Millennium-Upgrade-Program.aspx
[7] UBC Line Rapid Transit Study: Phase 2 Evaluation Report, 2012
https://www.translink.ca/-/media/Documents/plans_and_projects/rapid_transit_projects/Millennium-Line-Broadway-Extension/alternatives_evaluation/UBC_Line_Rapid_Transit_Study_Phase_2_Alternatives_Evaluation.pdf
[8] 41st Ave Rapid Bus, City of Vancouver https://vancouver.ca/streets-transportation/41st-ave-rapid-bus.aspx
[9] TransLink Fleet Pictorial, 2012 https://www.translink.ca/-/media/Documents/plans_and_projects/expansion_upgrades/Fleet%20Pictorial.pdf
[10] UBC Campus Bike Share Pilot Survey Summary Report, 2019
[11] UBC SEEDS Study: Bicycle Share's Effect on UBC Property Trust Residential Bicycle Storage, 2019
[12] Clewlow, R.R., Mishra, G.S. (2017). Disruptive transportation: the adoption, utilization, and impacts of ride-hailing in the United States. In. University of California Davis, Institute of Transportation Studies
[13] Who Uses Ride-Hailing Services in the United States? S. Sikder. Transportation Research Record. 2019.
[14] UBC SEEDS Study: Residential Environmental Assessment Program (REAP): Community Carshare Credit, 2019

Suggested Facilities / Public Realm Considerations

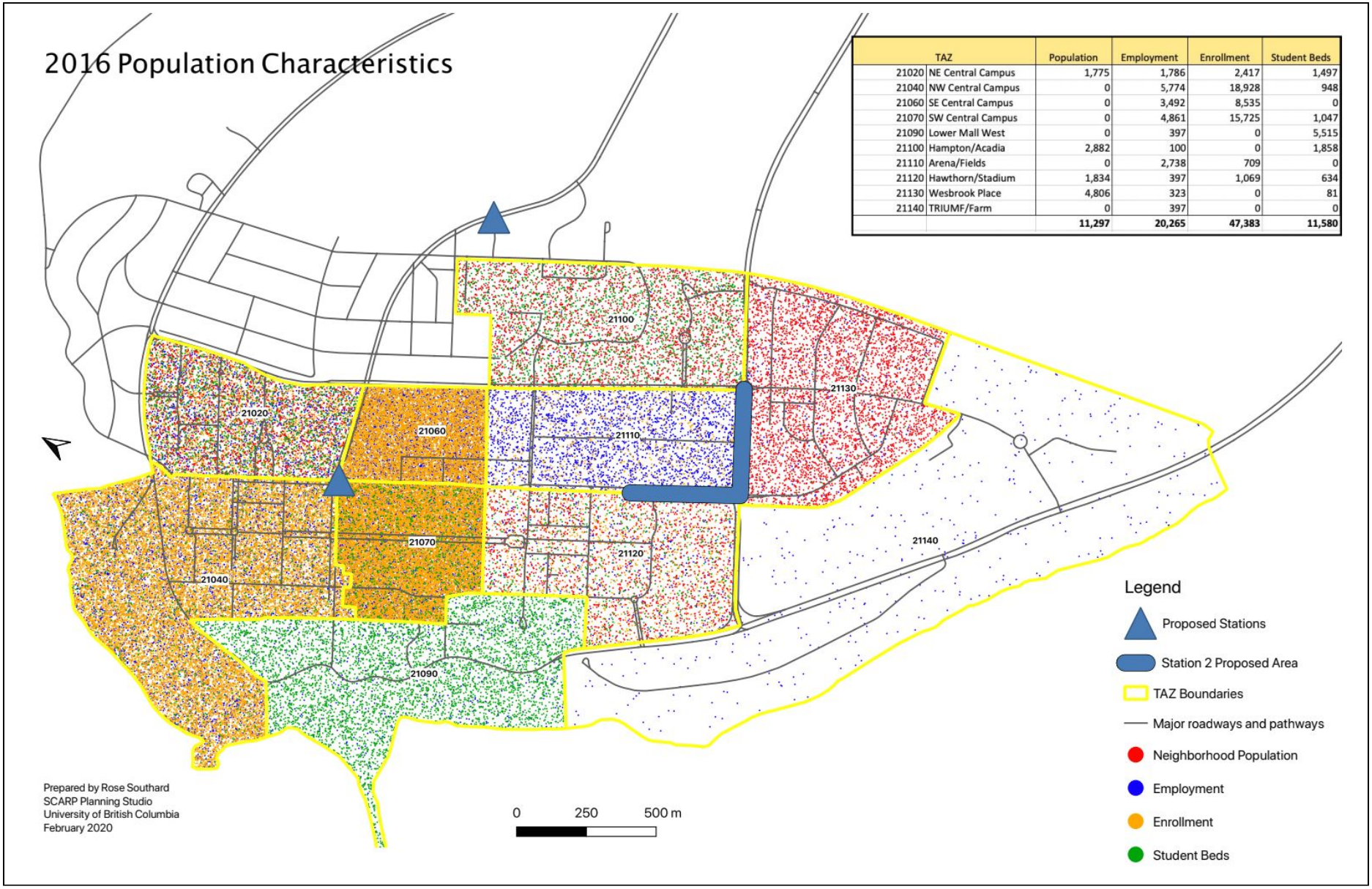
- Parking (e.g., on-street and off-street)
- Curbspace Management / Loading and Unloading (e.g., e-commerce)
- Streetscape elements (e.g., pedestrian, cycling, transit, vehicles and/or micro-mobility)
- End-of-trip facilities
- Oversized vehicles (e.g., waste management, emergency response and various UBC service vehicles)
- Wayfinding
- Operations and maintenance
- General safety (e.g., traffic calming, crosswalks, signalizations, lighting)
- Prioritization of modes
- Accessibility

UBC's Broad Land Use and Transportation Planning Goals

- **Plan for Complete Community**
    - Design compact urban/mixed use development
    - Balance stakeholder needs and desires
- **Sustainability**
    - Prioritize sustainable transportation options
    - Limit SOV usage on campus
    - Eliminate greenhouse gas emissions
    - Promote climate change resilience
- **Connectivity**
    - Strengthen intra-campus connections
    - Enhance connections between campus and the region
- **Liveability**
    - Protect open space networks
    - Create sense of place
    - Support all ages and abilities accessibility
    - Promote wellbeing
- **Financial Feasibility**
    - Maximize effectiveness of past investments
    - Promote cost efficiency in future investment

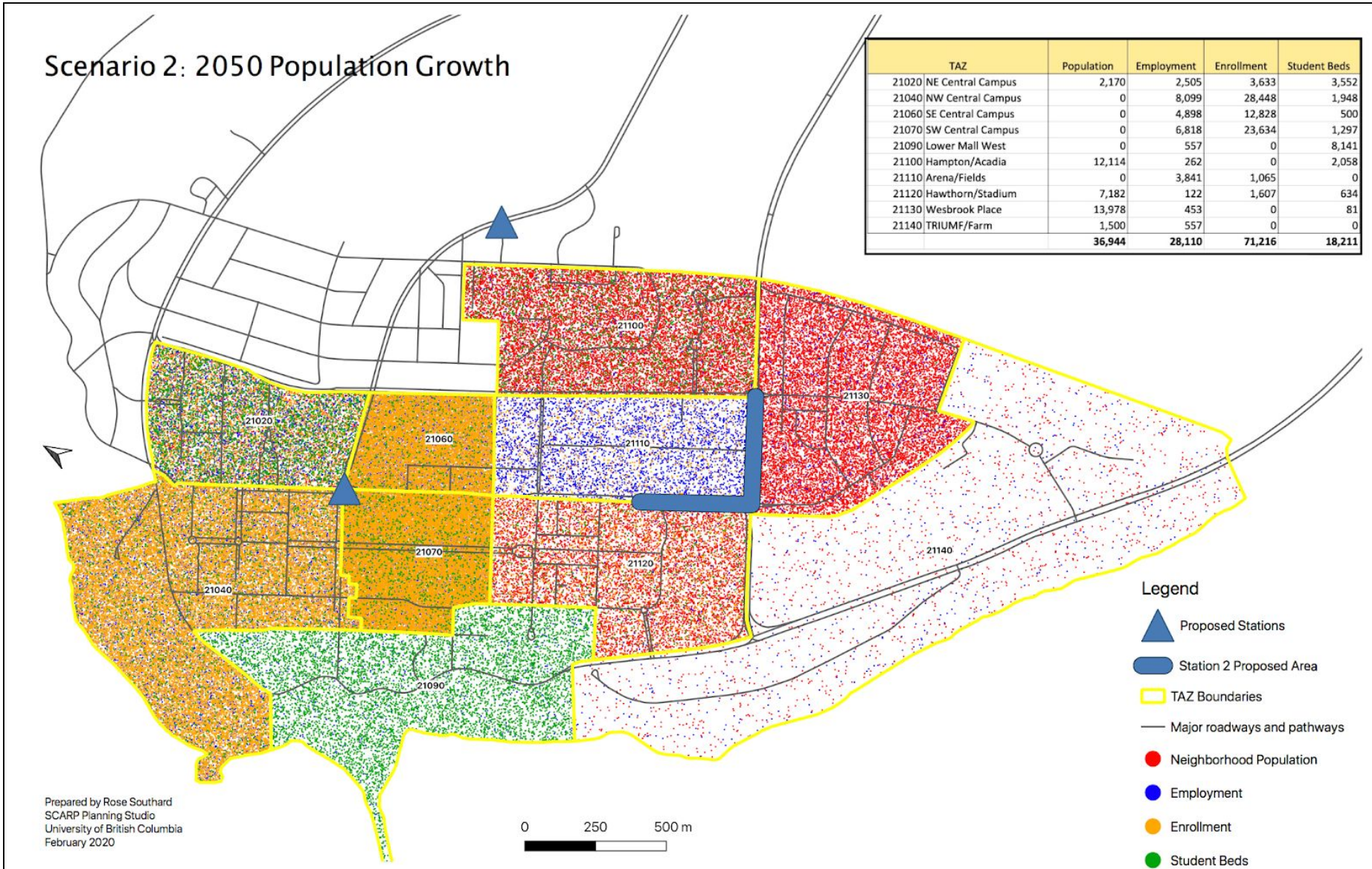
2016 Population Characteristics

TAZ		Population	Employment	Enrollment	Student Beds
21020	NE Central Campus	1,775	1,786	2,417	1,497
21040	NW Central Campus	0	5,774	18,928	948
21060	SE Central Campus	0	3,492	8,535	0
21070	SW Central Campus	0	4,861	15,725	1,047
21090	Lower Mall West	0	397	0	5,515
21100	Hampton/Acadia	2,882	100	0	1,858
21110	Arena/Fields	0	2,738	709	0
21120	Hawthorn/Stadium	1,834	397	1,069	634
21130	Wesbrook Place	4,806	323	0	81
21140	TRIUMF/Farm	0	397	0	0
		11,297	**20,265**	**47,383**	**11,580**



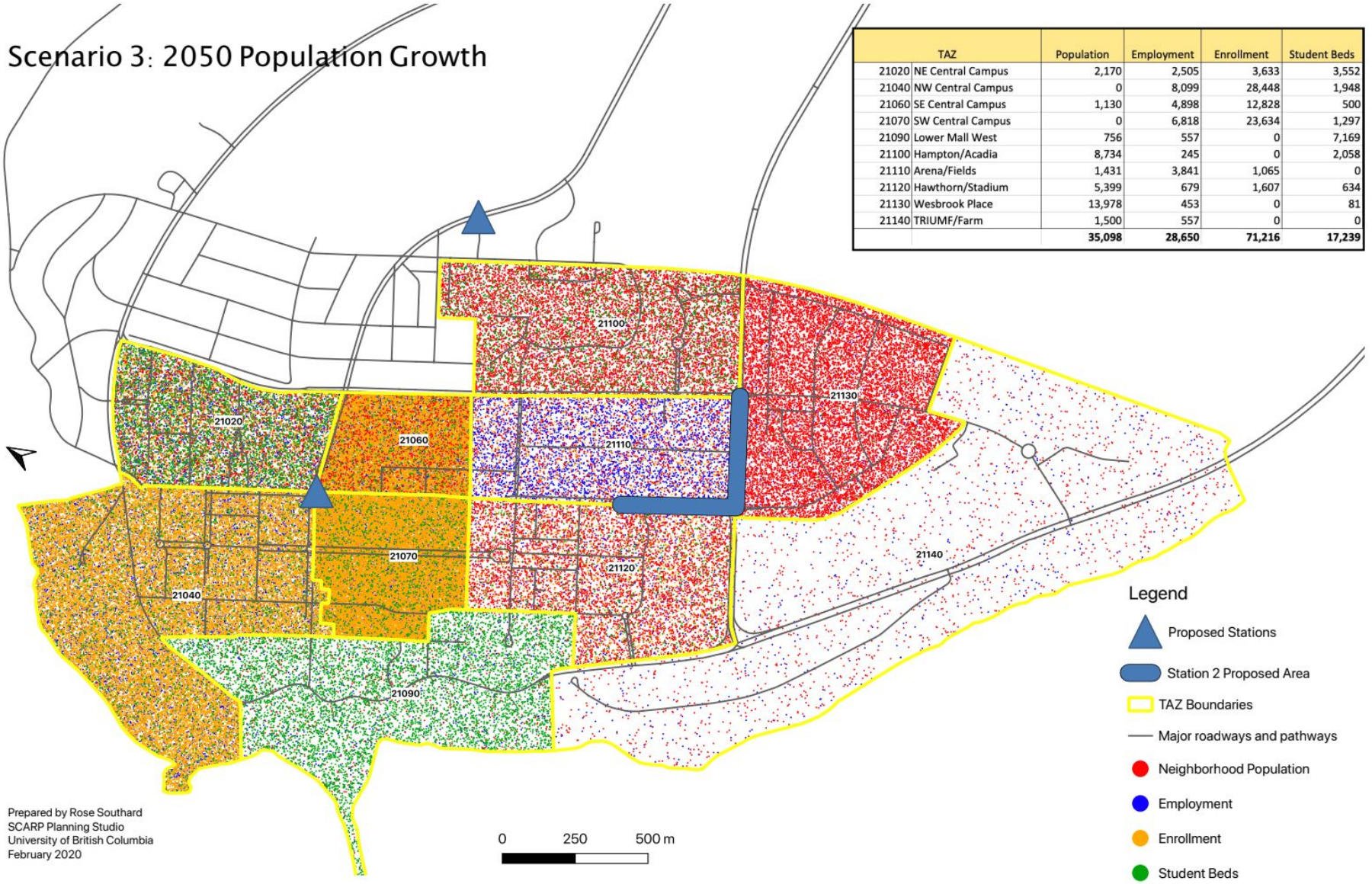
Scenario 2: 2050 Population Growth

TAZ		Population	Employment	Enrollment	Student Beds
21020	NE Central Campus	2,170	2,505	3,633	3,552
21040	NW Central Campus	0	8,099	28,448	1,948
21060	SE Central Campus	0	4,898	12,828	500
21070	SW Central Campus	0	6,818	23,634	1,297
21090	Lower Mall West	0	557	0	8,141
21100	Hampton/Acadia	12,114	262	0	2,058
21110	Arena/Fields	0	3,841	1,065	0
21120	Hawthorn/Stadium	7,182	122	1,607	634
21130	Wesbrook Place	13,978	453	0	81
21140	TRIUMF/Farm	1,500	557	0	0
		36,944	**28,110**	**71,216**	**18,211**



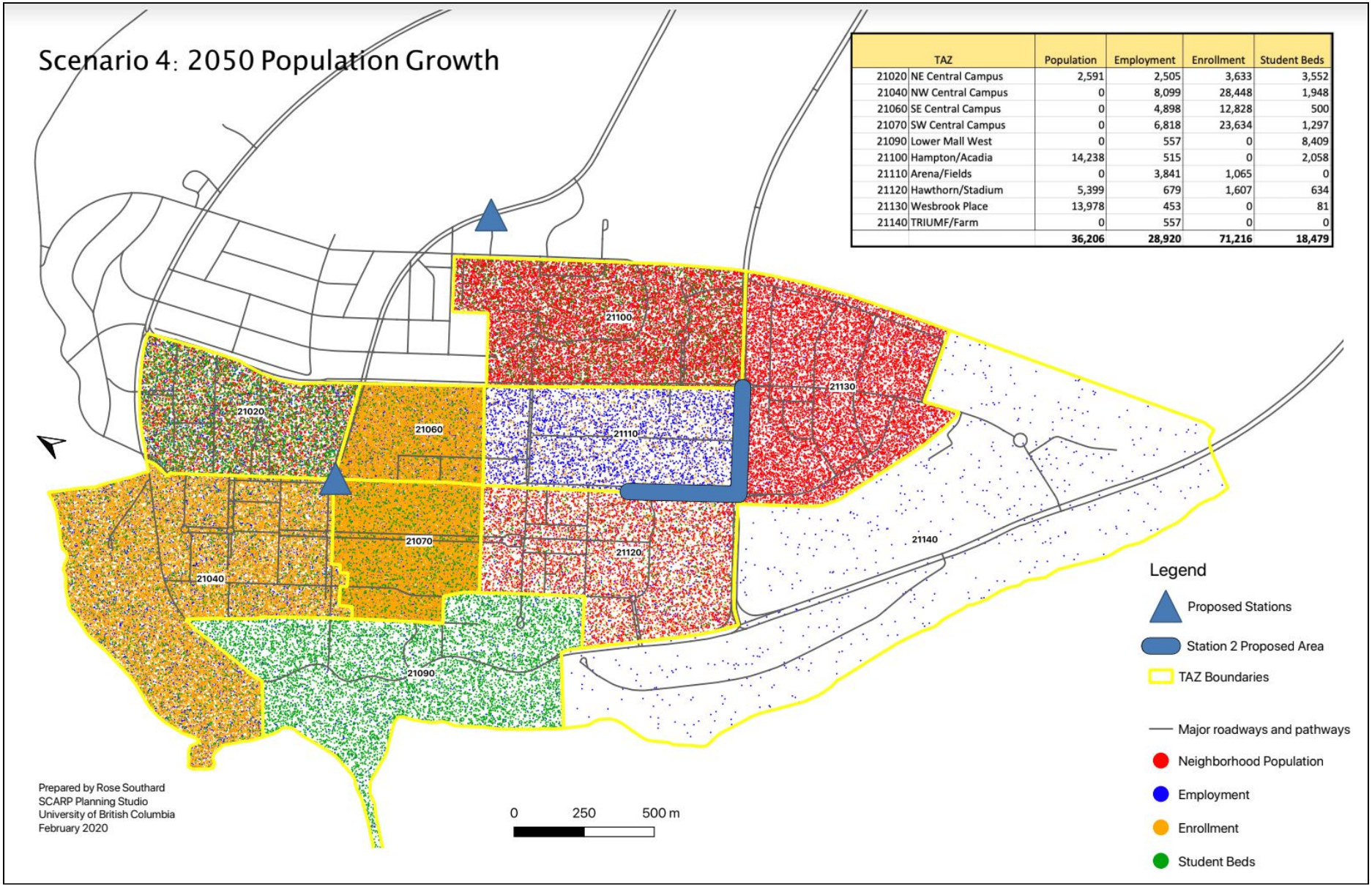
Scenario 3: 2050 Population Growth

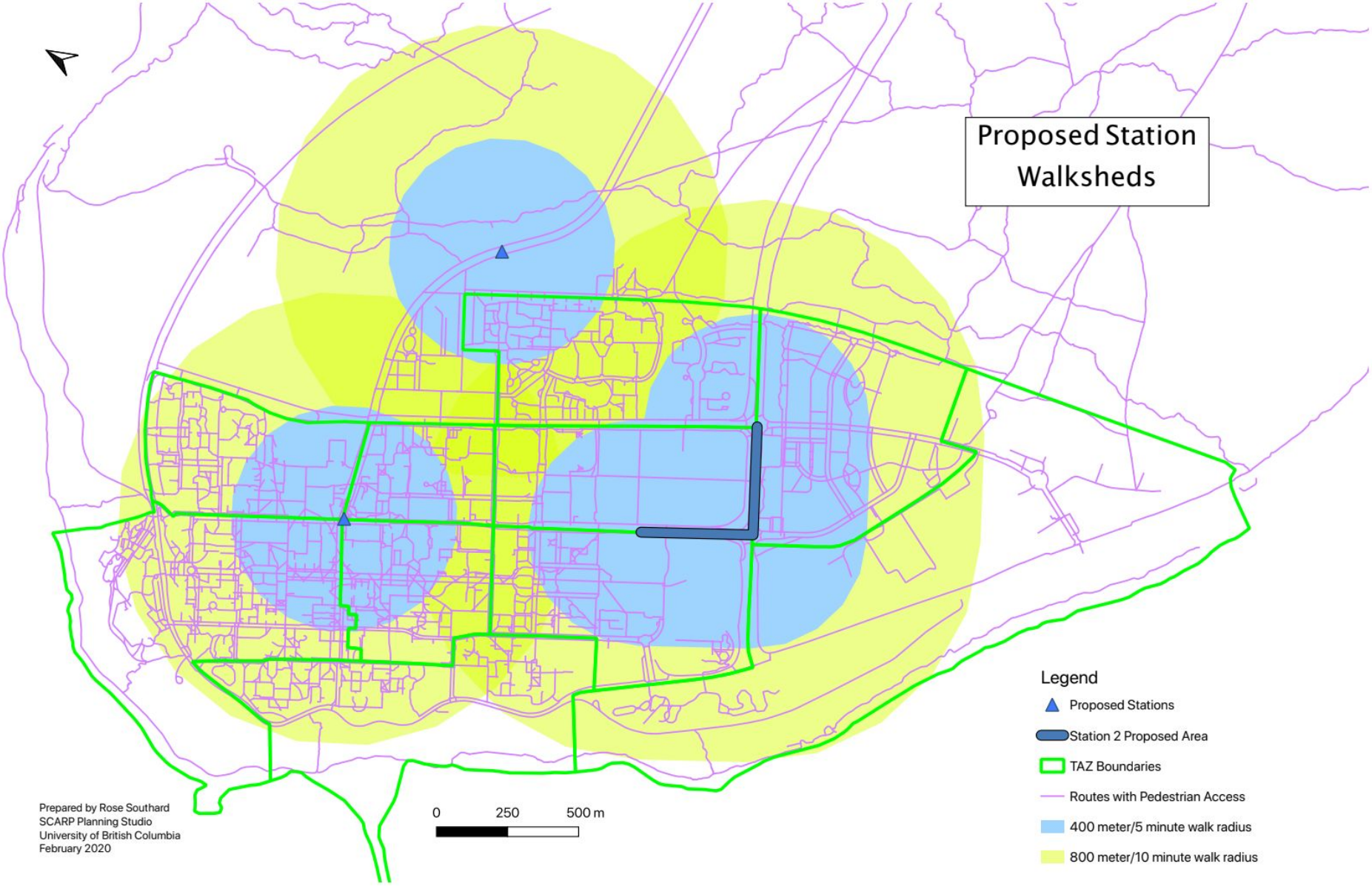
TAZ		Population	Employment	Enrollment	Student Beds
21020	NE Central Campus	2,170	2,505	3,633	3,552
21040	NW Central Campus	0	8,099	28,448	1,948
21060	SE Central Campus	1,130	4,898	12,828	500
21070	SW Central Campus	0	6,818	23,634	1,297
21090	Lower Mall West	756	557	0	7,169
21100	Hampton/Acadia	8,734	245	0	2,058
21110	Arena/Fields	1,431	3,841	1,065	0
21120	Hawthorn/Stadium	5,399	679	1,607	634
21130	Wesbrook Place	13,978	453	0	81
21140	TRIUMF/Farm	1,500	557	0	0
		35,098	**28,650**	**71,216**	**17,239**



Scenario 4: 2050 Population Growth

TAZ		Population	Employment	Enrollment	Student Beds
21020	NE Central Campus	2,591	2,505	3,633	3,552
21040	NW Central Campus	0	8,099	28,448	1,948
21060	SE Central Campus	0	4,898	12,828	500
21070	SW Central Campus	0	6,818	23,634	1,297
21090	Lower Mall West	0	557	0	8,409
21100	Hampton/Acadia	14,238	515	0	2,058
21110	Arena/Fields	0	3,841	1,065	0
21120	Hawthorn/Stadium	5,399	679	1,607	634
21130	Wesbrook Place	13,978	453	0	81
21140	TRIUMF/Farm	0	557	0	0
		36,206	**28,920**	**71,216**	**18,479**




Proposed Station Walksheds
Legend
Proposed Stations
Station 2 Proposed Area
TAZ Boundaries
Routes with Pedestrian Access
400 meter/5 minute walk radius
800 meter/10 minute walk radius
0
250
500 m
Prepared by Rose Southard
SCARP Planning Studio
University of British Columbia
February 2020

APPENDIX D: WORKSHOP RESULTS

Table One - Exercise 1

Proposed Network Map 1

Proposed Network Map 2

Other Notes

Station placement matters if the SkyTrain line will eventually be continuing south down 41st or Marine. The third station should be placed to serve the existing density in Wesbrook Village, however this would limit where the UBC Commons station can be located. Outside the Nest, it is proposed to transform part of the plaza into a Linear Transit Plaza, that would allow an AV shuttle, walking, and cycling corridor with dedicated lanes for uses stretching down East Mall. One fast north to south shuttle service is proposed, as well as one fast east to west. There is also a slow north to south shuttle proposed. There are also dedicated bike lanes for high speed cycling (keep cycling out of pedestrian pathways) and an expanded dedicated pedestrian zone

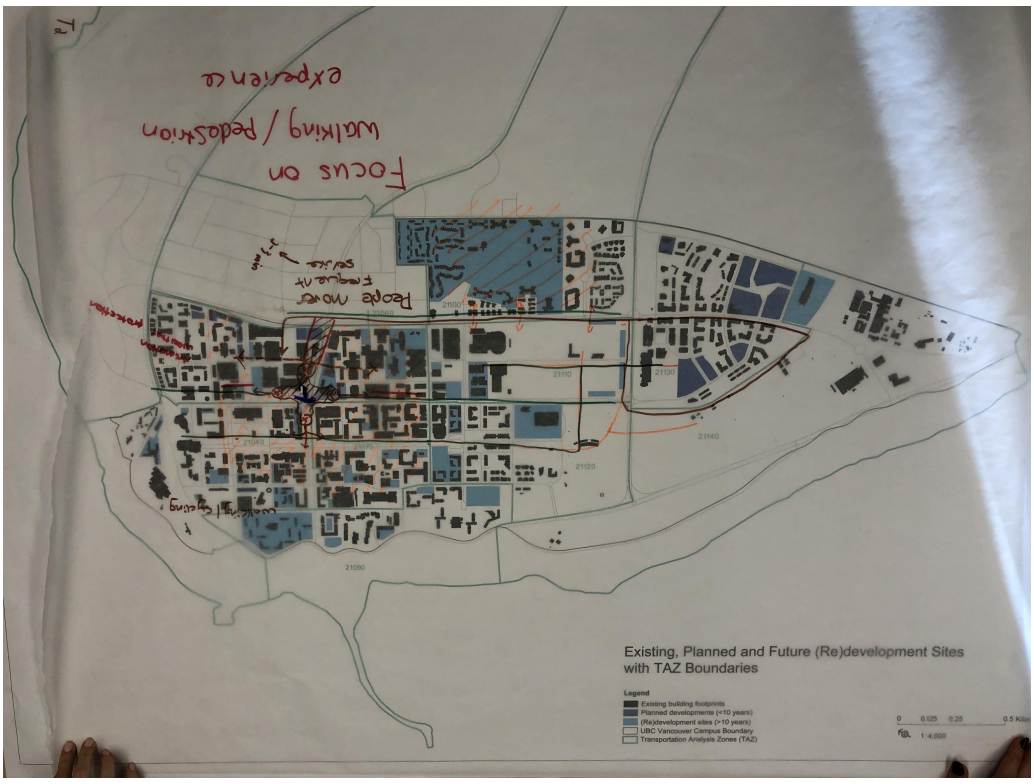
Table One - Exercise 2

Policy Considerations	**Influences/Opportunities**	**Barriers**
Curbspace management to serve new tech (pick up / drop off)	Minimize proximity parking	Incentives to maximize the cost of parking pass. Paying for parking for employees
Continue what works	Pairing bikeshare etc (with rapid transit)	Design considerations for shuttle routes on east mall in front of the rest
Min. general purpose traffic access within intercampus roadways	Intercampus shuttles	Need to continue to serve service vehicles (practical considerations)
Preserve pedestrian spine of campus main mall	5 minute walkability. Transit as part of the pedestrian zone	
HR incentives around sustainable alternatives	University incentivizing transit use	NIMBYism around campus growth and development
Paying for transit pass and + limited parking requirements	Station siting to influence RT investment	Reliance on neighbourhood jurisdictions for delivery of
Other mobility pricing	Proximity to stations - opportunity for to maximize density	Parts of plan. Mishmash of authority.
Strict no vehicle boundary	Rapid Shuttles - opportunity shape efficiency	Vancouver weather

Table Two - Exercise 1

Proposed Network Map 1

Proposed Network Map 2



Other Notes

Two scenarios generated, one centered on transit and the other on pedestrians and cycling. Scenario 1 focused on transit with two loops that have high frequency shuttles with smaller vehicles. One loop is to wesbrook and up to university blvd. The second to up agronomy, down chancellor. Shuttles are frequent to ensure usability (2-3 mins max), however this would create a trade-off of a high operating cost. Perhaps conversation around AV is because of cost reduction. Area at East Mall/University should be a shared space with East Mall closed to normal traffic to 16th. Scenario 1 also has only shuttles allowed on west mall and mixes shuttles and people on East Mall.

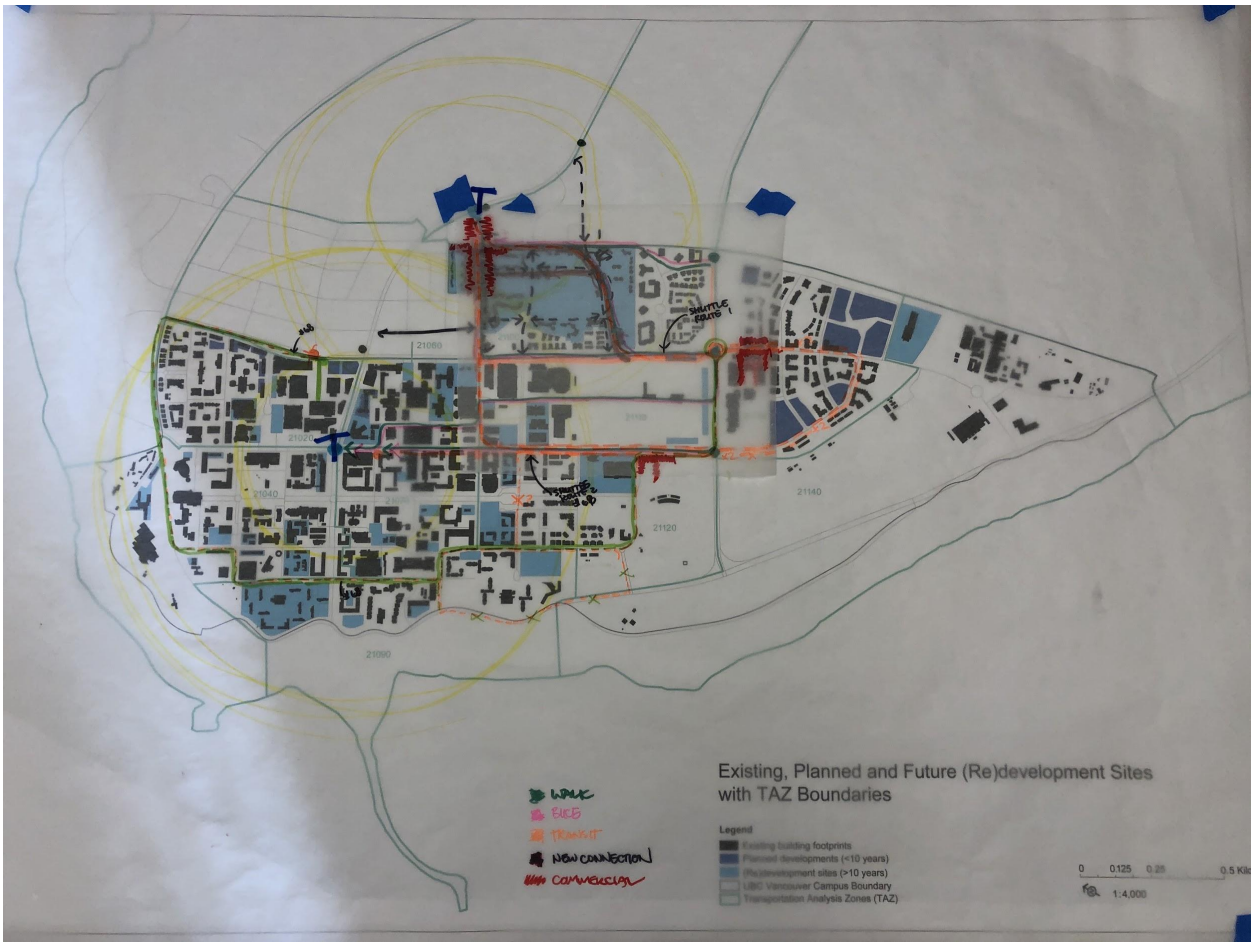
Scenario 2 is pedestrian and cycling focused. In this scenario the shuttle goes along wesbrook. East mall is all pedestrian and all closed. The one SkyTrain Station would have more spread out placement of the entrances and exits reducing concentration of pedestrians around and increasing weather protection There would be a high frequency linear shuttle connecting the station with Acadia and wesbrook. It would have a frequency of 2-3 min so you don't need to think about wait. There would be better cycling and walking connections on east mall

Table Two - Exercise 2

Policy Considerations	Influences/Opportunities	Barriers
Reduced Parking Standards	- Cost less (affordability for rental) - Enable better campus connectivity - Already over-capacity	- Market tastes/tolerance - Political/cultural - Unintended consequences
Free intra-campus transit (maybe cycling?)	- Would raise cost of parking to subsidize	- External operator?
Weather protection design standards	- More comfortable to walk	
More weather-protected and convenient bike parking	- Keep bikes dry	
Reduced roadway space for motor vehicles	- Shift to walking, cycling, shuttle priority - East Mall easiest to do - Pilot projects	
Emphasize pedestrian experience	- Animate - Weather protect - Mixed-use nodes	
5-min campus	- Smaller grocery stores, coffee shops, meeting places spread throughout campus	
High-frequency, reliable shuttle		

Table Three - Exercise 1

Proposed Network Map



Other Notes

There are two shuttles serving both SkyTrain stations (neighborhood vs. academic). These include a new shuttle that serves Wesbrook Village and Hawthorne Place, funnelling this population to Lelem Station, and a rerouted/optimized existing #68 shuttle to continue serving UBC academic campus and reduce overlap with the new proposed shuttle. New commercial areas are focused near transit hubs (i.e., Lelem and Wesbrook) and parking is pushed outside of campus core. Bike networks are enhanced with facility spot upgrades throughout campus. Active transportation is prioritized inside Acadia. HOV/SOV vehicle networks are limited through neighborhoods to maintain “local roadways”. Active transportation and shuttle connection are increased from Wesbrook Village (since no SkyTrain station). Acadia is built out to increase density and the road network is expanded through the neighbourhood to provide connections to University Boulevard. However, it needs to be ensured that drivers don’t shortcut through Acadia to access Thunderbird Parkade or University Boulevard. Shoudl consider shifting existing campus roads to limited access roadways (banning private automobiles, only permitting transit or active transportation).

Table Three - Exercise 2

Policy Considerations	**Influences/Opportunities**	**Barriers**
Road Network Changes	Improving access to: Daycare, Norma Rose ES, Reducing demand on existing roads	Community opposition Justidiction opposition (MOTI or UEL)
Roadway Jurisdiction	Create a desirable network where deficient discrepancy in road design standards	Maintenance/ownership jurisdiction Working with multiple jurisdictions
Property Ownership	Create a desirable network where deficient discrepancy in road design standards	Maintenance/ownership jurisdiction Working with multiple jurisdictions
Parking Access For Acadia	Lower Parking Requirements = Lower Housing Cost, Encourages Transit Use, More Walking & Biking, Sustainability	Ingrained expectations and behavior mobility / accessibility challenges
Urban Design Guidelines: Weather protection Separated bike lanes	Support more active transportation	
Transportation Demand Management (TDM)	Building awareness of choices	What are the funding sources