



# EXECUTIVE SUMMARY

**The City of New Westminster has a bold vision for a climate-friendly community at the 22nd Street SkyTrain Station in the Connaught Heights neighbourhood.** In 2022, 48% of greenhouse gas emissions in the City of New Westminster (hereafter referred to as the City) were related to transportation. As such, the City seeks to both reduce dependence on private vehicles and to support more sustainable and active modes of travel through the cultivation of car-light communities. The City has partnered with the UBC School of Community and Regional Planning (SCARP) and tasked our student team with investigating how to enable car-light living in transit-rich areas, at both the multi-unit residential building and neighbourhood scales to help realize their bold vision for the community

This final report, representing the culmination of our research, explores promising practices and provides key recommendations relating to the following five objectives: 1) transportation demand management (TDM), 2) curbspace management, 3) building design for deliveries, 4) developer insight on car-light development, and 5) equity and accessibility.

The key recommendations were developed over 7 months of research that involved literature reviews of promising practices and interviews with local real estate developers. The research culminated in building-scale and neighbourhood-scale recommendations that are carefully informed by research into promising practices, the local context, and interviews with local developers. Each recommendation in our report outlines their respective key features, limitations, and rationale.

Some highlights from our recommendations include:

- Encourage building typologies that attract and meet the needs of potential car-light building residents
- Implement bicycle parking that is convenient to access and appropriately scaled to meet evolving and dynamic user needs
- Prioritize the implementation of complete community-oriented planning interventions alongside building development

In summary, these recommendations are most impactful when implemented in tandem with each other, and are meant to be flexible, adaptable, and supportive of the realization of climate-friendly and car-light communities across the City.

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The Final Report was prepared by the SCARP Studio Team consisting of Willow Cabral, Christopher Chan, Audrey Choong and Fumika Noguchi.







# ACKNOWLEDGEMENTS

Enabling car-light living in transit-rich neighbourhoods is vital for municipalities as they shift towards transit-oriented development in light of both recent provincial legislation and climate change-related emissions reduction targets. This project, which explores novel and emerging approaches to community planning and development, was supported by the City of New Westminster and the University of British Columbia’s School of Community and Regional Planning (UBC SCARP).

In particular, the project team would like to extend our heartfelt gratitude to the following people, whose generous contributions of time, knowledge, and guidance were integral to the development of this final report:

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We would also like to gratefully and respectfully acknowledge the Indigenous communities whose unceded, traditional, and ancestral lands we live, work, and play on. This report was produced at the University of British Columbia on the unceded lands of the xʷməθkʷəy̓əm (Musqueam), Sḵwxwú7mesh (Squamish), and səliłwətał (Tsleil-Waututh) Nations, whilst the City of New Westminster sits on the unceded lands of the Halkomelem-speaking peoples.

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The City envisions a climate-friendly community that generates lower transportation emissions by increasing independence from personal vehicles and switching to more sustainable modes, such as public transit and active travel.

# TOWARD A CAR-LIGHT NEW WESTMINSTER

## Context

As part of its goals for bold climate action and resilience, the City of New Westminster (the 'City') envisions a climate-friendly community at the 22nd Street SkyTrain Station in the Connaught Heights neighbourhood. Currently, half of the City's greenhouse gas emissions are transportation-related. As such, the City aims to reduce transportation-related emissions by reducing dependence on private vehicles and supporting more sustainable and active modes of transportation, such as walking, transiting, and cycling.

While Connaught Heights is predominantly composed of single-family homes, the City's Official Community Plan (OCP) designates the future land-use of 22nd Street SkyTrain Station as higher-density and mixed-use development. The master planning process for the area was halted due to the COVID-19 pandemic and then restarted in 2023 with a new direction: a Bold Vision for a Climate Friendly Community.

The City sent out an RFP for successful car-light buildings in early September 2023 that the SCARP Studio Team (the 'team') responded to. The team developed deliverables focused on a hypothetical, single-building scale near the 22nd Street Station, with consideration paid to potential interactions and integration with infrastructure and facilities at the neighbourhood or community scales. That said, the findings and recommendations presented within this report are meant to be flexible and adaptable, allowing for their implementation in communities beyond the 22nd Street Station.

# Purpose and Objectives

The purpose of this project is to explore how car-light living can be enabled at the scale of a multi-unit residential building in a transit-rich neighbourhood. While the concept of ‘car-light’ is one that is still emerging and context-dependent, it generally refers to a community that is designed and experienced in a way that prioritizes non-car modes of travel, including public transit, cycling, and walking.

This final report, representing the culmination of our research, aims to provide the City of New Westminster with recommendations and promising practices for the realization of car-light buildings in transit-rich areas. These recommendations are meant to be flexible, adaptable, and supportive of the implementation of car-light buildings across the city, and may be used by other municipalities in realizing their own car-light communities.

A copy of the team’s approach and detailed workplan can be found in Appendix A.

The five objectives of this project are to provide:

- Recommendations on **transportation demand management (TDM)** facilities, amenities, and/or programs necessary within a car-light building
- Recommendations on the successful **design and management of curb space**
- Insight and guidance on **building design for deliveries**
- Insight on **developer sentiment** towards car-light buildings, identifying challenges and opportunities for development
- A strong **equity lens** that considers how car-free living can be enabled for everyone and how those with accessibility needs who require access to personal vehicles can live and thrive in car-light communities

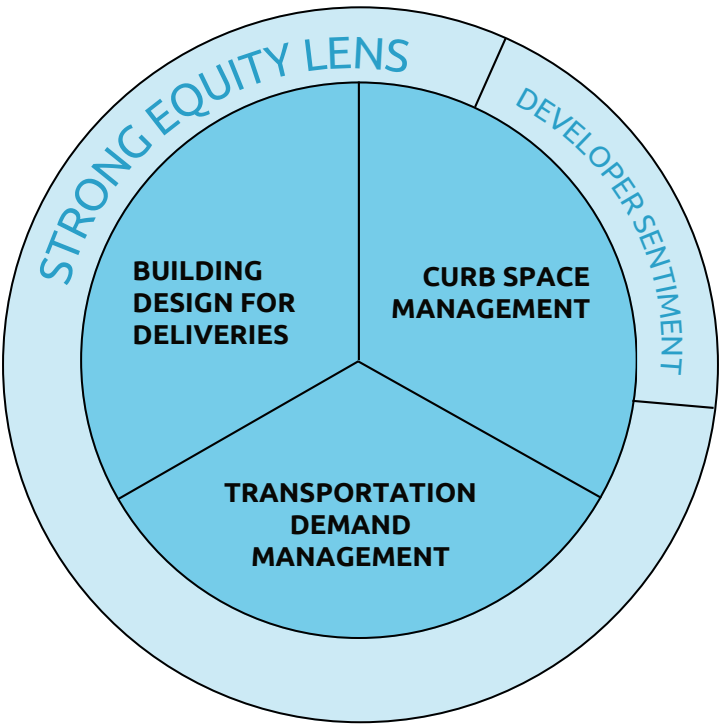


Figure 1. Diagram of key project objectives.





# THE CONNAUGHT HEIGHTS NEIGHBOURHOOD

## Community Profile Summary

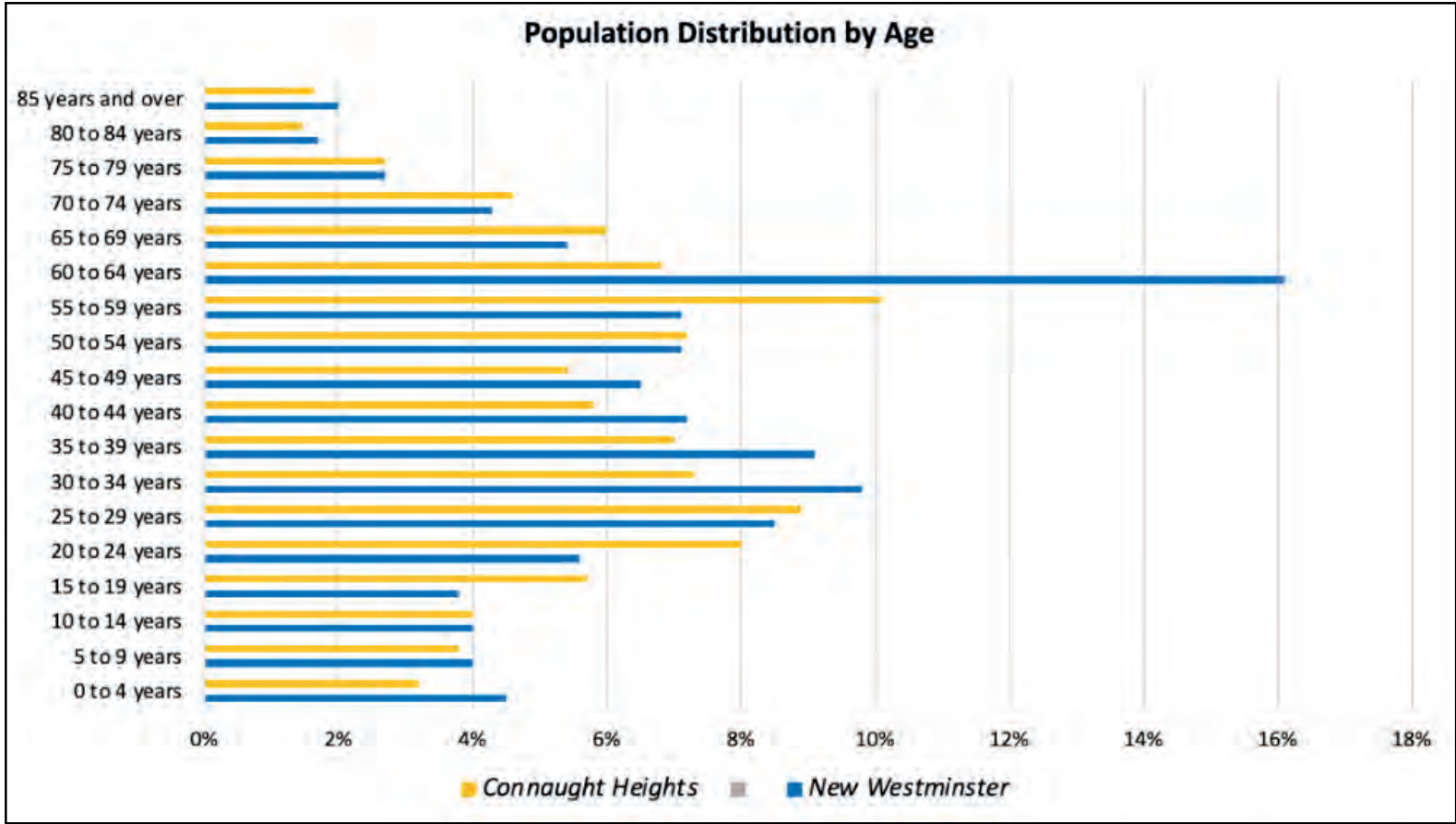


Figure 2. Diagram of Connaught Heights residential population distribution by age.

The 22nd Street Station is located within the Connaught Heights neighbourhood on the western side of New Westminster. While the station is used by commuters from all across the region, this new vision for 22nd Station may potentially impact local residents and the surrounding community most significantly.

As of the present, the housing type for the Connaught Heights neighbourhood is primarily single detached dwellings and secondary suites, with approximately 65% of local residents being home owners, and 35% being renters [1]. Due to the prominence of single-family dwellings, the neighbourhood also consists of a higher proportion of family households compared with New Westminster overall. Over three-quarters of households are families with an average household size of 2.9 persons [2].

The age profile of Connaught Heights is similar to the rest of New Westminster as a whole, although there are significantly more 15 to 24 year olds, which validates the finding of a higher proportion of family-oriented households. There are also significantly more 55 to 59 years old within the Connaught Heights neighbourhood.

In terms of labour, the top three primary occupation types are *Sales and service*, *Trades*, *Transport and Equipment Operators*, and *Business, Finance, and Administration*. As for income, according to the 2021 Census, the Connaught Heights neighbourhood has a median household income of approximately \$96,000 [3], which exceeds the New Westminster median of approximately \$82,000. Furthermore, around 49% of Connaught Heights households earn over \$100,000 per year as opposed to the citywide average of 39%. Connaught Heights is also a very diverse neighbourhood, with a higher percentage of immigrants than the rest of the city, with a percentage of 41% as opposed to 37.5% [4]. A large proportion of these immigrants come from Asia, particularly India and the Philippines.

For transportation and commuting in the neighbourhood, despite their proximity to the 22nd Street Station, 66% of local residents' main mode of commuting is by car, truck, or van. 27% of local residents rely on public transit for their main mode of transportation, which slightly exceeds the city's ridership average. Similarly to the rest of the city, a large proportion of Connaught Heights residents commute to a different census subdivision within Metro Vancouver for work (79%).

[1] Statistics Canada (2021).

[2] Statistics Canada (2021).

[3] City of New Westminster (2022).

[4] Statistics Canada (2021).

# Notes on Recent Changes to B.C. Legislation

The Province of British Columbia is committed to taking action on delivering more homes near transit. To meet this vision, Legislation Bill 47 was introduced in November 2023. This new legislation requires BC municipalities to designate Transit-Oriented Areas (TOAs) according to the legislation’s definitions, of which there are two:

- Land within 800 metres of a rapid transit station (e.g. SkyTrain station)
- Land within 400 metres of a bus exchange

In these defined TOAs, municipalities cannot restrict or prohibit the density, size, or dimension of buildings. There is one guideline in the legislation which has the most relevance to this project, that being:

- Municipalities must remove restrictive parking minimums. Parking will be determined on a project-by-project basis.

Based on this guideline, developments in TOAs no longer have to supply a minimum number of off-street parking spaces. Parking spaces that are still required and unaffected by the legislation are parking for people with accessibility needs and parking for commercial developments. Therefore, residential developments do not have a minimum parking requirement, which is an opportunity for more car-light buildings to be built.

22nd Street SkyTrain Station is classified as a Category 1 SkyTrain TOA under the legislation’s framework. SkyTrain TOAs have a prescribed 800-meter radius catchment area, and any parcel of land that is partially included in the 800-meter radius is considered a part of the catchment area. There are three tiers within the catchment area, which are Tier 1 (200-meter radius), Tier 2 (400-meter radius) and Tier 3 (800-meter radius). Parking minimums are removed across all three tiers, whereas minimum allowable density (FAR), minimum allowable height, and building type vary depending on the tier level according to the legislation’s policy framework. Municipalities (including the City of New Westminster) have until June 30, 2024, to designate their TOAs and new parking requirements by bylaw.



Figure 3. 22nd Street SkyTrain Station surrounded by the 200-meter radius (green) and 400-meter radius (blue). The boundaries of Connaught Heights Neighbourhood is outlined with the solid orange line. The 800-meter radius was not included as it extends beyond Connaught Heights.



# Supportive Amenities in Connaught Heights

Loosely drawing from the methodology of Seltzer (2021), the team established a material context table to summarize the extent and quality of current walking, cycling and transit network connections between the Connaught Heights neighbourhood and the City of New Westminster. Additionally, the team sought to capture the presence of key amenities available to residents within and beyond the neighbourhood boundaries. In the context of this table, walking and cycling accessibility is defined in relation to residents being located within a 400-meter radius of complete networks and destinations [5].

Active transportation speed calculations assume a walking speed of 10 minutes per 0.5km [6], and a cycling speed of 15 minutes per 3.2km (2 miles) [7].

Material Context in Connaught Heights			
Availability and quality of alternative transport modes to the private car within the neighbourhood	Public transport accessibility	Service level (on weekdays)	One SkyTrain station and bus interchange within walking distance (via SkyTrain).
			Direct connection, every 6 minutes, to the city center.
		Travel time	3 minutes to the city center (via SkyTrain).
	Walking and cycling accessibility	Travel time by bicycle	Approximately 15 minutes to the city center (assuming cycling speed of 15 minutes per 2 miles, or 3.2km).
		Travel time on foot	Approximately 64 minutes to the city center (assuming walking speed of 10 minutes per 0.5km).
	Mobility services (station-based)		Modo car sharing (\$4 per hour).
			Limited bike or e-bike sharing availability.
Direct connection, every 6 minutes, to the city center.			
Network of alternative transport modes to the private car, beyond neighbourhood boundaries	Public transport		Part of the Expo Line; currently serviced by 11 buses, including handyDART.
	Cycling		Connected with off-street cycling pathways along Stewardson Way, with proposed connections to local street bikeways.
	Walking		Generally walkable with room for improvements, given low-density residential development and the greater equity needs of Connaught Heights residents [8].
	Mobility services		Network of car sharing exists, but limited availability of bike and e-bike sharing.
Built environment factors	Distance to other destinations in New Westminster		Approximately 3.2km from the city center of New Westminster.
			No grocery stores within walking or cycling distance.
			No post offices within walking or cycling distance, seven post offices and two Amazon lockers accessible via transit (bus/SkyTrain).
			Three green spaces within walking or cycling distance.
	Diversity and design		Primarily single-family detached residential dwellings, with one multi-family apartment building. Amenities include the Connaught Heights Park and Elementary School [9].
			Existing traffic-calming measures in place, including speed humps between 10th and 12th Streets, and a traffic circle at 13th Street.
			Outdoor bike racks and bicycle parking lockers available at-grade at the SkyTrain station (\$10 per month). TransLink is also piloting on-demand bicycle parking lockers at the SkyTrain station.

[5] City of New Westminster (2022).

[6] Layton (2017).

[7] Foster, Panter & Wareham, N.J. (2011).

[8] City of New Westminster (2022).

[9] City of New Westminster (2019).

## Site Visit Findings

On Friday, October 20, 2023 from 1 PM to 3 PM, the project team conducted a site visit to the 22nd Street SkyTrain Station Area with City of New Westminster planners and project partners Meredith Seeton and Lynn Roxburgh. This exercise helped the project team to gain a better understanding of the local social context and built environment through both site observation and on-the-ground conversations with the partner planning team.

The site tour highlighted the following key observations:

- The 22nd Street SkyTrain Station is a significant regional connection point for linking people and places, and the station provides a unique opportunity to envision and transform Connaught Heights into a complete, transit-oriented community that is vibrant, diverse, and walkable.
- The station area's current built environment (comprised primarily of single-family homes with limited supportive infrastructure for active transportation modes, particularly walking and cycling) contradicts visions for the area (high-density, mixed-use, and walkable).
- The geographic context of the area, including its street congestion and sloped topography, provides challenges but also opportunities for novel designs and planning approaches.
- Project success will depend on design and policy interventions that integrate and enhance existing transportation infrastructure (e.g., the nearby greenway) at both the community and building scales.

A full record of notes made during the site visit can be found in Appendix B.

Figure 4. Image of informal pick-up drop-off zone used by residents near the station.



Figure 5. Shared street for use by cyclists and drivers, close to the station.

Figure 6. Image of signage indicating cycling greenway close to the station.

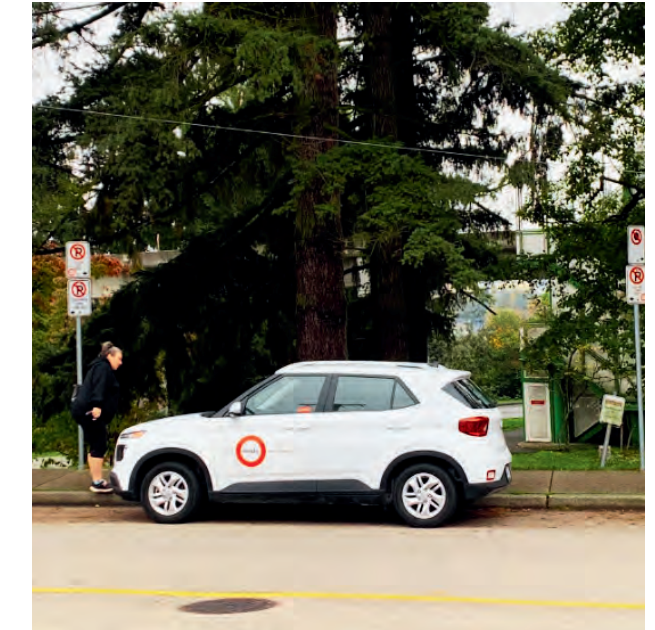


Figure 7. Image of on-street designated Modo parking space near the station.





## Insights from City Staff

*Interviewed: Erica Tiffany, Senior Transportation Planner for the City of New Westminster*

On November 10, 2023, the SCARP Studio team conducted an informational interview with Erica Tiffany, Senior Transportation Planner for the City of New Westminster, to gain a greater understanding of the transportation planning context, challenges, and opportunities around the 22nd Street SkyTrain Station area. We began our interview with a discussion of the key challenges that pedestrians, cyclists, and drivers faced in and around the station. Erica mentioned the issues of U-turns on 7th Avenue when private vehicles and on-demand services, such as Uber and taxis, drop off passengers, as there are currently no designated pick up drop off (PUDO) zones around the station. The frequent pick-up and drop offs occurring in the area create safety issues and conflicts between active travelers and drivers, especially as 7th Avenue is an on-street neighbourhood street bikeway. As a result, Erica describes the need for establishing protected cycling lanes to prioritize cyclist safety and comfort by reducing the need to navigate around buses and temporarily parked cars. The increase in demand for e-commerce deliveries has also resulted in more cases of double-parking and parking on bicycle routes due to no available parking spaces or restricted parking; therefore, creating conflict between road users and resulting in congestion on the road and curb space. The City currently lacks data on local demand for e-commerce deliveries and the resulting impacts on curb space uses.

We also discussed current and future opportunities to provide greater mobility options around the station through shared micromobility and cars. The City is in the process of completing a feasibility study for an e-bike sharing program, with the goal of deployment in the coming year. However, the exact locations of the e-bike stations are not yet determined. Additionally, we discussed the presence of Modo, a car-share program, on 7th Avenue immediately outside the station. Erica explained that to establish a designated on-street parking space, Modo was responsible for submitting a request to the City. As such, the possibility of increasing the number of Modo car-share vehicles in the area is subject to Modo's assessment of local supply and demand for car-sharing. As of present, the 22nd Street Station does not appear to be an in-demand location for Modo as they have not submitted any further designated parking requests.





*Interviewed: Mike Watson, Acting Manager of Development Planning for the City of New Westminster*

The team also interviewed Mike Watson, the Acting Manager of Development Planning for the City of New Westminster to learn more about development history, challenges, and opportunities in the site and more broadly in the city. Mike notes that 22nd Street SkyTrain Station has not received many development applications, which may be due to challenges like its isolated location, proximity to high-volume road infrastructure, and hilly topography. Mike also mentioned the challenges associated with Connaught Heights's development pattern and roads which do not align with neighbouring streets, because the area was only incorporated into the City in the 1960s; therefore, resulting in misaligned streets. Furthermore, the arrival of the SkyTrain station resulted in strange property configurations, right-of-ways, and roads. Although there is interest in development from current landowners, the City is unable to move forward with it until the neighbourhood's masterplan is prepared.

The conversation then transitioned into the topic of TDM measures, in particular, the tradeoffs between one-time capital investments and ongoing operational investments. Mike suggests that the most successful TDM measures are the one-time investments which only require putting in place, whereas on-going investments like transit subsidy passes require long-term operating and monitoring. This is likely due to a developer's interest in building and selling a project. As such, ongoing TDM measures may face challenges as the responsibility of operating and monitoring falls onto a new party.

Although the City has had developments with fairly low parking, the City has yet to see a truly car-light development. Development projects which have gotten close to car-light have largely come about because of their small lot sizes that necessitate reducing parking. Mike concluded by stating that developing a successful, car-light project is dependent on marketability to the community's demands and interests for it (i.e. how much parking is a developer willing to provide in order to successfully sell units?).



# DEVELOPER INTERVIEW FINDINGS

## Overview of Interviewed Developers

The team interviewed six developers from six different development companies throughout January and February 2024. The majority of the development companies are based in Metro Vancouver, aside from two of them, and many have project experience and knowledge of the region. All developers are involved in residential projects, but the type and scale vary from boutique townhomes, and residential high-rises, to larger-scale mixed-use communities.

A copy of the questions used for each developer interview is included in Appendix C. The questions were slightly modified during the interview process to reflect each developer’s background and their respective transit-oriented development projects.

Developer	Development Projects Experience
1	Predominantly residential and mixed-use type projects, split between market rental and condos, mostly high-rise
2	Multi-family development, boutique infield development sites, 4-6 storey and 2-3 storey townhome sector
3	50/50 commercial and residential projects, residential has mostly been rental, prioritising developments close to transit
4	Large multi-national investment partner, larger-scale mixed-use projects in major urban gateway markets
5	Backed by union and pension funds so long-term investment projects, building larger-scale communities with a mix of market rental, below-market etc.
6	Development advisory, a range of projects like multi-family mixed-use around Skytrains, industrial and office spaces, focuses on complete communities in the Lower Mainland



# Key Themes from Interviews

## *Financial Viability and Marketability*

The overarching theme across all developer interviews was that a car-light project would only be built if it is financially viable and profitable for the developer. If the project is unable to attract enough potential buyers or renters, then the project may be unprofitable and therefore, unlikely to be ever developed.

As certain communities and municipalities continue to rely heavily on personal vehicles for travel, it would be difficult to successfully market and sell a project which does not provide an amenity that potential residents desire (i.e. parking). Developers may also face competition with other development projects that may not be car-light and offer plentiful parking; therefore, competition with other non-car-light projects is another factor that determines whether or not a car-light project would be successful financially and marketability-wise.

## *Policy*

Developers perceived the new provincial legislation on TOAs to be a step in the right direction, yet at the same time, ambiguous. For instance, the legislation does not specify building tenure types, and the tenure type would influence the success of car-light buildings. Several developers also highlighted some confusion about the potential ways in which the legislation may interface with existing policies around affordable housing and other requirements.

In this regard, developers expressed that municipalities may choose to steer the nature of developments to meet perceived local housing needs or demands, in ways that the provincial legislation did not intend. Despite the ambiguity of the legislation, many developers agreed that the elimination of minimum parking requirements within the defined TOAs is a positive step in allowing flexibility for developers to create projects with reduced parking without applying for reductions (i.e. reducing red tape).

## *Residential Project Type*

A common finding among all developers was the importance of tenure and unit mix type when it comes to implementing car-light developments. Developers believe car-light buildings that are primarily rental with smaller unit types such as studios or 1-bed rooms are more successful. With a rental tenure, there is often more flexibility among residents to move in without a personal vehicle, whereas condo residents are usually more sensitive; condo residents are more likely to prefer owning a property with a designated parking space than without.

Developers have also mentioned the relevance of market conditions around rentals. For example, the low vacancy rate in Vancouver's rental market may limit the options for renters, and therefore, renters would accept available units even if they may not align with their lifestyle preferences.

A smaller unit size (i.e. studios and 1-bed rooms) was also found to support car-light buildings more so than larger unit mixes. Having smaller units often caters to demographics that may not require owning a car for their daily mobility needs, such as young working professionals and students. Whereas larger units are often occupied by larger families with children who tend to require more trips using cars, therefore, needing parking spots. The financial implications of having a rental tenure type in car light developments were also mentioned. Developers stated that parking reductions in some rental projects may improve the project's feasibility considering the significant costs of underground parking, as well as the traditionally lower returns on rental projects.

In summary, developers find that rental projects and smaller unit sizes have greater flexibility in living without a personal vehicle, and as such, can have lower parking ratios than condo projects or larger units. Lastly, the new legislation on TOAs is an additional push for more rental projects because of the removal of minimum parking requirements that may encourage developers to build car light rental projects.



### *Perspectives on Building Amenities*

The effective implementation of TDM measures is imperative to enabling the success of car-light developments. However, certain types of TDM measures were mentioned by developers to face potential challenges after implementation during the management and operation stages. TDM measures such as in-house car-shares and cargo bikes are likely to be discontinued as an amenity because of the higher maintenance and operational fees associated with it; in some cases, a building's strata council would sell off such amenities to reduce management responsibilities and lower fees. These experiences demonstrate the lack of understanding about priorities between planners, developers, and strata council. As such, some developers suggested that third-party operators for these types of amenities may be more appropriate in the long run.

The rise in e-commerce deliveries has also resulted in a need for more curbside loading and delivery spaces in a building's lobby. Developers emphasize the importance of curbside loading in front of a building like a 5-minute loading zone or PUDO zone. A designated curbside loading space benefits couriers because of more efficient and immediate access to a lobby's delivery room. It also reduces the need to designate underground spaces for loading which is costly for developers to build that couriers may not even use due to its distant location from the lobby. In addition to the loading aspects, developers find that more space is needed to receive parcels in a building's lobby. Parcel deliveries could be further optimized with a concierge for receiving and storing the parcel, as well as a fridge for cold packages.

### *Existing Neighbourhood Land Use Context*

The developer interviews repeatedly stressed the significance of the neighbourhood land use context in predetermining the success of a car light building. A neighbourhood fabric with a denser and more diverse land use mix that is well supported with sustainable and active transportation infrastructure (i.e. public transit, greenways) and commercial amenities would more strongly encourage car-light living than a low-density, amenity-poor neighbourhood. Based on these neighbourhood factors, a developer can also evaluate how low or how high a parking-to-unit ratio could be for their project. Overall, developers expressed the need for a better and more robust transit system and active travel network to better support them in building future communities with car-light buildings.

### *Existing Street Context*

Another common finding was the perceived difficulties from developers in implementing new pedestrian and active travel-oriented curbspaces. In particular, they may face challenges with limited available space and conflicting street priorities. Furthermore, individual developments can result in piecemeal improvements to the curbspace that may create a street with an incomplete pedestrian network. Developments that are of a larger, community-scale (i.e. more than one building) have a greater opportunity to be more thoughtful with the pedestrian and active travel network on the curbspace that facilitates car-light living.

### *Interesting Mentions*

Multiple interesting mentions were heard from the developer interviews. These findings were not a common trend across all, but could be worth considering. In our interview with developer 4, a larger multi-national investment firm, they stated that a new practice seen amongst their competitors was the provision of in-house car shares.; developers would purchase their own cars with company branding for the exclusive use of residents, although maintenance would still be funded by strata fees.

Another interesting mention pertains to the effective use of the new provincial legislation regarding TOAs. During our interview with developer 2, they mentioned the consideration of Residential Rental Tenure Zoning (RRTZ) pre-zoning to enforce rental housing. RRTZ limits the form of tenure to residential rental within a certain zone or part of a zone for a location in relation to which multi-family use is permitted. The developer suggests the utilization of this zoning from municipalities as a tool to enforce rental housing in designated TOAs.



# KEY FINDINGS FROM PROMISING PRACTICES

## Overview

In the interim report published in December 2023, we explored and reviewed a catalog of promising practices that could incentivize change towards transit and sustainable transportation modes, in support of car-light living. However, their implementation and use is dependent on various contextual factors, and they may require action from the building management team and/or the community to establish the necessary funding, programming and infrastructure supports. These promising practices were organized in relation to the four key objectives proposed by the City. A copy of the findings from the promising practices can be found in Appendix D.

### Transportation Demand Management (TDM)

Transportation demand management (TDM) strategies are vital to the realization of car-light buildings in transit-rich neighbourhoods. As such, the promising practices include TDM initiatives as they relate to walking, cycling, public transit, and driving. The use of active modes of transportation such as walking depends not only on the provision of physical infrastructure, but also that of social infrastructure. For example, walking events and programming provide accessible and enjoyable opportunities for community members to walk around and experience their neighbourhood.

Grassroots and community walking initiatives can be enjoyable, effective, and low to no-cost. Building managers and/or local residents can start a walking group and organize monthly or bi-weekly walks, for instance. Local governments can also promote walking through larger events such as temporary pedestrianization of streets for local music, markets, and other community-gathering initiatives.

Ample, adequate, and high-quality bike storage is necessary for accommodating existing cyclists and encouraging non-cyclists to shift towards more active transportation modes. A checklist detailing promising practices for bicycle storage in multi-unit buildings was included in the interim report, encompassing design elements of storage facilities, short-term bike storage, long-term bike storage, storage facilities management and bicycle rack design [10]. Additionally, building-scale bike-share programs are increasingly implemented by developers as an amenity because of low implementation costs (at about \$40 per unit), and their high return in attracting and retaining residents [11]. Other on-site in-building amenities that encourage cycling include bike repair and wash stations.

Having users be fully aware of public transit and how to easily navigate it is a critical component in supporting the shift away from car dependency. To facilitate transit use, the cultivation of competencies like the ability to read the timetable schedule, purchase the right ticket, and seamlessly navigate the local transit network are key [12].

[10] Smith (2017).  
[11] Rothberg (2023).  
[12] Selzer (2022).



TransLink’s kiosks are a local form of wayfinding that enables such competencies [13]. Integrating digital or physical information kiosks within the residential building is hence a promising intervention. Additionally, the use of digital applications could also be an innovative way to encourage more residents to use public transit. Apps such as Commutifi are data-driven commuting platforms that inform users of all commuting options based on different variables such as time, cost, and carbon emissions, and ultimately help the commuter identify the best option [14]. Commuter benefits through public transit fare subsidies are another approach to incentivize public transit use and reduce dependencies on personal vehicles [15].

Finally, car-light developments, as the name suggests, would continue to offer private parking to residents but with significantly fewer spots than traditional buildings. The management of parking within these buildings can be addressed through contracts and policies. For example, numerous boroughs in London host registered car-free developments that require developers and landlords to inform the resident or buyer that it is car-free, and to purchase or sign a lease, they must also agree that they are not legally permitted to apply for on-street parking permits [16]. Certain residents—such as those with accessibility requirements, families with children and others—could apply through the property manager for some form of status which grants them parking from the limited pool of parking. Car-share and carpool matching services may also meet residents’ occasional needs to access a car from time to time. Car-share services may be provided through on-street parking spaces located adjacent or in close proximity to the building, or in-building through designated parking spaces, either of which may be established in partnership with local car-share service providers.

*Curbspace Management*

The City of New Westminster’s Transportation Master Plan (TMP) has outlined their hierarchy for curbspace access, which gives highest priority to sustainable transportation, including spaces such as the sidewalk, bike lane, transit priority lanes, shared micro-mobility, and bike parking. Curbside access for private vehicles like delivery and loading, short-term parking, and long-term parking are the lowest in this hierarchy [17]. The overview of promising practices for curbspace management indicate that the curbspace design adjacent to the building as well as throughout the neighbourhood would shape the residential experience of navigating the community—as such, car-light living is arguably best empowered by a more thorough application of curbspace management strategies throughout the community.

To promote effective curbspace access, walking as a mode of transportation can be promoted through design interventions like pedestrian bulb outs, separation from the vehicle lane, curb cut free sidewalks, and parklets [18]. Other elements in the public space that can improve the pedestrian experience include public lighting and slower road speeds. Design interventions that have been found to prioritize and improve the cycling experience in car-light developments include separated bicycle lanes, short-term bicycle parking, and a shared micromobility station. Prioritising public transit at the curbspace for car-light living would require interventions such as transit priority lanes, bus bulbs, level boarding, and restrictions on curb cuts. Delivery, loading, and short-term parking on the curb are a lower priority to sustainable transportation modes, but the most unimportant access is for on-street vehicular parking.

*Designing for Deliveries*

Performing deliveries in urban cities have become increasingly complex to manage, given a greater fragmentation in freight patterns caused by an increase in the number of people requesting deliveries (leading to more deliveries being performed and more addresses being serviced), reduced volumes per delivery, and the increase in same-day or ‘click-to-door’ deliveries of groceries, food and retail goods to residential doorsteps [19]. With the proliferation of deliveries to residential doorsteps, challenges in accommodating a larger and greater mix of short-term traffic around buildings may emerge. Insufficient availability of loading zones or temporary parking may lead to double-parking or illegal parking on streets leading to obstructions of pedestrian and cyclist thoroughfares, for example.

To accommodate seamless, efficient and secure deliveries, a varied mix of different building design interventions and programming can be utilised, some of which can also be used to accommodate passenger PUDO operations performed by ride-hailing services (such as Uber). For example, off-street zones and/or service alleys may be established for loading and unloading operations, which may be placed at the rear of the building in relation to the preferred frontage of the building to reduce pedestrian-vehicle conflicts. Reserving on-street or off-street parking spaces could allow for PUDO, loading and unloading operations, and also accommodate the expanded range of vehicles that delivery drivers may use. Package rooms may perform storing, processing and organising services for incoming deliveries, which may reduce package theft and prevent overflows.

[13] TransLink (2022).  
[14] TransLink (2023).  
[15] TransLink (2023).  
[16] Tower Hamlets (2023).  
[17] City of New Westminster (2014).  
[18] Institute of Transportation Engineers (n.d.).  
[19] Baker et al. (2023).



# All Ages and Abilities Active Transportation Network Plan

September 2022



## *Equity Considerations*

Transportation users have diverse and varying needs. However, traditional transportation planning practices have often centered on the able-bodied man who commutes to work in a commercial district, while the remaining diversity of transportation users receive fewer recognition [20]. The dimensions of transportation equity that are considered include mobility-based access and affordability-based access, which relate to substantive equity outcomes. Procedural equity, which is the inclusion of diverse voices and values in the planning process, is a component that will not be addressed, as it lies beyond the scope of this project. Equity-focused interventions could require a mix of investments into curbside and street infrastructure, social programming and subsidy schemes. These may be complex to execute in tandem as the stakeholders required for infrastructure improvements, programming and subsidy-management are likely to be operating at different scales, and possibly without inter-stakeholder communications to ensure that equity gaps are fully addressed.

Equity-focused walking interventions included promotion of an accessible walking environment that creates a more equitable active travel network and community, in connection with curbspace management.

For example, implementing pedestrian bulb outs at intersections reduces the number of lanes that pedestrians must cross, while also increasing their visibility to oncoming vehicles. Cycling equity-driven interventions could include the existence of protected cycling facilities to alleviate fears of collision, in addition to strong integrations between cycling and transit networks and facilities [21]. To further improve cycling equity and address logistical and financial barriers, programming and other solutions could be explored: bike-sharing schemes have successfully induced modal changes across all groups while supporting transportation experiences for low-income individuals in particular [22]. Improving public transit access could entail the incorporation of level boarding to address mobility-based accessibility, and the inclusion of shelters at transit stops and stations to cater to the comfort, safety, and inclusion of all its possible users for an equitable transportation network. Equity considerations also span maintaining a minimum level of accessibility to cars, particularly for groups that may find it challenging to navigate transit and active transportation to perform specific services. Short-term access to vehicles may be provided through enabling convenient access to shared mobility services, such as ride-hailing, ride-pooling and car-sharing providers.

[20] Institute for Transportation and Development Policy (2022).

[21] Cauwenberg et al. (2018).

[22] Mohiuddin, Fitch-Polse & Handy (2023).



# Monitoring and Evaluation

**In response to City interest, this final report includes a more detailed review of promising practices in Monitoring and Evaluation processes.**

## *Resident Surveys*

Particularly with the novel nature of car-light buildings in a largely auto-centric society, resident surveys could be employed to assess the perception and satisfaction of residents with their quality of life in a car-light community. These surveys should be thoughtfully developed, with clarity and precision of writing being paramount. Consideration should also be paid to timing, frequency and follow-up, and even the potential provision of incentives to take the survey. For example, the Village Green multi-family housing development encourages residents to take surveys at four points in their residential journey, including to provide feedback on the move-in experience and 60 to 90 days before the renewal of leases [23]. Through these touchpoints, different aspects to the residential experience can be examined and explored.

These surveys can be scoped more specifically to evaluate the success of the unique features of car-light developments, by assessing for specific outcomes related to the amenities, in addition to general well-being and self-reported interest or use patterns of amenities. For example, BC Housing examined building design-associated challenges to the residents of Mazarine Lodge, which is a multi-family modular housing development in New Westminster that sought to house individuals that were experiencing or at-risk for homelessness.

While the development did not intend to be car-light, the context of the survey methodology—assessing for outcomes specific to the unconventional development—allowed for emergence of specific insights, such as the layout of the reception area being confusing and unintuitive to navigate for wheelchair-using residents [24].

## *Parking Audits*

When attempting to estimate an undersupply or oversupply of parking, parking audits are a key part of the puzzle. Across different types of parking, including regular vehicle parking, visitor parking and bicycle parking, parking audits may be used to assess for parking capacity, peak-occupancy, daily average occupancy, daily turnover and the average parking duration of users. However, fairly intensive effort may be required to fully account for measures like the average parking dwelling time, since the monitoring of specific license plates would be required instead of a simple vehicle count. Additionally, it is important to observe that any true ‘demand’ for parking is affected not just by the parking capacity provided, but also by the use of other car-light strategies including the accessibility of other transit modes and community-normalised travel patterns. In scoping the parking audit, Metro Vancouver offers some guidance as to parking behaviour considerations, such as needing to account for ‘peak’ visitor parking demand, which may tend to occur in the evenings in apartment buildings [25].

## *Usage Data*

The usage data of third party-operated services could communicate important information about the demographics and use patterns of current users, thereby allowing developments to potentially tailor the types and range of services offered to the potential residents that are likely to transition to car-light lifestyles. These services could include bike-share and car-share programming, wayfinding kiosks and carpooling programming. They may also offer an opportunity to model the types of trips being undertaken and the times of day that the services are most in-demand, which could facilitate a more thorough profile of the current gaps and limitations in transit offerings to be formed. However and likely owing to the sensitive nature of user data, very limited information on usage data is hosted on publicly available sites, and the City may have to liaise and coordinate information-sharing privately with providers.

## *Program Performance Reviews*

A program performance review can be conducted to review the successes and limitations of existing programming in relation to meeting resident needs and aspirations. Accordingly, the evaluation results may determine the need to re-scope or re-design certain elements of the programming. Typically, reviews may consist of two stages: (1) Performance measurement, and (2) Evaluation [26]. The former aims to describe a program in terms of what it achieved, and the extent of success achieved. The latter intends to describe the impacts of the program on the people, families or communities that are served. Unfortunately, there is a lack of transparency surrounding the performance of in-building programming provided by existing car-light developments, such as the bike-share amenity provided at the Bosa-Blue Sky 183 E. Georgia development—perhaps because a review has not been completed, or because of the sensitivity of user data involved.

[23] Doyle (2021).

[24] BC Housing Research Centre (2021).

[25] TransLink & Metro Vancouver (2019).

[26] Tatian (2016).



# KEY RECOMMENDATIONS

Our aspiration for car-light living in Connaught Heights...

Rental Tenure



Primarily Studios + 1 Bedrooms



In-lobby Wayfinding



Package Delivery Room



On-street Car-share



Convenient Bike Parking



Bike Wash / Repair Station



Pick-up Drop-off (PUDO) Zone





# Stories from Our Car-Light Residents

Living in a car-light building should and can be for people of all age groups, incomes, and abilities. The ability to live independently from car ownership presents numerous opportunities to reduce one’s environmental footprint, have a healthier and more active lifestyle, and build stronger connections within a vibrant community. However, we acknowledge that individuals have varying general and unique needs and activities that must be met. A successful car-light building would be accessible and equitable to diverse users when it meets their general and unique mobility needs and activities while also improving their quality of life beyond the car.

## Young Working Professional



With the offer of unbundled parking, it’s so nice to be given a choice to save a little money!

**Young working professionals** may have dynamic and flexible needs and aspirations. With fewer years on the job, they may prefer to save by opting to spend less on owning and maintaining a car. With uncertainty over where their career could take them, they appreciate the flexibility of renting. Easy access to the 22nd Street Skytrain and the bus interchange means that commuting to their place of work can be efficient and timely even during peak hour traffic.

## Senior



I can plan my trip independently with the wayfinding kiosk in the lobby.

**Seniors** may have different daily interests and mobility needs. Increased wayfinding resources can simplify navigation, and empower independence and autonomy in moving around their community. A curb space design that prioritizes pedestrians can enhance the safety and comfort of their walk. Well-designed PUDO zones can also facilitate their reception of online grocery deliveries and their experience taking a HandyDART.

## Parent



Going grocery shopping with my children is so much easier with a car-share vehicle close-by.

**Parents** will have great access to a diversity of transportation modes and services to meet their various daily responsibilities. A carshare in close proximity to the building allows flexibility in traveling with their children to get groceries, go to soccer practice, etc. Parents who bike with their children will benefit from an accessible bike parking area on the first floor of the building.

## Teenager



My friends can cycle over and easily store their bikes in the secure bike parking!

**Teenagers** enjoy the freedom to move around with accessible public transit and safe streets, to and from school, recreational spaces and the workplace of their part-time job. Their friends are able to visit and leave their bicycles in the building’s bike parking room securely for hangouts.



## Conceptual Approach to Applying Recommendations



Figure 8. *Various elements of transit-oriented design.* (British Columbia, 2024).

The following key recommendations are a synthesis of the insights gathered from the promising practices and the interviews with local and regional developers. While the promising practices are broadly successful, we have chosen to prioritize the following key recommendations as they were found to be particularly impactful and reflective of the local context. These recommendations will communicate opportunities and limitations with the implementation of car-light building designs.

While these recommendations can theoretically be applied independently of each other, they are most effectively used in tandem to cultivate a suitable neighbourhood context that can support the viability of a car-light development. In a similar vein to transit-oriented area development, encouraging a drastic transition away from individual car use to transit and active transportation modes requires a transformation of the urban fabric. Ideally, the neighbourhood would support a diverse range of local uses including commercial, retail, grocery, education, green and recreational spaces, in addition to being well-served by a variety of transit modes and walking and cycling infrastructure designed for easy, accessible and enjoyable maneuvering. By and large, developers overwhelmingly stressed that this was the primary driving force in ensuring the attractiveness of car-light buildings to potential future residents.

**Key recommendations were organised to be implemented at either the building-scale or the neighbourhood-scale.**

ENCOURAGE BUILDING TYPOLOGIES THAT ATTRACT AND MEET THE NEEDS OF POTENTIAL CAR-LIGHT BUILDING RESIDENTS.

As part of its Family Friendly Housing Policy, since 2016 the City has mandated that at least 25% of units in multi-family rental developments are larger two- and three-bedroom units, with at least 5% of total units being three-bed units [27]. As of 2019, the City’s Inclusionary Housing Policy further requires specified minimums of affordable rental units and/or non-market rental units to be included in projects that are exceeding or within OCP / Density Bonus Limits respectively [28].

Key Features

- Include a greater proportion of rental units.
- Include a larger proportion of smaller residential units, such as studios, junior one-bedroom, one-bedroom and den units.

Limitations

- Contributes to continuous undersupply of larger family rental units in the market [29]. In particular, the Connaught Heights Neighbourhood currently has a higher proportion of families than the rest of the City. As such, prioritizing smaller unit sizes may limit the opportunity for existing families to move in and stay in their community.
- Car-light buildings that prioritize rentals with a smaller unit mix may be contradictory to the vision of a successful car-light building for all, emphasizing the need for such projects to include family-friendly amenities that could support occasional car use, such as third-party car-share programming.

Rationale

- Alignment with project objectives to promote feasible uptake of the units within the market, where potential residents who are best positioned to or most likely to adopt car-light lifestyles are also most likely to be attracted to rental units, with a larger proportion of smaller residential units.
- As such, building out a greater proportion of smaller units could better serve the limited parking demands of students, young working professionals and couples.
- Developers mentioned in interviews that residents intending to purchase condominium units, either to reside in it themselves or use it as a real estate investment, are more likely to prefer units with an attached parking space. In contrast, residents who are looking for rental units are more likely to have flexible demands for parking.



Figure 9. Rental tenure.

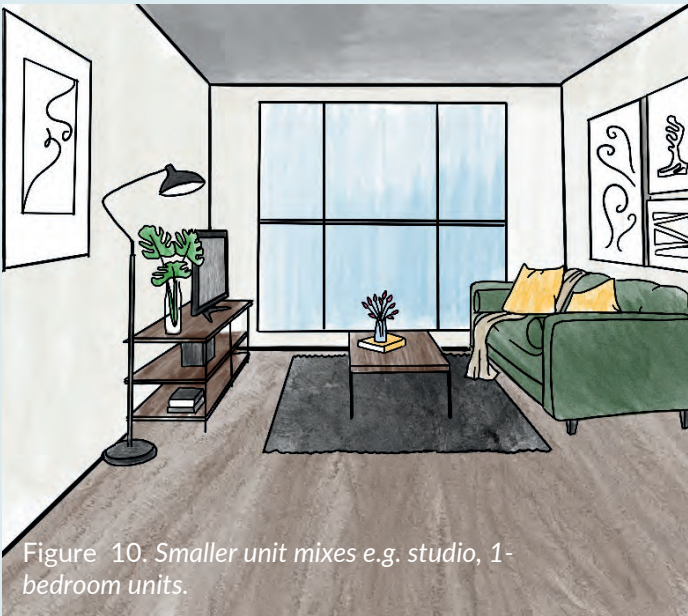


Figure 10. Smaller unit mixes e.g. studio, 1-bedroom units.

[27] City of New Westminster (2024a).  
[28] City of New Westminster (2024b).  
[29] City of New Westminster (2024a).



IMPLEMENT BICYCLE PARKING THAT IS CONVENIENT TO ACCESS AND APPROPRIATELY SCALED TO MEET EVOLVING AND DYNAMIC USER NEEDS.

While bicycle parking provision is guided by City Bylaws, proposed car-light developments have sought to provide higher proportions of bicycle parking to substitute the reduction in parking provisions. For example, the 810 Agnes Street development proposed providing 550 bicycle parking spaces as part of their TDM strategy following a 35.5% reduction in vehicle parking [30].

Key Features

- Integrate secure bicycle parking on the ground floor or lobby space. Ideally, bicycle parking would be clearly marked and placed close to the elevators, with easy access from the building lobby space.
- Accommodate a larger number and wider variety of bicycles to encourage transitions towards day-to-day bicycle use.
- Incorporate bicycle maintenance facilities, such as bike wash and repair stations.
- Include electric charging facilities within bicycle parking to support the increasingly popular use of e-bicycles and other electric micromobility devices.
- Avoid excessive supply of bicycle parking. It is important to balance providing bicycle parking with the high costs that may be required to construct underground parkades to house them, where bicycle-to-user ratios may be poorly calibrated.

Limitations

- There is currently a seeming lack of consensus around what precise ratios of various bicycle parking would best meet the needs of car-light communities. As such, there is a pressing need to draw on or call for more monitoring and evaluation of the bicycle parking use rates within and across existing and future car-light residential projects, to better model bicycle parking needs (while observing the limitation that behaviours may continue to change depending on the provided parking supply).

Rationale

- Placing some bicycle parking on the ground floor could help alleviate the need for extensive underground parkade construction while allowing for accessibility and ease of use. To ensure security, the bicycle parking should be located in visible areas with relatively high foot traffic, and the doors leading into storage should be well-lit and within sight of security cameras.
- Several developers emphasized that the theoretical cost savings generated by the reduction of underground parking construction may be reduced as a result, which could affect the financial viability of projects. Additionally, this may lead to reduced space and resource allocations towards enlarging other vibrant facilities for socializing and community-building.
- One developer highlighted that increasingly, municipalities have indicated their interest in seeing the provision of e-bicycle charging facilities in bicycle parking rooms.
- Several municipalities have updated their vehicle parking policies to incorporate e-bike charging facilities alongside electric vehicle charging stations: For example, North Vancouver requires that all secure bicycle storage must include Level 1 (110v) electric outlets for electric bicycle charging [31].

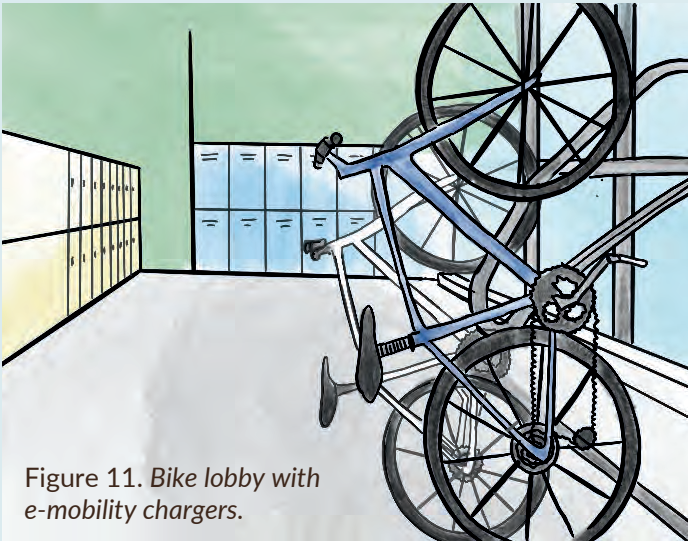


Figure 11. Bike lobby with e-mobility chargers.

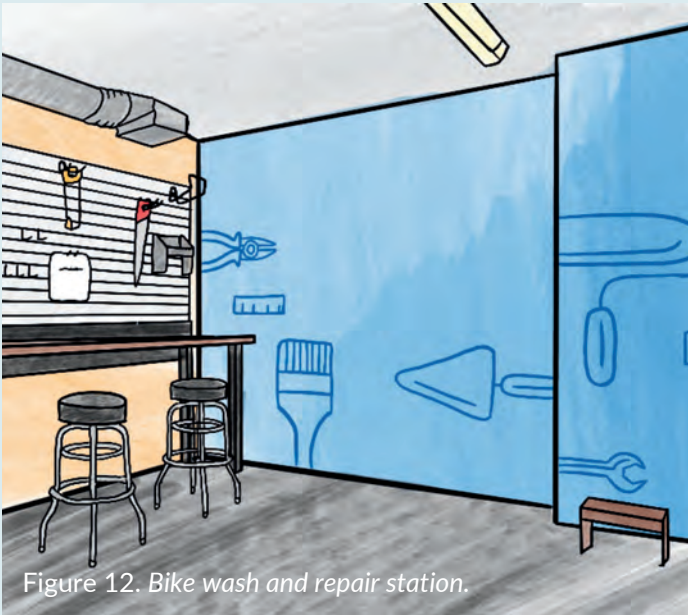


Figure 12. Bike wash and repair station.

[30] Be Heard New West (2023).

[31] PlugInBC (2024).

BUILDING-SCALE RECOMMENDATION

AVOID EXCESSIVE SUPPLY OF VISITOR PARKING.

City By-law 8225 (2020) currently requires the provision of 0.2 off-street visitor parking spaces per dwelling unit in multiple-dwelling units.

Key Features

- Avoid over-supplying visitor parking.

Limitations

- There is currently a seeming lack of consensus around the ratio of visitor parking that would best meet the needs of car-light communities. There is a need to model visitor parking use rates within and across existing and future car-light residential projects, to better model visitor parking needs.

Rationale

- There may be redundancy in providing excessive visitor parking in dense and urban neighbourhood contexts where there is already an extensive and accessible transit network.

IMPLEMENT WAYFINDING STRATEGIES AND CONTRIBUTE TO PLACE-MAKING.

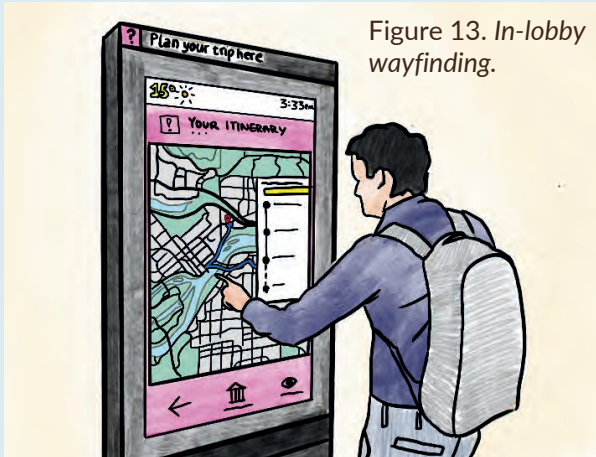


Figure 13. In-lobby wayfinding.



Figure 14. King Portland Centre, Toronto, Ontario.

City staff engagement with First Nations around the visioning process for the 22nd Street Skytrain Station has indicated the interest of First Nations staff in exploring wayfinding as a means of improving the visibility of the Coast Salish context and Indigenous culture [32].

Key Features

- Utilize signages and maps to signify the location of transit and amenities, and overall increase the ease of navigation.

Limitations

- Some curb spaces may have limited available space for wayfinding signages without disrupting the pedestrian environment. Wayfinding may also be an additional in-house amenity or design feature that would have to be considered in the development process.
- As travel networks change over time, wayfinding signage will also need to be updated. Therefore, it is necessary to determine to whom this responsibility falls, and how the changes will be funded.

Rationale

- Wayfinding is an integral part of creating a successful car light community where pedestrians can easily navigate themselves around the neighbourhood.
- Wayfinding can contribute to place-making. Having distinct consistent signages and maps that pertain to a specific area creates a sense of place which fosters community identity.

[32] Corporation of the City of New Westminster (2023).



CONSIDER THE PROVISION OF THIRD-PARTY BIKE-SHARE AND CAR-SHARE AMENITIES.

One designated third party car-share parking space currently exists on-street near 22nd Street Skytrain Station. The City’s e-bike share feasibility study was also concluded in January 2024 and the City has indicated interest in implementing such a program throughout the City [33].

Key Features

- Bike-share and car-share amenities could appease and encourage the perception of car-light living to residents who may perceive themselves as occasionally—but not perpetually—requiring the use or ownership of bicycles or cars.
- Operated by existing third-party service providers, such as Evo or Modo.
- Designated car-share and bike-share parking spaces could be placed on-street, within the sightline of the building lobby entrance, or signs could be placed in the building lobby indicating the location of the parking space.

Limitations

- There is limited information on the extent of bike-share or car-share services that should be provided in car-light building developments.

Rationale

- As proposed in the interim report, the promising practices indicate that bike-share and car-share programming could potentially be offered and operated within the building, typically underground or curbside (e.g. third-party bike share like Lime), to encourage easy and convenient access.
- However, with car-sharing programs in particular, third-party operation (e.g. Evo and Modo) would be more suitable as there is a strong risk of in-house programs being discontinued by strata during post-occupancy because of unwanted car insurance and maintenance responsibilities. The risks associated with in-house car-share programs were especially emphasized in the developer interviews.
- The risks of in-house bike-share programs were not discussed as extensively in the developer interviews, although there was one example from a developer where shared electric cargo bikes received pushback from strata because of liability concerns.

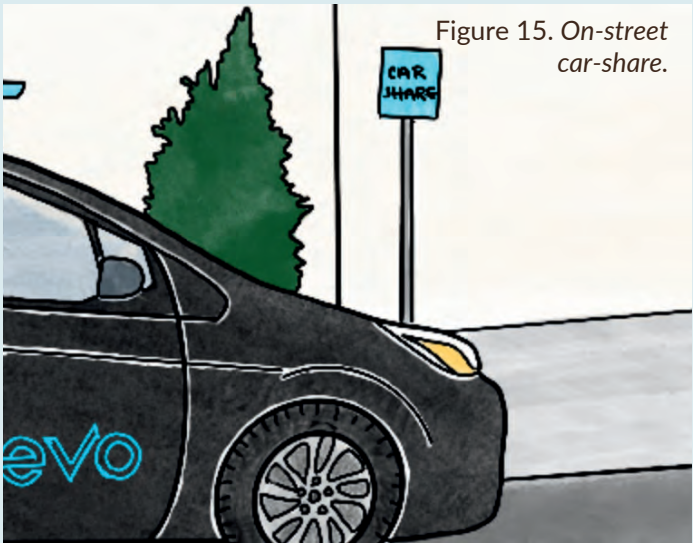


Figure 15. On-street car-share.

[33] Be Heard New West (2023).

ENSURE THOUGHTFUL DESIGN OF PICK-UP DROP-OFF (PUDO) ZONES FOR EFFICIENCY OF LOADING AND OTHER OPERATIONS.

City By-law 8184 (2020) currently requires the provision of one off-street loading space per building (with more than 30 dwelling units), which can be shared with a visitor parking space and/or commercial uses in a mixed use building. Off-street loading spaces are to be a minimum of 7.6m in length, 3.0m in width and 4.0m in height.

Key Features

- Provide larger and better-priced off-street loading zones to accommodate a greater volume of deliveries and passenger PUDO services (e.g. ride-hailing operations).
- Provide clear signposting of loading and dwelling time regulations to allow the seamless routing of various vehicles.
- Space may be allocated for on-street or off-street temporary parking reserved for delivery drivers, with stricter sign-posted limits on dwelling time.

Limitations

- The feasibility of expanding loading zones is dependent on lot size and should be scaled in proportion to the number of residential units and their anticipated PUDO demands.
- Successful operation of the PUDO zone is ultimately dependent on the anticipated dwelling times of these vehicles to prevent congestion and blockages.
- The provision of a larger PUDO zone is constrained by the amount of curbside space available and may lead to the corresponding shrinkage of pedestrian and cyclist thoroughfares.

Rationale

- Better-designed PUDO zones can accommodate a larger and greater mix of short-term traffic around buildings, and reduce the incidence of double-parking or illegal parking on streets leading to obstructions of pedestrian and cyclist thoroughfares.
- For example, Washington D.C. lengthened loading zones from 40 feet (12.2m) to 100 feet (30.5m) where possible and implemented meters at the loading zones to encourage a reduction in dwelling time. In 2021, White Rock B.C. similarly proposed zoning bylaw updates that would require one Class I Loading Space of a minimum length of 9.0m for every residential building with more than 20 dwelling units.



Figure 16. Pick-up drop-off (PUDO) zone.



INCLUDE AN ADEQUATE DELIVERY ROOM TO ACCOMMODATE GROWING AND CHANGING DELIVERY NEEDS.

*BC Housing [34] and Canada Post [35] design guidelines currently require that secure mailboxes are located in the building lobby area or a weather-protected common area. Buildings with more than 100 units will further require a secure mailroom and rear-loading mailboxes.*

**Key Features**

- Establish a sufficiently large delivery room to avoid overcrowding the lobby area.
- Ensure the delivery room is accessible from the front of the lobbies to encourage use.
- Include a small fridge in the delivery room to accommodate temperature-sensitive food deliveries.
- Enhance the use of delivery rooms by including resident education and signposting, alongside delivery notification systems to ensure awareness and timely collection of deliveries.

**Limitations**

- The delivery room may require staffing to sort and organize packages and other deliveries if it is not intuitively designed for standard delivery operations to be conducted.
- Building management would have to account for fridge service and maintenance fees.

**Rationale**

- With the recent increase in e-commerce, consideration for an adequate delivery room allows for efficient deliveries and reduces the time of loading zones being occupied.
- BC Housing recommends establishing a building intercom system that could enable residents to receive calls from and allow building access to deliveries, and the use of video surveillance in common spaces to reduce package thefts [36].
- The implementation of a fridge/freezer in delivery rooms for perishable items such as food has also been mentioned by developers as requests they've heard from tenants.



Figure 17.  
Package  
delivery room.

[34] BC Housing (2023).  
[35] Canada Post (2016).  
[36] BC Housing (2023).

# NEIGHBOURHOOD-SCALE RECOMMENDATION

## PRIORITIZE THE IMPLEMENTATION OF COMPLETE COMMUNITY-ORIENTED PLANNING INTERVENTIONS ALONGSIDE BUILDING DEVELOPMENT.

### Key Features

- Invest in developing complete communities to include public plazas, retail amenities, grocery options and other public realm enhancements that would allow vibrant spaces for residents of different needs and backgrounds to live, work and play.
- Communicate the availability of key destinations, active transportation pathways (e.g. the nearby cycling greenway) and attractions within the community to new residents, by way of an informational brochure or booklet during move-in processes.

### Limitations

- Requires long-term planning and coordination of the community’s land use with multiple public and private bodies (e.g. Translink, municipality, developers).

### Rationale

- Potential car-light residents would be most incentivized to move into buildings located within communities that are complete, and in which they can meet most needs within a very short transit time or travelling distance.

## PRIORITIZE THE DEVELOPMENT OF PEDESTRIAN-ORIENTED INFRASTRUCTURE.

### Key Features

- Establish and maintain street and curbspace infrastructure that are relevant to pedestrians, such as wide and accessible sidewalks, well-lit streets, and safe crossings with pedestrian bulb outs.

### Limitations

- Despite curbspace improvements benefitting the larger community, it may come at an increased cost to the new housing, as the responsibility of improving the development-adjacent curbspace often falls to the developer.
- Individual development projects may result in piecemeal, isolated curbspace improvements rather than an entire block or neighbourhood improvement to the pedestrian environment. As a result, there is a lack of continuity with and accessibility for pedestrians on a larger neighbourhood scale.

### Rationale

- Fostering a successful car-light neighbourhood entails the presence of pedestrian-oriented infrastructure and curb space. Having infrastructure that enhances the pedestrian experience such as adequate lighting for a sense of safety, or widely-paved walkways and benches for accessibility increases the overall appeal for pedestrians.
- Effective implementation of this could come from developers; however, developers have highlighted that they would appreciate greater support from municipalities to work collaboratively to ensure cohesive builds.
- Intentional implementation of these types of infrastructure supports the increased preference of walking and shift away from driving. In addition, the pedestrian environment is critical for accessing transit infrastructure like the SkyTrain and buses to further encourage sustainable transportation use.





## CONCLUSION & NEXT STEPS

**The purpose of this report is to provide recommendations that enable successful, car-light living at the 22nd Street SkyTrain Station area in the City of New Westminster.**

The final recommendations are a starting point to support future, potential strategies that could enable car-light living at the building and neighbourhood scales. Ultimately, the recommendations contribute to the City's bold vision of a climate-friendly community, one with a future where its residents are independent of cars and can confidently rely on sustainable transportation for their daily mobility needs.

**However, it should be acknowledged that implementing car-light buildings and communities within Metro Vancouver, let alone North America, is still a fairly novel practice, particularly within relatively less dense neighbourhoods with predominantly single-family houses.**

Moreover, our literature reviews revealed that there is currently a lack of North American case studies that can be used as a reference. As such, there are bound to be contextual challenges and other obstacles that will arise with implementing new practices such as car-light buildings in the Canadian landscape. These challenges do not necessarily indicate that car-light buildings and communities are completely unfeasible, or that they are not worth pursuing. Instead, we encourage the discovery of these challenges and obstacles through the use of monitoring and evaluation methods. Post-occupancy monitoring and evaluation strategies such as resident surveys, parking audits, and programming performance reviews can be used to identify areas for optimization. Through the systematic use of the monitoring and evaluation methods on a long-term horizon, the City can develop a stronger understanding of the balance of different priorities that inform the successful development and operation of car light buildings.

**The consideration of implementing car-light living in the City has never been more crucial and appropriate than now.**

Addressing climate change and implementing more sustainable communities has been at the forefront of planning practice globally for a long time. Furthermore, at the time of writing this report, the Province of British Columbia released Legislation Bill 47 regarding municipally designated transit-oriented areas where parking minimums are removed. As such, the City of New Westminster is poised to enter a new planning and community era of car-light living. Through this report, the team aspires to empower the realization of a bold vision for the 22nd Street SkyTrain Station area. The recommendations are a starting point to assist the City with implementing car-light buildings within the Connaught Heights neighbourhood and potentially—with time—in other transit-rich neighbourhoods in the City.

# REFERENCES

## The Connaught Heights Neighbourhood

City of New Westminster. (2023). 22nd Street reGENERATE Ideas Challenge. <https://www.newwestcity.ca/planning-building-and-development/new-westminsters-official-community-plan/ocp-implementation-projects/22nd-street-regenerate>

City of New Westminster (2019). Backgrounder for the 22nd Street SkyTrain Station Area Master Plan [Report]. [https://www.newwestcity.ca/database/files/library/22ndStreetBackgrounder\\_Updated\\_July\\_2019\(1\).pdf](https://www.newwestcity.ca/database/files/library/22ndStreetBackgrounder_Updated_July_2019(1).pdf)

City of New Westminster (2022). All ages and abilities active transportation network plan [Report]. <https://www.newwestcity.ca/database/files/library/11.pdf>

Foster, C.E., Panter, J.R. & Wareham, N.J. (2011). Assessing the impact of road traffic on cycling for leisure and cycling to work. *International Journal of Behavioral Nutrition and Physical Activity*, 8(61). <https://ijbnpa.biomedcentral.com/articles/10.1186/1479-5868-8-61>

Layton, R. (2017). Walkability standards: Test of common assumptions. *Design Concepts for the City and County of Denver*. <https://www.dcla.net/blog/walkability-standards#:~:text=Distances%20ranging%20from%201%2F8,standard%20for%20determining%20walkable%20access>.

Province of British Columbia (2023). Legislation introduced to deliver more homes near transit hubs. <https://news.gov.bc.ca/releases/2023HOUS0063-001748>

Province of British Columbia (2023). Transit Oriented Development areas - Policy framework. [https://news.gov.bc.ca/files/TOD\\_Areas\\_PolicyFramework.pdf](https://news.gov.bc.ca/files/TOD_Areas_PolicyFramework.pdf)

Seeton, M. & Roxburgh, L. (2023). *Walking tour of the 22nd Street SkyTrain Station site*. City of New Westminster, B.C. Accessed October 20, 2023.

Seltzer, S. (2021). Car-reduced neighborhoods as blueprints for the transition toward an environmentally friendly urban transport system? A comparison of narratives and mobility-related practices in two case studies [Table 1]. *Journal of Transport Geography* 96, 103126. <https://doi.org/10.1016/j.jtrangeo.2021.103126>

Statistics Canada. (2021). Census Profile of New Westminster [census subdivision].

Statistics Canada. (2021). Census Profile of 59152835 [dissemination area].

Statistics Canada. (2021). Census Profile of 59152836 [dissemination area].

Statistics Canada. (2021). Census Profile of 59152837 [dissemination area].

Union of BC Municipalities (2023). Province introduces Transit Oriented Development legislation. <https://www.ubcm.ca/about-ubcm/latest-news/province-introduces-transit-oriented-development-legislation>

## Key Findings from Promising Practices

Baker, D., Briant, S., Hajirasouli, A., Yigitcanlar, T., Paz, A., Bhaskar, A., Corry, P., Whelan, K., Donehue, P. & Parsons, H. (2023). Urban freight logistics and land use planning education: Trends and gaps through the lens of literature. *Transportation Research Interdisciplinary Perspectives* 17, 100731. <https://doi.org/10.1016/j.trip.2022.100731>

Cauwenberg, J. V., Clarys, P., Bourdeaudhuij, I. D., Ghekiere, A., de Geus, B., Owen, N. & Deforche, B. (2018). Environmental influences on older adults' transportation cycling experiences: A study using bike-along interviews. *Landscape and Urban Planning* 169, pp. 37–46. <http://dx.doi.org/10.1016/j.landurbplan.2017.08.003>

City of New Westminster. (2014). Transportation master plan. [https://www.newwestcity.ca/council\\_minutes/0616\\_14/2014-06-11%20New%20West%20Master%20Transportation%20Plan%20DRAFT.pdf](https://www.newwestcity.ca/council_minutes/0616_14/2014-06-11%20New%20West%20Master%20Transportation%20Plan%20DRAFT.pdf)

Institute of Transportation Engineers. (n.d.). Curbside management practitioners guide. <https://s23705.pcdn.co/wp-content/uploads/2019/03/ITE-Kerbside-Curbside-Management-Guide.pdf>

Institute for Transportation and Development Policy. (2022). Access and persons with disabilities in urban areas. <https://www.itdp.org/publication/access-for-all-persons-with-disabilities/>

Mohiuddin, H., Fitch-Polse, D. T. & Handy, S. L. (2023). Does bike-share enhance transport equity? Evidence from the Sacramento, California region. *Journal of Transport Geography* 109, 103588. <https://doi.org/10.1016/j.jtrangeo.2023.103588>



# REFERENCES

Rothberg, J. (2023, November 15). Bike shares, e-bikes gain speed as amenity. Multi-housing News. <https://www.multihousingnews.com/multifamily-adoption-of-bike-share-and-e-bike-programs/>

Selzer, S. (2022). Car independence in an automobile society? The everyday mobility practices of residents in a car-reduced housing development. Travel Behaviour and Society, 28. <https://doi.org/10.1016/j.tbs.2022.02.008>.

Smith, C. (2017). (rep.). Making spaces: Bicycle storage in multi-unit residential buildings on the University of British Columbia campus. Vancouver, BC: University of British Columbia.

TowerHamlets. Car free developments. Accessed March 20, 2024, at [https://www.towerhamlets.gov.uk/ignl/transport\\_and\\_streets/Parking/car\\_free\\_development.aspx](https://www.towerhamlets.gov.uk/ignl/transport_and_streets/Parking/car_free_development.aspx)

TransLink. Commutifi Program. Accessed March 20, 2024, at <https://www.TransLink.ca/rider-guide/travelsmart/TransLink-for-organizations/commutifi-program>

TransLink (2022). 54-trip planning touch screens now available at Transit Hubs [Press release]. Accessed March 20, 2024, at <https://www.TransLink.ca/news/2022/august/trip%20planning%20touchscreens%20now%20available%20at%2054%20transit%20hubs>

## Monitoring and Evaluation

BC Housing Research Centre (2021). Mazarine Lodge - Modular supportive housing resident outcomes [Report]. <https://www.bchousing.org/sites/default/files/rcg-documents/2022-04/Mazarine-Lodge-Modular-Supportive-Housing-Resident-Outcomes-Report.pdf>

Doyle, D. (2021). The power of resident satisfaction surveys [Article]. Multi-Housing News. <https://www.multihousingnews.com/the-power-of-resident-satisfaction-surveys/>

Tatian, P. A. (2016). Urban Institute Performance measurement to evaluation [Report]. Metropolitan Housing and Communities Policy Center. [https://www.urban.org/sites/default/files/publication/78571/2000555-performance-measurement-to-evaluation-march-2016-update\\_1.pdf](https://www.urban.org/sites/default/files/publication/78571/2000555-performance-measurement-to-evaluation-march-2016-update_1.pdf)

TransLink & Metro Vancouver (2019). The 2018 regional parking study technical report [Report]. <https://metrovanancouver.org/services/regional-planning/Documents/regional-parking-study-technical-report.pdf>

## Key Recommendations

BC Housing (2023). Design guidelines and construction standards [Including Technical Bulletin Updates]. Province of British Columbia. <https://www.bchousing.org/publications/BCH-Design-Guidelines-Construction-Standards.pdf>

Be Heard New West (2023). 810 Agnes Street. City of New Westminster. Accessed March 23, 2024, at <https://www.beheardnewwest.ca/810-agnes-st>

Be Heard New West (2024). E-bike share feasibility study. City of New Westminster. Accessed March 23, 2024, at <https://www.beheardnewwest.ca/e-bike-share>

Canada Post (2016). Delivery planning standards manual for builders and developers. [https://www.canadapost-postescanada.ca/cpo/mc/assets/pdf/business/standardsmanual\\_en.pdf](https://www.canadapost-postescanada.ca/cpo/mc/assets/pdf/business/standardsmanual_en.pdf)

City of New Westminster (2024a). Planning, building and development: Family friendly housing policy. Accessed March 20, 2024 at <https://www.newwestcity.ca/housing/family-friendly-housing>

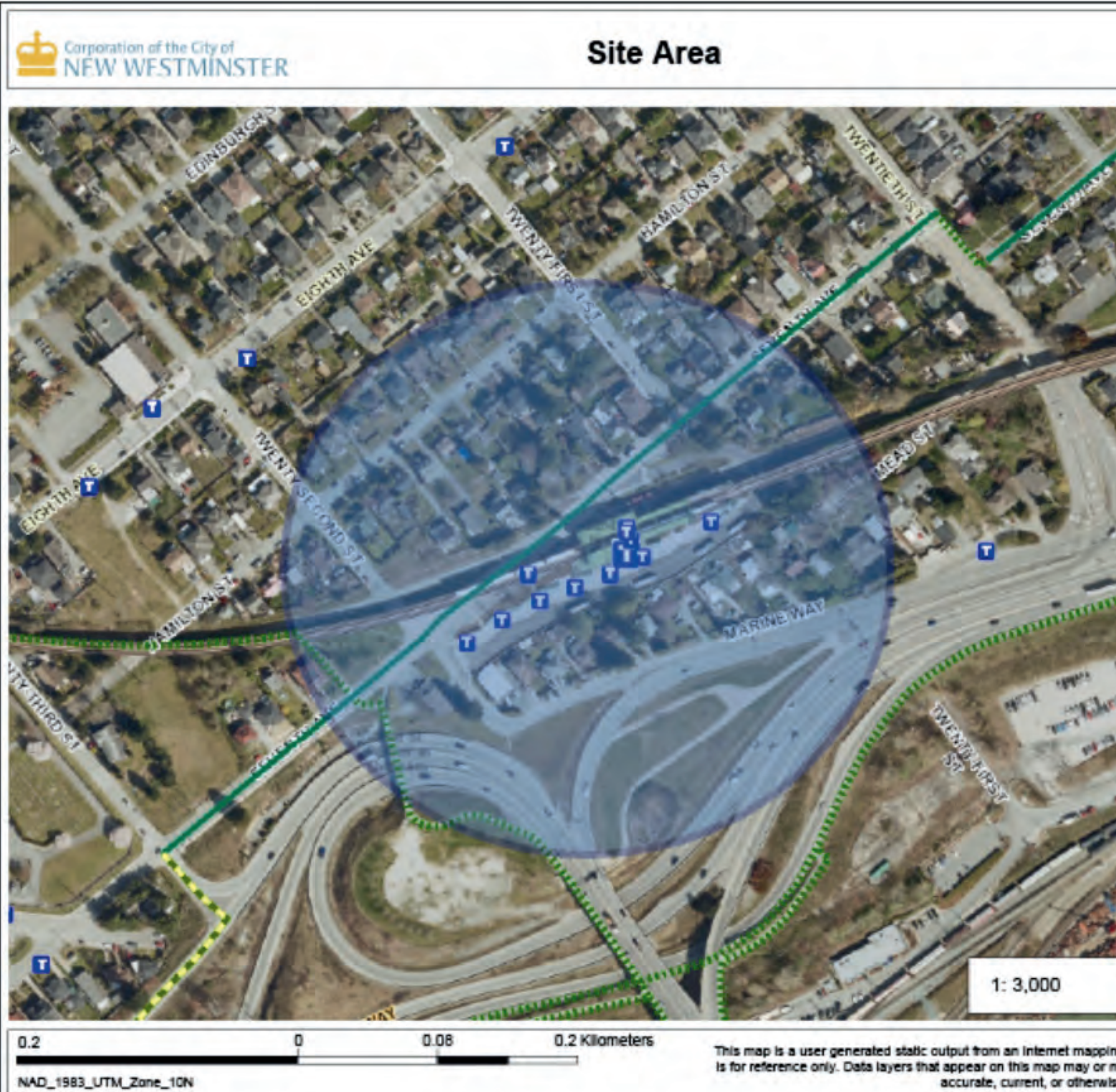
City of New Westminster (2024b). Planning, building and development: Rental housing initiatives. Accessed March 20, 2024 at <https://www.newwestcity.ca/housing/inclusionary-and-rental-housing-initiatives>

Corporation of the City of New Westminster (2023). Report on climate action, planning and development: 22nd Street station area visioning update. <https://www.beheardnewwest.ca/39288/widgets/168416/documents/123968>

PlugInBC (2024). Electric Vehicle Policies. Accessed March 23, 2024, at <https://pluginbc.ca/policy/>

Province of British Columbia (2024). Provincial policy manual: Transit-oriented areas [Version 2.0]. <https://www2.gov.bc.ca/assets/download/C0FB024045A243C5ADA5543893363A9F>





# APPENDIX



# APPENDIX A - PROJECT APPROACH AND WORKPLAN

## Theoretical Approach: Densified Car-Light Development

In response to the City’s aspiration for a climate-friendly community at the 22nd Street SkyTrain station area, the team’s approach revolves around the concept of densified car-light development.

Densified car-light development will prioritize features such as compact building footprints, provision of bike storage facilities, and car-sharing or other parking demand-alleviating options within the developments. To promote sustainable reduction in long-term car dependence, dimensions of mobility experiences that impact the preferences of residents must be considered, including the spatial arrangement of active transportation facilities and infrastructure within the building and the neighbourhood at-large, perceived individual competencies, and shared building spaces (including curb spaces) that impact communal mobility patterns.

Additionally, densified car-light residential development may create unintended consequences or challenges to realization, including limited local acceptance, increased traffic congestion and varied responses from developers to reduced parking standards. By practicing sensitivity to the neighbourhood context and identifying appropriate case studies and best practices, the team will seek to address and mitigate these impacts and balance reduced parking provisions with greater transit and active transportation accessibility.

## Project Phases

Through a five-phase approach, the team will conduct a comprehensive exploration of key case studies and best practices in relation to the five identified project objectives. Phases 1 and 2 will focus on developing an understanding of the Connaught Heights neighbourhood community and its residents, in addition to investigating key challenges and opportunities in managing transportation demand, curb space, building design for deliveries, and enabling car-free living in car-light neighbourhoods. Phase 3 will seek to engage local and regional developers to gain their insights into the constraints and opportunities associated with car-light building design. Phases 4 and 5 will synthesize and contextualize findings from earlier phases, culminating in the production of evidence-informed recommendations on the granularities of designing for car-light buildings.

By fostering a car-light urban environment, we aim to achieve a reduction in greenhouse gas emissions, optimize public transportation use, and create vibrant, walkable communities.

# Project Workplan

## PHASE 1: BACKGROUND RESEARCH

### [1.1 Review background City reports and related resources](#)

The team will review relevant City reports to ensure a deeper understanding of the historical and current context surrounding the area, the City's plans, and the community's needs and aspirations. Understanding this context is essential for aligning our planning approach with the city's goals and priorities.

### [1.2 Review demographic profile summary of local residents](#)

Demographic data can shed light on potential disparities or inequities within the community. By drawing from publicly available information and shared City resources, the team will assemble a profile of local residents to allow identification of groups that may have unique transportation needs or face particular challenges in accessing transit, and spotlight recommendations that address these disparities.

### [1.3 Team site visit of current 22nd Street Station facilities](#)

The team will organize a site visit to the current 22nd Street Station, to facilitate observations of current pedestrian, cycling and commuter infrastructure, and the diversity of commuters to the neighbourhood. Traffic hotspots where conflicts frequently occur between commuters, automobile drivers and other types of transportation users may also be identified.

## PHASE 2: PROJECT RESEARCH

### [2.1 Review TDM facilities, amenities and programming best practices](#)

The team will conduct a comprehensive review of best practices and case studies related to Transportation Demand Management (TDM) facilities, amenities, and programming. It intends to identify proven strategies for promoting sustainable transportation choices within car-light multi-unit residential buildings.

### [2.2 Review curb space management best practices](#)

Concurrently, the team will examine established best practices and case studies for the efficient management of curbside spaces. The goal is to understand effective design of curb space to accommodate various needs, including deliveries, loading, temporary parking and others, while minimizing conflicts.

### [2.3 Review building design for deliveries best practices](#)

The team will simultaneously explore best practices and case studies for designing buildings to facilitate efficient and convenient deliveries. It aims to identify innovative building design solutions that accommodate delivery services while maintaining a car-light environment.

### [2.4 Review equity, accessibility and Reconciliation-focused best practices](#)

Additionally, the team will review best practices and case studies in promoting equity, accessibility, and Reconciliation in transportation and building design. This will include exploration of accommodating a diversity of community needs, including residents that may rely on personal vehicles and/or residents with mobility challenges.

### [2.5 Establish interim summary findings from each best practices sub-report](#)

Sub-reports will be developed for each of the Phase 2 workplan items. To provide a snapshot of progress in Phase 2, an interim report will be compiled to highlight preliminary insights across the four sub-reports.

## PHASE 3: ENGAGEMENT

### [3.1 Develop interview approach and guide](#)

The team will craft an interview approach and guide tailored to engage developers and gather their insights on opportunities and constraints in developing car-light buildings. Furthermore, the team will emphasize that the engagement is conducted independent of the City's official representatives and interests, and instead for student research purposes.

### [3.2 Scope potential interviewees](#)

The team will identify and evaluate potential interviewees within the developer community who hold expertise in developing car-light buildings in the region or City.

### [3.3 Draft and distribute outreach emails](#)

This workplan item involves creating and sending outreach emails to developers to invite them to participate in interviews. These emails will articulate the purpose of the interviews and encourage their involvement in sharing their insights on the subject.

### [3.4 Conduct interviews](#)

Using the structure provided by Item 3.1, interviews will be conducted virtually and/or in-person with developers that are interested in participating.

### [3.5 Summarize and develop themes of findings](#)

Following the developer interviews, the team will analyze the gathered data to identify recurring themes, insights, and patterns. This step aims to distill the developers' perspectives into key findings that will inform actionable recommendations for the project, enhancing the contextualisation of the recommendations' feasibility and applicability to local context.



## PHASE 4: RESEARCH ANALYSIS

### [4.1 Develop recommendations for the final report](#)

The team will synthesize the insights gathered from the review of best practices and case studies (2.1 to 2.4) and the developer interviews (3.4) to develop a robust set of recommendations for the final report. These recommendations will encompass opportunities for and limitations to the implementation of car-light building designs, ensuring they are both informed by best practices and reflective of real-world insights.

### [4.2 Consolidate visuals for illustration of recommendations](#)

Collection and organization of visuals will occur to supplement the recommendations, including case study photographs and relevant illustrations. These visuals will enhance the final report by providing clear and visually appealing representations of the proposed car-light building design concepts.

### [4.3 Imagine different user profiles and their diverse experiences of recommendations](#)

To comprehensively envision the recommendations in practice, the team will envision various user profiles and explore how different individuals and groups may experience and benefit from the recommendations. By considering diverse user perspectives, this step aims to ensure that the proposed car-light building designs cater to the needs and preferences of a wide range of potential residents and stakeholders. Chapter 3 of the City of Mississauga Transportation Master Plan, approved by City Council in May 2019, captures this visualization exercise.

## PHASE 5: REPORTING

### [5.1 Prepare the draft final report](#)

The team will compile and assemble all the findings, recommendations, and visual elements into a comprehensive draft final report.

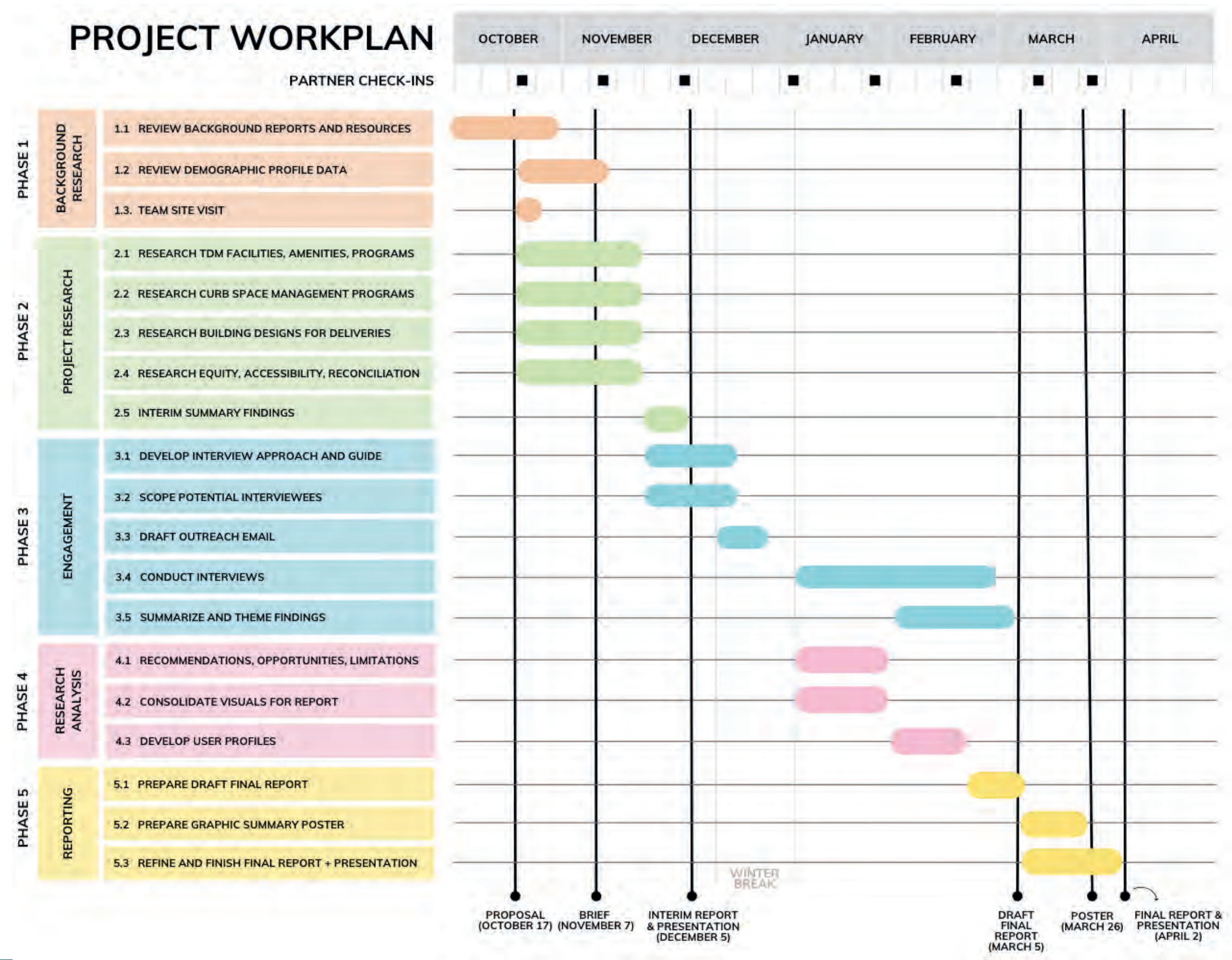
### [5.2 Prepare the graphic summary poster](#)

This workplan item involves the creation of a concise and visually engaging graphic summary poster. The poster will distill the most important findings and recommendations into a format that is easily digestible for stakeholders and the public, serving as a powerful communication tool.

### [5.3 Refine and complete final report and final presentation](#)

Following the creation of the draft final report and graphic summary poster, the team will undertake a thorough review and refinement process. This will include addressing feedback, improving the clarity and coherence of the report, and finalizing the presentation for the project's conclusion.

Project Workplan  
Timeline





# APPENDIX B - SITE VISIT NOTES

October 20, 2023 [Friday, 1 pm]

- Demographics
    - Observed commuters primarily people of colour (particularly south-east Asian)
    - Mostly single people, some young families
  - From New West
    - Significant regional station / connection pt
    - Transfer onto bus is very high
    - Rapid bus charging / improving emergency exits
    - More coverage spaces and seating
    - Bike parking might have went in at a bad time
    - Overall landscape improvements made for safety
    - Down the hill makes sense for tower development
    - 7th Ave = important / key bike and pedestrian route, connects to 7th Ave Greenway
      - Connects to library, Modo car share
      - Becomes interesting destination for 22nd, hub for connecting routes
      - Intermodal connection
      - Developers in area could pay for local improvements to transportation infrastructure
      - Bidirectional bike lane coming to 7th next year
      - Park-deficient area
    - 20th = major traffic route, lots of blockages
      - City-wide park across 20th
      - Very dependent on limited access
      - Faster you can get off 20th, the better (as a cyclist)
      - Lot of bus movement from 7th to 20th
    - Not Evo homezone currently, would like to extend it to this part of the city with further development
  - VISION: Commercial on both sides of 7th, highly redeveloped
    - Activates area for enjoyment and transportation
    - Don't want to overdeliver on retail, don't want vacant spaces
    - Wants: cafe, grocery store
    - Other areas: commercialize the corners
    - People on edge who will feel change are least supportive but others are eager to sell
  - Mostly thinking about public realm improvements in terms of right-of-way
    - High interest in community meeting space (amongst community members)
    - City-owned park is right beside the school, feels a bit exclusive as feels like under school ownership
  - Idea of taking back 10% of city roadspace and putting it twd either park space or pedestrian/cyclist infrastructure
  - City doesn't have budget/resources to do significant land acquisition
  - City-serving rather than local-serving
  - Demand for park and ride facilities, but hesitation to bring that into this area if causes further congestion
    - There is Impark parking near New West station and Columbia station but no one is really wanting to pay
    - Think about last mile — people want to use SkyTrain but how do they get here?
  - Idea of car-free zone — how to do equitably?
  - Wayfinding might be helpful but not really the focus
  - Would be good to improve connectivity to park from empty lot along 20th
    - Pedestrian/cyclist overpass idea from community but costs a lot of \$\$\$
- Want a more Paris-like model of 6 storey apartments with courtyards and interesting spaces
- Bridge / ramp = managed by ministry of infrastructure, not the city
  - Don't necessarily agree on what boundaries are whose jurisdictions
  - Industrial train lines etc all around
- Amenity space half underground but facing out onto road infrastructure (how to deal with below-grade space?)
  - Might use lower level beside station for parking
  - Could build under the station/bus loop for parking
  - Rapid transit line proposed for this area
- Integrated TOD
- Can bike all the way to DT Vancouver from the greenway here
- Family requirements for developments
  - Minimum amounts for 2 and 3 bedrooms
- Looking into raising minimums
- Car LIGHT not ZERO
- Developer interviews
  - Talk to West group (?)
  - City will facilitate introductory connections to developers
- City staff interviews: Target Development and Transportation teams

# APPENDIX C - DEVELOPER INTERVIEW QUESTIONS

Opening statement

Would you like to remain anonymous or identified in the final report?  
Do we have permission to record the call?

Context statement

- We are second-year students in the Master of Community and Regional Planning program at UBC.
- The Studio is a final graduation project, and our team has been partnered with the City of New Westminster.
- The topic of the project is successful car-light buildings in transit-rich neighbourhoods, more specifically, 22nd Street SkyTrain Station in the City of New Westminster.
- There are 5 objectives of our project ....
- Since September, we have been doing literature reviews and research on promising practices of car-light buildings from around the world.
- The purpose of our interview ... opportunities and challenges with ...

**Broad Questions**

- Can you briefly tell us about [Development firm] and the type of projects that you usually take on?
  - Can you tell us more about the successes you have had with past projects you have worked on, specifically in the realm of parking minimums and transportation demand measures?
  - Are there any other projects you have worked on that you think are innovative in these areas?
- What opportunities and challenges do you see with building car-light developments from your perspective in the development industry? (Whether that's political or financial challenges - lending)
- *I'd like to shift our conversation now towards the new provincial legislation on transit-oriented areas (TOAs) → With this new provincial legislation, developers are not required to provide residential off-street parking, as such, do you potentially see a shift towards more car-light buildings in the development industry? (Is there anything that can help or needs to change for developers to build more car-light developments?)* Why or why not?
  - *Follow-up question* → In the new world of no parking minimums, how much parking are you looking for? Is there a target number in mind for specific types of residential development how does it compare between rentals and condos? Below market and market? In addition, what would the difference in parking be for a studio versus a 1 bedroom or a 3 bedroom apartment?
- What do you think can help or needs to change for developers to build more car-light developments? (*Broader question for developer to answer - whether focusing on policy or physical infrastructure*)
  - *Follow-up question* → Who would have to initiate this change?
  - How do you believe car-light buildings can be marketed? Specific audience/demographic in mind?
  - How can municipalities help brand certain areas as car light?

**Questions on Project Objectives**

- *One of our objectives is transportation demand management strategies.* What type of TDM measures have your past projects incorporated? How have they succeeded or failed in the long term?
  - Thoughts on TDM programming? (Such as transit subsidies)
  - *If they don't mention car share* → How many Have you had experience with implementing car-share in any of your past projects? Implementing electrical vehicle charging stations - How was that experience? Is there an ideal ratio of car-share to private parking units that you have observed?
- *With the increase in e-commerce,* → What kind of shift have you seen with loading and delivery services in terms of development design?
- *Another objective of our project is on curbspace design that prioritizes people walking, biking, and taking transit, and less so about the private vehicle.* → How does this allocation of curbspace impact the development outlook of carlight buildings? Do you have examples from previous projects?
  - *Follow up* → *What* are the differences in costs and effort required to design curbspaces for more active travel over a standard sidewalk with on-street vehicle parking?
- *Equity and accessibility are important features of a successful car-light building.* How do you approach parking in terms of visitor parking and accessibility with car-lite buildings and any of your past projects?
  - *If they don't mention examples* → Broadly speaking, how have your past projects incorporated these features to advance equity and accessibility?



# APPENDIX D - FINDINGS FROM PROMISING PRACTICES

## Transportation Demand Management

Transportation demand management (TDM) strategies are vital to the realization of car-light buildings in transit-rich neighbourhoods. This section outlines TDM initiatives as they relate to walking, cycling, public transit, and driving.

### Walking

#### *Pedestrian Programming: Promoting a Culture of Walking*

The use of active modes of transportation such as walking depends not only on the provision of physical infrastructure, but also that of social infrastructure. Encouraging and fostering a culture of walking is key to the realization of a walkable, dynamic, and car-light Connaught Heights. Due to the existing dominant culture of car usage, especially in neighbourhoods with a history and design of detached, single-family homes, it can be challenging to disrupt entrenched car-based travel patterns and behaviours. Walking events and programming provide accessible and enjoyable opportunities for community members to walk around and experience their neighbourhood.

Programming to encourage walking can be implemented across multiple scales, from initiatives that are city-wide, to neighbourhood-based, to building-focused. Walking promotes sustainability, physical health, mental wellness, connection with nature and the local environment, a sense of community, urban exploration, and quiet moments of reflection; as such, any of these benefits can be used to frame and promote walking initiatives within the community. In order to attract walkers of all ages and abilities, it is important to promote, and provide options for, walking event opportunities.

Grassroots and community walking initiatives can be enjoyable, effective, and low to no-cost. Building managers and/or local residents can start a walking group and organize monthly or bi-weekly walks, using shared communal spaces such as lobbies or digital infrastructure (such as a community Facebook group) to share information about the event, including date, time, meet-up location, and the walking route. Group walking events can be promoted through a variety of lenses like community-building, general wellness, and fitness challenges.

As noted by the U.S. Department of Transportation’s ‘Implementing Pedestrian Improvements at the Local Level’ report, walking events allow people to experience the joys and benefits of walking in a safe and positive environment [A1]. This is often a necessary pretext for car-driving community members to begin considering walking for utilitarian and/or commuting trips.

[A1] U.S. Department of Transportation (1998).





Local governments can also promote walking through larger events such as temporary pedestrianization of streets for local music, markets, and other community-gathering initiatives. An example of a notable pedestrianization event in Metro Vancouver is Car Free Days [A2] (on Vancouver’s Main Street and West End neighbourhood). While a similar event in Connaught Heights’ would be much smaller in scale, it can still achieve similar objectives of encouraging people to walk and explore their neighbourhood.

Historic walking tours are another way of encouraging community members to stroll through their neighbourhood while learning something new. Tours can be co-organized with local Indigenous groups to integrate elements of Indigenous-settler dialogue and reconciliation.

## Cycling

### Bike Storage

*For multi-unit residential buildings, City By-law 8184 (2020) currently requires the provision of 1.5 spaces of long-term bike parking per dwelling unit and 6 spaces of short-term bike parking for developments with 20 or more dwelling units.*

Ample, adequate, and high-quality bike storage is necessary for accommodating existing cyclists and encouraging non-cyclists to shift towards more active transportation modes. A case study from residential neighbourhoods at the University of British Columbia found that bicycle storage in multi-unit residential buildings often does not meet resident needs nor does supply meet high demand [A3].

In 2012, Metro Vancouver conducted a household survey that supports these findings on a more regional scale, citing that residents are frustrated by a lack of secure and sufficiently sized bike parking facilities in their buildings [A4]. This points to the need for bike storage infrastructure that goes above and beyond prescribed minimums, especially in the context of car-light buildings and communities.

### Research-based promising practices for bicycle storage in multi-unit buildings reveal the following [A5]:

#### Storage Facilities

- Developers should plan and integrate additional storage spaces in multi-unit residential buildings for future bike storage capacity expansions.
  - The Danish Cycling Federation suggests building for up to a 25% increase in capacity, as “good parking boosts demand” [A6].
- Consider bicycle-oriented development design solutions, such as designing elevators, corridors, ramps, and residential units with a consideration for bicycle transport in these spaces.
- Consider bicycle parking minimums in terms of anticipated number of residents, as compared to the normative approach of the number of units.
  - This is especially relevant in the context of car-light developments and considerations of who will be attracted to this kind of housing, such as groups who do not rely heavily on personal vehicles. This includes students and young professionals who often have shared living situations with roommates.

#### Short-term Bike Storage

- Promising practices checklist
  - Easy to find – preferably on the way to a residential building entrance from key bike routes and destinations.

- Visible – to all users, not just cyclists to prevent collisions.
- On-site – a maximum of 15 metres from main entrances.
- Safe at all times of day – sited near high volumes of foot traffic, in view of residents, and near a light source.
- Sheltered – at least 25-50% should be protected from weather.
- Attractive – racks and surrounding space kept in good condition.
- Challenges with space can be overcome through measures such as in-street corrals, angled parking, and grouping racks together.

#### Long-term Bike Storage

- Promising practices checklist
  - On site and at grade/ground level – placed for accessibility and ease of use; may also contribute towards resiliency during flood events when lower parkades are too dangerous to enter and vehicles and/or fuel are inaccessible.
  - Reduces conflict for space – placed in a way that minimizes conflicts between travel modes (i.e., drivers and cyclists) as they enter/exit the property; if bike storage is unavailable on ground level, it should at least be on the first level of the parkade and feature a separate bicycle entrance.
  - Easy to find – intuitively placed, marked as bike storage, and near elevators.
  - Accessible and convenient – minimal obstacles from unit to storage to street; parkade ramp grades should be comfortable for cyclists (maximum of 7% grade compared to vehicle standard of 15%).
  - Secure – located in visible areas with relatively high foot traffic; doors into storage should be well-lit and in sight of security cameras.

[A2] Car Free Vancouver (2023).

[A3] Smith (2017).

[A4] Metro Vancouver (2012).

[A5] Smith (2017).

[A6] Celis & Bølling-Ladegaard (2008).



### Bike Storage Facilities Management

- Promising practices checklist
  - Regular maintenance – biweekly or monthly checks; yearly audit and removal of abandoned bikes; in large storage rooms, waste bins should be provided and emptied regularly.
  - Standard operating procedures – all residents should be made aware of routines regarding cleaning, repairs, and removal; these routines should be integrated into contracts with property management companies.
  - Resources for residents – post information in communal spaces, including storage instructions, rules, and responsibilities, information about routines/procedures, and reminders of 24-hour surveillance.

### Bicycle Rack Designs

- Promising practices checklist
  - Fit all bikes – 25-33% of racks should accommodate non-standard bikes such as cargo bikes; width between racks should be slightly wider than the width of two bikes' handlebars.
  - Secure and durable – should be able to easily lock the bike frame and wheel with a standard U-lock.
  - High-quality – racks should be made of carbon steel or stainless steel.
  - Easy to use – by users of all ages and abilities; if tiered or hanging racks are installed, should include a manual assist.
  - Stable – bikes should easily balance on the rack without any damage to the bike.

- Avoid the following
  - Unstable designs – avoid installing racks where bikes are held primarily by the wheel.
  - Only providing standard parking spots – should provide a mix of standard and non-standard to meet different bike designs and cyclist needs.
  - Racks that hang bikes by the wheel.
- Simple and effective rack styles include inverted U/staple racks and ring and post racks.

### *Bike-share*

Bike-share programs make cycling a more accessible and affordable transportation mode by providing public bikes for shared use on a short-term, low-cost basis. Mobi, HOPR, and Lime are several bike-share providers in the Metro Vancouver area. Bike-share is often at the municipal or neighbourhood scale, but can also be integrated into multi-unit residential buildings.

Building-scale bike-share programs are becoming increasingly implemented by developers as an amenity because of low implementation costs (at about \$40 per unit), and their high return in attracting and retaining residents [A7]. Providing a free or affordable bike-share system allows developments to be more competitive and satisfy residents; community-wide amenities such as bike-share programs are shown to increase resident satisfaction at a higher rate than individualized, in-unit amenities.

Community-wide amenities also provide a higher return rate on investments than in-unit amenities by 30-40% [A8]. Additionally, bike-sharing leads to higher property values, thus, providing further incentive for developers to include this amenity in their projects [A9]. Developer-provided bike-share amenities can also be used as a tool for developer marketing and branding, such as through bikes branded with the developer's logo (Fig. A1 & A2).



Figure A1 (left) and Figure A2 (right). *Branded bike-share in a multi-unit residential building managed by RMK Management Corp. (Rothberg, 2023).*

[A7] Rothberg (2023).

[A8] Rothberg (2023).

[A9] Zhou, Li & Zhang (2022).

Blue Sky Properties in Vancouver provides a bike-sharing system for certain properties [A10]. Under this system, residents have free access to, and use of, a dozen hybrid city bicycles after signing a liability waiver, and residents must sign bikes in and out with the on-site building manager. The bicycles have different frame styles, locks, and feature a rear basket with branding for the building. Furthermore, the bikes are maintained through a partnership with a local bike shop. Blue Sky Properties is one example of how bike-sharing can be integrated into car-light buildings as a key amenity in transportation demand management.



Figure A3. Bike-share amenity at Bosa-Blue Sky's 183 E Georgia multi-unit residential development in Vancouver, BC. (HUB Cycling, 2017).

### On-site Amenities: Bike Repair and Wash Stations

Additional amenities that encourage cycling include on-site bike repair and wash stations. Blue Sky Properties and Bosa, a local development company, collaborated to build a mixed-use, purpose-built rental at 183 East Georgia in Chinatown. 183 East Georgia, also known as BlueSky Chinatown, features 192 rental units and 240 bike parking spaces and includes both bike repair and wash stations on the first floor of the parking garage. The space features a \$750 investment from Bosa in bike repair tools that are free for residents to use through an honour system. The room is locked and accessible by a key fob from 6 am to 11 pm daily.



Figure A4 (left) and Figure A5 (right). Bike repair (left) and wash stations (right) at Bosa-Blue Sky's 183 E Georgia multi-unit residential development in Vancouver, BC. (Hub Cycling, 2017).

## Public Transit

### Information Kiosks

Having users be fully aware of public transit and how to easily navigate it is a critical component in supporting the shift away from car dependency. A case study on a car-reduced housing development in Germany found that residents believe successful car-independent mobility practices necessitate users to have certain competencies. These competencies include being able to read the timetable schedule, purchase the right ticket, and seamlessly navigate the local transit network [A11]. One way to facilitate these competencies is through mobility centers in car-light development. Lincoln is another car-reduced development in Darmstadt, Germany, that includes mobility centers for their residents. These mobility centres are located within close proximity to the residences and provide personal traveler information on navigation and public transit [A12].

TransLink's kiosks are a more local form of these wayfinding practices [A13]. Currently, TransLink has implemented 54 touchscreen transit kiosks at SkyTrain stations, bus loops, sea bus terminals, and other public transit hubs within Metro Vancouver. These kiosks aid users in planning their trips, viewing live transit schedules, and staying informed on service disruptions and updates.

Integrating digital or physical information kiosks within the residential building is hence a promising intervention. Having accessible information within the building regarding networks, schedules, and overall navigation may be effective in empowering residents to take public transit.

[A10] HUB Cycling (2017).  
[A11] Selzer (2022).  
[A12] Selzer (2022).  
[A13] TransLink (2022).



*Commuting Applications*

The use of digital applications could also be an innovative way to encourage more residents to use public transit. Certain apps such as Commutifi are data-driven commuting platforms that inform users of all commuting options based on different variables such as time, cost, and carbon emissions, and ultimately help the commuter identify the best option [A14]. These applications are often serviced through large organizations or employers, some being the University of British Columbia or Vancity Credit Union. TransLink has currently partnered with Commutifi to help subsidize the service for organizations. Raising an individual’s awareness of time and cost savings and environmental impacts may stimulate reduced dependency on personal vehicles. Therefore, the implementation of these types of applications for residents within car-light buildings could be effective in promoting public transit. Certain collaborations could be considered in order to subsidize or cover the cost of the service, such as a partnership with the developer or the inclusion of service costs in the strata fee by contract.

*Commuter Benefits*

Commuter benefits through public transit fare subsidies are another approach to incentivize public transit use and reduce dependencies on personal vehicles. This entails providing residents of car-light developments, particularly those living in proximity to transit, with subsidized transit fares or passes. Oftentimes, these passes are funded by the developer, and the passes are then distributed by the property manager in the form of transit passes. However, these subsidies are often constrained in the long-term, either through the pre-loaded value that residents are able to access or the duration that the subsidy is provided for.

The Compass for Developments program under TransLink is a local example [A15]. The program’s efforts support municipal TDM requirements by reducing reliance on parking and single-occupancy vehicle trips through the help of developers. Developers make a one-time bulk payment to TransLink to fund subsidized Compass passes, which are then distributed to residents through the strata or property manager. A 3-month pilot project was conducted in collaboration with PCI developments and King George Hub, a transit oriented development steps away from King George Station. PCI developments had funded 300 Compass passes with \$150 in stored value for residents and workers. TransLink conducted a study on this project and found that 54% of respondents stated that the project in particular helped decrease their use of private vehicles, as well 50% indicated that they plan on continuing to use transit the same amount as they did during the project.

**Driving**  
*Parking*

Car-light developments, as the name suggests, would continue to offer private parking to residents but with significantly fewer spots than traditional buildings. Developments would commonly have a parking to unit ratio of 1.0 [A16], whereas car-light buildings would have much less, usually mandating a <0.5 ratio [A17]. The management of parking within these buildings can be addressed through contracts and policies. There are numerous boroughs in London where registered car-free developments exist. These car-free developments are secured through planning agreements between the developers and the borough. In these developments, developers and landlords must inform the resident or buyer that it is car-free, and to purchase or sign a lease, they must also agree that they are not legally permitted to apply for on-street parking permits [A18].

However, certain allowances may be granted for those with blue badges, which are assigned to persons with disabilities and individuals with accessibility requirements. To allow access to short-term parking, residents are able to purchase a limited number of temporary on-street parking for visitors called visitor vouchers. Certain additional allowances are also granted to blue badge holders; for example, they may apply for 240 vouchers in a year, whereas non-blue badge holders are only allowed 30 vouchers. This case study suggests that a car-free residential parking system could potentially be modified for implementation in car-light developments. Certain residents—such as those with accessibility requirements, families with children and others—could apply through the property manager for some form of status which grants them parking from the limited pool of parking within these buildings. These types of strategies are effective ways to reduce private parking while also considering equitable access for those with accessibility needs.

*Car-share*

Residents who live in car-light buildings that do not own a car may occasionally need to access one from time to time. One way to address this short-term demand is through facilitating car-shares. Car-share companies such as Evo and Modo are a form of short-term car rental which substitutes car ownership by making cars conveniently available and rent-able by the minute or hour [A19]. Trips are scheduled digitally through a mobile/web application, and vehicles are either returned to the same location where they were picked up, or at a different location. Cars can either be found dispersed throughout the city or within designated car-share stations, some of which are located near public transit hubs or airports.

[A14] TransLink (2023).  
[A15] TransLink (2023).  
[A16] City of Burnaby (2023).  
[A17] Foletta & Henderson (2017).  
[A18] Tower Hamlets (2023).  
[A19] Modo (2023).

Research indicates that each car-share vehicle takes 15 personally-owned vehicles off the road, therefore, it is an effective way to ease traffic congestion [A20]. Implementing a designated car-share station solely for the residents of car-light buildings could be effective in encouraging reduced car ownership and providing one when needed. GWL Terrein, Amsterdam, is a successful car-light development which consists of 600 residential units with no parking spaces. Along the border of the development are several car-sharing vehicles located in designated parking spaces. The cars were very popular among residents and over a quarter of the households had purchased a car-sharing membership [A21].

Car-sharing within car-light developments could also be incentivized through subsidies and vouchers that are funded by the developer. N3 Condo is Calgary’s first car-free condominium with 167 units, located in close proximity to their public transit [A22]. When the condominium was first completed, each home-buyer was given a lifetime car-share membership and \$500 in car-share mileage credits.

Funding and/or partnerships can also be directly arranged with a car-share company. A local example of this is the residents of Irving Living, a mid-rise condo located within New Westminster, are eligible to claim a free \$500 membership and \$100 in drive time when becoming a Modo member [A23].

Figure A6. Image of Modo car-share vehicle (Modo, 2023).



On-site car-sharing availability, paired with subsidies and incentives is a potential strategy to reduce private vehicle ownership. Most importantly, providing residents with access to a personal vehicle for temporary use will help address any potential needs for occasional car use.

*Driver Programming: Carpool Matching Service*

Carpooling allows users to be more sustainable with their private vehicle usage through reduced carbon emissions and reduced commuting costs. Similarly, carpooling aids in reducing traffic congestion and may allow users to reach their destinations faster through use of HOV (high occupancy vehicle) lanes. To encourage and ease the use of carpooling at the residential building scale, property managers, strata councils, and/or resident groups can organize a carpool matching service. In this program, drivers are matched with neighbours who share a similar route and/or end-of-trip destination. Such a program can be organized in a variety of ways, depending on the needs of the community and resources available. It can be as simple as putting up a flyer in the lobby requesting that those interested in carpooling get in touch with the program organizer (through phone, email, etc.) and provide basic information such as whether they’d like to be a driver or rider, where they commute to, and what time they typically leave the house/their workplace, as this is necessary for spatial matching. Participants can be tracked and matched using a spreadsheet. Other technology, such as survey software (e.g., Qualtrics) or dedicated carpooling applications (e.g., Liftango, RideShark), can also be helpful in administrating and implementing a carpool matching service, but may require additional resources.

For instance, Liftango is an application-based service that comes at no cost to drivers and riders but requires that organizations pay an annual fee.

The University of British Columbia is currently partnered with Liftango to provide commuters with a self-serve carpool community network that is comprised exclusively of members of the UBC community, including students, staff, and faculty [A24]—and without requiring transportation planning staff to spend time and other resources organizing and administering the program itself.

Additional incentives to carpool can be applied to encourage usage. In the case of UBC, drivers who carpool can earn up to \$2 per day on their student card, which can be used to purchase a coffee or snack on campus. However, this offer is unavailable to riders who carpool. While financial incentives such as this may not be feasible in the context of a residential building, other accommodations such as dedicated carpool parking may be effective in encouraging sustainability in commuting and realizing car-light communities.

**Methods for Monitoring and Evaluation**

Given the relatively novel nature of car-light development, it is important to monitor and evaluate the effectiveness of TDM strategies, the satisfaction of residents, and the use/availability of on-site residential parking. If of use and of interest to the City of New Westminster, this preliminary list of evaluation and monitoring methods can be expanded and detailed further in the final studio report.

Tools for evaluation and monitoring

- Resident surveys (sample topics: usage of TDM amenities, user experience, resident satisfaction, travel patterns/behaviours, longitudinal impacts, accessibility, and others)
- Parking audits (including bicycle storage)
- Usage data (i.e., bike-share, car-share, wayfinding kiosks, carpooling apps, and others)
- Program performance reviews (number of participants, and others)

[A20] TransLink (2023).

[A21] Foletta & Henderson (2017).

[A22] White (2017).

[A23] Modo (2023).

[A24] University of British Columbia (2023).



# Curbspace Management

The curbspace exists at the intersection of mobility and access. It is a space along the road that can be used for numerous purposes, but has most commonly been used for parking private vehicles. As a result, the use of curbspaces for purposes besides parking is often highly contested [A25]. Curbspace management is essentially about developing an “organizational scheme that improves mobility and safety for all prioritized and optimized curb space use” [A26]. What is considered a priority and an optimal use of the curbspace may vary based on the community, municipality, location, and site context.

The City of New Westminster’s Master Transportation Plan (MTP) has outlined their hierarchy for curbspace access. The highest priority is given to sustainable transportation which includes spaces such as the sidewalk, bike lane, transit priority lanes, shared micro-mobility, and bike parking. This is followed by access for people like accessible parking, bus stops, and passengers, and then greening and activation. Curbside access for private vehicles like delivery and loading, short-term parking, and long-term parking are the lowest in this hierarchy [A27].

## Walking

The sidewalk is a public space that is essential not only for walking, but for connecting people to and from other modes of transportation, like a SkyTrain station, bus exchange, bicycle lane, or regional greenway. A safe and comfortable pedestrian experience navigating the curbspace is critical for ensuring a walkable and livable community, and as such, is ranked highly in the City’s hierarchy of curbspace access.

### Pedestrian Bulb-out

A pedestrian bulb out, also known as a curb extension, is when the sidewalk is extended into the parking lane at intersections. This curbspace design increases the visibility of pedestrians at intersections and crosswalks, and reduces the number of vehicle lanes they must cross. Additionally, vehicles are forced to turn more slowly at intersections with pedestrian bulb outs, thus reducing road speeds and improving the overall walking and cycling experience [A28].

Figure A7. The City of New Westminster’s hierarchy of curbspace access outlined in their Master Transportation Plan (2020).



Figure A8. A pedestrian bulb-out reduces the number of lanes one has to cross, while also increasing their visibility at the intersection to oncoming vehicles (Institute of Transportation Engineers, n.d.).



[A25] Institute of Transportation Engineers (n.d.).  
[A46] Institute of Transportation Engineers (n.d.).  
[A27] City of New Westminster (2014).  
[A28] Institute of Transportation Engineers (n.d.).



*Separation from Vehicle Lane*

Another element of the curbspace that prioritizes walking is the use of parklets, which act as a physical buffer between the two modes. Parklets were situated on the curbspace in the Market and Octavia car-light development to encourage pedestrian safety and activity [A29]. Alternative features like a tree-lined median or even a bicycle lane would also help separate the sidewalk and the vehicle lane.

*Curb Cut-free Sidewalk*

A curb cut is a ramp in the sidewalk that primarily facilitates walking and cycling movement between a higher grade sidewalk and the street level. Curb cuts are also used for vehicles to be able to enter the sidewalk to access off-street spaces. Therefore, reducing the presence of vehicular curb cuts prevents them from entering the sidewalk and accessing off-street parking, hence creating a more seamless walking environment that is uninterrupted by vehicles [A30].

*Parklets*

Parklets are small public spaces that replace on-street parking spots. It is a design intervention which prioritizes pedestrian access to the curbspace through the use of public seating, art, and greenery [A31]. Public amenities in the curbspace encourages walking and cycling activity, while simultaneously reducing the presence of private vehicles parked on the curb. Parklets originated from San Francisco, and as such, are present in Market and Octavia as a form of public activation for those walking and cycling [A32].

Figure A9. A tree-lined median separates the pedestrian pathway from the vehicle lane (Foletta & Henderson, 2017).



Figure A10. A parklet with chairs takes the place of what was a parking spot on the curbspace in Market and Octavia, San Francisco, USA (Foletta & Henderson, 2017).

Figure A11. Bollards at the curb cut prevent vehicles from entering the sidewalk and disrupting the pedestrian environment (Foletta & Henderson, 2017).



Figure A12. An on-street bicycle lane that is painted green and separated from the vehicle lane with flexible soft hit posts (Foletta & Henderson, 2017).

**Cycling**

The bicycle and other pedaled devices have one of the highest priority access to curbspace in the City's MTP. Cycling is a mode of sustainable and active transportation that is an alternative to the use of private vehicles. Promising practices that have been found to prioritize and improve the cycling experience in car-light developments include separated bicycle lanes and short-term bicycle parking spaces along the curb.

*Separated Bike Lane*

On-street, separated bicycle lanes improve the cycling experience by prioritizing access to the curbspace for bicycles and other pedaled devices. A separated bicycle lane is a use of the curbspace that is frequently implemented in car-light developments. Market and Octavia, San Francisco and Hammarby Sjöstad, Stockholm painted their on-street bicycle lanes green to improve the bicycle lane's visibility to vehicles on the street [A33].

The addition of soft hit posts act as visual and physical buffers between the bicycle lane and the vehicle lane to increase separation and safety for those cycling. GWL Terrein, Amsterdam is another car-light development that separated their bicycle lanes from the vehicle lane with a tree-lined median [A34]. Having a clearly delineated and designated bicycle lane on the curbspace, instead of a shared road or other curb uses like parking, gives priority to cycling in the community and broader region's transportation network.

[A29] Foletta & Henderson (2017).  
[A30] San Francisco Planning Department (2020a).  
[A31] San Francisco Planning Department (2020b).  
[A32] Foletta & Henderson (2017).  
[A33] Foletta & Henderson (2017).  
[A34] Foletta & Henderson (2017).



### Short-term Bicycle Parking

Easy access to bicycle parking is an added incentive to ride a bicycle by increasing one's convenience of parking it. The Market and Octavia car-light development replaced what would traditionally be a parking spot on the curb for parklets with short-term bicycle parking [A35]. The convenience of bicycle parking in a parklet makes it an easier decision for people to choose a bicycle over a parked car. This feature is especially useful when the existing sidewalk's frontage and furnishing zone have limited space for adequate bicycle parking. However, it is important to note that the City's Street and Traffic Bylaw Section 6.17 does not permit bicycle parking or storage for a period longer than 72 hours. As such, any form of public bicycle parking on the curbspace can only be for short-term parking for less than 72 hours unless the City's bylaw is updated.

*City Street and Traffic Bylaw Section 6.17 mandates that a person must not place a Cycle upon any Public Place for any continuous period exceeding 72 hours without movement.*

## Public Transit

Public transit also has a high priority to curbspace access in the City's MTP. Public transit is a critical component in the transportation demand management of successful car-light development, and the accessibility of public transit begins with the curbspace's use and prioritization. Design interventions that have been found to prioritize public transit at the curbspace for car-light living include transit priority lanes, bus bulbs, level boarding, and restrictions on curb cuts.

Figure A13. An example design of a parklet on the curbspace with short-term bicycle parking (San Francisco Planning Department, 2020).

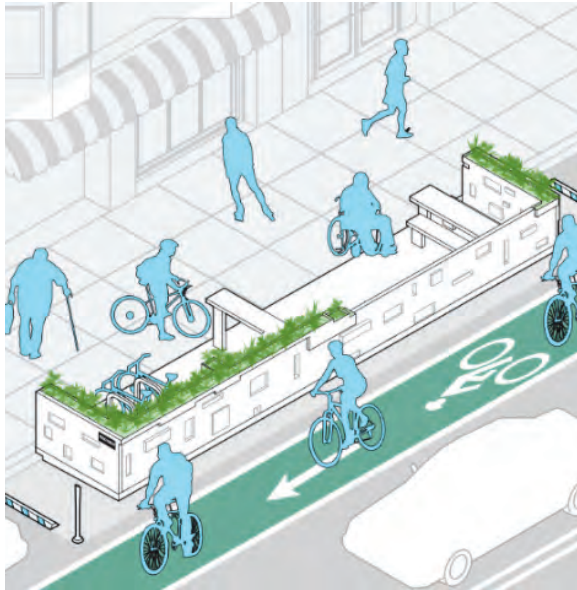


Figure A14. A bus-priority lane painted red and separated from regular vehicle lanes (Foletta & Henderson, 2017).

Figure A15. A bus bulb-out that extends out from the curb (Foletta & Henderson, 2017).



Figure A16. A platform with level boarding (NACTO, 2016).

### Transit Priority Lane

A transit priority lane is a use of the curbspace that prioritizes access for public transit vehicles by eliminating overlap and conflict with private vehicles on the road. Numerous case studies of car-light development highlight the value in transit priority lanes for improving transit times and reliability [A36]. The separation of private vehicles and transit vehicles on the road eliminates congestion and conflict, but most importantly, assigns greater priority access to the curbspace for public transit and its users.

### Bus Bulbs and Boarding Islands

Bus bulbs, also known as boarding islands, are an extension of the curbspace that allow buses to stop in the vehicle lane for passenger boarding. Therefore, bus bulbs improve travel times and efficiency by removing the need for the bus to exit and merge back into the vehicle lane [A37]. Market and Octavia uses this approach in their public transit and curbspace design [A38].

### Level Boarding

Level boarding is when the platform height, the height of the curb in this case, matches the floor height of transit vehicles. Having level boarding to public transit from the curbspace ensures ease of access for public transit users, because it decreases or nearly eliminates the gap and height distance for stepping down [A39].

[A35] Foletta & Henderson (2017).  
[A36] Foletta & Henderson (2017).  
[A37] Institute of Transportation Engineers (n.d.).

[A38] Foletta & Henderson (2017).  
[A39] NACTO (2016).



### Restriction of Curb Cuts on Transit-serviced Streets

As discussed in the walking portion of curbspace management, restricting curb cuts for vehicles to access off-street parking decreases conflict in the curbspace between different modes. Public transit has greater priority to the curbspace than private vehicles, therefore, restricting curb cuts on transit-serviced streets would eliminate or reduce private vehicles turning right or entering the street. This increases the efficiency of public transit vehicles as it reduces the need for waiting behind turning and entering private vehicles.

## Driving

Driving a private vehicle is an unsustainable mode of transportation that has the lowest priority access to curbspace in the City's MTP. Delivery, loading, and short-term parking on the curb are a lower priority to sustainable transportation modes, but the most unimportant access is for on-street vehicular parking.

### Reduced On-street Parking

On-street parking is an undesirable use of the curbspace which does not foster a community that would rely on sustainable transportation modes like walking, cycling, and transiting. The immediate and convenient access to parking at one's place of residence increases the odds of choosing the car [A40]. Therefore, reducing the number of on-street parking in the curbspace is a critical first step in encouraging residents and the broader community to use sustainable and alternative modes to their personal vehicles.

Figure A17. Restricting curb cuts for vehicles on transit-serviced streets reduces delays (NACTO, 2013).



Figure A18. Reducing the number of on-street parking discourages driving and encourages active travel (Foletta & Henderson, 2017).

Figure A19. Pay parking sign for on-street parking in Hammarby Sjöstad, Stockholm, Sweden (Foletta & Henderson, 2017).



Figure A20. A parking free street in Vauban (Foletta & Henderson, 2017).

### Priced Parking

A strategy to further discourage on-street parking, beside reducing their amount on the curbspace, is to not have free parking. Allowing private vehicles to park for free on the curbspace only incentivizes driving in the neighbourhood, and it does not bring in collective benefits for the wider community. Hammarby Sjöstad employed a strategy of charging more for their limited, on-street parking spots to encourage long-term parkers to park off the streets in private or public garages; thus, removing the long-term presence of parked vehicles in the curbspace [A41]. In addition, this strategy incentivizes shorter parking durations on the curb, which may increase parked car turnover and decrease circling vehicles in search of parking. Limiting the number of on-street parking is essential in prioritizing the curbspace for sustainable transportation, and ensuring that on-street parking is never free of charge is an added disincentive to reduce the presence of long-term, private vehicles on the curb.

### Pick-up Drop-off (PUDO) Zone

Short-term and long-term parking are discouraged uses of the curbspace, however, sections of the curb are needed to allow temporary movement of pedestrians from a private vehicle to the curb. Having a designated pick-up drop-off (PUDO) zone ensures brief access to the curb that does not require short-term or long-term parking or illegal double parking on the road. The neighbourhood of Vauban, Germany, is one example where their streets have PUDO zones only, and no on-street parking [A42]. The district's lack of on-street parking and presence of PUDO zones ensured that its streets provide more space for walking and cycling without obstacles.

[A40] Christiansen et al. (2017).

[A41] Foletta & Henderson (2017).

[A42] Foletta & Henderson (2017).





## Building Design for Deliveries

Performing deliveries in urban cities have become increasingly complex to manage, given a greater fragmentation in freight patterns caused by an increase in the number of people requesting deliveries (leading to more deliveries being performed and more addresses being serviced), reduced volumes per delivery, and the increase in same-day or ‘click-to-door’ deliveries of groceries, food and retail goods to residential doorsteps [A43]. To perform these urban freight logistics, a greater variety of vehicle types and sizes are also increasingly utilised [A44]. During and following the Covid-19 pandemic in particular, a surge in package and food deliveries have been observed: in Canada, food delivery transactions increased by 86% from April 2020 to April 2021 [A45]. With the proliferation of deliveries to residential doorsteps, challenges in accommodating a larger and greater mix of short-term traffic around buildings may emerge. Insufficient availability of loading zones or temporary parking may lead to double-parking or illegal parking on streets leading to obstructions of pedestrian and cyclist thoroughfares, for example. Lack of suitably-organised package rooms may lead to overflows and the obstruction of building corridors, along with increased risk of package thefts [A46].

Increased urban freight operations may be considered unsustainable given the emissions produced by vehicles, especially when vehicles are idling during congestion [A47]. Alongside the expansion of cycling networks and amenities, however, the City could potentially leverage this opportunity to encourage cleaner flexible freight operations via the use of electricity or battery-powered cargo bicycles, which are capable of performing smaller-volume deliveries with significantly lower carbon emissions [A48]. Innovations in unmanned autonomous vehicles or street robots are also emerging as alternative modes for transporting deliveries, which may suggest a heightened need for implementation of scalable and flexible building designs [A49].

To accommodate seamless, efficient and secure deliveries, a varied mix of different building design interventions and programming can be utilised, some of which can also be used to accommodate passenger PUDO operations performed by ride-hailing services (such as Uber). The interim report will focus on interventions relating to loading zone design, temporary parking spaces and package rooms. Policy interventions is one additional potential area for intervention: municipalities may choose to limit or restrict freight delivery services to off-peak hours [A50]. For example, the relaxation of noise by-laws by the Government of Ontario during the pandemic led to proliferation of more deliveries during off-peak hours (7:00PM to 6:00AM) and the successful reduction of traffic congestion during peak hours. This may be paired with parking pricing strategies and rigorous parking enforcement. However, as this requires legislative action extending beyond building- and community-scale design, the interim report will not explore this category of intervention in detail.

[A43] Baker et al. (2023).

[A44] Bjørgen & Ryghaug (2022).

[A45] Edison Trends (2021).

[A46] Landau (2020).

[A47] McDonald et al. (2021).

[A48] Lenz & Gruber (2021).

[A49] Dablanc (2021).

[A50] Chowdhury et al. (2022).

Figure A21. Overflow of packages at condominium lobby (Kaufman, 2020).



Loading Zone Design Guidelines

City By-law 8184 (2020) currently requires the provision of one off-street loading space per building (with more than 30 dwelling units), which can be shared with a visitor parking space and/or commercial uses in a mixed use building. Off-street loading spaces are to be a minimum of 7.6m in length, 3.0m in width and 4.0m in height.

Larger and better-priced off-street loading zones could be used to accommodate a greater volume of deliveries, with clear signposting of loading and dwelling time regulations to allow the seamless routing of various vehicles. For example, Washington D.C. lengthened loading zones from 40 feet (12.2m) to 100 feet (30.5m) where possible and implemented meters at the loading zones to encourage a reduction in dwelling time [A51]. In 2021, White Rock B.C. similarly proposed zoning bylaw updates that would require one Class I Loading Space of a minimum length of 9.0m for every residential building with more than 20 dwelling units [A52]. However, the feasibility of expanding loading zones is dependent on lot size and should be scaled in accordance with the number of residential units and their anticipated delivery demands.

Beyond conventional off-street loading spaces, service alleys may be designated to accommodate loading and unloading operations. Service alleys may act as flexible and dynamic spaces that can be used to accommodate loading and unloading services by motorised and non-motorised vehicles, including box trucks, cargo vans, passenger vehicles and bicycles performing deliveries.

However, this is dependent on the anticipated dwelling times of these vehicles to prevent congestion and blockages within the alley. Consideration must also be paid to the alley width (to accommodate more than one lane of traffic, an alley width should be at least 17 feet wide) and any alternate functions they may perform (e.g. providing access to visitor parking) [A53].

Temporary Parking Design Guidelines

City By-law 8225 (2020) currently requires the provision of 0.2 off-street visitor parking spaces per dwelling unit in multiple-dwelling units.

Increasingly, freight operations can be performed by motorised and non-motorised vehicles of various sizes and dimensions. Given the car-light building’s anticipated reduction of residential parking, some space may be allocated for on-street or off-street temporary parking reserved for delivery drivers (and include stricter sign-posted limits on dwelling time), though this should be similarly scaled to the number of residential units and anticipated delivery demands. They may include smaller spaces suitable for cargo bicycles, and larger spaces suitable for trucks, vans and passenger vehicles. Parking meters and parking enforcement may also be used to manage dwelling times, while smart parking systems could be used to pre-notify delivery drivers of parking availability and reduce cruising [A54]. However, the provision of on-street temporary parking in particular is constrained by the amount of curbside space available, and may lead to corresponding shrinkage of pedestrians and cyclists thoroughfares.

Package Room Design Guidelines

BC Housing [A55] and Canada Post [A56] design guidelines currently require that secure mailboxes are located in the building lobby area or a weather-protected common area. Buildings with more than 100 units will further require a secure mailroom and rear-loading mailboxes.

Package rooms may be enhanced by the use of complementary amenities or programming. This includes resident education and signposting, alongside delivery notification systems to ensure awareness and timely collection of deliveries. BC Housing further recommends establishing a building intercom system could enable residents to receive calls from and allow building access to deliveries, and the use of video surveillance in common spaces, such as the package room, to reduce package thefts [A57].

Parcel locker systems are also increasingly used in residential contexts to support 24-hour capacity for drop-offs and collection by delivery drivers and residents respectively: Snail is one such provider that has installed lockers at more than 200 sites in Canada, including several rental and condominium apartment developments in the Greater Toronto Area [A58]. These lockers may be placed in residential building lobbies or package rooms, or located in busier commercial or public spaces such as shopping mall complexes or transit hubs. The lockers mitigate the need to hire staffing to sort and organise deliveries, as per traditional package rooms, though this correspondingly requires building management to budget for locker-provider fees.

[A51] McDonald et al. (2021).  
[A52] City of White Rock (2021).  
[A53] Machado-León, Girón-Valderrama & Goodchild (2020).  
[A54] Chiara et al. (2022).  
[A55] BC Housing (2023).  
[A56] Canada Post (2016).  
[A57] BC Housing (2023).  
[A58] Landau (2020).



# All Ages and Abilities Active Transportation Network Plan

September 2022

Transportation users have diverse and varying needs. However, traditional transportation planning practices have often centered on the able-bodied man who commutes to work in a commercial district, while the remaining diversity of transportation users receive fewer recognition [A60]. As such, equity is a key lens and objective of this project to identify how car-light living can be enabled for everyone.

NEW WESTMINSTER

## Equity

The dimensions of transportation equity that are considered include mobility-based access and affordability-based access, which relate to substantive equity outcomes. Procedural equity, which is the inclusion of diverse voices and values in the planning process, is a component that will not be addressed, as it lies beyond the scope of this project. It is significant to recognize that all transportation networks should continuously strive to achieve greater equitable outcomes, especially for groups who experience barriers because of their age, gender, sexuality, presence of disability, socioeconomic status, and more.

Most importantly, the improvement of transportation for groups facing barriers will help to create a better, well-connected city for all users in the end [A61].

Given the proximity of the bus interchange to the 22nd Street SkyTrain station, a parcel locker system could theoretically be located close-by to facilitate access for both building residents and other Connaught Heights neighbourhood residents. Between 2020 and 2021, TransLink established a similar 1-year pilot to implement PigeonBox smart lockers at three SkyTrain stations in Vancouver [A59]. While no further updates have been publicly provided on the status of the pilot, and the PigeonBox website has since been deactivated, re-attempting such a project may be possible with a better-established parcel locker system provider.



Figure A22. Rendering of PigeonBox locker system at the Stadium-Chinatown SkyTrain Station in Vancouver, B.C. (Tung, 2020).

[A59] TransLink (2020).

[A60] Institute for Transportation and Development Policy (2022a).

[A61] Institute for Transportation and Development Policy (2022b).



## Walking

Walking is the most accessible and affordable mode of transportation available compared to cycling, transiting, and driving. However, not all individuals walking have the exact same experience, needs, and abilities. For instance, caretakers walking with children are more likely to require wider sidewalks to walk side by side, push strollers, and stop frequently. Persons with disabilities similarly require an environment that is calm with low-noise levels, barrier-free crosswalks, and more. The walking experience varies from one individual to another, and as such, promoting an accessible walking environment creates a more equitable active travel network and community.

Walking accessibility is closely connected with curbspace management: wide, flat, and well paved sidewalks with minimal to no obstructions are critical for ensuring walking that is equitable and accessible to all. In addition, implementing pedestrian bulb outs at intersections reduces the number of lanes that pedestrians must cross, while also increasing their visibility to oncoming vehicles; this curbspace design addresses mobility-based equity for individuals who may walk slower and feel unsafe crossing more lanes. Good public lighting is another element in improving visibility and safety at night. This is especially important in addressing gender inequity, where women may have lower perceptions of security walking at nighttime compared to men. Providing adequate public lighting would address the inequity women face, and facilitate walking for all regardless of the time of day [A62]. Vastra Hamnen is a car-light development that is testing different types of nighttime lighting to improve visibility and safety [A63].

Figure A23. Original lighting conditions of the Nobel tunnel in Malmö (Hammerglass, n.d.).

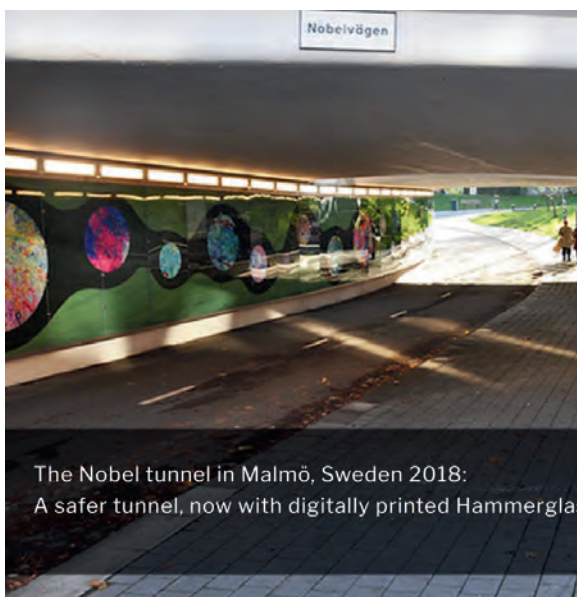


Figure A24. Improved lighting conditions of the Nobel tunnel in Malmö (Hammerglass, n.d.).

Figure A25. A ground floor unit with a wheelchair accessible ramp in GWL Terrein, Amsterdam which is a car-light development (Foletta and Henderson, 2017).



Figure A26. Wheel ramp in Beijing, China, allow seamless integration from ground-level to elevated cycle highway (ITDP, 2021).

Other elements to improve walking equity include public seating and shelter on the street, which is an important feature for older adults, people with disabilities, and caretakers with children, as these groups are more likely to stop frequently for reasons such as feeding and calming a child, increased fatigue, stress, and confusion with travel. Lastly, the experience of accessing a car-light development as a pedestrian is not the same for all walking. As part of their housing design, GWL Terrein in Amsterdam has ground floor units that are wheelchair accessible with built-in ramps [A64]. These are only a handful of examples on how walking equity can be enhanced through designs for mobility-based accessibility that accommodate all potential uses and users.

## Cycling

Despite perceived barriers to cycling that may be posed by lack of experience or lack of physical ability, cycling remains an in-demand mode of transportation for multiple mobility-disadvantaged groups, including people with mobility impairments, youths and low-income households [A65]. At the same time, systemic gender and age-based inequities may reduce the perception of safety and accessibility of cycling; in Toronto, for example, cyclists that self-identified as women expressed greater concerns over verbal abuse and harassment from drivers compared to men [A66]. While these concerns were identified to have no correlation with cycling infrastructure, suggesting the need for social programming to encourage equitable cycling communities, the existence of protected cycling facilities were able to alleviate fears of collision. Older cyclists similarly expressed strong preferences for wider, separated and protected cycling facilities, in addition to strong integrations between cycling and transit networks and facilities [A67].

[A62] Basu et al. (2021).

[A63] Foletta & Henderson (2017).

[A64] Foletta & Henderson (2017).

[A65] Litman (2023).

[A66] Graystone, Mitra & Hess (2022).

[A67] Cauwenberg et al. (2018).



In 2022, the City of New Westminster published a report detailing its plans to develop All Ages and Abilities (AAA) active transportation networks, including maps that indicate gaps in proximity to facilities that are considered to be comfortable for most people. Notably, the report suggests key interventions to improve cycling accessibility in close proximity to the 22nd Street SkyTrain station, including adding speed humps between 12th and 20th Streets and a bi-directional protected mobility lane between BC Parkway and 20th Street. These proposed retrofits make significant progress in improving physical barriers to cycling accessibility and enhancing integrated connectivity with transit and key neighbourhood destinations, in addition to supplementing existing amenities such as the TransLink-provided bicycle parking lockers under the SkyTrain station.

To further improve cycling equity and address logistical and financial barriers, programming and other solutions could be explored: bike-sharing schemes have successfully induced modal changes across all groups while supporting transportation experiences for low-income individuals in particular [A68]. If operated in-building or within the neighbourhood, investing in providing a greater variety of bicycle types—such as tandem bicycles, cargo bicycles, recumbent bicycles, tricycles and others—could be particularly effective to improving cycling accessibility for people of all abilities, including older adults, families with young children, people with disabilities and others [A69]. Bike-sharing programming can also be enhanced by offering subsidies to low-income and other transport-disadvantaged community members. Through the Better Bike Share Partnership, for example, the City of Philadelphia’s Indego bike-share system offered cash payment options and discounted pass programming to low-income residents, in addition to situating 20 bike-share stations within historically under-served communities [A70].

Figure A27. Bicycle parking lockers under the 22nd Street SkyTrain Station (Site visit, 2023).



Figure A28. A child with a disability riding a tricycle in the streets of Vietnam (ITDP, 2022a).

Figure A29. Progressive subsidy distribution for e-bikes to over 380 residents (District of Saanich, 2023).

INCENTIVES DISTRIBUTED		
• October 2021 – November 2022		
Incentive Amount	Income threshold	Total Distributed
\$1600	Lowest income	101
\$800	Medium income	105
\$350	No income verification	183
<b>Total</b>		<b>389</b>



Figure A30. Mexico City BRT uses low-grade transitions between street and station (ITDP, 2022a).

To improve the accessibility of e-bicycle ownership, in 2021 the District of Saanich provided progressive household income-based subsidies and discounted e-bike skills courses to encourage the purchase of e-bikes among low-income households, serving over 380 residents in the process [A71]. Financial barriers to purchasing and maintaining a bicycle can be further addressed through social programming: at the University of British Columbia, for example, free Community Bike Clinics are organised on Thursdays in four rotating community locations, with the intention of equipping community members with bike maintenance and cycling skills [A72].

## Public Transit

Improving access to public transit will facilitate equitable outcomes by increasing access to economic and social opportunities for all. However, an individual’s access to transit can vary based on where one lives in the region, the frequency of a specific route, ability to afford using transit, perceived and actual levels of comfort and safety, and other factors.

Level boarding of a public transit vehicle is a critical design element that addresses mobility-based accessibility. Minimizing or eliminating the gap and height between the boarding station and the vehicle allows passengers to get on and off independently without assistance. This feature is particularly valuable for groups who may have mobility needs like wheelchair users and caretakers with children and strollers. Hammarby Sjöstad in Stockholm is an example of a car-light development that designed level boarding for all of its tram stations. Their initiative is based on Stockholm’s Disability Program’s policies on transportation, which include the removal of physical barriers through strategies like widening doorways and installing handrails [A73].

[A68] Mohiuddin, Fitch-Polse & Handy (2023).

[A69] Institute for Transportation and Development Policy (2022b).

[A70] Better Bike Share Partnership (2023).

[A71] District of Saanich (2023).

[A72] University of British Columbia (n.d.).

[A73] Foletta & Henderson (2017).



Equitable public transit also includes the experience of waiting at a station or stop. Shelters at transit stations and stops are an important area of refuge for waiting passengers. People have varying levels of comfort to weather and temperature, and as climate change increases the frequency and intensity of severe weather events like heat domes and atmospheric rivers, protecting passengers who may be more vulnerable to these conditions is critical. As such, public transit should include shelters at their stops and stations to cater to the comfort, safety, and inclusion of all its possible users for an equitable transportation network.

## Driving

Broadly speaking, reducing automobile dependency and adopting car-light interventions are equitable strategies that reduce noise and health externalities from road congestion, prevent the burden of parking construction costs from being transferred to non-drivers, and avoid forcing low-income community members in under-served areas to shoulder the costs associated with purchasing and maintaining a private vehicle [A74]. However, a minimum level of accessibility to cars can still be maintained, particularly for groups that may find it challenging to navigate transit and active transportation to perform specific services; for example, during peak hours where accessible spaces on buses may be too occupied to fit in a stroller, families with young children may want to occasionally use a car to transport their children.

Women with disabilities are also more likely to prefer and perceive ride-hail options to be more secure than transit and active transportation options that require greater public exposure [A75]. As discussed in Transportation Demand Management findings, short-term access to vehicles may be provided through enabling convenient access to shared mobility services, such as ride-hailing, ride-pooling and car-sharing providers.

Convenient access can be facilitated through a variety of interventions. For example, structural barriers to physical access can be addressed by establishing a well-lit, barrier-free and sign-posted space within the residential building for PUDO operations to be conducted [A76]. Logistical barriers to access can be reduced by working with car-sharing and other service providers to establish more sites in close proximity to 22nd Street SkyTrain station [86]. Where financial barriers limit car-sharing accessibility, subsidy schemes could be offered for low-income and other transport-disadvantaged residents in combination with car-sharing services. For example, in combination with the Los Angeles Department of Transportation, BlueLA (electric car-sharing service provider) offered discounted memberships for low-income community members [A78]. The American Association of Retired Persons similarly offers discounts for car-rental services to its members (aged 50 and over) [A79].

While ride-hailing pricing is conventionally impacted by city-wide fluctuations in the demand for ride requests and supply of available drivers, community arrangements with ride-hailing providers could potentially occur to provide subsidised passes to building residents and/or a geofenced zone in which free rides can be taken during specific hours.

For example, under the USC Lyft Rides Program the University of Southern California (USC) subsidises (shared) Lyft rides taken by USC students, staff and faculty during evening and early morning hours, though the departure and arrival destinations are limited to a specific geographic area near the university campus [A80].

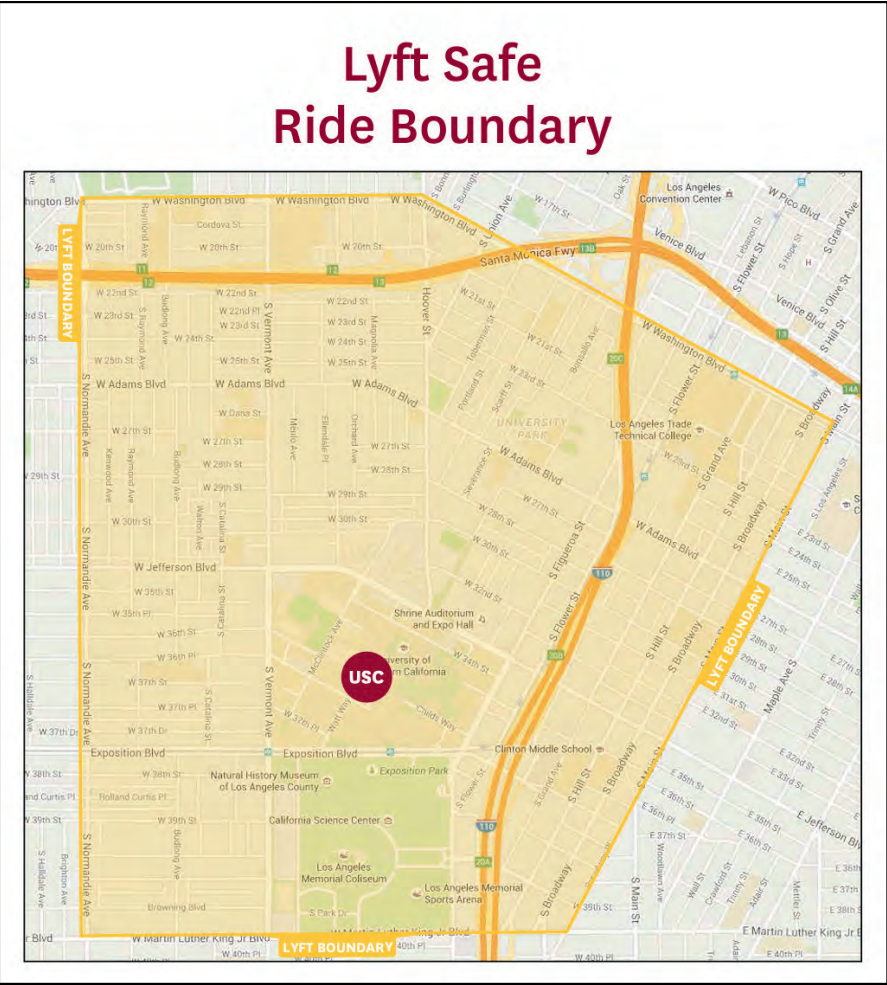


Figure A31. Map of geofenced free ride zone for USC Lyft Rides Program (USC Transportation, 2023).

[A74] Pereira & Karner (2021).

[A75] Institute for Transportation and Development Policy (2022b).

[A76] Institute for Transportation and Development Policy (2022b).

[A77] Institute for Transportation and Development Policy & Living Cities (2014).

[A78] Paul et al. (2023).

[A79] National Center for Mobility Management (n.d.).

[A80] University of Southern California Transportation (2023).



# APPENDIX D - REFERENCES, FOR FINDINGS FROM PROMISING PRACTICES

## Transportation Demand Management

City of Burnaby. Schedule No. VIII. Off-Street Parking. Accessed November 27th, 2023, at <https://www.burnaby.ca/sites/default/files/acquiadam/2021-08/Off%20Street%20Parking.pdf>

Celis, P., & Bølling-Ladegaard, E. (2008). Bicycle parking manual. *The Danish Cyclists Federation*. Retrieved March 13, 2017 from <http://www.cycling-embassy.dk/2010/08/16/bicycle-parkingmanual/>

HUB Cycling. (2017). (rep.). Not just bike racks: Informing design for end-of-trip cycling amenities in Vancouver real estate. Vancouver, BC.

Foletta, N., Henderson, J., & Taylor & Francis eBooks EBA. (2016). Low car(bon) communities: Inspiring car-free and car-lite urban futures. *Routledge, Taylor & Francis Group*.

Metro Vancouver. (2012).The Metro Vancouver apartment parking study: Revised Technical Report. Retrieved Nov 25, 2023 from <http://www.metrovancouver.org/services/regional-planning/PlanningPublications/Apartment Parking Study TechnicalReport.pdf>

Modo. Irving Living, New Westminster. Accessed November 25, 2023, at <https://modo.coop/building-directory/irving-living>

Rothberg, J. (2023, November 15). Bike shares, e-bikes gain speed as amenity. Multi-housing News. <https://www.multihousingnews.com/multifamily-adoption-of-bike-share-and-e-bike-programs/>

Smith, C. (2017). (rep.). Making spaces: Bicycle storage in multi-unit residential buildings on the University of British Columbia campus. Vancouver, BC: University of British Columbia.

Selzer, S. (2022). Car independence in an automobile society? The everyday mobility practices of residents in a car-reduced housing development. *Travel Behaviour and Society*, 28. <https://doi.org/10.1016/j.tbs.2022.02.008>.

TowerHamlets. Car free developments. Accessed November 25, 2023, at [https://www.towerhamlets.gov.uk/ignl/transport\\_and\\_streets/Parking/car\\_free\\_developments.aspx](https://www.towerhamlets.gov.uk/ignl/transport_and_streets/Parking/car_free_developments.aspx)

TransLink. Commutifi Program. Accessed November 25, 2023, at <https://www.TransLink.ca/rider-guide/travelsmart/TransLink-for-organizations/commutifi-program>

TransLink (2022). 54-trip planning touch screens now available at Transit Hubs [Press release]. Accessed November 25, 2023, at <https://www.TransLink.ca/news/2022/august/trip%20planning%20touchscreens%20now%20available%20at%2054%20transit%20hubs>

TransLink (2023). PCI-TransLink Compass for Developments Demonstration Pilot. Accessed November 25, 2023, at [https://www.TransLink.ca/-/media/TransLink/documents/business-with-TransLink/compass-for-developments/steer\\_TransLink\\_pci-compass-for-developments-pilot\\_april2023.pdf](https://www.TransLink.ca/-/media/TransLink/documents/business-with-TransLink/compass-for-developments/steer_TransLink_pci-compass-for-developments-pilot_april2023.pdf)

University of British Columbia. (2023). Carpooling and ride-sharing. Carpooling and Ride-sharing | UBC Campus & Community Planning. <https://planning.ubc.ca/carpooling>

US Department of Transportation. (1998). (rep.). Implementing pedestrian improvements at the local level. Washington, DC.

White, R. (2017). N3: No parking! No cars! No worries [Blog Post]. Retrieved from <https://everydaytourist.ca/city-planning-101/2017/11/18/n3-no-parking-no-cars-no-worries>

Zhou, Z., Li, H., & Zhang, A. (2022). Does bike sharing increase house prices? Evidence from micro-level data and the impact of COVID-19. *The Journal of Real Estate Finance and Economics*. <https://doi.org/10.1007/s11146-022-09889-x>

## Curbspace Management

Christiansen, P., Engebretsen, Ø., Fearnley, N., & Usterud Hanssen, J. (2017). Parking facilities and the built environment: Impacts on travel behaviour. *Transportation Research. Part A, Policy and Practice*, 95, 198-206. <https://doi.org/10.1016/j.tra.2016.10.025>

City of New Westminster. (2014). Transportation master plan. [https://www.newwestcity.ca/council\\_minutes/0616\\_14/2014-06-11%20New%20West%20Master%20Transportation%20Plan%20DRAFT.pdf](https://www.newwestcity.ca/council_minutes/0616_14/2014-06-11%20New%20West%20Master%20Transportation%20Plan%20DRAFT.pdf)

Foletta, N., Henderson, J., & Taylor & Francis eBooks EBA. (2016). Low car(bon) communities: Inspiring car-free and car-lite urban futures. *Routledge, Taylor & Francis Group*.

Christiansen, P., Engebretsen, Ø., Fearnley, N., & Usterud Hanssen, J. (2017). Parking facilities and the built environment: Impacts on travel behaviour. *Transportation Research. Part A, Policy and Practice*, 95, 198-206. <https://doi.org/10.1016/j.tra.2016.10.025>

City of New Westminster. (2014). Transportation master plan. [https://www.newwestcity.ca/council\\_minutes/0616\\_14/2014-06-11%20New%20West%20Master%20Transportation%20Plan%20DRAFT.pdf](https://www.newwestcity.ca/council_minutes/0616_14/2014-06-11%20New%20West%20Master%20Transportation%20Plan%20DRAFT.pdf)

Foletta, N., Henderson, J., & Taylor & Francis eBooks EBA. (2016). Low car(bon) communities: Inspiring car-free and car-lite urban futures. *Routledge, Taylor & Francis Group*.

Institute of Transportation Engineers. (n.d.). Curbside management practitioners guide. <https://s23705.pcdn.co/wp-content/uploads/2019/03/ITE-Kerbside-Curbside-Management-Guide.pdf>

National Association of City Transportation Officials. (2013). Urban Street Design Guide.

National Association of City Transportation Officials. (2016). Transit Street Design Guide.

San Francisco Planning Department. (2020a). Market and Octavia area plan. [https://generalplan.sfplanning.org/Market\\_Octavia.htm#](https://generalplan.sfplanning.org/Market_Octavia.htm#)

San Francisco Planning Department. (2020b). San Francisco parklet manual. <https://groundplaysf.org/wp-content/uploads/San-Francisco-Parklet-Manual.pdf>

## Building Design for Deliveries

Baker, D., Briant, S., Hajirasouli, A., Yigitcanlar, T., Paz, A., Bhaskar, A., Corry, P., Whelan, K., Donehue, P. & Parsons, H. (2023). Urban freight logistics and land use planning education: Trends and gaps through the lens of literature. *Transportation Research Interdisciplinary Perspectives* 17, 100731. <https://doi.org/10.1016/j.trip.2022.100731>

BC Housing (2023). Design guidelines and construction standards [Including Technical Bulletin Updates]. *Province of British Columbia*. <https://www.bchousing.org/publications/BCH-Design-Guidelines-Construction-Standards.pdf>

Bjørgen, A. & Ryghaug, M. (2022). Integration of urban freight transport in city planning: Lesson learned. *Transportation Research Part D: Transport and Environment* 107, 103310. <https://doi.org/10.1016/j.trd.2022.103310>

Canada Post (2016). Delivery planning standards manual for builders and developers. [https://www.canadapost-postescanada.ca/cpo/mc/assets/pdf/business/standardsmanual\\_en.pdf](https://www.canadapost-postescanada.ca/cpo/mc/assets/pdf/business/standardsmanual_en.pdf)

Chiara, G. D., Krutein, K. F., Ranjbari, A. & Goodchild, A. (2022). Providing curb availability information to delivery drivers reduces cruising for parking. *Scientific Reports* 12, 19355. <https://doi.org/10.1038/s41598-022-23987-z>

Chowdhury, T., Vaughan, J., Saleh, M., Mousavi, K., Hatzopoulou, M. & Roorda, M. J. (2022). Modeling the impacts of off-peak delivery in the Greater Toronto and Hamilton Area. *Transportation Research Record*, 2676(10), pp. 413-425. <https://doi.org/10.1177/03611981221089552>

City of White Rock (2021). Off-street loading spaces and electric vehicle parking. Accessed November 25, 2023, at <https://www.talkwhiterock.ca/24768/widgets/100139/documents/64337>

Dablang, L. (2021). Urban freight policy. *International Encyclopedia of Transportation* 2021, pp. 278-285. <http://dx.doi.org/10.1016/B978-0-08-102671-7.10696-7>

Edison Trends (2021). Global food delivery trends 2018 vs. 2021: Understanding food delivery growth across the US, UK, Canada and Australia. Accessed November 25, 2023, at <https://trends.edison.tech/research/global-food-delivery-2021.html#:~:text=Looking%20at%20YOY%20numbers%20for,30%25%20and%20Canada%2086%25>.

Kaufman, J. (2020). The pandemic and package overflow. The New York Times. Accessed November 25, 2023, at <https://www.nytimes.com/2020/05/06/realestate/the-pandemic-and-package-overflow.html>

Landau, J. (2020). Pandemic-level parcel demand putting strain on multi-residential buildings. Urban Toronto. Accessed November 25, 2023, at <https://urbantoronto.ca/news/2020/06/pandemic-level-parcel-demand-putting-strain-multi-residential-buildings.42445>

Lenz, B. & Gruber, J. (2021). Bicycles for urban freight. *International Encyclopedia of Transportation* 2021, pp. 488-494. <http://dx.doi.org/10.1016/B978-0-08-102671-7.10603-7>

Machado-León, J. L., Girón-Valderrama, G. C. & Goodchild, A. (2020). Bringing alleys to light: An urban freight infrastructure viewpoint. *Cities* 105, 102847. <https://doi.org/10.1016/j.cities.2020.102847>

McDonald, N., Steiner, R., Yuan, Q. & Wood, S. (2021). Final Report Project C2: Urban freight delivery and loading spaces. Prepared for the U.S. Bureau of Transportation Statistics. <https://rosap.ntl.bts.gov/view/dot/57281>

Pembina Institute & Bloomberg Associates. (2021). Building healthy cities in the doorstep-delivery era: Sustainable urban freight solutions from around the world. Prepared for the National Association of City Transportation Officials (NACTO). [https://nacto.org/wp-content/uploads/2021/06/BuildingHealthyCities\\_UrbanFreightReportJune2021.pdf](https://nacto.org/wp-content/uploads/2021/06/BuildingHealthyCities_UrbanFreightReportJune2021.pdf)



TransLink (2020). Smart lockers open at SkyTrain Stations [Press release]. Accessed November 25, 2023, at <https://www.TransLink.ca/news/2020/june/smart%20lockers%20open%20at%20SkyTrain%20station#:~:text=%E2%80%9CPigeonBox's%20vision%20is%20to%20become,services%20on%20the%20transit%20system>.

Tung, A. (2020). Smart lockers coming to SkyTrain stations. *TransLink 'The Buzzer Blog'*. Accessed November 25, 2023, at <https://buzzer.translink.ca/2020/01/smart-lockers-coming-to-skytrain-stations/>

## Equity Considerations

Basu, N., Haque, M. M., King, M., Kamruzzaman, M., & Oviedo-Trespalacios, O. (2021). The unequal gender effects of the suburban built environment on perceptions of security. *Journal of Transport & Health* 23, 101243. <https://doi.org/10.1016/j.jth.2021.101243>

Better Bike Share Partnership (2023). About us. <https://betterbikeshare.org/about/>

Cauwenberg, J. V., Clarys, P., Bourdeaudhuij, I. D., Ghekiere, A., de Geus, B., Owen, N. & Deforche, B. (2018). Environmental influences on older adults' transportation cycling experiences: A study using bike-along interviews. *Landscape and Urban Planning* 169, pp. 37–46. <http://dx.doi.org/10.1016/j.landurbplan.2017.08.003>

District of Saanich (2023). Programs and rebates: TACES e-Bike incentives. Accessed November 25, 2023, at <https://www.saanich.ca/EN/main/community/sustainable-saanich/climate-change/programs-rebates/e-bike-incentives.html>

Folett, N., Henderson, J., & Taylor & Francis eBooks EBA. (2016). Low car(bon) communities: Inspiring car-free and car-lite urban futures. *Routledge, Taylor & Francis Group*.

Graystone, M., Mitra, R. & Hess, P. M. (2022). Gendered perceptions of cycling safety and on-street bicycle infrastructure: Bridging the gap. *Transportation Research Part D* 105, 103237. <https://doi.org/10.1016/j.trd.2022.103237>

Hammerglass (n.d.). Pedestrian subways: Safe pedestrian subways and bicycle tunnels with colour and LED lighting. Accessed November 25, 2023, at <https://www.hammerglass.com/en/pedestrian-tunnels/>

Institute for Transportation and Development Policy & Living Cities (2014). Connecting low-income people to opportunity with shared mobility. [https://livingcities.org/wp-content/uploads/2021/03/Can-Shared-Mobility-Help-Low-Income-People-Access-Opportunity\\_.pdf](https://livingcities.org/wp-content/uploads/2021/03/Can-Shared-Mobility-Help-Low-Income-People-Access-Opportunity_.pdf)

Institute for Transportation and Development Policy. (2021). Maximizing micromobility: Unlocking opportunities to integrate micromobility and public transportation. <https://www.itdp.org/publication/maximizing-micromobility/>

Institute for Transportation and Development Policy. (2022a). Access and persons with disabilities in urban areas. <https://www.itdp.org/publication/access-for-all-persons-with-disabilities/>

Institute for Transportation and Development Policy. (2022b). Access and babies, toddlers, and their caregivers. <https://www.itdp.org/publication/access-for-all-babies-toddlers-and-their-caregivers/>

Litman, T. (2023). Evaluating transportation equity: Guidance for incorporating distributional impacts in transport planning. *Victoria Transport Policy Institute*. <https://www.vtpi.org/equity.pdf>

Mohiuddin, H., Fitch-Polse, D. T. & Handy, S. L. (2023). Does bike-share enhance transport equity? Evidence from the Sacramento, California region. *Journal of Transport Geography* 109, 103588. <https://doi.org/10.1016/j.jtrangeo.2023.103588>

National Center for Mobility Management (n.d.). Carsharing: Providing vehicle access for people with low incomes. *U.S. Federal Transit Administration*. [https://nationalcenterformobilitymanagement.org/wp-content/uploads/2014/09/Car\\_Sharing\\_Final.pdf](https://nationalcenterformobilitymanagement.org/wp-content/uploads/2014/09/Car_Sharing_Final.pdf)

Paul, J., Pinski, M., Bronze, M. & Blumenberg, E. (2023). Can subsidized carshare programs enhance access for low-income travelers? A case study of BlueLA in Los Angeles. *Journal of the American Planning Association* 2023. <https://doi.org/10.1080/01944363.2023.2268064>

Pereira, R. H. M. & Karner, A. (2021). Transportation equity. *International Encyclopedia of Transportation* 2021, pp. 271-277. <https://doi.org/10.1016/B978-0-08-102671-7.10053-3>

University of British Columbia (2023). UTown@UBC Community Bike Clinics. Accessed November 25, 2023, at <https://utown.ubc.ca/articles/11-6-2014/utownubc-community-bike-clinics>

University of Southern California Transportation (2023). USC Lyft rides program. Accessed November 25, 2023, at <https://transnet.usc.edu/index.php/how-to-use-lyft/>