AAA BIKE FACILITIES ON COMMERCIAL HIGH STREETS AND PEDESTRIAN-PRIORITY SPACES

Greenest City Scholars 2015
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EXECUTIVE SUMMARY

This report focuses on the best practices of design, engagement, and evaluation of all-ages and abilities (AAA) cycling facilities on commercial high streets and pedestrian-priority spaces to ensure safe, comfortable, and convenient cycling to destinations.

COMMERCIAL HIGH STREETS

A commercial high street is a street that attracts local and regional visitors to a wide variety of destinations along the street.

Vancouver developed along streetcar lines, resulting in an urban form today with long strings of destinations along these roads, which are often also bus routes, vehicle arteries and trucking routes, and have high pedestrian traffic. Yet these roads are the most intuitive and direct connections and provide access to destinations across the city. They are also cycling safety hot-spots.

The question remains: how can AAA bike infrastructure be implemented on these streets?

Best practices:

- Place bike lanes on both sides of the street, adjacent to the sidewalk, to maximize access.
- Traffic reduction may be required.
- Maintain high visibility from the bike lane to pedestrian crossings.
- Well-defined separation to sidewalk and road using colour, paving material, height, and vertical elements.
- Mark pedestrian crossings well.
- Use floating bus stops where possible.
- Parking and loading in a parking lane/flex space or on adjacent streets. Both may be limited to certain periods.

PEDESTRIAN-PRIORITY SPACES

A pedestrian-priority space is a plaza, street, or other space where the emphasis is on the pedestrian experience. There may or may not be other modes of transportation, such as low amounts of vehicle traffic (for example, restricted by time).

Bikes can be safely integrated onto pedestrian-priority spaces (with fewer than 200 pedestrians per metre width per hour) and people cycling will naturally change their speed in response to the volumes of pedestrians, dismounting when necessary. As the volume of pedestrians increase, the method of separation should also increase.

Best practices:

- Give cues through the design: do not rely on signage, although it is a helpful addition. Avoid road-type markings.
- Transition between pedestrian-priority space and adjacent streets is critical to emphasize shift in priorities.
- Maintain high levels of visibility and width.
- Guide people cycling away from doors and towards the centre, using a small amount of street furniture, different paving materials, or markings along the edge of the path. This separation should be extremely permeable by pedestrians.
- Emphasize slow cycling through using textured paving, horizontal lines, slightly curved lines, and an emphasis on the priority of pedestrians.
- Use similar paving building-to-building.

ENGAGEMENT METHODS

Engagement around bike lanes can be an emotonal conversation, and can be expected to be long-term.

Best practices:

- Collect good data in order to address concerns, test projects, and test common beliefs.
- Address subjective experiences and build empathy across multiple sectors. Ensure voices from all sides are in the room, and encourage formats which encourage long-term engagement and discussion.
- Consult meaningfully and long-term: long-term consultation can help build trust and buy-in into projects.

METRICS AND ASSESSMENT

Data and metrics can be used in three distinct parts of implementing a bike lane: defining the expectations and concerns, designing the project, and evaluating the project.

Thematically, data can cover:

- Safety and comfort
- Impacts on all modes
- Economic vitality
- Overall satisfaction and vibrancy
- Understanding/legibility of design
- Conflict between modes
- Cost-benefit analysis
- External impacts

It is important to directly address concerns with data on the bike lane, and to use the data in ways which are useful in designing further bike facilities.

RECOMMENDATIONS

- Consider creating Advisory Committees or Citizen Councils for each project with a diversity of backgrounds and interests.
- Collect strategic pre- and post-implementation data.
- Engage with diverse businesses and collect data to directly address their concerns.
- Evaluate next streets based on a multi-criteria approach.

In Vancouver, Commercial Drive (Graveley to 10th) is an optimal street to implement a protected bike lane as a pilot project, but it will be challenging.

- Consider a parking-protected bike lane
- Use floating bus islands with bus bulbs where appropriate
- Consider right-turn, left-turn, and passing lanes at bus stops contingent on traffic analysis.
- Consider long-term strategies to reduce traffic on Commercial Drive.
- Plan for connections to the neighbourhood and existing bike routes.

In Vancouver, Water Street is being redesigned.

- Pilot a bike-permeable pedestrian-priority street on Water St.
- Use lamp-poles and trees to guide people cycling away from doors. Consider diffeent colour paving or edge markings. Consider using smoother paving stones in part of the central area for people cycling.
- Provide plentiful bike parking at the edges of and throughout Gastown.
- Extend the design treatment across intersections and plan for gateway features or transitions.
- Consider extending the car-free treatment to Carrall St North of Cordova ST.

(Paul Krueger)

TABLE OF CONTENTS

ABOUT THIS REPORT

GREENEST CITY SCHOLARS

I am a master's student in the School of Community and Regional Planning (SCARP) and wrote this report as a Greenest City Scholar with the City of Vancouver over May to August, 2015.

The Greenest City Scholars program is a collaboration between the City of Vancouver and the University of British Columbia (UBC), sponsoring UBC graduate students to perform 250 hours of research on select sustainability projects with the City in support of the Greenest City Action Plan.

This research was completed in support of the Green Transportation goals to have over 50% of trips be by walking, cycling, and transit by 2020, and was completed in the Transportation Division of Engineering Services at the City of Vancouver.

RESEARCH PURPOSE

This report focuses on the best practices of design, engagement, and evaluation of all-ages and abilities (AAA) cycling facilities on commercial high streets and pedestrian-priority spaces to ensure safe, comfortable, and convenient cycling to destinations.

A commercial high street is a street that attracts local and regional visitors to a wide variety of destinations along the street, including retail shops, services, and restaurants. They are essentially high-density linear strings of destinations. In Vancouver, they typically have high pedestrian traffic and are often bus routes and arteries for vehicles.

A pedestrian-priority space is a plaza, street, or other space where the emphasis is on the pedestrian experience. There may or may not be other modes of transportation, such as low amounts of vehicle traffic or transit access (for example, restricted by time).

best practices of design, engagement, and evaluation

of bike facilities on commercial high streets and

pedestrian-priority areas

METHODOLOGY

RESEARCH QUESTIONS

1. Why is it important to design for and encourage cycling on commercial high streets?
2. Can people cycling be integrated into pedestrian-priority spaces while maintaining or increasing the experience of people walking and the vibrancy of the space?
3. What are common conflicts and problems when designing AAA cycling facilities on commercial high streets and pedestrian-priority areas?
4. How can common conflicts and problems be solved or mitigated (through design or other methods)?
5. What are the best methods to use when engaging with the public about these types of cycling facilities?
6. What are the best ways to collect data and evaluate these types of cycling facilities?

METHODS

1. Twenty-six (26) cities were contacted directly and additional cities across North America were contacted through mailing lists. I received written answers via email from seven cities (four in Europe, three in North America) and conducted four phone interviews (one in Europe, three in North America).
2. I conducted a literature review of studies done about cycling, including economic impacts, safety, perceived safety, and design of bike lanes.
3. I read official policy documents and plans from cities in Europe and North America.
4. I synthesized this information into this report, with an emphasis on linking experiences, studies, and policy.

LIMITATIONS

The main challenge in conducting this research was making contact with city representatives during the summer research period. Of the 26 cities directly contacted, 11 responded with information and four in-depth interviews were conducted.

Some of the factors behind this challenge were:

- Lack of direct contacts in other cities and therefore reliance on organizational contacts and contact forms
- Lack of response to inquiries
- Limited time available in research period for follow-up inquiries
- Research period was during summer when many people take vacation time

A further challenge was the limited availability of secondary data sources particular to bike facilities on commercial high streets. Most guidelines best practices, and studies are for general cases and do not address the specific requirements of this context.

POLICY AND PRINCIPLES

This research was guided by the visionary goals set out in the City of Vancouver's Transportation 2040 plan:

ECONOMY	PEOPLE	ENVIRONMENT
We envision a smart and efficient transportation system that supports a thriving economy while increasing affordability.	We envision healthy citizens in a safe, accessible, and vibrant city.	We envision a city that enhances its natural environment, ensuring a healthy future for its people and the planet.

In addition to these three goals, I conducted this research with the following principles in mind, which reflect the City's approach to transportation decision-making:

EVERYDAY CYCLING	STREET EXPERIENCE	CONSIDER ALL NEEDS	SAFETY
Cycling should be a safe, convenient, and fun way of getting to your destination. It should be a normal choice for transportation.	The street is a fundamental public space, and the experience of people on the street should be prioritized.	The City's transportation decisions generally reflect a hierarchy of transportation modes. Impacts on all modes are considered and compromises may be made on certain streets. Walking Cycling Transit Taxi/Shared Vehicle Private Auto	Everyone should feel and be safe using the mode of transportation they choose. There should be special emphasis on vulnerable road users, including people using active transportation modes and at-risk groups like children, seniors, and those with mobility challenges.

VANCOUVER POLICY CONTEXT

Active transportation in the City of Vancouver is guided by several plans:

- Greenest City Action Plan (2011)
  - Green Transportation Goal: Make the majority (over 50%) of trips by foot, bicycle, and public transit by 2020.
- Transportation 2040 (2012)
  - Mode Share Target: By 2040, at least two-thirds of all trips will be made on foot, bike, or transit. The total number of trips by sustainable modes will grow significantly, while motor vehicle volumes will slightly decline.
  - Safety Goal: Our goal is to move toward zero traffic-related fatalities.

It is also touched upon by other plans, including the Healthy City Action Plan (2015).

In the Transportation 2040 Plan, two cycling directions (C 1.1 and C 1.2) give particular direction to providing all-ages and abilities cycling facilities for people cycling on commercial high streets:

- C 1.1. Build cycling routes that feel comfortable for people of all ages and abilities.
- C 1.2. Expand the cycling network to efficiently connect people to destinations.

Direction C 1.2 notes, "Cycling routes are most useful when they connect to form a cohesive and legible network providing convenient access to important destinations like schools, community centres, libraries, transit stations, and employment and shopping areas."

Other directions from the Transportation 2040 Plan which are relevant when deciding on and designing cycling facilities on commercial high streets include:

- W 1.1. Make streets safer for pedestrians.
- W 1.2. Provide generous, unobstructed sidewalks on all streets.
- W 1.3. Make streets accessible for all people.
- M 1.2. Consider impacts to transit, commercial vehicles, and general traffic flow prior to reallocating road space.
- M 1.3. Manage traffic to improve safety and neighbourhood livability.
- G 1.1. Provide for efficient loading and unloading.

In addition, in pedestrian-priority areas, the relevant directions include:

- W 2.2. Create public plazas and gathering spaces throughout the city.
- C.1.4. Make the cycling network easy to navigate.

COMMERCIAL HIGH STREETS

INTRODUCTION

People on bikes want to be on high streets for the same reason everyone else does – they're where the destinations are! The greatest cycling cities have high cycling mode share for all kinds of trips, not just commuting and recreation. All-ages and abilities bike lanes on commercial streets increase the number of people who feel comfortable cycling on everyday trips. They increase access to destinations used every day and increase the prominence and visibility of cycling to people who don't already ride.

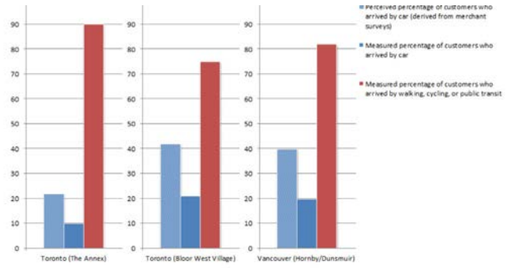
BENEFITS OF PEOPLE CYCLING ON COMMERCIAL HIGH STREETS

People are already cycling on commercial high streets to get to their destinations, often using their own strategies to increase their own perceived safety (including cycling on sidewalks). Commercial high streets are already a safety hot-spot in Vancouver, despite relatively lower volumes of people cycling (City of Vancouver, 2015).

Protected bike lanes are an important component of reaching into the "near market" by making cycling an easy choice for the interested but concerned (41% of the population of Metro Vancouver (Translink, 2011), as they make cycling easy and convenient (Translink, 2011).

In addition to the many general benefits of cycling, including reduced greenhouse gas emissions, keeping the air cleaner, and keeping people active and healthy, there are specific benefits for providing safe bike facilities on commercial high streets.

streets with a high density of local and regional destinations with high pedestrian traffic, often vehicle arteries and bus routes



(Toronto Cycling Think & Do Tank, 2013)

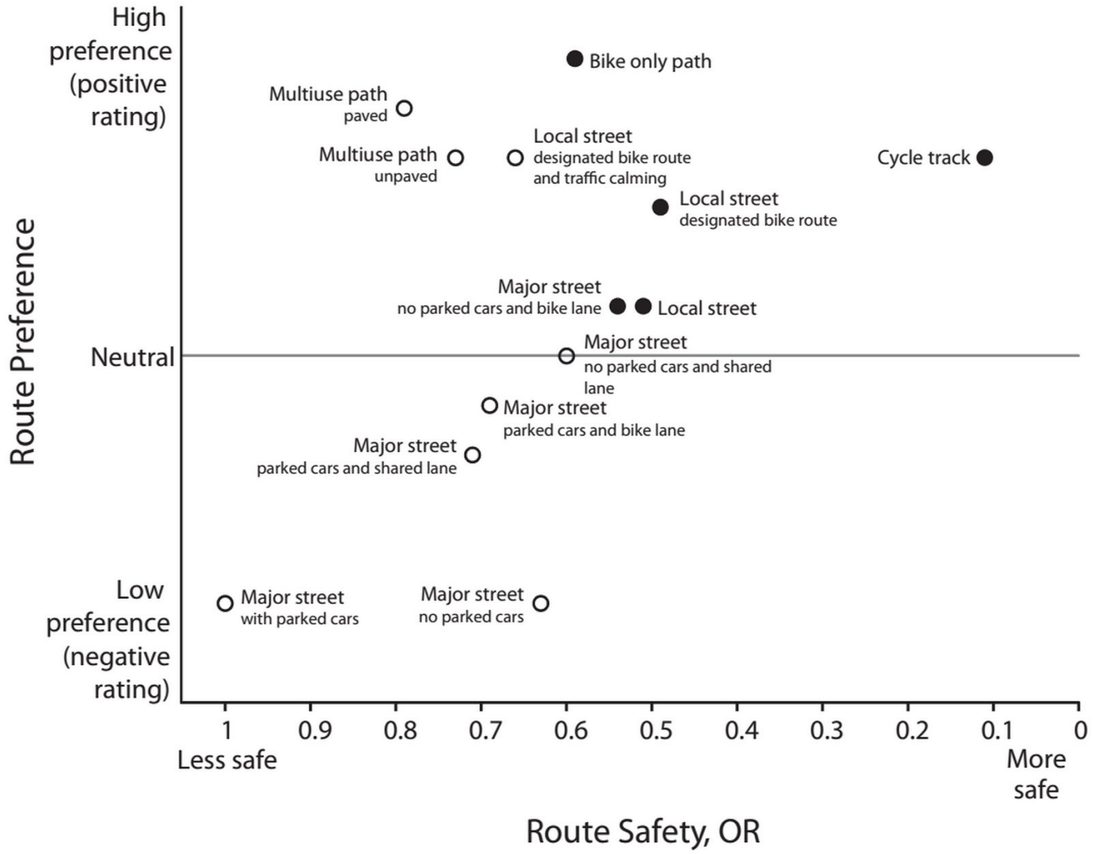
ECONOMIC VITALITY

People cycling are potential customers for the businesses they pass. They can become aware of the shops as they pass by, and it is easy and inviting to stop when the shop is 'on the way'. When facilities are a block away, customers may be less likely to stop because they may not be aware of the destination and/or it is inconvenient to deviate from the bike network. Many potential customers are lost because they are simply not aware of shops that are close by. Bike facilities can be a catalyst for economic vitality (Toronto Cycling Think & Do Tank, 2013).

People who cycle are competitive shoppers! People who cycle tend to spend less per visit than people who drive but visit more frequently and spend more locally (Toronto Cycling Think & Do Tank, 2013; Clean Air Partnership, 2009). For the same amount of space, devoting it to bike parking or other bike facilities can produce much higher levels of retail spend than the same amount of space devoted to car parking (National Heart Foundation of Australia, 2011; Toronto Cycling Think & Do Tank, 2013).

There are often significant amounts of people cycling and walking to the stores. Store owners frequently overestimate the share of people who arrive at their store by vehicle, understimating all other modes (Sustrans, 2003; Toronto Cycling Think & Do Tank, 2013)

In Edinburgh, shoppers were primarily concerned with a good selection of shops (43%) and wider sidewalks (33%), while store owners were primarily concerne with parking (51%) (Sustrans, 2003).



(Teschke et al., 2012)

SAFETY OF PEOPLE CYCLING

People are already cycling on commercial high streets, and are often doing so to get to their final destination, in spite of a lack of infrastructure. In Vancouver, a very high number of collisions are the result of interactions with parked or parking cars on arterials without cycling infrastructure (City of Vancouver, 2015). Adjusted for exposure, the collision risk is particularly significant, as there are a high number of collisions with relatively few bike trips. In commercial areas the risk is especially high, since the parking turnover is much higher than in residential areas.

One of the largest factors tied to cycling safety is the total number of people cycling. Providing safe bike facilities on these streets can virtually eliminate risks of dooring, interactions with parking cars, and more, in addition to encouraging more people to cycle and increasing this "safety in numbers".

Protected bike lanes are one of the safest forms of infrastructure (Lusk, Furth, Morency, Miranda-Moreno, Willett & Dennerlein, 2011, Teschke et al., 2012).

PERCEIVED SAFETY

There are different types of people cycling: the fearless, the confident and enthused, the curious and concerned, and the people who will never bike. Reaching into the "near market" for cycling means making cycling an easy choice for the curious and concerned by making cycling easy, direct, and safe.

To get into the "near market" for cycling, we need to make cycling feel safe. Protected bike lanes are one of the safest and most preferred forms of bicycle infrastructure (Winters & Teschke, 2009). In fact, one of the greatest motivating factors for people to cycle is when the route is separated from traffic for the entire trip (Winters, Davidson, Kao & Teschke, 2010; Winters & Teschke, 2009). To achieve a cycling network suitable for all ages and abilities, cycling infrastructure should feel safe for everyone. Women, currently underrepresented in people cycling, prefer to use safe routes and routes with maximum separation from motorized traffic.

ACCESS TO DESTINATIONS

Safe infrastructure for bicycles on commercial high streets offer easy, direct connections between and to destinations, including transit, shopping, groceries, restaurants, coffee shops, community centres, and more.

Without safe infrastructure providing access to destinations, people riding bikes are left on their own to get to their final destination - and may choose to ride on the street if they feel safe enough, ride on the sidewalk, walk until they get to their destination, or simply choose another mode of transportation.

To encourage people to cycle during their trips, people should be able to access their final destination on their bicycle, and feel safe doing so. This is particularly true to get people with diverse needs, requirements, and tasks to cycle.

SAFETY OF PEOPLE WALKING

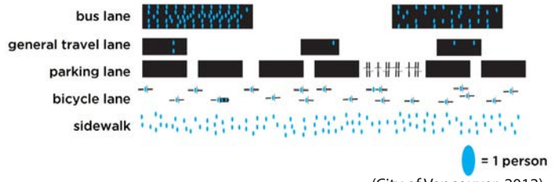
Providing bike infrastructure on high streets helps keep bicycles off the city's busiest sidewalks and buffers people walking from vehicular traffic. People cycling want to feel safe, and so will choose the facility that enables that – which, on high streets, may be the sidewalk. Once safe on-street bike facilities are provided, far fewer people cycle on the sidewalk. Data on Hornby Street, for example, showed an 80% reduction in sidewalk cycling despite a huge increase in the overall number of people cycling.

VISIBILITY OF CYCLING

Infrastructure on commercial high streets makes cycling more visible to people who do not already ride, and increases the perception of cycling as a safe, viable, and normal option. Current bike infrastructure is primarily on side streets, which can have the effect of "hiding" cycling from the general population who primarily travel on arterials and commercial streets.

ROAD EFFICIENCY

Metro Vancouver is set to grow by 1 million people by 2041, and the City of Vancouver to accommodate 139,000 people of that growth (Metro Vancouver, 2011). The City of Vancouver is out of road space, and must use the existing network to accommodate the trips of the increased population. People walking, cycling, and taking transit use up considerably less road space than people driving – resulting in a more efficient use of road space and enough space for everyone.



(City of Vancouver, 2012)

INFRASTRUCTURE COST

A person using active transportation costs very little in infrastructure cost, as active transportation causes little wear-and-tear on infrastructure as compared to vehicles. Through taxes, people using active transportation pay more than their "fair-share" of infrastructure costs (Victoria Transport Policy Institute, 2013). The more trips taken using active transportation modes, the less the infrastructure costs per trip.

STREET LIFE AND VITALITY

High streets tend to be where the "action" is in Vancouver communities, so bike facilities on these streets enable people on bikes to safely people-watch, window-shop, and so on. People walking and cycling can easily see their surroundings, and it is easy to decide to stop at a store. People cycling spend more time in a commercial area than people driving (National Heart Foundation of Australia, 2011).

A protected bike lane can provide insulation from vehicular traffic, and can provide a more attractive street - among the top concerns of people shopping (Sustrans, 2003).

Photo of Boulevard de Magenta bike lane, 2011

CASE STUDIES

PARIS

A cycle track on an extension of the sidewalk on Boulevard de Magenta was built in 2006. According to Paris staff there have been many issues and complaints with conflicts between people cycling and walking (Fayet, J., personal communication, June 16, 2015).

At intersections, the bike lane "disappears" – for aesthetic purposes, the surfacing material becomes the same paving material as the sidewalk. Mid-block the bike lane has different paving materials, but is at the same level as the sidewalk and is not highly distinguished.

The lack of differentiation between the bike lane and sidewalk results in many people walking not noticing the bike lane or realizing it is not part of the sidewalk (Fayet, J., personal communication, June 16, 2015). Many people walking hence walk across or do not check for people cycling on the bike lane.

There are numerous trees, benches, street-poles, and other street furniture between the bike lane and the sidewalk, which results in relatively poor visibility from the bike lane to see any pedestrians on the sidewalk - even if they may be on the verge of walking into the bike lane.

People walking seem to "come from nowhere" into the bike lane, resulting in unintentional conflicts. People walking have felt unsafe, and people cycling have felt frustrated with the design (Fayet, J., personal communication, June 16, 2015).

DESIGN FEATURES

Ensure bike lane and sidewalk are well differentiated, particularly where people walking may be crossing the bike lane.

Maintain good visibility from the bike lane to sidewalk at the height of a person cycling, especially at crosswalks and other areas there are likely to be many people crossing the bike lane.

Mark pedestrian crossings across the bike lane to alert people walking and cycling to the presence of the other.

Cultural shift also vital: all people must pay attention to other people and modes of transportation.

COPENHAGEN

Norrebrogade is a commercial high street in Copenhagen, with bus routes along it. In 2007-2008, it was transformed and redesigned.

The cycle tracks (one-way on both sides) were widened, up to 16ft (4.9m) in some sections (Jensen, N., personal communication, June 23, 2015). The cycle tracks are raised from the road and slightly lower than the sidewalk. It has marked curbs to both the sidewalk and road, and is asphalt, a different colour and material from the sidewalks. The sidewalks were also improved.

There is no on-street parking. Some sections of the road are bus-only, restricting vehicle through-traffic. Vehicle traffic has dropped by around 40-50% with around a 10% drop in the neighbourhood as a whole. This traffic restriction did not result in more traffic on the side streets (Jensen, N., personal communication, June 23, 2015).

The number of people walking and cycling has increased and travel time for buses has decreased.

Parking and loading zones are on side streets. Where there is room, bus stops are floating stops with a bus bulb. Otherwise, people taking transit cross the bike lane when boarding or alighting.

The commercial along the street has remained vibrant, with relatively few stores closing (Jensen, N., personal communication, June 23, 2015).

DESIGN FEATURES

Widened bike lanes allow high volumes of people cycling as well as social cycling (cycling side-by-side).

Restricting traffic may not have an adverse effect on surrounding residential area, but can allow for increased space for other modes.

Walking and cycling are key to street vibrancy, and commercial can remain vibrant with restricted vehicle traffic and parking.

Zeschky, 2009

BEST PRACTICES

GENERAL PRACTICES

In order to facilitate people being able to cycle to their destinations, it is optimal to place bike lanes on both sides of the street to provide access to both sides. This also minimizes awkward maneuvers where the bike lane begins/ends, as well as people driving not expecting people cycling from unusual directions.

Bicycle facilities on commercial high streets highlights the challenges of managing the many different uses of these streets - high pedestrian volumes, bus routes, loading and parking restraints, and often high vehicule traffic.

VISIBILITY AND WIDTH

High visibility from the bike lane at a height of a person cycling is preferred, especially at intersections, pedestrian crossings and other areas where many people walking may be crossing the bike lane (to their parked car, in loading areas, bus stops, easy jay-walking locations).

This visibility can be impeded by objects between the bike lane and the sidewalk, such as trees and street furniture. Keeping these objects far enough apart, at a low height, or decreasing any motivation to cross the bike lane (location of bus stops and loading, ease of crossing the road) can mediate visibility issues.

SEPARATION

Good separation should be a principle when designing protected bike lanes on commercial high streets, between people walking and cycling, and between people cycling and vehicle traffic (people driving and transit).

There are two types of protected bike lanes noted: a bike lane on the sidewalk (at the same height, looking functionally part of the sidewalk at intersections), and a bike lane adjacent to the sidewalk (usually at a different height, looking fully separated at intersections).

People travelling at different speeds may notice different elements or methods of separation: smaller elements and details will be noticed at a slower speed.

Common methods of separation include:

- height/curbs
- colour
- paving material
- vertical elements (ex. planters, bollards)
- parking

The separation method used is critical at high conflict points, such as transit stops and intersections.

Schwartz, 2010

SLOW CYCLING

Slow cycling can be encouraged in a number of ways, and the treatment will depend on the exact conditions of the site.

Specific areas that require more attention and encouragement to slow down (for example, pedestrian crossings, bus stops) can be narrowed.

While vertical lines (parallel to the direction of the bike lane) tend to encourage longer views, faster movement, and higher ownership of the space, horizontal lines encourage slowing down by breaking up the view. Calgary is experimenting with this at Stephen Avenue at a space used heavily by crossing pedestrians.

Different surface treatment can be effective, and is already used in Vancouver (eg. sea wall at North False Creek). Using visual or physical texture is an indication to people cycling to slow down. Physical texture can be grating for other people with wheels on their form of motion (e.x. people using wheelchairs or walkers). This impact should be considered.

TRANSIT

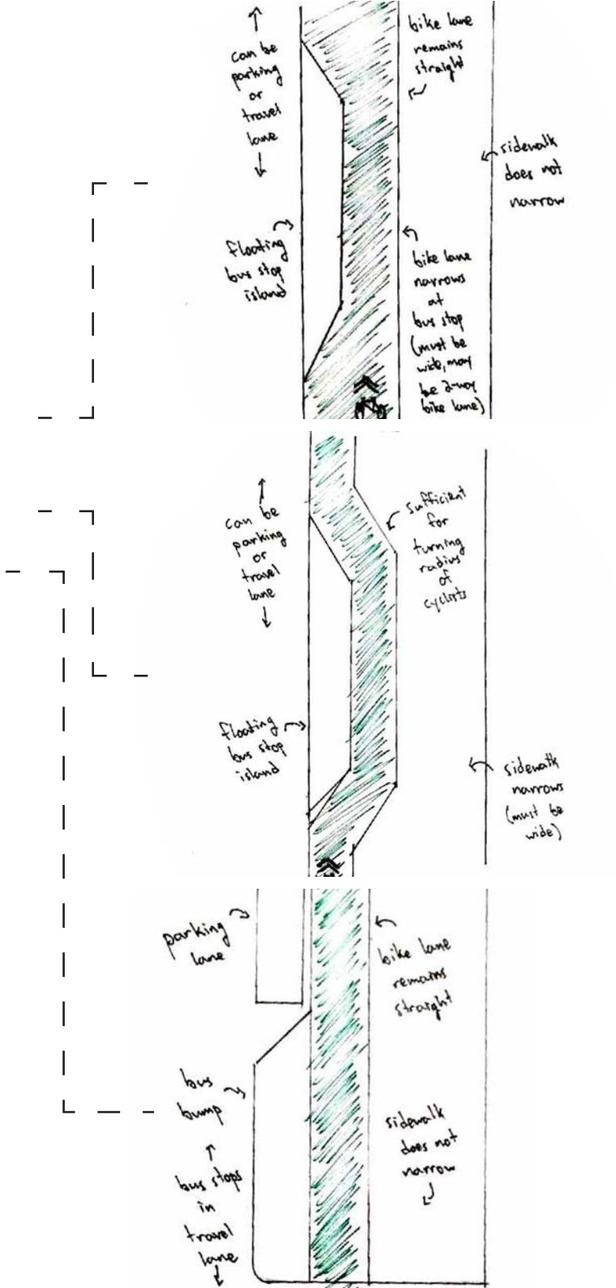
Transit stops can create conflict between people cycling and people boarding and alighting the bus. The current best practice is for a floating bus stop, with a protected bike lane between the bus stop and the sidewalk.

This can be accomplished by a number of different designs, depending on the width of the sidewalk, bike lane, and availability of a parking lane.

- Bike lane continuing straight, narrowing at the bus stop. Can be used if the bike lane is wide enough to be narrowed.
- Bus bulb in a parking lane, bike lane continuing straight behind the bus stop.
- Bike lane curving behind and around the bus stop. Can be used if the sidewalk is wide enough to accommodate the curve.

Bus bulbs provide more room on the sidewalk and avoid buses merging into traffic after a stop, which can speed the travel time. In streets with multiple lanes of vehicular traffic, bus bulbs also increase traffic flow.

If space constrained and there is no space for a floating bus stop, a second option is available if the bus stop is not heavily used. The bus stop is on the far side of the bike lane, with the bike lane raised to sidewalk height. However, this requires people taking transit to wait on the sidewalk, and cross the bike lane when boarding or alighting a bus. People cycling must yield.



PEDESTRIAN CROSSINGS

Pedestrian crossings should always be visibly marked so they are legible by people walking and cycling in order to minimize conflict. The bike lane can be slightly narrower at these points so that people cycling naturally slow down to let people walking cross the lane. Zebra markings or an extension of the paving material of the sidewalk are two possibilities to mark the crossing.

LOADING

One common solution for loading is placing loading areas between the road and the bike lane in a "flex" space (including bus stops, bike parking, street furniture, other parking) or in a parking lane.

The loading zone may either be on a raised table at the same height as the sidewalk (with mountable curb or ramp) or at the same height as the road. There should preferably be an accessible access to the sidewalk next to the loading area or at the nearest pedestrian crossing.

Loading is often only available for certain time periods.

Seattle, in a parking-protected bike lane, has delivery vehicles park in the parking lane and unload into the buffer zone (3 ft) between the parking and the bike lane. The delivery can then be carried across the bike lane or wheeled to the nearest pedestrian crossing (with ramp) using the buffer zone.

PARKING

Parking is often available, but it comes in different forms.

Parking protected bike lanes are one cheap method of protection, such as on Union Street in Vancouver.

Limited parking can also be put in a "flexible" space between the bike lane and driving lanes, along with bus stops, bike parking, and other street furniture. This could be similar to Granville Street in Vancouver or Boulevard de Magenta in Paris.

No parking may be allowed, with parking only on side or parallel streets, such as on Norrebrogade in Copenhagen.

There may be limited periods when parking is allowed in order to allow for another driving lane during peak periods, such as on 2nd Avenue in Seattle.

If, how, and when parking is allowed is specific to the road geometry, number of vehicles, and specific role of the street.

VANCOUVER CONTEXT

POLICY AND DIRECTIONS

In the Transportation 2040 Plan, the directions which give particular direction to providing all-ages and abilities cycling facilities for people cycling on commercial high streets are:

- C 1.1. Build cycling routes that feel comfortable for people of all ages and abilities.
- C 1.2. Expand the cycling network to efficiently connect people to destinations.
- W 1.1. Make streets safer for pedestrians.
- W 1.2. Provide generous, unobstructed sidewalks on all streets.
- W 1.3. Make streets accessible for all people.
- M 1.2. Consider impacts to transit, commercial vehicles, and general traffic flow prior to reallocating road space.
- M 1.3. Manage traffic to improve safety and neighbourhood livability.
- G 1.1. Provide for efficient loading and unloading.

COMMERCIAL HIGH STREETS IN VANCOUVER

Vancouver developed along streetcar lines, which created the urban form evident in Vancouver today - north-south and east-west arteries throughout the city forming the backbone of Vancouver. They are the some of the most intuitive and direct connections throughout the city.

This has resulted in many different uses on commercial high streets:

- Concentration of commercial and other destinations used by people in the neighbourhood and larger region.
- The most intuitive and direct connections across the city, including in such areas as across False Creek and in areas where severe topography changed the street grid or there are other shifts in the street grid due to various development patterns.
- High pedestrian traffic, as many people are:
  - walking to commercial areas and other destinations
  - waiting for and walking to and from public transit
  - walking between other destinations
  - walking to or from a destination from a vehicle or parked bicycle.
- Important public transit lines and connections.
- Trucking routes.
- Loading requirements for commercial areas.
- High volumes of vehicular traffic.
- Parking for people in vehicles to access commercial and other destinations.

It is these considerations which create the unique conditions for creating AAA bike facilities on commercial high streets. It is also this history which points to it being vital to including these bike facilities - it should be safe, comfortable, and convenient for people cycling to be able to access these same destinations that everyone uses.

Vancouver's situation is unique, as these commercial high streets are often unavoidably arteries for vehicular traffic and transit and severely limiting traffic, such as limiting through traffic, is not a realistic option. In many other cities where protected bike lanes are implemented, it has been accompanied by slowing down or taking away/redirecting vehicular traffic. On Norrebrogade in Copenhagen, car traffic was reduced and through traffic was prevented (Jensen, N., personal communication, June 23, 2015); in Oakland, Telegraph Avenue was effectively downgraded from an arterial to a collector road (Patton, J., personal communication, June 4, 2015); in Paris, congestion has increased as the city purposefully tried to shift towards cycling (Fayet, J., personal communication, June 16, 2015).

With a constrained right-of-way (varies for different Vancouver streets, but for commercial high streets it is typically either 66 ft. (20m) or 99 ft. (30m)), it is important to carefully design each and every facility to manage these conflicting uses and ensure the street is a great public space.

COMMERCIAL DRIVE

Commercial Drive is an integral part of the diverse and vibrant neighbourhood of Commercial Drive. It originally developed along the New Westminster Interurban, which encouraged the development of local businesses and residences along the line - a form still seen today in many narrow commercial lots facing Commercial Drive. Today, the Commercial-Broadway SkyTrain station is the busiest transit station in the region, with the 99 bus route (the busiest bus route) terminating at the station. The second busiest bus route (20) runs along Commercial Drive running at a frequency of 6 minutes during peak hours.

Commercial Drive serves local and regional visitors with cafes, restaurants, boutiques, and more. It is home to several festivals, including the first location of Car Free day in Vancouver.

The street right-of-way (property line to property line) is typically 80 ft. (24.4 m) south of 1st Ave, and 73 ft. (22.2 m) north of 1st Ave, with some sections as narrow at 66 ft (20.16 m).

Vehicle counts are approximately 17000-22000 south of Venables St. Major intersections streets include Hastings St, Venables St, 1st Ave, and Broadway.

COMMERCIAL DRIVE RECOMMENDATIONS

- Implement protected bike lanes south of Graveley Street to 10th Ave on Commercial Drive as a pilot project.
- Consider the connections to the existing bike network, notably the Adanac Bikeway, 10th Ave, the Central Valley Greenway, Woodland Drive, and Lakewood Drive. North of Graveley St to the Adanac Bikeway consider sharrows along Commercial Drive. Consider traffic calming along Graveley St (or other AAA bike facility) to connect to Woodland Dr and Lakewood Dr.
- Pay particular attention to connectivity to residential streets within the neighbourhood. Consider adding more pedestrian-activated lights where necessary (consider 2nd Ave and 5th Ave) and conducting bicycle counts or observations.
- Consider long-term strategies to decrease vehicular traffic on Commercial Drive without increasing traffic through neighbourhood streets.
- Pilot a "simultaneous green" for cyclists (green for cyclists in all directions at once, which permits single-stage left-turns from a protected bike lane) at an intersection heavily used by people cycling, and collect data on potential uses in Vancouver at intersections with sufficient cyclist use and infrastructure. Possible intersections include Commercial Drive at 10th Ave or Grandview Highway.
- Design:
  - For initial pilot, consider a parking-protected bike lane with additional barriers where parking is eliminated and at intersections.
  - Use bus bulbs where appropriate, especially at the busiest bus stops (such as at Broadway). Relocate bus stops to far-side of signal if currently on near-side. At bus stops consider: removing parking on both sides of the street, and use the extra space for either a second lane to pass a stopped bus or a right-turn lane in the opposite direction based on the specific traffic at that intersection.
  - Use floating bus islands except where severely space-constrained.
  - Consider right-turn lanes, including removing parking. Consider banning left-turns at some intersections or removing parking to implement a left-turning lane, particularly to each intersection. The Broadway and Commercial Drive intersection may be particularly appropriate.
- Increase wayfinding to nearby parking garages and lots.
- Increase wayfinding to and from nearby bike routes, especially at ends of Commercial Dr bike lane.
- In future extensions and if made permanent, consider eliminating parking on one side of Commercial Dr and widening sidewalks in busy areas. This should be balanced with maintaining existing trees.

Zeschky, 2009

PEDESTRIAN-PRIORITY SPACES

INTRODUCTION

The magic of city life happens in pedestrian-priority spaces - small and large events, from meeting friends to major festivals. These spaces are well-used by a diverse array of people.

People should be able to cycle to these spaces, and in some cases they may serve as important all-ages and abilities cyling connectors between places while the cycling network is still growing.

Studies show that people cycling in pedestrian-priority spaces do not present a major safety concern, and people cycling tend to modify their behaviour based on the number of people walking. Moreover, many people cycling will not dismount regardless of a ban on cycling; this preferene for riding should be designed for rather than discouraged (Davies et al, 1999; Kiyota et al, 2000; Toronto; Madison)..

As the volumes of people walking and cycling increase, so should the level of separation, from none to using colouring and surface material, to an alternate route.

WHEN CAN IT WORK?

Cyclist permeable pedestrian-priority areas can and do maintain excellent safety, and do not greatly impact comfort for people walking given certain pedestrian volumes (Trevelyan and Morgan, 1993; Davies et al, 1999; Toronto; Madison). Design of these spaces can serve to mediate conflicts and encourage slow cycling.

Peak flows of people cycling (often morning and evening) may not occur during the same times as peak flows of people walking (often building over the morning peaking at lunch and continuing until early evening) ((Trevelyan and Morgan, 1993; Calgary). This alone minimizes conflict.

As the volumes of people increase, some method of separation is necessary. In particular, during special events, it is important to plan for possible alternate routes.

Two standards from the Netherlands (CROW Manual) and the United Kingdom are shown on the right, indicating methods of separation and minimum width of usable space (not including commercial or street furniture).

plaza, street, or other space where the emphasis is on the pedestrian experience

The Dutch CROW Manual suggests the following forms of separations for the flows of people walking per meter of usable space (not including space for trees, street furniture, posts, patios, etc.).

People Walking (per metre width per hour)	Separation
<100	None - combine people walking and people cycling completely without delineation.
100-160	Some separation - mark a route for people biking through the space using colouring and surface material. People walking should be able to use the full space.
160-200	More separation - mark a route for people biking through the space using colouring, surface, material, height separation.
>200	Complete - people biking should have an alternate route.

A report prepared for Sustrans in the United Kingdom notes the following minimum standards for paths. An additional column of people walking per metre per hour been calculated to provide comparability to the Dutch standard.

Level of Flow	People Walking per hour	Cyclists per hour	Unseg-regated Path Min Width	Segre-gated Path Min Width	People Walk-ing / m / hr
Very low	0-120	0-10	2	3	0-60
Low	120-200	10-50	2	3	60-100
Medi-um	200-450	50-150	3	4	66-150
High	450-900	150-450	4.5	5.4	100-200

CASE STUDIES

TORONTO: DISTILLERY DISTRICT

The Distillery District is a National Historic Site in Toronto. Originally a Victorian Industrial site, it is now a vibrant pedestrian-priority district dedicated entirely to arts, culture, and entertainment (The Distillery District).

The Distillery District is open to people walking and cycling. No vehicular traffic is allowed onsite after 10:00am. There is no demarcated walking or cycling paths. Conflict between people walking and cycling has not been perceived to be a problem by the historic district (J. Goad, personal communication, June 24, 2015), and no incidents have been reported.

This lack of conflict is attributed to an important feature – the Distillery District is a destination without direct through routes. During special events there is no formal restriction on people cycling, but no people were observed cycling during extremely busy periods, such as during the Christmas Market (J. Goad, personal communication, June 24, 2015).

DESIGN FEATURES

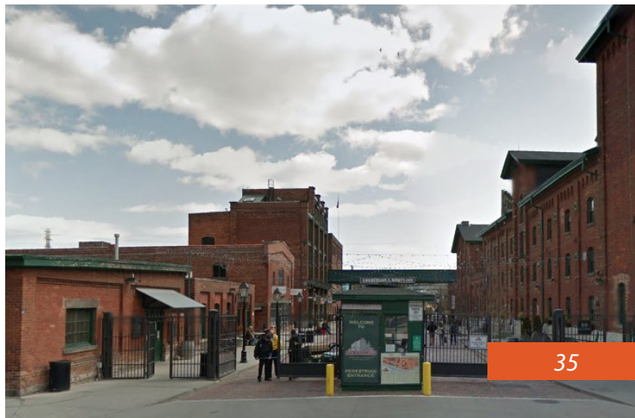
No differentiation between sidewalk and road (one exception). Norm is narrow road widths (30') (one exception); roads are regularly narrowed by patios.

Well-defined edges and patios guide people cycling in the center of the roads.

Brick paving to suit historic character.

Destination rather than through-routes for people cycling. Bike racks and bike parking throughout the district.

Well-defined transitions and entry-points to the district emphasize pedestrian priority.



SAFETY, PERCEIVED SAFETY, AND COMFORT

Multiple studies and interviews showed relatively little risk in pedestrian-priority spaces inclusive of people cycling. In observational studies there are few incidences of conflict, and there were exceptionally few or no incidences of contact between people walking and cycling (Trevelyan and Morgan, 1993; Davies et al, 1999; Toronto; Madison). One study found only one contact in 15 years of three separate streets (Trevelyan and Morgan, 1993).

Considerate behaviour, path width and speed of travel were found to be extremely important in determining perceived level of conflict (Sustrans, 2011).

Prior to mentioning people cycling, people walking indicate the same level of safety and comfort regardless of whether or not they had a conflict (perceived and actual) with a person cycling. In open questions about pedestrian-priority streets, most people walking do not mention people cycling as a problem (Davies et al, 1999). Children have been seen to wander at some distance, indicating little concern by their parents (in contrast to vehicles) (Trevelyan and Morgan, 1993).

Perceptions of conflict are escalated after discussing conflict between people walking and cycling (Sustrans, 2011): its assumed incidences increase and are more serious. However, in one study, even when asked specifically about people cycling in the pedestrian-priority area, most people walking are 'not at all' or 'not very much' concerned – and are more concerned about children and elderly people than themselves. Conflicts observed by people walking often involve people cycling close to entrances of stores.

The amount of space between a person cycling and a person walking can be more important in the perception of safety than the speed of the passing cyclist. Risk is perceived to be high when skull-to-skull spacing is less than 75cm and low when the spacing is greater than 150cm (Kiyota et al, 2000). When there are many people walking people may feel less safe, as people cycling will be passing with less room (but with a lower speed).

Memories of people are more memorable than empty space, so people tend to remember more people and people cycling than actuality. Negative memories of people cycling in mixed use spaces may be more memorable than positive or neutral memories (Sustrans, 2011).

The most vulnerable users, including elderly people and people with disabilities, are likely to have lower levels of tolerance for incidences (Sustrans, 2011), however, no quantitative studies have tested this. Organizations representing the interests of people with disabilities, particularly visual impairments, may oppose shared use paths and spaces.

BEHAVIOURS OF PEOPLE WALKING AND CYCLING

People walking tend to have diverse and sometimes unpredictable movements. People will walk in many patterns: in and out of stores, up and across the space. People walking were found to change behaviour in reaction to vehicles – but not to people cycling (Trevelyan and Morgan, 1993).

People cycling tend to move in a linear fashion down the street in elongated S curves to manoeuvre around and pass other people. Most tend to be responsive to the surrounding environment, including how many people are present. As the number of people walking increases, the average speed of people cycling decreases and the number of people dismounting increases (Davies et al, 1999; Kiyota et al, 2000; Toronto; Madison).

People will still cycle when it is prohibited. Davies et al found over 50% of people continued to cycle illegally during a ban, consistent with experience from Madison. However, people cycling may become more cautious if they know a ban is in effect, even if they do not dismount.

Four significant factors in explaining when people cycling do choose to dismount include pedestrian volume, site location and characteristics, interaction between pedestrian volume and a cycling ban (which is more likely to be in effect during times with high pedestrian flow), and interaction between pedestrian volume and site location (likely more pedestrians on a bustling commercial street) (Sustrans, 2011).

ADVANTAGES AND DISADVANTAGES OF SEPARATION

There are multiple forms and designs of separation, from a fully shared use space, to some indication to people cycling where they should be through different surface treatment and other cues, to a fully alternate route for people cycling. These generally are used with different levels of pedestrian flow and types of cycling (commuting, recreational, or to other destinations).

Fully shared-use space	Low pedestrian flow	Slow cycling
Some separation through design cues	Medium pedestrian flow	Slow cycling
Alternate route for people cycling	High pedestrian flow	Fast cycling

If the route is a through route for people cycling, the following should be considered during design:

- Temporal patterns of people walking and cycling.
- Availability of alternate, parallel routes.

Pedestrian volume can be an important factor for people cycling deciding their route, and alternate routes merit consideration if pedestrian volume is very high (Trevelyan and Morgan, 1993). In areas in the United Kingdom, people cycling have used both the pedestrian areas and alternate routes, depending on time of day, pedestrian density, the need to make stops on route, and their destinations (Davies et al., 1998).

Pedestrian areas should likely not be relied on for significant commuting routes of the bike network. However, they can be used to connect between routes and provide access to commercial and other destinations for people cycling. Sometimes pedestrian-priority areas may be the best option to provide AAA cycling facilities while the cycling network is still being built.

A repeated theme, although one with a lack of quantitative data, is that separation between people walking and cycling paths is better. However, it may or may not actually reduce conflict between people walking and cycling – there are a number of advantages and disadvantages to having separation.

FULLY SHARED-USE SPACE

In Toronto's Distillery District, there is no distinction between people walking and cycling paths.

Advantages:

- Shared use is more flexible for varying proportions of people walking and cycling.
- Allows people cycling access to destinations.
- Provides important AAA connectors.

Disadvantages:

- Slower for people cycling.
- Perception of safety for people walking, particularly more vulnerable users, may be lower.

ALTERNATE ROUTE FOR PEOPLE CYCLING

Stroeget, a pedestrian street in Copenhagen, does not allow people cycling on it, as it has too many pedestrians for it to be practical for people cycling. Instead, an alternative cycling route parallel is provided.

Advantages:

- People can cycle faster on fully separated routes.
- Reduces perception of conflict by people walking, especially vulnerable groups.
- Can reduce actual conflict, particularly if volumes of people are high.

Disadvantages:

- Does not allow access to destinations by people cycling.
- May be difficult to implement if routes are limited.

SOME SEPARATION THROUGH DESIGN CUES

In Calgary's Stephen Avenue, a pilot project is being tested to allow people cycling on the avenue at all times (closed to vehicles during the day). It creates an important link in the downtown cycling network, and has peaks of pedestrian and cyclist activity at different times of the day.

Advantages:

- People cycling have a designated area.
- People walking may have a greater awareness of potential of people cycling.
- Allows people cycling access to destinations.

Disadvantages:

- Any height difference used as a separation method may impede horizontal movement across street, particularly for people using walkers or wheelchairs.
- May detract from aesthetics of street.
- People cycling may move faster than what is perceived as comfortable by people walking.

BEST PRACTICES

GENERAL PRACTICES

The spaces should, as best as possible, give cues as to the desired behaviour through the design. Signage (e.x., indicating that people walking have priority) can be helpful additions but design cues are critical.

Many people cycling will not dismount even if there is a ban on cycling. Using some of these best practices can help to minimize conflict in a space regardless of a cycling ban.

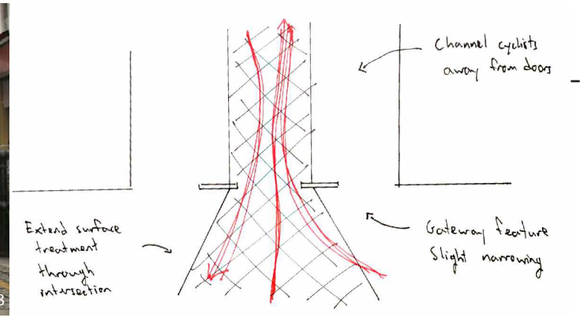
The transitions between the pedestrian-priority space and adjacent streets are important to emphasize the shift in the priorities of the street and emphasize the priority of pedestrians.

VISIBILITY AND WIDTH

As much as possible, maintain high levels of visibility for people cycling to see people walking. Try to direct people cycling into areas with few "blind spots" (areas which would not be visible, where people walking could come from).

Try to keep a wide width for people cycling, which allows for more space to pass people walking in a manner that feels safe. Keep in mind the overall volume of people walking and cycling as well as a passing distance which feels safe to people walking (greater than 150cm feels the most safe (Kiyota et al, 2000)).


Stanton, 2008




NACTO, 2014

INDICATING PEDESTRIAN PRIORITY

Based on the volumes and temporal patterns of people walking and cycling, a balance should be struck between separation and and diminishing the sense of priority to pedestrians (by indicating to people cyling that they have "ownership" over an area).

Any "road-type" markings or design should be avoided, as they tend to give the impression that the rules of the road apply on the pedestrian-priority space.

If appropriate, methods of subtle separation can end before crossings or intersections to encourage people cycling to yield to normal pedestrian movement at the crossing.

The transitions from the pedestrian-priority space to the adjoining streets and neighbourhoods are critical to emphasize the pedestrian-priority nature of the space. Consider extending the design treatment (including pavement, street furniture, etc.) across the street and into adjacent streets. Raised tables and gateway features can also be used.

Maintain similar paving and height building-to-building across the space to emphasize the pedestrian-priority of the entire space.

SEPARATION METHODS

Try to guide people cycling down a central channel of the space, away from storefronts, doors, and patios or street furniture where people walking could exit from unexpectedly. There are a number of methods to do this, and the decision on which to use may be guided by volume of people walking and cycling, aesthetic, and other site-specific considerations.

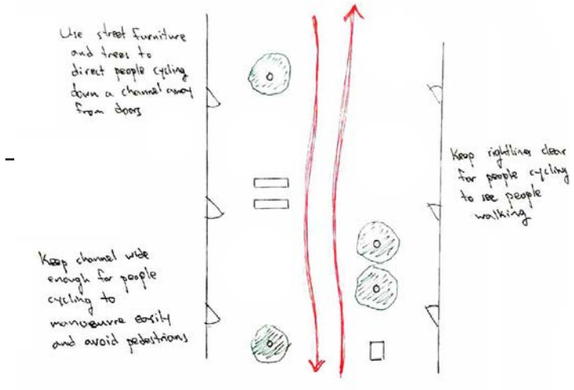
Trees and street furniture can be used to create a central channel to guide people cycling.

Subtle variations in materials or colours can be used to indicate a path for people cycling. This could include using asphalt in contrast to a paving stone, a smoother paving stone, or a different colour of stone or pavement. Subtle markings indicating the edge of the path can be used to the same effect, including circles, studs, or other markings.

If there is a high volume of people, can use a small height difference with shallow, angled curbs to indicate a path for people cycling.

Consider having a "ladder-grid" movement pattern by encouraging people walking to cross at certain points at regular intervals through breaks in street furniture/trees and subtle variations to the width of the central channel.

In choosing the method, consider people who have impaired vision or mobility. People who are visually impaired will have different abilities to detect the edge of the path. Height differences can cause accessibility issues, particularly for people using walkers and wheelchairs.




Calgary, 2015


Plougmann, 2013


Craven, 2010

SLOW CYCLING

A sense of pedestrian priority should be emphasized in the entire design and in transitions into the area.

Horizontal lines across the space are an indicator to move more slowly. By contrast, vertical lines can be an indicator to move faster.

Slightly curved paths and a lack of straight lines in the design can slow people down and indicate a more leisurely space.

Similarly, street trees, art, bike parking, and street furniture in "unconventional positions" can slow people cycling and create a curved path. However, this could create bottlenecks.

Textured paving is another indicator to people cycling to slow down.

HERITAGE

The paving can be used building-to-building across the street to maintain the pedestrian and heritage character of the space.

If the paving is particularly rough or bumpy, consider using smoother paving stones to create a path for people cycling. This may also be beneficial for people who are using walkers or wheelchairs.

Consider alternatives for drainage solutions, including a central channel or two channels on the edge of the central area.

VANCOUVER CONTEXT

POLICY AND DIRECTIONS

The Transportation 2040 Plan notes the essential role of pedestrian-priority spaces and plazas, notably the following directions:

W 2.2.1. Create pedestrian-priority streets and spaces, considering needs for cycling, transit, services, and deliveries to determine appropriate design treatments. Potential locations (subject to additional consultation) include:
a. 800-block Robson Street (Robson Square);
b. portions of Robson and/or Granville streets;
c. Hamilton and/or Mainland streets between Nelson and Davie; and
d. other locations as identified through future planning processes.

W 2.2.3. Implement a City-led 'Pavement-to-Plazas' program to create low-cost, high-impact public spaces by transforming underused street rights-of-way.

PEDESTRIAN-PRIORITY SPACES IN VANCOUVER

Viva Vancouver, the Jim Deva Plaza in Davie Village, and the possibilities in Gastown are examples of current planning for vibrant pedestrian-priority public spaces.

Viva Vancouver is a program run by the City of Vancouver focused on temporary street closures, transforming these streets into vibrant pedestrian spaces. Robson Redux is one program focused on 800-block Robson Street (Robson Square), transforming this street each summer into a pedestrian plaza with an innovative seating installation.

A new permanent plaza in the heart of Davie Village is currently being planned, which will transform Bute Street between Davie Street and Burnaby Street into a vibrant public space named after Jim Deva, recognizing the historical character of the Davie Village as a hub for the LGBTQ community.

Gastown will be undergoing reconstruction work, which provides an opportunity to redesign the streets and public space in Gastown as a vibrant pedestrian-priority space .

GASTOWN

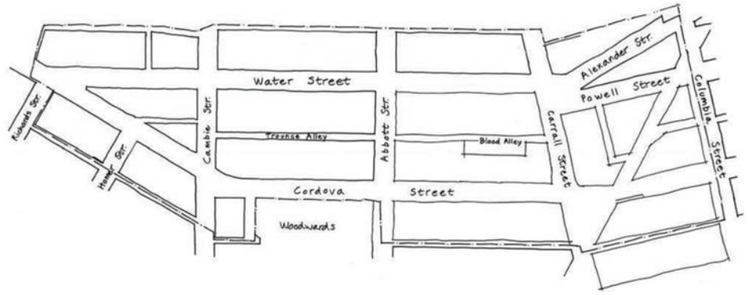
Gastown was the original epicentre of Vancouver and is a designated National Historic Site. Today, it is filled with stores, boutiques, restaurants, and bars, and is a major tourist attraction in Vancouver.

At the core of Gastown is Water Street and Maple Tree Square, two very distinctive public spaces. The streetscape includes brick and stone paved sidewalks and crosswalks, brick paving on the roadway, and heritage-appropriate lamp-posts and bollards.

The area strays from the standard grid pattern as well as containing many one-way streets, and there are some struggles with traffic conflicts and conflicting demands.

RECOMMENDATIONS

- Design for bike-permeable pedestrian-priority spaces using primarily design cues to minimize conflict along with simple signage to emphasize that cyclists should yield to pedestrians.
- Consider the connection and an extension to the protected bike lane on the Powell Street overpass, either along Alexander Street or Powell Street.
- Consider traffic flow requirements and connections, particularly for westbound traffic from the Powell Street Overpass. Consider making Cordova Street two-way east of Richards Street.
- Plan for a future additional protected bike lane for through cyclists and commuters, likely on Cordova or Hastings. Find an immediate alternate route for special events.
- Provide plentiful bike parking at the edges of and throughout Gastown.
- Keep trees as much as possible. Where necessary, use heritage appropriate street furniture, bollards, or lampposts to keep people cycling away from doors. Space these far enough apart as to remain permeable to people walking but encourage people cycling to stay in the central area.
- Maintain the same level and similar paving material building-to-building across the street.
- Consider a smoother paving stone or material in part of the central area to encourage people cycling along this path.
- The central channel should be wide enough to accommodate loading vehicles as well as car access to the parking lot between Abbott and Cambie Streets. Restrict or ban through vehicle traffic through Water Street.
- Extend the design treatment across intersections, plan for a gateway feature or transition at Main Street and Richards Street.
- Consider extending car-free treatment to Carrall Street between Water Street and Cordova Street, and blocking vehicle access from Alexander Street and Powell Street to Maple Tree Square. This would require limiting access along Alexander Street and Powell Street west of Columbia Street, and changing Columbia Street to two-way.



Duthie, 2012

ENGAGEMENT METHODS

INTRODUCTION

As bike facilities will change an integral part of public space - streets - it is important for public engagement around these facilities to take place.

People can have emotional responses to bike lanes, and there are a lot of reasons for this. One of the keys to engagement around bike lanes is to manage and utilize these high emotions without silencing any particular voices.

This conversation around bike facilities can take a long time, but is worth it!

BEST PRACTICES

COLLECT GOOD DATA

Test Common Concerns
Data can be extremely useful to address concerns, test projects, and test common beliefs. If a concern is not true, it can be debunked using good data presented effectively, and people may change their minds (Walljasper, 2013). If a concern is true, the data can help to change the design of projects to mediate it.

This data can be a crucial element of framing the problem and engagement around a project.

Use Pilot Projects
Pilot projects can be an opportunity to collect data on whether or not a project is addressing the concerns and learn from the project in order to adapt and change the current and future projects.

Pilot projects can be extremely effective framing tools, as they are low-cost and not permanent. Concerns can be directly addressed in data collection and the design, and they can be adapted after the project is in use and enough data is collected (Bracic, B., personal communication, 2015).

in-depth conversations about bike facilities and their impacts

Enable visualization and understanding of trade-offs
Good data can clearly convey the social impacts and financial viabilities that underpin different scenarios, enabling visualization and understanding of trade-offs and allowing people to be a part of the complex process of design and managing conflicting uses and trade-offs. This may result in a higher engagement and ownership level and less conflict when a project is announced.

ADDRESS SUBJECTIVE EXPERIENCES

People may form opinions or evaluate projects based on their own experiences and experiences they have heard from others. It is vital to address these experiences and concerns, good and bad .

Fear and concerns should be addressed head-on, and if possible, should be addressed in the framing of the project. One possible method is using strategies for people walking, cycling, taking transit, and driving to be able to empathize with each other.

- Frame bicycle facilities by what they mean to the city, not just people who cycle (ex. reducing traffic, noise, pollution, increasing mobility options) (Walljasper, 2013).
- Ensure voices from all sides are in the room, especially people who cycle or who want to cycle (Bracic, B., personal communication, 2015; Rebuild by Design; Jensen, N., personal communication, June 23, 2015).
- Have consultation formats which encourage long-term engagement and discussions in smaller groups. Avoid "presentation and question" format with large groups of people which provides a disproportionate amount of time for more extreme opinions (Bracic, B., personal communication, 2015).
- Bring more people into the planning process by using less conventional activities (ex. community bike rides, celebrations) (Rebuild by Design).
- Work to build support from different sectors, including businesses (Jensen, N., personal communication, June 23, 2015).
- Share stories of all different kinds of transportation, and share experiences of why people use different kinds of transportation.

People may see people cycling as "ignoring the rules of the road" and not paying their own way in infrastructure costs. There is often a perception of too few people cycling (especially in poor weather), perception that bike lanes will take away parking and have a negative effect on businesses, and that bike lanes will cause congestion.

People walking may have had uncomfortable interactions with people cycling, such as being passed closely or being cut off. People cycling may feel unsafe or not understood as a mode of transportation.

CONSULT MEANINGFULLY AND LONG-TERM

Moving towards engagement strategies where community members can collaborate on a project from the beginning can increase ownership and decrease conflict after the finished design is produced. When communities can help set the project's foundation and have their concerns addressed throughly, buy-in from community members can be higher (Rebuild by Design).

From the beginning, try to frame the concerns around the project broadly in order to bring in disparate members of the community, and try to collaborate early to set the foundation of the project (Rebuild by Design).

Ensure that voices from many sides are in the room. This could look like increasing the representation of people who are interested in cycling but cautious - they may not currently cycle but would given facilities they feel safe in.

Bringing together a small group of stakeholders multiple times to act as an advisory group on a specific project has worked well for cities, such as Calgary. This can lend itself towards substanstive conversations, changed opinions over a long-term, and a robust design given feedback from multiple perspectives.

Testing small forms of large proposals with community stakeholders before the final design or implementation strategy is completed can alert to potential points of conflict or improvement, increase buy-in, and increase the quality of the final design and fit of the design with the community.

Being willing to address concerns head-on and explaining points of the design and process thoroughly can increase the trust between the community and the City by showing that the City is open to feedback and concerns.

Finally, communities may judge the success partially by how flexibly and inclusively it provided multiple points of engagement (Rebuild by Design).

CASE STUDY

CALGARY

Calgary is planning a cycle track pilot project implementing a network of cycle tracks through downtown. The City implemented an extensive consultation process with multiple public touchpoints around establishing this cycle network, attempting to establish what was important to people about cycling downtown (Bracic, B., personal communication, June 5, 2015). They concluded with criteria around getting to destinations and direct routes, which were used to choose routes.

For Stephen Avenue, a pedestrian-only space during the day which would be opened to people cycling, an advisory committee was created with drew upon multiple stakeholders with diverse opinions. The City wanted to get their concerns and start conversations, meeting with the advisory committee around seven times to establish priorities, share directions, concepts, and gather feedback.

Throughout the process, staff noted that the tone of the conversation in the advisory committee changed, from being against the project with concerns around the safety of pedestrians and the vitality of the street to placing more trust in the evaluation process they had established. By the end of the process the conversations were about the details of the design and looking forward to the results of the evaluation (Bracic, B., personal communication, June 5, 2015).

Staff noted that part of this process was taking the time to respond seriously to concerns around safety and knowledge in the design, in programming (there will be bicycle ambassadors and an extensive education program), and in the evaluation of the pilot project (Bracic, B., personal communication, June 5, 2015).

Key points:

Respond directly to concerns, and be willing to change the design and evaluation plan to address those concerns in an ongoing manner.

Long-term conversations may be vital to building trust and changing the tone of the engagement. Building an advisory committee with many perspectives is a good way to start these conversations.

Start engagement from the foundations of the project, including through establishing priorities and concepts from the design.

METRICS AND ASSESSMENT

Data and metrics seek to answer a number of questions about protected bike lanes: Do the facilities attract more people cycling? How well does the design of the facilities work? Do safety and perceived safety increase? Are there measureable increases in economic activity?

Data and metrics can be used in three distinct parts of the lifecycle of a bike lane, in different thematic areas, and at three different scales.

Lifecycle:

- Defining the problem: what are the expectations of the project, and what are the concerns about the street and the surrounding neighbourhood?
- Designing the project: what are the specific conditions of the street and the surrounding community that will impact the design? Ex. Transit, number of people driving, cycling, walking.
- Evaluating the project: how well did the project perform compared to the expectations and goals?

Defining the problem and designing the project will often use the same source of data, and evaluating the project will use data from after the project is implemented.

Different scales of data collection lend themselves to different data. The three scales below indicate three different methods of collecting data.

- Segment or entire route and surrounding street: measuring data and using surveys directly on the street in question (ex. intercept surveys, video surveys).
- The surrounding community: using surveys from the surrounding community to determine the response of the neighbourhood and community to the changes.
- The entire city: using surveys to determine the overall satisfaction and general data from the entire city.

Thematic areas:

- Safety and comfort
- Impacts on all modes
- Economic vitality
- Overall satisfaction and vibrancy
- Understanding/legibility of design
- Conflict between modes
- Cost-benefit analysis
- External impacts (emergency services route, loading zone impacts, transit impacts)

It is important to measure both perception and reality, in particular regarding behaviour and use of the bike lane, interactions between different modes, safety, and number of people using the bike lane. It can often be important to look at trends rather than absolute numbers.

data and methods to define, design, and evaluate

bike facilities

Pilot projects are a popular way of getting projects on the ground and getting good data on the bike lanes. If possible, have pilot projects in several areas with different problems in order to be able to generalize data and solutions.

Be responsive to local concerns, and attempt to collect data to address whether those concerns are true or not. This is one way of directly debunking myths and having data to address concerns which are true.

This section outlines possible data to collect, and then outlines methodologies to collect that data. Bolded entries indicate measures common to many cities.

CASE STUDIES

CALGARY

Calgary is starting a cycle track pilot project with a network of bike lanes downtown, all of which will be measured and evaluated before City Council decides whether or not to make them permanent in 2016.

Part of this pilot project involves opening up Stephen Avenue, a pedestrian-only street during the day. There were concerns from an advisory committee around the safety and comfort of the people walking during the day, as it is heavily used, particularly during the lunch period (Bracic, B., personal communication, June 5, 2015).

The evaluation plan includes a general survey of Calgarians of satisfaction levels, safety and crash rates, volumes of people walking and cycling, economic vitality (surveys of both merchants and patrons), and demographics of people cycling .

On Stephen Avenue, it will also include using video cameras and trained data collectors to observe for careless bike riding and counting the number of near-misses. This is a direct response to the concerns around the comfort of people walking and will assist in the evaluation and any redesign (Bracic, B., personal communication, June 5, 2015).

Key points:

Collect data in response to specific concerns brought up by stakeholders in order to either alleviate the concern or have the data to properly address the concern.

Create a thorough plan for data collection and evaluation, and clearly state what success is and how the project will be evaluated.

Pilot projects with an evaluation plan can be more palatable for new ideas and controversial projects.

EDMONTON

In planning two new bike routes, Edmonton used a multi-criterion analysis to determine the best route, with input from internal stakeholders, industry best practices, and community consultation (City of Edmonton, 2015). Edmonton publicly used evaluation during the planning of this project.

The criteria used were:

- Perceived safety (cyclists)
- Conflict points (pedestrians-bikes)
- Parking impacts
- Emergency services route
- Maintenance implications
- Conflict points (vehicles-bikes)
- Motorized traffic flow impacts
- Transit integration
- Freight/loading impacts

Key points:

Data and evaluation can be used in selecting routes and design decisions, and may increase public trust in the transparency of the process.

Criteria from multiple sources is critical, including internal stakeholders and the community, increasing the involvement and hopefully leading to a higher buy-in from these stakeholders.

The external and long-term impacts are crucial to consider, including routes for emergency vehicles and maintenance implications and costs.

	Defining the proble; designing the project	Evaluating the project	Route and Surrounding Street	Surrounding Community	Entire City
Safety					
Crashes reported to police or hospital	•	•	•		
Collisions (between people cycling and driving; between people cycling and walking)	•	•	•		
Number of near-misses (between people cycling and driving; between people cycling and walking)	•	•	•		
Careless and unlawful bike riding	•	•	•		
Perceived Safety					
Perception if safety and comfort of the street is increased (as a person walking, cycling, driving)		•	•	•	•
Perception if the bike lane is safer than cycling elsewhere in the city		•	•	•	•
Comfort ratings of different types of buffers	•				•
Impacts on People Cycling					
Number of people cycling		•	•	•	•
Demographics of people cycling		•	•	•	•
Travel time or level of service	•	•	•	•	
Access to destinations	•	•	•	•	
Potential to attract new riders		•		•	
Increased connectivity/network	•	•	•	•	•
Preference for different types of facilities and buffer methods	•				•

	Defining the proble; designing the project	Evaluating the project	Route and Surrounding Street	Surrounding Community	Entire City
Impacts on People Walking and Taking Transit					
Perception if safety and comfort of the street and sidewalk has increased		•	•	•	
Perception if they walk the street more or less		•		•	
Travel time and delay for buses	•	•	•		
Perceived travel time and delay for buses		•		•	•
Impacts on People Driving					
Peak period travel time for drivers	•	•	•		
Avoidance of driving on the street because of the bike lane		•		•	•
Perception of length of time it takes to drive the street		•		•	•
Actual impact to parking on street (including nearby parking)	•	•	•		
Perceived impact to parking		•		•	•
Understanding of Design					
Perception of increase or decrease of predictability of people cycling or driving		•	•	•	
Perception of design as being easy to use/understand		•	•	•	
Observation of improper use of facilities by people walking, cycling, and driving		•	•		

	Defining the proble; designing the project	Evaluating the project	Route and Surrounding Street	Surrounding Community	Entire City
Economic Vitality					
User cost savings through surveys of travel behaviours and costs		•	•		
Direct economic benefits to pedestrian- and bicycle-related business		•	•		
Customers per day		•	•		
Visits per week and money spent per month by patron		•	•	•	
Increase or decrease in how often people cycling stopped at shops		•	•	•	
Vacancy rates		•	•		
Sales revenue (or sales taxes)		•	•		
Concerns of people shopping		•	•		
Concerns of store owners		•	•		
Mode split of customers		•	•		
Perceived mode split of customers by store owners		•	•		
Correlations with property values		•			•
Correlations with housing costs		•			•
Correlations with wages		•			•
Cumulative Economic Impacts (REMI, Impacts Analysis for Planning, TREDIS models)		•			•

	Defining the proble; designing the project	Evaluating the project	Route and Surrounding Street	Surrounding Community	Entire City
Overall Satisfaction and Vibrancy					
Support for building more protected bike lanes at other locations		•		•	•
Support for separating people cycling from people driving		•		•	•
Perception of how well the street works		•		•	•
Perception of the quality and vibrancy of the street		•		•	•
Overall satisfaction with the retrofit		•		•	•
Perception if desireability of living in the neighbourhood has increased or decreased		•		•	•
Conflict Between Modes					
Number of times people cycling and transit come into conflict	•	•	•		
Number of times people cycling and people using transit come into conflict	•	•	•		
Number of times people cycling and walking come into conflict	•	•	•		
Number of times people driving and people cycling come into conflict	•	•	•		
Ease of switching modes	•	•	•		

	Defining the proble; designing the project	Evaluating the project	Route and Surrounding Street	Surrounding Community	Entire City
Cost-Benefit Analysis					
Maintenance costs	•		•		•
Physical space trade-off	•		•		
Public funding trade-off	•				•
Infrastructure cost per trip	•			•	•
Economic measures of health impacts	•			•	•
Economic measures of environmental impacts	•				•
Network effects	•			•	•
External Impacts					
Increased or decreased travel time for emergency vehicles	•	•	•		
Are there convenient and accessible loading zones?	•	•	•		

METHODS OF DATA COLLECTION

Some common methods to collect data include the following detailed below.

Video observations: to observe actual behaviour on the street, including if people are understand and are using the redesigned street correctly, and understanding if and when there are conflicts between people walking, cycling, using transit, and driving.

Use for actual safety, understanding of design, conflict between modes, and volume counts.

Intercept surveys on the street:
Of people on the street, including people walking, using transit, and cycling. Use for perceived safety, comfort, mode split, and satisfaction with the street.

Intercept surveys in businesses: either of people in a business or actual customers. May need to be administered by store owner and will need to have a cross-section of businesses, which could be difficult. Use for mode split of customers, amount spent per customer, and other economic vitality measures.

Survey of surrounding businesses: to find perception by businesses and store owners of the new design of the street, and what their preferences are before the street is redesigned. Use for economic vitality measurees.

Survey of surrounding community and/or city through door-to-door, telephone, or mail surveys. Use for overall satisfaction of the street, perception of impacts to different users, and if people are likely to use a street more or less.

General cyclist survey: use to find satisfaction of street to people cycling as well as preferences for different types of facilities and separation methods.

Data from 311 can be used to get some feedback with current functionality and feedback on the redesign.

Other data sources:
- Census: mode share of commute trips
- Trip Diary: mode share of trips
- 311: feedback on satisfaction on current and redesign of street
- Vacancy rates
- Transit data on timings, boardings and alightings
- Police and hospital collision data
- Number of parking stalls
- Pedestrian, cyclist, and vehicle counts

RECOMMENDATIONS

GENERAL RECOMMENDATIONS

- Do pilot projects on Commercial Drive and Water Street
- Engage with the Active Transportation Policy Council with the design from the beginning of the process. Consider forming Advisory Committees or Citizen Councils particular to Commercial Drive and Water Street with a diversity of backgrounds and interests.
- Collect strategic pre- and post-implementation data, including:
  - Number of pedestrians throughout the day.
  - Number and demographics of people cycling throughout the day – including number of cyclists on nearby and connecting routes.
  - Economic impacts through an objective method (number of vacancies, sales revenue (if possible, surveys at point-of-sale).
  - Intercept surveys on the streets of people walking and cycling to determine: satisfaction, concerns, perception of safety, how many times people come to the street and how much they spend, mode share.
  - Impacts to bus route timings.
  - Observations of behaviour of people cycling and driving, including number of people cycling on the sidewalk, if there are any collisions, whether infrastructure is being used as designed.
  - General satisfaction of nearby community through survey.
  - General satisfaction of businesses.
  - Motor vehicle volumes and travel times.
  - Parking usage on street, nearby streets, and parking lots and garages.
- Do particular engagement with multiple, diverse businesses, including representatives from the Business Improvement Association as well individual store owners, and listen to their concerns. Find data collection methods to address their concerns.
- Consider an intercept survey to find mode share of customers, spending split of different modes, and the top customer concerns about the street (or what would encourage them to shop on the street more often). Do this survey prior to and after a redesign of the street.
- Evaluate next appropriate streets for bike lanes on commercial high streets based on multiple criteria, including: collisions and safety, number of pedestrians, number of cyclists (including on nearby streets), community and political support, impacts to transit, impacts to motor vehicle volumes and travel times, ties into the bicycle network, and opportunities to coincide with other work on the street. These streets could include Burrard Street and Main Street, which are two safety hot-spots.

COMMERCIAL DRIVE

- Implement protected bike lanes south of Graveley Street to 10th Ave on Commercial Drive as a pilot project.
- Consider the connections to the existing bike network, notably the Adanac Bikeway, 10th Ave, the Central Valley Greenway, Woodland Drive, and Lakewood Drive. North of Graveley St to the Adanac Bikeway consider sharrows along Commercial Drive. Consider traffic calming along Graveley St (or other AAA bike facility) to connect to Woodland Dr and Lakewood Dr.
- Pay particular attention to connectivity to residential streets within the neighbourhood. Consider adding more pedestrian-activated lights where necessary (consider 2nd Ave and 5th Ave) and conducting bicycle counts or observations.
- Consider long-term strategies to decrease vehicular traffic on Commercial Drive without increasing traffic through neighbourhood streets.
- Pilot a "simultaneous green" for cyclists (green for cyclists in all directions at once, which permits single-stage left-turns from a protected bike lane) at an intersection heavily used by people cycling, and collect data on potential uses in Vancouver at intersections with sufficient cyclist use and infrastructure. Possible intersections include Commercial Drive at 10th Ave or Grandview Highway.
- Design:
  - For initial pilot, consider a parking-protected bike lane with additional barriers where parking is eliminated and at intersections.
  - Use bus bulbs where appropriate, especially at the busiest bus stops (such as at Broadway). Relocate bus stops to far-side of signal if currently on near-side. At bus stops consider: removing parking on both sides of the street, and use the extra space for either a second lane to pass a stopped bus or a right-turn lane in the opposite direction based on the specific traffic at that intersection.
  - Use floating bus islands except where severely space-constrained.
  - Consider right-turn lanes, including removing parking. Consider banning left-turns at some intersections or removing parking to implement a left-turning lane, particularly to each intersection. The Broadway and Commercial Drive intersection may be particularly appropriate.
- Increase wayfinding to nearby parking garages and lots.
- Increase wayfinding to and from nearby bike routes, especially at ends of Commercial Dr bike lane.
- In future extensions and if made permanent, consider eliminating parking on one side of Commercial Dr and widening sidewalks in busy areas. This should be balanced with maintaining existing trees.

WATER STREET

- Design for bike-permeable pedestrian-priority spaces using primarily design cues to minimize conflict along with simple signage to emphasize that cyclists should yield to pedestrians.
- Consider the connection and an extension to the protected bike lane on the Powell Street overpass, either along Alexander Street or Powell Street.
- Consider traffic flow requirements and connections, particularly for westbound traffic from the Powell Street Overpass. Consider making Cordova Street two-way east of Richards Street.
- Plan for a future additional protected bike lane for through cyclists and commuters, likely on Cordova or Hastings. Find an immediate alternate route for special events.
- Provide plentiful bike parking at the edges of and throughout Gastown.
- Keep trees as much as possible. Where necessary, use heritage appropriate street furniture, bollards, or lampposts to keep people cycling away from doors. Space these far enough apart as to remain permeable to people walking but encourage people cycling to stay in the central area.
- Maintain the same level and similar paving material building-to-building across the street.
- Consider a smoother paving stone or material in part of the central area to encourage people cycling along this path.
- The central channel should be wide enough to accommodate loading vehicles as well as car access to the parking lot between Abbott and Cambie Streets. Restrict or ban through vehicle traffic through Water Street.
- Extend the design treatment across intersections, plan for a gateway feature or transition at Main Street and Richards Street.
- Consider extending car-free treatment to Carrall Street between Water Street and Cordova Street, and blocking vehicle access from Alexander Street and Powell Street to Maple Tree Square. This would require limiting access along Alexander Street and Powell Street west of Columbia Street, and changing Columbia Street to two-way.

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APPENDIX: INTERVIEW SCRIPT

I'm working with the City of Vancouver researching bike facilities on commercial destination streets, looking into two different types of these streets.

The first type I'm looking at is a pedestrian-priority street, with either no cars or a small volume of cars.

The second type is a commercial high street (i.e. it serves both local and regional visitors), with about 15,000 cars per day, on street parking and lots of pedestrian activity and small storefronts. In our case there is also a highly-used bus route. The nature of the street requires separated facilities between vehicular traffic, people walking, and people biking.

I'm contacting you because I've heard about _____ in _____, although if your city has both types I'd like to talk about both!

For commercial high streets with high volumes of motor vehicles and buses:
Were there particular design considerations for having people on bikes being able to access businesses or other destinations? Do you think you designed the street differently because it is a destination for people who are cycling? (i.e. different design considerations applied than you would have had you been designing it primarily as a thoroughfare for bikes).

- Did you include or add any bike parking?
- What was the width of the bike lane? Width of the sidewalk? Including trees, street furniture, and patios? Width of any buffer? Does it depend on parking and loading?
- Did any sections reduce in width or go below a minimum width standard in "squeezed" areas (eg. around bus stops)? What is the width of the bus boarding area or island?
- Did you add amenities or space for pedestrians (eg. bump-outs)?
- What type of differentiation did you use between pedestrian areas and bike lanes?

Were there design considerations for managing conflicts between people cycling and walking?

- Anything to encourage slow cycling?
- Anything that prioritized walking, without compromising bike and transit?

Did you have public transit on the street?

- How did you manage the conflict between transit, people waiting for buses, people walking, and people biking? How did you ensure people of all ages and abilities were considered in the design – eg. wheelchair accessible parking and bus stops; wayfinding across lanes of traffic and separated bike lanes for people with visual impairments?
- If you reduced the number of vehicle lanes, how did you ensure transit still flowed smoothly? If applicable, how did you ensure vehicles did not divert to local streets?
- How do the bus stops work? Do they stop in a travel lane or have a pullout?
- If they stop in a travel lane, are there other travel lanes or is it the only travel lane?
- Is there dedicated space for passengers to get on and off in a way that doesn't create conflicts with people who are walking (particularly those with disabilities) or people who are cycling? Do you have floating bus stops or does the bus need to cross or enter the bike lane?

Were there particular design considerations around parking and loading zones?

- Did you use parking to separate people who are cycling from moving traffic?

Did you use or consider using parking to buffer the bike lane from other traffic?

- How well did this work? Did you have any issues or conflict between the parking, people getting out of cars, and people biking? Are there any design elements you think make this better or worse?

How successful was the design? What were your measures of success? What would you change?

Was there significant opposition and/or support?

- From whom?
- What were their reasons behind supporting/opposing? What were the key issues?
- How did you engage with the people who were opposing the project?
- Did any of them change their minds during the process?
- Has the level of support and/or opposition changed since implementation?

What was the process like to get the bike facility in place, particularly overcoming that opposition?

- What worked and what would you change?
- How successful was this process, by your definition?
- By your stakeholders?

What type of metrics did you measure and how?

- How did you define the problems or issues of that street? What metrics did you use to identify those problems?
- Did you use any metrics to inform the design or redesign of the street? How?
- What was your definition of success?
- Did you measure anything related to safety?
  - Door-ing rates?
- Related to businesses and the commercial spaces?
  - (e.g. ways to better understand how customers get exposure and access to shops, how often they visit, how much they spend)
  - Vacancy rates of businesses?
  - Satisfaction surveys?
  - Mode share of people coming into businesses?
- Number of people biking or demographics of people biking?
  - Number of people biking on parallel and connecting streets?
  - Number of people riding on sidewalk pre- and post-?
- Number of people walking?
  - Did this vary by the side of the street if the design was asymmetrical?
- Number of people on transit? Travel time of transit? Any other transit statistics?
- Number of motor vehicles? Travel time of motor vehicles?

Why did you put a bike lane on the destination street versus a block over? How did you persuade people that this was the better option?

Are you aware of other good case studies we should be looking at?

For pedestrianised streets:
What are your policies on people biking on pedestrianised streets/zones?

- Do they change based on time of day/day of week/time of year/programming?
- How do people react to this change?

- If you are asking people cycling to dismount: why did you decide to have people biking dismount?
  - Have you found that people biking typically dismount or keep riding?
  - Are there any bike routes close to and going around the pedestrianised streets?
  - What are the design and wayfinding measures - such as signs, pavement markings, or other elements - you are using to tell people to dismount when biking?
  - How successful was the design? What are your measures of success? What would you change?

- If delineation: why did you decide to have delineate the "bike zone" in the space?
  - How is the space delineated?
    That is, what is the degree of separation - is it street furniture, different paving or colour, barriers, different level, signs?
- Do people biking tend to stay within the delineated space?
- What are the behaviours of people walking?
- How well does the space work for people walking and people biking? How do you measure that?
- How successful was the design? What are your measures of success? What would you change?
- What changes during special events?

- If mixing: why did you decide to have people who are walking mixing with people who are biking in the space?
  - What are the design considerations of the space, particularly to reduce conflicts between people biking and people walking?
    Are there any design considerations to separate the people biking and walking at all - for instance, street furniture?
    Do you expect people to cycle slowly? If so, what design features did you use to encourage slow biking?
  - What are the behaviours of people biking? Do they bike everywhere? Do they slow down?
  - What are the behaviours of people walking? Do they walk everywhere in the space? Do they move out of the way when they see a person biking coming? Do you know if they are satisfied with the design, or if they are uncomfortable with the shared use design?
  - How well does the space work for people walking and people biking? How do you know?
  - How successful was the design? What are your measures of success? What would you change?
  - What changes during special events?

Was there significant opposition and/or support? For pedestrianising the space? For allowing people biking into the space?

- From whom?
- What were their reasons behind supporting/opposing? What were the key issues?
- How did you engage with the people who were opposing the project?

- Did any of them change their minds during the process?

What was the process like to get the bike facility in place, particularly overcoming that opposition?

- What worked and what would you change?
- How successful was this process, by your definition?
- By your stakeholders?
- Has the level of support and/or opposition changed since implementation?

What type of metrics did you measure and how?

- How did you define the problems or issues of that street? What metrics did you use to identify those problems?
- Did you use any metrics to inform the design or redesign of the street? How?
- What was your definition of success?
- What type of metrics did you measure and how? What was your definition of success?
- Did you measure anything related to safety?
  - Door-ing rates?
- Related to businesses and the commercial spaces?
  - (e.g. ways to better understand how customers get exposure and access to shops, how often they visit, how much they spend)
  - Vacancy rates of businesses?
  - Satisfaction surveys?
  - Mode share of people coming into businesses?
- Number of people biking or demographics of people biking?
  - Number of people biking on parallel and connecting streets?
  - Number of people riding on sidewalk pre- and post-?
- Number of people walking?
  - Did this vary by the side of the street if the design was asymmetrical?
- Number of people on transit? Travel time of transit? Any other transit statistics?
- Number of motor vehicles? Travel time of motor vehicles?

Are there other examples you know about we should be looking at?