



SECURE BIKE PARKING IN VANCOUVER: Local & Regional Context, Best Practices, and Recommendations for an EasyPark Pilot

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EXECUTIVE SUMMARY

For cycling to be a practical and mainstream transportation choice, it is important to ensure people have safe, convenient, and secure places to park. Parking with added security is particularly important in high-theft areas and places people will park for longer periods of time, from a few hours to a day, and can be complemented with other end-of-trip facilities such as showers and lockers. This report reviews the state of secure bike parking in Vancouver, including local and regional context, case studies, and best practices. It also provides recommendations for an EasyPark pilot bike mobility centre, one of the actions identified in the City of Vancouver's transportation plan.

LOCAL AND REGIONAL CONTEXT

STUDIES

TransLink has conducted a number of studies on secure bicycle parking and end-of-trip facilities. A 2008 regional survey identified the lack of secure bike parking at destinations as a barrier to 8 to 15% of people, and bicycle theft was pointed out as a serious problem by 57% of people. To help address this concern, and to improve intermodal bike-transit options, TransLink has long-term plans to provide secure bike parking at rapid transit stations throughout the region. Four Cycling Support Services studies outline how these facilities could be located, managed, and operated.

POLICIES

The City of Vancouver has many policies that relate to bicycle mobility. The Greenest City Action Plan identifies secure bike parking and end-of-trip facilities as a way to help reach the Green Transportation goal of at least 50% of trips by walking, cycling, or transit. Transportation 2040 outlines more precise actions to undertake, and the parking bylaw defines existing requirements for residential and commercial bike parking. TransLink has many policy objectives related to secure bike parking that are found in the Regional Cycling Strategy and its Implementation Plan, with an ultimate goal to provide it at 30 major transit stations over the next 30 years.

INITIATIVES

There are relatively few secure bicycle parking facilities accessible to the public in the City of Vancouver. Main Street – Science World Station is the first facility TransLink has provided in the region, and its keycard spaces are available to anyone who registers. Two more TransLinks facilities are planned for the near future, at Commercial – Broadway and Joyce – Collingwood stations.

The City is facilitating publicly-accessible secure bike parking through private development; Marine Gateway and 320 Granville Street are two projects underway that will include secure bicycle parking. In addition, several studies have investigated the feasibility of a facility at Pacific Centre, but concrete progress has yet to be made. The City had also planned for secure bike parking at the Broadway – City Hall and Olympic Village Skytrain stations, but these never reached the construction stage.

While publicly accessible facilities are rare in Vancouver, there are some good examples of private facilities, provided by companies and clubs to their employees or members. These include the Vancouver General Hospital Cycling Centre (accessible to staff and designed according to best practices) and the Bentall Centre Cycle Commuter Facility (accessible to gym members).

BEST PRACTICES

LOCATION

High demand area: secure bicycle parking facilities should be built close to transit stations, workplaces, schools, or other destination-rich locations.

Proximity to destination: for longer stays, a maximum distance of 50-100 metres to the final destination is recommended, although TransLink suggests that it can be up to 250 metres if it is a staffed bicycle station that provides additional services.

Connection to the bicycle network: the bike parking should be directly on or easily accessed from a bike route, with no need to dismount until as close to the entrance as possible.

Ease of access: the bike parking should be at grade, or otherwise accessible by a ramp separated from motorised traffic.

DESIGN

Visibility & Wayfinding: the facility should be visible from the street, with clear wayfinding signage on the bike route and facility to raise awareness and provide direction. Locations should also be available on bike maps, electronic wayfinding systems, and apps.

Future proofing: the bike parking should be planned to accommodate expansion, if needed.

Security: formal surveillance is necessary to ensure security. The most common options are the presence of staff or the use of closed-circuit television (CCTV). Crime Prevention Through Environmental Design (CPTED) principles should also be followed to ensure people of all ages and abilities are comfortable using the facility. Key characteristics include the use of natural surveillance (see-through walls, etc.), good maintenance, lighting, etc.

Access Control: the control system used to access the facility should consider the types of users parking at the location. Membership-based card access systems may be better suited for regular commuters, whereas transient users may be better served by a system that can be accessed without membership (e.g. cellphone app or staff).

Bicycle parking density: there are many type of racks available to store bicycles, each with different advantages. The most relevant to be considered for the pilot bike mobility centre are free standing surface racks (for special bicycles, for example with trailers), simple bicycle racks (inverted U racks, etc.), alternated height (“one-up one-down”), and double deck racks.

MANAGEMENT

Financing: the capital costs are typically covered by public funding, while operating costs can be covered by public funding and/or by operating revenues. Operating costs are more likely to be covered with bigger facilities that allow for economies of scale and/or by providing revenue-generating supplementary services such as bike repair or laundry, which people are generally more willing to pay for than parking alone.

Parking charges: the typical rate in North America is between \$1-2 per day. TransLink charges \$1 per day and up to a maximum of \$8 per month at its new Main Street - Science World station bicycle parking.

Operation: the secure bike parking facility can be managed by the city or subcontracted to a company. It is important to ensure a good maintenance of the facility at all times. Having a single company or organization managing multiple sites has benefits because it creates brand recognition and reduces the need for multiple registrations on the part of the user.

Marketing and promotion: a marketing strategy will help to reach out to potential users, especially in the context of a pilot. It should be put in place before the facility opens. Effective wayfinding can go a long way.

Evaluation criteria: these could include awareness, usage and satisfaction rates, as well as the number of reported thefts.

PILOT EASYPARK BIKE MOBILITY CENTRE

The goal of this pilot project is to implement a secure bicycle parking facility by converting existing space at an EasyPark lot. EasyPark already provides bicycle racks at a number of locations, and in some cases bicycle gated areas.

The best practices section should serve as a guideline for the design of the facility. However, there are challenges specific to parkades which should be considered:

- Potential conflicts between motor vehicles and bicycles
- Lack of surveillance
- Limited Ceiling Height

The following matrix is intended to assess the potential of secure parking at EasyPark lots. It is largely based on the best practices location criteria:

- Connection to the bike network
- Proximity to transit
- At grade
- Proximity to public places
- Proximity to commercial streets

A total of five lots are recommended as potential sites to host the pilot bike mobility centre, all of which are connected to the bike network.

INTRODUCTION

The City of Vancouver has adopted many plans and policies to promote sustainable transportation choices over the years. Consistent with those policies, efforts have been made to facilitate utilitarian riding, and to promote cycling as an every day and practical transportation option for all kinds of trips. Ridership in the city has climbed significantly in recently years, growing over 40% between 2008 and 2011 alone (TransLink, 2011a). The city still has a long way to go, however; the current bicycle mode share is around 4% (TransLink, 2011a), while internationally renowned cities like Copenhagen and Amsterdam have bicycle shares as high as 30 % (Pucher & Dijkstra, 2003).

Having a safe, comfortable bike network with direct, convenient access to destinations is critical to achieve a high bicycle mode share, but it is not enough on its own. Many academic studies have noted the importance of secure bicycle parking and other end-of-trip facilities in order to achieve a higher share of utilitarian cycling.

Studies conducted in Vancouver and Edmonton have found that the availability of secure bicycle parking - along with the existence of a cycling network - had a positive influence on the likeliness to cycle (Winter et al., 2010; Hunt and Abraham, 2007). Showers were found to have a smaller but positive impact. In Australia, one study on the effectiveness of the cycling centre Cycle 2 City suggested that most of their users were previous transit users, rather than car users (Burke, 2011). However, other studies in the United States suggest an important mode shift occurs from driving to cycling when bicycle stations are made available (TransLink, 2010a).

Consistent with these studies, and to encourage more people to cycle, the City of Vancouver has specific policies to provide secure bicycle parking and end-of-trip facilities. This report aims at providing support for the provision of such infrastructure and services.

After providing basic definitions and a brief statement on the importance of promoting utilitarian cycling, three sections outline more detailed information:

- A local and regional level context and status report
- A summary of best practices, presented as criteria to help locate, design, and manage secure bicycle parking facilities
- An evaluation of EasyPark locations to help prioritize and choose a location(s) for a pilot bike mobility centre

DEFINITIONS

Secure Bicycle Parking refers to a bicycle parking facility that is enclosed in a structure with limited access. This type of parking is intended for stays from an hour up to a day, particularly in high theft-risk areas.

End-of-Trip Facilities refer to a variety of facilities that complement cycling, such as lockers, showers, change rooms, repair stations, and other services (repairs, laundry, etc.).

TYPE OF SECURE BICYCLE PARKING

TransLink identifies the following secure bike parking types in its Cycling Support Services Study (TransLink, 2010a):

- **Bicycle enclosure:** fully enclosed structure that contains bike racks, either freestanding or built into an existing structure (e.g. parkade)
- **Bicycle garage:** “a purpose-built multi-level structure” to park bicycles
- **Bicycle station:** a fully enclosed structure also offering other end-of-trip facilities, typically staffed
- **Mechanized bicycle parking:** fully automated storage mechanism with one access point



From the top, clockwise: Bicycle parking garage (Freiburg, Germany), bicycle station (Malmö, Sweden), mechanized bicycle parking (Tokyo, Japan), and bicycle enclosure (University of British Columbia, Canada).

LOCAL & REGIONAL CONTEXT

The intent of this section is to provide the reader with an overview of the local context in terms of secure bicycle parking. Short summaries of regional studies and policies are presented, as well as some details relating to bike parking initiatives that are either existing, planned, as well as some projects that got abandoned along the way.

STUDIES

TRANSLINK LISTENS — CYCLING END-OF-TRIP FACILITIES SURVEY

The 2008 survey divides participants based on their cycling habits (regular cyclists, monthly cyclists, yearly cyclists, less than yearly residents, uninterested non-cyclists, and potential cyclists). Its main end-of-trip related findings are:

- The “lack of places to park/lock a bike at destination” was identified as a barrier by 8 to 15 % of people surveyed
- The absence of a place to shower or change was identified as a barrier for 2 to 10 % of people surveyed
- 57 % of regular and potential cyclists identified bicycle theft as a serious problem, and 18 % of the current and potential cyclists had a bicycle stolen in the past five years
- Two of four bike parking options presented were identified by respondents as very secure:
 - “Fenced area with bike rack, staffed by an attendant at a cost of \$10 per month” (95 % reasonably or very secure)
 - “Bike cage with bike racks at a transit stop with monitored video cameras, accessed with a card reader at a cost of \$8” (91 % reasonably or very secure)

TRANSLINK CYCLING SUPPORT SERVICES STUDIES

In 2010, TransLink published a series of four reports on cycling support services: the Strategic Plan, Bicycle Station and Enclosure Location Study, Pilot Bicycle Enclosure Study, and Pilot Bicycle Station Implementation Plan (TransLink, 2010a-d). The studies look at a variety of topics including different management

options, market and demand, priority locations at key transit exchanges, types of design for a secure bike parking facility, and funding options.

BIKE THEFT

The Vancouver Sun published an interesting piece on bike theft in the City of Vancouver in March 2014 (Skelton, 2014). The journalist published a map showing the bike theft hotspots based on the crime data of the Vancouver Police Department (VPD) for the period of 2008-2012. The three locations with most reported bike theft are Granville Island, the Vancouver Public Library Central Branch, and City Hall.



POLICIES

This section provides a review of policies relevant to providing secure bike parking in the City of Vancouver at the local and regional level.

CITY OF VANCOUVER Greenest City Action Plan (2011)

Goal 4 of the Greenest City Action Plan is to “make walking, cycling, and public transit preferred transportation options”, with a target for the majority of trips to be by foot, bicycle or public transit. As part of the strategies to make cycling more convenient, comfortable and fun for people of all ages and abilities, the city wants to provide “better bike parking and end-of-trip facilities”.

Transportation 2040 (2012)

Vancouver’s transportation plan includes a vision to make cycling “safe, convenient, comfortable and fun for people of all ages and abilities”. Within the cycling section, there is an explicit policy to “[p]rovide abundant and convenient bicycle parking and end-of-trip facilities” (C2). It identifies the need for parking to be more secure at locations where bikes are parked for longer periods of time such as at home, work, or transit stations, with a focus on making facilities easily accessible for people of all ages and abilities (AAA). Examples cited include bike cages, indoor stations, pay-as-you-go lockers, or automatic storage systems. Specific actions under this policy are detailed here:

- C 2.1.1 Periodically review policies for new developments to ensure abundant and conveniently located secure bicycle parking and end-of-trip facilities. Minimum requirements should support long-term mode share targets and ownership levels, and include convenient parking for visitors.
- C 2.1.2 Develop a retrofit program to make it easier to add bicycle parking and other end-of-trip facilities to existing buildings.
- C 2.1.3 Provide higher-security bicycle parking:
 - a) prioritizing major transit stations and other high-demand locations;
 - b) piloting at least one downtown bike centre that includes additional maintenance and end-of-trip facilities;
 - c) providing convenient pay-as-you-go bicycle lockers in high-turnover areas; and
 - d) converting some motor vehicle parking at City-owned parking lots.

Parking Bylaw

The Parking Bylaw requires a large set of buildings to provide Class A bicycle spaces for long-term parking. Surveys conducted by the City in 2006 showed that Class A bicycle parking facilities in “commercial office buildings were generally well used”, with the 13 surveyed buildings having an observed usage of 74% and above, and five buildings providing more than the bylaw requirements due to the high demand (City of Vancouver, 2008). The same survey found that most residential parking was underused and did not meet bylaw requirements.

TRANSLINK

Cycling for Everyone - A Regional Cycling Strategy for Metro Vancouver

As part of the Bicycle Transportation Network strategy 2.1, TransLink aims to provide “sufficient parking and end-of-trip facilities” (TransLink, 2011b). The related actions include:

- Investments to provide sufficient bicycle facilities, anticipating future needs
- Monitoring bicycle parking use (private and public facilities) to inform the supply management and optimize the resources
- Modifying legislation to ensure the provision of bicycle parking and end-of-trip facilities in new and existing private developments
- Ensuring the accessibility of public secure bicycle parking for on-demand access and integrating it with the electronic smart card

Regional Cycling Strategy Implementation Plan

In its Implementation Plan, TransLink identifies the construction of secure bicycle parking at key transit areas as its second priority. The Plan identifies TransLink as responsible for the provision of secure bicycle parking, and municipalities as responsible for the provision of other end-of-trip facilities. The recommended investments for the provision of bicycle Secure Parking Areas (SPAs) at 30 major transit hub over the next 30 years accounts for 2.1% of its planned investments in cycling.

The plan identifies the following bike parking-related short term actions that should be undertaken within the next 5 years:

- Building covered SPAs at all rapid transit stations and major exchanges

- Expanding its Bicycle Infrastructure Cost Sharing (BICCS) Parking grant program to non-municipal recipients such as major employers

Transit Passenger Facility Design Guidelines

The design for the bicycle SPAs is based on TransLink’s Transit Passenger Facility Design Guidelines (TransLink, 2011c). The specific guidelines for bicycle parking require it to be:

- Easy to access
- Close to transit entrances
- In well-lit areas with good natural surveillance
- Announced with clear and consistent signage

LOCAL INITIATIVES

OPERATIONAL SECURE BICYCLE PARKING

Main Street – Science World Station



Main Street – Science World Station Bike Parking

TransLink’s first Secure Bike Parking area opened in May 2014 (TransLink, 2014a; TransLink, 2014b). In accordance with their Regional Cycling Strategy Implementation Plan, TransLink is not planning to include other end-of-trip facilities as part of any of their bicycle secure parking areas (SPAs). This is due to the high

cost of maintenance, and the lack of knowledge on the need for such facilities at transit exchanges.

Vancouver General Hospital Cycling Centre

The Vancouver General Hospital Cycling Centre offers secure indoor bike parking at the street level for the hospital employees (Vancouver Coastal Health, 2014). This facility has been included in the report even though it is not accessible to the public because of the high standards it achieves.

Bentall Centre Cycle Commuter Facility

The Bentall Centre Cycle Commuter facility is available to the Athletic Club members for a fee of \$450 per year, or \$40 per month (Bentall Centre Athletic Club, n.d.). It gives its member access to a bike cage on the first level of the parkade, as well as to the Athletic Centre’s change rooms, lockers and showers. Additional services are available, such as dry cleaning and laundry. There is capacity for 68 bikes.

Comparison Between Two Existing Secure Bicycle Parking

Characteristics	Main Street - Science World Station	Vancouver General Hospital Cycling Centre
Users	Public	Employees only
Access	Electronic card	Electronic card
Hours of operation	Same as the SkyTrain No bicycle can be left overnight	24 hours
Capacity	86 bicycles	182 bicycles
Cost	\$1 per day, up to \$8 per month	\$1.50 per day, up to \$11 per month
Security features	Closed-circuit television, 24 hours lighting, glass walls for visibility	Closed-circuit television
Location	At grade, in the Sky-Train station	At grade, ramp inside the facility to access bike racks
Connectivity to bicycle network	Problematic	Facility accessed from the West 10th Avenue bikeway
Funding of operations	TransLink investments, and membership revenues	The membership revenues should be sufficient to finance the operation of the centre
Other end-of-trip facilities	No	Showers and change rooms, 105 ventilated storage lockers, bike repair area



Vancouver General Hospital Cycling Centre

PLANNED SECURE BICYCLE PARKING

TransLink Stations Upgrades

In their document on the Expo Line Station Upgrades, TransLink specifies that secure bicycle parking will be included at three stations. Consistently with their policies, they won’t include other end-of-trip facilities. However, they are planning to install plumbing at some of the new SPAs in order to be able to integrate additional services in the future, as needed. Those stations are:

- King George: funding has been secured for this location and the construction of the facility is expected to start in 2014
- Commercial – Broadway: the location and funding have been available for a while, but TransLink decided to uphold its construction to synchronize it with the station upgrade in order to avoid disrupting its users
- Metrotown and Joyce – Collingwood: it is planned that a bike SPA will be added to those stations at the time of their upgrade

Marine Gateway

The developer of the Marine Gateway project has offered a space for a bike mobility centre as a public amenity. They are providing the built space as well as startup funding to be used for the centre. Due to the absence of existing guidelines at the city currently, they will not be providing the infrastructure

necessary for showers or other end-of-trip facilities. The location of the secure bicycle parking will be at grade and adjacent to the Marine Drive Station. TransLink has expressed an interest in managing the facility.

320 Granville Street

VIA Architecture has applied for a rezoning that would enable them to build a tower in place of the current parkade located in front of the Waterfront Station. The rezoning application includes a proposal for a valet bike parking that would be located at grade and accessible to the public (VIA Architecture, 2014).

Pacific Centre

Although many studies and plans have been realized for the construction of a publicly accessible secure bike parking on the Cadillac Fairview property, nothing has been built to this day. There are no indications that Cadillac Fairview is planning to go forward with the construction of such a facility.

UNREALISED PROJECTS

City of Vancouver, Broadway – City Hall and Olympic Village SkyTrain stations

The two SkyTrain stations were identified by the City of Vancouver to build secure bike parking around 2008. Funding was secured for it and plans of the facilities were realized (see *Appendix 1* for the plans of Broadway – City Hall secure bike parking). However, both projects were abandoned before their construction. At the Broadway – City Hall station, the upcoming redevelopment of the site lead certain city officials to question its relevance. At the Olympic Village station, many factors were probably at play: lack of interest from the city to manage this type of facility, uncertainty about the involvement of TransLink, expected revenues from the newly renovated car parking, etc.

BEST PRACTICES

The best practices section identifies location, design, and management criteria for secure bike parking facilities. As part of the best practices, attention should also be given to the possible synergies between cycling and other sustainable transportation options such as transit and carshare.

LOCATION

The choice of a location for a secure bicycle parking facility should be based on the criteria detailed below.

HIGH DEMAND AREA

Typically, secure bike parking should be near high-demand destinations such as transit exchanges, commercial centres or workplaces and schools (PRO VELO, 2013). There is a need to evaluate the demand for medium to long term bicycle parking in numbers that are sufficient to justify the construction of new parking. This can be informed by the number of bicycles parked in an area (FMECD, 2009a; Los Angeles County, 2004), and the number of reported thefts. However, this type of data should not be the only consideration, as it does not capture latent demand in areas without secure bike parking.

PROXIMITY TO DESTINATION

Secure bicycle parking should be very close to the main surrounding destinations. A United Kingdom research group suggests a maximum distance of 25 metres for short stays (on-street parking) and of 50 metres for longer stays, while the Los Angeles County suggests a maximum of 100 metres (Bikeoff, 2008; Los Angeles County, 2004). According to TransLink, a staffed bicycle station offering secure bike parking and other end-of-trip facilities could be up to 250 metres away from the users' destination (TransLink, 2010a).

CONNECTION TO THE BICYCLE NETWORK

The secure bicycle parking should be well connected to the existing bicycle network (Blunt & Associates, 2008). There should be no need to dismount until as close to the entrance of the station as possible (Bikeoff, 2008; PRO VELO, 2013).

EASY ACCESS

Ideally, the station should be at grade for easy all ages and abilities access. The access should ensure the safety of cyclists as well as pedestrians (PRO VELO, 2013). If it is not possible to provide a facility as grade, an access ramp separated from motorised traffic should be provided. As an example, guidelines from Switzerland's Vélostations are the following (PRO VELO, 2013):

- Width: 1.5-2m one-way or 3-4m two-ways
- Slope: 6 % or 10-12 % if covered

TOPOGRAPHY

When planning cycling infrastructure for people of all ages and abilities, it is common sense that topography should be taken into account to avoid building bikeways on steep hills (Wardman et al, 2007). The same principle should apply to secure bicycle parking.

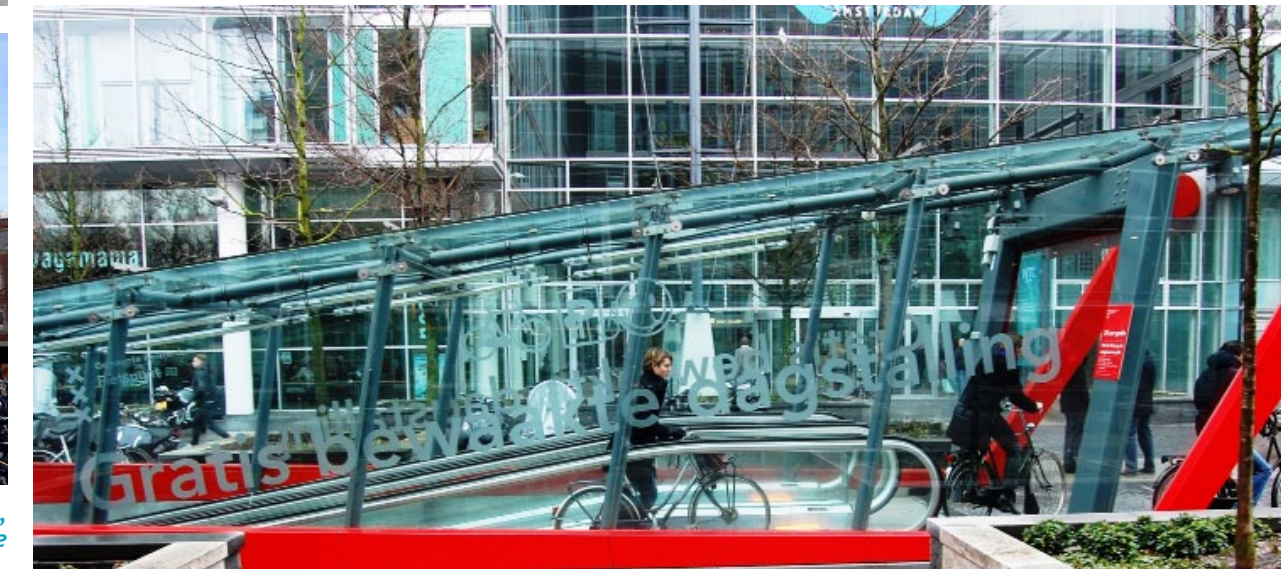


From the top: Entrance from a ramp to the Cicloparqueadero (Bogota, Columbia), Parkiteer Bike Cage (State of Victoria, Australia), and the Radstation (Münster, Germany).



Above: Union Bikestation in Washington (D.C).

Below: Amsterdam Zuid Station access bike ramp (The Netherlands).



DESIGN

VISIBILITY

The bike parking needs to be visible at the street level in order to be successful and attract users (TransLink, 2010b; Blunt & Associates, 2008). If the facility isn't located at grade, additional efforts should be made to make the entrance easy to identify.

WAYFINDING

It is recommended to have consistent signage across all facilities and to have good wayfinding signs on the streets and bikeways surrounding each facility (TransLink, 2010, 2/4; Bikeoff.org, 2008; PRO VELO, 2013). It is also important to include the information in electronic wayfinding systems or apps, and to make sure that the information is accurate and up to date (e.g. Google Maps, etc.).

FUTURE PROOFING

Opportunities for expansion should be taken into account (PRO VELO, 2013; Bikeoff, 2008). This is important in order to account for a potential increase in demand over time, which might take a few years to manifest. This might also help fulfill the recommendation that spare bicycle racks should be available even at the busiest times.

SECURITY

Actual and perceived security of the bicycles and safety of cyclists is important. Formal surveillance is often required, with the two main options being the presence of **staff** for larger facilities, or the use of **closed-circuit television** (CCTV; PRO VELO, 2013). At least one of these options should be provided in all secure bike parking facilities. In addition, many other elements can be ensure facilities are secure and comfortable to use.

Crime Prevention Through Environmental Design guidelines (CPTED, see [CPTED Principles](#) for more details) should also be used to ensure that the bicycle parking facilities are secure (City of Virginia Beach, 2000; BC Housing, n.d.).

Maintenance

As the CPTED design guidelines suggest, good maintenance is key in order to ensure the security of the facility. Studies have shown that the presence of damaged or abandoned bicycles deters users from bicycle parking facilities (Bikeoff, 2008). The maintenance of the facility should be organized to prevent this from occurring (see [Operation of the secure bicycle parking](#)).

Lighting

Adequate lighting must be provided at all times, both inside and outside of the facility (PRO VELO, 2013; Los Angeles County, 2004).

Natural Surveillance

The sight lines should be maximized for the facility to be visible from surrounding buildings, roads and sidewalks (Los Angeles County, 2004). The entrances to the facility should be visible as well.

Access Control

There are different systems to allow people to access the facilities.

- Fobs and electronic card access are common ways to access secure bike parking. They require users to get a membership before they can access the facility. While this creates an additional measure of security, it prevents the facility from serving one-time users and casual passers-by.
- Some facilities require the use of a credit or debit card instead, which allows transient cyclists to gain access (Los Angeles County, 2004).
- A cellphone-based access could also allow for more flexibility for short-term users and should be considered, potentially tied in with Vancouver's existing pay-by-phone parking meter system.
- Some facilities also provide additional access control systems to ensure that users come in with a bike and leave with one. For example, Freiburg's bike centre uses a bike mat that detects the presence of a bike.

- It is important to note that the type of access control system needs to take into account the pricing structure envisioned. For example, if there is a price per usage, the access system must be able to track the usage of each member.

For more details, readers should consult the *Los Angeles County Bike Transit Centre Implementation Plan (2004)*.

CPTED PRINCIPLES

CPTED makes use of the built environment to create safe spaces.

Territoriality: design to delineate private versus public spaces;

Natural surveillance: maximize visibility (open design concept, building orientation, windows, entrances and exits, etc.) and provide good lighting;

Access control: use of infrastructure and signage to guide the public around the facility, gates and lights to prevent access to dark and unmonitored areas, and the use of locks;

Maintenance: maintaining the space for its intended use (e.g. well-maintained vegetation, lighting, infrastructures, etc.).



Freiburg Bike Mobility Centre, Germany

BICYCLE PARKING DENSITY

The density of parked bicycle depends on the type of racks used in the facility. While denser bike parking decreases the cost per parking space, increased density of parking affects ease of use and security. As a general rule, the racks should always be accessible to people of all ages and abilities and allow for the bike frame and at least one wheel to be locked to it .

The spacing required between different types of racks will determine what density can be achieved and is explained in more details below. To get an overview of the most common bicycle racks (description, spacing requirements, suitability for AAA, and cost), see [Appendix 2](#).

The cost of bike parking in free-standing and fully enclosed bicycle cages has been estimated at approximately \$300-400 per bicycle, including the racks (Transport Canada, 2010). The Bike Transit Centre Implementation Plan from Los Angeles County (2004) is also a good resources for detailed plans of bicycle parking.

Spacing

The City of Vancouver Parking Bylaw specifies the following minimum dimensions for bicycle parking:

- Length of 1.8 m
- Width of 0.6 m
- Vertical clearance of 1.9 m
- Aisle width of 1.2 m (except with a special permit, for an absolute minimum of 0.9 m)

This is similar to other recommended dimensions for some of the most common bike racks (PRO VELO, 2013; Transport Canada, 2010). However, placing the racks at a 45° angle can allow for a higher density. The following table shows the space necessary to park one bicycle depending on the type of bicycle rack used, and the angle at which the racks are fixed. For example, according to the Bikeoff study (2008), the minimum space for parking a bicycle is 1.85 x 0.5 m (or down to 0.4 m if using alternated height racks). The aisle width can also be reduced to about 1m for the ground racks if the bicycles are parked at a 45 degree angle (Transport Canada, 2010). The following table will provide a basic comparison for three types of bicycle racks.

Additional consideration should be given to provide some space for less conventional bicycles (e.g. cargo bikes, bikes with trailers, high-end bikes which may have additional theft concerns, and electric-assist bikes; see [Appendix 2](#) for more details).

Spacing required for different racks

Type of rack	90° angle parking	45° angle parking	Minimum aisle width
Free standing surface	3 x 1.2 m	2.05 x 1.7 m	2 m
U-shaped	2 x 0.6 m	1.45 x 0.85 m	1.75 m
Front wheel, alternated height	2 x 0.45 m	1.45 x 0.65 m	1 m

A detailed description of the most common types of bicycle racks can be found in [Appendix 2](#).



Example of a facility combining the simple bike racks (in front), and double deck racks.

MANAGEMENT

FINANCING

In some cases, the facility is funded as a public service, whereas in other cases it is expected that the operational costs will be paid off by the revenues the facility generates. Typically, secure bike parking is funded as follows:

- Capital costs (planning, construction and infrastructure) are generally publicly funded (PRO VELO, 2013)
- Operational costs (maintenance, staff, electricity, etc.) can be:
 - Covered by public funding (possibly with some contributions from the parking price revenues)
 - Recovered through operation revenues. If this is the objective, two factors for success have been identified by the Radstation facility in Münster, Germany (INEXIA, n.d.):
 - ◇ Bigger facilities that provide economies of scale
 - ◇ Supplementary services that generate profits because of the higher willingness to pay for those services
 - Revenue generated through other means, such as advertising or sponsorship (PRO VELO, 2013)

PARKING CHARGES



The cost charged for secure bike parking in major Canadian and American cities is typically between \$1 and \$2 a day, with maximum monthly and yearly rates ranging between \$12-20 and \$96-180, respectively (TransLink, 2010d). Consistent with these ranges, TransLink suggests a maximum rate of \$2 per day in its Cycling Support Services Study, and its secure bike parking at Main Street - Science World Station costs \$1 per day, with a maximum of \$8 per month. TransLink market studies suggest that there is little flexibility before the cost deters use of the facility. Charging a \$20 yearly administration fee is also a common practice in the United States. In Switzerland, studies suggest that a third to half of cyclists are willing to pay for bicycle parking (PRO VELO, 2013).

International Examples for Financing

In Switzerland, it is acknowledged that the capital investments (including rent) are hard to recover with the revenues generated by the operation of the bike parking. However, stations can still be cost-efficiently managed if funding is available to cover capital costs.

In Brisbane, King George Square Cycle Centre was expected to generate enough revenue to cover its operating costs (Burke, 2011). Yet, two years after opening the revenues were not sufficient to cover the costs, mostly due to insufficient membership.

MEMBERSHIP AND USE OF SECURE BIKE PARKING

The City of Los Angeles Bike Transit Center Implementation Plan studied examples of secure bicycle parking from the United States' west coast (Los Angeles County, 2004). They found that usage of the facility is very low for the first 12 months and grows fast during the second year of operation as the facility becomes more well-known by the population. Marketing is noted as an important element in attracting more users, with some of the more successful Bikestations in the USA taking several years and good marketing before reaching targeted usage levels (Los Angeles County, 2004).

OPERATION OF THE SECURE BICYCLE PARKING

There are a few things that should be considered regarding the operation of a secure bike parking facility. First off, initial investments will influence the operational costs. For example, investing more money for an electronic access system will result in savings for the operational costs (Los Angeles County, 2004).

Management and the maintenance are key to user satisfaction (Los Angeles County, 2004). A poorly maintained bike parking attracts vandalism and deters users. Organizations such as TransLink subcontract the management of their secure bike parking, which could be a good option for the City.

MARKETING AND PROMOTION

In order for a secure bike parking facility to be successful, it needs to be well-known by the public. For that to happen, a marketing strategy should be put in place well before the facility is operational (FMECD, 2009b). The German Federal Ministry for Economic Cooperation and Development developed a guide on social marketing for cycling policies that could be helpful to develop such a strategy (FMECD, 2009b). Simple, effective wayfinding that is visible from the bike route can go a long way to promote a facility.

SETTING EVALUATION CRITERIA

It is also important to establish some objectives at a project's outset that can help assess and optimize the facility throughout its lifespan, and to inform the construction of future facilities (PRO VELO, 2013).

CASE STUDY: MÜNSTER, GERMANY

RADSTATION

This bicycle station is located at a main train station in the City of Münster, Germany. It offers secure bicycle parking for 3,300 bikes, accessible with a ramp. Most of the parking is free, although a section is reserved for members for the cost of € 0.70 per day (INEXIA, n.d.). There is also an insurance for bike theft or damage caused by a third party (up to € 700; Radstation, n.d.). The City planned and built the bike station and subsequently found a private company to operate it. The € 6.5 million investments for its construction were paid half by the city and half by the state of Nordrhein Westphalia. At the city level, two thirds of the funding comes from a tax paid by developers who build less car parking than normally required by zoning regulations. The tax funds the construction of neighbourhood car parking as well as bicycle parking.

The firm that operates the station pays a subsidised rent (insufficient to refund the capital investments), but is profitable. This is attributed to the size of the facility (allowing for economies of scale) and the additional services provided, for which people are willing to pay more than for parking. The facility was full 6 months after its opening.

RADLAGER

Radlager is another secure bicycle parking facility in the City of Münster, located in a former parking garage owned by the municipality in the city centre (FMTUD, 2011). This station has a total of 360 secure bicycle parking spaces, of which 124 are simple bicycle racks, 60 are bike lockers and 120 are automatic parking spaces (PRO VELO, 2013). The cost of utilization is of 0.50 cents per day, € 7 per month, or € 70 per year (FMTUD, 2011).

Unlike Radstation, Radlager has not been successful at attracting cyclists and has an occupation rate of about 10% (Kötterheinrich, 2014). The destinations surrounding the bike parking are mostly commercial, and it seems that people prefer to take their bikes from store to store rather than leaving them at Radlager.



Radlager, viewed from the street and from the inside.

PILOT EASYPARK BIKE MOBILITY CENTRE

An EasyPark pilot bike parking centre is one component of a larger approach to providing secure bike parking and other end-of-trip facilities in Vancouver. The objective of this section is to recommend locations for an EasyPark pilot. The centre will be created via the reallocation of motor vehicle parking spaces in one of the EasyPark parkades.

This section offers a brief overview of all of the EasyPark locations in the City of Vancouver, as well as the challenges for bicycle parking. Finally, based on the best practices detailed in the first section of this report, recommended locations are identified for their potential to host the pilot project.

EASYPARK BICYCLE INITIATIVES



It is important to acknowledge the work EasyPark has already undertaken to accommodate bicycle parking on their lots. There are a number of lots that already have bicycle racks. Moreover, it is possible to access a “Bicycle Gated Area” at Lot 31 on Water Street for a monthly fee of \$8.93. EasyPark also rents some parking spaces to businesses who wish to offer secure bike parking in the form of bicycle cages to their employees.

CHALLENGES

The recommendations on the design of the pilot bike parking and the choice of some top locations on EasyPark lots is informed by the *Best Practices* section. However, there are some challenges related to the following of those guidelines that are specific to parkades.

- **Potential conflicts between motor vehicles and bicycles:**

Conflicts can be minimized if bike parking is located near the parkade entrance, or if bicycles are provided with a separate entrance

- **Lack of surveillance:** Bike parking facilities within parkades and not visible from the street might have limited natural surveillance. In these cases, additional security measures may need to be taken.

- **Limited ceiling height:** Many parkades have a limited ceiling height

(usually 1.9m, which corresponds to the required height for bicycle parking in the Parking Bylaw). It should be noted that in order to use double deck racks, the recommended minimum floor-to-ceiling clearance is 2.7m (Transport Canada, 2010). Their use will thus likely be limited in many EasyPark lots.

MATRIX

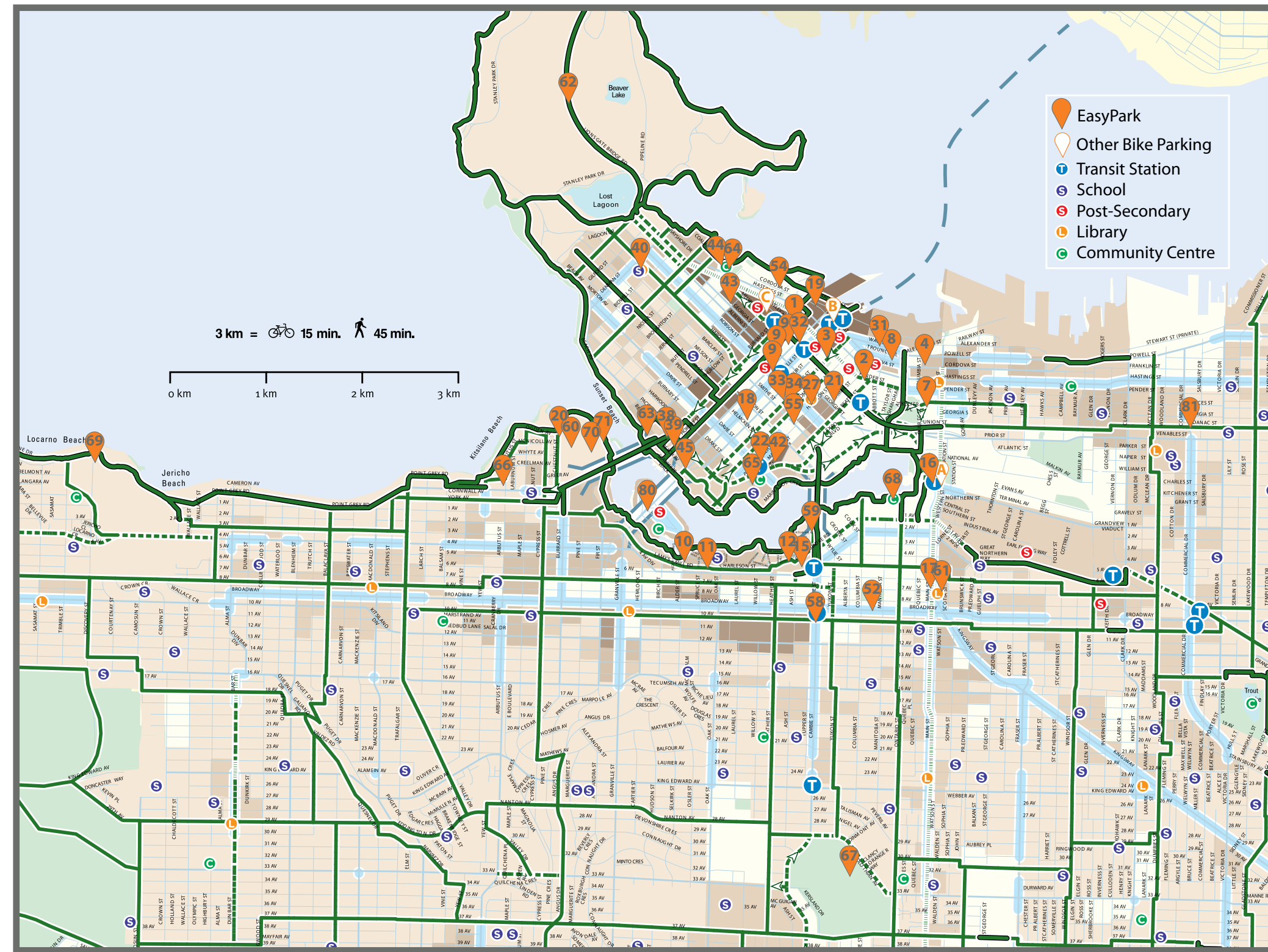
As part of this report, a matrix containing information on all EasyPark lots has been created. The intent of this document is to help the City assess which lots might be suitable to implement other secure bike parking facilities. Each EasyPark lot is assessed on how it corresponds to different criteria derived from the Best Practices. They can either fulfill each of the following criterion completely (Yes), partially (Somewhat), and not at all (No):

- **Connection to the bicycle network:**
 - Currently: This refers to EasyPark facilities that are located and accessed directly from a bike route (any type), or near a bike route (for example, half a block away)
 - Planned: This refers to EasyPark facilities that may become accessible with the development of potential future bike routes planned for the near future (2015-16)
- **Proximity to transit:** A location considered close to a transit station is within an approximate radius of 50-100 metres
- **At grade:** This indicates that at least a part of the parking lot is located at grade
- **Proximity to public places** (community centres, schools, library, and post-secondary institutions): The parking lot will be considered close to a public space if it is within an approximate radius of 50-100 metres
- **Proximity to commercial streets:** The parking lot will be considered close to a commercial street if it is within an approximate radius of 50-100 metres

Additional details specific to each EasyPark parkade are also included in the table, available as a separate document.



Vancouver Public Library employee bike cage, Lot 1 bicycle racks, and panoramic view of lot 31, with the public bicycle racks and the employee bike cage.



EASYPARK LOTS

- Lot 1 – 535 Hornby St
- Lot 2 – 150 West Pender St
- Lot 3 – 535 Richards St
- Lot 4 – 107 East Cordova St
- Lot 7 – 180 Keefer St
- Lot 8 – 5 West Cordova St
- Lot 9 – Pacific Centre (3 entrances)
- Lot 10 – 1100 The Castings
- Lot 11 – 990 Lameys Mill Road
- Lot 12 – 600 Moberly Road
- Lot 15 – 595 West 6th Ave
- Lot 16 – 1500 Quebec St
- Lot 17 – 199 East 7th Ave
- Lot 18 – 1067 Seymour St
- Lot 19 – 900 West Cordova St
- Lot 20 – 900 Chestnut St
- Lot 21 – 688 Cambie St
- Lot 22 – 1180 Mainland St
- Lot 27 – 775 Hamilton St
- Lot 31 – 160 Water St
- Lot 32 – 777 Dunsmuir St
- Lot 33 – 856 Richards St
- Lot 34 – 872 Richards St
- Lot 38 – 1430 Burrard St
- Lot 39 – 1441 Hornby St
- Lot 40 – 900 Denman St
- Lot 42 – 201 Alvin Narod Mews
- Lot 43 – 1201 W Georgia St
- Lot 44 – 490 Broughton St
- Lot 45 – 1475 Granville and Beach
- Lot 52 – 130 W Broadway
- Lot 54 – 1095 W Waterfront Rd
- Lot 55 – 909 Mainland St
- Lot 58 – 2615 Cambie St
- Lot 59 – 1800 Spyglass Place

- Lot 60 – 1100 Chestnut
- Lot 61 – 1 Kingsway
- Lot 62 – Stanley Park
- Lot 63 – Beach Ave
- Lot 64 – Coal Harbour Community Centre
- Lot 65 – Roundhouse Community Centre
- Lot 66 – Kitsilano
- Lot 67 – Queen Elizabeth Park
- Lot 68 – Creekside Community Centre
- Lot 69 – Jericho
- Lot 70 – Vanier Park (gravel)
- Lot 71 – Vanier Park (water)
- Lot 80 – Granville Island
- Lot 81 – 800 Commercial Dr

OTHER BIKE PARKING

- A – Main Street – Science World Station, operational and open to the public
- B – 320 Granville Street, proposed bike centre
- C – Bentall Centre Athletic Club, accessible to club members

RECOMMENDED LOCATIONS

The locations outlined in this section have been identified for their potential to include secure bike parking. This means that the parking lots fulfill many of the best practices for the choice of a location. The selected lots are split into two categories: (1) high demand area; and (2) ease of implementation. The high demand area lots might not fulfill as many of the best practices criteria or might require more modifications to the parkade to make it suitable, but that are located in areas that are likely to have high demand. The ease of implementation lots is for sites where the construction of a secure bike parking facility is likely to require few modifications to the existing parkade.

HIGH DEMAND AREAS

Lot 19 – 900 West Cordova Street

This lot is located by the Hornby separated bike lane. While its car entrance is accessible from West Cordova Street, an elevator provides a direct link from the plaza which is directly adjacent to the separated bike lane. This location is also in a high job density area.

Use of the existing elevator as the primary access point not recommended. Cyclists are less likely to use facilities that are difficult to access or require them to dismount well in advance of reaching the parking. This location could however be modified to improve access from the Hornby bike lane, for example by building a bike-only ramp through the existing plaza, or using an automated bicycle storage with an access point on the plaza.

Summary of Best Practices Criteria for lot 19

High Demand Area	Yes
Proximity to Destination:	
Transit Station	Somewhat
School	No
Post-Secondary Institution	No
Community Centre	No
Library	No
Commercial Street	Somewhat
Connection to the bike network	Yes
Ease of Access	Somewhat



View of the plaza and the elevator access to the parking lot, from Hornby Street.

Lot 2 – 150 West Pender Street

This parking lot is located at the intersection of West Pender and Beatty Streets with painted bike lane access from both. It is a multi-level parkade above grade, and its first level already has bicycle racks, near the Pender entrance. It is possible to build highly visible bike parking facility on the first level.

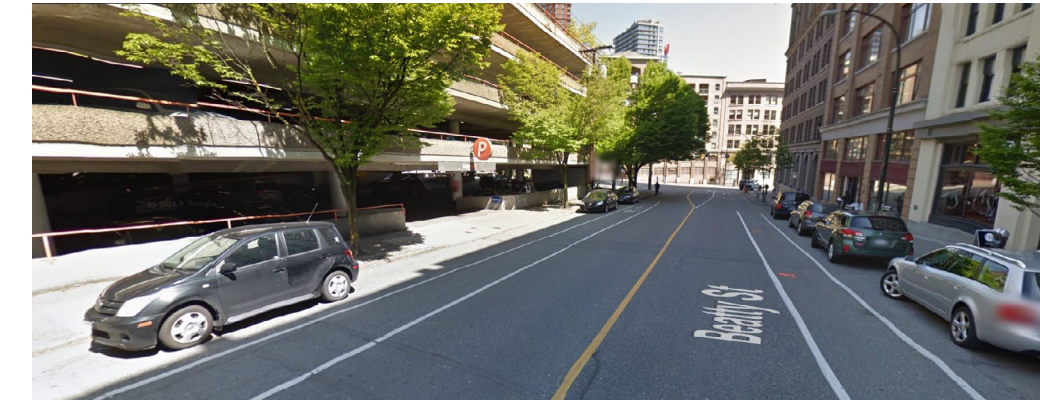
Nearby destinations include a library, Vancouver Community College (directly across the street), the Vancouver Film School, and a shopping mall with a movie theatre. The Stadium – Chinatown SkyTrain Station is a few block away. It is also an area where a lot of bike theft has been reported to the Vancouver Police Department. The current painted bike lanes are not accessible to all ages and abilities, but this location may become more attractive if Beatty Street facilities are upgraded.

Summary of Best Practices Criteria for lot 2

High Demand Area	Yes
Proximity to Destination:	
Transit Station	Somewhat
School	No
Post-Secondary Institution	Yes
Community Centre	No
Library	No
Commercial Street	No
Connection to the bike network	Yes
Ease of Access	Yes



Entrance from Pender Street and bike racks.



Entrance from Beatty Street.

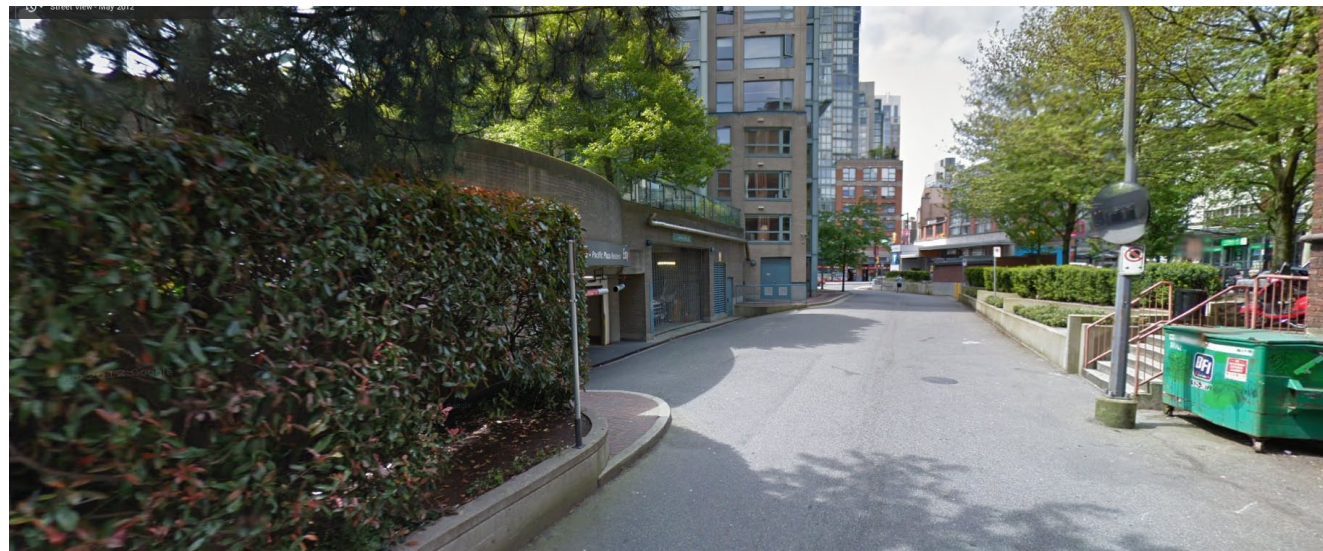
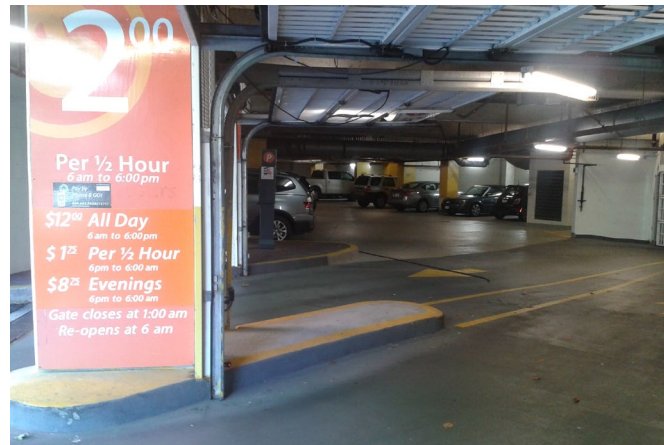
EASE OF IMPLEMENTATION

Lot 22 – Mainland Street

This lot fulfills many of the criteria identified as best practices. It could offer a bike parking facility at grade and close to commercial streets, a community centre and the Yaletown Skytrain Station. It is also near two existing bike routes (painted lanes on Pacific Boulevard and the Seaside Greenway (Seawall)). The possible challenges at this location might include the limited size of the parkade, and potential bicycle conflicts with trucks in the alley.

Summary of Best Practices Criteria for lot 22

High Demand Area	Yes
Proximity to Destination:	
Transit Station	Yes
School	No
Post-Secondary Institution	No
Community Centre	Yes
Library	No
Commercial Street	Yes
Connection to the bike network	Somewhat
Ease of Access	Yes



From the top of the page: view of the entrance and inside of the parkade, and of the parking entrance (on the left) from the lane, looking towards the Yaletown Skytrain Station.

LOT 44 & 64 – COAL HARBOUR COMMUNITY CENTRE

This location includes two EasyPark lots that are adjacent to each other and to the Coal Harbour Community Centre. One is a surface lot and one is a parkade, and both have parking spaces at grade. The lots are directly accessible from the Seaside Greenway (Seawall). There is potential availability of change rooms and showers within the community centre, which could be used by cyclist commuters. However, other than the community centre, there are few destinations nearby.

Summary of Best Practices Criteria for lot 44 & 64

High Demand Area	Somewhat
Proximity to Destination:	
Transit Station	No
School	No
Post-Secondary Institution	No
Community Centre	Yes
Library	No
Commercial Street	No
Connection to the bike network	Yes
Ease of Access	Yes



Clockwise: view of the Coal Harbour Community Centre with the parkade and surface parking on its right; surface parking lot; surface parking lot and entrance to the parkade; inside fo the parkade



LOT 54 – 1095 WEST WATERFRONT ROAD

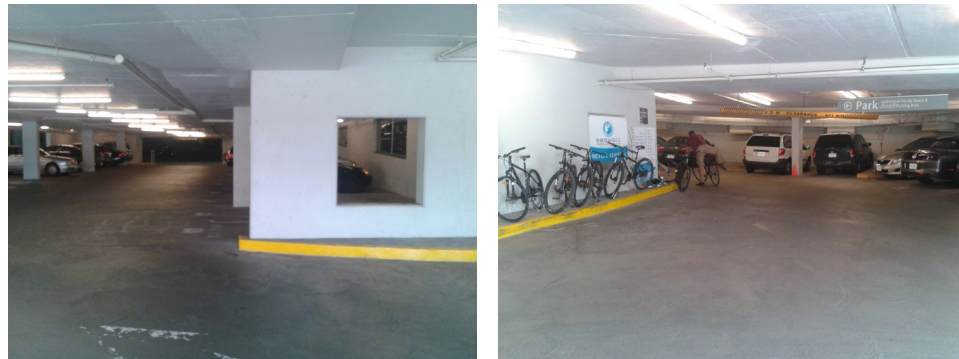
This parking lot is located underneath the Vancouver Convention Centre, and is accessible at grade from the Seaside Greenway (Seawall). There is already a bike rental booth located within the parkade, and an elevator nearby that could take the cyclists to the Convention Centre and West Cordova Street after they drop off their bicycles. This would likely serve the clientele of the Vancouver Convention Centre, and possibly the Sea Plane Terminal. If this location was to be selected, a partnership with those organizations should be considered in order to spread the word to potential users, many of whom may be their clientele. There are not many other destinations near this parkade, other than some ground floor commercial units to the east along the Seaside Greenway.

Summary of Best Practices Criteria for lot 54

High Demand Area	Somewhat
Proximity to Destination:	
Transit Station	No
School	No
Post-Secondary Institution	No
Community Centre	No
Library	No
Commercial Street	No
<i>Located next to the Vancouver Convention Centre and the Sea Plane Terminal.</i>	
Connection to the bike network	Yes
Ease of Access	Yes



Bicycle access to the parkade, and view from the inside of the parkade, with the bike rental on the right.



CONCLUSION

The provision of secure bike parking by the City of Vancouver has the potential to contribute to an increase in the bicycle mode share. Studies and surveys conducted on the topic suggest that it would have a positive impact on utilitarian cycling, and support the City's intent to make cycling an every day, practical transportation option for all kinds of trips. It also has tremendous potential to improve integration with other modes, extending the reach of walking, transit, and car-share trips, and supporting a multi-modal city in general. The policies in place at the City and at TransLink already support the provision of such facilities, and a few of them are already in place or planned to be operational within the next few years.

With the large quantity of secure bike parking facilities existing around the world, a number of best practices have emerged. This report suggests a series of criteria to make choices in terms of the location, design, and management of secure bike parking. They should be used as guiding principles.

An EasyPark pilot is one component of a larger approach to providing secure bike parking in Vancouver. In order to make the best use of the EasyPark lots, different sites have been assessed based on how they fulfill the best practices criteria for location. Five recommended locations have emerged, two of which are likely to have higher demand but necessitate more infrastructure modifications, and three that might be easier to implement. All of the recommended locations are at least somewhat connected to the current bike network. Lots will need to be re-evaluated as conditions change, for example as decisions are made on the expansion of the bike network.

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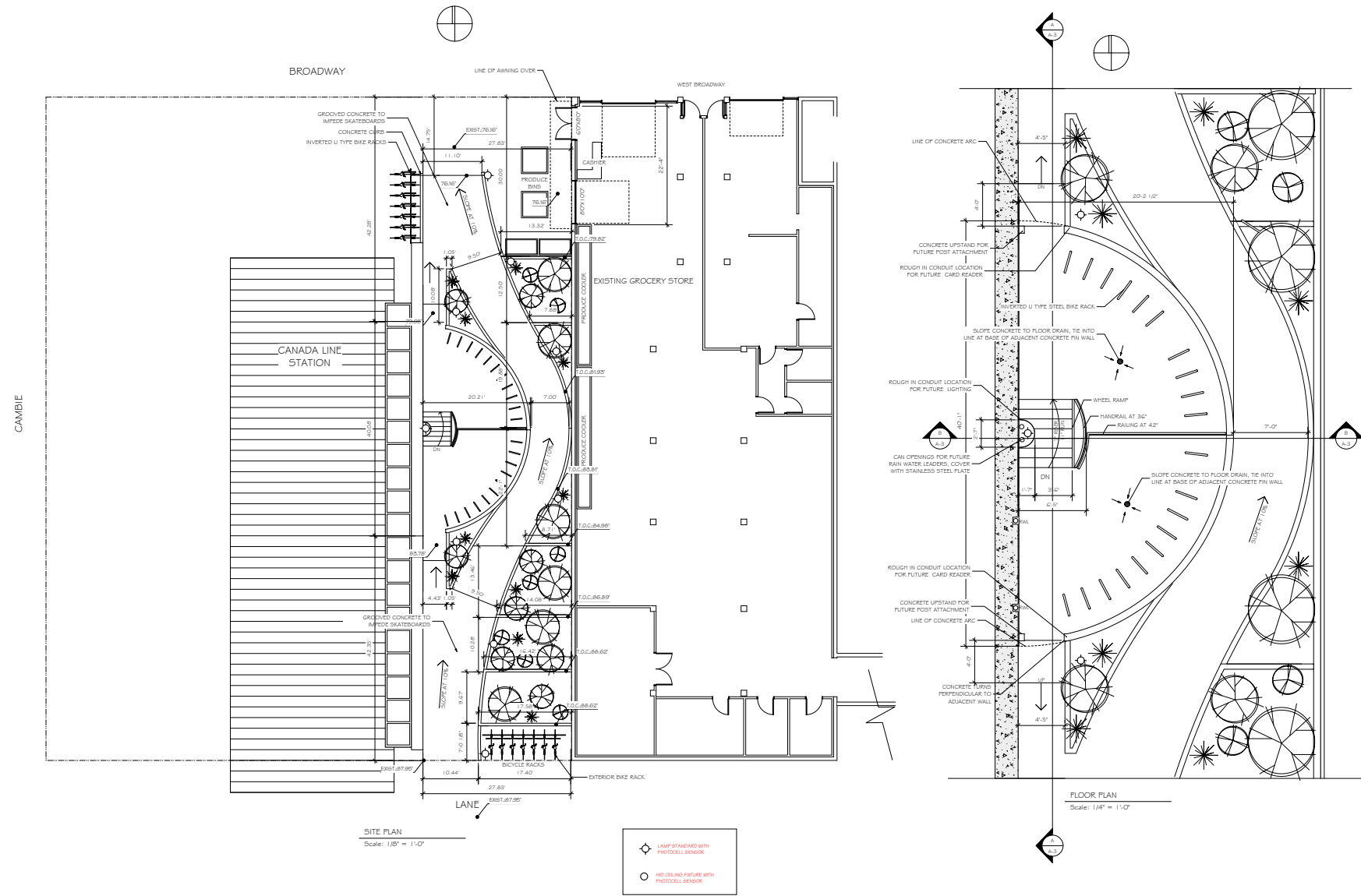
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PHOTO CREDITS

- Page 7: Paul Krueger (Bicycle garage, Freiburg, Germany), Caters News Agency (Mechanized bike parking, Tokyo, Japan) Copenhagenize (Malmö Bike and Ride, Sweden) Camille B. Lefrançois (UBC Bike Cage, Vancouver)
- Page 8: Camille B. Lefrançois
- Page 10-11: Camille B. Lefrançois (Main Street – Science World Station, Vancouver) Paul Krueger (Vancouver General Hospital Cycling Centre, Vancouver)
- Page 13: Mike's Bogota Blog (Cicloparqueadero, Columbia) Bicycle Network (Parkiteer, Australia) Yellow Map (Radstation, Germany) Cycling Weekly (Union Square Bikestation, Washington, D.C.) Dutch in Dublin (Amsterdam, The Netherlands)
- Page 15: Paul Krueger
- Page 16: Camille B. Lefrançois
- Page 17: INEXIA
- Page 19: Klaus Klötterheinrich
- Page 21: Paul Krueger
- Page 24: Google
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- Page 26: Camille B. Lefrançois Google
- Page 27: Google Camille B. Lefrançois
- Page 28: Camille B. Lefrançois
- Page 36-37: Copenhagenize (free standing surface, Malmö, Sweden) Paul Krueger (simple bicycle rack, Vancouver) Arthur Orsini (alternating height racks, Vancouver) Klaus Kötterheinrich (double deck) David Sanz (Ascobike, Bresil) Caters News Agency (mechanized bike parking, Tokyo, Japan)

A-1 SCHEME B



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PROPOSED BICYCLE PATH WITH FADDOCK, 458 WEST BROADWAY AVENUE, VANCOUVER

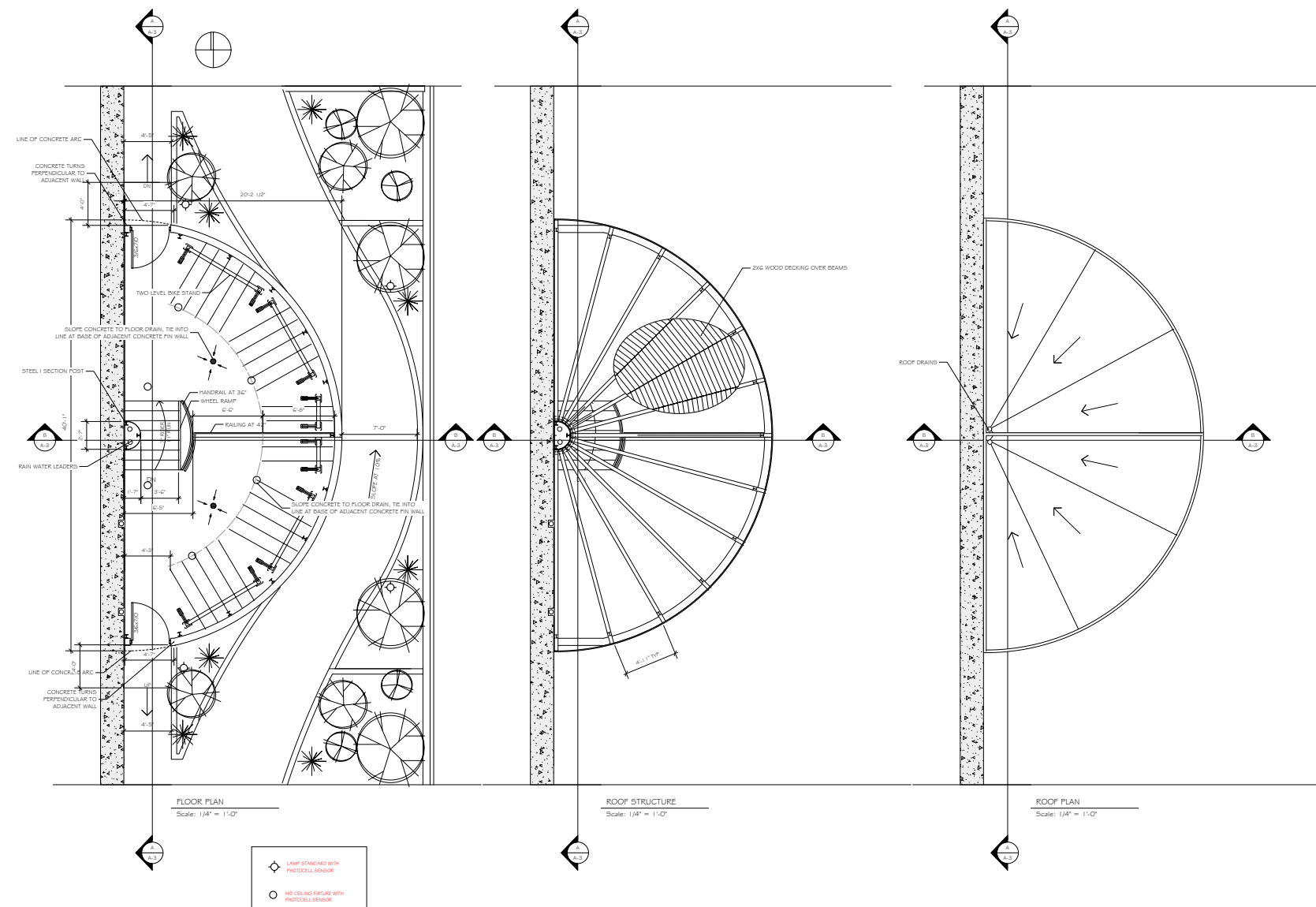
Revisions / Submissions:

Drawn	CM
Date Printed	MARCH 5, 2009
Scale	AS SHOWN
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Showing Title: **SITE PLAN, FLOOR PLAN, INTERSTITIAL SCHEME B**

A-1

A-2 SCHEME A



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A-2

APPENDIX 2

TYPES OF BICYCLE RACK

Type of Rack	Description	AAA	Space required for one bicycle	Recommended Aisle Width	Cost
Free standing surface 	This type of parking space is useful for special bicycles (eg. trailers, electric bikes, etc.). It can be left empty, or have widely spaced simple bicycle racks (e.g. u-shaped, etc.). One way to delineate this parking space from the aisle is to paint the floor.	Good	3.6 m ² (3 x 1.2 m; PRO VELO, 2013)	2 m (PRO VELO, 2013)	Low
Simple bicycle racks 	This type of bicycle rack such as the inverted U rack shown here is very common and easy to install and to use.	Good	1.2 m ² (2 x 0.6 m; Transport Canada, 2010)	1.2 - 1.75 m (Los Angeles County, 2004; Transport Canada, 2010)	For U-shaped, \$75-150 per space (Transport Canada, 2010)
Alternating height / “one-up one down” racks 	This type of rack allows for a higher density while avoiding handlebars to get tangled when using it.	Good	0.9 m ² (2 x 0.45 m; Transport Canada, 2010)	(See <i>Simple bicycle racks</i>)	Unknown
Double deck 	The double deck racks allow for a much higher density, although they require larger aisle and a higher vertical clearance (2.7 m). It can remain user-friendly if the second tier comes with a sliding device. Clear instructions should be provided for their ease of use.	Ok (with sliding device)	Nearly doubles the density compares to regular ground racks (PRO VELO, 2013)	1.75 m (Los Angeles County, 2004)	\$350-400 per space (Transport Canada, 2010)

Type of Rack	Description	AAA	Space required for one bicycle	Recommended Aisle Width	Cost
Suspended 	Suspended racks allow for a high density of bicycles, although they require more physical strength to place the bicycles. A minimum vertical clearance of 2 m is required (Transport Canada, 2010).	No	0.75 m ² (0.6 x 1.25 m; Transport Canada, 2010)	1.75 m (Transport Canada, 2010)	\$20-300 per space (Transport Canada, 2010)
Automated bicycle parking 	Automated bicycle parking can allow for a high density with a very small on-street footprint. However, they are quite expensive to build.	Good	Minimal	N/A	\$2,400-3,900 per space (Transport Canada, 2010)