City of Richmond

Agenda

Public Works and Transportation Committee
Electronic Meeting

Council Chambers, City Hall
6911 No. 3 Road

Wednesday, July 20, 2022
4:00 p.m.

Pg. # ITEM

MINUTES

PWT-4 ***Motion to adopt the minutes of the meeting of the Public Works and Transportation Committee held on June 22, 2022.***

NEXT COMMITTEE MEETING DATE

September 21, 2022, (tentative date) at 4:00 p.m. in Council Chambers

PLANNING AND DEVELOPMENT DIVISION

1. **CYCLING NETWORK PLAN UPDATE - FINAL PLAN**
(File Ref. No. 02-0775-50-6708) (REDMS No. 6889117)

PWT-10 See Page **PWT-10** for full report

Designated Speaker: Fred Lin

STAFF RECOMMENDATION

That the update of the Cycling Network Plan, as described in the report titled "Cycling Network Plan Update - Final Plan," dated June 21, 2022 from the Director, Transportation, be endorsed for implementation.

2. **PROVINCIAL E-SCOOTER PILOT PROJECT – ANNUAL REPORT FOR PARTICIPATING MUNICIPALITIES**
(File Ref. No. 10-6460-03) (REDMS No. 6894298)

PWT-211 See Page **PWT-211** for full report

Designated Speaker: Sonali Hingorani

STAFF RECOMMENDATION

That the report titled "Provincial E-Scooter Pilot Project – Annual Report for Participating Municipalities" dated June 20, 2022 from the Director, Transportation be received for information.

ENGINEERING AND PUBLIC WORKS DIVISION

3. **EXTENSION TO CONTRACT 6917Q - PUBLIC WORKS LEASE VEHICLES**
(File Ref. No. 02-0780-03) (REDMS No. 6892985)

PWT-224 See Page **PWT-224** for full report

Designated Speaker: Suzanne Bycraft

STAFF RECOMMENDATION

That staff be authorized to issue a change order to Purchase Order 96440 to increase the value of the current contract between the City of Richmond and Zeemac Vehicle Lease Ltd. by $244,794, bringing the new contract value to $700,000, and extending the contract end date to July 1, 2023.

Pg. # ITEM

4. **AGEING UTILITY AND ROAD INFRASTRUCTURE PLANNING – 2022 UPDATE**
(File Ref. No. 10-6060-01) (REDMS No. 6894627)

PWT-227 See Page **PWT-227** for full report

Designated Speaker: Jason Ho

STAFF RECOMMENDATION

That the staff report titled, "Ageing Utility and Road Infrastructure Planning – 2022 Update", dated June 8, 2022, from the Director, Engineering be received for information.

5. **MANAGER'S REPORT**

ADJOURNMENT

City of Richmond

Minutes

Public Works and Transportation Committee

Date:	Wednesday, June 22, 2022
Place:	Council Chambers Richmond City Hall
Present:	Councillor Chak Au, Chair Councillor Alexa Loo (by teleconference) Councillor Andy Hobbs (by teleconference) Councillor Linda McPhail (by teleconference) Councillor Michael Wolfe (by teleconference)
Call to Order:	The Chair called the meeting to order at 4:00 p.m.

MINUTES

It was moved and seconded
That the minutes of the meeting of the Public Works and Transportation Committee held on May 18, 2022, be adopted as circulated.

CARRIED

AGENDA ADDITION

It was moved and seconded
That Pedestrian Crosswalk Feasibility Study at River Road and Lynas Lane be added to the agenda as Item No. 6A.

CARRIED

PLANNING AND DEVELOPMENT DIVISION

1. **MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE APPLICATION TO NATIONAL TRADE CORRIDORS FUND**
(File Ref. No. 01-0150-20-THIG1) (REDMS No. 6894828)

It was moved and seconded
That the City provide a letter of support for the Ministry of Transportation and Infrastructure's submission of the Moray Bridge Area Integrated Planning Study for consideration of cost-share funding from the Government of Canada's National Trade Corridors Fund, as described in the report titled "Ministry of Transportation and Infrastructure Application to National Trade Corridors Fund" dated May 6, 2022 from the Director, Transportation.

CARRIED

ENGINEERING AND PUBLIC WORKS DIVISION

2. **MUNICIPAL ACCESS AGREEMENT WITH CIK TELECOM INC.**
(File Ref. No. 10-6000-01) (REDMS No. 6886345)

A brief discussion ensued with respect to 5G network infrastructure requirements.

It was moved and seconded
That the Chief Administrative Officer and the General Manager, Engineering & Public Works be authorized to negotiate and execute, on behalf of the City, a Municipal Access Agreement between the City and CIK Telecom Inc. as outlined in the staff report titled, "Municipal Access Agreement with CIK Telecom Inc.", dated May 17, 2022 from the Director, Engineering.

CARRIED

3. **FEDERATION OF CANADIAN MUNICIPALITIES MUNICIPAL ASSET MANAGEMENT PROGRAM GRANT FUNDING APPLICATION – SANITARY PUMP STATION CONDITION ASSESSMENTS**
(File Ref. No. 10-6060-03-01) (REDMS No. 6893847)

A brief discussion ensued with respect to condition assessment timelines for sanitary pump stations throughout the city (previous and future forecast). Staff advised they will report back with a memorandum.

It was moved and seconded

(1) ***That the City's grant application for the Sanitary Pump Station Condition Assessments project to the Federation of Canadian Municipalities Municipal Asset Management Program be endorsed; and***

(2) ***That the Chief Administrative Officer and General Manager, Engineering and Public Works, be authorized to negotiate and execute funding agreements with the Federation of Canadian Municipalities for the Sanitary Pump Station Condition Assessments project should it be approved for funding, and that the Consolidated 5 Year Financial Plan (2022-2026) be amended accordingly.***

CARRIED

4. **2021 ANNUAL WATER QUALITY REPORT**
(File Ref. No. 10-6000-01) (REDMS No. 6886255)

It was moved and seconded

(1) ***That the annual report titled, "2021 Annual Water Quality Report" dated May 16, 2022, from the Director, Public Works Operations, be endorsed; and***

(2) ***That the annual report titled, "2021 Annual Water Quality Report" dated May 16, 2022, be made available to the community on the City's website and through various communication tools including social media channels and as part of community outreach initiatives.***

CARRIED

5. **REGIONAL PUBLIC WORKS MUTUAL AID AGREEMENT**
(File Ref. No. 10-6000-00) (REDMS No. 6845456)

It was moved and seconded

That the following actions be taken in regard to approving the Regional Public Works Mutual Aid Agreement as more particularly described in the staff report dated May 9, 2022 from the Director, Public Works Operations:

(1) ***The Chief Administrative Officer and the General Manager, Engineering and Public Works be authorized to execute the Regional Public Works Mutual Aid Agreement on behalf of the City of Richmond; and***

(2) ***The General Manager, Engineering and Public Works or his delegate be designated as the Authorized representative under the Regional Public Works Mutual Aid Agreement.***

CARRIED

6. **AWARD OF CONTRACT: 7268P – ROLL-OFF AND IN-GROUND CONTAINER COLLECTION AND RECYCLING/DISPOSAL SERVICES**
(File Ref. No. 10-6370-01) (REDMS No. 6882400)

Discussion ensued with respect to the review and procurement process to engage qualified service providers. In particular, community and environmental responsibility was noted and it was requested that, prior to the next Council meeting, staff confirm if the recommended contractor pays their employees a living wage.

It was moved and seconded

(1) ***That Contract 7268P – Roll-Off and In-Ground Container Collection and Recycling/Disposal Services be awarded for a five-year term, commencing August 1, 2022 to GFL Environmental Inc. at an estimated total contract value of $3,163,153.03, as described in the report titled "Award of Contract: 7268P – Roll-Off and In-Ground Container Collection and Recycling/Disposal Services", dated May 13, 2022, from the Director, Public Works Operations;***

(2) ***That the Chief Administrative Officer and General Manager, Engineering and Public Works be authorized to extend the initial five-year term, up to the maximum total term of seven years, for the maximum total amount of $4,588,832.26, as described in the report titled "Award of Contract: 7268P – Roll-Off and In-Ground Container Collection and Recycling/Disposal Services", dated May 13, 2022, from the Director, Public Works Operations; and***

(3) ***That the Chief Administrative Officer and General Manager, Engineering and Public Works be authorized to execute the contract and all related documentation with GFL Environmental Inc.***

CARRIED

6A. **PEDESTRIAN CROSSWALK FEASIBILITY STUDY AT RIVER ROAD AND LYNAS LANE**
(File Ref. No.)

Discussion ensued with respect to pedestrian safety at the intersection of River Road and Lynas Lane, noting that there is parking permitted by the Recycling Depot, and for the residents of the apartments opposite, but no safe access to cross over to the dyke. It was suggested that staff undergo a feasibility study of the area for opportunities to improve pedestrian safety. The pedestrian crosswalk at the intersection of River Road and McCallan Road was noted as an example.

It was further suggested that a dedicated pathway for dyke access also be considered at the intersection, as the wooden staircase that provides dyke access is further along River Road (mid-block) and is equally unsafe for pedestrians. It was noted that 60% of pedestrians cross at the staircase.

As a result of the discussion, the following **referral motion** was introduced:

It was moved and seconded
That staff undergo a feasibility study for a pedestrian crosswalk and dyke access at the intersection of River Road and Lynas Lane.

CARRIED

7. MANAGER'S REPORT

(i) Transportation Update

Staff noted that ongoing concerns regarding buses waiting on Steveston Highway near Seaward Gate (in front of the Richmond Transit Centre) were reviewed with Coast Mountain Bus Company. As a result, transit operations will be modified beginning June 27, with revised bus schedules that will reduce bus wait times by 90%.

Staff further noted that a new flashing yellow pedestrian actuated crosswalk was installed at Sexsmith Road and Brown Road, and activated on June 14.

(ii) Segway/One Wheel Personal Transportation

The legality of personal electronic transportation devices, e.g. Segway and Onewheel, on City roadways, was raised. Staff noted that these devices are not considered E-Scooters under the City's bylaw, and not legal on City roadways; would be a matter of police enforcement.

(iii) Frechet Update

Staff provided an update on the freshet, noting the higher than normal snow pack levels and a cooler than normal spring resulted in a late snow melt and an increased flood risk across the province. Staff further noted that Richmond is well protected without any significant flood issues to-date and will continue to monitor. Once frechet season is over, staff will present the annual freschet summary report to Council in the coming months.

(iv) Invasive Species

Discussion ensued with respect to controlling the significant growth of invasive species this time of year (e.g. Himalayan blackberries) that limit access to nature and recreation on trails and multi-use paths throughout the city. It was also noted that a large patch of Japanese knotweed has been growing rapidly at the Odlinwood ESA, which has not been contained due to the trail closure for project work over the past few months. Staff advised they will look into these matters further and report back with a memorandum.

ADJOURNMENT

It was moved and seconded
That the meeting adjourn (4:33 p.m.).

CARRIED

Certified a true and correct copy of the Minutes of the meeting of the Public Works and Transportation Committee of the Council of the City of Richmond held on Wednesday, June 22, 2022.

Councillor Chak Au
Chair

Lorraine Anderson
Legislative Services Associate

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	June 21, 2022
From:	Lloyd Bie, P.Eng. Director, Transportation	**File:**	02-0775-50-6708/Vol 01
Re:	**Cycling Network Plan Update – Final Plan**		

Staff Recommendation

That the update of the Cycling Network Plan, as described in the report titled "Cycling Network Plan Update - Final Plan," dated June 21, 2022 from the Director, Transportation, be endorsed for implementation.

Lloyd Bie, P.Eng.
Director, Transportation
(604-276-4131)

Att. 4

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Parks Services	☑	Wayne Craig Acting General Manager
Recreation & Sport	☑	
Engineering	☑	
Sustainability & District Energy	☑	
Development Applications	☑	
Policy Planning	☑	
SENIOR STAFF REPORT REVIEW	**INITIALS:**	**APPROVED BY CAO**
	LB	Serena

Staff Report

Origin

In October 2021, Council endorsed the Phase 2 engagement activities to support the update of the City's Cycling Network Plan (the Plan). This report summarizes the results of the Phase 2 engagement activities and subsequent analyses, and presents the final Plan (Attachment 1). The Plan has a 15-year time horizon with a prioritised implementation strategy that fits within that timeframe and supports Strategic Direction 4 of the Community Energy and Emissions Plan 2050 (CEEP 2050) to achieve a cycling mode share of 10% by 2030. Going forward, the intent is to regularly update the Plan to ensure that the City's cycling network and policies reflect the community's current needs, continue to support the City's long-term mobility and climate change objectives and reflect best practices with respect to cycling facility planning and design.

This report responds to the following referral arising from the discussion of bike lane infrastructure at the January 7, 2020 meeting of the General Purposes Committee:

(1) That staff review and analyze that all new bike lane infrastructure is protected and that when bike infrastructure is renewed, lane protection is included, and report back;

(2) That staff explore implementation of alternative lane configurations, including Dutch intersections, bike lane pairing, and Vision Zero principles, including the following:

(a) new technologies that could be implemented;
(b) colour of lanes and markings;
(c) synchronization options;
(d) connecting lanes;
(e) various types of lane protection; and
(f) challenges of parking in bike lanes;

and report back; and

(3) That consultation on bike lanes include various stakeholders including Advisory Committee on the Environment and HUB Cycling.

This report supports Council's Strategic Plan 2018-2022 Strategy #4 An Active and Thriving Richmond:

> *An active and thriving community characterized by diverse social and wellness programs, services and spaces that foster health and well-being for all.*
>
> *4.2 Ensure infrastructure meets changing community needs, current trends and best practices.*

This report supports Council's Strategic Plan 2018-2022 Strategy #6 Strategic and Well-Planned Growth:

> *Leadership in effective and sustainable growth that supports Richmond's physical and social needs.*
>
> *6.3 Build on transportation and active mobility networks.*

Analysis

Phase 2 Engagement

Phase 2 consultation focused on three major objectives:

- Validating the findings from the route level evaluation
- Refining feedback heard during Phase 1 engagement
- Understanding how stakeholders and the public prioritize between different cycling network improvements and connections at the implementation stage

Activities

All engagement activities took place on-line during November 1-30, 2021. As with Phase 1, public engagement was held via the City's Let's Talk Richmond site, which hosted a survey, mapping tool and ideas board for the general public and students. Public awareness of the engagement process included issuing a news release, promoting on the City's social media channels, inclusion on the City website, posting a notice at transit shelters in the City Centre that have a digital panel, and installation of temporary signage along bike routes across the city. Separate stakeholder sessions were convened with relevant external agencies[1], the Advisory Committee on the Environment and the Richmond Active Transportation Committee.

Results

The Let's Talk Richmond site recorded 811 visitors who contributed 528 completed surveys, 31 ideas, 66 map pins, and 43 additional comments (Attachment 2). The results informed the finalization of the updated Plan including a prioritized implementation strategy.

Cycling Network Evaluation

Informed by the Phase 1 and 2 engagement results, a two-step evaluation process was used to identify priorities and plan interim network phases focusing first on the wider route-level benefits and then the segment-by-segment prospects. An evaluation matrix was used based on the following key themes from Phase 1 engagement: safety, connectivity, utility and convenience, feasibility, network gaps, and social equity.

Results indicate higher priority in central Richmond and the City Centre along major corridors, and decreasing priority moving out towards lower density areas. The evaluation shows the following segments as receiving the highest relative scores (Figure 1):

- Routes in the City Centre to provide greater cycling access to a density of jobs and destinations
- Southern extension of No. 2 Road bike lanes from Westminster Highway to Granville Avenue to enhance cycling connections to Burkeville
- Northern extension of the paved Shell Road Trail from Highway 99 overpass to River Road to complete a north-south link in east Richmond

[1] The Ministry of Transportation and Infrastructure, TransLink, Vancouver Airport Authority, Richmond School District, Metro Vancouver, ICBC, HUB Cycling, Richmond RCMP, and Vancouver Coastal Health.

- Upgrading shared road segments on Garden City Road and Westminster Highway to provide designated cycling facilities

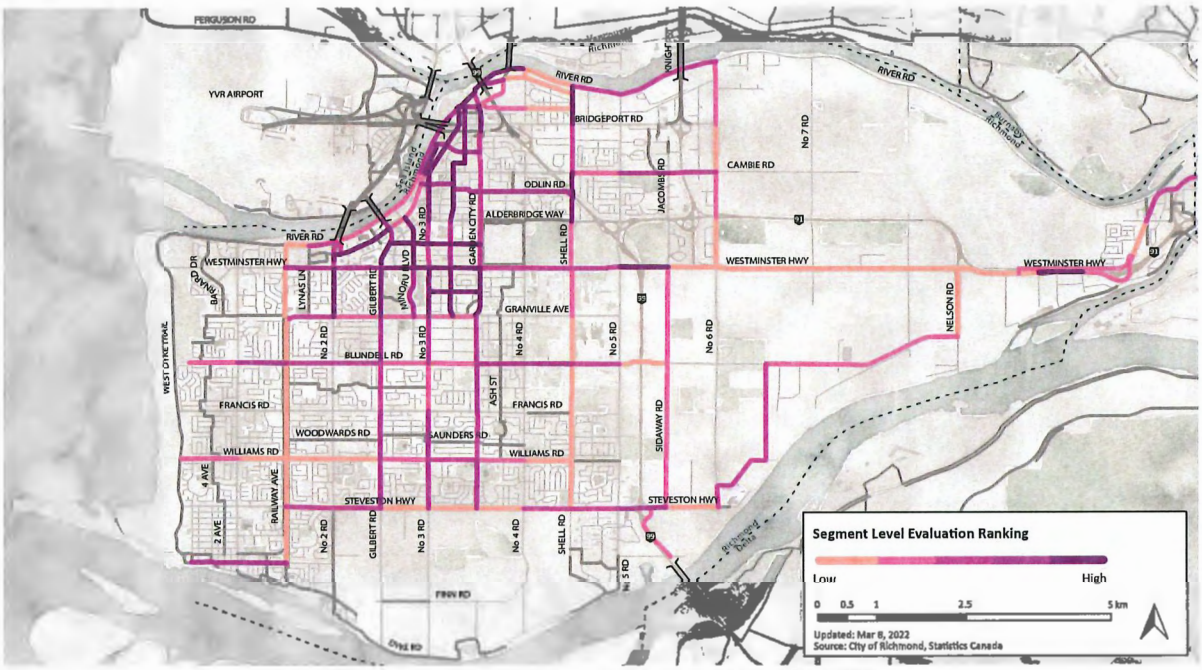


Figure 1: Segment Level Evaluation Results

Prioritized Implementation Strategy

The results of engagement and the priority network evaluation provided considerable insight to projects with high potential benefits. Improving safety and comfort are the overarching themes, which are most significantly impacted by the level of exposure to motor vehicle traffic. Accordingly, an approach that prioritizes the physical separation of cyclists from traffic whenever feasible presents the greatest opportunity to increase cycling in Richmond. The projects were prioritized in three five-year tranches of short-, medium-, and long-term based on transportation planning principles and feedback heard during engagement.

Beyond the key themes of the evaluation matrix previously noted, the implementation strategy also includes several key objectives for network expansion:

- An emphasis on transecting and multi-purpose (commuter and recreational) routes
- A concern for ensuring basic levels of local and regional connectivity
- An awareness of the City's current cycling capital plan and ongoing cycling improvements
- A core network that locates most residents within 800 metres of a major cycling route
- A finer grain network in the City Centre to support greater access to a density of jobs and destinations
- A focus on intersection improvements at major roads

As this plan has a time horizon of 15 years, there are remaining planned cycling routes (as shown in the Official Community Plan) that are not identified due to:

- The project did not score relatively high based on the evaluation criteria
- The project will be implemented as part of a larger City project rather than as a stand-alone cycling project (e.g., improvements to River Road east of No. 6 Road, which would be addressed as part of the City's Dike Master Plan).

Figure 2 illustrates the short-, medium- and long-term priorities with the key projects within each timeframe summarized below. The short-term priorities align with Transportation's existing 5-Year (2022-2026) Capital Plan. The majority of these projects are currently funded and in the design or implementation stage (Attachment 3).

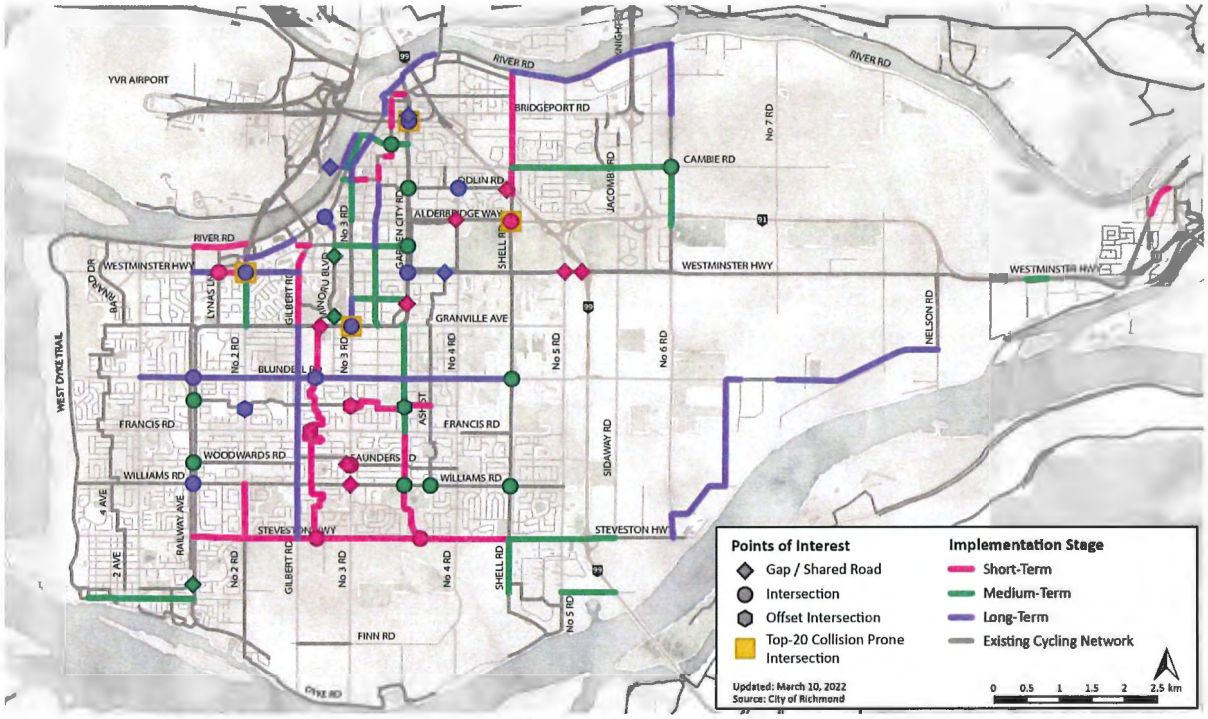


Figure 2: Map of Implementation Plan – Short, Medium and Long-Term Priorities

Short-Term Priorities (2022-2026)

- Develop a core protected cycling network in the City Centre
- Completion of parallel neighbourhood bikeways as alternatives to long-term routes on Gilbert Road and Blundell Road
- Completion of Shell Road and Steveston Highway cycling facilities in preparation for medium- and long-term connections

Medium-Term Priorities (2027-2031)

- Continue increased connectivity and protection in the City Centre
- Connections to Steveston, Ironwood, East Cambie, and the Fraser River Tunnel Crossing
- Completion of a central loop of directional bike lanes on Garden City Road, Williams Road, Railway Avenue, and Granville Avenue
- Projects dependent on redevelopment or collaboration with other agencies that are likely to occur at this stage

Long-Term Priorities (2032-2036)

- Expanded/enhanced connections to Hamilton and southeast Richmond
- Completion of new east-west and north-south corridors on Blundell Road and Gilbert Road respectively
- Further connectivity and protection improvements within the City Centre
- Projects dependent on redevelopment or collaboration with other agencies that are likely to occur at this stage

Estimated Costs of Unfunded Priority Projects

Table 1 summarizes the range of estimated costs for unfunded projects (i.e., projects not already part of an approved Capital Budget or secured through the development process). These low and high cost ranges are indicative only and based on a review of unit costs for recent comparable projects. Site specific designs and estimated costs (such as property acquisition, utility relocation and environmental management costs) will be prepared prior to projects being presented to Council for consideration as part of future capital programs.

Table 1: Estimated Costs to Fund the Implementation Strategy

Phase	Total # of Projects	# of Projects Already Funded	Estimated Cost to Fund Remaining Projects ($Millions) (1)	
			Low	High
Short-Term (2022-2026)	29	15 (2)	$6	$12
Medium-Term (2027-2031)	29	8	$19	$37
Long-Term (2032-2036)	25	9	$20	$39
Pilots/Interim Improvements	4	0	$3	$5
Total	**87**	**33**	**$48**	**$93**

(1) Estimated costs are indicative only and were generated based on previous cycling projects. Site specific designs and cost estimates will be developed and presented to Council for consideration of future capital programs.

(2) Fifteen projects are fully funded and a further five projects are partially funded (e.g., funded for design but not for construction).

Low range costs typically involve providing quick-win or interim solutions (e.g., installation of delineators between the vehicle lane and the adjacent painted bike lane) and/or adding cycling facilities within the existing right-of-way. The latter may involve street reallocation that changes the existing use of a roadway such as the removal of on-street parking or a vehicle lane, reducing the vehicle lane width, or reducing the boulevard and/or raised median width.

High range costs reflect expansion of the road right-of-way to accommodate cycling infrastructure while maintaining the existing road features (e.g., on-street parking, the number and width of vehicle lanes, the width of the boulevard and median).

Funding Considerations

Historically, the City has expanded the cycling network by focusing on projects that can be accommodated within the existing right-of-way or, where right-of-way is needed, waiting for the adjacent development process. Completion of these low impact projects has sufficiently progressed that now the City will need to consider street reallocation to support the cost-effective

and timely expansion of the cycling network in line with CEEP 2050 targets to achieve a cycling mode share of 10% by 2030.

Implementation with Street Reallocation

Over the past five years (2018-2022), annual City funding via Roads Development Cost Charges for active transportation projects has averaged $3.2 million or $16 million over the five-year period. Subject to Council approval in future capital programs of the same annual City funding and conservatively assuming that the City can secure approximately one-third of these costs as an external grant (total of $6 million), this combined baseline funding of $22 million is sufficient to fund each five-year phase of the prioritized implementation strategy at the low cost estimate with street reallocation.

Implementation without Street Reallocation

Without street reallocation, there is a cost premium that in turn impacts the ability to achieve completion of the projects within the time horizon of the Plan. Of the projects identified in the medium- and long-term phases, 10 projects comprising 19 kilometres of facilities are candidates for street reallocation. These projects will require a minimum of an additional $23 million to implement without street reallocation, which is equivalent to seven years at current City funding levels. The additional funding required will be higher as the $23 million estimated does not include property acquisition to expand the road right-of-way.

The potential impacts of street reallocation are context sensitive for each relevant project. Thus, staff anticipate undertaking the following activities prior to inclusion of the project in a future capital program:

- Technical analysis to quantify the traffic impacts of any street reallocation
- Consultation with the impacted neighbourhood
- Presentation of the results including advantages/disadvantages of feasible options for Council consideration

Resource Considerations

Over the 15-year time horizon of the Plan, 89 projects are identified that could cost up to $104 million, which averages to six projects per year with an average annual budget of $7 million per year. Should the Plan be endorsed, additional staffing or other resources will be necessary for program delivery of the medium- and long-term phases based on the number of projects, the relatively large budgets and the complexity of some of the projects.

Further analysis and conceptual design of the proposed projects will be required to gain a better understanding of potential resource impacts. Staff envision that prior to each five-year tranche, a report outlining the estimated additional requirements will be presented to Council for consideration.

Policies, Programs and Initiatives

In addition to improved existing and new cycling infrastructure, the Plan includes supporting policies and education initiatives tailored to the Richmond context. The focus areas reflect policy needs and challenges identified through public and stakeholder engagement, as well as areas with a strong connection to encouraging and enabling cycling activity.

Bicycle Parking

The provision of safe, secure, attractive, and convenient bike parking facilities is an important factor in encouraging more people to cycle. The need for secure and covered parking facilities was heard throughout Phase 2 engagement. Survey respondents ranked "Secure Bike Parking" as the third highest investment priority behind "Network Expansion or Upgrades" and "Maintenance and Repair of Network." The Plan includes guidance across four areas (Figure 3).

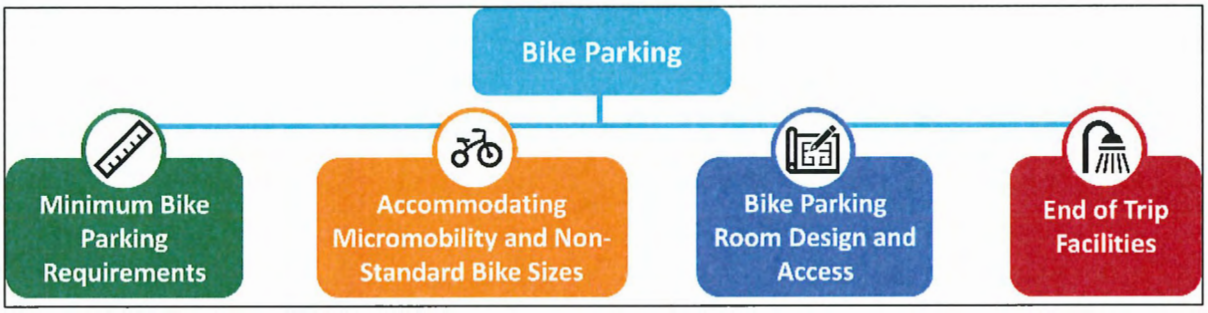


Figure 3: Components of Bike Parking Policy

A future staff report anticipated later in 2022 will propose updated off-street bicycle parking requirements for Section 7.14 (Provision of On-Site Bicycle Parking Facilities) of Zoning Bylaw 8500 including:

- Alignment of the number of required multi-family residential bicycle parking spaces to unit square footage or the number of bedrooms to better match the number of household occupants
- Access to electrical outlets for charging e-bikes and other electric micro mobility devices
- Provision of end-of-trip facilities (e.g., bike maintenance facilities, showers, change rooms, and clothes lockers for use by bike commuters)

Programs and Initiatives

Societal and personal factors, such as a lack of training and negative perceptions around safety, can act as barriers to encouraging more cycling. The Plan identifies existing and new programs that can address these factors and help shift behaviour (Figure 4).

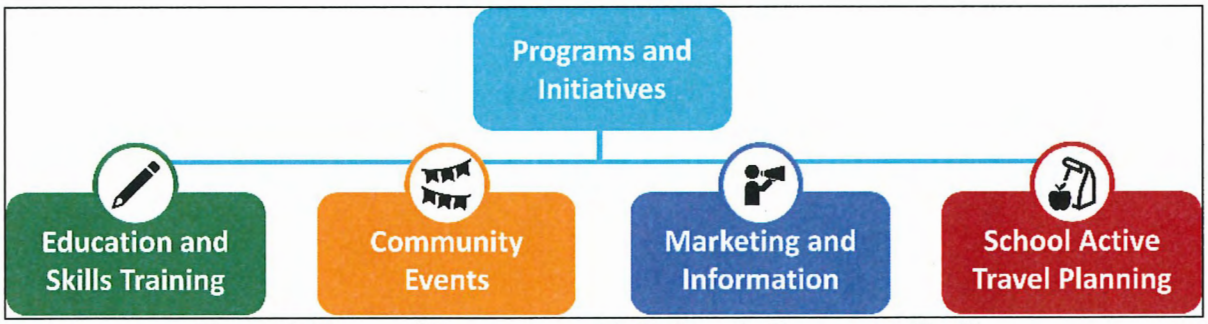


Figure 4: Types of Programs and Initiatives to Encourage Cycling

The Plan recommends continuation of the City's existing initiatives that include:

- The delivery of cycling skills education courses for all Grade 6 and 7 public school students, including in-class lessons, on-bike safety training and street ride education, as well as similar programs for adults.
- Participation in regional cycling events (e.g., Go by Bike Week, Bike to Shop) that aim to reward existing cyclists and encourage new cyclists to try cycling for transportation and to continue cycling after the event.
- Staging of annual free guided bike ride for the community to discover Richmond's on- and off-street bike routes.

New opportunities to encourage cycling based on feedback from the engagement process include greater wayfinding to guide cyclists and formalizing a branded bike route that circumnavigates the island as the "Tour de Richmond." Further considerations include facilitating the introduction of shared e-bike services, which can increase access to cycling via the electric assist, and expanding data collection to evaluate the performance of infrastructure and programs, monitor trends, produce analysis, and identify changes that may be required.

Infrastructure Design Review

The update includes a technical review of best practices for cycling infrastructure design to help refine existing and identify new standards and guidance that may be best suited for the Richmond context. The standards and guidance reviewed reflect both feedback heard during engagement as well as future gaps and challenges that may emerge with the types of cycling facilities being considered for Richmond.

Several cycling infrastructure design concepts relevant to the Richmond context were reviewed. The Plan provides an overview of the design considerations and recommended approach for the following concepts:

- *Fully Protected Intersection (Dutch Style)*: Intersection with dedicated queuing and crossing areas for cyclists that are often physically separated from motor vehicles and pedestrians.
- *Neighbourhood Street Bikeways*: Intersection where the local street is off-set and does not connect directly across the arterial road thereby requiring cyclists to travel along a short section of the arterial road before crossing.

- *Multi-Use Pathways – Intersections*: Intersection of off-street two-way multi-use pathway including accommodation for cycling turning movements.
- *Multi-Use Pathways – Separation of Users*: Thresholds for separation of pathway users and the use of bike calming measures to mitigate conflicts due to the speed differential between cyclists and other pathway users, and amongst cyclists with different skills and comfort levels.
- *Channelized Right-Turn Lanes and On-/Off-Ramps*: Intersections of cycling facilities with road connections that allow motorists to make a higher speed right turn or to speed up/slow down between a provincial highway and a municipal road.
- *Bus Stops*: Interaction of on-street cycling facilities with buses and off-street cycling facilities with pedestrians as they cross between the bus stop and sidewalk.
- *Cycling Facility Transitions*: Alignment of the transition between one-way cycling lanes to two-way multi-use pathway at an intersection or mid-block.

The overarching objective of these new design concepts is to provide protected cycling facilities that are comfortable for all ages and abilities, and to improve safety and connectivity. The new design concepts will be pursued in future capital projects as appropriate.

Next Steps

With Council approval of the Plan, staff anticipate providing annual reports on the progress of the Plan that summarize completed actions over the past year and identify upcoming actions to support continued delivery. On that basis, activities planned for the remainder of 2022 include:

- *Communications*: The Plan and a reader-friendly Executive Summary (Attachment 4) will be posted on the City website. Completion of the Plan will be communicated to the public via social media and other community engagement tools, and to all stakeholders that participated in the engagement program.
- *Capital Projects*: Implementation of approved cycling-related capital projects for short-term priorities will continue. For future projects identified as medium-term priorities, staff will analyse and quantify the resource and potential road reallocation impacts for future consideration by Council.
- *Cycling Infrastructure Design*: The new infrastructure design standards will be incorporated into the City's Engineering Design Guidelines.
- *Program and Policy Initiatives*: A staff report anticipated to be presented later in 2022 will propose updates to the off-street bicycle parking requirements of Zoning Bylaw 8500. Staff will continue to monitor and facilitate expansion of the City's shared e-bike pilot program to expand access to cycling for the community and continue existing cycling-related education and promotional events.

Financial Impact

None. Future expenditures required for implementation of the Plan will be presented to Council for consideration during the annual budget process.

Conclusion

With a phased implementation strategy to achieve a safer, more comfortable and expanded active transportation network, this update to the Cycling Network Plan will help the City achieve multiple mobility, climate action and community wellness objectives – particularly a 10% cycling mode share and a 50% reduction in community GHG emissions by 2030.

Fred Lin, P.Eng., PTOE
Senior Transportation Engineer
(604-247-4627)

Joan Caravan
Transportation Planner
(604-276-4035)

JC:jc

Att. 1: Cycling Network Plan
Att. 2: Summary of Phase 2 Engagement Results
Att. 3: Short-Term Priorities – Funding Status
Att. 4: Cycling Network Plan – Executive Summary

Report
May 2022

Cycling Network Plan Update

City of Richmond
Our ref: 23743801
Client ref: 6897532

BINNIE | steer

Report
May 2022

Cycling Network Plan Update

Prepared by:

Steer
Suite 1030 – 999 W Hastings Street
Vancouver, BC V6C 2W2
Canada

T (604) 629 2610
www.steergroup.com

Prepared for:

City of Richmond
6911 No. 3 Road
Richmond, BC
V6Y 2C1
Canada
Client ref: 6897532
Our ref: 23743801

PWT - 22

Steer has prepared this material for City of Richmond. This material may only be used within the context and scope for which Steer has prepared it and may not be relied upon in part or whole by any third party or be used for any other purpose. Any person choosing to use any part of this material without the express and written permission of Steer shall be deemed to confirm their agreement to indemnify Steer for all loss or damage resulting therefrom. Steer has prepared this material using professional practices and procedures using information available to it at the time and as such any new information could alter the validity of the results and conclusions made.

steer

Contents

1 Introduction 1

1.1 Project Overview 1

2 Existing Cycling Network 3

2.1 Introduction 3

2.2 Cycling Comfort Level 5

2.3 Cycling Ridership 6

3 Priority Network Evaluation 7

3.1 Introduction 7

3.2 Results 10

Implementation Strategy 13

4.1 Introduction 13

4.2 Approach 13

4.3 Key Considerations for Implementation 16

4.4 Priorities by Stage 17

4.5 Short-Term (2022-2026) 19

4.6 Medium-Term (2027-2031) 22

4.7 Long-Term (2032-2036) 25

5 Policies, Programs, and Initiatives 28

5.1 Introduction 28

5.2 Bike Parking 28

5.3 Programs and Initiatives 34

5.4 Wayfinding 38

5.5 Lighter, Quicker, Cheaper / Pilot Projects 38

5.6 Enhanced Safety 38

5.7 Equity 39

5.8 Data Collection 40

Figures

Figure 1.1: Inputs into Project Objectives 1

Figure 1.2: Project Phases Overview 1

Figure 1.3: Summary of Phase 1 and Phase 2 Engagement Activities 2

Figure 2.1: Cycling Network by Facility Types 3

Figure 2.2: City of Richmond's Existing Cycling Network by Facility Type 4

Figure 2.3: Cycling Comfort Level Criteria 5

Figure 2.4: Cycling Comfort Level – Existing Cycling Network 5

Figure 2.5: Cyclist Comfort Level by Facility Type 5

Figure 2.6: Average Monthly Cyclist Volumes and Climate Data (Jan 2020 – Dec 2021) 6

Figure 3.1: Routes Included in the Route Level Evaluation 8

Figure 3.2: Route Level Evaluation Results 11

Figure 3.3: Segment Level Evaluation Results....12
Figure 4.1: Intersection of the Railway Greenway and Williams Road....15
Figure 4.1: Legend for Interpreting Implementation Phases....17
Figure 4.2: Map of Implementation Plan – Short, Medium and Long-Term Priorities....18
Figure 4.3: Map of Short-Term Priorities....21
Figure 4.4: Map of Medium-Term Priorities....24
Figure 4.5: Map of Long-Term Priorities....27
Figure 5.1: Components of Bike Parking Policy....28
Figure 5.2: Cyclist on Lansdowne Road....33
Figure 5.2: Types of Programs and Initiatives to Encourage Cycling....34
Figure 5.3: Cyclist on the Railway Greenway....40

PW1 - 24

Tables

Table 1.1: External Stakeholder Workshop Attendees....2
Table 2.1: Summary of Cycling Facilities by Key Characteristics....3
Table 3.1: Route Level Evaluation Criteria....9
Table 3.2: Segment Level Evaluation Criteria....9
Table 4.1: Short-Term Gap / Shared Road and Intersection Improvements....19
Table 4.2: Short-Term Route Improvements....20
Table 4.3: Medium-Term Gap / Shared Road and Intersection Improvements....22
Table 4.4: Medium-Term Route Improvements....23
Table 4.5: Long-Term Gap / Shared Road and Intersection Improvements....25
Table 4.6: Long-Term Route Improvements....26
Table 5.1: City of Richmond On-Site Bicycle Parking Requirements....29
Table 5.2: European Cities by Bicycle Mode Share and Apartment Parking Requirements....29
Table 5.3: Comparison of Bicycle Parking Bylaw Specifications - City of Richmond and City of Victoria Zoning Bylaws....32
Table 5.4: City of Coquitlam Off-Street Zoning Bylaw....33

Appendices

A Phase 1 Engagement Summary

B Phase 2 Engagement Summary

C Existing Network Analysis Summary

D HUB Cycling/TransLink – State of Cycling Comfort Level Criteria

E Implementation Strategy: Expanded Project Descriptions

F Map of Implementation Plan and Future Major Routes

G Infrastructure Design Review Memo

H Comparison of Metro Vancouver Bike Parking Requirements

I Micromobility Review Memo (July 2020)

1 Introduction

1.1 Project Overview

1.1.1 Policy Context

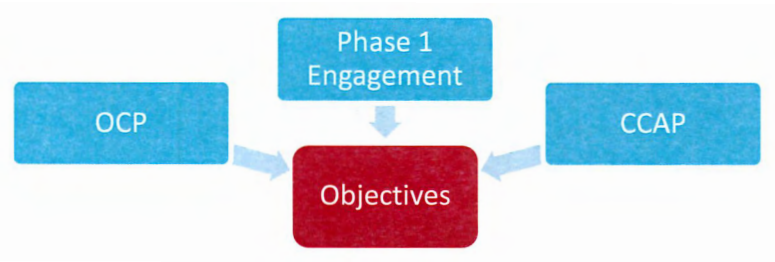
The City of Richmond's Official Community Plan (OCP) identifies the need to reduce vehicle trips by 34% between 2008 and 2041 in order to achieve local mobility, air quality and liveability goals. The Community Energy & Emissions Plan 2050 (CEEP 2050), adopted in February 2022, accelerates OCP targets to increase cycling mode share from 1% in 2008 to 10% by 2030.

In 2008, the City Centre Transportation Plan (CCTP) was completed and incorporated into the City Centre Area Plan (CCAP). The CCTP identifies cycling-related strategies and polices and a planned network of bike routes within the City Centre. Further cycling-related strategies and a planned city-wide major street cycling network, including a complementary network of local street bikeways, were included within the update of the OCP in 2012.

PWT - 25

Since the completion of the CCAP and OCP, continued population growth, a high level of development activity, and the arrival of the Canada Line have brought considerable changes to the city. Simultaneously, the last decade has seen an evolution in the design of cycling facilities and an expansion of small electric mobility devices.

Figure 1.1: Inputs into Project Objectives



1.1.2 Project Objectives

This update to the Cycling Network Plan (CNP), originally adopted in 1996, will help the City respond to its policy objectives by identifying what the future cycling network will look like over the next 15 years and a phased implementation strategy to achieve it, including short-term, high priority projects. This update to the CNP set out with the following objectives to increase cycling:

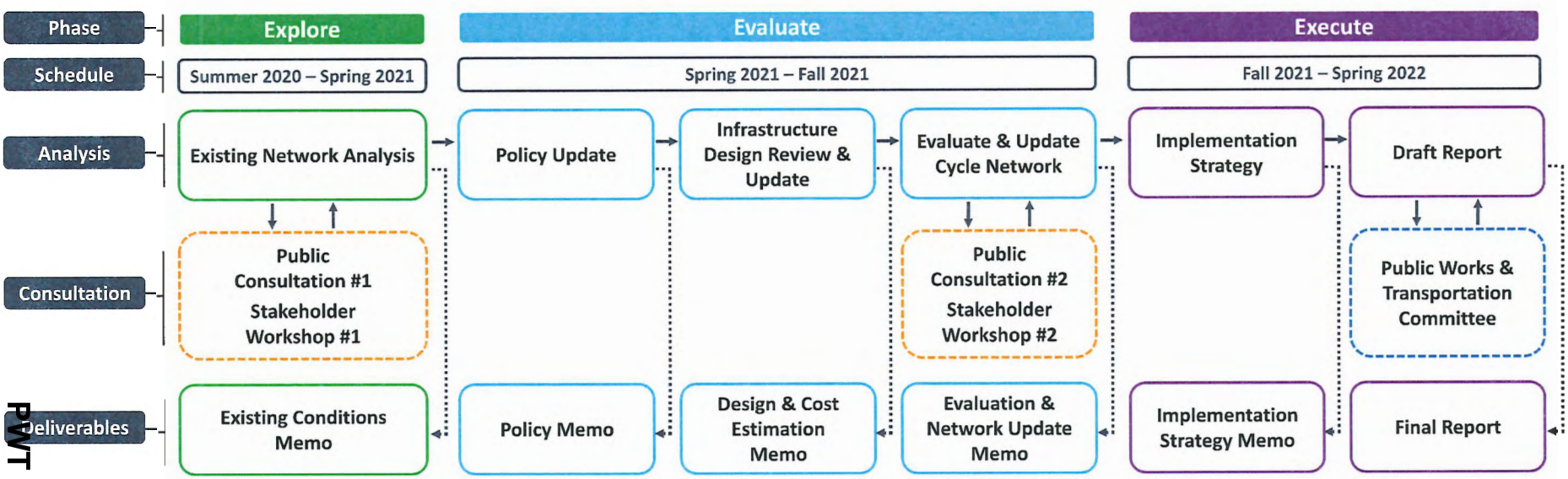
- **Use** as a viable and sustainable option, for all ages and abilities
- **Safety and access** to key destinations and transit
- **Network connectivity** within Richmond, and between adjacent cities
- **Infrastructure** with designs reflecting current and emerging standards

Through the planning process, the City also sought to develop a CNP that reflects the community's input. Hence, these initial objectives were revised to reflect recurring themes and messages from Phase 1 engagement. The following key themes were distilled from the feedback:

- **Connectivity**
- **Feasibility**
- **Network Gaps**
- **Safety**
- **Social Equity**
- **Utility and Convenience**

These key themes are discussed in Chapter 3 and formed the building blocks of the priority network evaluation framework.

Figure 1.2: Project Phases Overview



PWT - 26

1.1.3 Process/Project Phases

The development of the CNP was divided into three phases to **explore** the existing conditions, **evaluate** and update the future cycling network plan, and **execute** a final Cycling Network Plan by prioritizing investments through an implementation strategy. Figure 1.2 presents the subtasks, consultation phases and associated deliverables within each phase of work.

1.1.4 Engagement Approach

As shown in Figure 1.2, this project used a multi-phase approach to public engagement – reporting back on what was heard and sharing initial evaluation results – to enhance responsiveness to community feedback and better address regional, local and site-specific considerations at the prioritization and implementation phase.

Phase 1 engagement focused on gathering public and stakeholder input on existing conditions and recommendations for future improvements. Phase 2 engagement targeted three major objectives:

- Validating findings from the route-level evaluation (detailed in section 3.2.1)
- Refining feedback heard during Phase 1 engagement
- Understanding how stakeholders and the public prioritize between different improvements and connections at the implementation stage

To reach a broad audience and enable participants to share their contributions from a comfortable location during the COVID-19 pandemic, public engagement was delivered online through the *Let's Talk Richmond* platform. Phase 1 ran over the month of June 2021 and Phase 2 was completed during the month of November 2021.

During these engagement periods, several activities were conducted to gather public and stakeholder input including:

- Internal stakeholder consultation with:
  - City of Richmond Staff
  - Advisory Committee on the Environment
  - Richmond Active Transportation Committee
- External stakeholder workshop (see attendees in Table 1.1)
- Public consultation for both the public and students via the *Let's Talk Richmond* portal

Figure 1.3 provides a high-level summary of the engagement activities and participation. Detailed results from both phases of engagement are documented in Appendices A and B. Key findings have informed recommendations and are referenced throughout this report.

Table 1.1: External Stakeholder Workshop Attendees

Attendees
HUB Cycling, Insurance Corporation of British Columbia (ICBC), Metro Vancouver, Ministry of Transportation and Infrastructure (MoTI), Richmond Active Transportation Committee, Richmond School District, Richmond RCMP, TransLink, Vancouver Airport Authority, Vancouver Coastal Health

1.1.5 Document Structure

This report is divided into five chapters with a depth of reference materials available in the Appendices. **Chapter 1** outlines the project objectives, phases and engagement approach. **Chapter 2** recaps the current conditions of the cycling network including available facility types and comfort levels. **Chapter 3** details the approach and results of the priority network evaluation. The implementation strategy, including approach, key considerations and stages, is provided in **Chapter 4**. Finally, **Chapter 5** recommends further cycling-related policies, programs and initiatives.

Figure 1.3: Summary of Phase 1 and Phase 2 Engagement Activities

PWT - 27

2 Existing Cycling Network

2.1 Introduction

As of 2021, Richmond's cycling network comprises more than 330 lane-km of cycling facilities with a mix of facility types. Figure 2.1 illustrates the composition of the existing cycling network by facility type. The key characteristics of each facility type are summarized in Table 2.1, with detailed facility descriptions available in Appendix C.

The Existing Cycling Network map, Figure 2.2 on the following page, shows the distribution of cycling facilities throughout the city by facility type.

Figure 2.1: Cycling Network by Facility Types

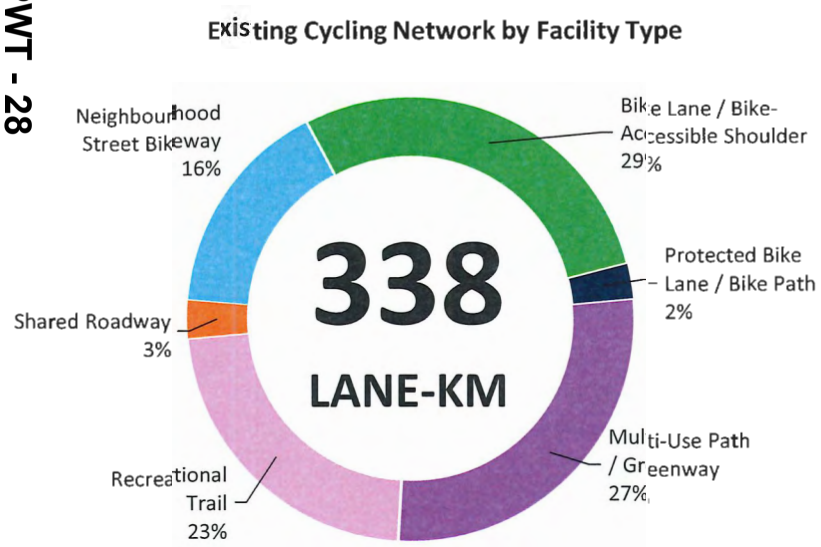
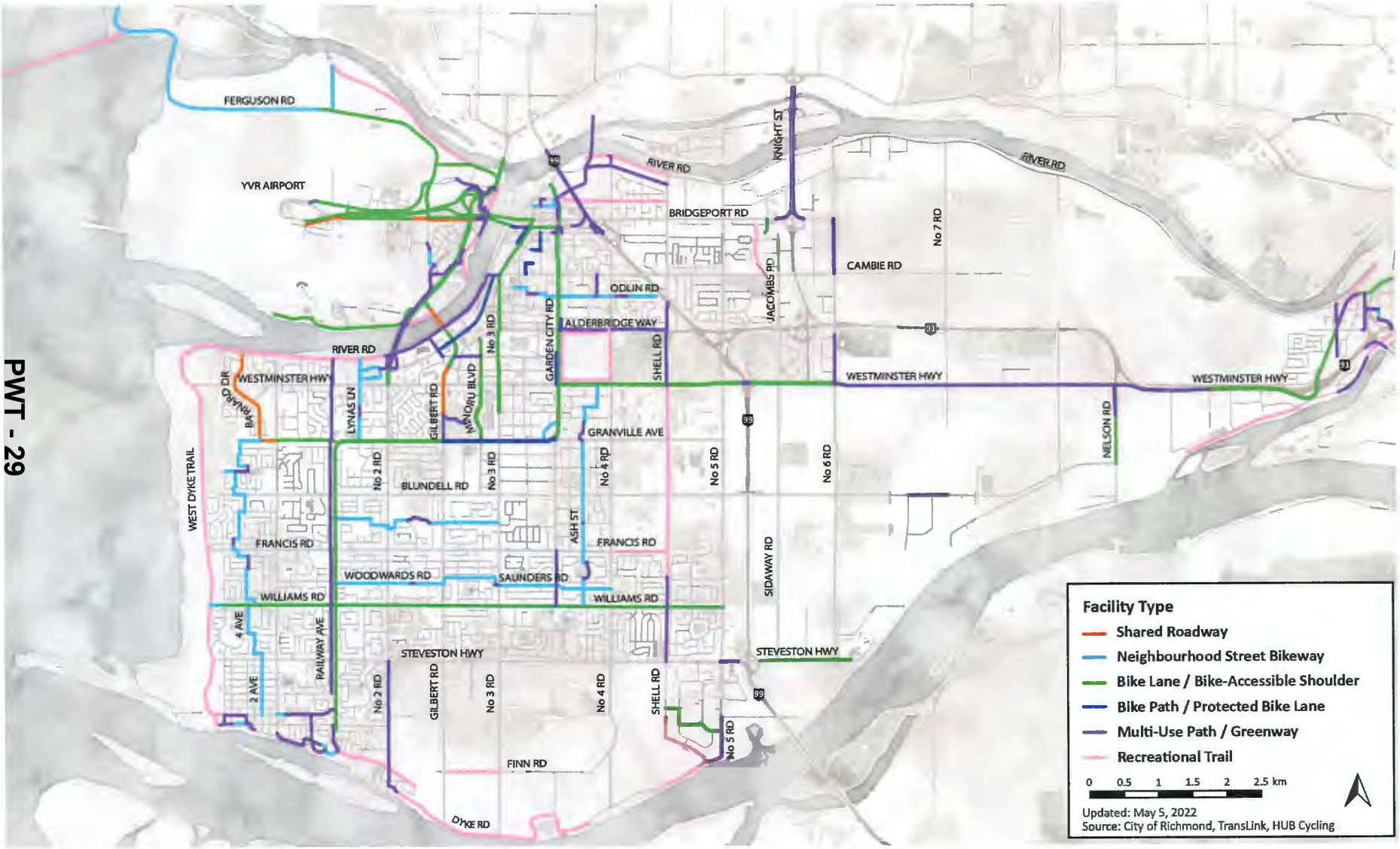


Table 2.1: Summary of Cycling Facilities by Key Characteristics

Facility Type	Alignment / Surface	Exclusive vs Shared	Treatments
Bike Path	Off-Street / Paved	Exclusive	Uni- or bi-directional lanes separated from traffic by boulevard, or through park / not adjacent to roadway.
Protected Bike Lane	On-Street / Paved	Exclusive	Uni- or bidirectional lanes separated by 0.3-1.0m delineator (bollards, curbs, concrete barriers, planter boxes, etc.)
Multi-Use Path / Greenway	Off-Street / Paved	Shared with pedestrians	Uni- or bi-directional lanes for all active uses and recreation.
Recreational Trail	Off-Street / Unpaved	Shared with pedestrians	Bi-directional paths, typically finished with crushed gravel
Bike Lane / Bike-Accessible Shoulder	On-Street / Paved	Exclusive	Uni-directional lane, delineated from traffic with painted line
Neighbourhood Street Bikeway	On-Street / Paved	Shared with traffic on local roads	On-street sharrow markings with directional signage on roadway and street signs
Shared Roadway	On-Street / Paved	Shared with traffic on major roads	On-street sharrow markings with shared roadway signage

As the cycling network develops, balancing the needs for enhanced safety with an expanded network will continue to require a combination of facility types to accommodate different users and trips of varying purposes through the city.

Figure 2.2: City of Richmond's Existing Cycling Network by Facility Type



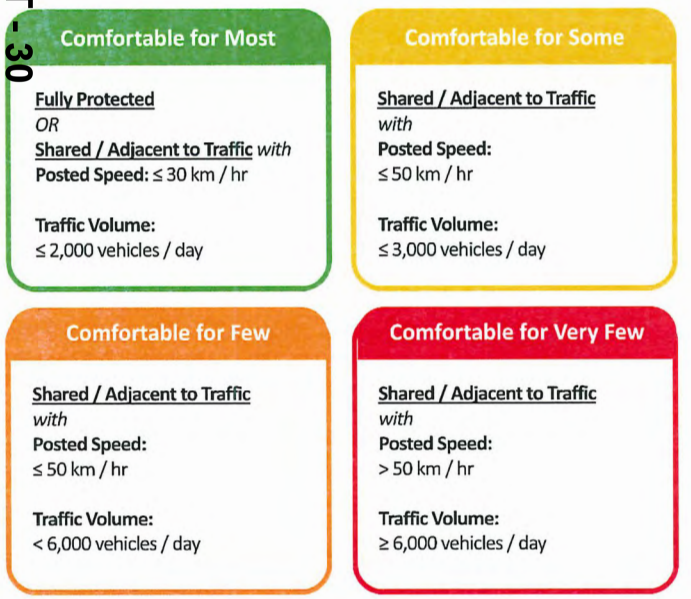
PWT - 29

2.2 Cycling Comfort Level

In consultation with City of Richmond staff, and to allow for consistency with the reported data for Metro Vancouver municipalities, this study has adopted the cycling comfort level criteria used within TransLink/HUB Cycling's 2019 ***Benchmarking the State of Cycling in Metro Vancouver*** report. A detailed list of the criteria for cycling comfort by facility type is provided in Appendix C.

Generally, the level of comfort – or conversely, the level of stress – of a given cycling facility depends on its specific design configuration, characteristics of the adjacent traffic (i.e., volume and speed) and user mix. Typically, cyclists are most comfortable when physically separated from other modes, and stress is most significantly impacted by exposure to motor vehicle traffic (see Figure 2.3). Additionally, comfort levels tend to decrease as both traffic speeds and volumes increase.

Figure 2.3: Cycling Comfort Level Criteria



Inherent design features of different facility types lend themselves towards lower or higher levels of comfort. Thus, while Figure 2.4 shows that over 50% of the existing cycling network in Richmond can be classified as 'comfortable for most,' the breakdown of comfort level by facility type in Figure 2.5 highlights that this is primarily accounted for by off-street Recreational Trails and Multi-Use Paths/Greenways.

Figure 2.4: Cycling Comfort Level – Existing Cycling Network

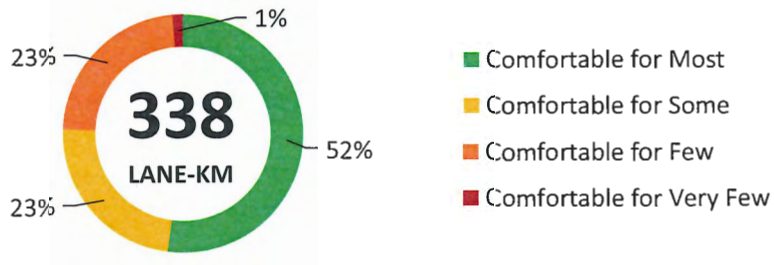
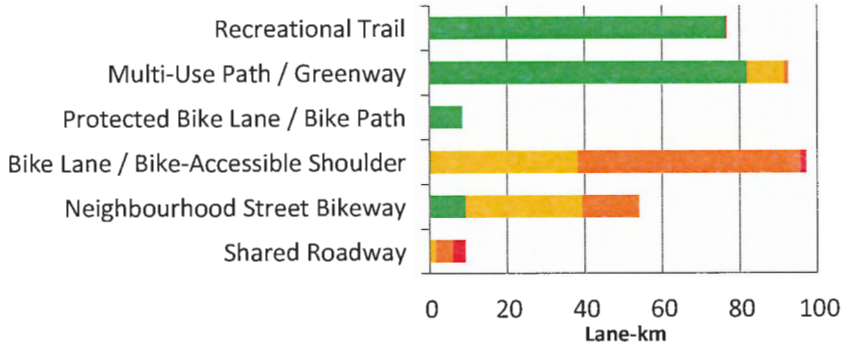


Figure 2.5: Cyclist Comfort Level by Facility Type



The majority of remaining facilities are considered 'comfortable for some' (23%) or 'comfortable for few' (23%). This mainly reflects the shortcomings of conventional bike lanes/bike-accessible shoulders, which may not be viewed as a viable option by many potential users, particularly inexperienced cyclists, youth and older adults.

Importantly, facility types are not evenly distributed across the network and may serve different user groups or trip purposes. This is particularly true of perimeter Recreational Trails like the Dyke Trails, which offer limited utility for general purpose trips or commuting.

2.3 Cycling Ridership

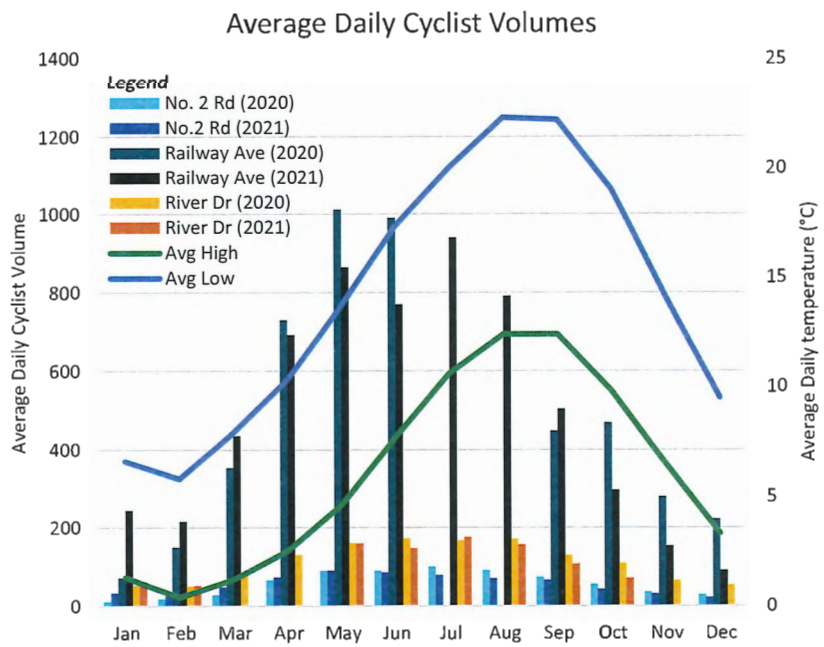
Installed in late 2019, bike counters on the River Drive multi-use path (MUP) west of No. 4 Road, Railway Greenway MUP at Maple Road, and No. 2 Road MUP south of Steveston Highway provide initial insight into the daily trends and seasonal usage patterns of cyclists at different locations. Figure 2.6 shows the average daily count of cyclists at the City's three bike counter locations for 2020 and 2021 alongside average historical precipitation and temperature data for Richmond.

While the relative cycling rates vary greatly by location (approx. 5-10 times as many average daily cyclists on the Railway Greenway in March to June 2020), all three locations similarly reflect a seasonal pattern of increased cycling with warmer temperatures and reduced rainfall during the summer months.

PWT - 31

Third-party data obtained from the app-based fitness tracking service *Strava* affirms the findings of the bike counter data, with a focus on longer distance recreational cycling patterns. Strava's historical trip data supports anecdotal evidence that Richmond remains a popular destination for recreational cyclists, indicating that in a typical (non-pandemic) year, around one in seven active Strava users cycling in Richmond are visitors from other communities. Comparing historical data also indicates a general increase in local recreation during the summer months of the pandemic for 2020 and 2021 by users of the Strava platform in Richmond.

Figure 2.6: Average Monthly Cyclist Volumes and Climate Data (Jan 2020 – Dec 2021)



Overall, these initial findings highlight the importance of establishing a reliable dataset to monitor cycling activity in the city. Despite Strava's limitations as an opt-in platform with only a subset of cycling trips, it provides a fine-grained level of cycling data. Identified trip patterns can better inform development of the future network and investment prioritization.

Continued monitoring of bike counter data as well as expanded installation at other strategic locations in the future will help to better understand cycling patterns as the network evolves. Such an expansion will also enable a decreased reliance on third-party data, which may not continue to be reliable in the long-term and which represents only a subset of cyclists.

3 Priority Network Evaluation

3.1 Introduction

Figure 3.1 presents the set of major and minor routes that were considered during the network evaluation, mainly drawing from the OCP and CCAP. While the OCP and CCAP together present a roadmap for the ultimate cycling network, implementing this network requires a phased delivery approach that reflects the relative priorities of different projects. When making these decisions, an evaluation of the potential of different routes is informative for identifying priorities and planning interim network phases.

Hence, this project carried out a two-step evaluation process: first assessing the wider route-level benefits and then assessing the segment-by-segment prospects of potential cycling investments. In this way, routes that were outside the scope or 15-year timeline of this plan (e.g., cycling facilities on River Road east of No. 6 Road, which will be considered as part of the Dike Master Plan, or a future pedestrian- and cyclist-only crossing over the Middle Arm) could be excluded before assessing the opportunities and challenges of network improvements in a more targeted way. The evaluation was developed around several key themes identified during Phase 1 engagement.

PWT - 32

3.1.1 Key Themes

Based on public and stakeholder feedback during Phase 1 engagement, several key themes emerged that could be codified into the evaluation of potential projects:

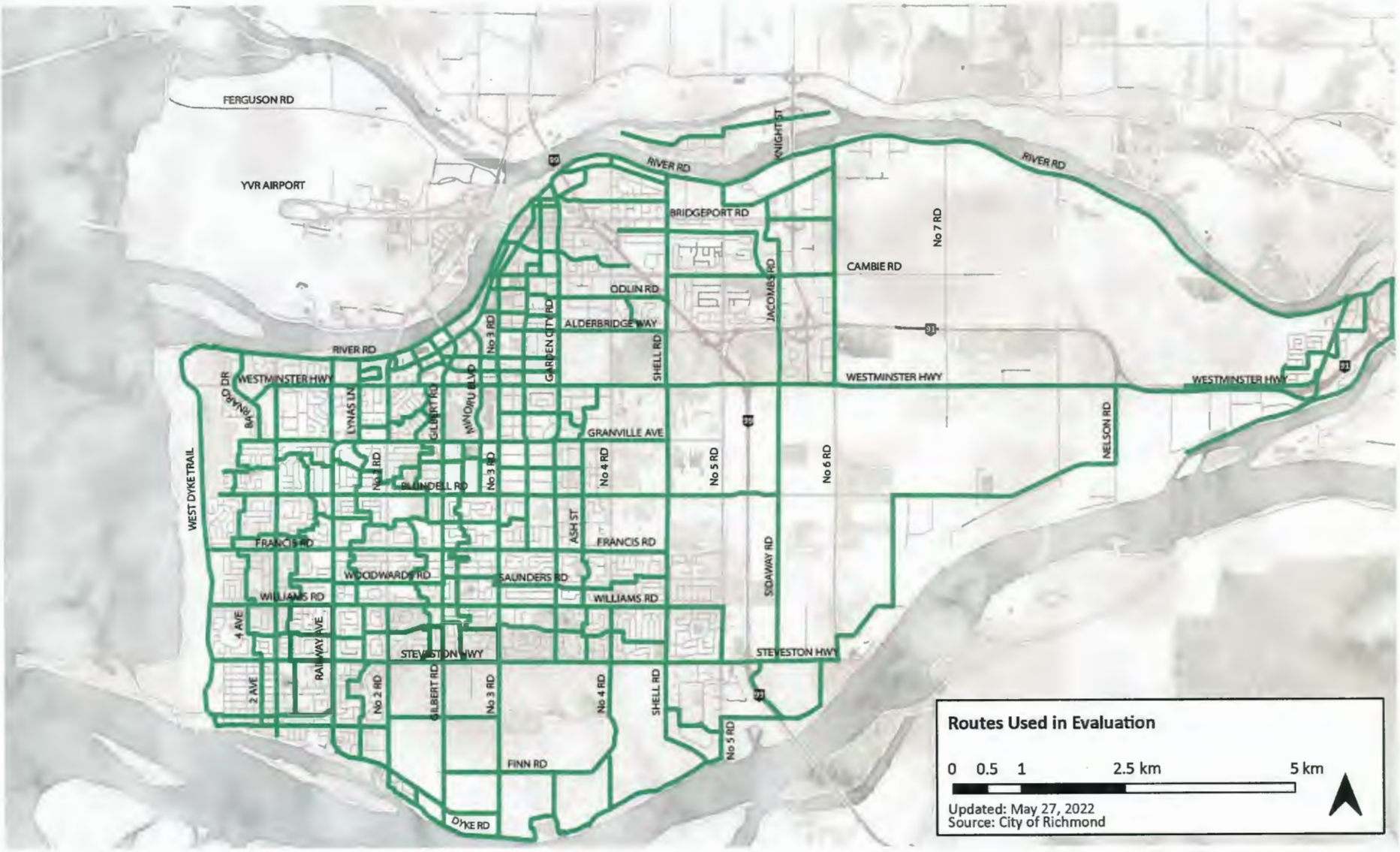
- **Community Support** – Emphasizing priority projects and corridors identified during public engagement
- **Connectivity** – Establishing wider cycling connections to important local and regional areas as well as the existing cycling network
- **Feasibility** – Costs and constraints, impacts on other modes
- **Network Gaps** – Completing missed connections in the existing major cycling network and improving wayfinding
- **Safety** – Improving cycling comfort and serving all ages and abilities
- **Social Equity** – Targeting improvements in areas with high proportions of equity-deserving groups to improve conditions on the major streets these cyclists are likely already using
- **Utility and Convenience** – Improving access to key cycling destinations, including activity centres, transit hubs, schools, employment centres, population centres, and parks

3.1.2 Methodology

Not all the themes identified could be easily operationalized into practical evaluation criteria. For example, each cycling network improvement that completed a network gap, expanded the network by adding a new facility, or added a layer of protection to an existing route or intersection could achieve greater safety for cyclists. Hence, safety and comfort were combined in an all-encompassing objective for developing the cycling network as outlined in section 4.2.1.

Likewise, the themes of feasibility and network gaps were not considered in the first step of the evaluation, which was used to exclude lower priority routes and validate preliminary high-scoring routes identified during Phase 2 engagement. Instead, for those routes shortlisted through the initial route level evaluation, these considerations were reviewed at the segment level where the relative impacts of segments with existing right of way constraints or interrupted facilities could be more reliably assessed. Table 3.1 and Table 3.2 present the evaluation criteria used in each step of the evaluation process.

Figure 3.1: Routes Included in the Route Level Evaluation



PWT - 33

Table 3.1: Route Level Evaluation Criteria

Objective	Evaluation Criteria	Relative Scoring
Community Support	Priority route from Phase 1 engagement or provides a continuous corridor, including east-west neighbourhood bikeways	High/Medium/ Low
Connectivity	Regional – is a Major Bike Route (TransLink), Regional Greenway (Metro Vancouver), or entry point for adjacent municipalities	Yes/No
	Directly connects between several routes in the existing cycling network or provides a new east-west or north-south corridor	Yes/No
	Provides a direct connection to at least one neighbourhood centre in the OCP	Yes/No
	Provides a direct connection between East Richmond and the wider cycling network	Yes/No
Social Equity	High percentage of households spending 30% or more of income on housing	High/Medium/ Low
	High percentage of low-income households based on Statistics Canada low income measure (LIM) thresholds	High/Medium/ Low
	High percentage of population identifying as Indigenous	High/Medium/ Low
Utility / Convenience	Improves access to activity centres, transit hubs and schools within a 200m radius	High/Medium/ Low
	Provides direct access into and within employment centres and areas of high population density	High/Medium/ Low

Table 3.2: Segment Level Evaluation Criteria

Objective	Evaluation Criteria	Relative Scoring
Community Support	Priority route from Phase 2 engagement	High/Medium/ Low
Connectivity	Creates or extends an east-west or north-south corridor	Yes/No
Feasibility	Entire segment is within municipal jurisdiction	Yes/No
	Overlaps with planned projects in the current 5-year capital plan	Yes/No
	Extent and likelihood of requiring further right of way expansion to add/improve cycling facility	High/Medium/ Low
Network Gaps	Completes a gap in the existing cycling network or upgrades an existing shared road facility	Yes/No
Safety	Improves cycling comfort by adding new cycling facility or adding separation to an existing facility.	Yes/No
Social Equity	High percentage of households spending 30% or more of income on housing	High/Medium/ Low
	High percentage of low-income households based on Statistics Canada low income measure (LIM) thresholds	High/Medium/ Low
	High percentage of population identifying as Indigenous	High/Medium/ Low
Utility / Convenience	Improves access to activity centres, transit hubs, schools, and parks within a 200m radius	High/Medium/ Low
	Intersects with the City Centre	Yes/No

Evaluation criteria were assessed using spatial analysis tools in QGIS and visual inspection. The final score for both the route level and segment level evaluations reflects the average scores of each of the objectives. In other words, the average score among all criteria within each objective was taken before equally weighting the combined results for each objective.

Two measures were developed from 2016 Canadian Census data (results for the 2020 census were not available at the time of analysis): population densities and social equity. In addition, employment centres were derived from relevant land uses in the OCP. Routes overlapping with areas of increased employment uses and population densities were evaluated as providing higher utility and convenience. To assess social equity, a three-criteria average level of disadvantage was developed that targeted key components of social equity critical to the Greater Vancouver context. The Core Housing Need measure was also assessed but did not considerably alter the results of the social equity analysis.

To carry out the route level evaluation, major and minor routes from the OCP and the CCAP were grouped into continuous segments, generating 61 discrete routes for analysis. During the segment level evaluation, the remaining routes were further broken down into sections of approximately 800 metres in length, in alignment with the distance between arterial roads and key intersections. The continuous shading in Figure 3.2 compared to the intermittent shading in Figure 3.3 provides an indication of the different scales of each stage of the analysis.

PWT 35

3.2 Results

3.2.1 Route Level Evaluation

Results from the social equity evaluation showed that equity deserving populations are more likely to be living near and within the City Centre. Hence there is a strong correlation between prioritizing routes for equity seeking groups and prioritizing routes within the urban core. Routes adjacent to and within the City Centre similarly scored high on utility and convenience, given the density of population, employment, and destinations in the area. Top routes for community support reflected the results from Phase 1 engagement (detailed in Appendix A), while top routes for connectivity included Steveston Highway, Westminster Highway, Blundell Road, No. 3 Road, Garden City Road, Shell Road, and Cambie Road (between Shell Road and No. 6 Road).

Aggregate results from the route level evaluation are shown in Figure 3.2. In general, scores were highest in Central Richmond and the City Centre along major corridors, decreasing toward the edges of residential development. In sharing these results during Phase 2 engagement (see Appendix B), we also heard priorities to extend routes on Gilbert Road, Shell Road (between Alderbridge Way and River Road), River Road (east of Shell Road), and No. 3 Road (in the City Centre).

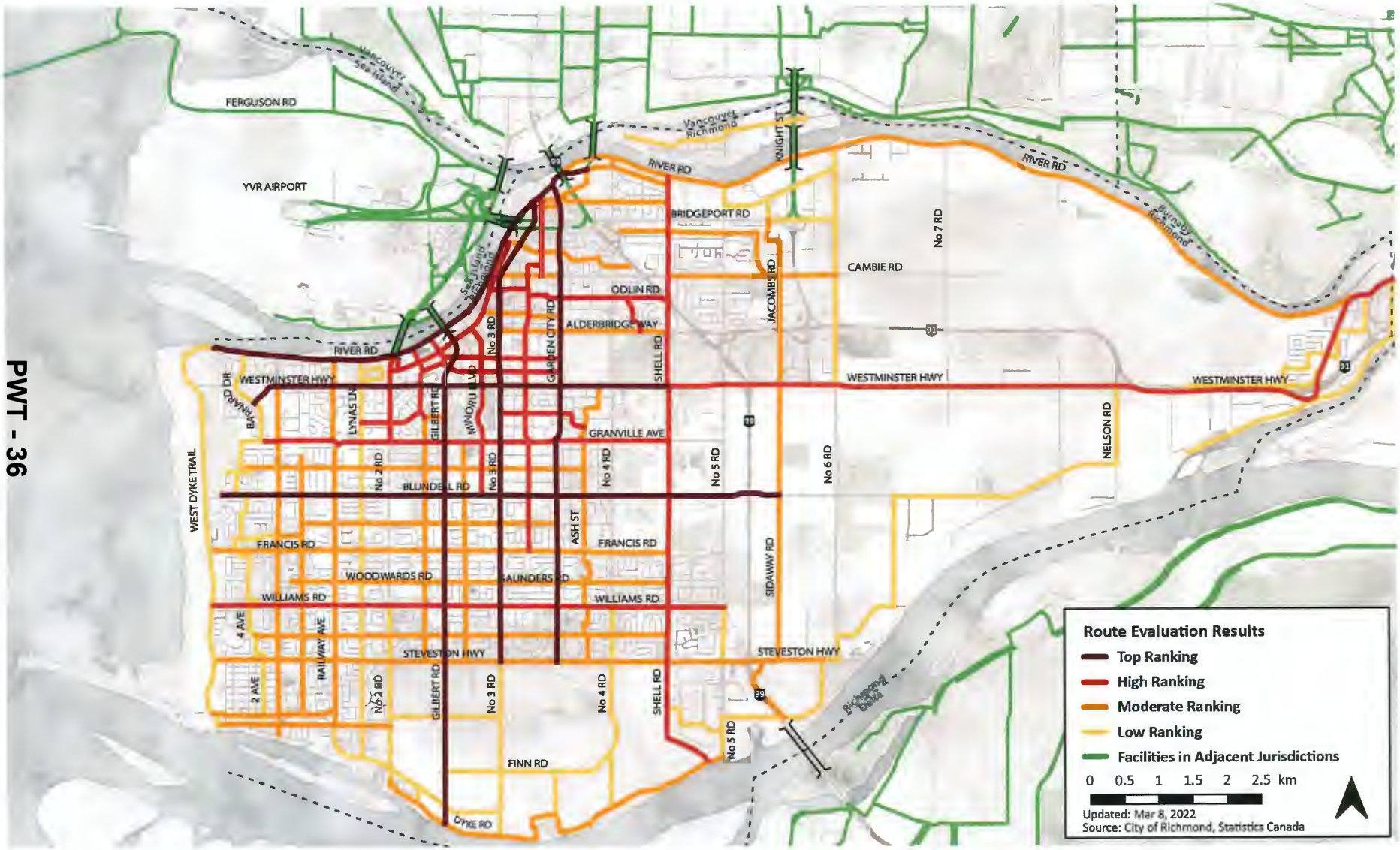
3.2.2 Segment Level Evaluation

Building on the results of the first evaluation, the segment level evaluation provides a finer grain investigation of the evaluation criteria for routes that could potentially serve as major corridors within the interim cycling network proposed by this plan. In this way, it is possible to identify segments with high potential as well as look at parallel corridors in closer detail. For example, the corridors of No. 2 Road, Gilbert Road and No. 3 Road all emerged as top ranking during the route level evaluation but serve a similar area of the city.

Figure 3.3 depicts the results of the segment level evaluation and shows the following segments as receiving the highest relative scores:

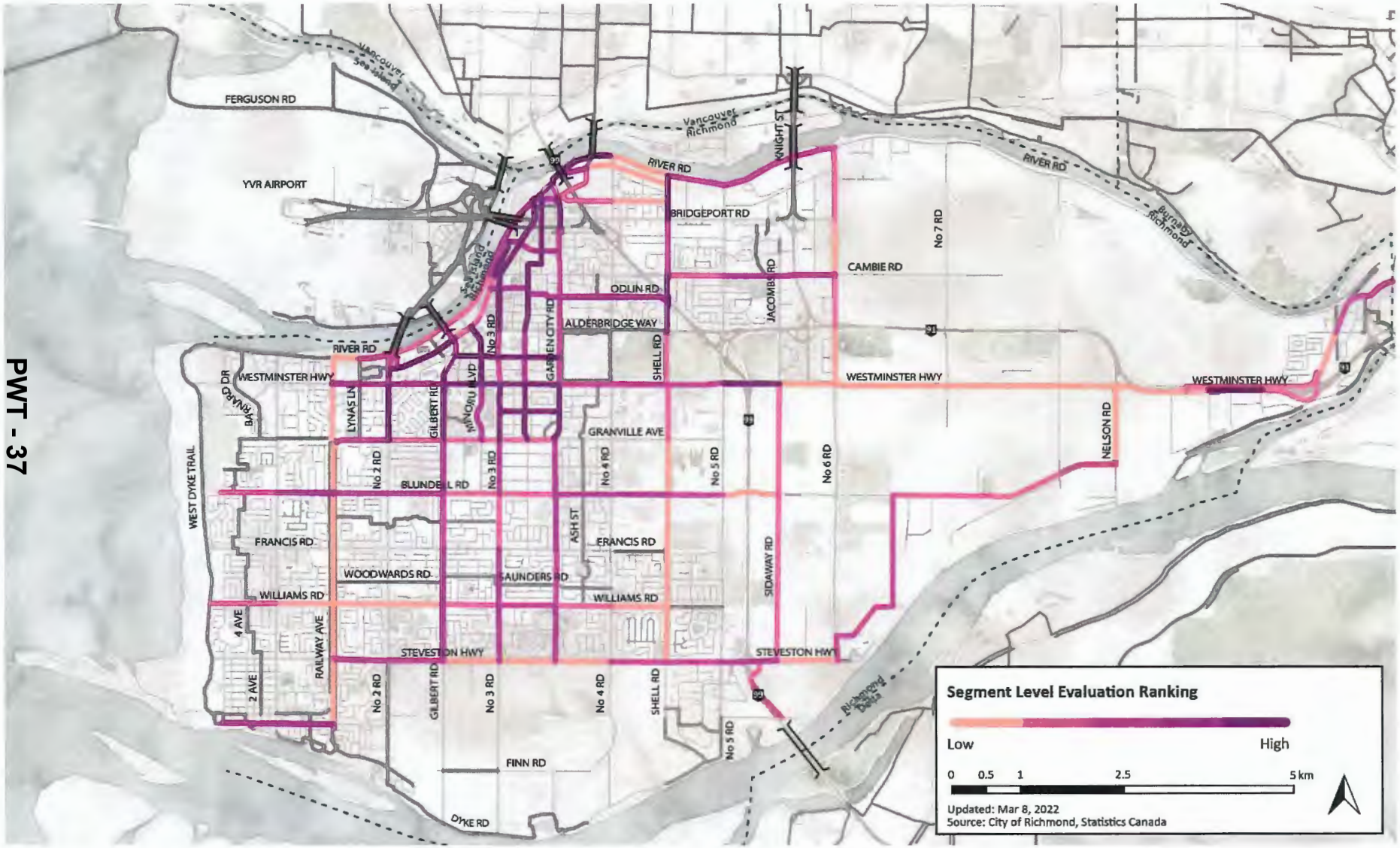
- Routes in the City Centre
- Southward extension of No.2 Road facilities to Granville Avenue
- Northward extension of paved Shell Road facilities to River Road
- Replacing shared road segments on Garden City Road
- Replacing shared road segments on Westminster Highway

Figure 3.2: Route Level Evaluation Results



PWT - 36

Figure 3.3: Segment Level Evaluation Results



4 Implementation Strategy

4.1 Introduction

The results of engagement and the priority network evaluation provided considerable insight to projects with high potential benefits. To move forward with prioritization, a series of planning principles were distilled from feedback and trends, informing our approach to identifying short-, medium-, and long-term investments. This approach and other key considerations are summarized below, before outlining projects to be undertaken in each stage of the implementation. For detailed project rationale, please refer to Appendix E. A map of the implementation plan and future major routes from the OCP is provided in Appendix F.

4.2 Approach

PWT - 38

4.2.1 Safety and Comfort

While perceptions of cycling comfort and stress cannot be tied to a single variable, they are most significantly impacted by the level of exposure to motor vehicle traffic. The needs and comfort levels are also not unique across different cycling groups (e.g., road/touring cyclists, commuter cyclists, recreational cyclists). Despite some differences, an approach that is geared toward improving safety and viability of the network for all ages and abilities (AAA) by prioritizing the separation of cyclists from traffic whenever feasible presents the greatest opportunity to increase cycling use in the City of Richmond.

Cycling comfort and safety were also central themes of feedback received during public and stakeholder engagement. While select safety improvements are mentioned within this plan, many more decisions pertaining to safety and comfort will need to be made during the site/corridor design stage. Moving forward, the following principles will be central for progressing safety and comfort objectives in later decision-making at the implementation stage:

- **Design for the AAA user, prioritizing separation from traffic whenever feasible.** Achieving mode share goals and broadening the cycling user base is strongly dependent on designing facilities that are comfortable for most. While some destinations may only be accessible by highly constrained corridors and neighbourhood street bikeways may also provide a suitable alternative route in some instances, a progression toward protected and separated facilities on major routes should be the default assumption.
- **Future proof facilities by considering the spatial requirements of both emerging and increasing walking and rolling needs**. For example, bicycle facilities built to minimum standards do not well accommodate cargo bicycles while electric bicycles may increase the prevalence of faster moving cyclists. If it is possible that multi-use paths may reach minimum thresholds for separation of cyclists and pedestrians, there should be sufficient space to allow for this separation in the future.
- **Address intersection conflicts**, recognizing that the intersection and the mid-block conditions both contribute to cycling safety and comfort. Uncomfortable intersections may further present major barriers to overall cycling network connectivity. Both design (e.g., concrete barricades) and operational (e.g., signal phasing) improvements should be considered and are detailed in Appendix G.
- **Strive to provide a consistent facility type along a corridor.** However, facilities are often built out over time in sections and design best practices and local policy may evolve. Where transitions between facility types are necessary, locate them where they are safe, clear to all users, and offer a seamless connection (e.g., following a no-parking zone or at a low-traffic intersection).

4.2.2 Major Routes

As previously mentioned in Chapter 3, existing and future major cycling routes were evaluated based on the themes of *feasibility, connectivity, utility and convenience, social equity, community support and completing network gaps*. With most routes presenting new connections and real improvements to the network but with finite resources, this implementation plan was further informed by a few key objectives in recommending priorities for major network expansion:

- **An emphasis on transecting and multi-purpose routes**. In many instances, routes may play an important role temporally for commuter cyclists and still have the potential to service recreational needs in off peak hours. Shell Road is one strong example; conversely, improvements to a rural perimeter route such as the South Dyke Trail do not deliver these dual benefits to the same extent.
- **A concern for ensuring basic levels of local and regional connectivity**. This includes connections to more distant communities within Richmond such as Hamilton, Ironwood, Steveston, and Burkeville, as well as surrounding municipalities. For example, connections to the No. 2 Road Bridge, Canada Line Bridge and Massey Tunnel as well as crossing Highway 99 are included.
- **An awareness of the current cycling capital plan and ongoing cycling improvements.** Short-term recommendations are sensitive to align with and not deprive resources from projects that the City is already moving forward.
- **A core network, locating most residents within 800 metres of a major cycling route.** On a local scale, routes do connect better or worse to different destinations. At a network level, distributing coverage is an important directive for this planning horizon. Hence, while each of No. 2 Road, Gilbert Road and No. 3 Road were identified as key north-south routes through engagement, Gilbert Road was preferred in alignment with the overall distribution of routes in the network.
- **A finer grain network in the City Centre.** Separated cycling facilities are particularly important within Urban Centres, with greater access to a density of jobs and destinations and increased prevalence of high-traffic routes. This also aligns with TransLink's recent Regional Transportation Strategy: Transport 2050, which supports urgent action to put separated cycling facilities within the Urban Centres. It also responds to our findings of a higher prevalence of equity deserving groups in the City Centre (see section 3.2).

4.2.3 Minor Routes

In select cases, minor routes (generally neighbourhood street bikeways on local roads) have been prioritized within this plan. These routes align with existing short-term planning decisions (i.e., 5-year cycling capital plan) and provide a nearby alternative route to long-term priorities identified for the major bike network. In most cases, continued expansion of neighbourhood street bikeways is generally low-cost, beginning with paint and wayfinding signage, and should progress.

In some cases, more costly improvements to neighbourhood bikeways may be required. One example is where local streets do not directly connect with each other across an arterial road. In such cases, intersections for neighbourhood street bikeways often need to be 'off-set,' with cyclists travelling along a small section of the arterial before crossing.

In the Phase 2 engagement survey, participants were asked to rank their most preferred improvements to increase comfort levels when using neighbourhood bikeways. The most preferred choice was "safer crossings at major streets (e.g., traffic signals, green paint, refuge islands)." In alignment with this priority and overall cost considerations, the implementation plan for neighbourhood bikeways has focused on intersection improvements at major roads, specifically **those intersections with average hourly traffic volumes in any travel direction exceeding 500 vehicles**.

Going forward, to improve cyclist visibility and wayfinding, a wider, low-cost program of upgrades to neighbourhood bikeway intersections with lower traffic volumes should also be considered.

4.2.4 Intersection Prioritization

In addition to neighbourhood bikeway intersections, intersections of other cycling facility types have also been prioritized. With so many candidate intersections and ongoing improvements to the cycling network possibly altering cyclist travel behaviour, a forward-looking set of selection criteria was developed. As mentioned, neighbourhood street bikeways were selected based on higher traffic volumes. Otherwise, only intersections where two cycling facilities (e.g., one east-west and one north-south route) intersected were considered for improvements within this plan. The rationale for this decision is that these intersections are more likely to have a higher number of cyclist turning movements, thereby increasing the potential for interactions with motorists. From this short-list, only intersections that met one or more of the following criteria were included:

- Intersections where **5 or more incidents involving cyclists** were reported to ICBC between 2014 and 2019
- Intersections with average hourly traffic **volumes exceeding 1,500 vehicles** in any travel direction
- Intersections where a **new cycling facility** is being connected to an **existing protected bike path**

Generally, intersection improvements have been envisioned to occur **alongside completion of a new route**. However, as many neighbourhood street bikeway intersections are located on existing routes or at major arterials with no cycling facility, the following additional criteria were applied to include the following cases:

- Short-term completion of unsignalized intersections at arterial roads
- Medium-term completion of intersections at arterial roads with an existing pedestrian priority crossing

Figure 4.1: Intersection of the Railway Greenway and Williams Road

4.3 Key Considerations for Implementation

4.3.1 Piloting Improvements

Constraints and trade-offs are likely to be faced in some corridors during the project implementation stage. For example, on-street parking spaces or turning lanes may need to be removed to fit cycling facilities within the existing right of way. When faced with these decisions, temporary installations present a great opportunity to collect data and identify good routes and potential design improvements.

Rapid implementation facilities are also a cost effective and quick means for providing separation (e.g., flexible bollards) to existing routes. Candidate routes to initially target in the existing cycling network include **Granville Avenue, Garden City Road, Westminster Highway, and Williams Road**.

4.3.2 Phasing and Sequencing

Projects are generally grouped as being short- (0-5 years), medium- (6-10 years), or long-term (10-15 years). Results from public engagement provide further insight to prioritize projects on a project by project or annual basis.

Fixing shared road segments was the most upvoted idea on the Let's Talk Richmond Ideas Board platform during Phase 1 engagement, with "fix bicycle lanes that suddenly turn into regular roads" receiving 30 votes. While missed connections and shared road segments generally exist due to corridor constraints, these improvements are often viewed as a top priority.

Longer length facilities will likely also be delivered in segments, presenting opportunities to prioritize individual portions of the route before others. In these instances, building out from the existing network is preferred to maximize network connectivity and minimize gaps. In addition, survey participants were also asked during Phase 2 engagement to rank destinations from highest to lowest priority when completing routes in multiple segments. Canada Line stations and schools were the top choices and would be good locations to target with initial improvements.

4.3.3 Stewardship

As the network expands, so too do considerations for maintenance and asset management once facilities are implemented. One key consideration at the site level is the provision of new bike counters to expand understandings of cycling behaviour and ridership and inform future improvements.

4.3.4 Street Expansion versus Reallocation

At the design and segment level, cycling projects face differing constraints and vary in the magnitude of street redesign and rebuild that may be required. Several proposed projects are planned to be completed as part of an existing program (e.g., the City's current 5-year capital plans for cycling facilities) or new building development (e.g., Brown Road Extension), while other corridors are less fixed in their design or approach.

As this plan is not prescriptive regarding the segment level design of projects, some decisions with important cost implications will still need to be determined at the implementation stage. Namely, whether to build new cycling infrastructure through expansion of the street right-of-way or through street reallocation (i.e., removal of parking or motor vehicle lanes).

Street reallocation is one way to extend limited cycling infrastructure funding and enable timely completion of new facilities. To assess the relative costs of separated cycling facilities installed within the existing right of way and those installed by expanding the right-of-way, key unit costs were reviewed for comparable projects. From this exercise, estimated cost savings of more than $20 million could be achieved for this plan by pursuing the reallocation of parking and motor vehicle lanes for cycling investments. This estimate is based on an initial inspection which found that 10 major routes representing nearly 40 lane kilometres of proposed projects are candidates for street reallocation. This is a conservative estimate as it does not include the costs of property acquisition, which further increases the costs of expanding the street right-of-way.

4.4 Priorities by Stage

Figure 4.2: Legend for Interpreting Implementation Phases

Legend

Priority

1	First priority for completion during phase
2	Second priority for completion during phase
D	Dependent on development or other agency

Cost

L	Less than $250,000
M	Between $250,000 and $1 Million
H	Between $1 Million and $3 Million
VH	Greater than $3 Million
E	Funded by existing program or development
SC	Special case (not costed)

Note: Costs represent very rough estimates based on comparable projects and have not been informed by site specific concept designs.

The following pages details the three phases of the implementation plan. To interpret the tables, a legend is provided in Figure 4.2. Note that the **costing ranges provided are only indicative**, having been adopted from recent, comparable projects. Site specific costs, such as property acquisition, utility relocation and environmental management costs have not been considered. Initial design work is necessary to increase the accuracy of such estimates.

Short-Term (2022-2026):

- Development of core protected cycling network in City Centre
- Early completion of parallel neighbourhood bikeways as alternatives to long-term routes on Gilbert Road and Blundell Road
- Completion of Shell Road and Steveston Highway in preparation for medium-term and long-term connections

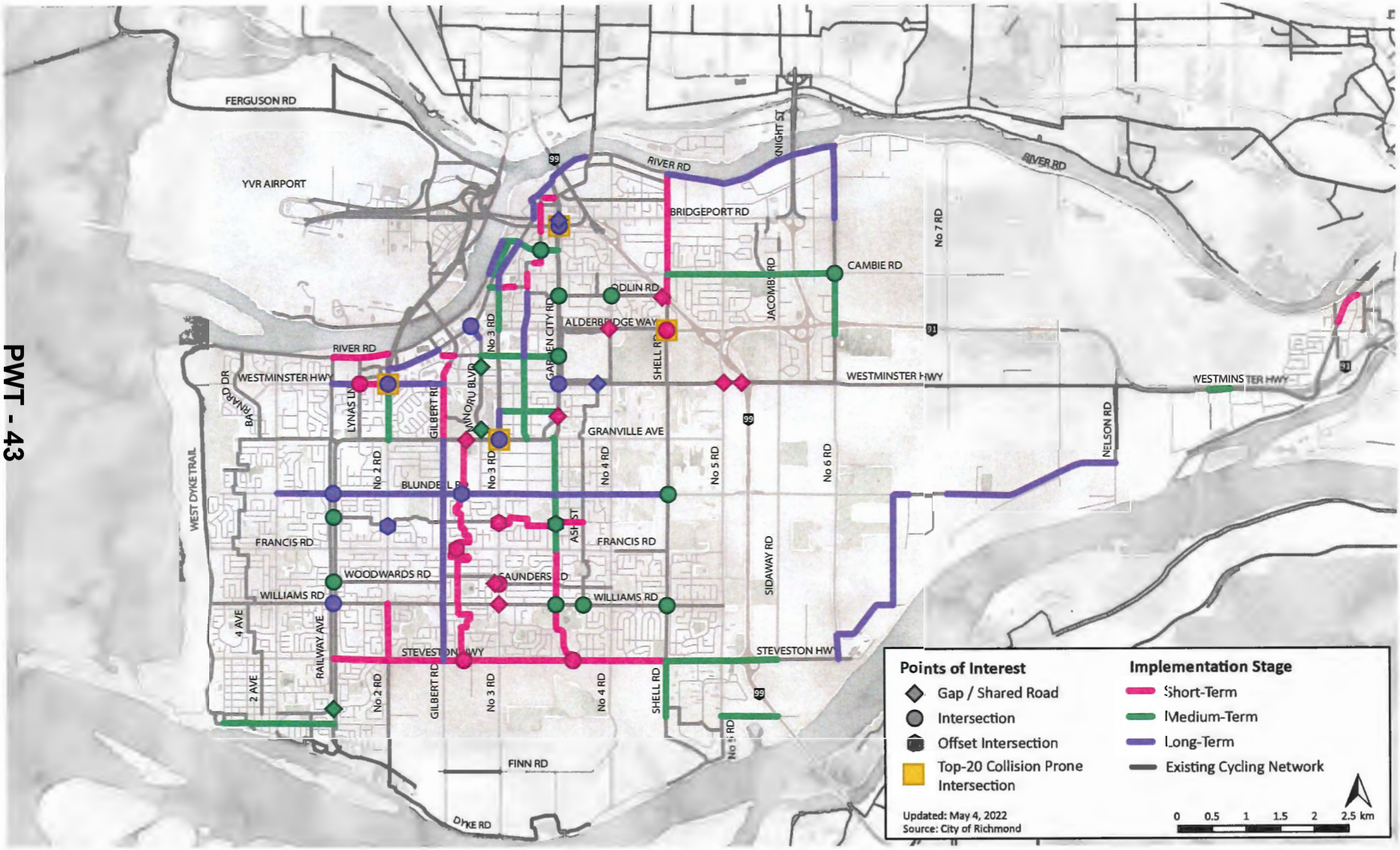
Medium-Term (2027-2031):

- Connections to Burkeville, Steveston, Ironwood, East Cambie, and the future Fraser River Crossing
- Completion of central loop of directional bike lanes on Garden City Road, Williams Road, Railway Avenue, and Granville Avenue
- Increased connectivity and protection in the City Centre
- Projects dependent on redevelopment or collaboration with other agencies that are likely to occur at this stage

Long-Term (2032-2036):

- Connections to Hamilton and Southeast Richmond
- Completion of new east-west and north-south corridors of Blundell Road and Gilbert Road respectively
- Further connectivity and protection improvements within the City Centre
- Projects dependent on redevelopment or collaboration with other agencies that are likely to occur at this stage

Figure 4.3: Map of Implementation Plan – Short, Medium and Long-Term Priorities



PWT - 43

4.5 Short-Term (2022-2026)

Table 4.1: Short-Term Gap / Shared Road and Intersection Improvements

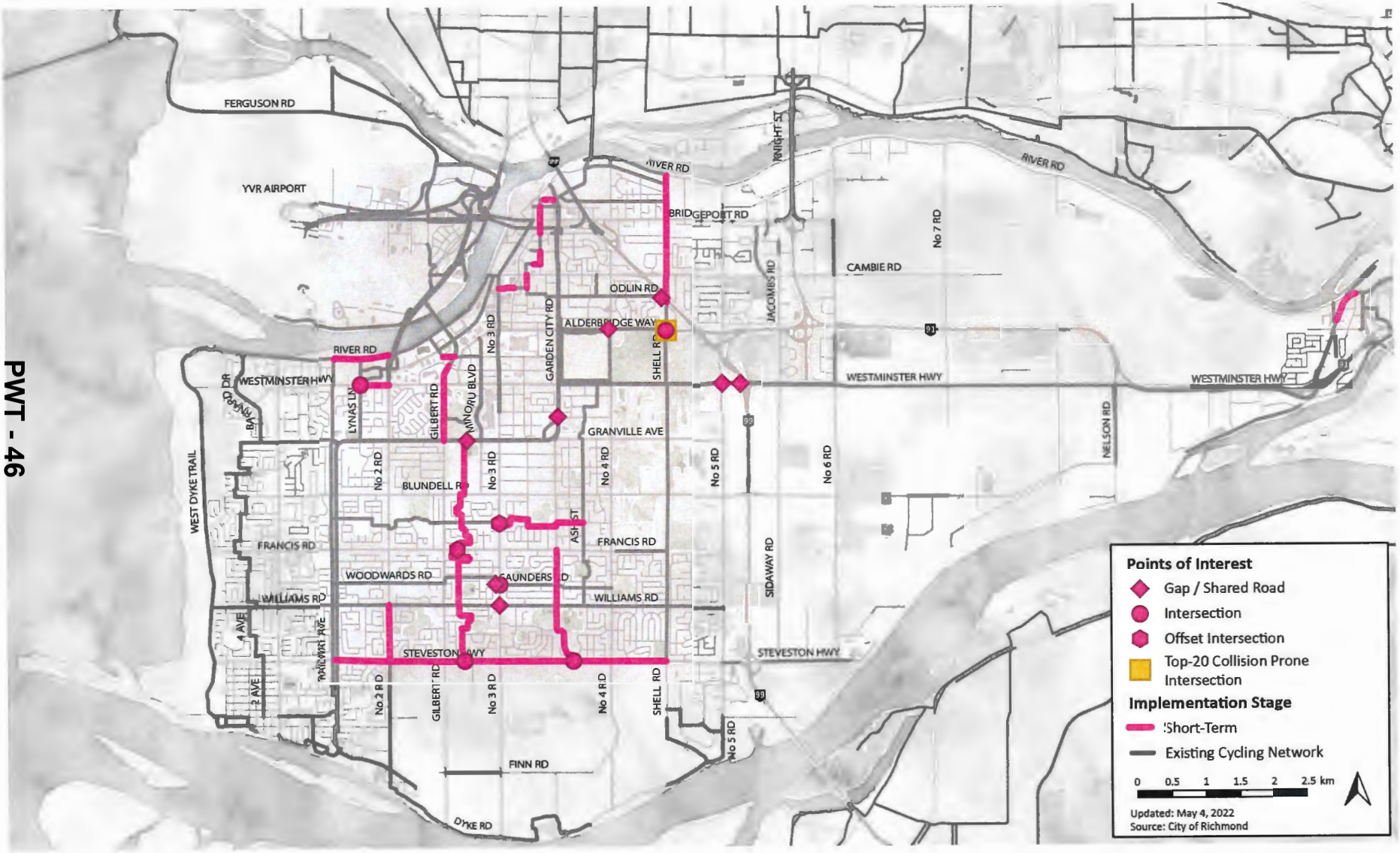
Point ID	Location Name	Description	Priority	Cost
SG-ALD	Alderbridge Way west of No. 4 Road	Complete gap in multi-use path	1	L
SG-WH-C	Westminster Hwy and No. 5 Road	Separate eastbound bike lane from the right turn lane approaching the intersection	1	E
SG-GCR	Garden City Road (Cook Road to Citation Drive)	Add green paint treatment for cyclists crossing right turn lane for Citation Drive	1	L
SG-WH-D	Westminster Hwy at SB Hwy 99 On-Ramp	Add green paint treatment for cyclists crossing on-ramp (dependent on MoTI)	D	SC
SG-SAU	Saunders Road and No. 3 Road	Widen path to increase visibility of cyclists emerging from off-street pathway on Woodwards-Saunders Neighbourhood Bikeway	2	E
SG-OD	Odlin Road and Shell Road	Provide new cycling connection between cul-de-sac and Shell Road, creating continuous east-west connection from the Shell Road MUP to the City Centre (dependent on MoTI)	D	SC
SI-ALD	Alderbridge Way and Shell Road	Upgrade busy, wide intersection to connect bi-directional MUP facilities	1	E
SI-LUC	Lucas Road and No. 3 Road	Improvements to off-set intersection (30m spacing) on Crosstown Neighbourhood Bikeway	1	M
SI-WH-A	Lynas Lane and Westminster Hwy	Upgrades to support cyclist turning movements (e.g., bike boxes)	1	M
SI-WIL	Williams Road at No. 3 Road	Separate bike lanes from the right turn lane in both directions approaching the intersection	1	L
SI-MDB-A	Minoru Gate and Granville Avenue	Improvements to wayfinding, the eastbound travel lane, and intersection to connect cyclists from Moffatt Road seeking to travel westbound on Granville Avenue	2	L
SI-MDB-B	Bamberton Drive and Steveston Hwy	New pedestrian and cyclist-controlled intersection to connect on-street facility on Midtown Neighbourhood Bikeway and off-street facility on Steveston Highway	2	M
SI-MDB-C	McCutcheon Place and Schaefer Gate at Francis Road	Improvements to off-set intersection (50m spacing) on Midtown Neighbourhood Bikeway	2	M
SI-GCR	Mortfield Gate and Steveston Hwy	Upgrade existing intersection with cyclist push buttons and green paint	2	M
SI-SAU	Saunders Road and No. 3 Road	Upgrade existing pedestrian crossing to a pedestrian signal with green paint on Woodwards-Saunders Neighbourhood Bikeway	2	M

PWT - 44

Table 4.2: Short-Term Route Improvements

Route ID	Route Name	Description	Priority	Cost
S-SH	Shell Road (Alderbridge Way to River Road)	Extend existing MUP north of Highway 99 to connect to East Cambie and Bridgeport areas. One of the most requested new routes during Phase 1 engagement	1	VH
S-SS	Sexsmith Road and Brown Road (Beckwith Road to Browngate Road)	Frequently identified as a network gap during engagement, these segments offer an alternative route to access Bridgeport Station and the Canada Line Bridge (to Vancouver)	1	E
S-CH	Charles Street (Existing MUP to Van Horne Way)	Improves connections between Sexsmith Road / Brown Road and nearby routes	1	M
S-BG	Browngate Road (Hazelbridge Way to No. 3 Road)	Improves connections between Sexsmith Road / Brown Road and nearby routes	1	E
S-GIL	Gilbert Road (Elmbridge Way to Granville Avenue)	High priority project from engagement replacing existing shared road segment and enhancing connections to Minoru Park, Richmond General Hospital and Samuel Brighouse Elementary	1	H
S-LDR	Lansdowne Road (Pearson Way to Gilbert Road)	Completes network gap, extending connections to the Middle Arm Greenway	1	E
S-LBD	Lucas Road – Bowcock Road – Dayton Avenue	Completes east-west Crosstown Neighbourhood Bikeway between Railway Avenue and the Parkside (Ash Street) Neighbourhood Bikeway)	1	E
S-WH-A	Westminster Hwy (Lynas Lane to No. 2 Road)	Safer connection southbound from the No. 2 Road Bridge to Granville Avenue via Lynas Lane	1	E
S-MDB	Moffatt Road – Deagle Road – Bamberton Drive	Short-term north-south Midtown Neighbourhood Bikeway between City Centre and Steveston Hwy MUP as alternative to Gilbert Road	2	E
S-MAG	River Road (McCallan Road to Middle Arm Greenway)	Extending paved segments of the Middle Arm Greenway westward along the south side of River Road to meet McCallan Road supports a continuous recreational and off-street connection to the Railway Greenway	2	E
S-STH	Steveston Hwy (Railway Avenue to Shell Road)	Direct east-west connection between Ironwood and Steveston, and recreational routes	2	E
S-WH-B	Westminster Hwy (Fraserside Gate to Smith Cres)	Priority upgrade of shared road facilities identified in Phase 1 engagement	2	E
S-GCR	Garden City Road – South Arm Park – Ryan Road (Francis Road to Steveston Hwy)	Complete gaps in the existing MUP south of Francis Road, and begin expansion of Garden City Road route south to connect to Steveston Hwy MUP	2	E
S-No2	No. 2 Road (Williams Road to Steveston Hwy)	New northern extension of No. 2 Road MUP as a key route in the cycling network	2	E

Figure 4.4: Map of Short-Term Priorities



PWT - 46

4.6 Medium-Term (2027-2031)

Table 4.3: Medium-Term Gap / Shared Road and Intersection Improvements

Point ID	Location Name	Description	Priority	Cost
MG-RW	Railway Avenue (Garry Street to Moncton Street)	Extend off-street MUP to address feedback from engagement and cyclist-vehicle collisions at Garry St	1	H
MG-MIN	Minoru Blvd	Upgrades to existing shared road segments to provide separate bike lanes	1	L
MI-GCR	Garden City Road, Bowcock Road and Dayton Avenue	Improvements to off-set intersection (60m spacing on Crosstown Neighbourhood Bikeway	1	M
MI-WIL-A	Williams Road and Garden City Road	Upgrade existing signalized intersections with cyclist push buttons and green paint	1	M
MI-WIL-B	Williams Road and Ash Street	Upgrade existing signalized intersections with cyclist push buttons and green paint	1	M
MI-SH-A	Shell Road and Williams Road	Upgrade for transitions between bi-directional facilities on Williams Road and MUP on Shell Road	1	H
MI-OD-A	Odlin Road and Garden City Road	Add bike boxes and cyclist-activated signals for cyclists making left-turns at this wide intersection on the Odlin Road Neighbourhood Bikeway	2	H
MI-OD-B	Odlin Road and No. 4 Road	Upgrade existing signalized intersections with cyclist push buttons and green paint on Odin Road Neighbourhood Bikeway	2	M
MI-No6	No. 6 Road and Cambie Road	Bring No. 6 Road MUP through intersection and create strong link to future Cambie Road facilities (e.g., space for cyclists to queue outside of travel lane)	2	M
MI-RW-A	Railway Avenue and Woodwards Road	Upgrade existing pedestrian crossings with cyclist push buttons and green paint	2	M
MI-RW-B	Railway Avenue and Colbeck Road	Upgrade existing pedestrian crossings with cyclist push buttons and green paint	2	M
MI-CAP	Sexsmith Road and Capstan Way	Protected intersection to support of safe through and turning movements for cyclists at high-traffic intersection with completion of Capstan Way route	D	E
MI-LDR	Lansdowne Road and Garden City Road	Improve wide, high-traffic intersection with completion of Lansdowne Road route	D	E
MI-SH-B	Shell Road and Blundell Road	Add pedestrian and cyclist-controlled crossing (dependent on coordination with CN Rail)	D	SC

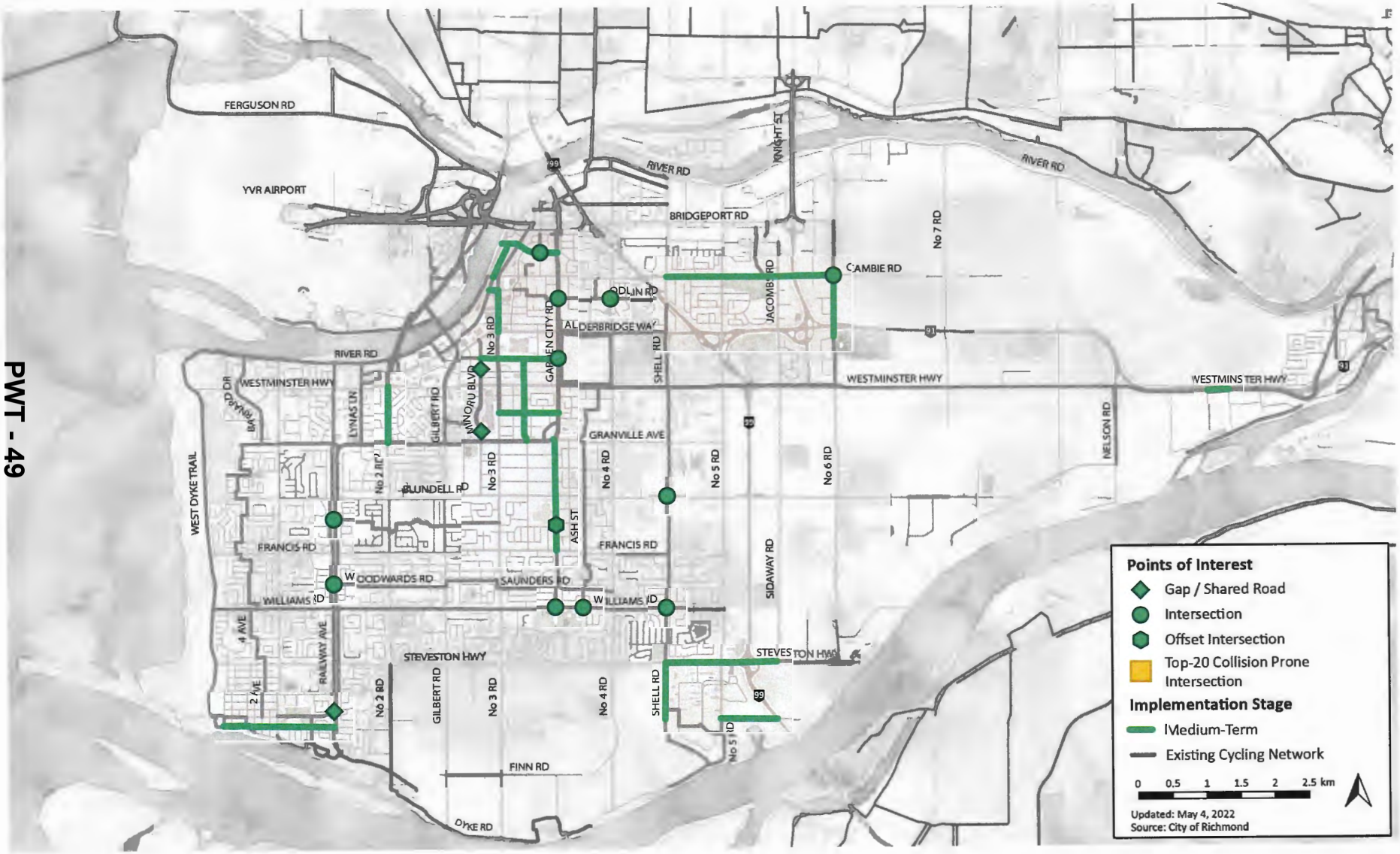
PWT - 47

Table 4.4: Medium-Term Route Improvements

Route ID	Route Name	Description	Priority	Cost
M-GCR	Garden City Road (Granville Avenue to Francis Road)	Completes the final leg of a central loop of bi-directional bike lanes on Garden City Road, Williams Road, Railway Avenue, and Granville Avenue	1	VH
M-No2	No. 2 Road (Westminster Hwy to Granville Avenue)	More direct connection from Granville Avenue to the No. 2 Road Bridge with access to Burkeville, YVR, Iona Beach Regional Park, and Vancouver	1	H
M-WH	Westminster Hwy (McMillan Way to Graybar Road)	Upgrade 300m eastbound segment of shared roadway to improve safety concerns, as heard during engagement	1	M
M-BG	Browngate Road Extension (No. 3 Road to River Pkwy)	Direct connection between existing protected facilities on River Parkway and protected facilities on Sexsmith Road-Brown Road	1	M
M-CAP	Capstan Way (River Road to Garden City Road)	Connections to protected facilities on Sexsmith Road and a future extension of River Parkway, as well as the new Capstan Canada Line Station	D	E
M-No3	No. 3 Road (Browngate Road to Alderbridge Way)	Southbound connection to establish direct north-south link between other parts of the network, including Lansdowne Road, Cook Road and Browngate Road	D	E
M-RPK	River Pkwy Extension (Capstan Way to Cambie Road)	Extension of pedestrian and cycling facilities to connect with Middle Arm Greenway, providing a safer alternative to parallel segments of No. 3 Road	2	H
M-CAM	Cambie Road (Shell Road to No. 6 Road)	Connections to East Cambie and East Richmond, as heard during engagement	2	VH
M-No6	No. 6 Road (Cambie Road to Commerce Pkwy)	Completes network gap, providing a cycling connection across a major highway, with connections to East Cambie and East Richmond	2	H
M-LD	Lansdowne Road (Minoru Blvd to Garden City Road)	Continuous east-west route in City Centre connecting to Richmond Olympic Oval, Lansdowne Canada Line Station and Kwantlen Polytechnic University	D	E
M-CK	Cook Road (No. 3 Road to Garden City Road)	East-west route in City Centre, with connections to Richmond-Brighouse Canada Line Station and William Cook Elementary with future potential for extension to Minoru Park	2	H
M-CO	Cooney Road (Lansdowne Road to Granville Avenue)	North-south route that enhances connections to several nearby routes in the City Centre	D	E
M-MO	Moncton Street (No. 1 Road to Railway Avenue)	Direct east-west route into Steveston Village from Railway Avenue	2	VH
M-STH	Steveston Hwy (Shell Road to Sidaway Road)	Provides connections to Ironwood and Riverport, an improved crossing of Highway 99 for cyclists, and connections to future Fraser River Crossing (dependent on MoTI)	D	SC
M-RM	Shell Road (Steveston Hwy to Horseshoe Slough Trail) and Rice Mill Road (No. 5 Road to Massey Tunnel)	Improves cycling connections to the future Fraser River Crossing within municipal jurisdiction and on roads with lower traffic volumes	2	H

PWT - 48

Figure 4.5: Map of Medium-Term Priorities



PWT - 49

4.7 Long-Term (2032-2036)

Table 4.5: Long-Term Gap / Shared Road and Intersection Improvements

Point ID	Location Name	Description	Priority	Cost
GI-GCR	Garden City Road (Bridgeport Road-Sea Island Way)	Upgrade substandard facility in the southbound direction	1	L
LI-GCR	Garden City Road and Sea Island Way	Improvements to high traffic intersection that is among the top 20 collision prone intersections, most requested for improvements during engagement	1	E
LI-BLU-A	Blundell Road and Moffatt Road	Improvements to off-set intersection (90m spacing) on Midtown Neighbourhood Bikeway	1	M
LI-BLU-B	Blundell Road and Railway Avenue	Improvements to high traffic intersection with a higher number of collisions involving cyclists	1	H
LI-WH-A	Westminster Hwy and No. 2 Road	Additional improvements to high traffic intersection that is among the top 20 collision prone intersections with a higher number of collisions involving cyclists	1	E
LI-WH-B	Westminster Hwy and Garden City Road	Improvements to high traffic intersection to support of safe through and turning movements as the Westminster Highway route terminates	1	H
LI-WIL	Williams Road and Railway Avenue	Upgrades to support transitions between bi-directional facilities on Williams Road and the multi-use path on Railway Ave	1	H
LI-No2	No. 2 Road at Colville Road and Danube Road	Improvements to off-set intersection (50m spacing) on Crosstown Neighbourhood Bikeway	1	M
LI-MIN	Minoru Blvd and River Pkwy	New intersection with existing River Parkway protected bike lane facility	D	E
LI-No3-C	No. 3 Road and Granville Avenue	Improvements to high traffic intersection that is among the top 20 collision prone intersections with a higher number of collisions involving cyclists	2	E
LI-ASH	Westminster Hwy and Birch Street	Current alignment of the Parkside (Ash Street) Neighbourhood Bikeway on Birch Street connects to Westminster Highway at a divided median – upgrade or realign to Alder Street with pedestrian signal to allow westbound connections	2	M

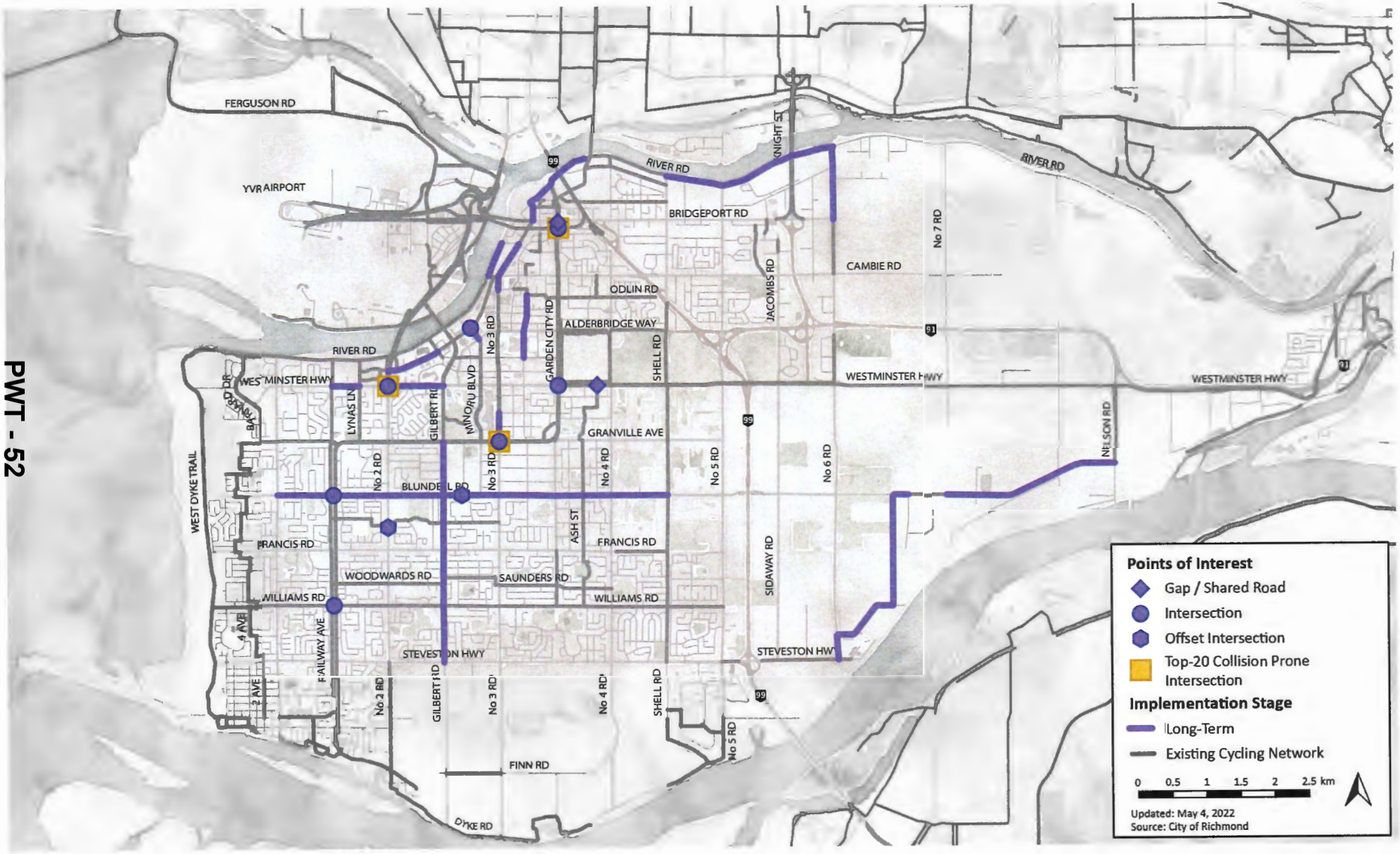
PWT - 50

Table 4.6: Long-Term Route Improvements

Route ID	Route Name	Description	Priority	Cost
L-GIL	Gilbert Road (Granville Avenue to Steveston Hwy)	Top new route requested during both phases of public engagement, providing a north-south route mid-point between Garden City Road and Railway Avenue	1	VH
L-BLU	Blundell Road (No. 1 Road to Shell Road Trail)	New east-west route with potential to provide future cycling crossing of Highway 99	1	VH
L-WH	Westminster Hwy (McCallan Road to Gilbert Road)	Extension providing improved connections between the Railway Greenway and the City Centre	2	H
L-BRN	Brown Road Extension (Odlin Road to Lansdowne Road)	New north-south roadway corridor per the City Centre Area Plan that includes cycling facility	D	E
L-RIV-A	River Road (No. 2 Road to Lansdowne Road)	Completion of western leg of protected River Road route	2	H
L-MIN	Minoru Blvd (River Pkwy to Alderbridge Way)	Redevelopment along Alderbridge Way will present opportunities to extend Minoru Boulevard with cycling facility	D	E
L-No3-A	No. 3 Road (River Road to Bridgeport Road)	Completion of continuous cycling facilities on No. 3 Road with connections to Canada Line stations as well as the Moray Channel and Airport Connector Bridges	D	E
L-No3-B	No. 3 Road (Capstan Way to Browngate Road)		1	M
L-No3-C	No. 3 Road (Cook Road to Granville Ave)		2	H
L-RIV-B	River Road (No. 3 Road to Tait Waterfront Park Trail)	Initial segments of new route requested during engagement between the Canada Line Bridge and the Middle Arm Greenway	D	E
L-MAG	Middle Arm Greenway / River Road (Capstan Way to Cambie Road)	Extending the current off-street multi-use path from Cambie Road to Capstan Way will provide wider network connections, as well as a quieter north-south alternative to No. 3 Road	2	H
L-RIV-C	River Road (Shell Road to No. 6 Road)	Initial segment of the North Arm Trail providing a route for East Richmond and road cyclists	2	VH
L-No6	No. 6 Road (River Road to Bridgeport Road)	Completes connections for East Cambie, providing an alternative route from Hamilton via Westminster Highway	2	H
L-VFPA	Blundell Road Extension through Southeast Richmond	Alternative route from Hamilton to southern destinations in Richmond (dependent on Vancouver Fraser Port Authority)	D	E

PWT - 51

Figure 4.6: Map of Long-Term Priorities



PWT - 52

5 Policies, Programs, and Initiatives

5.1 Introduction

This Chapter recommends actions to review, refine existing and develop new supporting policies and education initiatives that are well suited for the City of Richmond context. The policy and programming focus areas developed in this document reflect policy needs and challenges identified through public and stakeholder engagement (including City staff), as well as areas with a strong connection to encouraging/enabling cycling behaviours.

The approach also considered best practice design guidance, considering whether elements may be suited to the local context, to inform more concrete policy recommendations.

5.2 Bike Parking

The provision of safe, secure, attractive, and convenient bike parking facilities is an important factor in encouraging more people to cycle. There are several components of bike parking policy as shown in Figure 5.1. However, caution should be applied when considering prescriptive requirements that dictate a narrow form and function for bike parking as this may also discourage innovative approaches to meeting bike parking needs in the longer term.

Figure 5.1: Components of Bike Parking Policy

5.2.1 Minimum Bike Parking Requirements

Bike parking can often be a barrier to cycling if there is not enough of it, it is not weather protected, there is a perceived risk of theft, or parking is out of the way and difficult to find and access. One important policy tool to help ensure high standards for bike parking, is minimum bike parking requirements for different types of facilities and uses.

The need for secure and dry parking facilities was heard throughout Phase 2 engagement. In the *Let's Talk Richmond* Public Survey, "Secure Bike Parking" was ranked as the 3rd highest investment priority, behind "Network Expansion or Upgrades," and "Maintenance and Repair of Network."

Existing Requirements

On-Site Bike Parking Requirements for the City of Richmond are outlined in **Section 7.14 of the City's Zoning Bylaw**, reproduced in Table 5.1. Included are minimum bike parking requirements for residential (Town Housing, Apartment Housing and Mixed Commercial/Residential Uses) and non-residential uses, with specific requirements for both Class 1 (long-term secured) and Class 2 (short-term) bicycle parking.

A side-by-side comparison of on-site bike parking requirements from other Metro Vancouver municipalities is available in Appendix H. Notably, Class 1 requirements for residential uses are similar between Richmond, Coquitlam, and New Westminster. The City of Vancouver requires additional residential spaces per dwelling unit based on unit size. Class 2 requirements in the City of Coquitlam are allocated based on building entrances. Among these cities, the City of Richmond has the highest Class 1 and Class 2 bicycle parking requirements for educational uses.

Table 5.1: City of Richmond On-Site Bicycle Parking Requirements

Minimum Number of On-site Bicycle Parking Spaces Required		
Use	**Class 1**	**Class 2**
Town Housing	1.25 spaces per dwelling unit	0.2 spaces per dwelling unit
Apartment Housing		
Mixed Commercial/Residential Uses		
General and Convenience Retail	0.27 spaces per each 100.0m2 of gross leasable floor area greater than 100.0m2	0.4 spaces per each 100.0m2 of gross leasable floor area greater than 100.0m2
Restaurant		
Office		
Private Club	0.27 spaces per each 100.0m2 of gross leasable floor area greater than 100.0m2	0.78 spaces per each 100.0m2 of gross leasable floor area greater than 100.0m2
Religious Assembly		
Indoor Recreation		
Education – Elementary School	1 space for each 3 staff members	2 spaces for each 10 students
Education – Secondary School	1 space for each 3 staff members	3 spaces for each 10 students
University Education	1 space for each 4 staff members; plus 1 space for each 10 students	1 space for each 10 students
General and Heavy Industrial	0.27 spaces per each 100.0m2 of gross leasable floor area greater than 100.0m2	0.27 spaces per each 100.0m2 of gross leasable floor area greater than 100.0m2
Hotel		
Spectator Entertainment		
Major Health Service		
Community Care Facility, Major		

Source: City of Richmond Zoning Bylaw

Policy Considerations

As the City of Richmond aims to increase the use of cycling from 1% of trips in 2008 to 10% of trips made in 2030, increasing the amount of bike parking required is a key policy tool for achieving this goal.

According to a 2018 study by the European Cyclists' Federation, there is a correlation between bike parking spaces required per apartment and cycling mode share (Table 5.2).

There are **different types of bike parking facilities**, which range from bike racks (lower cost, lower security/weather-protection) to bike lockers, to bike parking stations/rooms (higher cost, higher security/weather-protection). Each of these facilities come with their own design considerations, but generally **bike racks** are considered for short-term parking and **bike lockers or rooms** are considered for long-term parking.

Table 5.2: European Cities by Bicycle Mode Share and Apartment Parking Requirements

City, Country	Population	% of Trips made by Bike	Required Bike Parking Spaces per Apartment
Glasgow, United Kingdom	592,000	3	1.25
Bergen, Norway	271,949	3	1.75
Frankfurt (Oder), Germany	58,237	4	1.4
Zurich, Switzerland	402,762	8	1.75
Trondheim, Norway	181,513	9	2.0
Dresden, Germany	543,825	12	1.5
Nurnberg, Germany	506,000	13	2.0
Rostock, Germany	206,011	14	2.0
Munich, Germany	1,450,381	17	1.75
Darmstadt, Germany	143,499	17	2.0

Source: Adapted from European Cyclists' Federation, Making Buildings Fit for Sustainable Mobility (2018)

Moving forward, policies for the City of Richmond to consider include:

- **Ensure Bike Parking Requirements Align with Mode Share Goals**: As building lifespans can last multiple decades, updated bike parking minimums for residential and commercial buildings may be required to ensure they align with the City's long-term goal to increase cycling trips.
- **Align Residential Bike Parking Requirements with Number of Occupants**: Consider aligning the number of required bike spaces to unit square footage or number of bedrooms to better match the number of household occupants.

> According to Statistics Canada (2017), 8.6% of commuters who live at UBC (Electoral Area A) commute by bicycle. A **(Smith, Bigazzi) 2018 study** found that even though UBC requires new buildings to have 1.5 bike parking spaces per residential unit, this requirement is "...deficient, leading to heavy parking congestion."

- **Advocate to TransLink for More Long-Term Secure Bike Parking at Transit Stations**: In the Phase 2 Public Survey, respondents were asked to prioritize destinations for providing bike lockers and bike rooms. Canada Line stations and Bus Exchanges were among the highest priorities (1st and 4th, respectively). TransLink is responsible for the provision of bike parking facilities at transit stations across the region. In Richmond, there are a total of 4 bike locker locations at 4 Canada Line Stations and 1 bike parkade at Bridgeport Station.
- **Work with Recreation Facilities, Community Centres and Schools to develop new Bike Parking Requirements**: In the Phase 2 Public Survey, Community Centres were also ranked highly (3rd) among destinations to prioritize bike lockers and bike rooms. The City should work with stakeholders to explore the development of new bike parking facility requirements for recreation facilities, community centres and schools.
- **Work with Stakeholders to Determine Approach to Implement Bike Parking in City Centre, Commercial Areas and Neighbourhood Centres:** In the Phase 2 Public Survey, the City Centre, commercial areas, and neighbourhood centres ranked 2nd, 5th and 6th, respectively, for where respondents would prioritize new bike lockers and rooms. The City should work with stakeholders to determine how long-term, publicly-accessible parking for cycling can be implemented (e.g., public/private space, funding, etc.) in these locations.

5.2.2 Accommodating Micromobility and Non-Standard Bike Sizes

Over the past decade, cycling has undergone a revolution, ranging from new business models (bike-share) to new technology (electric bicycles or e-bikes). There is also more widespread use of other small electric devices (e.g., scooters, hoverboards) – often termed 'micromobility' – that have broadened the term 'active transportation,' and should now be considered when planning and designing storage space for such devices. In addition, as more people cycle, a wider spectrum of bicycles may be used, such as cargo bikes, which do not have the same spatial needs as traditional bike sizes.

During Phase 2 engagement, feedback was received on the Ideas Board that there should be consideration towards wider/cargo bikes and electric scooters.

Policy Considerations

- **Provide Bike Parking Requirements that are Flexible and Can Accommodate a Range of Micromobility Devices**: According to the ***B.C. Active Transportation Design Guide*** (2019), e-scooters and other small electrically-powered devices have similar parking considerations as bicycles, such as security, infrastructure flexibility and proximity to electrical outlets. When outlining configuration and design requirements in bike parking policy, flexibility may need to be considered for these types of devices. The Design Guide also recommends that 10% of all bicycle parking spaces be able to accommodate larger, non-standard bicycles such as cargo-bikes.

- **Modify Requirements in Commercial Areas**: Consider higher minimum requirements and more flexibility to accommodate non-standard bicycle sizes in commercial areas, as there may be a higher ratio of these bikes in these areas than residential areas (e.g., use for goods delivery). Likewise, bike parking rooms deserve greater emphasis, given the increased value of e-bikes and other electric mobility devices.
- **Ensure More Bike Parking Spaces have Access to Electrical Outlets**: For e-bikes, the Design Guide also recommends that 50% of long-term and 10% of short-term bike parking spaces in new multi-unit residential and commercial developments have access to electrical outlets for charging.
- **Designate Parking Locations for Dockless Bike/E-Scooters**: At the street level, cities and dockless bike/e-scooter share operators are increasingly encouraging customers to either use parking 'corrals' in high volume or crowded areas, or to drop off their bikes/e-scooters in the furniture zone of sidewalks. Designating locations provides cities and operators more control over the start and end location of bikes/ e-scooters, increases predictability for users and non-users alike, and reduces encroachment in the public right-of-way. Corrals should be marked with neutral, non-branded, or universal-branded signage to best inform customers of where bikes/e-scooters should be parked. In determining appropriate parking locations, most cities use the following guidelines:
  - Bikes/e-scooters should not be parked within 1.5m – 4.5m of a crosswalk or curb ramp.
  - Bikes/e-scooters parked on sidewalks may only be parked in the street furniture zone, unless otherwise permitted.
  - A minimum 1.8m clear path is required for all sidewalk corral locations.
  - If using bike racks or other lock-to equipment, cities should ensure that shared micromobility vehicles do not restrict parking options for people using personal bikes and e-scooters.
  - Locate bike/e-scooter parking corrals close to loading zones, allowing them to be easily serviced and re-distributed.

5.2.3 Bike Parking Room Design and Access

In addition to being accessible, functional and convenient, bike parking facilities that are attractive may also encourage more people to cycle.

For long-term secure bike parking, particularly bike rooms, it is important to outline requirements that are clear and directive of the amount and type of bike parking facilities required. But there should also be design flexibility to enable innovative solutions and help make rooms more attractive.

Existing Bike Parking Room Requirements

Bike Parking Room Requirements for the City of Richmond are outlined in Section 7.14 of the City's Zoning Bylaw, which details minimum dimensions for bicycle parking and design requirements.

- **Bike Parking Room Requirements**: Existing requirements for long-term secured bicycle parking include that it be at-grade, within sight of the building entry or security room, be lighted with uniform 160 lux (min.) lighting, have a maximum of 40 bicycle spaces per room or compound, have solid opaque walls with a steel frame.

Policy Considerations

- **Adopt More Flexible Bike Parking Room Requirements**: Balancing for security concerns, consider flexibility around the description of security features, lighting levels, maximum number of bicycles per room/ compound, materials used for the walls, doors and windows, the acceptable forms of bike racks, and the maximum number of bicycle spaces provided in each room.
- **Explore More Flexible Bike Parking Room Location Requirements:** While it is important that bike rooms are easily accessible to a building entrance, allowing bike rooms that are not within sight of the entrance may enable larger, more flexible and optimal bike room dimensions and designs. However, wayfinding between the building entrance and bike parking facility must be clear, with circulation accessible throughout (e.g., wide doorways, inclined ramps/escalators if grade-change, etc.).

To provide an example of policy from another municipality in B.C. for possible guidance, Table 5.3 outlines the **City of Victoria Zoning Bylaw No. 80-159 Schedule C: Off-Street Parking Regulations**, Section 3: Bicycle Parking.

Table 5.3: Comparison of Bicycle Parking Bylaw Specifications - City of Richmond and City of Victoria Zoning Bylaws

City of Richmond Zoning Bylaw – 7.14 Provision of On-site Bicycle Parking Facilities	City of Victoria Zoning Bylaw – 3.1 Bicycle Parking Specifications
7.14.5 On-site bicycle parking shall be provided as follows: a) Class 1: Long-term secured bicycle parking shall be at-grade, within sight of the building entry or security room. Bicycle parking shall be provided in the form of waterproof bicycle lockers, secured bicycle rooms, or secured compounds within a building complete with bicycle racks. A maximum of 40 bicycle spaces may be provided in each bicycle room or compound. Bicycle rooms, compounds or bicycle locker areas shall be lighted with uniform 160 lux (min.) lighting which yields true colours. A maximum of 33% of the required Class 1 spaces shall be vertical spaces that support the bicycle without the bicycle being suspended on the wheels or hung above ground. Bicycle rooms shall have the following: i. solid opaque walls with a steel frame and door with the door hinged from the inside unless hinges are tamper-proof; ii. a security window constructed of a laminate of tempered glass and polycarbonate in a steel frame for permanent visual access; and iii. an entry door to the bicycle room with a separate lock and key or a programmed entry system. Bicycle compounds shall extend from floor to ceiling and have industrial-grade (No. 7 gauge or higher) chain-link walls and door Bicycle lockers shall have lockable doors which open to the full height and width of each locker, be grouped together, not be located at the head of bicycle parking, and have clear minimum dimensions	3. (a) Each bicycle parking, long term space required under this Bylaw must: i. be designed and installed to the minimum dimensions shown in Table 4 of this Schedule; ii. be provided as a bicycle rack that is permanently anchored to the ground or a wall; iii. have a minimum unobstructed height clearance of 2.1m between the floor and any mechanical equipment, or, if there is no mechanical equipment, between the floor and the ceiling; iv. be provided in a secure, weather-protected, dedicated bicycle parking facility accessible to residents, employees or other identified users of the building; v. be located in a bicycle parking facility accessible through an entry door with a minimum width of 0.9m; and vi. be located within one floor of finished grade and, if accessed by a stairwell only, the stairwell must include a ramp for bicycles. 3. (b) At least half of the bicycle parking, long term spaces required under this Bylaw must be ground anchored.

PWT - 57

5.2.4 End of Trip Facilities

End of trip facilities can be another important factor that may make the experience of cycling more comfortable for riders, particularly for work commutes. These amenities can include bike maintenance facilities (providing tools and work space), as well as showers, change rooms and clothes lockers for use by bike commuters. The number and size of end of trip facilities required should be reflective of the number of bike parking spaces.

During Phase 2 engagement, External Stakeholder Workshop feedback indicated that end of trip facilities and expanding needs should be considered, including amenities such as e-bike/e-mobility charging and repair stations.

Figure 5.2: Cyclist on Lansdowne Road

The *B.C. Active Transportation Design Guide* (2019) discusses bicycle repair stands and shower and change room facilities in more detail. ***Not Just Bike Racks***, a guide by HUB Cycling, also provides examples of well-designed bike rooms in Metro Vancouver including their amenities.

Policy Considerations

- **Adopt Requirements for End of Trip Facilities**: Work with stakeholders to determine the types of facilities and the extent to which they should be required in new non-residential buildings.

For further policy guidance, in July 2021, the City of Coquitlam adopted requirements that all non-residential buildings provide end of trip facilities and all buildings provide Bicycle Maintenance facilities. Refer to **City of Coquitlam Zoning Bylaw No. 5112, 2021**, 711 Off-Street Bicycle Parking, and 712 Off-Street Bicycle Minimum Design Standards (shown in Table 5.4).

Table 5.4: City of Coquitlam Off-Street Zoning Bylaw

City of Coquitlam Zoning Bylaw – 712 Off-Street Bicycle Parking Minimum Design Standards
(3) End of Trip Facilities a) Where bicycle parking, long-term is required for non-residential buildings minimum two on-site amenity rooms are required and shall include as a minimum the following features: shower, changing room, water closet, wash basin, mirror, and electrical outlet. b) Personal storage lockers shall be provided within close proximity to the on-site amenity rooms in non-residential buildings. The number of personal lockers shall equal the number of bicycle parking, long-term spaces on the site. (4) Bicycle Maintenance Facilities a) Where bicycle parking is required on-site, bicycle maintenance areas shall be provided for each building and shall include as a minimum the following: work space and desk, repair stand, wash station, and bicycle tire air pump.

5.3 Programs and Initiatives

While bike access and bike facilities are important factors in encouraging cycling, there are also societal and personal factors that can act as barriers. These include lack of training, motivation, community, and negative perceptions around safety, comfort and convenience. Several programs can address these factors and help shift behaviour (Figure 5.2).

Figure 5.3: Types of Programs and Initiatives to Encourage Cycling

PWT-59

The City of Richmond, TransLink and other community-based organizations already operate various programs locally; however, there are additional examples of successful programs for the City to consider. These programs can be operated by City staff, community partners, or private businesses, and range from being passive information to active programming and events. Many municipalities have dedicated budgets for such programs.

5.3.1 Education and Skills Training

Education and skills training activities are important to ensure community members can cycle safely and confidently. Education can range from basic bike riding skills to bike maintenance and repair. There can also be information on new emerging devices, such as e-bikes, and messaging to help motorists understand how to safely drive around people cycling.

Education can range from passive safety campaigns to skills workshops. In-person education can also be fun and help build a sense of community around cycling. The recent pandemic has also presented an opportunity for agencies to develop and improve virtual education events and materials.

Existing Initiatives

There are a variety of bicycle educational programs in the City of Richmond, either with support/funding from the City, or delivered by community-based organizations. These include:

- **Bike to School Education for Students**: In collaboration with the Richmond School District, the City annually funds the delivery of bike skills education courses for all Grade 6/7 students, including in-class lessons, on-bike safety training and street ride education.
- **Learn-to-Ride Bike Camps for Kids**: Private companies offer bike camps, which range from teaching kids who are just starting to ride to those that are more comfortable riding.
- **Learn to Ride Education for Adults**: In cooperation with the Immigrant Services Society of BC, the City annually funds beginner courses targeted to recent immigrants. The City also funds bike maintenance courses for adults that are delivered by HUB Cycling.
- **Cycling Workshops for Employers/Companies**: HUB Cycling offers interactive (or online) workshops and lunch and learns for staff of all riding abilities. These workshops can cover basics of bike maintenance, city cycling, e-biking, and fall or winter cycling.
- **Educational Materials**: The City of Richmond's website has an **Events and Resources page** for cycling, which includes a list of publications from active transportation organizations.

Proposed Policies and Initiatives

The City of Richmond should continue to support and develop these existing programs and resources. Other ways the City can continue to advance cycling in the city through education may include:

- **Advocate for Cycling to be More Prominent in Driver Training and Education**: ICBC's driver training programs and materials could include more components about cycling facilities and how to drive safely in the presence of cyclists.

- **Advocate to the Province to Include Cycling Skills Training and Testing in School Curricula:** This will ensure that students province-wide receive training, and not just those students who attend schools that have local champions or partnerships with local agencies and programs.
- **Support Expanded Bike to School Education for Students**: Expanding cycling education and adding peer-to-peer cycling training in both elementary and high schools can help improve cycling confidence. These efforts can be supported by encouraging the development of a student advocacy 'club' for biking to school issues and opportunities.
- **Support the Development of a Local 'Bike Kitchen'**: UBC's Bike Kitchen was founded in 1999 as a space for students to learn how to maintain, repair and build their own bicycles. The facility also recycles abandoned and donated bikes to provide students with reliable and reasonably priced bicycles and parts. The creation of a similar place with a community centre or community-based organization is worthy of exploration.
- **Provide Training sessions for City Staff and Staff of Partner Agencies**: Providing on-going education of cycling for staff can help increase knowledge of beneficial bike planning, design and operations practices.
- **Encourage Community Centres and Community-Based Organizations to Host Skills Training and Safety Programs:** While the City already partners with local advocacy groups (e.g., HUB Cycling) to offer bike training classes to adults, these efforts could be expanded through new partnerships with local community-based organizations and partially or fully subsidizing the delivery of targeted training. Skills and safety training programs offered by community centres or other community-based organizations are fun, build community, and may offer new opportunities for cycling if targeted to demographics or segments of the population that are historically underrepresented in cycling.
- **Offer More Educational Materials**: To build on the materials already provided on the City website, offering and promoting other educational materials, such as online courses, handbooks, or infographics can be an effective way to help community members educate themselves on their own time. The topic of materials can range from how to ride safely, to shared pathway and trail etiquette. These can be developed by the City or a community-based organization.
- **Ensure There are Multilingual Options for Education**: Whether education is offered through materials or workshops, ensuring that there can be offerings in different languages can be effective in reaching a wider cross-section of the community. Outreach via engaged cultural organizations is an important step in connecting with the target audience. For example, the City provided funding to HUB Cycling to support the production of the **Get Cycling** handbook in 5 languages. In San Francisco, Bike East Bay has offered cycling **education programs** in both Cantonese and Spanish.

5.3.2 Community Events

Community events can be great places to deliver information about cycling, generate excitement and help build a sense of community around biking.

Events can be bike specific (e.g., Go by Bike Week in Metro Vancouver) or community-wide with a bike activity (e.g., bike share operator having a booth at a popular local destination). Community-wide events can also be effective ways to reach a broader cross-section of the population.

Existing Initiatives

There are already several regular events that are either organized by, or take place in, the City of Richmond including:

- **Island City, by Bike Tour:** Free, family-oriented annual event offering guided cycling tours of some of Richmond's bike routes. The event is delivered by the City of Richmond and additional activities include a bus bike rack demo and Richmond RCMP bike registry to discourage theft.
- **Go by Bike Week:** Weeklong event that aims to reward existing cyclists and encourage new cyclists to try cycling for transportation and to continue cycling after the event. The event is run twice a year by HUB Cycling.

- **Commuter Challenge BC:** An annual competition during Canadian Environment Week (1st week of June) between Canadian cities to see which one can cut its air pollution the most by using active and/or sustainable modes of transportation.
- **Bike Valet**: Some events (e.g., Canada Day) in the city offer bicycle valet services that provide secure, coat-check style bicycle parking to event attendees. Major City events offer Wheel Watch, operated by the City, while other events may use **Bike Valet**, which is offered by Better Environmentally Sound Transportation (BEST).

Proposed Policies and Initiatives

There are several ways the City of Richmond can continue to develop cycling in the city through community events, such as:

- **Further Integrate Cycling as a Component of Community-Wide Festivals**: Encourage more people to cycle to city events such as the Richmond Maritime Festival and Canada Day celebrations. If available, offer a bike-share discount and provide pre-organized secure bike parking areas, or simply have a table where there can be marketing materials about cycling in the city.
- **Encourage Themed Bike Events:** Encourage community organizations to locate cycling events in Richmond. Local examples include **Bike the Blossoms (Vancouver Cherry Blossom Festival)**, **Bike Rave (VYVE)**, and **Ride Don't Hide (Canadian Mental Health Association)**.
- **Permit Community-Led Open Streets:** Temporarily close streets to motor vehicles and encourage people to walk, bike and use the street as a public space. This can be run or programmed by the City, local businesses, or community-based organizations. Famous international examples include Bogata's Ciclovia and Portland's Sunday Parkways. **Car Free Day** in the City of Vancouver and the City of North Vancouver's **Open Streets program** are local examples. The **Open Streets Project Toolkit** may also serve as a resource.

PWT - 61

5.3.3 Marketing and Information

Marketing can help raise awareness of opportunities, shift negative perceptions and help develop a stronger community culture towards cycling. This can be passive information or active marketing campaigns.

Existing Initiatives

- **Tourism Richmond**: The City of Richmond's destination marketing organization already features cycling prominently as an outdoor activity, advertising its "more than 80 kilometres of designated routes; you'll coast past lots of camera-worthy urban, historic, and nature loving spots."
- **City Website**: The City of Richmond's website has a section on cycling in the city, including resources, events, and maps.

Proposed Policies and Initiatives

- **Enact Public Messaging and Marketing Campaigns**: Purposeful messaging about cycling in Richmond can be targeted and personalized, and may come through a diverse array of marketing channels, such as social media, new outlets, radio ads, etc. It can be used for purposes such as increasing awareness about cycling opportunities in the city (e.g., to attract more visitors) or as a campaign on public safety. The City of Vancouver has marketing campaigns for cycling as a component of their **Active Transportation Promotion & Enabling Plan**.
- **Explore Developing a Cycling Brand for the City**: Some municipalities actively promote cycling to encourage residents to cycle or to attract visitors. Some jurisdictions develop a specific cycling brand as part of a larger tourism and economic development strategy. For instance, Copenhagen's 'I Bike CPH' is recognized internationally. Developing a brand with stakeholders can help build awareness, and the credibility and reputation of cycling in Richmond.
- **Consider Embedding Cycling in City Marketing Materials**: Consider how to embed and align cycling and behaviour change with other initiatives in the proposed City of Richmond Marketing Plan.

- **Create an Employer Outreach Program**: Employer Outreach Programs can be local government-led initiatives that engage and support local employers to encourage their staff to travel by active and sustainable modes. Locally, the City of Vancouver has recently piloted an employer outreach program called **VanGo**, which provides resources and guidance to employers as part of the City's larger Transportation Demand Management strategy.
- **Ensure Marketing is Inclusive**: Having material, outreach, customer service, and web platforms in multiple languages, or having visuals include 'non-sport' cyclists, as well as people of colour, Indigenous peoples, women, and other historically underrepresented riders can help broaden the number of communities feeling included in cycling initiatives. An example of this is the **Faces of Indego Campaign** in Philadelphia.
- **Promote Bicycle-Friendly Business Programs**: Having a community or business organization create a list of bike-friendly businesses that may offer rentals, bike parking, discounts, or awards for cyclists can help promote Richmond as a cycling destination and support local businesses. A possible example may be HUB Cycling's **Bike Friendly Business Certification**.

PWT - 62

5.3.4 School Active Travel Planning

School Active Travel Planning (SATP) is the encouragement and facilitation of having more students walk or bike to and from school. This shift can come through education, infrastructure or encouragement activities. While some of these activities have been described earlier, SATP deserves special attention as youth can be a demographic that require tailored approaches, there can be lots of potential for them to do more travel by walking or cycling, and habits developed at school may stick with them through later in life. Improving school active travel planning was heard through public engagement, with ideas such as identifying school champions and having roundtables for parent concerns.

Existing Initiatives

- **City of Richmond-TransLink TravelSmart Partnership**: In the past, the City has partnered with TravelSmart, TransLink's transportation demand management (TDM) program, to implement strategies that can lead to increased use of walking and cycling (as well as transit and carpooling) to school.

Proposed Policies and Initiatives

- **Measure Progress for Active Travel to Schools**: Develop a strategy and metrics (e.g., mode share) for active transportation to and from schools, and then conduct annual surveys of staff and students to monitor progress. The City of Edmonton is hoping to accomplish this, as outlined in their recent **cycling plan**. Students can also be empowered to take part in walkability audits, identifying unsafe areas or gaps for the City to consider future improvements such as signalized crossings.
- **Expand Safe Routes to School Initiatives**: In addition to cycling skills and safety training for all Grade 6/7 students, the City could advocate for integration of cycling awareness into provincial curriculum (Social Studies cover transportation and climate change, Physical Education covering cycling skills) and support infrastructure improvements (e.g., new crosswalks, gap connections to the cycling network, bike parking facilities), or events such as bike rodeos.
- **Champion Local Participation in Provincial Programs and Partnerships**: The B.C. government partnered with BC Health Communities Society to develop the Active School Travel Pilot Program, which provides funding, information and resources to participating schools. The City could advocate to the Richmond School Board for broad local participation in cycling-related assessments, skill-building opportunities, incentives and infrastructure programs.
- **Support Education for Parents, Guardians and School District Staff:** Partner with community-based organizations and the Richmond School District to offer education to parents and administrators on the safety and benefits of walking and riding to school for students.

5.4 Wayfinding

Wayfinding is an important component of communicating with cyclists. Signage can help with directions and indicate connections to other routes and the length of time and distance to reach destinations. It can also be a component in creating a distinctive sense of place along cycling routes.

During engagement, stakeholders consistently expressed a desire for better cycling connections within the region. Beyond physical infrastructure, clear and continuous wayfinding design standards that can help guide cyclists across different municipalities are an important supportive action.

Proposed Policies and Initiatives

- **Establish a City Wayfinding Strategy**: The City could produce a comprehensive plan and design standard for bicycle wayfinding in Richmond, aligned or integrated with pedestrian wayfinding. An example of a recent comprehensive wayfinding strategy, is **Toronto TO360**, which includes **specific wayfinding for cycling**.
- **Align Wayfinding Policy and Design with TransLink**: TransLink developed **wayfinding guidelines** for cycling in 2013 and the City is using this standard for signage along its neighbourhood bikeways. The City could further identify how to align with these guidelines, taking inspiration from the guidelines of adjacent municipalities.
- **Tour de Richmond**: Through public engagement, many respondents commented on the desire for a Tour de Richmond: a touring cycling route around Richmond that provides a reliable riding experience around the city. A similar initiative to consider is the **Green Necklace** urban greenway in the City of North Vancouver.

5.5 Lighter, Quicker, Cheaper / Pilot Projects

To support recent increases in walking and cycling, cities globally and regionally have relied on materials that are quick to implement or temporary (e.g., pylons as a means of protection for bike lanes). These efforts are often supported by reallocating motor vehicle lanes or further traffic calming measures. This approach of rapidly implementing new or upgraded active transportation facilities or plazas with materials that are 'Lighter Quicker Cheaper' is popular for pilot projects that can be a precursor to permanent facilities and was emphasized by stakeholders during engagement.

Existing Initiatives

- **Increased Use of Pilot Projects**: The City should consider expanding this approach of piloting projects to test new ideas more quickly and cheaply, as well as to demonstrate changes to the public to gather feedback and build support. The installation of delineators on Granville Avenue between the bike lane and the vehicle lane is an example of testing the effectiveness of quick and cost-effective separation.

5.6 Enhanced Safety

Personal safety is an important factor for people when considering whether, and where, to cycle. Many municipalities have adopted enhanced policies around improving safety for vulnerable street users including those cycling.

Existing Initiatives

- **Reduced Motor Vehicle Speed Limits on Local Streets**: The City continues to look at areas to lower speed limits on neighbourhood bike routes and has successfully implemented 30km/h zones in Steveston Village and Burkeville. Reduced speed limits can improve safety for vulnerable street users while also improving comfort for walking and cycling. Reducing speed limits to 30 km/h on residential streets was an idea put forward and supported during engagement.

Proposed Policies and Initiatives

- **Expand Safe Systems Approaches**: A human-centred safe systems approach seeks to improve safety with a focus on vehicle or roadway design and operational changes rather than behavioural changes of road users. The City could build upon its recent Network Screening Study to identify and develop measures to address the top 20 collision-prone intersections for motorists in Richmond with a comparable study focused on cyclists and pedestrians.

5.7 Equity

It is important to ensure that everyone can have access to, and feel comfortable, cycling. During Phase 2 engagement, stakeholders expressed support for achieving social equity objectives. The City may want to consider developing more policy around promoting equitable cycling access. For programming, this can include having offerings that enable people to access the activity, who may not otherwise be able to. This can range from having e-bikes, to bikes specifically made for people with mobility challenges, to reducing costs for those with low income.

Existing Initiatives

- **Supporting Bike-Share Operators to Offer E-Bikes**: The Province launched its **Electric Kick Scooter Pilot Project** in April 2021. As a participating pilot project community, the City of Richmond selected Lime to be the operator of its public e-scooter and e-bike share pilot project in September 2021. The City should continue to encourage bike-share operators to offer e-bikes, which may provide more people with access to bike-share, as the electric assist can provide physical support.
- **Encouraging Discounted Fares for Bike/E-Scooter Share**: Cycling can be an affordable way to move around the city. Unfortunately, the cost of purchasing or renting a bike (or a residence with enough storage room) is still a barrier to some folks. Encouraging local bike-share operators to provided discounted fares can help to reduce these barriers. In Richmond, Lime will offer discounted fares for users enrolled in any federal, provincial, or local subsidy program. In the City of Hamilton, the '**Everyone Rides**' initiative offers subsidized bike-share memberships, as well as learn-to-ride lessons, training, and free monthly group rides.
- **Encouraging Cash/Non-Credit Card Options for Bike/E-Scooter Share**: Offering a cash/non-credit card method of payment is one way to make payment systems, service options and price structures more inclusive to low-income users. In Richmond, Lime will allow users to pay with PayPal or via a prepaid card. Consideration should be given to how potentially higher costs of cash handling can be spread across all users. The City of Vancouver's bike-share system, Mobi, offers a **community pass** option with discounted access for some groups and cash options available.

Proposed Policies and Initiatives

- **Ensure Bike Facilities are Created for All Ages and Abilities**: While the City's ***Building Our Social Future*** Strategy does emphasize the importance of ensuring facilities are accessible to those of all ages and abilities, the City should consider developing specific policy language regarding accessible design of cycling infrastructure and facilities.
- **Apply a GBA+ Lens to New Policy and Facility Designs**: Gender-Based Analysis Plus (GBA+) is an analytical tool used to assess the potential impacts of policies, programs, and infrastructure on people of all genders, and considers many other factors like race, ethnicity, religion, age, and mental or physical disability. The general process is to identify an issue, challenge assumptions, gather facts through research and consultation, develop options, and make recommendations. The **Government of Canada** and the **Province of BC** have committed to implementing this lens. In their **bike plan**, the City of Edmonton also committed to using this lens when designing new cycling facilities.
- **Explore Offering Adaptive Bikes, Trikes and other Shared-Use Equipment**: Encouraging bike rental businesses or bike/e-scooter-share companies to offer devices that are designed for people with disabilities can help make cycling more inclusive. Offering this equipment, as well as training lessons, can allow new community members to access bike recreation. **Adaptive Biketown** in Portland, Oregon is an example of a civic led program, while **MoGo** in Detroit, Michigan is run by a bike-share operator.

5.8 Data Collection

The availability of data is an important tool to evaluate the performance of infrastructure and programs. It can be used to monitor trends, produce analysis and determine changes that may be required. Data collection practices have also evolved over recent years with widespread use of smart phones and new technology being applied to bikes, e-scooters and other micromobility devices. The need for data collection and more bike counters was heard during Phase 2 engagement, particularly from external stakeholders.

Existing Initiatives

- **Bike Counters:** The City already has several bike counters and is planning to install more.
- **Requiring Bike/E-Scooter-Share Operators to Provide Data**: Provision of real-time and historical data is required from Lime as a condition of operation to ensure that data can be analysed for both short-term and long-term planning needs. Data requirements are aligned with the Provincial e-scooter pilot to achieve comparability across municipalities. Permit applications should stipulate penalties for non-compliance and a mechanism for enforcement.

Proposed Policies and Initiatives

- **Annual Cycling Surveys:** Consider whether more regular or comprehensive counts of walking and cycling are needed to inform policy, program and infrastructure development. One method is a regular survey of people that asks why they do or do not cycle. This initiative can be taken on by the City or delivered in partnership with a community-based organization.
- **Explore Collecting Data that has Disaggregated Demographics:** Information with more detailed demographics can be used to better develop and monitor equity-supporting policies.
- **Consider New Technologies to Better Track Cycling Activity:** Cycling data is increasingly captured via GPS tracking devices such as smart phones. Some companies that capture and provide this data include **Strava Metro** and **See.Sense**. This data can be used to supplement of technology can aid program and infrastructure design in Richmond. However, these apps may be biased towards more recreational cycling, and there may be privacy considerations.

Figure 5.4: Cyclist on the Railway Greenway

Appendices

A Phase 1 Engagement Summary

A1 Introduction

As part of Phase 1 engagement, several activities were conducted to gather public and stakeholder input on existing conditions and recommendations for future improvements including:

- Internal stakeholder consultation with:
  - City of Richmond staff
  - Advisory Committee on the Environment
  - Richmond Active Transportation Committee
- External stakeholder workshop
- Public consultation for both the public and students via the *Let's Talk Richmond* Ideas Board, Mapping Tool, and Survey Tool

This note summarizes the key findings and highlights from the consultation period, which fed into the next phase of technical analysis and later informed the prioritization of cycling network improvements.

PWT - 68

A2 Internal Consultation

A2.1 Internal Review by City Staff [2021-03-24]

A cross-departmental internal review by City of Richmond staff (including Transportation, Park Services, Development, Policy Planning, Sustainability and District Energy, Sports Services and Events, and Public Works) was completed prior to seeking approval from Council to begin public consultation. Several key ideas regarding future evaluation criteria emerged at this stage:

- Access to community centres as future mobility hubs offering supportive infrastructure (secure bike parking, fountains, tool stands)
- Desire to maximize cycling ridership and meet emissions reductions targets
- Prioritize upgrades of existing facilities that are deemed unsafe by the public or 'comfortable for few'

A2.2 Advisory Committee on the Environment [2021-06-09]

Major themes from our discussion included shared mobility services, safe cycling for students, and access to transit by bike. The interests of participants aligned in several key areas:

- Enhanced separation for students cycling on Williams Road and students cycling to Cambie Secondary School from Hamilton via Westminster Highway
- Providing an additional major north-south cycling route
- Improved cycling connectivity to Bridgeport Canada Line Station, as well as to the wider transit network via cycling for the last mile

5.8.1 Richmond Active Transportation Committee [2021-06-16]

Our discussion with members of the committee focused on ranking high-level priorities and soliciting solutions and ideas. **Connectivity** was presented as the top priority by most members, followed by **safety** and **wayfinding**. Beyond overall connectivity to the wider cycling network, connections to the Canada Line, business districts, and other major destinations were also emphasized. From a project prioritization perspective, key themes included:

- Extend east-west routes further east (especially to service the northeast quadrant of the city)
- Upgrade of existing routes to be composed of a continuous facility type
- Complete missed connections where existing facilities are interrupted

A3 External Consultation

A3.1 External Stakeholder Workshop [2021-06-28]

Attendees
HUB Cycling, Metro Vancouver, MoTI, Richmond Active Transportation Committee, Richmond RCMP, Richmond School District, TransLink, Vancouver Airport Authority, Vancouver Coastal Health, ICBC

External stakeholders were engaged on three topics: high-level priorities for cycling; stakeholder plans, initiatives, and funding; and framing the Phase 2 evaluation. **Safety, connectivity** and **education** were key priorities shared by stakeholders. Several desired safety initiatives were discussed including:

- Lower speed limits on cycling corridors
- Separated cycling facilities (including from pedestrians) within urban centres
- Improved intersection designs

Many opportunities for enhanced regional connectivity were put forward, including expanding regional greenways, the Great Blue Heron Way initiative, planned updates to TransLink's Regional Cycling Map, and parallel efforts by MoTI to conduct a Regional Gap Analysis. Regarding Phase 2 evaluation components, stakeholders highlighted:

- Access to multi-model transportation **hubs and activity centres**
- **Social equity** considerations
- Ties to the **existing HUB Cycling framework**

PWT - 69

A4 Public Consultation

A4.1 Ideas Board

The Ideas Board generated **160 ideas**, receiving **84 additional comments**. In total **203 people viewed or participated** in the discussion with **814 upvotes** and **11 downvotes**. To analyse this discussion, all ideas were coded into 1 of 5 categories shown in Table A1. Comments were not coded as the overwhelming majority of comments reinforced or challenged the central focus of the original idea. While the average number of votes per idea was 3.34, the median and mode for upvotes were 1 and 0 respectively. Hence, upvotes skewed towards several key ideas. These ideas are summarized under the Key Topics column in Table A1.

Table A1: Key topics discussed using the Let's Talk Richmond Ideas Board

Category	Ideas	Key Topics
Safety Improvement	63	• Upgrade existing shared road segments • Improve Dyke Road segments • Continuous cycling facilities at Garden City Road and Sea Island Way • More AAA dedicated and segregated facilities • Improve safety on River Road between western terminus and No. 3 Road • Continuous cycling facilities on No. 3 Road, extend to Steveston Hwy • Separate walking and rolling on shared pathways
New Route	33	• River Road and River Drive improvements to link West Dyke to eastern terminus of River Road • New east-west neighbourhood bikeway • Extend route on Shell Road to River Drive
Policies & Programs	28	• Formalize an official 'Tour de Richmond' • Construct routes on disused rail lines • Install secure bike lockers • Beginner mountain biking trail in Richmond • More signs directing cyclists to existing routes • More cycling education
Infrastructure	20	• Pave the West Dyke Trail • More dedicated bikeways like Europe • Bike sensors at intersections fail to trigger • Install cyclist-controlled crossings • Ensure bike rack designs are secure/enhance bicycle parking
Connectivity	16	• East Richmond is poorly connected to the cycling network • Create east-west and north-south corridors • Better access to Canada Line • Continuous paved trail loop around Richmond • More neighbourhood bikeways

Safety Improvements

In general, safety improvements were the most common ideas generated and represented several of the most popular ideas. Fixing shared road segments was the most upvoted idea on the platform with "fix bicycle lanes that suddenly turn into regular roads" receiving 30 votes. The remaining safety improvements in Table A1 received no fewer than 15 votes, and often were mentioned across multiple unique ideas. The Railway Greenway was a key example cited by participants who expressed a need for separate walking and rolling on shared pathways.

New Routes

While new routes were a core focus of engagement on the Mapping Tool (summarized in the next section), several routes were also discussed on the Ideas Board. Two new routes were consistently requested by multiple entries on the Ideas Board: River Road and Shell Road. "Make all of River Road along the North Arm a safer bike route" received 21 upvotes, while three additional entries requesting similar extensions on River Road received 10 or more votes. An extended north-south route on Shell Road between River Drive and the existing cycling network was requested five times, with the most popular entry receiving 16 votes. The idea to have more east-west neighbourhood routes also received 16 upvotes.

Policies & Programs

"Please establish and dedicate a Tour de Richmond cycle route around the island" received the most upvotes of all ideas coded under this category with 13 votes. In a similar vein, directive to work towards a continuous trail system around Lulu Island was also requested. Regarding bike lockers, City Centre locations and Canada Line stations were put forward as key priority areas. A beginner mountain biking trail was specifically requested to prevent the need to travel to neighbouring municipalities for this activity. From a wayfinding perspective, 8 participants agreed that more signs directing cyclists to existing bike routes were needed.

Infrastructure

Paving the West Dyke Trail was the top infrastructure idea, receiving 16 votes. The rationale for this idea is to create a tourist destination; expand access for strollers, small children's bicycles and rollerbladers; and address the difficulty of riding on gravel for long periods. Several infrastructure improvements for crossings along the existing network were requested including push buttons, designated traffic lights for cyclists, and upgrades to unresponsive bike sensors. Finally, it was noted that existing City facilities use some bike parking designs that are less secure, with a shape that is difficult to properly secure a bike to using a U-lock.

Connectivity

Ideas were coded under connectivity if their focus was on wider connectedness across the city. Several respondents emphasized a need for east-west and north-south corridors. Connections between East Richmond and the difficulties crossing Highway 99 emerged as key issues. Connections to Canada Line stations and the Canada Line Bridge were directly referenced by several participants. As previously mentioned under Policies & Programs, 10 participants further supported the idea of a "continuous paved loop around Richmond."

Intersections

Across these five categories, improvements at intersections were an important subtopic and central to 16 of the 160 ideas generated. In general, these ideas focused mainly on enhanced detection and protection of cyclists when crossing. The need for "appropriate bicycle lane paths at the intersection of Garden City Road and Sea Island Way" received 21 upvotes. Meanwhile, 6 participants expressed the need for enhanced traffic calming measures at Shell Road Trail crossings in response to fast-moving vehicles.

A5 Mapping Tool

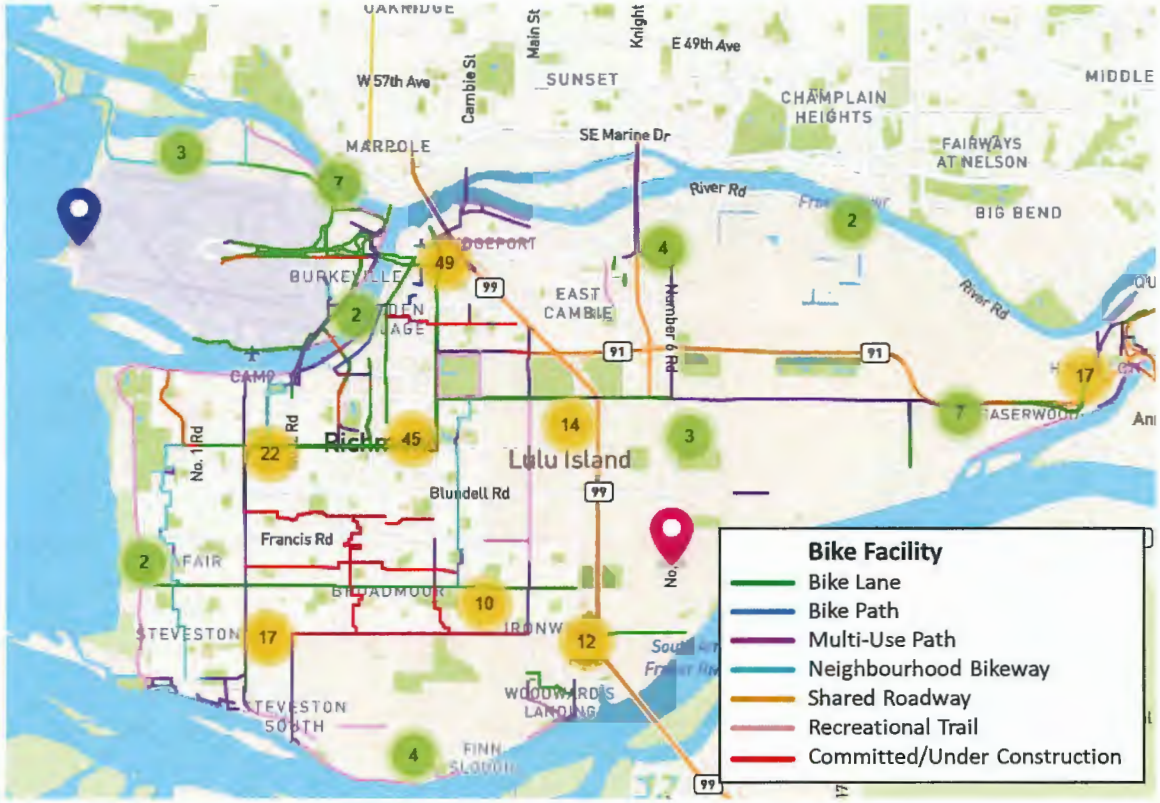
To assess opportunities for improvements to the existing cycling network and to prioritize future investments, a mapping tool was created to allow residents to provide location specific feedback and recommendations. A screenshot of the mapping tool is provided in Figure A1. As shown, the base map included the existing street network, several key destinations, and the existing and planned cycling network for reference.

This tool enabled participants to create pins and view the pins that others had created. When creating a pin, participants could choose from one of four descriptive categories: network gap, upgrade needed, suggestion for new route, or favourite place to ride. To better represent levels of geography and account for instances where a different category better described the written feedback, data was recoded during our analysis into six categories. In total, **49 contributors** plotted **222 pins**. Table A2 depicts the breakdown of these pins by category.

Table A2: Number of pins on Let's Talk Richmond by category

Category	Mentions
Favourite Place to Ride	11
Improve Intersection	37
Missed Connection	8
Network Gap	39
New Route	70
Upgrade Needed	57
Total No. of Mentions	**222**

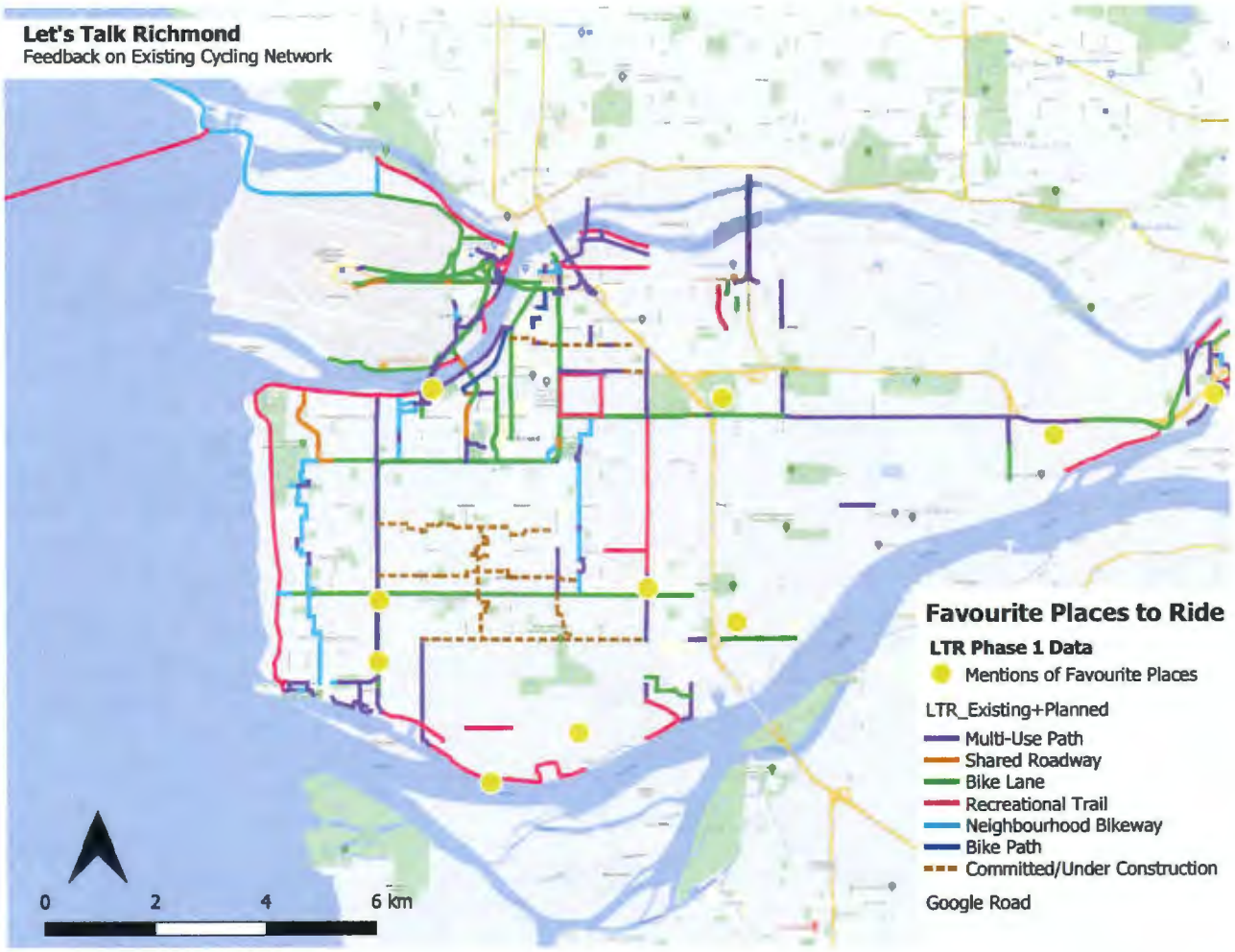
Figure A1: Let's Talk Richmond Mapping Tool



A5.1 Favourite Place to Ride

Figure A2 shows favourite places to ride were dispersed throughout the city. In two instances, respondents voted for the same destination. First, two pins were placed identifying the Railway Greenway as their favourite cycling facility. Second, two pins were placed calling for an official mountain bike trail to be established in Richmond Nature Park East between Jacombs Road, Westminster Hwy, Highway 99, and Highway 91. The rest of the seven responses were spread-out throughout the city and were evenly distributed between official cycling routes and unmarked routes. Based on the pins and commentary provided, we can conclude that stakeholders generally selected locations along bike corridors that are continuous with lower potential of conflict with motorists.

Figure A2: Pins on Let's Talk Richmond indicating favourite places to ride



A5.2 Improve Intersection

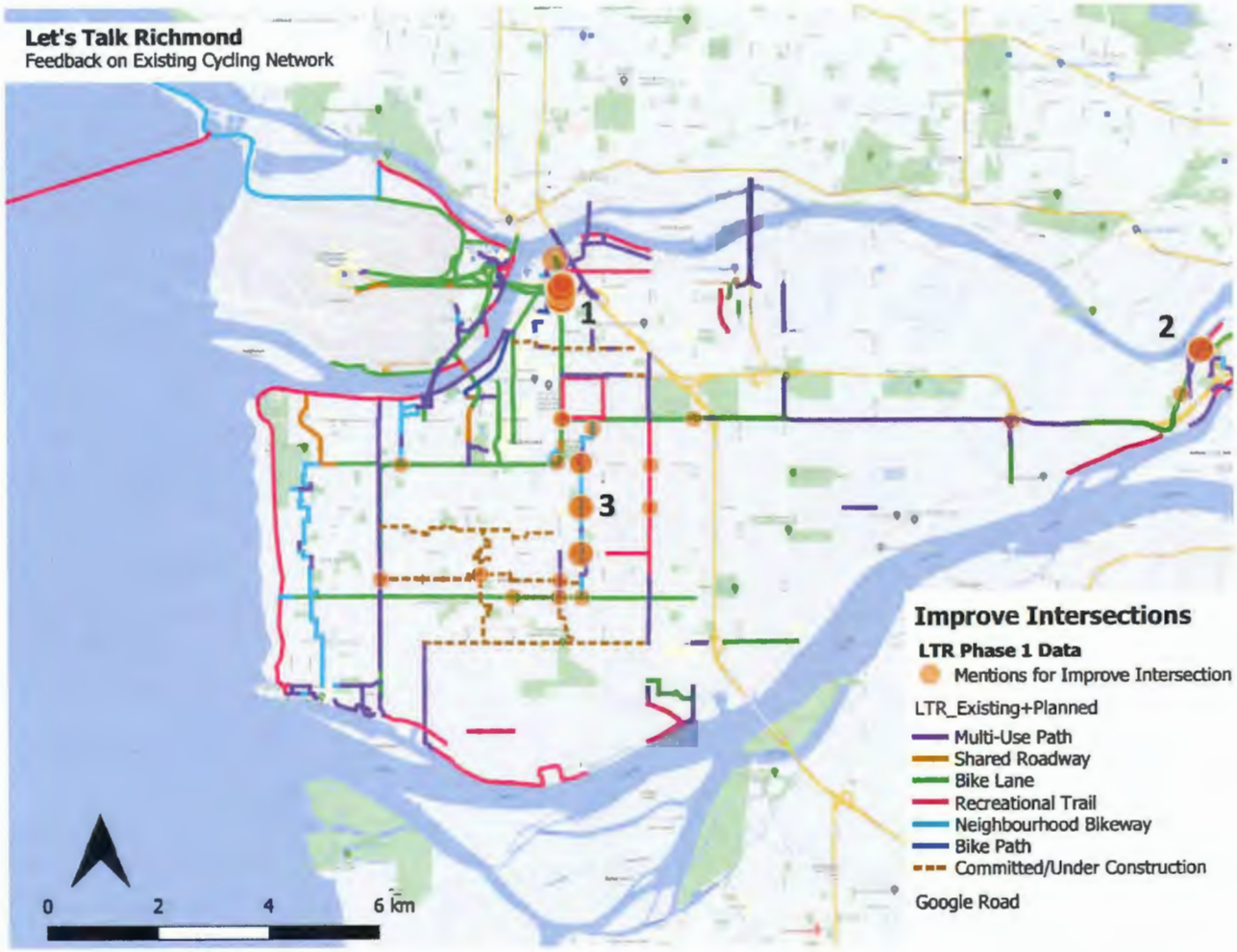
Figure A3 depicts intersections where respondents indicated a need for improvement. The size and transparency of data points has been adjusted to show frequency of pins, and highlight areas repeatedly mentioned by respondents. Larger, opaque clusters of pins indicate key locations. These clusters of pins reveal several key intersections identified as needing improvements:

1. **Sea Island Way and Garden City Rd**
   Travel lanes for cyclists on Garden City Rd end prior to the intersection, creating safety concerns for cyclists.

2. **Westminster Hwy and River Road**
   The bike lane terminates into a shared street at this intersection heading southbound on Westminster Hwy until Fraserside Gate. Enhanced separation from motorists and a signalized intersection are requested in response to close calls. The City has a committed project to provide a protected bike lane in this section.

3. **Parkside Neighbourhood Bikeway**
   Bike detection at controlled intersections is not responsive enough. A cyclist-controlled crossing is also requested for the intersection of Ash Street and Granville Ave.

Figure A3: Pins on Let's Talk Richmond mentioning intersection improvements



A5.3 Missed Connections

Eight missed connections are shown in Figure A4. This category for missed connections was created to differentiate between network gaps and gaps of a very small geography (i.e., one block). Hence, these improvements likely have lower costs to implement.

The southernmost pins have been placed on the committed east-west Crosstown Neighbourhood Bikeway at intersections with No 2. Road and No. 3 Road. In these locations the offset street grid creates a potential gap if connections are not provided on these major roads. Completion of the committed project will address the comments. The remaining missed connections are located on existing facilities.

Figure A4: Pins on Let's Talk Richmond mentioning missed connections

PWT-74

A5.4 Network Gaps

In Figure A5 we observe that most respondents mentioned network gaps along three major routes:

1. **Sexsmith Road to Canada Line Bridge** – Sexsmith Road was identified as a network gap between Beckwith Road and Patterson Road. Respondents recommended a southern extension of the existing MUP on Sexsmith Road as a potential alternate route to Garden City Road for accessing the Canada Line Bridge.

No. 3 Road from Sea Island Way to Alderbridge Way – While there is a continuous northbound bike lane, the southbound bike lane along No. 3 Road ends at Capstan Way before starting again at Alderbridge Way. In both directions there is a gap between Cook Road and the existing route on Granville Ave.

3. **No. 2 Road from Westminster Hwy to Granville Avenue** – A continuous route is requested between the No. 2 Road Bridge and the existing Granville Ave route.

Figure A5: Pins on Let's Talk Richmond mentioning network gaps

A5.5 New Routes

Figure A6 shows the distribution and frequency of the 70 pins recommending new routes (i.e., larger network gaps of several kilometres or routes on entirely new roads). Five key corridors emerged from our analysis:

1. **Gilbert Road** – North-south route selected for being approximately equidistant between the Parkside (Ash Street) Neighbourhood Bikeway and Railway Greenway.
2. **Francis Road** – Potential east-west route between West-Dyke Trail and Shell Road.
3. **Fraser River Park Bridge** – Five respondents recommended constructing a pedestrian-cyclist bridge to connect directly to the Fraser River Park and Arbutus Greenway in Vancouver.
4. **River Road West from Canada Line Bridge to Middle Arm Greenway** – Creation of a continuous route from the North Dyke to the Middle Arm Greenway.
5. **Shell Road Trail to Bridgeport Road and River Drive** – An extension of the Shell Road route from Hwy 99 to Bridgeport Road and River Drive.

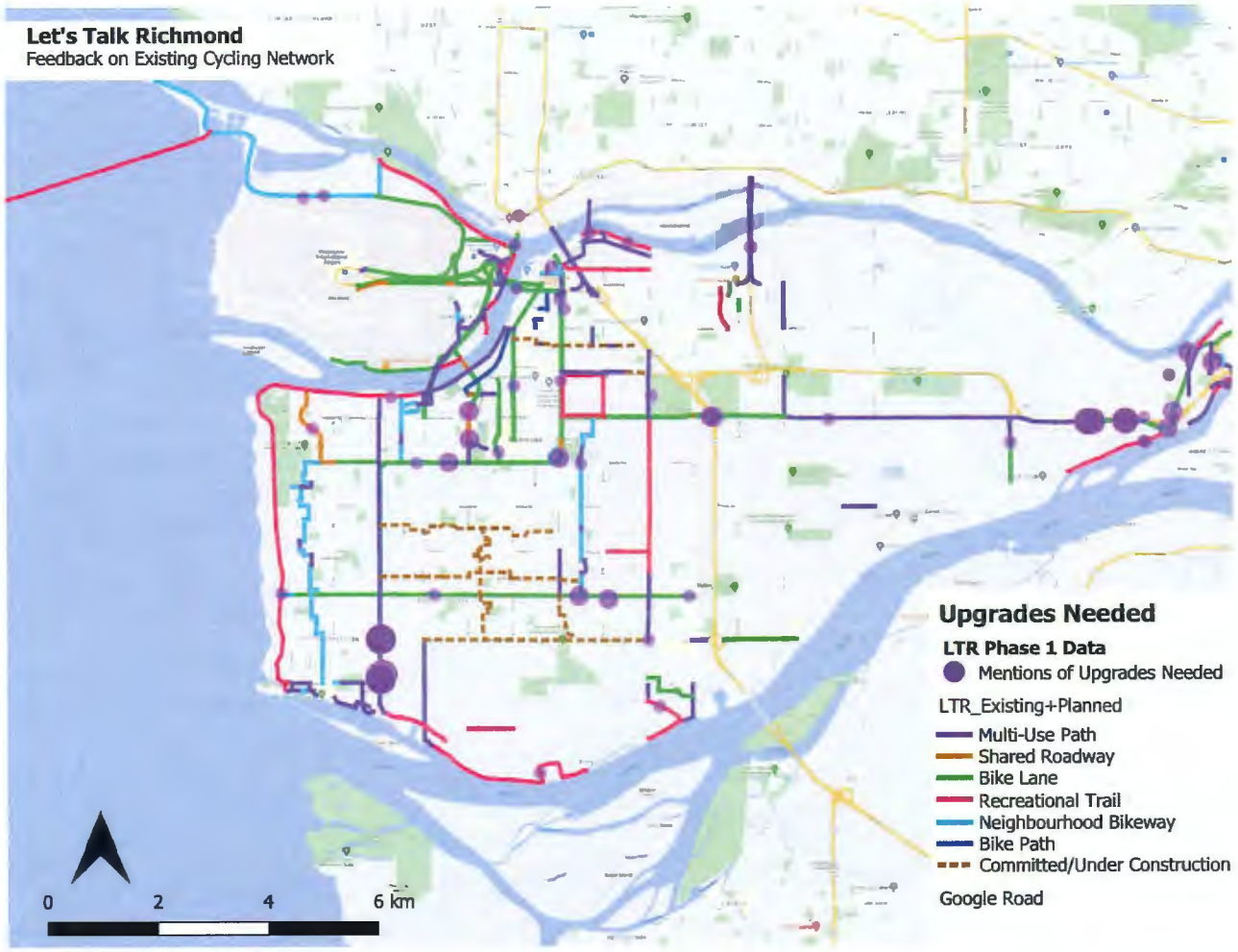
Figure A6: Pins on Let's Talk Richmond mentioning new routes

A5.6 Upgrades Needed

Figure A7 shows areas where upgrades are needed. This category mainly describes areas in the existing network where the public has proposed further safety upgrades that vary greatly in scale. From the data, two key areas stand out as locations respondents prioritize for upgrades:

1. **Westminster Hwy in East Richmond** – In general, the entire Westminster Hwy corridor in East Richmond received requests for upgrades to areas where bicycles are not physically separated from traffic. More specifically, the 300m shared road segment between McMillan Way and Graybar Road was a key focus of these safety concerns.
2. **Railway Ave between Garry Street and Moncton Street** – The Railway Greenway MUP currently ends at Garry Street. While a bike lane is provided on Railway Ave, this discontinuity of the protected two-way facility poses a challenge for less confident riders, especially those travelling northbound given the MUP is exclusively on the west side of the roadway.

Figure A7: Pins on Let's Talk Richmond mentioning upgrades needed



A6 Public Survey

In total, we received **571 submissions** to the public survey. For our analysis, we have split these respondents into two groups: ***more frequent cyclists*** who cycle "daily, weekly, or monthly" (455); and ***infrequent cyclists*** who cycle "never, rarely, or sometimes" (116). This was done to better understand differences in behaviours and attitudes between the two groups.

Age Demographics

As a demographic measure, respondents were asked "The age group I, or the cyclists in my household, belong to is." The distribution of responses is show in Table A3, and was generally similar between groups. The more frequent cyclist group had a larger proportion of respondents between 19-35, while the infrequent cyclist group was made up of more persons aged 65 and older.

PWT - 78

Table A3: Age distribution of respondents by cycling frequency

Age	More Frequent Cyclists	Infrequent Cyclists
2-5	4%	6%
6-12	10%	10%
13-18	10%	7%
19-35	18%	12%
36-50	26%	24%
51-64	19%	22%
65+	13%	19%

A6.1 Shared Mobility

As shown in Table A4, few respondents reported being very interested or extremely interested in having a shared mobility program be it a bike, electric bike, or electric scooter. Approximately half of respondents were not interested at all in a shared mobility program. Interest in an electric bike share program was the highest, with similar levels of interest in a shared bike or electric scooter program. These trends may be partially explained by the fact that most respondents reported already owning a bicycle.

Table A4: Interest in shared mobility programs

	Bike	E-Bike	E-Scooter
Not interested at all	58%	46%	58%
Slightly interested	22%	23%	17%
Not sure	8%	9%	10%
Very interested	7%	13%	9%
Extremely interested	6%	9%	6%

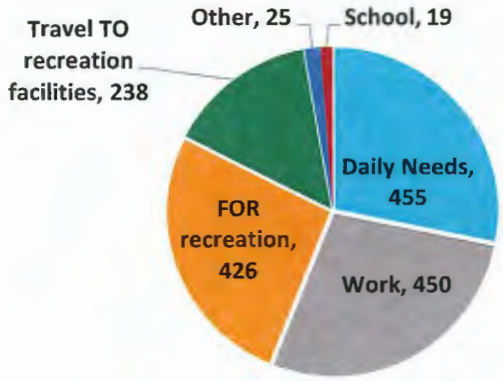
A6.2 Trip Purpose

More Frequent Cyclists

Survey participants were asked to select all responses that apply for cycling trip purposes. Nearly all ***more frequent cyclists*** reported cycling for the purposes of daily needs (455, 100%), work (450, 99%), and recreation (426, 94%). Approximately half of respondents reported travelling to recreation facilities by bike (see Figure A8 on the next page).

For **daily needs**, common destinations include groceries (multiple locations), Ironwood and Steveston. Similarly, common destinations **for work** include Ironwood and Steveston. **For recreation**, common destinations include Dyke trail (multiple locations), Gary Point Park, Steveston, Terra Nova, and Iona Beach.

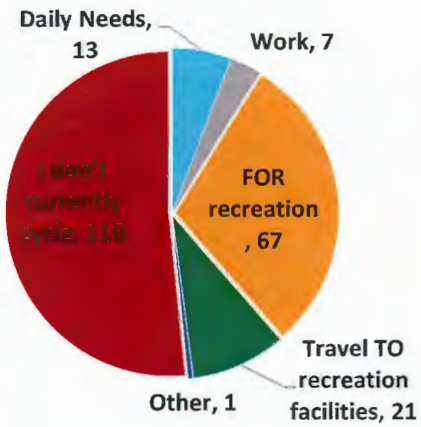
Figure A8: Trip purpose (more frequent cyclists)



Infrequent Cyclists

Most ***infrequent cyclists*** travel by bike for **recreation** (see Figure A9), with the most popular destinations being a dyke trail, Minoru, Steveston, and Terra Nova.

Figure A9: Trip purpose (infrequent cyclists)



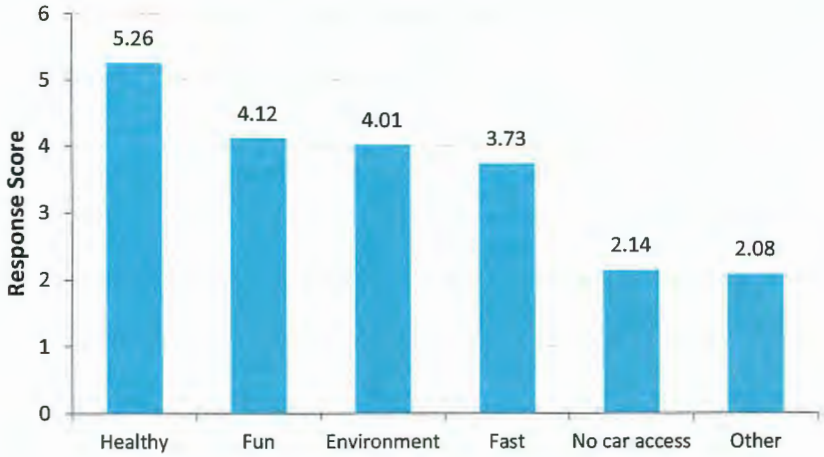
A6.3 Reasons for Cycling

Respondents were asked to rank responses to the prompt "I choose to cycle because" from 1 to 6. Options included: it's fast and convenient; it's healthy / good exercise; it's better for the environment; I don't have access to a car; it's fun; and other.

These results were calculated using a weighted average, where the respondent's highest ranked choice has the highest weight (in this case 6, as there were 6 options) and their lowest ranked choice has a weight of 1. Hence, their second choice would receive a weight of 5, their third choice 4, and so forth. Weights were multiplied by the total response count for each ranking and divided by the total response count.

Figure A10 shows the relative influence of these factors on cycling, with personal health, environment and fun being the top reasons selected. **Healthy** scored the highest, as many respondents selected this as their first or second choice. The reasons people choose to cycle were comparable between the more frequent cyclist and infrequent cyclist groups.

Figure A10: Reasons for cycling



A6.4 Comfortable Cycling Environments

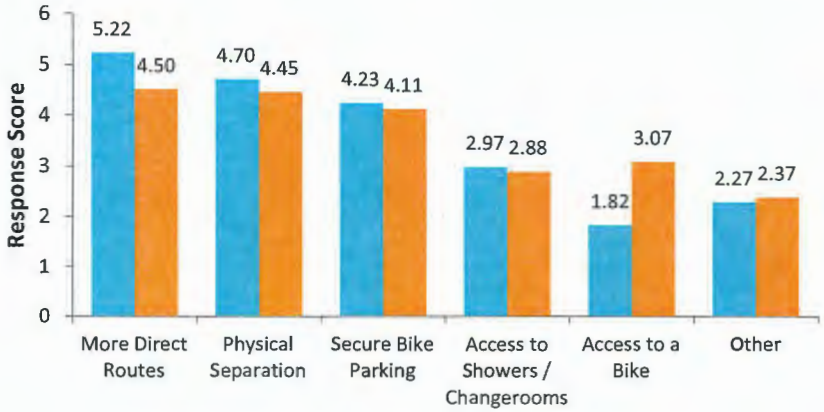
All 455 ***more frequent cyclists*** reported that they felt comfortable cycling on trails and off-street paths, in bike lanes with barriers, and in bike lanes without barriers. Approximately **70%** of more frequent cyclists agreed that they were comfortable cycling in **mixed traffic on neighbourhood streets**. Meanwhile only 20% of respondents were comfortable in mixed traffic on major streets.

Roughly two thirds of ***infrequent cyclists*** reported feeling comfortable cycling on **trails and off-street paths**, while 58% of respondents were comfortable in bike lanes with barriers. Less than one third of infrequent cyclists were comfortable in any other facility types, while 33% indicated that they did not feel comfortable cycling in Richmond.

Encouraging Cycling

The top three answers for what would get people to cycle more include **having more direct routes, access to secure bike parking** and **physically separated infrastructure** (see Figure A11). These results were also calculated using a weighted average (described in section A6.3).

Figure A11: Factors that encourage people to cycle more (more frequent cyclists)

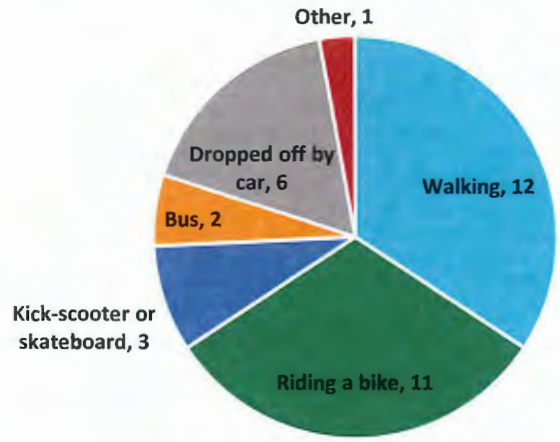


In general, factors encouraging cycling followed a similar trend between more frequent cyclists and infrequent cyclists. Access to a bike was a more important factor for less frequent cyclists, 116 of whom reported that they do not currently cycle (see Figure A9), and who may be more likely not to own a bicycle.

A7 Student Survey

We received **33 responses** to the student survey, with most respondents identifying as being in grades 9 through 12. **Typical ways of getting to school most commonly include walking or riding a bike** (see Figure A12), with the majority of students who walk or bike being in grades 7 or higher.

Figure A12: Typical ways students travel to school

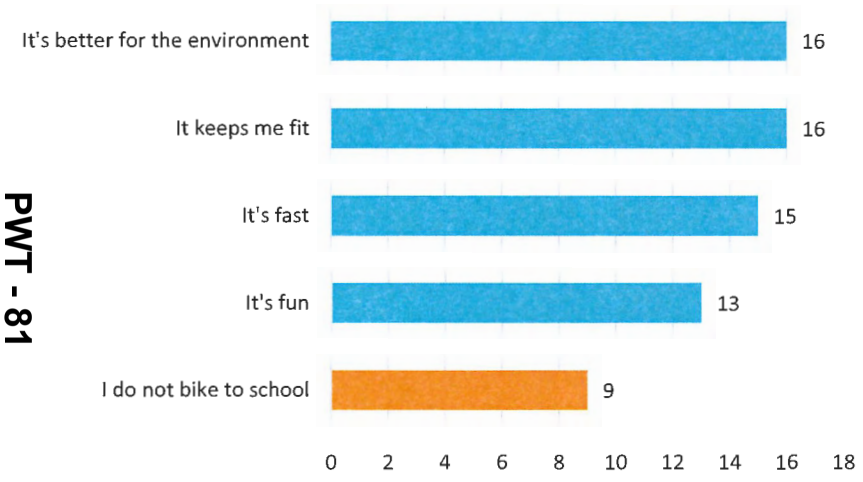


PVT-080

Reasons for Cycling

Figure A13 shows **reasons for biking to school are fairly evenly distributed** amongst possible responses, with the highest response rates being it's better for the environment, keeps me fit, and it's fast. Of the 9 respondents who reported they did not bike to school, 7 were students who reporting walking as their most common way of travelling to school.

Figure A13: Reasons respondents bike to school



Reasons Against Cycling

Unfortunately, there was a low response rate (n=14) to the reasons respondents don't ride a bike to school. Similarly, none of the students who reported cycling or being dropped off by a car as their most common method of travel to school responded to this question. Within this small sample, using other active modes, concerns about safety, and worrying about having their bike stolen were the top responses (see Table A5).

Table A5: Reasons respondents do not bike to school

Responses	Number of Respondents
too far / too long	1
I don't have a bike	0
I don't know how to ride	0
I don't feel safe	3
bad weather	0
worry about stolen bike	2
I walk / skateboard / kick scooter	3
I take the bus	0
my parents won't let me	2
other	3

Favourite Cycling Locations

The most common favourite places to ride in Richmond amongst students (n=25) were the Railway Greenway, Dyke Trails, Garry Point Park, and Steveston.

B Phase 2 Engagement Summary

B1 Introduction

Phase 2 engagement for the Richmond Cycling Network Plan Update focused on three major objectives:

- Validating the findings from our route-level evaluation
- Refining feedback heard during Phase 1 engagement
- Understanding how stakeholders and the public prioritize between different improvements and connections at the implementation stage

As part of this second phase of engagement, several activities were conducted to gather public and stakeholder input including:

- Internal stakeholder consultation with:
  - City of Richmond staff
  - Advisory Committee on the Environment
  - Richmond Active Transportation Committee
- External stakeholder workshop
- Public consultation for both the public and students via the *Let's Talk Richmond* Ideas Board, Mapping Tool, and Survey Tool

PWT - 83

This note summarizes the key findings and highlights from this phase of engagement, which have refined the final phase of technical analysis, policy recommendations and the implementation strategy for the future cycling network and prioritized investments.

B2 Internal Consultation

B2.1 Internal Review by City Staff [2021-03-24]

An internal review by City of Richmond staff (including Transportation, Park Services, Recreation Services, Development Applications, Policy Planning, Sustainability and District Energy, Sports Services and Events, and Public Works) was completed prior to seeking approval from Council to begin public consultation. Several ideas were presented that influenced the framing and delivery of Phase 2 engagement materials:

- Importance of speed differential when managing shared pathways
- Showing connections to routes on Sea Island and Vancouver
- Direct feedback to refine questions for the Survey and Ideas Board
- Supporting the needs of all cyclists (e.g., recreational, touring, commuting, confident, families, etc.)

B2.2 Advisory Committee on the Environment [2021-11-10]

Our discussion with members of the committee focused on three key topics:

- **Support for achieving social equity objectives** in determining where the core cycling network should focus
- Desires for improved cycling **connections to the No. 2 Road bridge**, with consideration for separation given recent traffic collisions
- **Separating cyclists and pedestrians** in busy areas (e.g., Steveston Boardwalk)

B2.3 Richmond Active Transportation Committee [2021-11-17]

Three discussion topics framed much of our dialogue with the committee:

- Perspectives on e-mobility devices on roads and multi-use paths
- Comments on safely sharing trails and pathways with pedestrians
- Priorities for expanding the network

In response, we heard about the challenges of sharing facilities with e-scooters, e-bikes, and cyclists capable of reaching higher speeds. Support was given for **separation between pedestrians and cyclists on multi-use pathways**, as well as education on courtesy for shared spaces. In identifying priorities for the future network, the importance of having **multiple connections to East Richmond to allow options in the event of** road closures (e.g., climate impacts, road construction, etc.) was highlighted.

Overall, **No. 3 Road** received considerable attention as a high priority route, with remarks on the narrowness of the existing bike lanes, observations of cyclists using sidewalks and key destinations within the No. 3 Road area.

B3 External Consultation

B3.1 External Stakeholder Workshop [2021-11-30]

Attendees
HUB Cycling, ICBC, Metro Vancouver, MoTI, Richmond Active Transportation Committee, Richmond School District, TransLink, Vancouver Airport Authority, Vancouver Coastal Health

Phase 2 engagement was a good opportunity to hear from stakeholders about current and upcoming policy directions and learn from their experiences. For example, Metro Vancouver shared their vision of planning regional greenway routes along **scenic resources** for recreation and the benefits and trade-offs of paving gravel trails in Tynehead Regional Park.

Stakeholders also shared several recommendations for the final report including:

- Consideration for **end of trip facilities** and expanding needs (e.g., charging and repair stations)
- **Highlighting rapid implementation facilities** as quick, cost effective, piloting tools
- Supporting regional coordination in managing electric and micromobility devices
- Addressing the need for **data collection** and counters to inform successes and future planning
- Maps of phased cycling network build out to align with prioritization and implementation plan
- Understanding access from communities to key destinations (e.g., nature, jobs, and essential services)
- **Prioritizing multi-function routes** that service commuting as well as recreation in off peak hours

B4 Public Consultation

B4.1 Ideas Board

The Ideas Board generated **31 ideas**, receiving **43 additional comments**. In total **67 people viewed or participated** in the ideas board. To analyze this discussion, all ideas and comments were coded into 1 of 5 categories shown in Table B1. Here, the key topics column summarizes the main discussion points receiving further comments and upvotes.

Table B1: Key Topics discussed using the Let's Talk Richmond Ideas Board

Category	Key Topics
Speed and Separation on Pathways	• Emphasis on separation of modes over speed limits • Some support for speed limits (if clearly posted), especially in busy scenic areas • Using road lanes for faster rolling modes – Railway Greenway/bike lanes as positive example
Priority Routes	• Support for Garden City Road improvements • Improved connections to Canada Line Bridge • Support for expanding neighbourhood routes and including safe crossings at major intersections • Support for routes on Blundell Road • No. 2 Road from Westminster Hwy to Granville Ave • North Westminster Hwy as preferred cycling route
Active School Travel	• Conduct research into local barriers • Identify school champions • Roundtables for parent concerns
Bike Parking	• Continued need for secure, dry, parking facilities • Considerations for repair stands and other mobility devices such as wider/cargo bikes and electric scooters
Other Ideas	• 30 km/h speed limits on residential roads • Shift focus from cyclists to active transportation and mode shift for the wider population • Improve pathway lighting for cycling at night

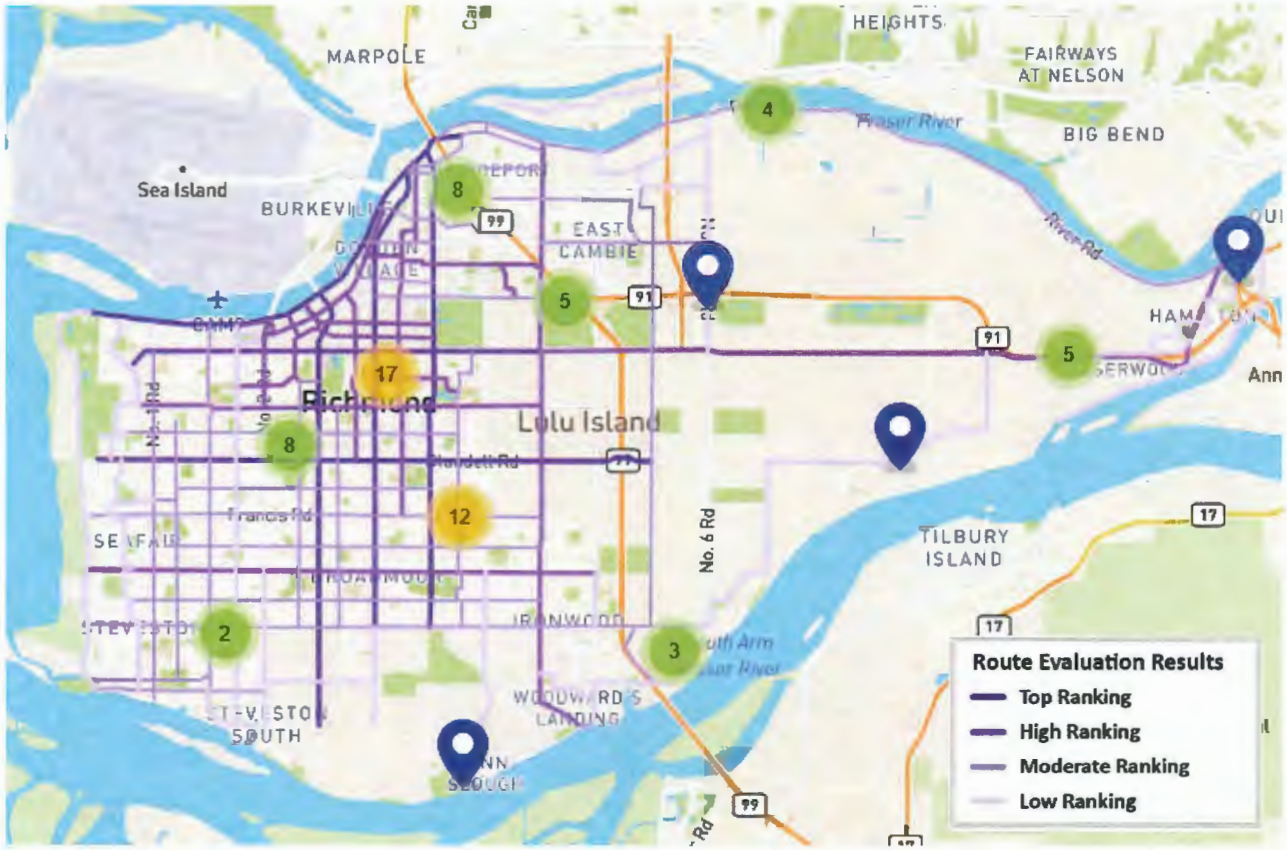
In general, the most discussed categories were priority routes and speed and separation on pathways, with 21 and 19 ideas and comments respectively. The prioritization of connecting to the No. 2 Road Bridge was also presented as an opportunity to address concerns with Lynas Lane, which participants preferred for local connections only. The top idea (7 votes) was to shift focus from cyclists to active transport (i.e., a wider population of users). This aligned with feedback on the Tour de Richmond idea. Attitudes were that this was a positive idea, though the priority should be mode shift for the wider population.

B5 Mapping Tool

To validate the findings from our route-level evaluation, and further assess opportunities for improvements to the existing cycling network and how to prioritize future investments, the *Let's Talk Richmond* Mapping Tool was once again used for this phase of engagement, to allow residents to provide location specific feedback and recommendations. A screenshot of the mapping tool is provided in Figure B1.

As shown in Figure B1, the base map included the results of the route level evaluation carried out during the Phase 2 analysis. To better understand how the Richmond community prioritizes different improvements and connections, participants were asked to reflect on the routes considered top or high ranking and to identify additional routes that they would consider top or high ranking.

Figure B1: Pins on the Let's Talk Richmond Mapping Tool



This tool enabled participants to create pins and view the pins that others had created. When creating a pin, participants were asked for comments. To better represent levels of geography and account for different types of written feedback, data was recoded during our analysis into four categories.

Table B2 depicts the breakdown of these pins by category. In total, **17 contributors** plotted **66 pins**.

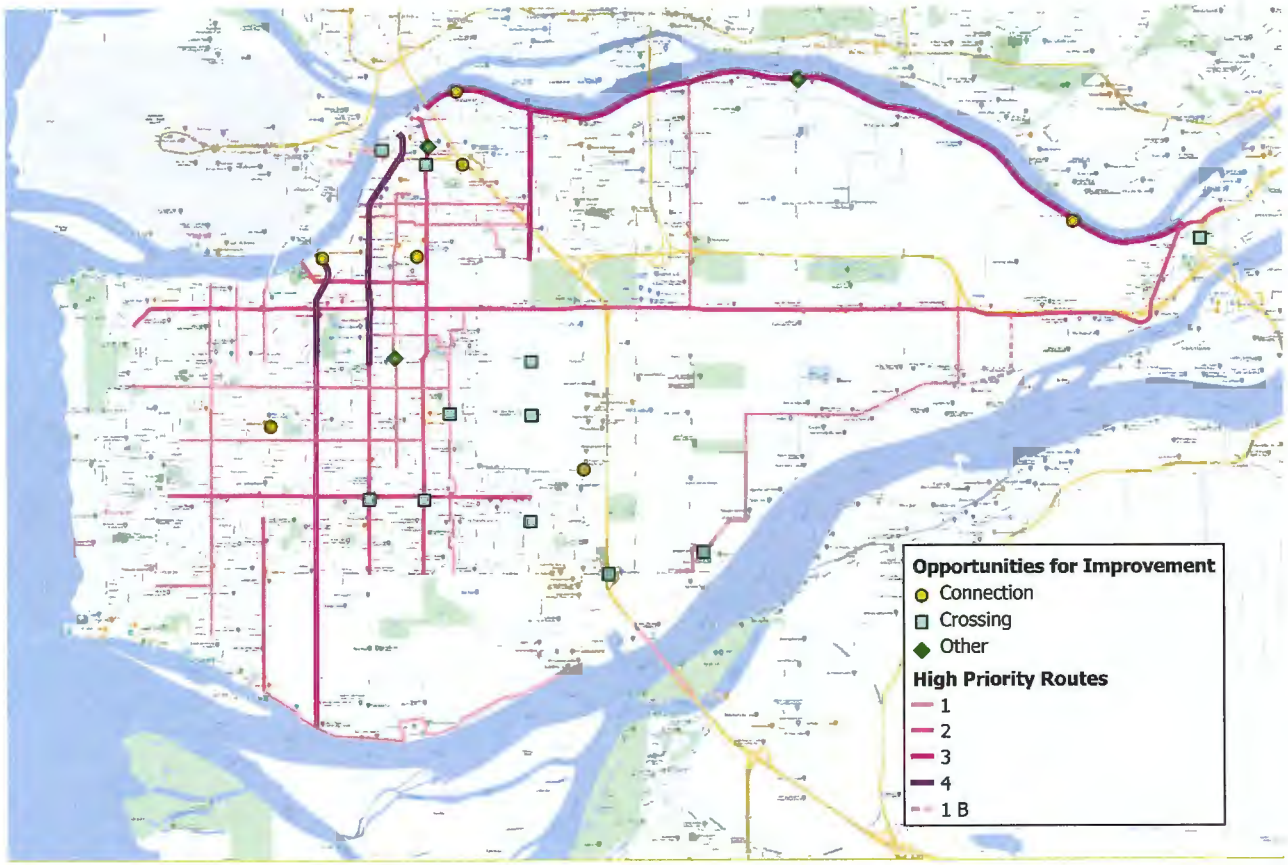
Table B2: Number of pins on Let's Talk Richmond by Category

Category	Mentions
High Ranking	45
Crossing	11
Connection	7
Other	3
Total No. of Mentions	**66**

B5.1 Network

Figure B2 shows the distribution and frequency of the 45 comments that recommended new or improved cycling routes. The comments are displayed as lines, with darker colours indicating more mentions and requests for that route.

Figure B2: Coded Map of the Let's Talk Richmond Mapping Tool Results



PWT 86

While the recommendations are dispersed throughout the city, several key corridors emerged from our analysis:

1. **No. 3 Road and Gilbert Road** – Both routes from Granville Ave to River Road were consistently identified as high priority. Both options would provide a north-south route for travelling through the City Centre.
2. **Gilbert Road** – Further improvements along Gilbert Road between the City Centre and Dyke Road.
3. **North Dyke/River Road** – Either improvements along River Road or an alternative route along the North Dyke connecting Bridgeport Station/Canada Line Bridge to Queensborough in the east.
4. **Shell Road** – An extension of cycling/pedestrian infrastructure along Shell Road between the Highway 99 overpass and River Road would enable a safer crossing of Highway 99 and connection to the North Dyke from the Shell Road Trail.
5. **Bartlett Lane/No. 9 Road –** Several users suggested alignments to complete a route connecting Westminster Hwy and Blundell Road to the dyke trails east to Dyke Road.

B5.2 Connections

The seven recommended connections are marked by yellow circles in Figure B2. Associated comments were concerned with safety, missed connections, improvements to existing connections, and signage/wayfinding.

B5.3 Crossings

The blue square markers in Figure B2 represent the 11 crossings mentioned for improvements. The comments concerned modifications to alignment, unsafe crossings, upgrading pedestrian overpasses to accommodate cyclists, more responsible bicycle sensors, and improving crossings across Moray Channel. High ranking comments on Westminster Hwy also emphasized the importance of crossing Highway 99.

B5.4 Other Opportunities

Miscellaneous opportunities (represented by green diamonds in Figure B2) focused on the removal of an incomplete bike lane on Cooney Road, turning safety concerns, and reducing vehicle volumes along River Road.

B6 Public Survey

In total, there were **528 submissions** to the public survey; 90% of respondents identified as being a resident of Richmond, while 20% indicated that they were employed in Richmond. Only 3% of survey respondents identified as being a student in Richmond and 8% identified as a visitor.

Over 50% of respondents selected that they heard about this engagement through an email from LetsTalkRichmond.ca. Other popular ways respondents heard of the engagement included word of mouth (11%), via a news story (10%), and City of Richmond social media channels (10%).

B6.1 Improvements to Increase Comfort Level

Respondents were asked to indicate their level of comfort with several types of cycling facilities, and the extent to which they would deviate from their perceived more direct route to use more indirect routes that provided a higher level of comfort.

According to results, 42% of survey respondents selected that, if it takes 20 minutes to cycle to their destination on roads with no bike facilities, they are willing to **alter their route by more than 5 minutes or at least 1500 metres** to ride on a fully protected bike lane or off-street path. An additional 23% of respondents indicated that they would deviate by up to 5 minutes or 1500 metres.

Local Streets

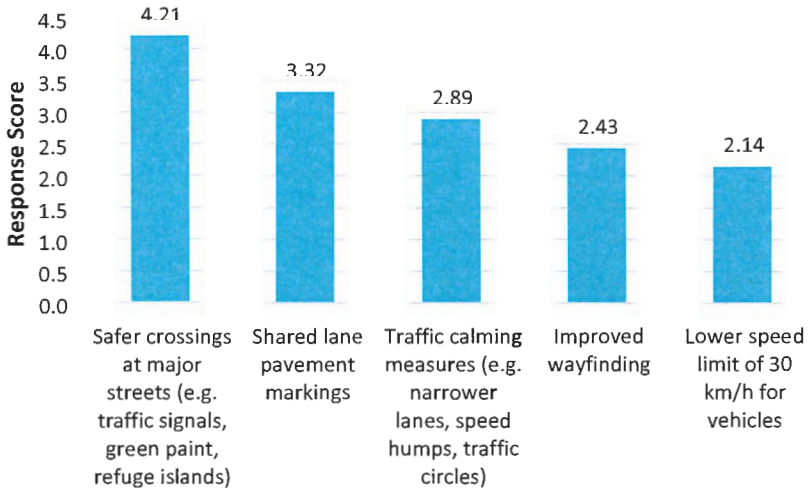
For local streets (non-busy roads), respondents were asked to rank responses to the prompt "*I prefer the following improvements to increase my comfort level of using neighbourhood bikeways on local streets.*"

Options included: *safer crossings at major streets (e.g., traffic signals, green paint, refuge islands)*; *shared lane pavement markings*; *traffic calming measures (e.g., narrow lanes, speed humps, traffic circles)*; *improved wayfinding*; and *lower speed limit of 30 km/h for vehicles*.

Approximately **56% of respondents selected *safer crossings at major streets*** *(e.g., traffic signals, green paint, refuge islands)* as their **most preferred choice**, while 46% of respondents selected *lower speed limit of 30 km/h for vehicle* as their least preferred choice.

Figure B3 displays the overall results for each facility. These results were calculated using a weighted average, where the respondent's highest ranked choice has the highest weight (in this case 5, as there were 5 options) and their lowest ranked choice has a weight of 1. Hence, their second choice would receive a weight of 4, their third choice 3, and so forth. Weights were multiplied by the total response count for each ranking and divided by the total response count.

Figure B3: Ranked Preference of Cycling Improvements for Neighbourhood Bikeways



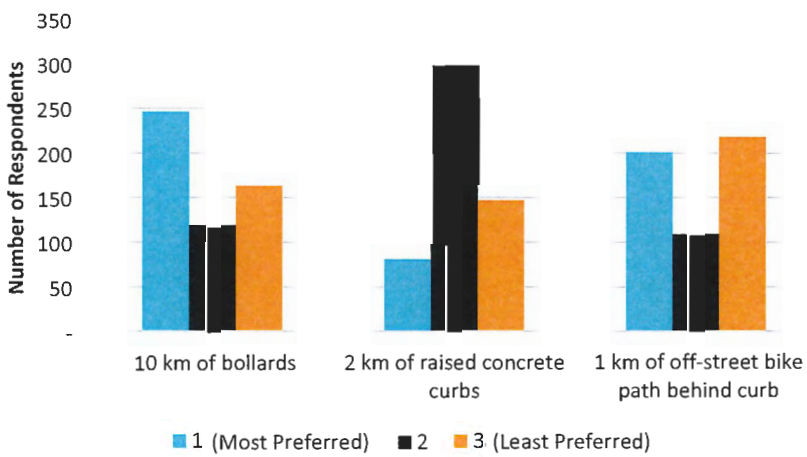
Major Street Bike Routes

As for major streets (busy roads), respondents were asked, "*Given the relative cost of different forms of physical protection measures, I prefer the following designs to increase my comfort level using major street bike routes*".

For the results, 47% of respondents ranked *10 km of bollards* as their most preferred choice, while 57% of respondents ranked *2 km of concrete curbs* as their 2nd choice, and 41% ranked *1 km of off-street bike path behind curb* as their least preferred choice.

However, the average ranking has *1 km of off-street bike path behind curb* favoured over *2 km of raised concrete curbs*. Respondent views were relatively polarized around the *off-street bike path*, with over 200 respondents each putting it as their most preferred and least preferred option. Figure B4 shows the results for each facility type. In general, preferences between facilities appear to be relatively similar when controlling for differences in costs per kilometre.

Figure B4: Ranked Preference of Cycling Facilities for Local Streets

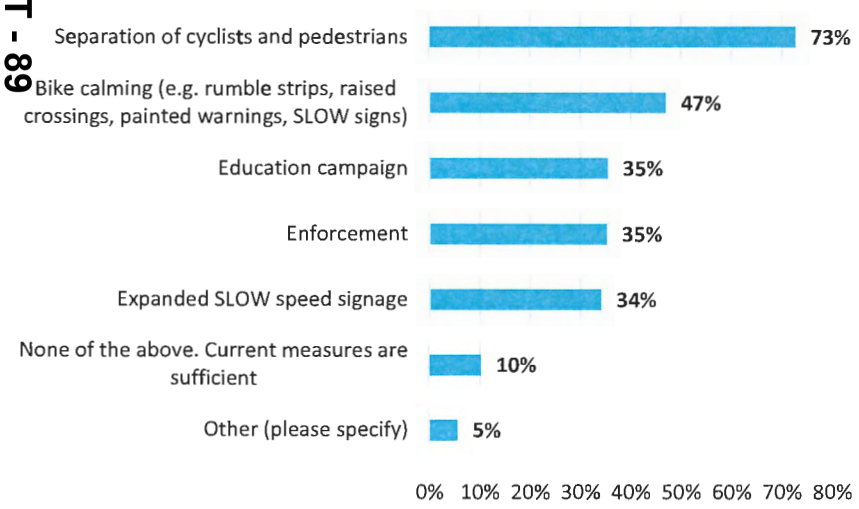


Survey participants were also asked whether they think *"…physically separated cycling facilities should be prioritized in high traffic and high density areas (e.g., City Centre, major streets)."* To this, 70% of respondents stated that they *Strongly Agreed*, and **89% of respondents either *Strongly Agreed* or *Agreed***.

Cycling/Pedestrian Mix

The survey also posed questions about how to integrate/separate people walking and cycling. Survey respondents were asked whether *"the City should upgrade existing busy multi-use pathways (e.g., Railway Greenway) to separate cyclists and pedestrians."* In response, 30% or respondents selected that they *Strongly Agreed*, and **60% either *Strongly Agreed* or *Agreed* that cyclists and pedestrians should be separated**.

Figure B5: Percentages of Respondents Who Support Measure to Encourage More Appropriate Cycling Speeds on Shared Pathways



As for *"…measures to encourage more appropriate cycling speeds on pathways shared with pedestrians,"* 73% of respondents selected that they support the *Separation of cyclists and pedestrians,* which was followed by 47% of respondents indicating that they support *Bike calming (e.g., rumble strips, raised crossings, painted warnings, SLOW signs)*. Only 10% of respondents stated that the *current measures are sufficient*. Complete results are shown in Figure B5.

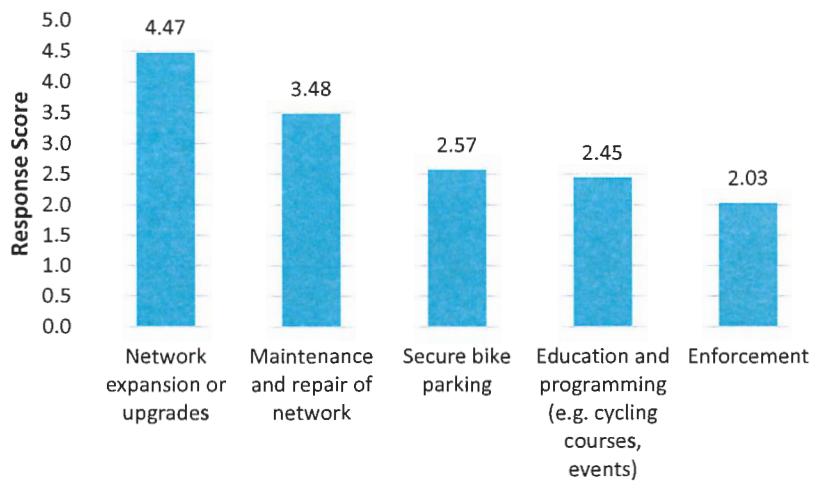
B6.2 Investment Prioritization

In the latter half of the survey, respondents were asked questions on how they would prioritize investments in the cycling network and bike parking.

Cycling Network Facilities

For the Cycling Network, respondents were provided with the prompt: *Over the next several years, I would prioritize the following cycling network investments*, and were then asked to rank the options of *Network expansion or upgrades*, *Maintenance and repair of network*, *Secure bike parking*, *Education and programming (e.g., cycling courses, safe routes to school, events)* and *Enforcement*.

Figure B6: Ranked Priority of Cycling Network Investments

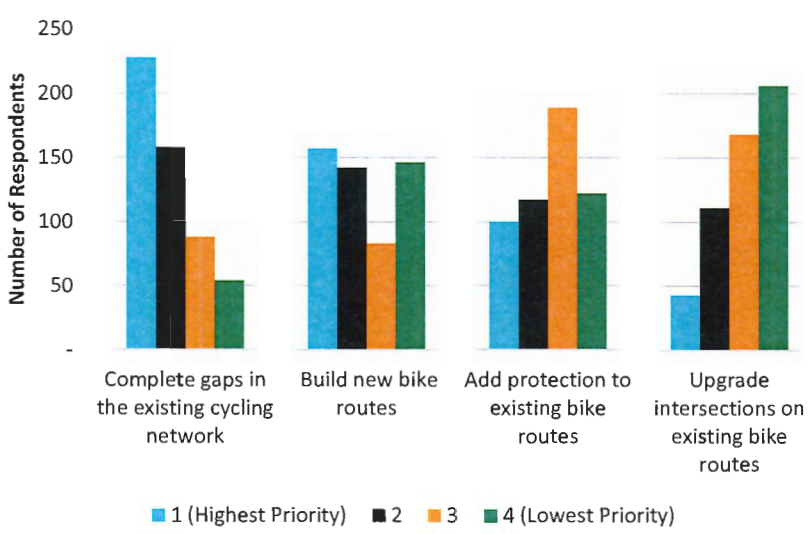


Overall, **76% of respondents ranked *Network expansion or upgrades* as their highest priority**, and 55% of respondents ranked *Maintenance and repair of network* as their second priority. Meanwhile, 51% of respondents selected *Enforcement* as their lowest priority. Figure B6 displays the weighted average ranking for each investment.

As a follow up, respondents were asked how they *"...would prioritize funding for the following types of cycling network expansion or upgrade projects over the next several years,"* with the options being *Complete gaps in the cycling network*, *Build new bike routes*, *Add protection to existing bike routes*, and *Upgrade intersections on existing bike routes*.

Of the results, 43% of survey respondents ranked *Complete gaps in the existing cycling network* as their top priority, while 39% of respondents ranked *Upgrade intersections on existing bike routes* as their lowest priority. Figure B7 displays the results, showing the number of rank placements each investment received, as well as the average ranking for each investment.

Figure B7: Ranked Priority of Cycling Network Expansion or Upgrade Projects

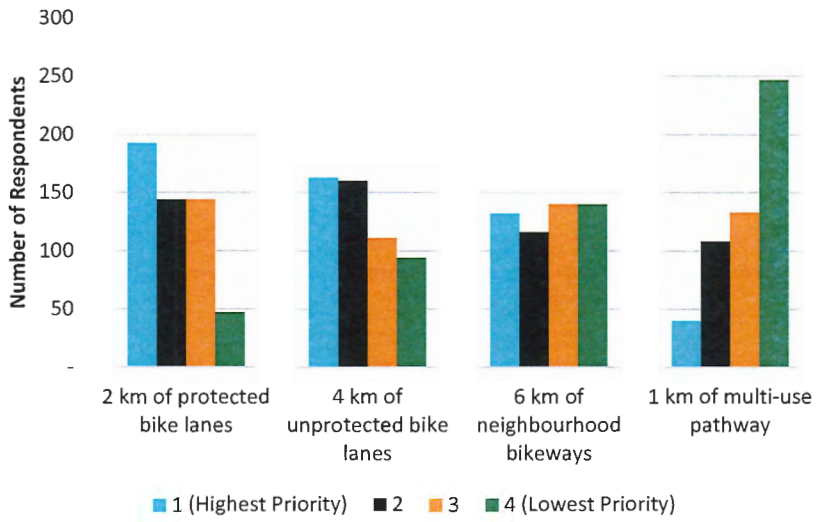


Similarly, survey respondents were asked, what they *"...would prioritize the next $1 million of investment on,"* if $1 million was able to provide either *6 km of neighbourhood bikeways*, *4 km of unprotected bike lanes*, *2 km of protected bike lanes* and *1 km of multi-use pathway*.

Survey results showed that while *2 km of protected bike lanes* garnered the most first place rankings, only 36% of respondents had it as their first priority. This option tended to have a slight preference over *4 km of unprotected bike lanes* and *6 km of neighbourhood bikeways*. The clearest result was that 47% of respondents ranked *1 km of multi-use pathway* as their last priority (Figure B8).

It is unclear if the low prioritization of multi-use pathways is from a preference of length of facilities over separation, versus the possible perceived mixing of cyclists and pedestrians on multi-use pathways, which previous questions revealed an aversion towards.

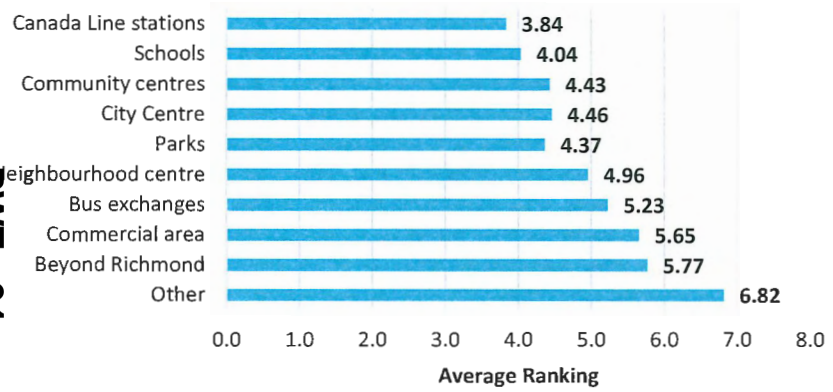
Figure B8: Ranked Priority of Investment in Cycling Facilities (when given $1 million)



To build on these questions, survey respondents were asked "*If longer bike routes need to be completed in segments, I would prioritize the following destinations*" in order from most to least importance.

Of the ten choices, 24% of respondents ranked *Schools* as their top choice, while 20% of respondents ranked *Canada Line stations*. *Community Centres, City Centre*, and *Parks* also scored in the top half. The average rank of each destination is displayed in Figure B9.

Figure B9: Average Ranking of Destinations for Prioritizing Cycling Connections

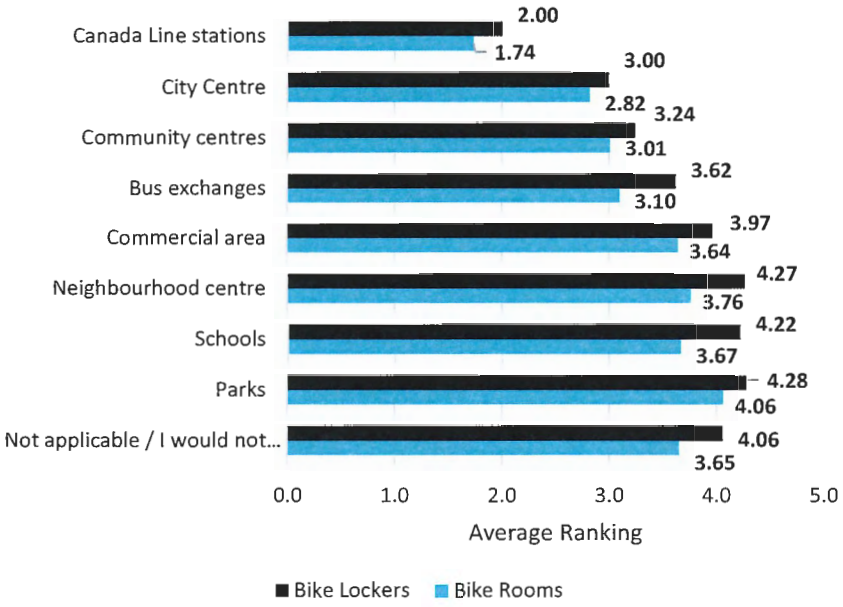


Other destinations that people listed included shopping centres (e.g., childcare facilities, movie theatres, grocery stores, banks, etc.), the dyke, the Railway Greenway and the George Massey Tunnel.

Investment Prioritization – Public Bike Lockers/Rooms

Finally, survey respondents indicated that they would prioritize public bike lockers and bike rooms at Canada Line stations (top choice by 44% and 47% of respondents respectively). The City Centre, Community Centres, and Bus Exchanges also ranked well. The difference between the results for bike lockers and bike rooms was minimal. The average rank of each destination is provided in Figure B10.

Figure B10: Average Ranking of Destinations for Prioritizing Bike Lockers and Rooms



B6.3 Other Comments or Suggestions

Comments called for protection to be prioritized on arterials and in the urban core and more neighbourhood bikeways in residential areas. Respondents also emphasized separating cyclists and pedestrians on shared pathways, and that more cyclist-controlled crossings are needed.

Route suggestions included east-west connections between No.3 Road and East Cambie, a desire to extend Shell Road northward to River Road, and improved connections between the Canada Line and Middle Arm Greenway.

Key policy feedback included the need for more charging infrastructure for electric mobility devices and concern over bike rooms being a target for bike theft.

C Existing Network Analysis Summary

Report
May 2022

Cycling Network Plan Update: Existing Network Analysis Summary

PWT - 93

City of Richmond
Our ref: 23743801
Client ref: 6584412

steer

Report
May 2022

Cycling Network Plan Update: Existing Network Analysis Summary

Prepared by:

Steer
Suite 1030 – 999 W Hasting Street
Vancouver, BC V6C 2W2
Canada

+1 (604) 629 2610
www.steergroup.com

Prepared for:

City of Richmond
6911 No. 3 Road
Richmond, BC
V6Y 2C1
Canada
Client ref: 6584412
Our ref: 23743801

PWT - 95

Steer has prepared this material for City of Richmond. This material may only be used within the context and scope for which Steer has prepared it and may not be relied upon in part or whole by any third party or be used for any other purpose. Any person choosing to use any part of this material without the express and written permission of Steer shall be deemed to confirm their agreement to indemnify Steer for all loss or damage resulting therefrom. Steer has prepared this material using professional practices and procedures using information available to it at the time and as such any new information could alter the validity of the results and conclusions made.

steer

Contents

1 Introduction 6

2 Existing Cycling Network 7

2.1 Introduction 7

2.2 Cycling Facility Types 9

3 Cycling Comfort Level 17

3.1 Factors Affecting Cyclist Comfort Level 17

3.2 Analysis 20

4 Cycling Ridership 24

4.1 Introduction 24

4.2 Analysis 26

5 Cycling-Related Incident Analysis 34

5.1 Introduction 34

5.2 Analysis 34

6 Network Connectivity and Accessibility Analysis 45

6.1 Connectivity Analysis 45

6.2 Cycling Accessibility to Key Destinations 48

7 Key Findings and Next Steps 52

Figures

Figure 1.1: A cyclist on the No. 3 Road bike lane 6

Figure 2.1: Proportion of Cycling Facility Types 7

Figure 2.2: City of Richmond Existing Cycling Network by Facility Type 8

Figure 2.3: Protected Bike Lane – River Parkway 9

Figure 2.4: Protected Bike Lane - Dunsmuir Street in Vancouver, BC 9

Figure 2.5: Bike Path – Garden City Road (Source: Google Street View) 10

Figure 2.6: Multi-Use Path – Railway Greenway 11

Figure 2.7: Multi-Use Path – Railway Greenway 11

Figure 2.8: Recreational Trail - The West Dyke Trail 12

Figure 2.9: Bike-accessible shoulder – Railway Avenue 13

Figure 2.10: Bike lane - Williams Road (Source: Google Street View) 13

Figure 2.11: Nighbourhood street bikeway - Crabapple Ridge 14

Figure 2.12: Shared roadway – Barnard Drive (Source: Google Street View) . 14

Figure 2.13: Existing Cycling Network by Facility Type + Informal Routes 16

Figure 3.1: Primary Factors and relationship with Cycling Comfort 17

Figure 3.2: High-Level Summary of Cycling Comfort Level Attributes 18

Figure 3.3: City of Richmond Cycling Comfort Level 19

Figure 3.4: Potential Cycling Comfort Level by Facility Type 20

Figure 3.5: Cyclist Comfort Level Breakdown (All Facilitites) 21

Figure 3.6: Cyclist Comfort Level Breakdown (Excluding Trails) 22

Figure 3.7: Cyclist Comfort Level Breakdown (Excluding Trails and MUPs).....23

Figure 4.1: Strava Fitness Tracking (Source: Strava.com) 24

Figure 4.2: Location of the City of Richmond's Bike Counters.....25

Figure 4.3: Average Daily Cyclist Volumes by Month (City of Richmond, 2020 - 2021) and Average Monthly Temperatures (en.climate-data.org; downloaded October 2020) 26

Figure 4.4: Seasonal Trip Data (Strava, 2018-2021).....27

Figure 4.5: Breakdown of Activity by Locals and Visitors (Strava, 2018-2021)27

Figure 4.6: Strava Trips at Bike Counter locations (Strava, 2019 / 2020) 28

Figure 4.7: Example of Strava Trip Assignment 29

Figure 4.8: A cyclist on the West Dyke Trail.....29

Figure 4.9: Average Daily Strava Trips in Richmond (Strava, July 2020).....30

Figure 4.10: Cyclists on the Railway Greenway MUP 31

Figure 4.11: Change in Average Daily Strava Trips influenced by the COVID-19 Pandemic (Strava, July 2019 + July 2020) 32

Figure 4.12: Average Daily Cyclist Volumes by Day of Week (City of Richmond, 2020 - 2021) 33

Figure 4.13: Average Hourly Cyclist Volumes (City of Richmond, 2020 - 2021) 33

Figure 5.1: Reported Incidents Involving Cyclists by Year (ICBC, 2014-2019) .34

Figure 5.2: Total Incidents Involving Cyclists by Year (ICBC, 2014-2019) 35

Figure 5.3: Cycling Incidents by Facility Type.....37

Figure 5.4: Cycling Facility Type and Average Annual Traffic Incidents Involving Cyclists (ICBC, 2014-2019).....38

Figure 5.5: Cycling Incidents by Comfort Level 39

Figure 5.6: Cycling Comfort Level (TransLink/Hub Cycling) and Average Annual Traffic Incidents Involving Cyclists (ICBC, 2014-2019)..... 40

Figure 5.7: Top 20 Collision Locations, Average Annual Cyclist Incidents (ICBC, 2014-2019), and Average Daily Traffic (UrbanLogiq, Sept 2019)..... 42

Figure 5.8: A cyclist stopped at Railway Greenway and Williams Road..... 43

Figure 5.9: Trends in Cyclist Incident Rates (ICBC, 2014-2019) and Recent Cycling Infrastructure Investments (City of Richmond) 44

Figure 6.1: Cycling Connectivity Analysis – Existing Cycling Network..... 46

Figure 6.2: Connectivity Analysis – Existing Cycling Network and Informal Routes..... 47

Figure 6.3: Bridgeport Canada Line Station and Bus Exchange..... 48

Figure 6.4: Key Destinations, Points of Interest and Major Transit Nodes 49

Figure 6.5: Cyclists riding on Bayview Street East of No. 1 Road 50

Figure 6.6: Cycling Accessibility to Educational Institutions 51

Figure 7.1: Cyclist on Lansdowne Road (Source: City of Richmond)..... 53

Tables

Table 2.1: Length of Existing Cycling Network by Facility Type 7

Table 2.2: Summary of Cycling Facilities by Key Chracterstics..... 15

Table 5.1: Corridors with the most reported cycling related incidents 36

Table 5.2: Intersections with the most reported cycling related incidents 36

1 Introduction

1.1.1 Document Structure

This document provides a recap of the analysis and findings of the existing conditions assessment with the following sections:

1. Introduction
2. Existing Cycling Network
3. Cycling Comfort Level
4. Cycling Ridership
5. Incident Analysis
6. Cycling Connectivity and Accessibility Analysis
7. Key Findings and Next Steps

1.1.2 Data Sources

This phase of the study makes use of the following primary data sources:

- The City of Richmond
  - Transportation network base data
  - Average Daily Traffic data (via *UrbanLogiq*)
  - Cyclist count data
- TransLink/HUB Cycling
  - Benchmarking the State of Cycling in Metro Vancouver
- ICBC
  - Reported traffic incident involving cyclists (2014–2019)
- Strava Metro
  - Aggregated and de-identified cycling trip data for Metro Vancouver

Figure 1.1: A cyclist on the No. 3 Road bike lane

PWT - 98

2 Existing Cycling Network

2.1 Introduction

The City of Richmond's cycling network currently includes more than 330 lane-km of cycling facilities, including a mix of the following facility types:

- Off-street Bike Path
- Protected Bike Lane
- Multi-Use Path (MUP) / Greenway
- Recreational Trail
- Bike Lane / Bike Accessible Shoulder
- Neighbourhood Street Bikeway
- Shared Roadway

While a wide variety of different facility types are used in Richmond, some cycling facility types are more common than others. The total lane-km and proportion of each facility type (by end of year 2021) are shown in Table 2.1 and Figure 2.2. Note that due to low instance of both protected bike lanes and bike paths, these facility types have been grouped together.

Table 2.1: Length of Existing Cycling Network by Facility Type

Facility Type	Lane-km	Proportion
Protected Bike Lane / Bike Path	8.5	3%
Multi-Use Path / Greenway	92.6	27%
Recreational Trail	76.7	23%
Bike Lane / Bike Accessible Shoulder	97.2	29%
Neighbourhood Street Bikeway	54.1	16%
Shared Roadway	9.3	3%

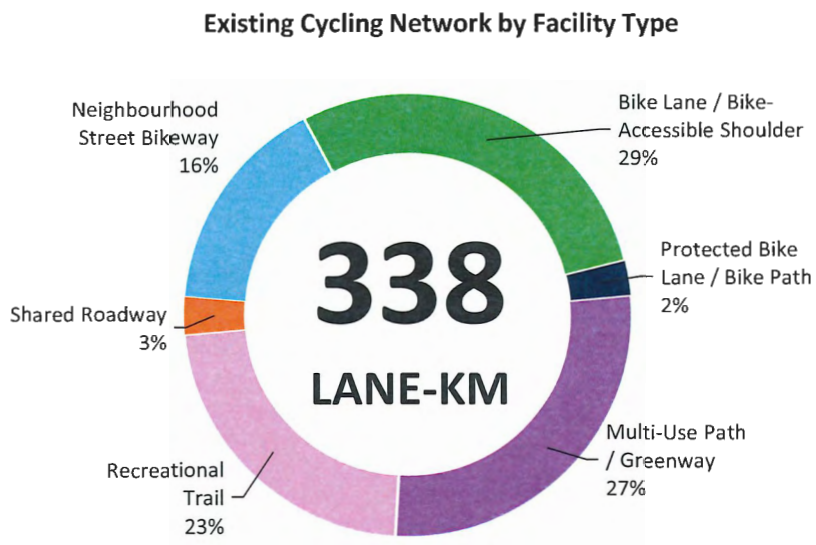


Figure 2.1: Proportion of Cycling Facility Types

The Existing Conditions Cycling Network, Figure 2.2 on the following page, shows the distribution of cycling facilities throughout the city by infrastructure type.

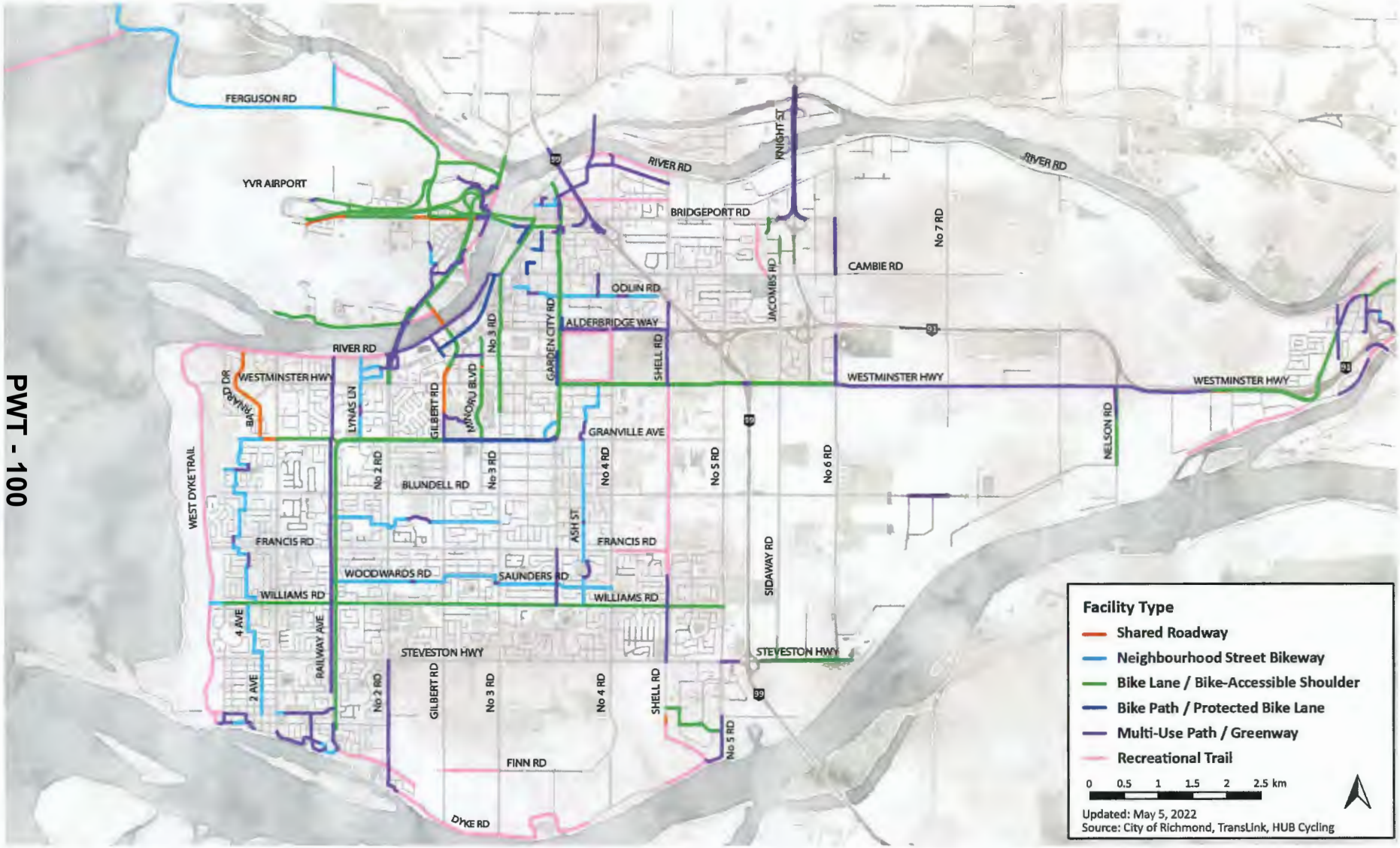


Figure 2.2: City of Richmond Existing Cycling Network by Facility Type

PWT - 100

2.2 Cycling Facility Types

This section provides descriptions of each facility type along with a representative photo from within the City of Richmond's existing cycling network. Additional photos from other municipalities are also provided for reference as appropriate.

The definitions used within this study are based on the categorizations presented by HUB Cycling and TransLink's B*enchmarking the State of Cycling in Metro Vancouver* 2019 report and consultation with City of Richmond staff.

Figure 2.3: Protected Bike Lane – River Parkway

2.2.1 Protected Bike Lane

Protected bike lanes are similar to (unprotected) bike lanes in that they are on-street cycling facilities adjacent to traffic but differ in that they also include the addition of a physical barrier separating cyclists from motor vehicle traffic. Raised medians, vegetated buffers and bollards are all examples of common protection elements.

As with unprotected bike lanes, additional surface treatments including high-visibility paint are typically applied to highlight the presence of cyclists to vehicle drivers through intersections and other locations where protection elements cannot be implemented.

At present, protected bike lanes are not common within Richmond's cycling network, representing approximately 1% of all cycling facilities.

Figure 2.4: Protected Bike Lane - Dunsmuir Street in Vancouver, BC

PWT - 101

2.2.2 Bike Path

Bike paths are similar in function to protected bike lanes as cyclists are physically separated from motor vehicle traffic, however this type of facility is located outside of the traffic right-of-way as an off-street facility.

By physically separating cyclists from traffic, the risk of conflict with motor vehicles is dramatically reduced relative to on-street bike lanes.

The potential for conflict remains where bike paths cross intersections, however this risk can be minimized by modifying the intersection layout.

The number of bike paths in Richmond has increased in recent years, but this facility type remains less common, currently accounting for approximately 1% of the cycling network.

Figure 2.5: Bike Path – Garden City Road (Source: Google Street View)

PWT - 102

2.2.3 Multi-Use Paths / Greenways

Multi-use paths (MUPs), which are sometimes called 'greenways,' are paved, off-street facilities that accommodate a variety of different active transportation modes in addition to cycling, including walking/running, rolling with mobility aids, skateboarding, roller blading, and kick scooters. At present, MUPs make up a significant proportion of the existing active transportation network and account for 27% of the cycling network.

As a shared space, right-of-way priority is given to those moving at slower speeds, while faster moving users are encouraged to yield to those on foot.

MUPs are typically bi-directional facilities, with flows permitted in both directions, often with a painted line to delineate opposing flows. However, uni-directional MUPs can also be installed on either side of a street.

PWT - 103

Figure 2.6: Multi-Use Path – Railway Greenway

Figure 2.7: Multi-Use Path – Railway Greenway

2.2.4 Recreational Trails

Recreational trails are unpaved routes that accommodate pedestrians and cyclists and are typically located within parks or along more scenic routes, such as the West Dyke Trail (Figure 2.8).

Recreational trails play a significant role within Richmond's existing active transportation network, accounting for approximately 23% of all cycling facilities.

Trails are not typically used for commuting or general-purpose trips, particularly where more direct and paved routes can instead be used. Instead, these facilities tend to serve recreational users (e.g., people walking, running, and cycling), in part due to their scenic nature, but also because opportunities for conflicts with motor vehicles are relatively low or non-existent, meaning an uninterrupted workout.

Notably, unpaved trails present challenges for individuals who rely on mobility devices, in some instances requiring the use of specialized wheelchairs and scooters, for example, to navigate uneven terrain.

Figure 2.8: Recreational Trail - The West Dyke Trail

2.2.5 Bike Lane / Bike-Accessible Shoulder

For the purposes of this study, bike lanes and bike-accessible shoulders have been grouped together. Bike lanes and bike-accessible shoulders are designated on-street, paved cycling facilities located to the right of a general-purpose travel lane and separated by a painted line or painted buffer. For bike lanes, either a curb or parking lane is located to the right, while no curbs are present in the case of bike-accessible shoulders.

Where the potential for conflict with motor vehicles is greatest, the presence of a bike lane can be highlighted using bright green paint to draw attention to motorists. This includes through intersections and their approaches, as well as across laneways and private property access points with relatively high vehicle volumes.

Bike lanes and bike accessible shoulders play a key role in the City's active transportation network, accounting for 29% of the existing cycling network.

PWT - 105

Figure 2.9: Bike-accessible shoulder – Railway Avenue

Figure 2.10: Bike lane - Williams Road (Source: Google Street View)

2.2.6 Neighbourhood Street Bikeway

Neighbourhood street bikeways are designated local cycling routes. They are similar to shared streets in that cyclists share the roadway with motor vehicles with no physical separation from traffic. However, unlike shared streets, neighbourhood street bikeways are located on local, typically residential streets where traffic volumes and vehicle speeds are lower.

These routes are typically marked with bicycle 'sharrow' symbols (bicycle stencil with chevrons) and may include some form of traffic calming measures to decrease vehicle volumes and/or speeds. Currently, neighbourhood street bikeways account for approximately 16% of Richmond's cycling network.

Figure 2.11: Neighbourhood street bikeway - Crabapple Ridge

2.2.7 Shared Roadway

Shared roadways are designated on-street cycling routes where cyclists and motor vehicles share the travel lane. Sharrows are used to indicate the presence of a shared street and act as a reminder to motor vehicle operators to expect cyclists on the road and share the road safely. By distinction from neighbourhood street bikeways, shared roadways are located on collector and arterial streets. In Richmond, they often occur in short segments and make up only 3% of the existing cycling network

Since shared streets do not provide separation from motor vehicle traffic, this facility type presents the greatest level of risk for conflict. As a result, shared streets are less frequently used by individuals who are less confident cyclists, including children and those with less cycling experience. This is increasingly true where traffic volumes are elevated.

Figure 2.12: Shared roadway – Barnard Drive (Source: Google Street View)

PWT - 106

2.2.8 Facility Type Summary

Table 2.2 provides a summary of the key characteristics by cycling facility type.

Table 2.2: Summary of Cycling Facilities by Key Chracterstics

Facility Type	Alignment / Surface	Exclusive vs Shared	Treatments	Typical Intersection Facilities
Bike Path	Off-Street / Paved	Exclusive	Uni- or bi-directional lanes separated from traffic by boulevard, or through park / not adjacent to roadway.	Designated signals, painted crossings, bike turn boxes, signal push buttons
Protected Bike Lane	On-Street / Paved	Exclusive	Uni- or bidirectional lanes separated by 0.3-1.0m delineator (bollards, curbs, concrete barriers, planter boxes, etc.)	Designated signals, painted crossings, bike turn boxes, signal push buttons
Multi-Use Path / Greenway	Off-Street / Paved	Shared with pedestrians	Uni- or bi-directional lanes for all active uses and recreation.	Painted crossings, signal push buttons
Recreational Trails	Off-Street / Unpaved	Shared with pedestrians	Bi-directional paths, typically finished with crushed gravel	Painted crossings, signal push buttons
Bike Lane / Bike-Accessible Shoulder	On-Street / Paved	Exclusive	Uni-directional lane, delineated from traffic with painted line	Painted crossings, bike turn boxes, signal push buttons
Neighbourhood Street Bikeway	On-Street / Paved	Shared with traffic on local roads	On-street sharrow markings with directional signage on roadway and street signs	Painted crossings, bike turn boxes, signal push buttons
Shared Roadway	On-Street / Paved	Shared with traffic on main roads	On-street sharrow markings with shared roadway signage	Signal push buttons and painted crossings at major crossings.

PWT-107

A note on Informal Routes

The City of Richmond's current Cycling Network Map indicates several 'informal routes', where no formal cycling infrastructure, signage, or surface treatments have been applied. These routes are provided for information only, indicating potential travel routes where there are no existing facilities and where there are limited alternative routes in place.

These routes have been excluded from this study's definition of the existing cycling network but are shown in Figure 2.13 on the following page for reference. Notably, the informal routes are referenced in some aspects of the analysis. They will also be used to inform the development of the future network plan in subsequent phases to supplement feedback and input gathered through public and stakeholder consultations.

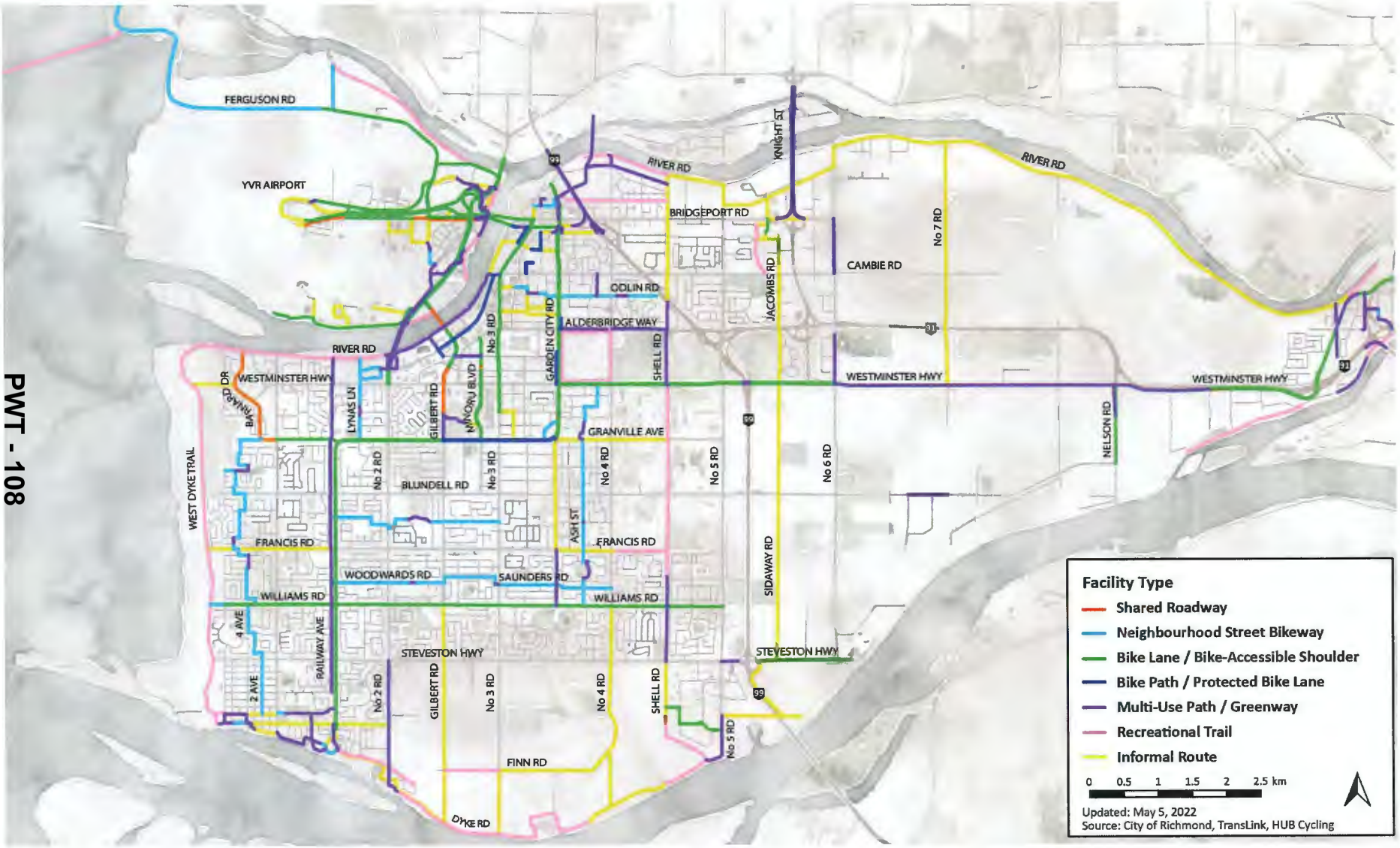


Figure 2.13: Existing Cycling Network by Facility Type + Informal Routes

PWT - 108

3 Cycling Comfort Level

3.1 Factors Affecting Cyclist Comfort Level

A number of factors contribute to the level of comfort – or conversely, the level of stress – that a cyclist might experience while cycling in a given location.

Figure 3.1 illustrates the primary factors and their associated relationship trends with cycling comfort level.

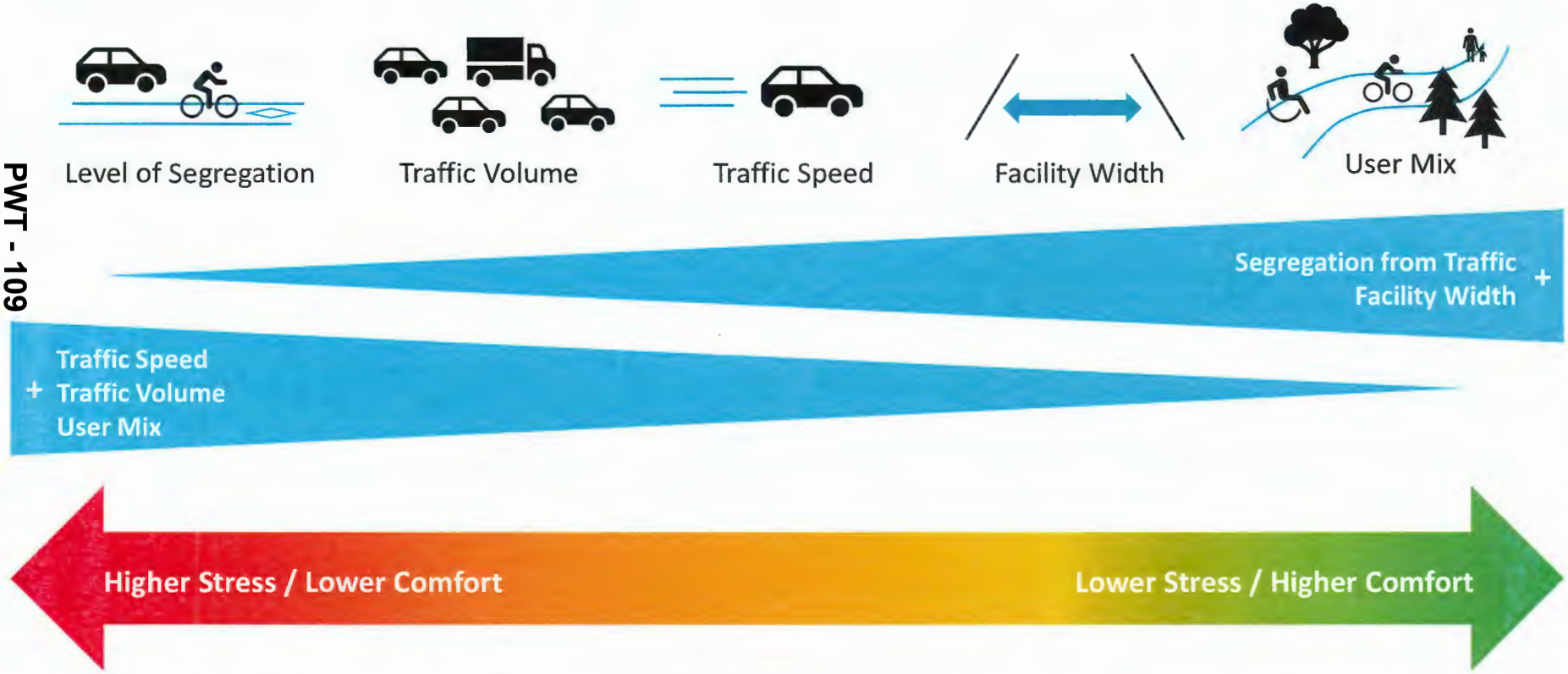


Figure 3.1: Primary Factors and relationship with Cycling Comfort

PWT - 109

Acknowledging that cycling comfort cannot be tied to a single variable, and while recognizing that personal experience will affect the perceived comfort/stress level at an individual level, in general cyclist comfort is most significantly impacted by the level of exposure to motor vehicle traffic. Typically, cyclists are most comfortable when physically segregated from vehicle traffic. Additionally, cycling comfort level tends to decrease as both traffic speeds and volumes increase.

The facility width also plays a role in cyclist comfort, with wider facilities providing additional buffer with adjacent traffic, as well as helping to facilitate safer passing. The mix of users on multi-use paths specifically can also impact cyclist comfort where user volumes are significant.

To allow for consistency with the reported data for Metro Vancouver municipalities, this study has adopted the cycling comfort level criteria used within HUB Cycling/TransLink's 2019 *Benchmarking the State of Cycling in Metro Vancouver* report.

The generalized criteria associated with each of the four cycling comfort levels are summarized at a high level in Figure 3.2 for all facility types.

Importantly, these attributes vary slightly from facility type to facility type, and design exceptions (e.g., presence of on-street parking) also result in variances from the metrics listed above. A detailed list of the criteria for cycling comfort by facility type is provided in *Appendix D*.

Figure 3.3 on the following page shows the relative comfort level of the existing cycling network.

PWT-110

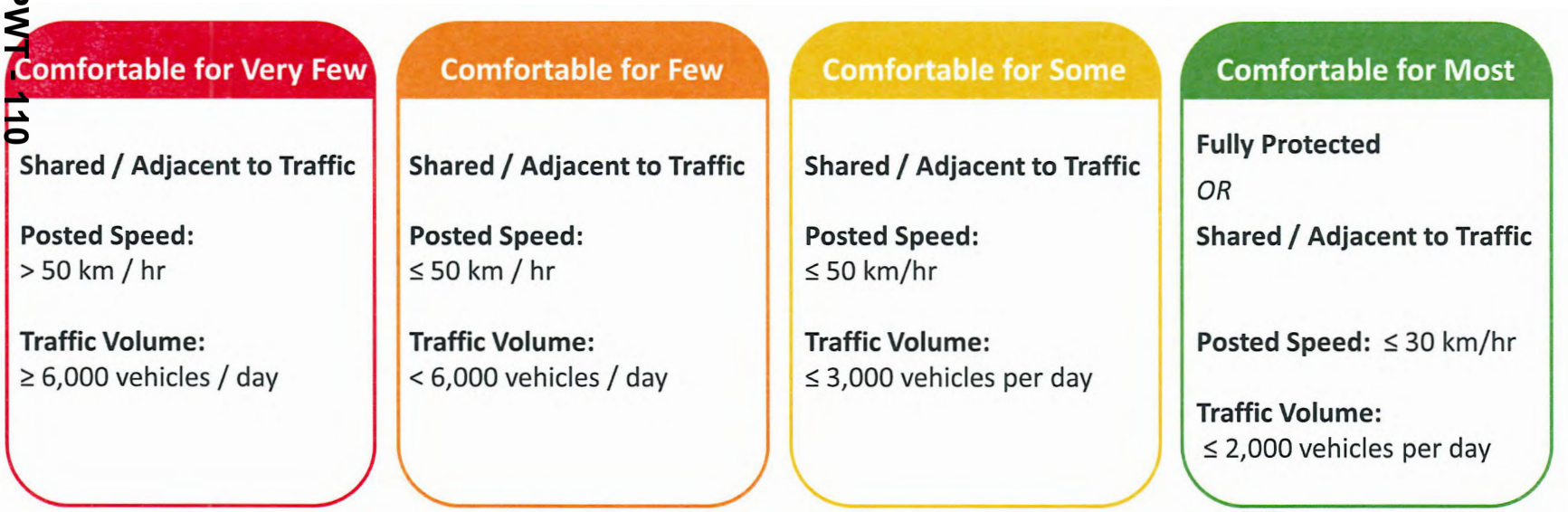


Figure 3.2: High-Level Summary of Cycling Comfort Level Attributes

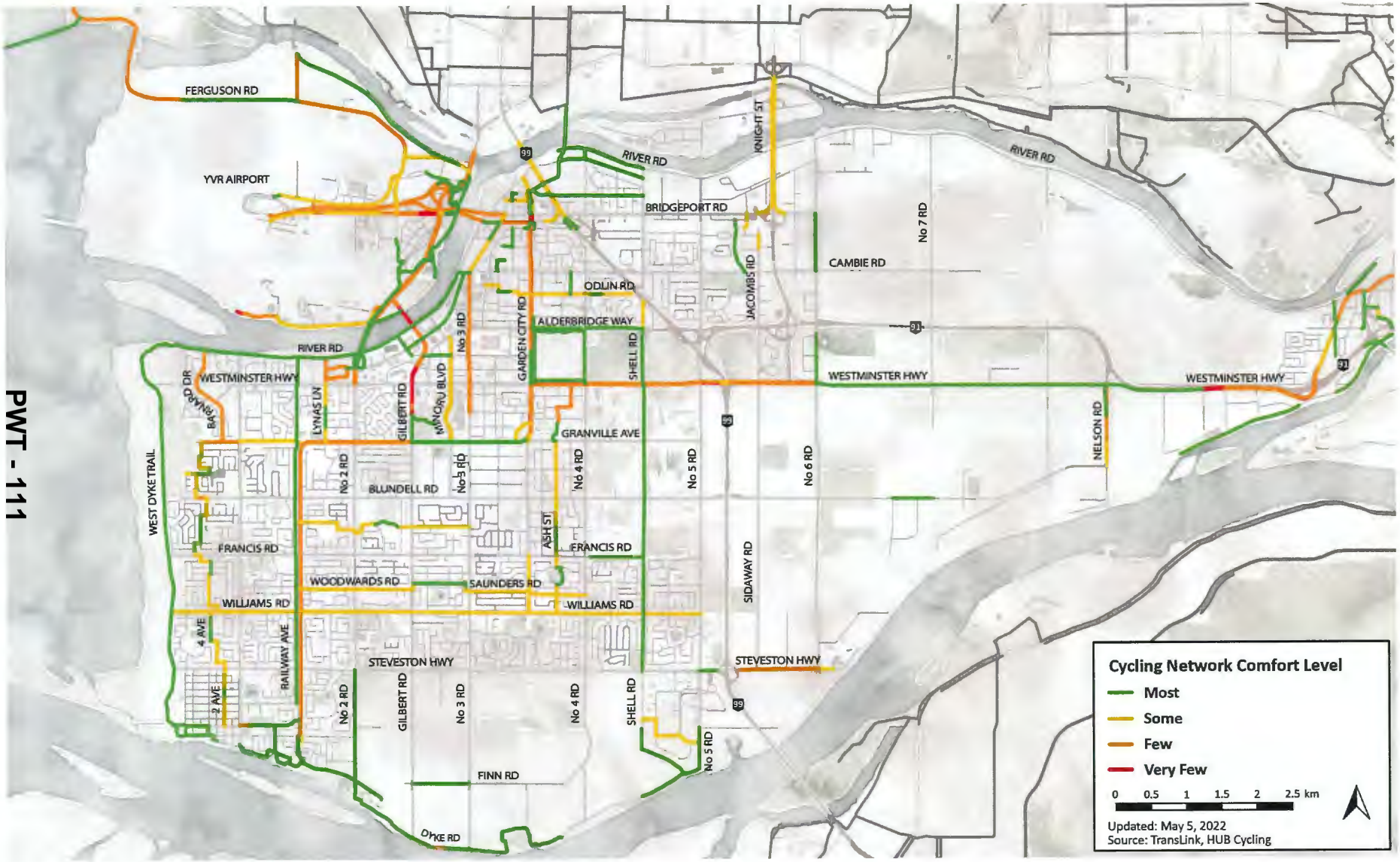


Figure 3.3: City of Richmond Cycling Comfort Level

3.2 Analysis

The comfort level assigned to a given facility depends on the specific design configuration, characteristics of the adjacent traffic, and user mix. However, inherent design features of some facility types lend themselves towards lower or higher levels of comfort. Figure 3.4 shows the potential cycling comfort level that can generally be attained for each facility type.

A bike lane might be considered 'comfortable for some,' for example, if adjacent traffic volumes are low (less than 4,000 average daily trips) and the posted speed limit is 50 km/hr or less. Increased traffic speeds and higher volumes would decrease the cyclist comfort level to 'comfortable for few' or 'comfortable for very few.' A reduction in traffic volumes, however, would not result in a 'comfortable for most' classification due to the inherent level of exposure and characteristics of a standard, unprotected bike lane.

Conversely, the design requirements of protected bike lanes are such that users are sufficiently removed from traffic, eliminating the influence of adjacent traffic from the level of cyclist comfort. As a result, the comfort level of bike path facilities is primarily dependent on facility width and are generally classified as 'comfortable for most.' In instances where the bike path width is constrained (i.e., <2.1m bi-directional; <1.2m uni-directional), the resulting classification is 'comfortable for some.'

Additionally, while multi-use paths typically provide a high level of comfort, they are not intended to replace sidewalks. This is particularly true in instances where there are high pedestrian and cyclist volumes that increase the potential for conflicts; as such, a reduced comfort level may result (e.g., HUB Cycling/TransLink do not recommend MUPs where peak-hour pedestrian and cyclist volumes exceed 200 users).

PWT - 112

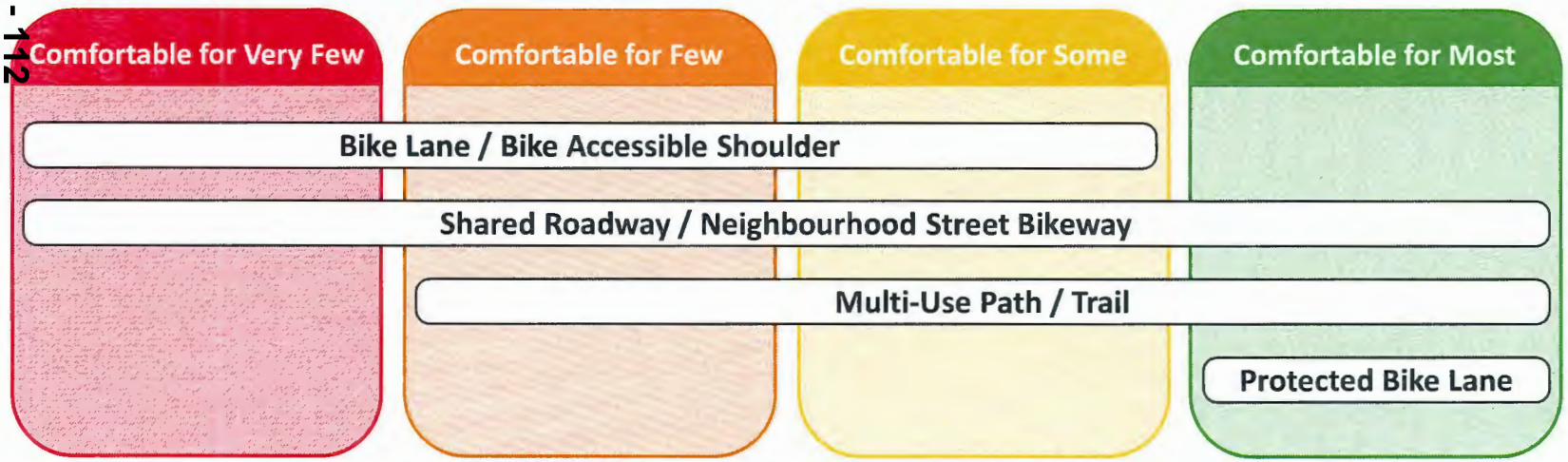


Figure 3.4: Potential Cycling Comfort Level by Facility Type

3.2.1 Cycling Comfort in Richmond

Figure 3.5 presents the breakdown of comfort level for the existing network. This breakdown indicates that over 50% of the existing cycling network in Richmond can be classified as 'comfortable for most.'

However, it is also important to consider how cyclist comfort is distributed across the network and by facility type, and how these different facility types serve different user groups.

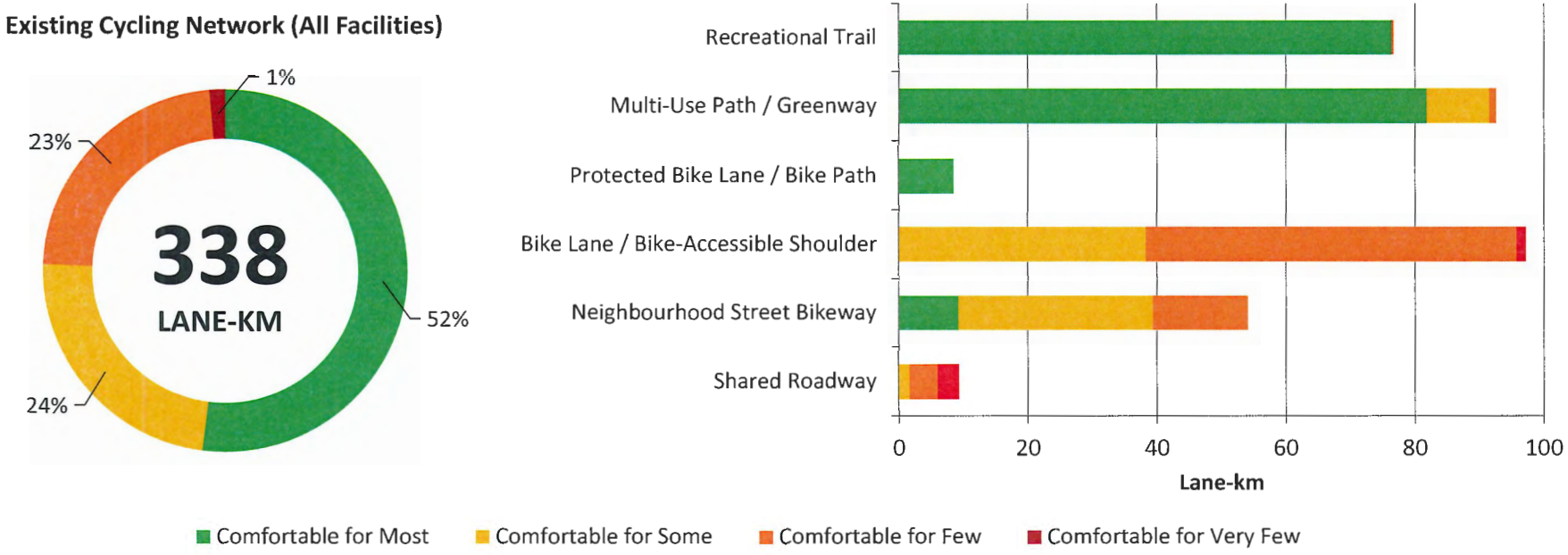


Figure 3.5: Cyclist Comfort Level Breakdown (All Facilitites)

PWT - 113

3.2.2 Facility Type Considerations

Together, recreational trails and multi-use paths/greenways account for more than half of all cycling facilities within the city and are almost exclusively categorized as 'comfortable for most.' This distinction is important when recognizing that trails tend to serve more recreational cycling purposes, both due to their character and location on the perimeter of the cycling network.

To illustrate this point, Figure 3.6 presents the breakdown of cycling comfort level when recreational trails are excluded. Figure 3.7 on the next page shows the cycling comfort level breakdown when both recreational trails and MUPs are excluded.

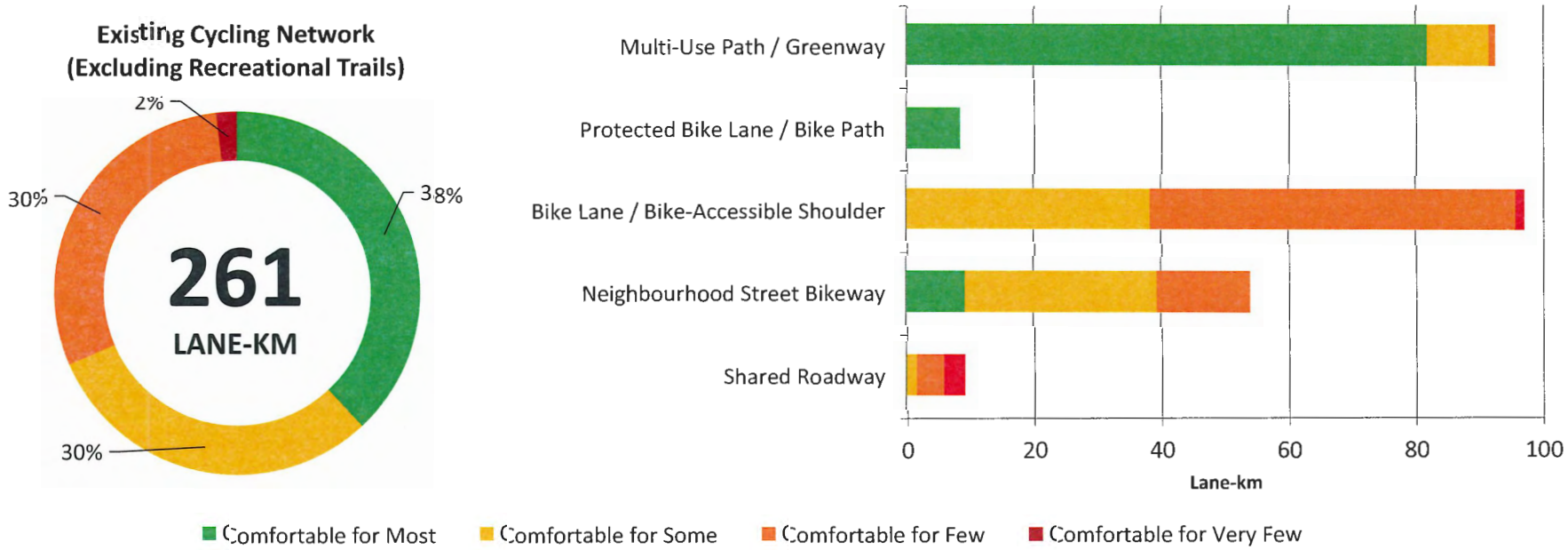


Figure 3.6: Cyclist Comfort Level Breakdown (Excluding Trails)

PWT - 114

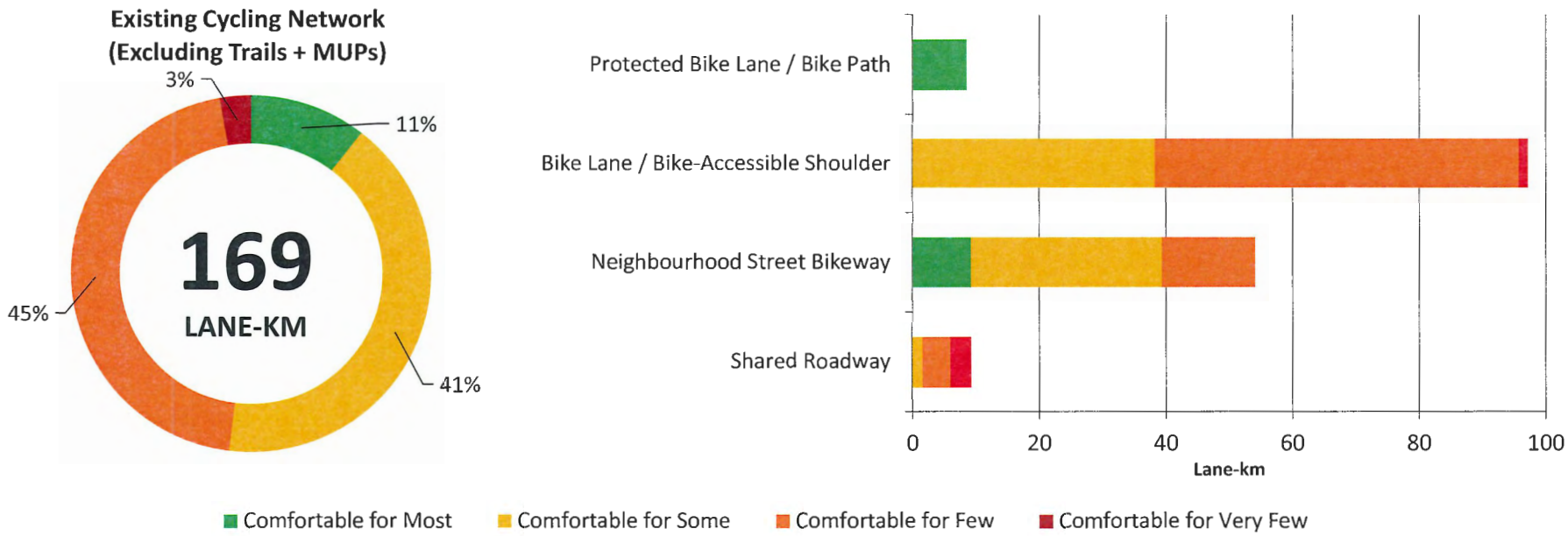


Figure 3.7: Cyclist Comfort Level Breakdown (Excluding Trails and MUPs)

This analysis highlights that while the City has developed an excellent foundation of recreational trails and a strong backbone of comfortable cycling facilities with its multi-use paths along key corridors, the vast majority of remaining facilities are considered 'comfortable for few.'

Recognizing that there are significant variances in both and capital and maintenance costs for different cycling facility types (and associated comfort levels), there are also significant differences in terms of space requirements and the associated trade-offs between land use and competing transportation modes.

Noting these caveats, the above analysis highlights some of the shortcomings of conventional bike lanes/bike-accessible shoulders, in that they may not be viewed as a viable transportation alternative to many potential users due to increased exposure to traffic and a lower level of comfort. Importantly this also illustrates opportunities to improve the comfort of existing facilities – by reducing posted speed limits to 30 km/hr along all neighbourhood street bikeways or adding protection to existing bike lanes, for example.

4 Cycling Ridership

4.1 Introduction

This section quantifies cycling ridership within Richmond using data obtained from the City of Richmond's in-ground bike counters, the City of Vancouver's cyclist count data for the Canada Line Bridge, and data obtained in partnership with Strava.

4.1.1 Bike Counters

The City has three in-ground bike counters located on MUPs that were installed in late 2019 and provide an accurate count of cyclists at specific locations. Over time, as more data is collected and the City fulfills plans to install additional counters, this bike counter data will provide a clearer picture of daily and seasonal ridership patterns throughout the cycling network.

Existing bike counter locations are listed below and shown in Figure 4.2.

1. River Drive MUP (west of No. 4 Road)
2. Railway Greenway MUP (at Maple Road)
3. No. 2 Road MUP (south of Steveston Highway)

4.1.2 Strava Data

Strava is a GPS-based activity tracking service available on smartphones and compatible with activity tracking devices (e.g. smartwatches and cycle computers). Strava users can track and share their physical activities (primarily running, cycling, and swimming) on Strava's social-media platform. Aggregated and de-identified data from Strava Metro was made available at the road segment level for this study. As an opt-in service, it provides insight into the trips logged by active Strava users for any given sample period only.

Figure 4.1: Strava Fitness Tracking (Source: Strava.com)

Likewise, while individuals can log cycling trips that they make for any purpose, Strava is typically more popular with recreational users. In 2019, for example, approximately 65-70% of the trips logged within the data analyzed for Richmond were 'tagged' as recreational trips, while approximately 30-35% were tagged as commute trips. Without additional data, there is no way of knowing how well this trend correlates with all other cyclists in Richmond who are not active on Strava.

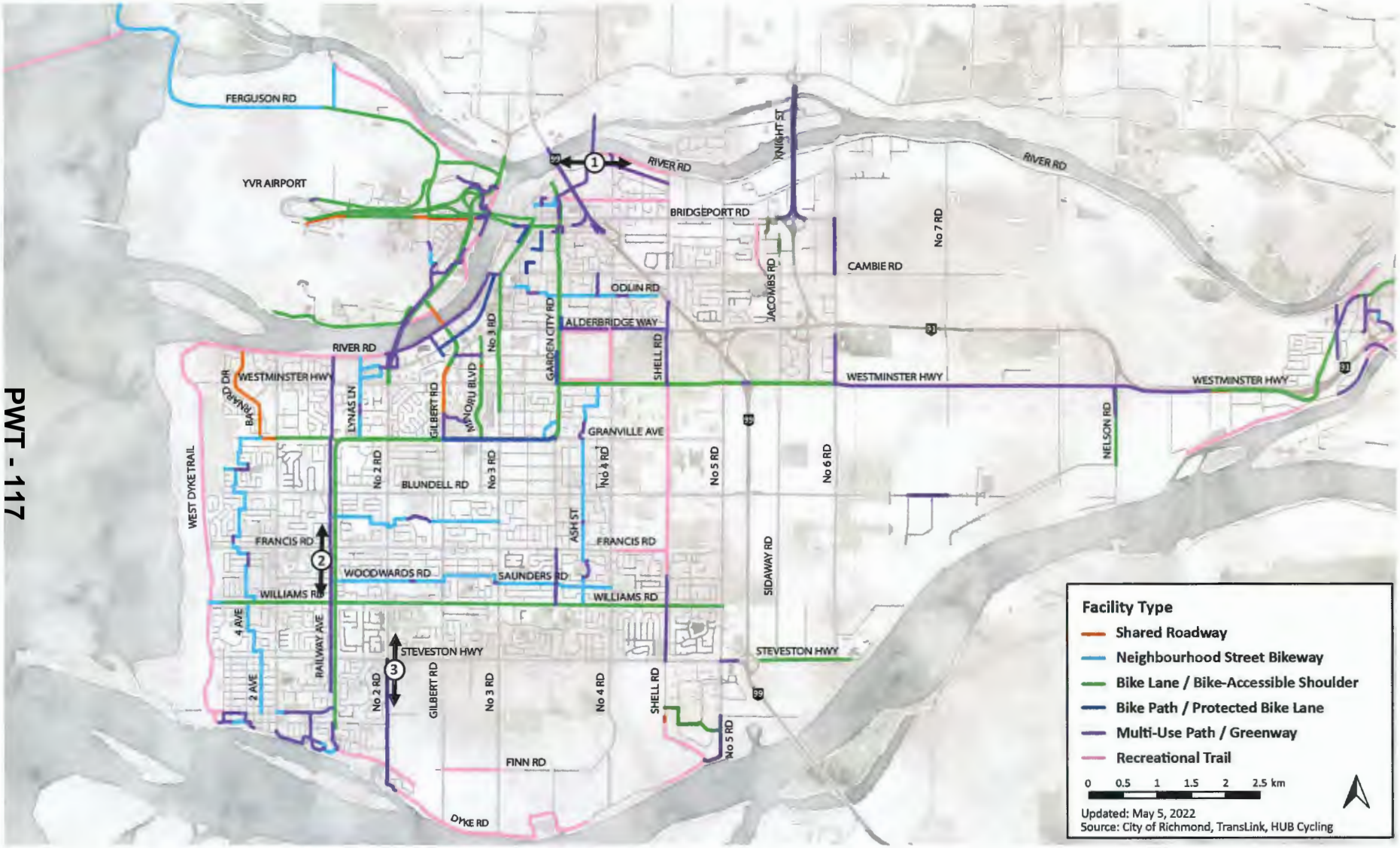


Figure 4.2: Location of the City of Richmond's Bike Counters

PWT - 117

4.2 Analysis

4.2.1 Seasonal Trends

Bike Counter Data

Figure 4.3 shows the average daily count of cyclists at the City's three bike counter locations for 2020 and 2021 superimposed along with average monthly temperature and monthly rainfall depths, for reference.

Note that volumes are not reported for the Railway Greenway and River Drive counters for select months due to a loss of power leading to gaps in available data.

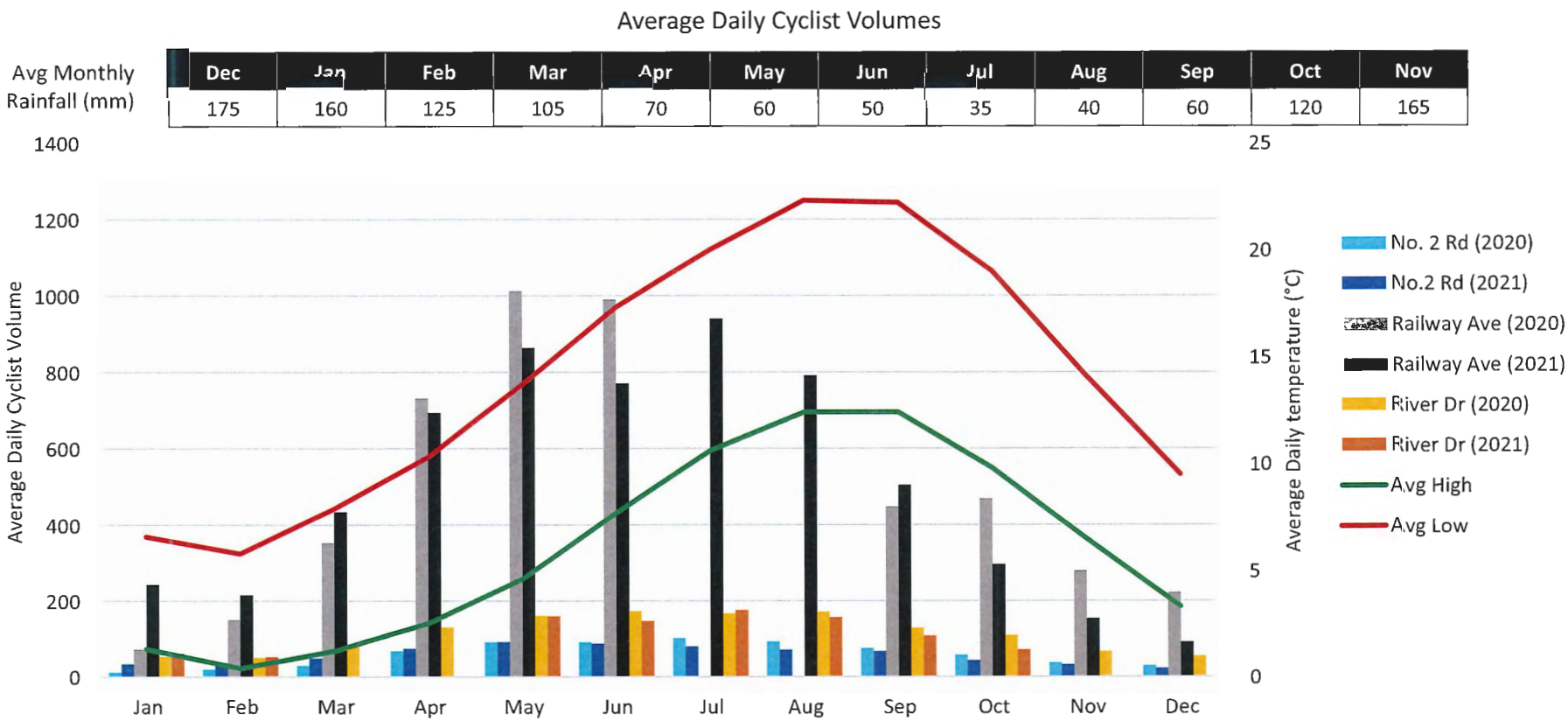


Figure 4.3: Average Daily Cyclist Volumes by Month (City of Richmond, 2020 - 2021) and Average Monthly Temperatures (en.climate-data.org; downloaded October 2020)

PWT - 118

Cycling volumes along Railway Greenway appear to be strongly aligned with warmer temperatures and reduced rainfall during the summer months. At No. 2 Road and River Drive, significantly lower daily volumes are observed, though a similar seasonal trend is observed with relative increases in overall cycling volumes during the summer months (April through September).

Strava Metro Data

Figure 4.4 shows the seasonal trends for trips logged by Strava Metro users in Richmond for 2018 to 2021. While there is strong correlation for trips logged in 2018 through 2019, the observed trip counts increase considerably beginning in March 2020, coinciding with the onset of the global COVID-19 pandemic. This seasonal trend of an increased rate of cycling during warmer summer months held for both 2020 and 2021. Some caution should be taken in interpreting this data as it may reflect, at least to some extent, a general increase in the number of Strava users in general.

PWT-119

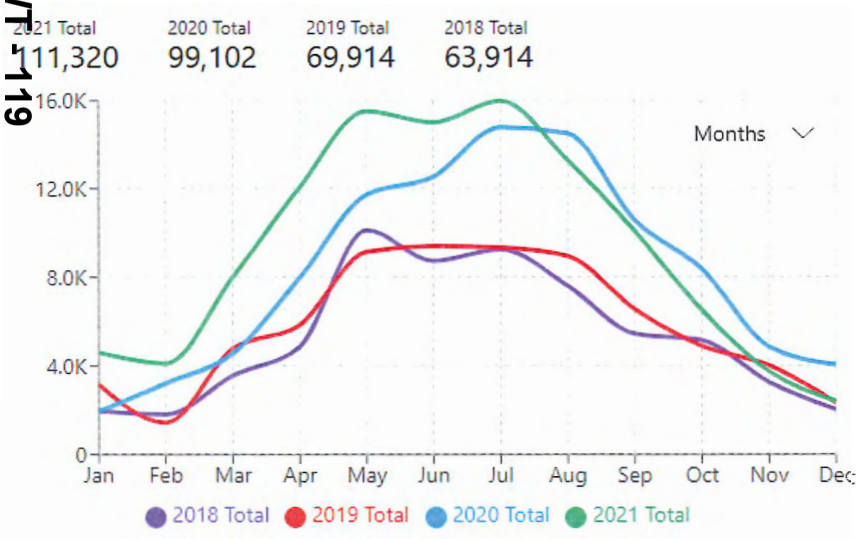


Figure 4.4: Seasonal Trip Data (Strava, 2018-2021)

Figure 4.5 shows the historical share of Strava trips logged by locals and visitors from 2018 to 2021, once again highlighting the impacts of the COVID-19 pandemic. Here we see the local population of cyclists increased considerably beginning in 2020, while seasonal visitor activity has mostly remained stable. Strava assigns users' 'local' areas based on where they have started the majority of their activities in the past year. Hence, here 'visitors' represent individuals who start most of their Strava activities outside of Richmond.

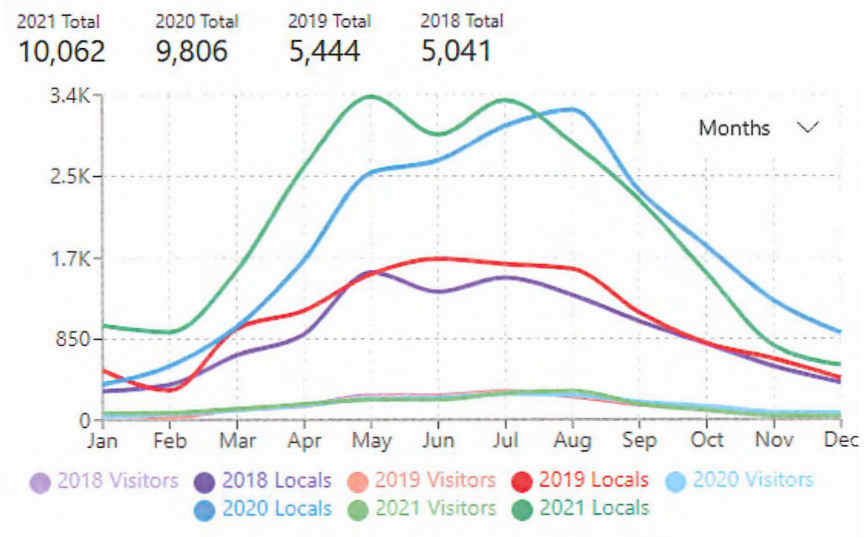


Figure 4.5: Breakdown of Activity by Locals and Visitors (Strava, 2018-2021)

Figure 4.6 shows the average daily number of trips logged by Strava users on the segments located adjacent to the City of Richmond's bike counters, providing an additional layer of data for comparison.

The overall trends for the 2020 Strava data are similar to the findings of the bike counter data analysis, with a significantly higher volume of trips on the Railway Greenway relative to the No. 2 Road and River Drive MUPs. This chart further highlights the significant increase in cycling trips logged by Strava users in 2020 relative to 2019 at all three locations.

Recognizing that logged trips on Strava represent a self-selecting subset of all cyclists, Strava trips appear to account for approximately 3-15% of total observed trips at the bike counter locations, when comparing average daily logged trips to bike counter observations for March, July and September 2020. This variation is dependent on both location and sample period, meaning that it is difficult to associate the Strava data with cyclist volumes throughout the city with accuracy. Instead, the Strava data is used to indicate high-level trends.

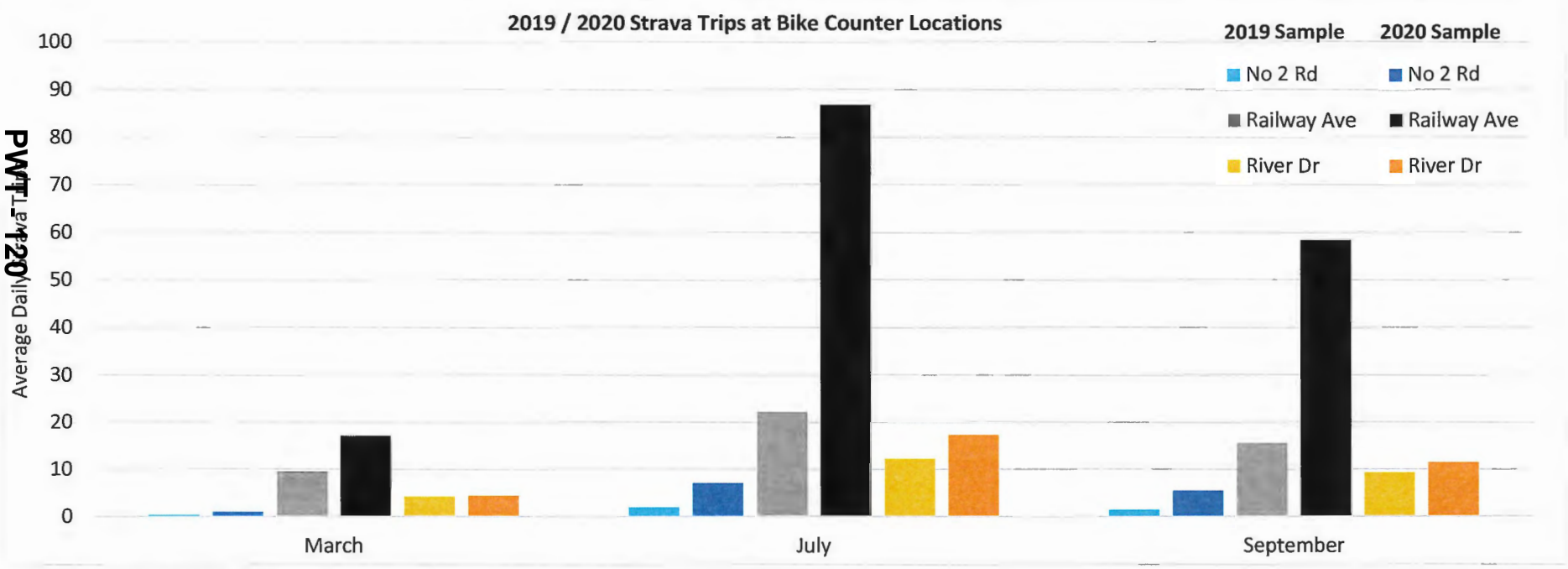


Figure 4.6: Strava Trips at Bike Counter locations (Strava, 2019 / 2020)

PWT-120

Of the Strava sample datasets obtained (March, July and September 2019/2020), July was determined to be the month with the greatest number of logged trips in Richmond for both 2019 and 2020.

Figure 4.9 on the following page shows the distribution and relative volume of cyclist trips logged by Strava users for the July 2020 period, based on the average number of logged trips linked to each roadway/cycling facility segment. Darker segments represent more daily cyclist trips, on average.

Higher cyclist volumes are generally observed along known cycle touring corridors (e.g., River Road and Sidaway Road) and recreational routes (e.g., Railway Greenway and Ferguson Road towards Iona Beach Regional Park).

Note that where there are multiple parallel cycling routes, such as along Railway Avenue, Strava trip counts are distinct for all corridors. Figure 4.7 shows an example of such an occurrence at the intersection of Granville Avenue and Railway Avenue. In these instances, the total volume along the corridor must account for all parallel routes.

PWT - 121

Figure 4.7: Example of Strava Trip Assignment

Figure 4.8: A cyclist on the West Dyke Trail

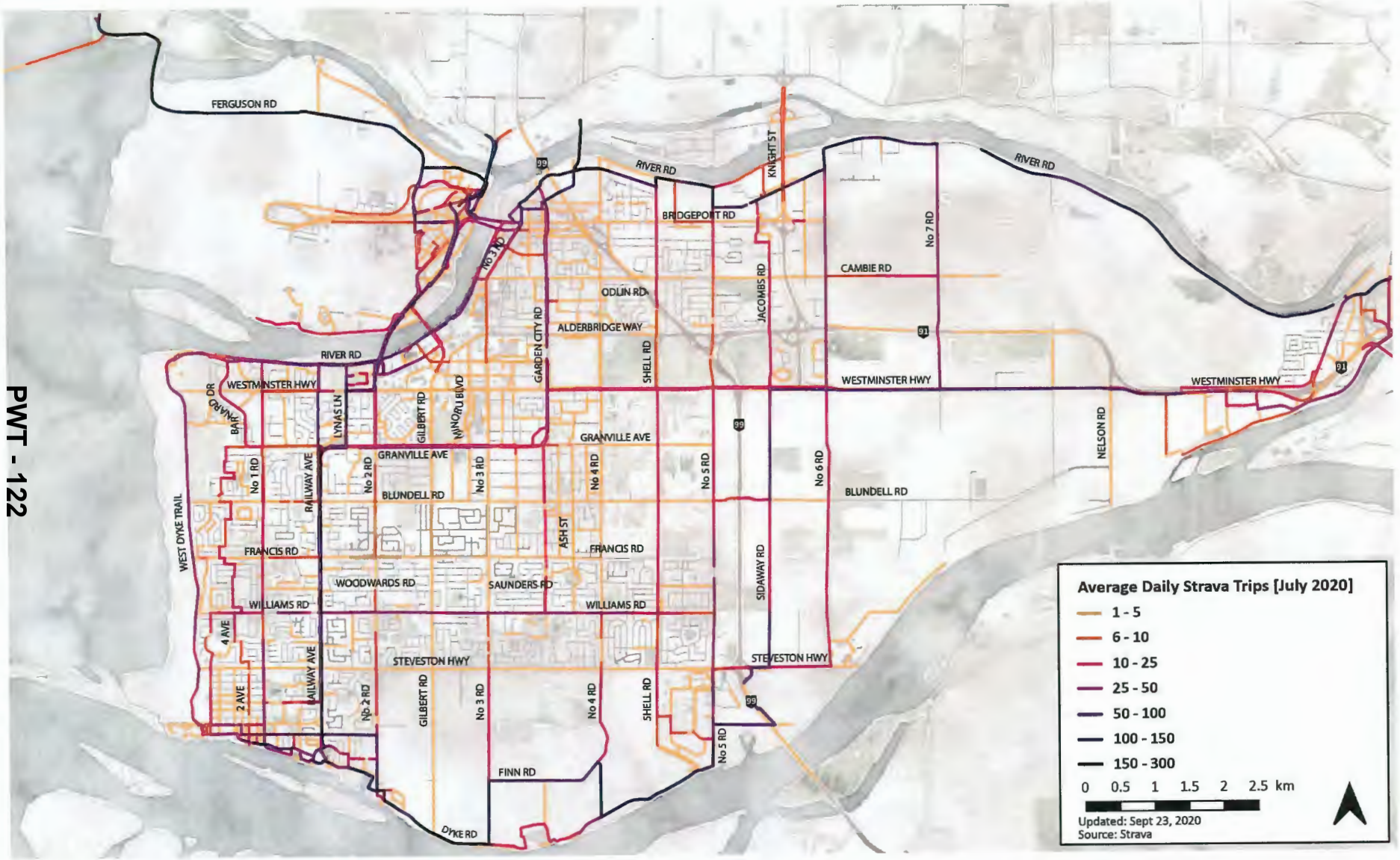


Figure 4.9: Average Daily Strava Trips in Richmond (Strava, July 2020)

PWT - 122

Figure 4.11 on the next page presents the year-over-year change in the average number of daily cyclist trips in Richmond for the month of July using Strava Metro data.

Segments that were determined to have an increased number of cyclist trips in July 2020 relative to July 2019 are shown in shades of green, while relative decreases are shown in shades of yellow and red. Note that segments with a change of less than +/- 5 average daily trips have been excluded from this map output for clarity.

Overall, this analysis shows that in general, most areas within the city have seen a moderate increase in the number of average daily Strava trips. The greatest relative increases (+20 to +100 average daily Strava trips) were primarily observed along recreational corridors, including Ferguson Road towards Iona Beach Regional Park, and along Railway Avenue, Dyke Road, Finn Road, and portions of River Road.

These findings are in line with expectations and anecdotal observations of greater levels of local recreation throughout the region (and more broadly) during the summer months of the COVID-19 pandemic.

Figure 4.10: Cyclists on the Railway Greenway MUP

PWT - 123

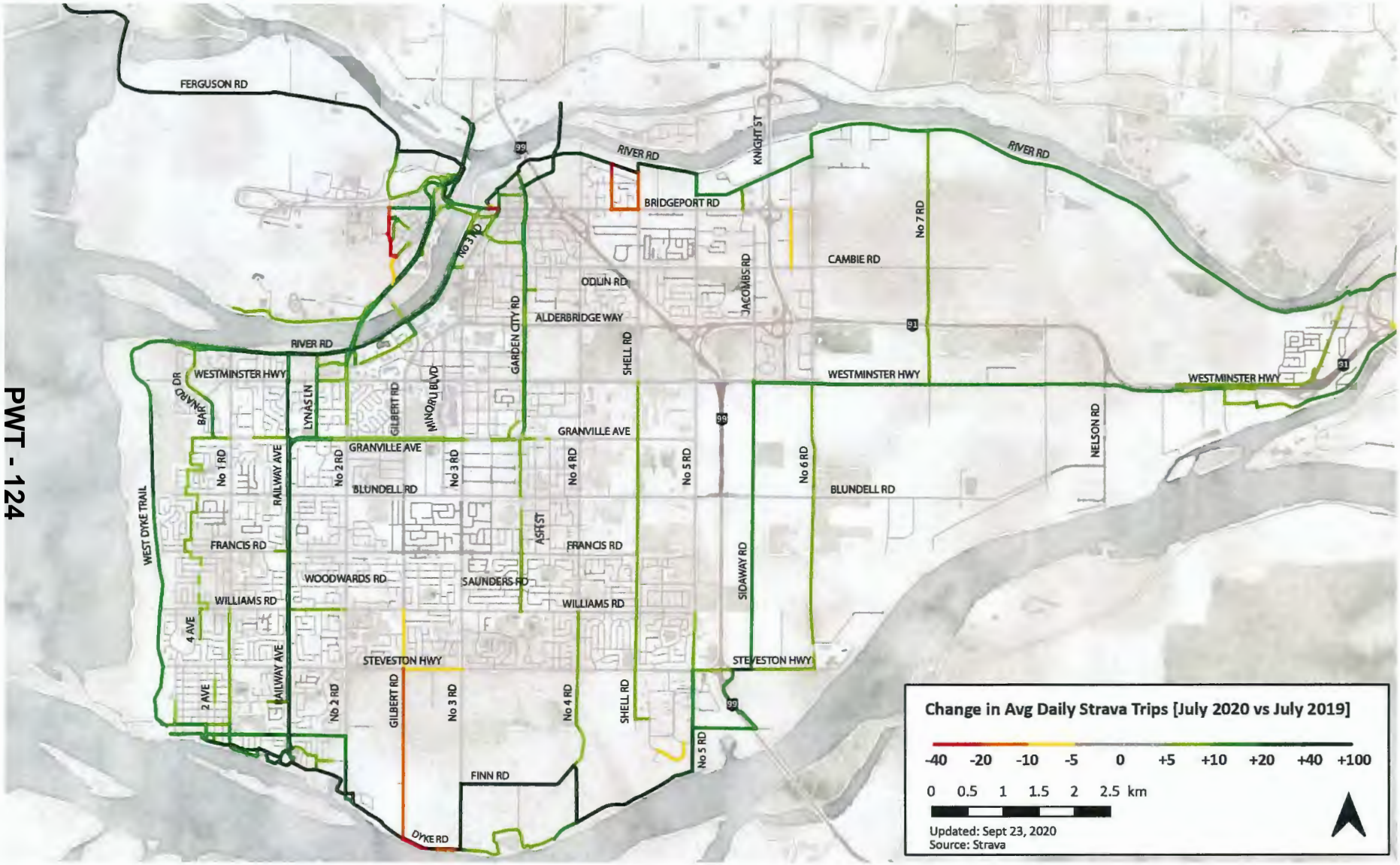


Figure 4.11: Change in Average Daily Strava Trips influenced by the COVID-19 Pandemic (Strava, July 2019 + July 2020)

4.2.2 Weekly Trends

Bike Counter Data

Figure 4.12 shows the variation in average daily cyclists by day of week at the City's three bike counter locations.

Daily variation is most significant on the Railway Greenway, with elevated volumes observed on Sundays in particular, and somewhat lower volumes on Tuesdays. Average daily volumes appear to be relatively stable across all days of the week at the No. 2 Road and River Drive bike counter locations.

4.2.3 Daily Trends

Bike Counter Data

Figure 4.13 shows the daily cyclist profiles for the City's three bike counter locations with average hourly volumes from 6am-11pm for 2020 and 2021.

This shows a similar trend to the seasonal data, highlighting the higher relative volume of cyclists using the Railway Greenway. Over the course of the sample period, there were approximately 4 to 8 times as many average daily cyclists on the Railway Greenway than the No. 2 Road and River Drive multi-use paths, respectively.

A distinct hourly profile is observed at all locations, with approximately 50% of the daily total occurring between 1:00pm and 6:00pm. The hourly profile is more pronounced for the Railway Greenway.

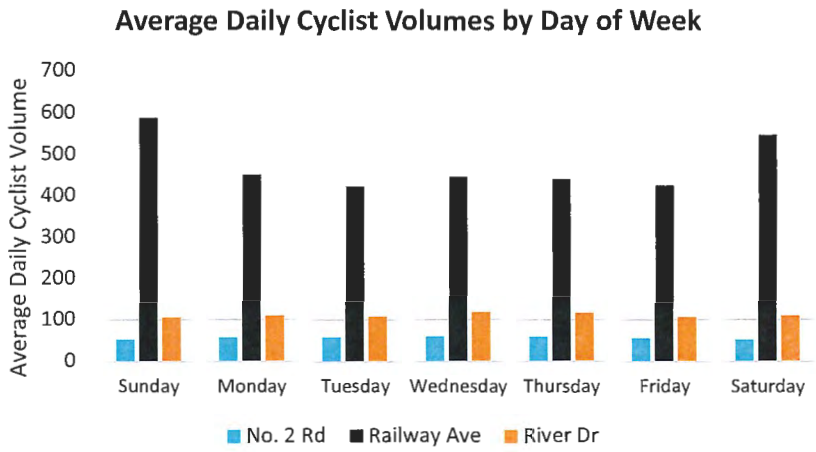


Figure 4.12: Average Daily Cyclist Volumes by Day of Week (City of Richmond, 2020 - 2021)

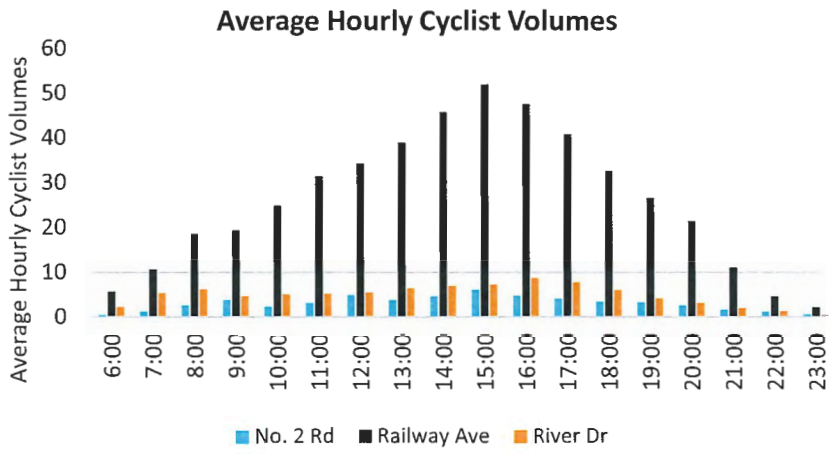


Figure 4.13: Average Hourly Cyclist Volumes (City of Richmond, 2020 - 2021)

5 Cycling-Related Incident Analysis

5.1 Introduction

5.1.1 Data Sources and Analysis Undertaken

Cycling incident analysis provides useful insight into the safety of cycling facilities and helps to identify areas where design interventions may be able to minimize the potential for conflicts between cyclists and motorists.

For this study, incident analysis was carried out using data obtained from the Insurance Corporation of British Columbia (ICBC). The obtained data includes annualized counts of cycling-related incidents that were reported to ICBC for 2014 through 2019, inclusive. Only incidents that occurred within the City of Richmond's municipal boundary were considered.

The analysis undertaken includes incident statistics at the city, corridor, and intersection level; annual incident rate trend and the impacts of recent cycling infrastructure investments; and, cycling incident rates in relation to:

- facility type
- comfort level
- traffic volumes
- traffic incident rates

5.1.2 Limitations

Available data only captures reported incidents involving motorists and cyclists, with midblock incidents being assigned to the nearest intersection. The dataset does not include incidents that occurred within parking lots or incidents involving parked vehicles, nor does it account for near misses. Hence, this data is best applied to identify initial trends and intersection locations where cycling incidents have been observed to occur more frequently.

5.2 Analysis

5.2.1 Cycling-Related Incident Statistics (2014 – 2019)

City-Wide Statistics

At the city-wide scale, the number of reported cycling-related incidents remains similar in 2019 (63) relative to 2014 (70), and a six-year annual average of 60 incidents. The least number of incidents were reported in 2015 (36 incidents), and nearly 80 incidents were reported in 2016.

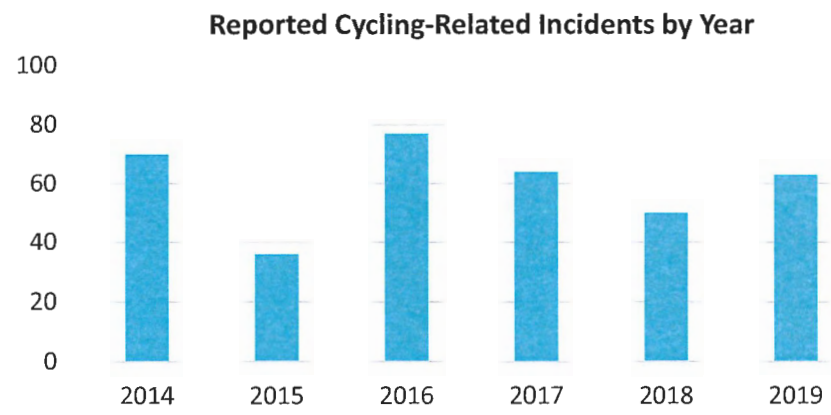


Figure 5.1: Reported Incidents Involving Cyclists by Year (ICBC, 2014-2019)

Figure 5.2 shows the cumulative count of ICBC-reported incidents involving cyclists at each location by year from 2014-2019, inclusive. It reveals that incidents involving cyclists have most frequently occurred at intersections of major roadways. Incidents are primarily concentrated west of Garden City Road and in the City Centre. In East Richmond, most reported incidents occurred along Westminster Hwy.

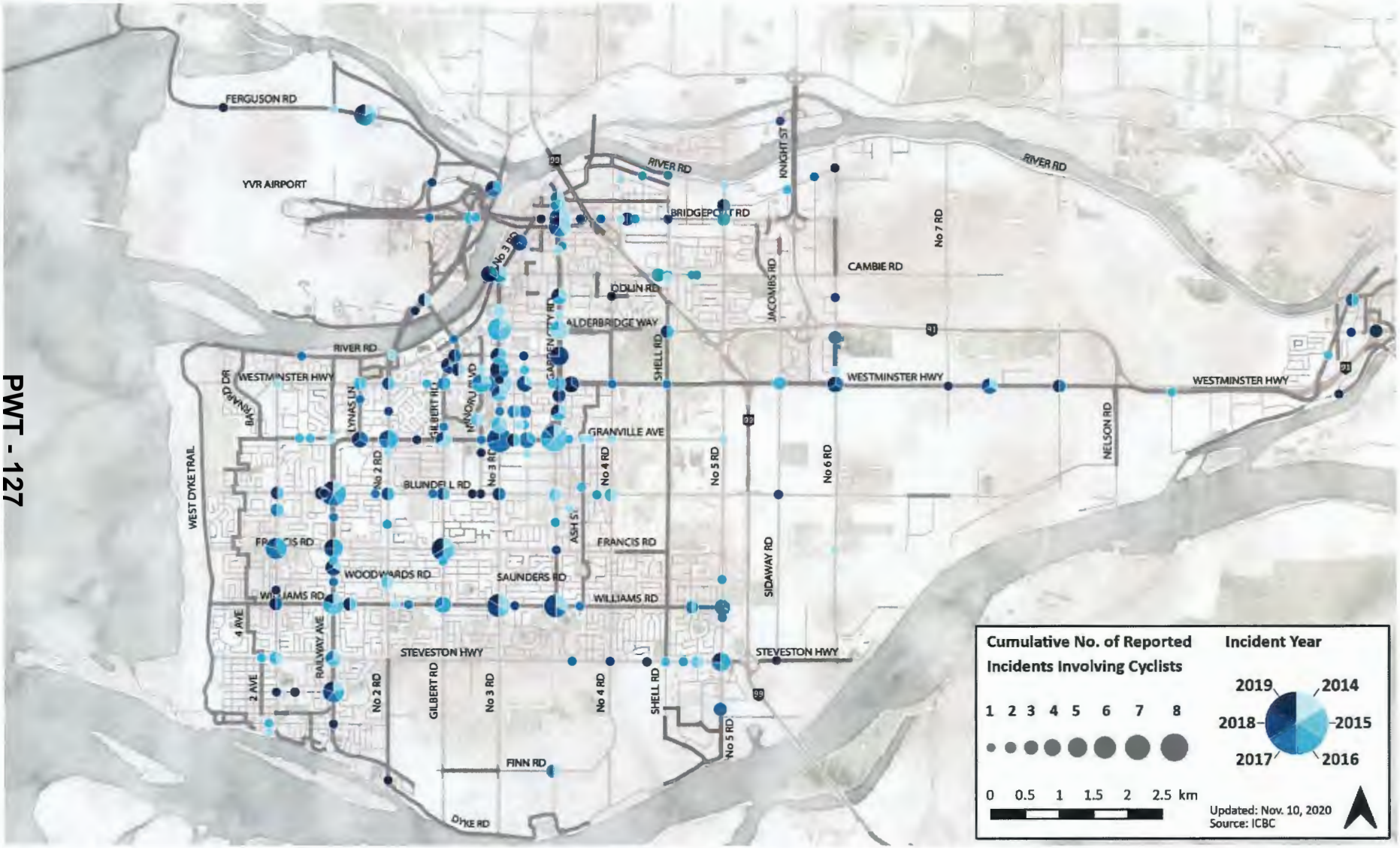


Figure 5.2: Total Incidents Involving Cyclists by Year (ICBC, 2014-2019)

Corridor-Level Statistics

Table 5.1 presents the total and average annual count of cycling-related incidents for the top 10 corridors with the highest number of reported incidents between 2014 and 2019. Taken together, these corridors account for approximately 67% of all reported incidents.

Table 5.1: Corridors with the most reported cycling related incidents

Rank	Corridor	Total Reported	Average Annual	Proportion of Reported Incidents
1	No. 3 Road	51	8.5	14%
2	Westminster Highway	45	7.5	13%
3	Granville Avenue	40	6.7	11%
4	Williams Road	33	5.5	9%
5	Railway Avenue	31	5.2	9%
6	Blundell Road	28	4.7	8%
7	Gilbert Road	26	4.3	7%
8	Steveston Highway	18	3.0	5%
9	No. 5 Road	17	2.8	5%
10	Francis Road	16	2.7	4%
10	No. 2 Road	16	2.7	4%

Intersection Level

Table 5.2 presents the total and average annual count of cycling-related incidents for the intersections with the highest number of reported between 2014 and 2019. Together these intersections account for approximately 23% of all cycling incidents. These intersections are identified with a red icon in subsequent incident maps.

Table 5.2: Intersections with the most reported cycling related incidents

Rank	Intersection	Total Reported	Average Annual
1	Garden City Road & Granville Avenue	8	1.3
2	Granville Avenue & No. 3 Road	7	1.2
2	Blundell Road & Railway Avenue	7	1.2
2	No 3 Road & Westminster Highway	7	1.2
3	Garden City Road & Williams Road	6	1.0
3	Francis Road & Gilbert Road	6	1.0
3	No 3 Road & Williams Road	6	1.0
3	No. 3 Road & Alderbridge Way	6	1.0
4	Garden City Road & Sea Island Way	5	0.8
4	Bridgeport Road & Great Canadian Way	5	0.8
4	Railway Avenue & Williams Road	5	0.8
4	Railway Avenue & Garry Street	5	0.8
4	Francis Road & No. 1 Road	5	0.8
4	Driveway access on Ferguson Road	5	0.8

5.2.2 Average Annual Cycling Incidents Relative to Facility Type

Figure 5.3 presents the total number of incidents by facility type compared to the average number of incidents per lane-km by facility type. Note that no incidents were reported along bike paths/ protected bike lanes or recreational trails and have thus been excluded.

Figure 5.4 on the next page shows average cycling incident rates along with facility types for the existing cycling network. This map shows that most of highest cycling incident rates occurred on bike lane corridors, except for the intersections of Francis Road at No. 1 Road and Francis Road at Gilbert Road which do not have cycling facilities.

This analysis shows that while there are relatively few incidents on shared roadways (3 per year on average), the reported incidence rate per lane km appears more significant. Bike lanes/bike-accessible shoulders, which are the most prevalent within the network, account for the highest number of incidents of any facility type and have a similar incidence rate per lane kilometer as shared roadways (approximately 0.33 incidents per year per lane km on average).

Note that along the Railway Ave corridor incidents have been attributed to both the bike lane and MUP as there is insufficient data to determine which facility was used for a given incident. This results in an overestimate for incident rates on one or both facility types.

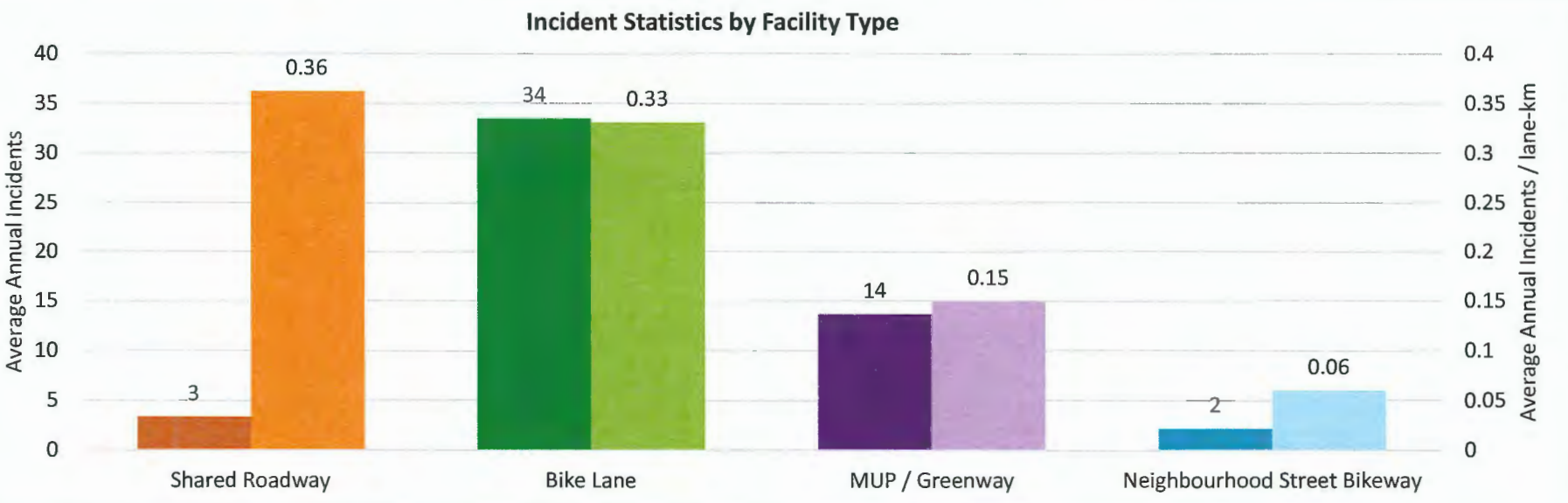


Figure 5.3: Cycling Incidents by Facility Type

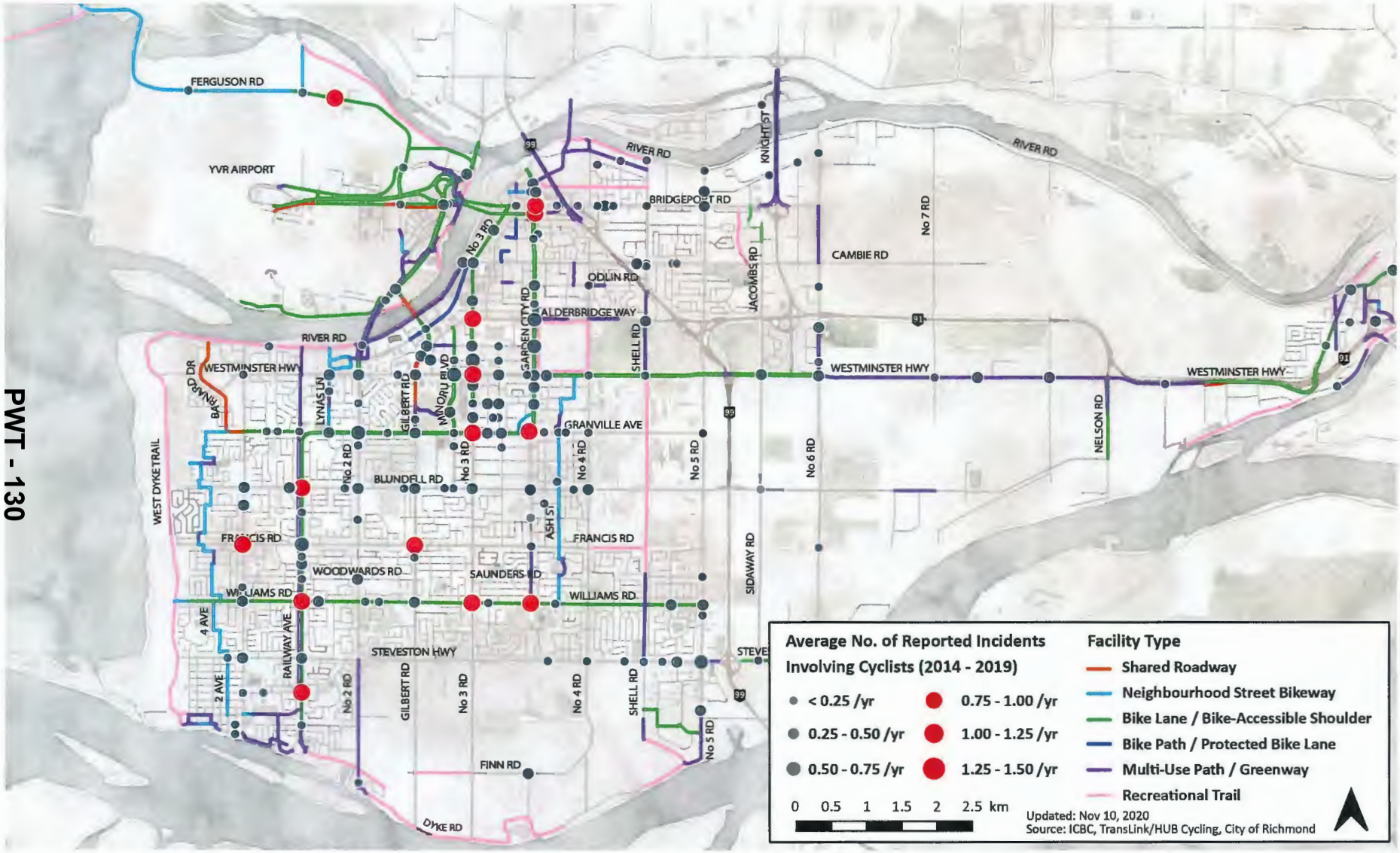


Figure 5.4: Cycling Facility Type and Average Annual Traffic Incidents Involving Cyclists (ICBC, 2014-2019)

Average Annual Cycling Incidents Relative to Cycling Comfort Level

When using comfort level as in indicator of safety, it is also important to consider that some areas do not have equally comfortable facilities on both sides of the roadway. This is true of Railway Avenue, where it is not known the relative frequencies of incidents involving cyclists using the off-street greenway versus the conventional on-street bike lanes.

Figure 5.5 and Figure 5.6 show that within the existing network, cycling incidents tend to occur more frequently on facilities with lower comfort levels.

Figure 5.5 represents analysis for incidents that occurred at locations where existing cycling facilities are present. This analysis highlights that relative to the distance-weighted incident rate for facilities that are classified as 'comfortable for most,' incident rates are roughly three, four or six times greater where the comfort level is classified as comfortable for some, few, or very few, respectively.

Additionally, it is noted that cycling comfort level is assigned for the mid-block condition along each segment and specific design treatments at intersections are not considered, which may contribute to overall safety and the incident rate in some locations. As with the analysis completed for incidents by facility type, reported incidents that occurred where facilities with different comfort levels intersect or run parallel to each other have been included for both comfort levels. This results in an overestimate in the average incident rates for some facility types.

PWT - 131

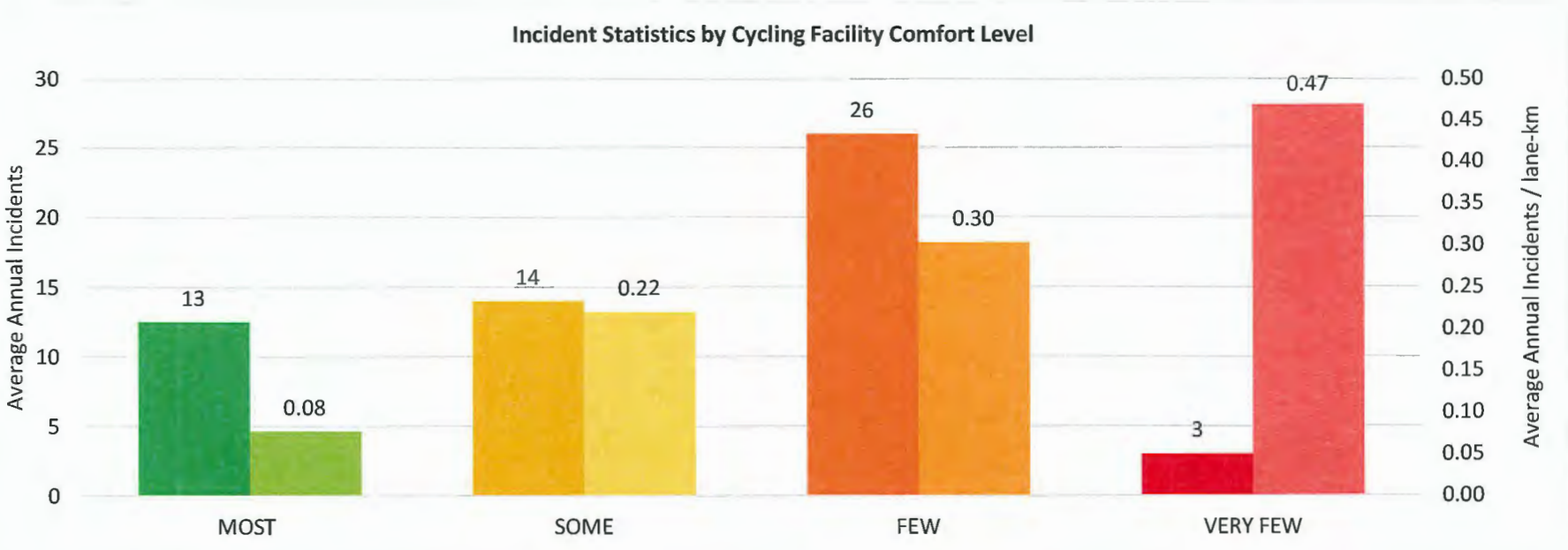


Figure 5.5: Cycling Incidents by Comfort Level

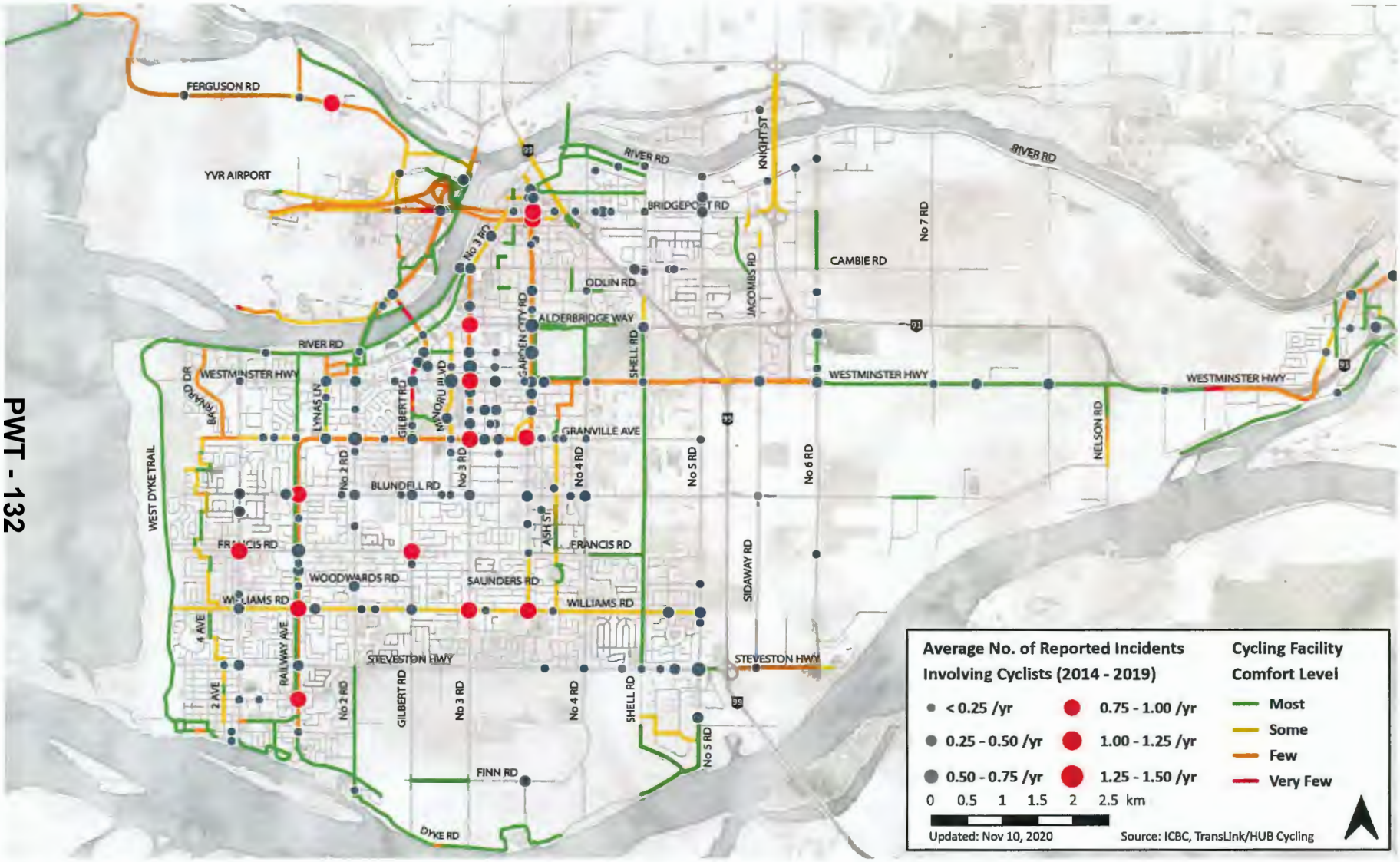


Figure 5.6: Cycling Comfort Level (TransLink/HUB Cycling) and Average Annual Traffic Incidents Involving Cyclists (ICBC, 2014-2019)

5.2.3 Average Annual Cycling Incidents Relative to Traffic Volumes

Figure 5.7 displays the average two-way daily traffic volumes in Richmond (September 2019), as obtained from UrbanLogiq.

This shows an overlap between locations with the most reported cycling related incidents and those segments experiencing the highest traffic volumes, particularly in the City Centre and continuing north from Granville Avenue. In this area, Garden City Road and No. 3 Road have several segments where average daily traffic volumes exceed 30,000 vehicles.

Volumes also consistently exceed this threshold on Westminster Highway between Cooney Road and No. 6 Road, as well as No. 2 Road/Russ Baker Way between Granville Avenue and Miller Road. Despite this, few accidents involving cyclists were reported across these two segments. Conversely, four or more incidents were recorded at several intersections along Railway Avenue and Williams Road despite lower traffic volumes, potentially highlighting the influence of cyclist volumes.

On Williams Road west of No. 4 Road and on Railway Ave south of Francis Road, daily average volumes are shown to be less than 15,000 vehicles. Aside from Williams Road, all intersections with six or more cyclist incidents since 2014 experience average daily traffic volumes exceeding 15,000 vehicles in both directions.

5.2.4 Average Annual Cycling Incidents Relative to Top 20 Intersections for Traffic Incidents

Continuing the investigation of the relationship between cycling collisions and areas of higher traffic collisions, the 20 intersections with the highest average annual collisions (data provided by the City of Richmond includes ICBC collision data for 2013-2017) are shown with gold circles in Figure 5.7.

Similar to the distribution of cyclist incidents, all 'top 20' intersections were observed to experience traffic volumes exceeding 15,000 vehicles per direction for the September 2018 data sample period.

Notably, the top 20 intersections for traffic incidents appear to be concentrated on No. 4 Road, No. 5 Road and Blundell Road corridors, as well as on Garden City Road and Shell Road. The average number of reported cyclist collisions are relatively low east of No. 4 Road. However, several intersections along Blundell Road experience an average of 0.5 to 0.75 incidents per year, and there is a high incidence of both cyclist and all traffic collisions at several intersections along Garden City Road.

While there is correlation with traffic incident rates at some locations, in general, other factors such as higher cyclist volumes and/or intersection design, may offer a better explanation for the increased incidence of collisions involving cyclists. This signals that safety improvements along existing designated cycling routes, with a particular emphasis on intersection design, may offer the greatest potential for minimizing the potential for cycling related traffic incidents.

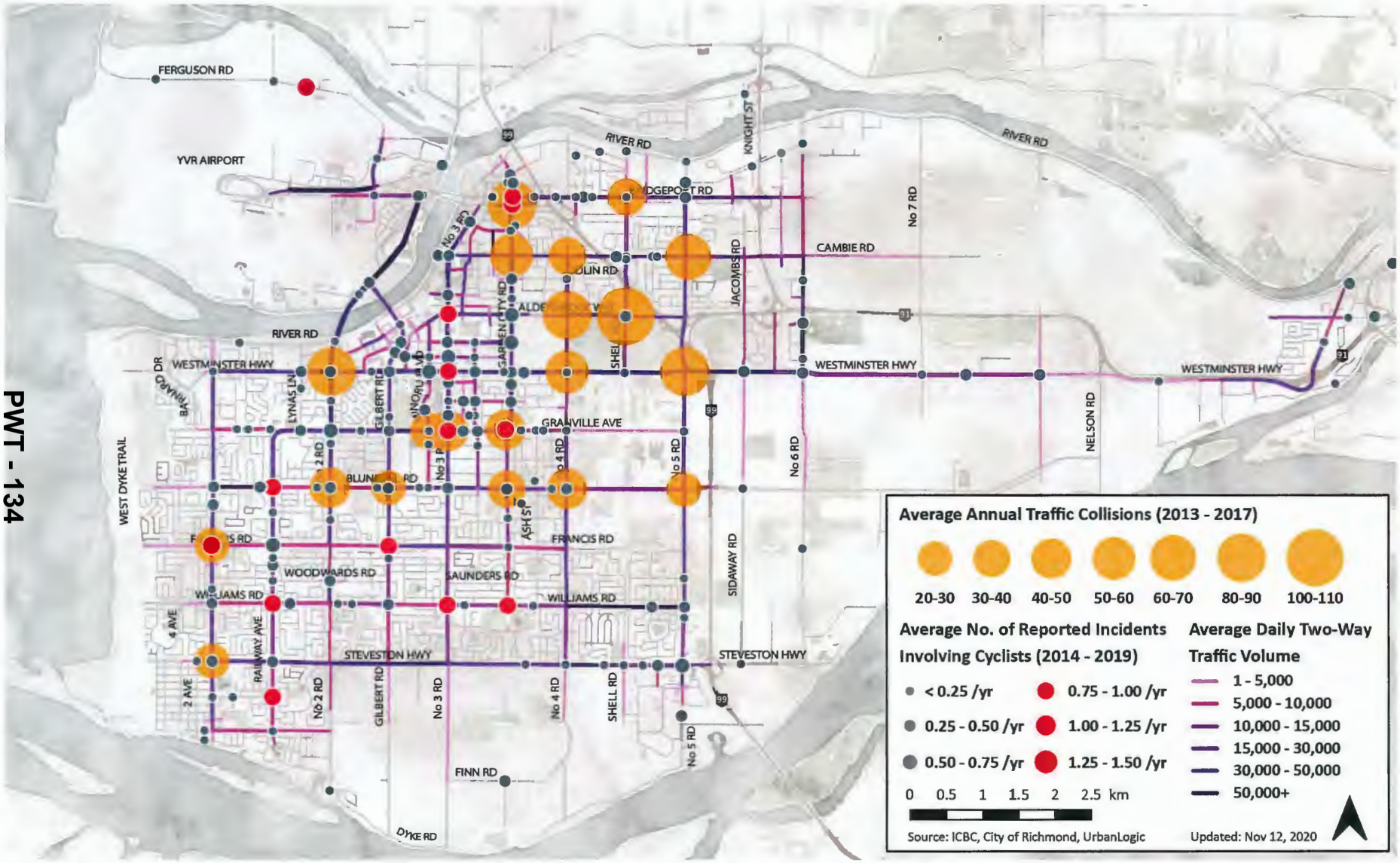


Figure 5.7: Top 20 Collision Locations, Average Annual Cyclist Incidents (ICBC, 2014-2019), and Average Daily Traffic (UrbanLogiq, Sept 2019)

5.2.5 Trends in Cycling Incident Rates Relative to Recent Investments in Cycling Infrastructure

Figure 5.9 shows the general trend in cycling-related incidents reported to ICBC between 2014 and 2019 as well as where cycling infrastructure investments have been made over the same six-year period.

Green circles indicate where the number of cycling incidents has decreased (improvement), whereas red circles highlight areas where the number of cycling incidents has increased. Larger circles indicate a higher number of cycling incidents on average per year, and recent cycling infrastructure investments are shown in shades of orange.

The analysis indicates that, at most, the incident rate has not increased or decreased by more than 45% at any given location over the six-year period for which data was available.

The analysis also shows that the number of incidents per year has tended to decrease along Garden City Road where incident rates have been among the highest on average. The primary exception along this corridor is at the intersection of Garden City Road and Lansdowne Road.

While no cycling infrastructure investments on Garden City Road were made between Williams Road and Granville Avenue, reported incidents did decrease. This could be the influence of the Parkside neighbourhood street bikeway that was established along Ash Street during this period, which may have diverted some cyclists off this busy arterial to a route with significantly lower traffic volumes and potential for conflicts. Notably, the incidence rate also decreased along Ash Street where the investment was made and where cyclist volumes presumably increased because of the route formalization.

On No. 3 Road, the incidence rate has decreased most notably at the intersections with Alderbridge Way and Westminster Highway. Conversely, the incidence rate increased at the intersection of No. 3 Road and Granville Avenue where the average incidence rate was already relatively high.

It is also noted that incident rates have increased along Railway Avenue, where cyclist volumes were observed to be high. Though higher cyclist volumes increase the number of opportunities for conflict, this upward trend indicates that additional measures or design changes may be warranted at intersections along this corridor specifically, and along higher cyclist volume routes in general, to minimize the potential for conflict along these highly used routes.

Figure 5.8: A cyclist stopped at Railway Greenway and Williams Road

PWT - 135

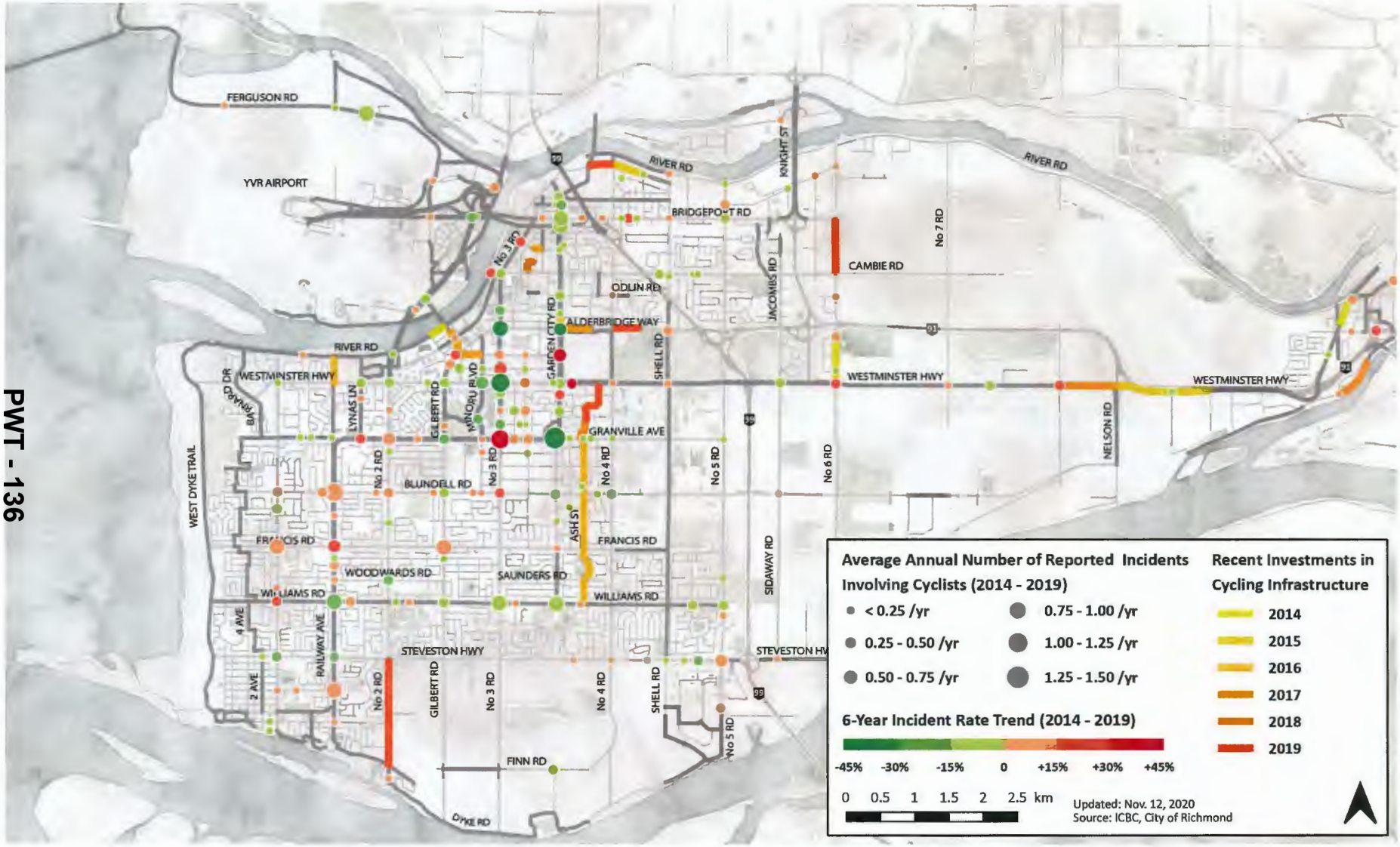


Figure 5.9: Trends in Cyclist Incident Rates (ICBC, 2014-2019) and Recent Cycling Infrastructure Investments (City of Richmond)

6 Network Connectivity and Accessibility Analysis

6.1 Connectivity Analysis

The distinction between 'connectivity' and 'accessibility' is subtle. Accessibility is defined as the ease of reaching desired destinations (e.g., schools) by a specific mode (e.g., bicycle) from a given location within the network. Connectivity represents the most basic form of accessibility and measures the level of a given node's 'connectedness' with adjacent nodes. More simply put, connectivity provides a sense of route choice from a given location.

For this study, connectivity represents a measure of the relative ease of reaching other locations within the cycling network from a given location. The more options and potential routes, the more 'connected' a given segment is to the broader network.

PWT - 137

Importantly, this analysis is constrained to the cycling network, and does not provide an indication of connectivity to locations that are not part of the existing network.

6.1.1 Methodology

Cycling network connectivity analysis was carried out using axial link analysis in *DepthMapX*, which attributes a connectivity value for a given segment based on the number of immediate connections and the relative ease of reaching other nodes within the network. Acknowledging regional connections, the analysis area included cycling networks in neighbouring municipalities within a three-km buffer of Richmond's municipal boundary to ensure network-edge effects are mitigated within the study area.

6.1.2 Existing Cycling Network Connectivity

Figure 6.1 on the following page shows the connectivity analysis results for the existing cycling network. The results show higher relative levels of cycling network connectivity for the primary north-south and east-west spines of the network where there are a greater number of route options to reach other areas of the network.

Conversely, the offshoots and network stubs exhibit lower levels of network connectivity as few, if any, alternative route options exist within the formalized cycling network. This is the case along the south-east branch of Dyke Road, for example.

6.1.3 Existing Cycling Network Connectivity with Informal Routes

Figure 6.2 (page C-47) illustrates the potential increase in connectivity that could be achieved by formalizing some of the informal cycling routes that currently do not have any special treatments.

While many of the informal routes are well used by more confident riders, as discussed previously not all users are comfortable cycling with traffic, and thus are not considered viable options for all users.

Comparing the two outputs, it becomes apparent how small changes to the network can dramatically increase overall network connectivity, and importantly, improve route choice between two given locations.

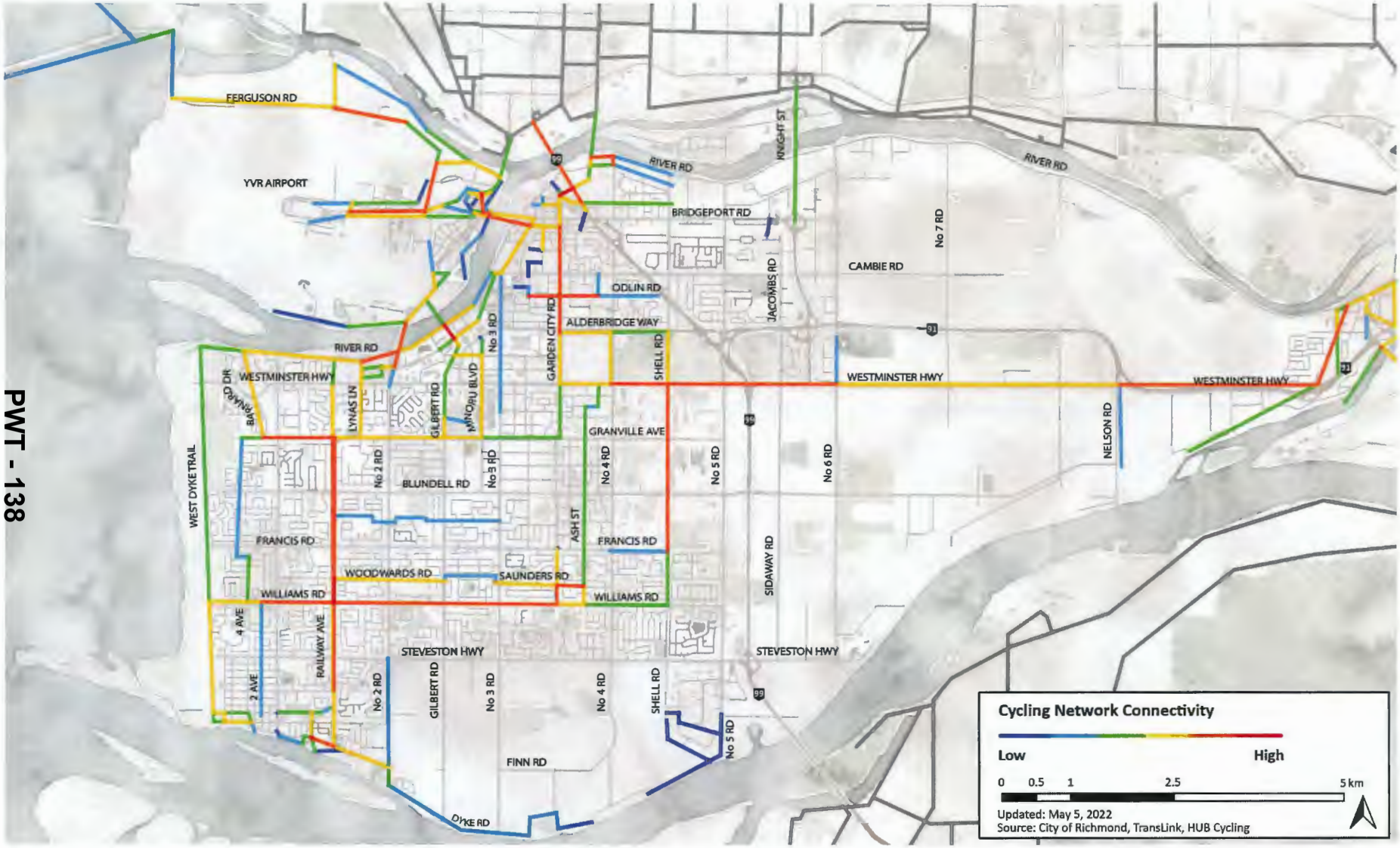


Figure 6.1: Cycling Connectivity Analysis – Existing Cycling Network

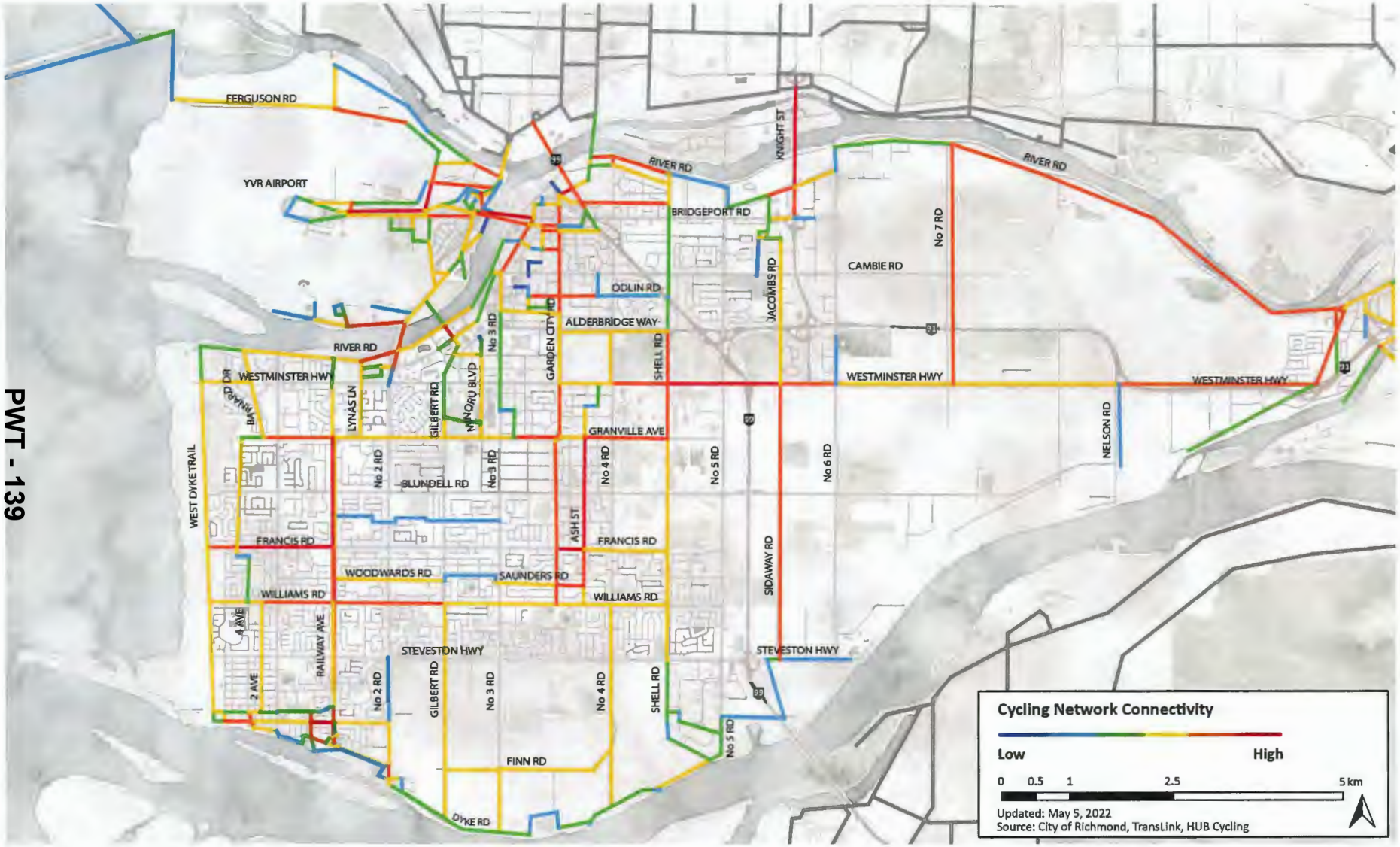


Figure 6.2: Connectivity Analysis – Existing Cycling Network and Informal Routes

6.2 Cycling Accessibility to Key Destinations

In addition to network connectivity, cycling accessibility to points of interest was also examined. This includes an assessment of cycling accessibility to:

- Commercial and mixed-use areas
- Community centres
- Rapid transit stations and major bus exchanges
- General points of interest / tourist destinations
- Schools/educational institutions

The identified key destinations and points of interest are shown in Figure 6.4 on the next page, underlaid with the existing cycling network.

6.2.1 Commercial and Mixed-Use Areas

The commercial core and City Centre mixed-use area are currently accessible by several north-south routes. While portions of the downtown core are linked by east-west connections, additional links between Minoru Boulevard and Garden City Road would increase cycling accessibility within the Richmond City Centre area.

PWT 140

Outside of the City Centre, Steveston is accessible via the Crabapple Ridge local street bikeway, West Dyke Trail, as well as the Railway Greenway and adjacent on-street bike lanes. The commercial areas adjacent to Highway 99 in North Richmond are not well connected to the cycling network, nor is the mixed use commercial area in Ironwood west of Highway 99.

6.2.2 Community Centres

Richmond's community centres are generally accessible via the cycling network (within a 400m networked buffer). One exception is the Cambie Community Centre (located south of the Knight Street Bridge) where nearby cycling facilities are disconnected from the rest of the network, with cyclists depending on unofficial routes to reach this destination.

6.2.3 Major Transit Nodes

All of TransLink's Canada Line rapid transit stations in Richmond are located adjacent to cycling facilities, in addition to the major bus exchange and Bridgeport Station.

Notably, cycling accessibility to the stations within the City Centre (i.e., Lansdowne and Aberdeen Stations) via the existing network is limited, potentially requiring a circuitous route to reach the bike lanes on No. 3 Road.

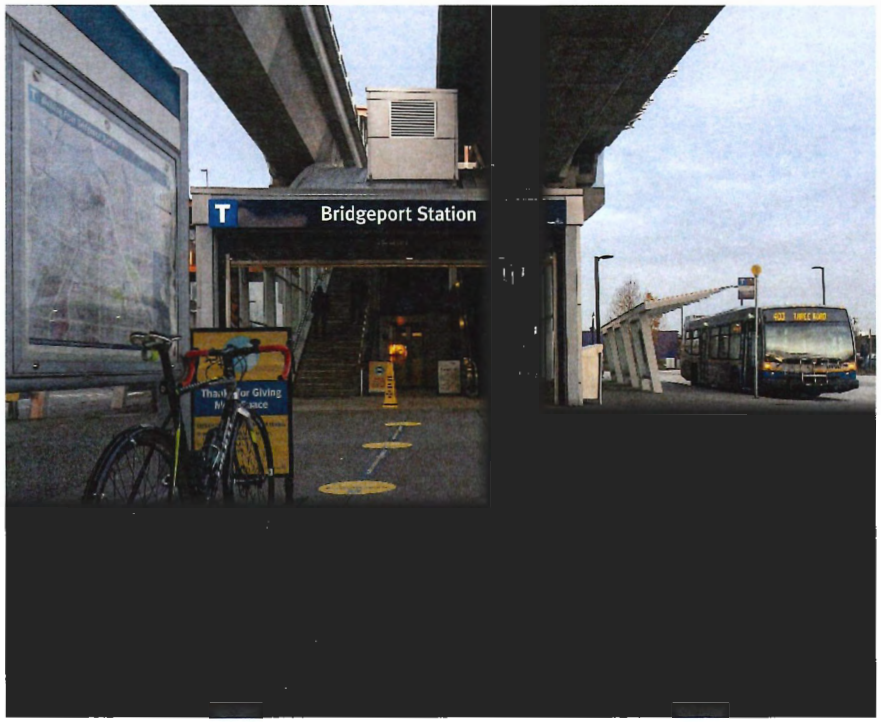


Figure 6.3: Bridgeport Canada Line Station and Bus Exchange

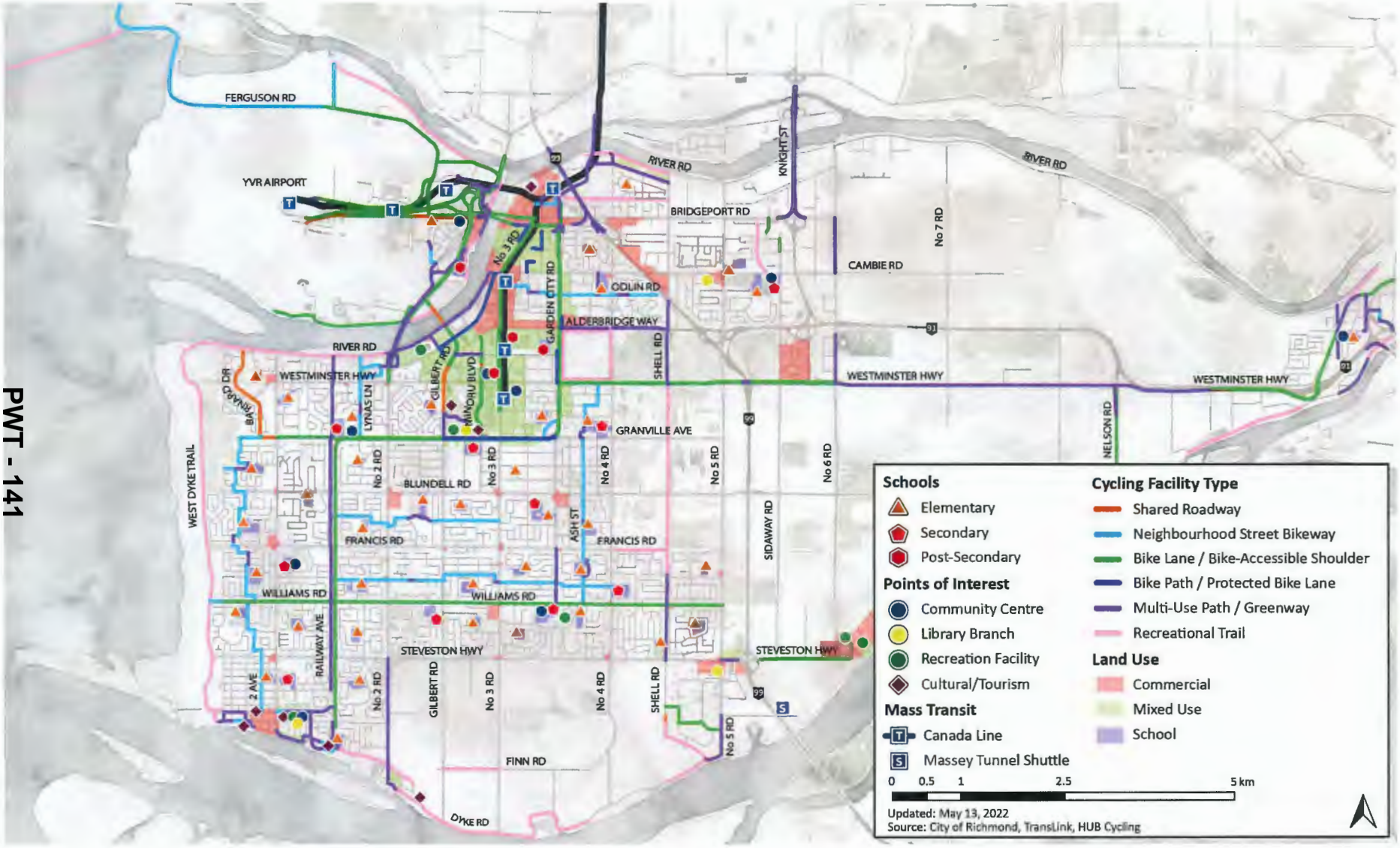


Figure 6.4: Key Destinations, Points of Interest and Major Transit Nodes

Figure 6.5: Cyclists riding on Bayview Street East of No. 1 Road

6.2.4 General Points of Interest / Tourist Destinations

All of the identified key tourist destinations/points of interest are located within 400m of the cycling network. In most cases, multiple different route options are available, increasing accessibility from different parts of the city.

6.2.5 Schools / Educational Institutions

Cycling accessibility to schools and educational institutions was considered to be particularly important. Similar to changing commuter behaviour, encouraging cycling as a safe, convenient, and desirable mode of transportation for students offers a multitude of benefits to individuals, communities, and the City.

In addition to the direct benefits to individual cyclists (promoting a healthy active lifestyle, building confidence, and fostering a connection with the community, for example), an increase in student cyclists reduces vehicle drop-offs, improving traffic congestion and greenhouse gas emissions.

Networked buffers of 400m and 800m were created for all elementary, secondary and post-secondary institutions to determine the ease of access by bicycle. In addition to assessing whether each institution could be easily accessed from the cycling network, the level of comfort of adjacent cycling facilities was also considered.

Figure 6.6 on the following page shows the cycling accessibility to schools by comfort level. While this exercise provides an indication of the comfort level of nearby cycling facilities, consideration for the level of cycling comfort level along the entire journey is especially relevant for students who are less likely to be confident cyclists. For young students in particular, cycling facilities with higher levels of traffic exposure are unlikely to be considered viable options by students or their parents and guardians.

PWT - 142

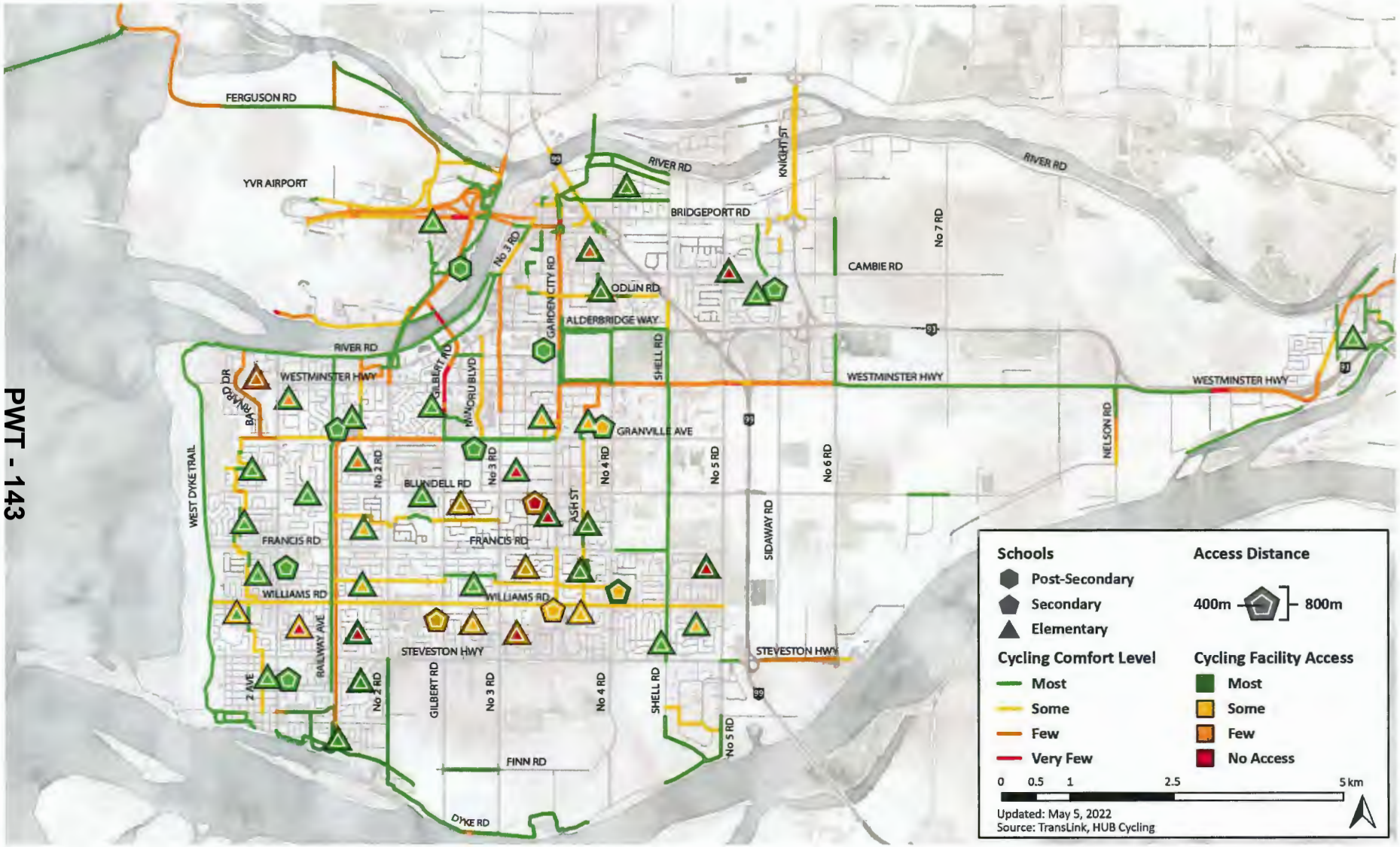


Figure 6.6: Cycling Accessibility to Educational Institutions

7 Key Findings and Next Steps

Existing Cycling Network

The cycling network currently includes more than 330 lane-km of cycling facilities and is mainly composed of bike lanes and bike accessible shoulders (29%), multi-use paths (27%), recreational trails (23%), and neighbourhood street bikeways (16%). An awareness of the current composition and distribution of facilities within the cycling network is essential to inform further consultation efforts and subsequent cycling infrastructure investments. As the foundation of many existing cycling trips in the city, the current network actively shapes and informs how users will experience and perceive their cycling needs. It is the baseline when considering further cycling improvements and their prioritization.

Cycling Comfort Level

Results of the cycling comfort analysis reveal that while over 50% of the existing cycling network in Richmond can be classified as 'comfortable for most,' this is largely made up of trails and multi-use paths/greenways. Going forward, careful consideration should be made for the distribution and suitability of these facilities for different trip purposes by engaging with public and stakeholders on perceptions of safety and facilities that would positively influence cycling behaviour. Ultimately, the comfort level analysis and feedback helps to inform considerations for the types of cycling infrastructure investments that should be prioritized moving forward.

Cycling Ridership

Bike counters at the initial three locations provide insight into the daily trends and seasonal usage patterns of cyclists in Richmond. Continued monitoring of this data as well as expanded installation of bike counters at other strategic locations in the future helps to better understand cycling patterns as the cycling network evolves.

Third-party data obtained from Strava supports anecdotal observations of greater levels of local recreation during the summer months of the COVID-19 pandemic. Despite Strava's limitations as a more recreationally focused subset of the cycling population, the platform provides a fine-grained level of cycling data for all locations within the city at no cost. This data helps to identify common cycling trip patterns and better inform development of the future network and investment prioritization.

Cycling Related Incident Analysis

The incident analysis found that corridors with higher cyclist volumes experience higher annual cycling incident rates, signalling the need for safe intersection designs that minimize the potential for conflicts. Intuitively, facilities with lower cycling comfort levels tended to have higher reported cycling incident rates per lane-km. The highest distance-weight incident rates were observed on shared roadways and bike lanes.

These findings support an approach of prioritizing investment toward higher comfort level facilities as the network expands to minimize the potential for conflicts while simultaneously building a network that is attractive to a broader group of potential cyclists. Identified intersections with a high numbers of collisions involving cyclists are also key candidates for improvements as part of Cycling Network Plan.

Network Connectivity and Accessibility Analysis

This analysis highlights considerations for diverse user groups and the role that different facility types can play in serving them. It also underscores the importance of providing connections to destinations to encourage cycling as a safe and convenient transportation alternative.

Most identified key destinations are located near existing cycling facilities. However, limited route options or network gaps limit the utility of these facilities as a viable option for many users. This is particularly true for less confident cyclists who may not be comfortable cycling with mixed traffic, even if for a short distance between high comfort level facilities.

Despite existing gaps, an evaluation of the increase in overall network connectivity attained by formalizing some of the informal routes in the city demonstrates that small extensions of the network can lead to dramatic improvements. Engagement with the public and stakeholders provides opportunities to understand where upgrades are desired, and where new facilities might better connect residents to the places they want to go.

Next Steps

The analysis and findings summarized within this memo inform public and stakeholder engagement and act as a stepping-stone to future phases of work. This work and the feedback gained through consultation guides the development and implementation of the updated Cycling Network Plan, including the identification of priorities for new cycling network facilities and recommendations for upgrades to existing facilities.

Ultimately, the updated Cycling Network Plan will help to improve cyclist safety, enhance the utility of the active transportation network, and increase the overall attractiveness of cycling as a comfortable and convenient transportation mode in Richmond.

Figure 7.1: Cyclist on Lansdowne Road (Source: City of Richmond)

Control Information

Prepared by

Steer
Suite 1030 – 999 W Hasting Street
Vancouver, BC V6C 2W2
Canada
+1 (604) 629 2610
www.steergroup.com

Prepared for

City of Richmond
6911 No. 3 Road
Richmond, BC
V6Y 2C1
Canada

Steer project/proposal number

23743801

Client contract/project number

6584412

Author/originator

[illegible] Fitzgerald
S. [illegible]agg

Reviewer/approver

G. England

Other contributors

Distribution

Client: Project Team

Version control/issue number	Date
1.0 - DRAFT	November 24, 2020
2.0 - DRAFT	March 12, 2021
3.0 - FINAL	May 19, 2022

DRAFT - 146

steer

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2015

D HUB Cycling/TransLink – State of Cycling Comfort Level Criteria

Bikeway Classification System (Source: HUB Cycling / TransLink)

e.g.	Type *	Class A	Class B	Class C	Class D	Class E	Notes
	Separated from vehicle traffic						
1	**Bike Path:** Off-road facility for the exclusive use of people cycling, may be unidirectional or bidirectional. Separate from both motorists and pedestrians, but designed based on bicycles operating in parallel with pedestrians, especially at intersections.	**Width:** Bidirectional 3.0-4.8m, Unidirectional 2.0-3.0m **Posted Speed:** N/A **Volume:** N/A	**Width:** Bidirectional 2.4-2.9m, Unidirectional 1.5-1.9m **Posted Speed:** N/A **Volume:** N/A	**Width:** Bidirectional 2.1-2.3m, Unidirectional 1.2-1.4m **Posted Speed:** N/A **Volume:** N/A	**Width:** Bidirectional <2.1m Unidirectional <1.2m **Posted Speed:** N/A **Volume:** N/A	Never	**When in a road right of way (ROW):** A bike path should fall outside of the Clear Zone (≥1.2 m on roadways with posted speeds of ≤60 km/h - see Transportation Association of Canada Geometric Design Guide (TAC GDG), see Table 7.3.1 for higher speed roads). Further, designs of bike paths should avoid obstacles in the pathway, include adequate sight lines and lighting, be direct, and avoid the use of rigid bollards. If cyclist volumes exceed 1,500 per day then *recommended* facility widths shall be ≥3.6 m bidirectional, and ≥2.4 m unidirectional. **Bike Path**'s are generally appropriate in association with higher speed roads.
2	**Protected Bike Lane:** Exclusive on-road facility delineated by a vertical barrier element/physical separation from motor vehicles, as well as separation from pedestrians. Can be unidirectional or bidirectional	**Width:** Bidirectional 3.0-4.8m, Unidirectional 2.0-3.0m **Posted Speed:** ≤60 km/h **Volume:** N/A	**Width:** Bidirectional 2.4-2.9m, Unidirectional 1.5-1.9m **Posted Speed:** ≤60 km/h **Volume:** N/A	**Width:** Bidirectional 2.1-2.3m, Unidirectional 1.2-1.4m **Posted Speed:** >60 & <80 km/h **Volume:** N/A	**Width:** Bidirectional <2.1m Unidirectional <1.2m **OR** **Posted Speed:** >80 & ≤90km/h **Volume:** N/A	**Width:** Bidirectional <2.1m Unidirectional <1.2m **Posted speed:** ≥90km/h **Volume:** N/A	Separation from vehicles by delineator (curbs, bollards, concrete barriers, etc.) is required. Type of delineator dependent on speed and volume of traffic (for specific details see TAC GDG Chapter 5, section 5.7.5). At intersections, a protected bike lane should be set back 6m from the parallel travel lane-see Transportation Association of Canada Geometric Design Guide (TAC GDG), Section 5.6.2.3 for guidelines. Parking may provide additional barrier beyond the delineator - at a minimum curbstops over 100 *mm* high are necessary with periodic gaps for drainage and wheelchair access. Width of delineator is 0.30-1.0 m. If adjacent to parking, min separation is ≥0. 80 m (Class A), ≥0.60 m (Class B). **Volume:** If motor vehicle ADT is greater than 4,000, this facility is more acceptable than others. If cyclist volumes exceed 1,500 per day then *recommended* facility widths shall be ≥3.6 m bidirectional, and ≥2.4 m unidirectional.
3	**Multi-Use Path (MUP):** Off-road facility that allows for shared use by people cycling and pedestrians.	**Width:** Bidirectional 3.3-4.0m, Unidirectional bikes 3.0-4.0m **Posted Speed:** N/A (ie outside of road ROW) **Volume:** N/A **Paved**	**Width:** Bidirectional 3.0-3.4m, Unidirectional bikes 2.4-2.9m **Posted Speed:** ≤50km/h & ≥1.2m from curb face **Volume:** N/A **Paved**	**Width:** Bidirectional 2.7-2.9m, Unidirectional bikes 2.1-2.3m **Posted Speed:** ≤60km/h & <1.2m from curb face **Paved or Unpaved**	**Width:** Bidirectional <2.7m, Unidirectional bikes <2.1m **OR** **Posted Speed:** >60km/h & with adequate setback or physical protection as per TAC guidance	**Posted Speed:** >60km/h & <1.2m from curb face	MUP's are not intended to replace a sidewalk where there is sufficient motor vehicle or pedestrian and bicycle traffic that may lead to high rates of conflict. As a guide, **MUPs** are not *recommended* when pedestrian and bicycle traffic volumes exceed a total peak hour volume of 200 users. A **MUP** should fall outside of the Clear Zone (≥1.2 m on roadways with posted speeds of ≤60 km/h - see TAC GDG, Table 7.3.1 for higher speed roads). Further, designs of **MUPs** should avoid obstacles in the pathway, include adequate sight lines and lighting, be direct, and avoid the use of rigid bollards.
	Unseparated from vehicle traffic						
4	**Neighbourhood Street Bikeway or Shared Roadway:** Bikes and motor vehicles share the roadway, which provides a continuous corridor in suitable operating conditions for people cycling, including limiting exposure to motor vehicle traffic. Can include a variety of roadways including local roads, alleys and service roads.	**Width:** Parking one side 5.5-7.5m, parking both sides 8.0-11.0m **Posted Speed:** ≤30km/h **Volume:** ≤1,000 ADT	**Width:** Parking one side 5.5-7.5m, parking both sides 8.0-11.0m **Posted Speed:** ≤30km/h **Volume:** ≤2,000 ADT	**Width:** varies by road type **Posted Speed:** ≤50km/h **Volume:** ≤3,000 ADT **OR** **Posted Speed:** ≤30km/h & Collector	**Width:** varies by road type **Posted Speed:** ≤50km/h **Volume:** <6000 ADT **OR** **Posted Speed:** <30km/h & Arterial	**Width:** varies by road type **Posted Speed:** >50km/h **OR** **Volume:** >6000	Traffic diversion can include such treatments as directional and median barriers. Traffic calming can include such treatments as raised crossings, and bicycle permeable humps and chicanes. All such facilities should include shared lane markings to indicate the potential presence and positioning of people cycling. Municipalities are *recommended* to limit posted speeds to 30 km/h on all **Neighbourhood Street Bikeways** and **Shared Roadways. Widths:** If curb less than 100 mm, or parking along curb, gutter pan can be included in width. Otherwise, width excludes gutter pan.
5	**Bike Lane:** On-road facility adjacent to a curb or a parking lane and delineated from motor vehicles with paint markings.	Never	**Width:** 1.7-2.4m **Posted Speed:** ≤50km/h **Volume:** ≤4,000 ADT Absence of curbside parking.	**Width:** 1.5-1.6m **Posted Speed:** ≤50km/h **Volume:** N/A Curbside parking permitted.	**Posted Speed:** >50 & ≤70km/h **Volume:** N/A	**Posted Speed:** >70km/h **OR** **Posted Speed:** >50 & ≤70km/h & curbside parking **Volume:** N/A	If parking present or speeds/ volumes might exceed limits or over 1,500 people cycling per day, **separated bikeway** *recommended*. **Widths:** If curb less than 100 mm, or parking along curb, gutter pan can be included in width. Otherwise, width excludes gutter pan.
6	**Bike Accessible Shoulder:** Signed and marked, paved area with no curb, located to the right of roadway general purpose travel lanes, and separated from general purpose lanes by white edge line or painted buffer. Usually in rural areas. May be shared with pedestrians.	Never	**Width:** 1.8-2.4m **Posted Speed:** ≤50 km/h **Volume:** ≤4,000 ADT	**Width:** 1.5-1.7m **Posted Speed:** ≤60km/h **Volume:** N/A	**Posted Speed:** >60 & ≤90km/h **OR** **Posted Speed:** ≤60km/h & Parking permitted outside shoulder	**Posted Speed:** >60 & ≤90km/h & parking permitted outside shoulder **OR** posted speed >90kmh	Parking not permitted in bikeway. If speeds/ volumes exceed limits, or over 1,500 people cycling per day **separated bikeway** *recommended*. Width for buffered facility: 2.4-3.5 m total, bike lane 1.8-2.4 m

* In all cases pavement markings (bicycle stencils) and signage are necessary at regular intervals and should be placed at a distance of 20 to 30 metres in advance of, and following each intersection and other decision points, or every 400 m when intersections are not present.

Notes:

Class A: Designed toward the practical and absolute upper limit of the design domain and intended to comfortably accommodate higher volumes of users, including for example passing movements and side-by-side cycling.

Class B: Includes dimensions that sit between lower practical and practical upper limits for the dimensions of bikeways. These facilities may not be intended to accommodate passing movements or side-by-side cycling. Agencies implementing such facilities should check with TAC guidance if passing movements or side by side cycling is intended.

Class C: These facilities are intended to accommodate lower volumes of cyclists and tend toward the lower practical and absolute lower limits of cycling infrastructure. Such facilities will tend to accommodate single file cycling, but are not intended to accommodate passing movements or side-by-side cycling.

Class D: These facilities are intended to accommodate low volumes of cyclists and are at or below absolute lower limits of the design domain. These facilities provide basic accommodation of cyclists operating in single file and exhibit deficiencies including, but not limited to deficient signage and pavement markings, higher speed and higher volume motor vehicle traffic on adjacent facilities, and/or motor vehicle parking permitted in close proximity to cyclists.

Class E: These facilities do not meet the absolute lower limit of the design domain and even experienced cyclists should use such facilities with caution. Such facilities tend to have a combination of deficiencies including for example, a lack of signage and pavement markings, higher speed and higher volume motor vehicle traffic on adjacent facilities, and/or motor vehicle parking permitted in close proximity to cyclists.

Comfort : Green = Comfortable for "**Most**", Yellow = Comfortable for "**Some**", Orange = Comfortable for "**Few**", Red = Comfortable for "**Very Few**"

Volume Assumptions: Local (or equilivant) = 2000, Collector (or equivilant) = 4000, Arterial (or equivilant) = 6000

E Implementation Strategy: Expanded Project Descriptions

E1 Short-Term (2022-2026)

E1.1 Shell Road (Alderbridge Way to River Road)

Extending the Shell Road bike corridor north of Highway 99 to connect to Bridgeport Road and River Road was one of the most requested new routes during Phase 1 engagement. This addition has also been identified in the City's recent 5-year cycling capital planning exercises. By extending the existing multi-use path, this route will not only offer a convenient and continuous off-street facility for north-south travel, but also improve cycling connections to the East Cambie and Bridgeport areas.

E1.2 Sexsmith Road – Brown Road (Beckwith Road to Browngate Road)

Continuing to build out segments of off-street bike paths on Sexsmith Road and Brown Road will eventually establish a protected north-south corridor in the City Centre, offering an AAA alternative to the current facilities on Garden City Road and No. 3 Road. These segments were frequently identified as a network gap during Phase 1 engagement. In their responses, the public specifically noted the potential for this route to provide an alternative to Garden City Road for access to and from Bridgeport Station and the Canada Line Bridge (to Vancouver). These additions were some of the highest scoring in the segment level analysis and have been identified in the City's 5-year cycling capital plan for 2022.

Further connections on **Charles Street (between the existing multi-use path and Van Horne Way)** and **Browngate Road (between Hazelbridge Way and No. 3 Road)** are also envisioned in the short term. These projects will improve connections between Sexsmith Road and Brown Road to nearby routes, extending facilities to meet the existing cycling network and averting the creation of future gaps.

E1.3 Gilbert Road (Elmbridge Way to Granville Avenue)

In addition to aligning with the priority to close gaps caused by existing shared road segments, improving Gilbert Road also enhances cycling connections in the City Centre to Minoru Park, Richmond General Hospital and Samuel Brighouse Elementary School. This priority has been reflected in the City's recent 5-year capital plans for cycling facilities. This segment was emphasized as a high priority during Phase 2 public engagement and upheld by a high score during the segment level analysis.

E1.4 Lansdowne Road (Pearson Way to Gilbert Road)

A top scoring east-west route in the segment level analysis, Lansdowne Road provides a direct connection between the Canada Line, Kwantlen Polytechnic University, and the Richmond Olympic Oval. While further upgrades are dependent on development, completing this network gap has been prioritized in the short-term, thus connecting facilities on Gilbert Road, River Road, and the Middle Arm Greenway and maximizing benefits from other recent improvements in the area.

E1.5 Lucas Road – Bowcock Road – Dayton Avenue

The Crosstown Neighbourhood Bikeway extension improves cycling connections to three schools – RC Palmer Secondary, Garden City Elementary, and Howard DeBeck Elementary – while also completing an east-west connection between the Railway Avenue Greenway and the Parkside (Ash Street) Neighbourhood Bikeway (beginning at Colbeck Road). Addressing an east-west gap until the long-term completion of Blundell Road, this segment also completes and improves upon recent cycling capital plans. As the east and west legs of **Lucas Street at No. 3 Road** are off-set by approximately 30 metres, corridor and traffic signal improvements at No. 3 Road have been identified in the short-term.

E1.6 Moffatt Road – Deagle Road – Bamberton Drive

The addition of the north-south Midtown Neighbourhood Bikeway midway between Gilbert Road and No. 3 Road offers an opportunity to provide a short-term response to the lack of north-south facilities between the Railway Greenway and the Parkside (Ash Street) Neighbourhood Bikeway. This need for a facility in central Richmond was widely expressed during

PWT - 150

engagement and included requests for facilities on Gilbert Road and No. 3 Road. The neighbourhood bikeway approach, recognized by recent cycling capital plans, presents a low-cost means to reduce exposure of cyclists to high volumes of motor vehicles. Meanwhile, Gilbert Road is envisioned as a long-term priority.

Several upgrades at major intersections have been identified to complete this route. At the northern terminus, Granville Avenue is a divided road. Hence, cyclists must head eastbound toward the **intersection of Minoru Gate**. Improvements to wayfinding, the eastbound travel lane, and this intersection are envisioned to connect cyclists looking to travel westbound. Similarly, a new pedestrian and cyclist-controlled intersection will improve the southern terminus at **Bamberton Drive and Steveston Highway**, facilitating left turns between on and off-street facilities. Finally, the intersection of **McCutcheon Place and Schaefer Gate at Francis Road** is off-set by approximately 50 metres. A new pedestrian and cyclist-controlled intersection and brief facilities on Francis Road will enhance north-south connectivity along this neighbourhood street bikeway.

DRAFT

E1.7 River Road (McCallan Road to Middle Arm Greenway)

Extending paved segments of the Middle Arm Greenway westward along the south side of River Road to meet McCallan Road supports a continuous recreational and off-street connection to the Railway Greenway. Previously identified for short-term completion through capital planning, this route serves recreational uses and connections to the City Centre.

E1.8 Westminster Highway (Lynas Lane to No. 2 Road)

This segment has been prioritized to create a safer connection southbound from the No. 2 Road Bridge to the Lynas Lane neighbourhood bikeway. This connection to the No. 2 Road Bridge was noted as a key network gap during Phase 1 engagement, with interim solutions aligning with priorities to address the top 20 collision prone intersections. Upgrades to the **intersection of Lynas Lane and Westminster Highway** are thus proposed to support necessary cyclist turning movements from westbound to southbound (e.g., bike boxes). Providing cycling facilities on No. 2 Road connecting to Granville Avenue is a medium-term priority.

E1.9 Steveston Highway (Railway Avenue to Shell Road)

The Steveston Highway route, identified in the City's recent 5-year cycling capital plans, offers the most direct east-west connection between Ironwood and Steveston. Envisioned as a multi-use path / greenway, this route will provide an off-street connection between two key recreational routes: Railway Avenue Greenway and Shell Road Trail. A continuous facility on Steveston Highway will further integrate the southern termini of the planned neighbourhood street bikeway facilities at Mortfield Gate and Bamberton Drive within the wider cycling network and provide connections to the future Fraser River Crossing cycling facilities.

E1.10 Westminster Highway (Fraserside Gate to Smith Crescent)

In addition to aligning with the priority to close gaps caused by existing shared road segments, this segment in the community of Hamilton was noted as a priority for safety improvements during the first phase of engagement. Respondents noted close calls with motorists and sought further delineation and separation for cyclists. Desires to improve this segment have also been reflected in recent cycling capital plans. These improvements also enhance regional connections to New Westminster and Burnaby.

E1.11 Garden City Road – South Arm Park – Ryan Road (Francis Road to Steveston Highway)

Garden City Road is a continuous north-south facility with proximity to many locations in the City Centre and Central Richmond. Hence, short-, medium-, and long-term improvements are planned for this route, beginning with a connection to the new Steveston Highway route. Improvements also complete gaps in the existing multi-use path between Francis Road and Williams Road, which currently ends in sharrow markings

at Williams Road. This project aligns with recent cycling capital plans as well as stakeholder feedback.

With a new multi-use path facility planned for the south side of Steveston Highway, upgrades to the existing pedestrian **intersection at Mortfield Gate** are proposed. In particular, cyclist push buttons and green paint.

E1.12 No. 2 Road (Williams Road to Steveston Highway)

A continuous cycling facility on No. 2 Road has not been envisioned within the horizon of this plan, recognizing the strengths of the nearby Railway Avenue Greenway. However, extending the recent multi-use path upgrades south of Steveston Highway along No. 2 Road to Williams Road remains an established priority from previous planning decisions. As Williams Road is envisioned as a key route in the cycling network, this is a logical terminus for the No. 2 Road multi-use path.

PWT 152

E1.13 Intersection Upgrades and Missed Connections

Alderbridge Way

Much of the multi-use path on Alderbridge Way between Garden City Road and Shell Road has been completed in recent years. The **missed connection west of No. 4 Road** remains a priority in the short-term once property has been acquired. Upgrades to the busy **intersection of Alderbridge Way and Shell Road** present an opportunity to better integrate these two off-street facilities. These short-term improvements are aligned with City priorities to address the top 20 collision-prone intersections and the short-term completion of both multi-use paths.

Garden City Road (Cook Road to Citation Drive)

Cyclists and vehicles **share the existing right turn lane for Citation Drive** heading southbound on Garden City Road. Greater delineation for cyclists, including bike lanes and green paint at conflict points are beneficial cycling improvements that can be undertaken in this area.

Odlin Road at Shell Road

Recently, a neighbourhood street bike route has been completed on Odlin Road, ending in a cul-de-sac just west of Highway 99. While dependent on wider support from the Ministry of Transportation and Infrastructure, completing this **missed connection between Odlin Road and Shell Road** is an aspiration in the short-term. This emphasis responds to the potential to develop a continuous east-west connection from the Shell Road Trail to the City Centre while overcoming barriers presented by highway crossings (key feedback from Phase 2 engagement).

Williams Road at No. 3 Road

The intersection of **Williams Road and No. 3 Road** experienced a relatively high number of collisions involving cyclists from 2014 to 2019, with safety concerns confirmed by public feedback. Short-term improvements will focus on cyclist through traffic on Williams Road, including separating the bike lane from the right turn lane in both directions up to the intersection.

Saunders Road at No. 3 Road

The Woodwards Road and Saunders Road neighbourhood bikeway relies on a pathway from the rear lane to reach No. 3 Road. Upgrades to this pathway and the **pedestrian-controlled intersection at No. 3 Road** and **Saunders Road** are planned in the short-term to increase the safety of cyclists crossing the arterial.

Westminster Highway at No. 5 Road

Current conditions on **Westminster Highway at No. 5 Road** include the eastbound bike lane merging into the right turn lane prior to the intersection. As one of the top 20 collision prone intersections with high traffic volumes, upgrading this shared road segment is one of the priorities for short-term improvements.

Westminster Highway at Southbound Highway 99 On-Ramp

Currently, sharrow markings in the bike-accessible shoulder on Westminster Highway direct cyclists heading eastbound toward the Highway 99 overpass with no markings where conflicts could emerge with motorists. In addition, safety concerns about this exit ramp were expressed during public engagement. In coordination with the Ministry of Transportation and Infrastructure, similar green paint treatments used in vehicle turning lanes at the intersection of Westminster Highway and No. 5 Road are suitable improvements.

E2 Medium-Term (2027-2031)

E2.1 Garden City Road (Granville Avenue to Francis Road)

Completion of a continuous route on Garden City Road is planned for the medium-term, establishing a foundation to continue to improve this north-south corridor within Central Richmond. This segment between Granville Avenue and Francis Road will also complete the final leg of a central loop of directional bike lanes on Garden City Road, Williams Road, Railway Avenue, and Granville Avenue that are well connected to the wider cycling network.

PWT - 153

As part of these improvements, upgrades to the **off-set intersection of Garden City Road with Bowcock Road and Dayton Avenue** should also be undertaken. Improvements to this intersection (off-set by 60 metres), such as cyclist push buttons and green paint, would improve safety for accessing nearby schools.

E2.2 No. 2 Road (Westminster Highway to Granville Avenue)

A top scoring segment during our evaluation that was frequently identified as a network gap during Phase 1 engagement, cycling facilities on this section of No. 2 Road are a key priority for the medium-term. Once completed, they will provide a more direct connection from Granville Avenue to the No. 2 Road Bridge with access to Burkeville, YVR, Iona Beach Regional Park, and Vancouver.

E2.3 Westminster Highway (McMillan Way to Graybar Road)

This 300m segment of shared roadway for eastbound cyclists between McMillan Way and Graybar Road was a key focus of safety concerns heard during public engagement. Upgrading shared roads is a top priority for this implementation plan, with corridor constraints along Westminster Highway making improvements more feasible in the medium term. As off-street facilities will be more comfortable with prevailing traffic conditions (including large trucks), it is recommended that the existing off-street multi-use path be continued eastward for this segment.

E2.4 Browngate Road Extension (No. 3 Road to River Parkway)

While complete build out of the Odlin Road and Browngate Road route is unlikely to be achieved in the short-term, this final extension is an important priority to carry into the medium-term. Once completed, it will provide a direct connection between existing protected facilities on River Parkway and planned protected facilities on Sexsmith Road.

E2.5 Capstan Way (River Road to Garden City Road)

Development and the associated completion of off-street cycling facilities is ongoing along Capstan Way. A continuous cycling route is aspirational for the medium-term, with connections to protected facilities on Sexsmith Road and a future extension of River Parkway, as well as the new Capstan Canada Line Station. Once off-street facilities have been completed in all directions, the high-traffic **intersection of Sexsmith Road and Capstan Way** would benefit from the installation of a protected intersection to support of safe through and turning movements for cyclists.

E2.6 No. 3 Road (Browngate Road to Alderbridge Way)

Presently, there are no cycling facilities heading southbound on this segment of No. 3 Road. While dependent on development activity due to corridor constraints, addressing this network gap in the medium-term provides enhanced permeability in the City Centre and a direct link between

other parts of the network via Lansdowne Road, Cook Road, and Browngate Road. This connection was also high scoring in the segment level analysis, and part of a key network gap from Capstan Way to Alderbridge Way emphasized during Phase 1 engagement. The northern segment of this gap is addressed with the River Parkway Extension (E2.7).

E2.7 River Parkway Extension (Cambie Road to Capstan Way)

Completion of the off-street facilities on Capstan Way through ongoing development presents a synergistic opportunity for northward expansion of the pedestrian and cycling facilities within the River Parkway corridor, with connections to the Middle Arm Greenway. With no southbound facility and an abundance of driveways on parallel segments of No. 3 Road, a multi-use path along the River Parkway right-of-way provides a suitable and safer alternative for cyclists in the medium-term.

E2.8 Cambie Road (Shell Road to No. 6 Road)

The completion of Shell Road in the short-term presents an opportunity to connect a cycling facility on Cambie Road into the wider cycling network. One of the key pieces of feedback received pertaining to connectivity during Phase 1 engagement was the lack of connections to East Cambie and East Richmond. This route addresses that need, with connections King George Park, Cambie Community Centre, Cambie Secondary School, and businesses in the Jacombs Road, Viking Way and No. 6 Road areas.

E2.9 No. 6 Road (Cambie Road to Commerce Parkway)

Filling in the gaps of multi-use paths between Cambie Road and Commerce Parkway along No. 6 Road supports key themes from public engagement, including prioritizing network gaps, connections to East Richmond, and overcoming the barriers of crossing major highways. Hence, this segment on No. 6 Road is also envisioned to be completed in the medium-term together with Cambie Road. Similarly, improvements to bring the multi-use path right through the **intersection of No. 6 Road with Cambie Road**, creating strong linkages between these routes, are considered as part of this project.

E2.10 Lansdowne Road (Minoru Boulevard to Garden City Road)

A top scoring east-west route in the segment level analysis, Lansdowne Road is dependent on development for full completion. Providing a direct connection to the Lansdowne Canada Line Station and Kwantlen Polytechnic University, this segment is proposed for the medium-term, completing a continuous east-west route within the City Centre.

Current conditions at the **intersection of Lansdowne Road and Garden City Road** include high-traffic volumes and lanes divided by a median. With Garden City Road being an important route in the wider cycling network and a need to accommodate left turning cyclists, intersection improvements should be undertaken with the completion of the eastern terminus on the Lansdowne Road route.

E2.11 Cook Road (No. 3 Road to Garden City Road)

Cook Road presents another opportunity for east-west connectivity in the City Centre, with connections to the Richmond-Brighouse Canada Line Station, bus mall and William Cook Elementary from Garden City Road. It is envisioned as a medium-term opportunity to improve connections within the City Centre. In the future, cycling facilities could be extended to Minoru Boulevard and Gilbert Road via development activity and Minoru Park.

E2.12 Cooney Road (Lansdowne Road to Granville Avenue)

Supporting the development of a finer grain network in the City Centre, with connections to Lang Centre and Richmond Public Market, Cooney Road is also proposed for the medium-term. A route that is dependent on development, Cooney Road cycling facilities are eventually envisioned to form a continuous route with Brown Road in the long-term. In the interim, this segment enhances connections between several other nearby routes.

E2.13 Moncton Street (No. 1 Road to Railway Avenue)

Steveston has an abundance of cycling destinations, with several meandering neighbourhood street bikeways and multi-use paths. This facility on Moncton Street would provide a direct east-west route into Steveston Village from Railway Avenue.

E2.14 Steveston Highway (Shell Road to Sidaway Road)

This segment of Steveston Highway fulfills three important objectives: enhanced connections to Ironwood, an improved crossing of Highway 99 for cyclists, and potential connections to the future Fraser River Tunnel. Completing the entire route is dependent on improvements being made by the Ministry of Transportation and Infrastructure within their jurisdiction.

E2.15 Shell Road (Steveston Highway to Horseshoe Slough Trail) and Rice Mill Road (No. 5 Road to Fraser River Tunnel)

These segments along Shell Road and Rice Mill Road present an opportunity for improving cycling connections to the future Fraser River Tunnel within municipal jurisdiction and on roads with lower traffic volumes. Upgrades are envisioned to occur in tandem with future provincial upgrades to the new Fraser River crossing.

E2.16 Intersection Upgrades and Missed Connections

Railway Avenue

The **segment of Railway Avenue between Garry Street and Moncton Street** was frequently noted as a priority upgrade during Phase 1 engagement. Extending an off-street facility for all ages and abilities to complete the existing multi-use pathway is targeted for the medium-term. This continuity is also a suitable first step to addressing the relatively high number of collisions involving cyclists recorded at Garry Street and Railway Avenue.

Two existing pedestrian intersections on Railway Avenue – Woodwards Road and Colbeck Road – would also benefit from upgrades to their current pedestrian crossings. Adding cyclist push buttons and green paint will support connections between these neighbourhood street bikeways and the on- and off-street cycling facilities on Railway Avenue.

Williams Road

Two nearby intersections on Williams Road met the criteria for improvements and have been prioritized in the medium term. **Williams Road and Garden City Road** experienced a high number of collisions involving cyclists from 2014 to 2019 and has direct connections into South Arm Community Park, McRoberts Secondary School and South Arm Community Centre. This intersection, and the nearby **intersection of Williams Road and Ash Street** (Parkside Neighbourhood Bikeway) would benefit from improvements such as cyclist push buttons and green paint to increase cyclist safety.

Shell Road

The high traffic **intersection of Williams Road and Shell Road** should be upgraded to support transitions between the bi-directional facilities on Williams Road and the multi-use path on Shell Road. A pedestrian and cyclist-controlled intersection is also proposed for the **Shell Road Trail crossing at Blundell Road**. More time has been allowed to develop improvements to these intersections by the medium-term, recognizing the adjacent rail line and need for collaboration.

Odlin Road and Garden City Road

While the Browngate Road extension at No. 3 Road is an important contribution to the complete build out of the Odlin Road and Browngate Road route, upgrades to the **intersection of Odlin Road and Garden City Road** are also worthy of consideration for the medium-term. Vehicle turning lanes and medians make this a wide intersection to cross for cyclists and pedestrians. Improvements such as bike boxes and cyclist-activated signals would benefit cyclists making left turns at this intersection.

Minoru Boulevard

There are currently two brief **shared road segments on Minoru Boulevard** located in both directions north of Elmbridge Way and travelling northbound between Minoru Gate and Granville Avenue. Both locations are proposed for bike lane upgrades in the medium-term.

E3 Long-Term (2032-2036)

E3.1 Gilbert Road (Granville Avenue to Steveston Highway)

Gilbert Road was one of the top new routes requested during both phases public engagement. Serving similar trips to a facility on No. 2 Road or No. 3 Road, a facility on Gilbert Road provides greater coverage. Once completed, it will provide a north-south route midpoint between Garden City Road and Railway Avenue, placing most Central Richmond destinations within 800 metres of the cycling network.

PWT - 156

E3.2 Blundell Road (No. 1 Road to Shell Road Trail)

With two future neighbourhood centres and the potential to act as a future cycling crossing of Highway 99, Blundell Road is the primary candidate to provide similar coverage (i.e., 800 metres) for east-west travel in Central Richmond. Further improvements along Blundell Road to improve the 90-metre **off-set intersection of the Midtown Neighbourhood Bikeway with Moffatt Road** should also be considered as this route is built out in the long-term.

The **intersection of Blundell Road and Railway Avenue** has high traffic volumes and experienced a higher number of collisions involving cyclists from 2014 to 2019. Improvements are recommended with the addition of a facility to Blundell Road, given the potential for increased turning movements by cyclists.

E3.3 Westminster Highway (McCallan Road to Gilbert Road)

In the long-term, the segment of Westminster Highway between McCallan Road and Gilbert Road will be stitched into the surrounding network, with improved connections to Thompson and the Railway Greenway. Right of way constraints between Gilbert Road and Garden City Road push continuous facilities on Westminster Highway beyond the long-term, with connections to River Road and Lansdowne Road playing an important role in maintaining east-west connectivity through the City Centre.

These improvements will establish cycling facilities in all directions at the **intersection of Westminster Highway and No. 2 Road**. Given the previously mentioned needs for cyclists to turn at this intersection and the higher vehicle volumes, intersection improvements are critical in the long-term. As one of the top 20 collision prone intersections, improvements may be undertaken on a shorter timeline.

E3.4 Brown Road Extension (Odlin Road to Lansdowne Road)

A continuous north-south facility from Cooney Road to Brown Road and Sexsmith Road is envisioned in the long-term and is dependent on development to create the opportunity to open this permeability between Lansdowne Road and Alderbridge Way. Hence, this high scoring route is to be completed over a longer time horizon. Once constructed, cyclists will have an alternative to No. 3 Road and Garden City Road for access to City Centre destinations, Sea Island and Vancouver.

E3.5 River Road (No. 2 Road to Lansdowne Road)

River Parkway is the longest protected facility in the City Centre with opportunities to expand. Completion of the western leg of this route is targeted for the long-term, removing an awkward network gap in front of the Richmond Olympic Oval and improving access from No. 2 Road.

E3.6 Minoru Boulevard Extension (River Parkway to Alderbridge Way)

Redevelopment along Alderbridge Way will present opportunities to extend Minoru Boulevard, potentially within this long-term planning horizon. When creating a **new intersection at the existing River Parkway protected bike lane facility**, cycling connections should be considered during intersection design with extension of the Minoru Boulevard cycling route northward from Alderbridge Way.

E3.7 No. 3 Road

Continuous cycling facilities on No. 3 Road through the City Centre were a top safety improvement put forward during Phase 1 engagement, scoring high during evaluations, and are planned for the long-term. To complete No. 3 Road, the following segments are identified within this planning horizon:

- River Road to Bridgeport Road (development dependent)
- Capstan Way to Browngate Road (southbound only)
- Cook Road to Granville Avenue

In addition to serving north-south connectivity, these improvements are important for network connections to Canada Line stations as well as the Moray Channel and Airport Connector Bridges.

The **intersection of No. 3 Road and Granville Avenue** experiences a high number of collisions involving cyclists and is one of the top 20 collision prone intersections. Hence cycling improvements should be undertaken for this intersection, with considerations for cyclist turning movements at this southern terminus of the No. 3 Road facility.

E3.8 River Road (No. 3 Road to Tait Waterfront Park Trail)

One of the most requested new routes during public engagement was the creation of a continuous route from the Canada Line Bridge to the Middle Arm Trail. A continuous waterfront-oriented alignment is beyond the horizon of this plan, with all improvements dependent on development activity. However, this initial alignment is a suitable aspiration for the long-term, with good connections to the existing network (i.e., No. 3 Road and Great Canadian Way).

E3.9 Middle Arm Greenway / River Road (Capstan Way to Cambie Road)

Connecting the current Middle Arm Greenway (off-street multi-use path) from Capstan Way to Cambie Road will provide wider network connections for users of future cycling facilities on Cambie Road, as well as providing a quieter north-south alternative to No. 3 Road. In the future, northward expansion under the Moray Channel and Airport Connector Bridges presents another opportunity to close a network gap.

E3.10 River Road (Shell Road to No. 6 Road)

“Make all of River Road along the North Arm a safer bike route” received the most upvotes of any new route requested on the Ideas Board during Phase 1 engagement, with multiple entries requesting similar extensions on River Road. With the complete route being a considerable undertaking, a first phase is within the considerations of this plan. Acting as an alternate east-west route for East Richmond along a desirable route for road cyclists, this route will extend to facilities on No. 6 Road.

E3.11 No. 6 Road (River Road to Bridgeport Road)

Completion of the northern segment of the multi-use path on No. 6 Road will complete a major grid for cycling connections in East Cambie. It will also service industrial destinations and provide an alternative route from Hamilton to northern destinations in Richmond.

E3.12 Blundell Road Extension through Southeast Richmond

This potential route between No. 6 Road and Nelson Road on Blundell Road provides an alternative route from Hamilton to southern destinations in Richmond. Portions of the route already exist (Savage Road to No. 7 Road) while significant road construction is required to create the entire route. The portion between No. 7 Road and No. 8 ad is planned for development by the Vancouver Fraser Port Authority.

E3.13 Further Intersections and Missed Connections

Garden City Road and Sea Island Way

The **intersection of Garden City Road and Sea Island Way** was the most requested for improvements during public engagement, with right of way constraints challenging potential solutions to the **shared road segment approaching Sea Island Way in the southbound direction**. Safety improvements are being considered here as part of efforts to address the top 20 collision prone intersections. Cycling specific improvements should also be prioritized by the long-term, considering the elevated number of collisions involving cyclists recorded here.

Westminster Highway and Garden City Road

The intersection of **Westminster Highway and Garden City Road** would benefit from greater protection and delineation to support safe through and turning movements for cyclists. As the terminus of the Westminster Highway route east of the City Centre, cycling turning movements continue to be necessary here.

Williams Road and Railway Avenue

As an established area of the cycling network that experiences a relatively high number of incidents involving cyclists, the **intersection of Williams Road and Railway Avenue** is a good candidate for upgrades to support transitions between bi-directional facilities and a multi-use path.

Westminster Highway and Birch Street

The current **alignment of the Parkside Neighbourhood Bikeway on Birch Street** connects to Westminster Highway at a divided median. If this intersection cannot be upgraded by the long-term to connect cyclists to Westminster Highway travelling westbound, an alternative alignment such as Alder Street should be considered.

Odlin Road and No. 4 Road

The **intersection of Odlin Road and No. 4 Road** would benefit from improvements such as cyclist push buttons or paint to increase cyclist visibility and priority where the Odlin Road Neighbourhood Bikeway crosses a major street.

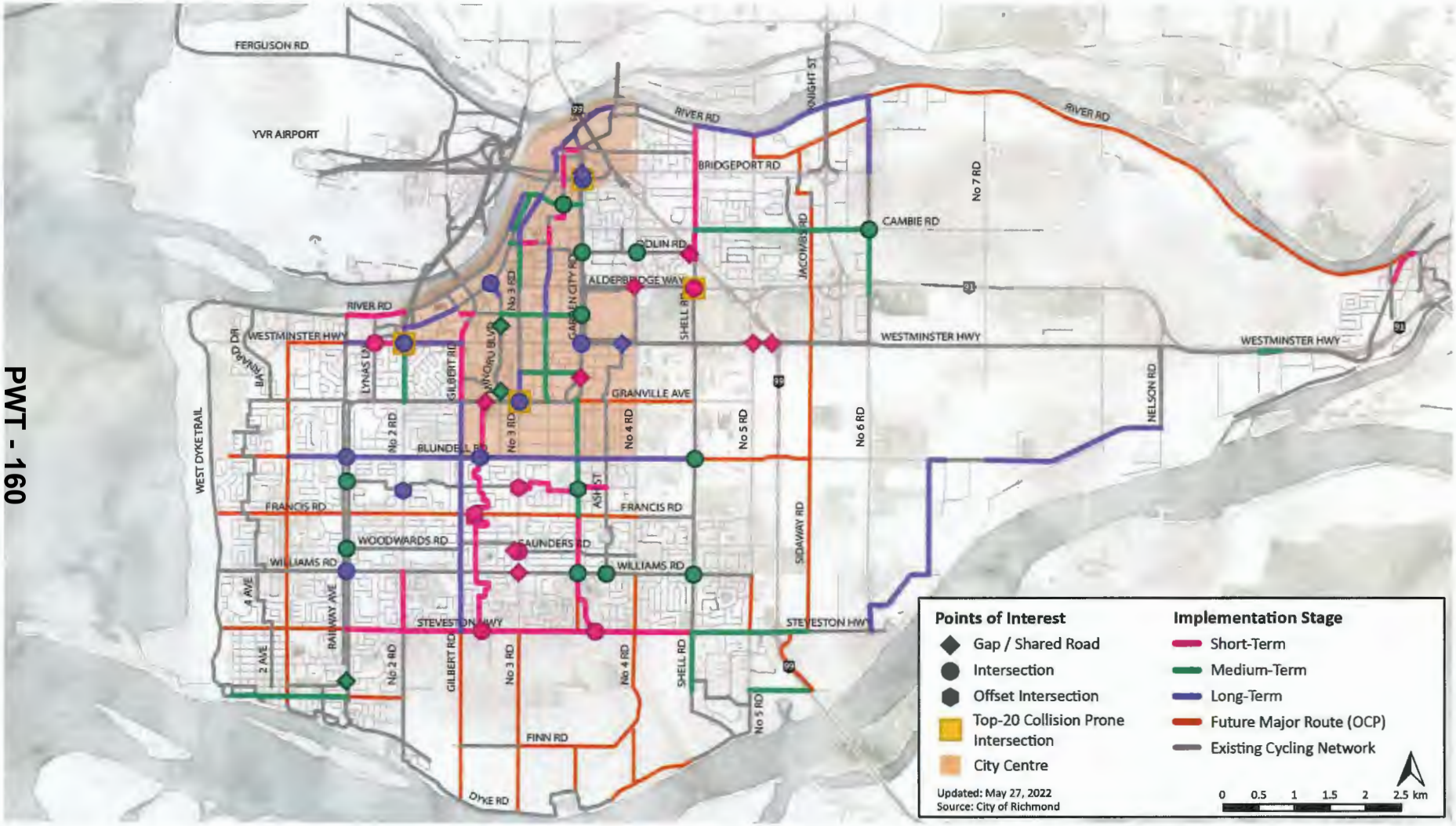
No. 2 Road at Colville Road and Danube Road

The intersection of **Colville Road and Danube Road at No. 2 Road** is offset by approximately 50 metres. Short cycling upgrades to the No. 2 Road corridor in this segment would enhance east-west connectivity along this existing Crosstown Neighbourhood Bikeway.

DVT-158

F Map of Implementation Plan and Future Major Routes

Figure F1: Map of Implementation Plan and Future Major Routes



Note: Major routes from the OCP are provided to envision and contextualize future expansion of the network beyond the timeframe of this plan. Future planned routes from the CCAP and minor routes from the OCP (i.e., the proposed network of neighbourhood bikeways) are not shown for legibility.

G Infrastructure Design Review Memo

Introduction

The City's existing standards for cycling infrastructure were reviewed to help the City refine existing and identify new standards and guidance that may be best suited for the Richmond context. The standards and guidance reviewed reflect both feedback heard during engagement with stakeholders, the public and City staff, as well as future gaps and challenges that may emerge with the types of facilities being considered for Richmond. For example, we heard support for further expansion of neighbourhood bikeways as well as a need for greater protection at intersections. Hence, this memo considers design for offset intersections at major roads, anticipating this future challenge in expanding the network.

In general, this review should be viewed as a companion document to existing design guidance, mostly targeting recommendations beyond the mid-block condition. As facilities continue to be upgraded along corridors, the City should be mindful of the design challenges presented herein. This review does not provide a comprehensive overview of all design considerations, but rather those elements best suited to the current and future challenges anticipated in expanding Richmond's network given the local design context.

Off-Street Bike Paths and Protected Bike Lanes

Off-street bike paths are cycling facilities that are typically separated from traffic by a landscaped boulevard, but sometimes are located further from the roadway (e.g., within parks). Protected bike lanes are on-street cycling facilities adjacent to traffic that include a physical barrier separating cyclists from motor vehicle traffic. Common physical barriers include raised medians, vegetated buffers and bollards.

These types of facilities are broadly considered safe and comfortable for cyclists of all ages and abilities. Off-street bike paths and protected bike lanes are most applicable for streets with high traffic volumes or speeds.

New Standard: Fully Protected Intersection (Dutch Style)

Fully protected intersections (sometimes referred to as "Dutch-Style" Intersections because they have been commonly used in the Netherlands) have dedicated queuing and crossing areas for cyclists. These queuing areas are often physically separated from motor vehicles, as well as pedestrians, and the crossing areas may have a different design treatment than the crosswalks to signify separation between user groups.

Protected intersections can be applied on any street where enhanced cycling comfort is desired. They are commonly found on streets with parking-protected cycling lanes or buffered cycling lanes. Where no parking lane exists, a setback can be created by shifting the bikeway or vehicle travel lanes away from one another on the intersection approach. Variants can be applied where there is no cycling facility on the intersecting street, as well as streets with two-way protected cycling lanes.

Current Status in Richmond

Currently, there are no fully protected intersections in the City of Richmond. In the City of Vancouver, the intersections of 1st Ave and Quebec St, Cornwall Ave and Burrard St, as well as Pacific Blvd and Burrard St (shown in Figure 1) provide local examples of this design treatment.

The City of Richmond's Official Community Plan (OCP) states that bike routes should have enhanced crossings at arterial roads and that, where feasible, key segments of the major street bike network should be upgraded to provide physical separation between cyclists and motorists. In addition, the City Centre Area Plan states that where feasible, cycling routes should be physically separated from vehicle traffic on major thoroughfares and major streets.

For street design, the City of Richmond follows their Engineering Design Specifications (EDS) and ensures that designs conform with guidelines from the Transportation Association of Canada (TAC) and the Province of BC. There are currently no design regulations for cycling protected intersections in the City of Richmond EDS. However, as of 2017, the Geometric Design Guide for Canadian Roads, published by TAC provides guidance on protected intersections (Chapter 5, Sub Section 5.6.2.3, Protected Intersection).

Figure 1: Intersection of Pacific Blvd and Burrard Street (Source: Associated Engineering, n.d.)

Issues and Challenges with Current Facilities

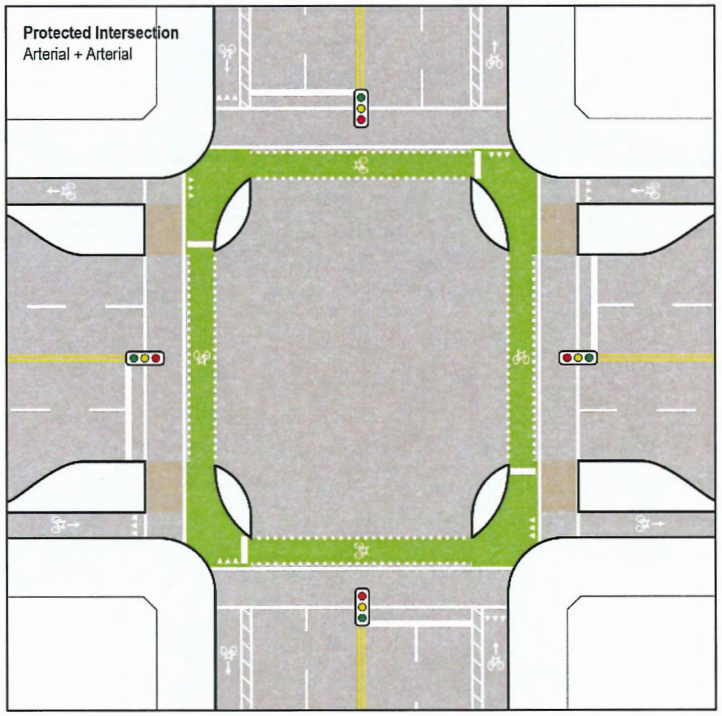
Intersections can be the most dangerous conflict location along cycling routes due to cross directional travel movements and turning motor vehicles. Even if cycling facilities adjacent to roadways are physically protected, if the intersections are unprotected, cyclists can still be exposed to turning vehicles or must wait on the sidewalk where they compete for space with pedestrians.

During Phase 1 engagement, 37 mapping pins and 16 ideas board topics centered on improving intersections. Key corridors mentioned were No. 3 Road, Garden City Road and Shell Road, with Garden City Road and Sea Island Way being the most referenced intersection.

Considerations and Recommended Approaches for Richmond

- **Available Space**: Protected intersections may require more space than intersections with unprotected cycling facilities. The amount of space required is dependent on several factors including lane configuration, presence of curbside parking, and turning radius requirements. Right-of-way acquisition may be required at corner locations to separate cyclists and pedestrians.
- **Cycling Lane Setback Distance**: This lateral distance between the cycling facility and the adjacent motor vehicle lane determines most other dimensions at a protected intersection. A setback of 4-6 metres is preferred. If the setback is smaller, a longer clearance distance for vehicle sight lines and additional signal phasing or speed reduction strategies should be applied.
- **Turning Radii**: The corner turning radii should be small enough that vehicles are discouraged from turning faster than 15 km/h. This is typically achieved with an effective turn radius of less than 5.5 metres. Corner islands may have a mountable area to accommodate larger vehicles.
- **Cyclist Queue Areas:** Queuing areas for cyclists should be large enough for the anticipated volume of cyclists and should be at least 2 metres deep (achieved using concrete barricades in Figure 2). A deeper bicycle queue area may be necessary to accommodate trailers, cargo bikes, and higher bicycle volumes.
- **Turning for Motor Vehicles**: A "Turning Vehicles Yield to Cyclists and Pedestrians" sign is recommended where right-turning vehicle movements are permitted at the same time as cyclist and pedestrian movements. Exclusive cyclists signal phase or prohibiting right-turns from vehicles during a red light will reduce these interactions but may negatively impact intersection capacity and throughput.

Figure 2: Protected Intersection (Arterial + Arterial)



- **Vision Impairments**: These intersections may be more challenging for individuals who are visually impaired due to the potential for pedestrian path deflection and challenges in detecting moving cyclists at crossing points. Potential mitigation measures include audible warnings, tactile walking surface indicators and 'Cyclists Yield to Pedestrian' signage.
- **Maintenance**: With the extra design elements and physical separation, these intersections may require specialized sweeping and snow removal practices.
- **Time and Budget**: Fully protected intersections can be expensive when fully implemented with materials like concrete. However, protected intersections can be implemented using interim materials such as paint and plastic bollards.

Figure 3: Protected Intersection (Arterial + Neighbourhood Bikeway)

Further Guidance for Richmond

Several standards and design documents provide further information and advice on intersection geometry, design elements and requirements when constructing fully protected intersections. They also provide further design considerations, applications, and examples. These guidelines include:

- Transportation Association of Canada (TAC), Geometric Design Guide for Canadian Roads, Chapter 5 – Bicycle Integrated Design (2019)
- Government of B.C., Active Transportation Design Guide, Section G.4 – On-Street Bikeway Crossings (2019)
- CROW Design Manual for Bicycle Traffic, Section 6 - Junctions (2016)
- National Association of City Transportation Officials (NACTO), Don't Give Up at the Intersection Guide (2019), Protected Intersections
- City of Nanaimo, Manual of Engineering Standards and Specifications, Section 8 – Transportation Standards and Drawings (2020)

Neighbourhood Street Bikeways

Neighbourhood street bikeways can be highly comfortable places to cycle for riders of all ages and abilities. These bikeways are located on local streets with low volumes of motor vehicles that travel at low speeds. In these conditions, cyclists share the roadway with motor vehicles with no physical separation from traffic. Often these neighbourhood street bikeways will have traffic calming (design elements to slow, reduce or divert the number of motor vehicles), distinctive directional signage and enhanced crossings at arterial roads (e.g., push buttons specifically for cyclists). They can be relatively low cost to implement compared with physically separated cycling facilities.

New Standard: Offset Intersection at Arterial/Collector Road

A common challenge for implementing neighbourhood street bikeways in Richmond can be the intersections with arterial roads. Historically, arterial roads may have acted as a boundary between different subdivisions that were developed at varying times and may have been designed to discourage through traffic. As a result, local streets may not always connect directly with each other across an arterial. Therefore, intersections for neighbourhood street bikeways often need to be "offset," where cyclists must travel along a small section of the arterial before crossing (Figure 4). Even in cases where intersections are aligned, adding a pedestrian/cyclist activated crossing at uncontrolled intersections can facilitate safer crossings.

Current Status in Richmond

There are several neighbourhood street bikeways in Richmond that consist of offset intersections. These bikeways include:

- Crabapple Ridge (connects Steveston with Terra Nova)
- Crosstown (connects Railway Ave with Garden City Road)
- Woodwards-Saunders (connects Railway Ave with Parkside bikeway on Ash St)

The OCP provides policy direction to establish a grid of neighbourhood street bike routes including enhanced crossings at arterial roads, but there is no specific guidance regarding offset intersections.

For crossing arterials, the City has installed pedestrian signals with cyclist activated loop detectors in the pavement with a painted bike symbol, along with directional signage. There are no specific design regulations for these offset intersections in the City of Richmond EDS or the TAC Geometric Design Guide. Throughout public engagement, respondents advocated to expand the installation of cyclist push buttons and bicycle signal heads (with several pins located on Ash St using the *Let's Talk Richmond* Mapping Tool).

Issues and Challenges with Current Facilities

Offset intersections along neighbourhood street bikeways can create gaps in the cycling network as they require cyclists to make right and left turns onto another street (usually a higher-volume, higher-speed arterial road) in order to continue in their original travel direction. There are several design challenges for offset intersections, including ensuring safety, seamless connectivity and wayfinding for those travelling along a neighbourhood bikeway.

During Phase 2 engagement, there was broad support from the community for expanding neighbourhood bikeways, including having more safe crossings at major intersections.

56% of *Let's Talk Richmond* survey respondents selected 'Safer Crossings at Major Streets' (e.g., traffic signals, green paint, refuge islands) as their top choice to improve the comfort level of neighbourhood bikeways.

Figure 4: Williams Road and Fourth Ave/Elkmond Road (Source: Google Earth)

Figure 5: Offset Intersection of King Edward Street and Yukon Street (Vancouver, BC)

Considerations and Recommended Approaches for Richmond

When designing these intersections, there are several design considerations including:

- **Characteristics of the Intersecting Street**: Selecting the appropriate cycling facility inside and approaching the intersection depends on the width and traffic characteristics of the intersecting street and on whether the neighbourhood street bikeway jogs to the right or to the left. If an intersecting street has traffic speeds and volumes equivalent or similar to the neighbourhood street bikeway, then specialized treatment may not be needed. However, wayfinding (signing and pavement markings) should clearly direct cyclists through the offset intersection.

Figure 6: Offset Intersection (Local Street + Major Street with Parking)

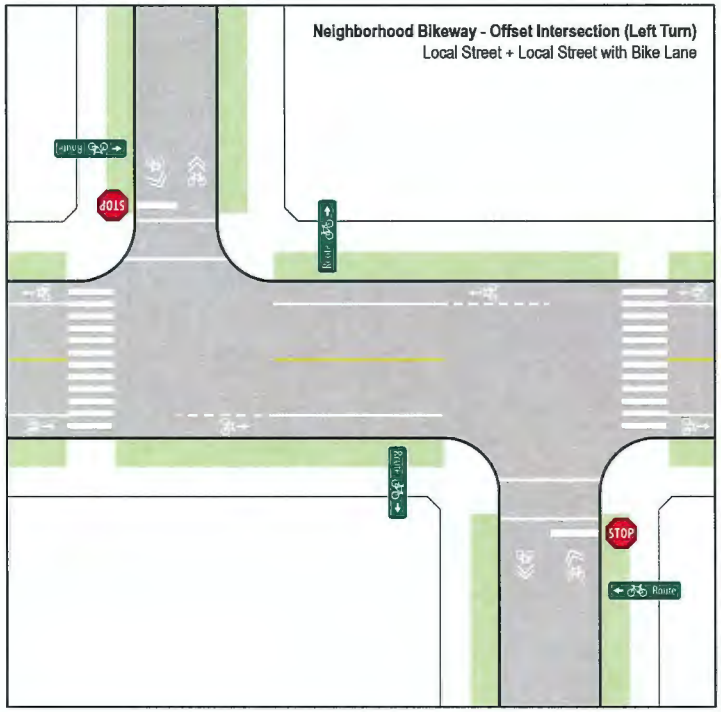
Figure 7: Offset Intersection (Neighbourhood Bikeway + Arterial)

- **Crossing Facilities:**
  - One-way cycling facilities (Figure 6 to Figure 8) or separated bi-directional facilities (Figure 5) are preferred for connecting along the section of arterial roadway between the offset segments of a neighborhood street bikeway. Where there are space constraints on this connecting road segment, these facilities may be accommodated by removing curbside parking. If curb-to-curb space is highly constrained, a shared multi-use path may be suitable (see Table 1 on page 11).
  - At right-turn offset intersections, crossing streets with or without cycling facilities, a two-stage turn queue box placed in the on-street parking lane can allow cyclists to reposition and wait for a crossing opportunity (Figure 6 and Figure 7).

- At right-turn offset intersections, on streets with low traffic speeds and volume, centre left-turn lanes can be marked to allow cyclists to turn left from the cross street back onto the neighborhood street bikeway.

- **Signalization**: Where the intersection is signalized, adjusting for a longer signal phase, or installing a cyclist-activated signal could help facilitate safe crossing movements. Figure 8 shows the intersection of a neighbourhood bikeway with an existing bike lane. Here, a cyclist activated signal would be a good measure to upgrade the intersection for connecting from the neighbourhood bikeway.

Figure 8: Offset Intersection (Neighbourhood Bikeway + Existing Bike Lane)



Further Guidance for Richmond

There are several standards and design documents that may provide further guidance to the City of Richmond in considering offset intersections for neighbourhood street bikeways. These include:

- **Government of B.C., Active Transportation Design Guide, Section D.2 – Neighbourhood Bikeways (2019)**
- **National Association of City Transportation Officials (NACTO), Urban Bikeway Design Guide, Offset Intersections (2014)**

Multi-Use Paths and Greenways

Multi-use paths (MUPs) or "greenways" are off-street paved facilities that are shared between a variety of different active transportation modes in addition to cycling including walking, skateboarding, and rolling with mobility aids. These pathways are considered safe for cyclists of all ages and abilities and can be highly comfortable to travel along as they are away from motor vehicles.

The City of Richmond has several MUPs including:

- Railway Greenway (River Road to Garry Street)
- Shell Road Trail (Steveston Highway to Athabasca Drive & Westminster Highway to Highway 99)
- No. 2 Road (Steveston Highway to Dyke Road)
- Westminster Highway (No. 6 Road to McMillan Way)

New Standard: Intersections

MUPs can have varying intersection designs when they are crossing streets. Some MUPs may travel in parallel to streets and use the same intersections, while others may follow different corridors and cross streets at mid-block locations. Depending on the context, different types of crossing devices and curb treatments may be used.

Current Status in Richmond

For designing intersections used by MUPs, the City of Richmond follows their EDS and ensures that designs conform with guidelines from TAC and the Province of BC. The EDS detail the curb radii to be used at intersections to ensure designs can accommodate the turning of large vehicles such as transit vehicles, emergency vehicles and/or trucks. The EDS also provides some direction on off-street bike paths "where an off-street bike path intersects a roadway or sidewalk at midblock, bollards or other equivalent speed deterrent measures" should be installed at the sidewalk to deter cyclists from speeding.

In addition, TAC's Geometric Design Guide for Canadian Roads provides some guidance on multi-use paths at intersections (Chapter 5, Sub Section 5.6.3).

60% of *Let's Talk Richmond* survey respondents either strongly agreed or agreed that multi-use pathways should be upgraded to separate cyclists and pedestrians

Figure 9: Intersection of Alderbridge Way and McClelland Road (Source: Google Earth)

Issues and Challenges with Current Facilities

Intersections deserve special attention due to the confluence of users moving in different directions. While cyclists may be travelling in a dominant travel direction, pedestrians are likely to cross in all directions. In addition, there is the challenge of intersecting space with motor vehicles, particularly at locations where motorists are turning.

Across the City of Richmond there is no consistent intersection treatment for MUPs, as the use of colour and separation measures has evolved over time. While green paint with elephant's feet is now used for connecting MUPs across a street, there is no consistent design treatment for how MUP intersections connect with different types of cycling facilities.

Throughout public engagement, several comments were received about the design of current intersections for MUPs. The intersection of Williams Road and Shell Road was explicitly noted as having poor-quality design, without paint through the intersection (unlike Alderbridge Way shown in Figure 9) or queuing areas for cyclists.

Considerations and Recommended Approaches for Richmond

When designing these intersections, there are many considerations including:

- **Managing Conflicts Between Turning Motorists and Cyclists:** Separately signalized movements for turning vehicles can reduce conflicts with cyclists and pedestrians but may potentially require additional space for turning vehicle lanes, potentially reducing intersection capacity for vehicle throughput due to longer signal cycles.
- **Accommodating Cyclist Turning Movements**: Some cyclists may be turning between the MUP and the cross street. This movement can be facilitated by providing waiting areas or bike boxes for turning cyclists.

Figure 10: Separated Bicycle and Pedestrian Bend-In Crossing (Source: B.C. Active Transportation Design Guide)

- **Bend-in or Bend-out Intersections:** Bends can slow cyclists and improve alignment at crossings. Bend-out intersections can provide more queuing space for pedestrians and cyclists and can provide motorists with more time and space to react. However, a wider right of way is typically required and sightlines may be impacted.
- **Tightening Intersections**: Having smaller curb radii can create a shorter crossing distance for people walking and cycling, as well as encourage slower motor vehicle turning speeds. However, the application of this treatment is highly dependent on what type of control/design vehicle is considered and the assumed motor vehicle speed. That is, tightened intersections are most achievable on lower speed roads with few or no specialized vehicles.
- **Slowing Down Cyclists Safely**: While physical speed deterrents such as bollards or maze gates can be effective to slow down cyclists, they are not recommended as they also pose a safety risk and inconvenience. Instead, pavement paint, signage and other design strategies that do not present a physical interruption to cyclist movements are strongly preferred. Where a physical element is required to prevent vehicular access, flexible bollards or low-height centre medians could be considered.
- **Surface Treatment**: Enhanced surface treatment (e.g., combination of pavement markings and symbols) is recommended at intersections to improve visibility and reinforce the presence of a "mixing" zone.
- **Separating People Walking and Cycling:** As volumes of cyclists and pedestrians increase, it may become important to separate these different user groups. Considerations of how and when to separate cyclists and pedestrians are discussed in detail in the next section.

Further Guidance for Richmond

There are certain standards and design documents that may provide further guidance to the City of Richmond for intersections with MUPs crossing including:

- Government of B.C., Active Transportation Design Guide, Section G – Intersections + Crossings (2019)
- City of Toronto, Multi-Use Trail Design Guidelines, Section 5 – Trail Crossings (2015)
- Transport for London, Cycling Design Standards, Chapter 5 – Junctions and Crossings (2014)
- U.K. Department of Transport, Local Transport Note1/20 Cycle Infrastructure Design, Section 10 – Junctions and Crossings (2020)
- National Association of City Transportation Officials (NACTO), Don't Give Up at the Intersection Guide (2019)

New Standard: Separation & Bike Calming Measures

MUPs also vary in their design in how they separate different types of users (e.g., pedestrians, cyclists), and the type of strategies employed to reduce the speed of users travelling at high speed. The recommendation to separate cyclists and pedestrians on pathways is highly dependent on the mix and volume of people walking and cycling on the MUP.

Current Status in Richmond

In Richmond, there are select short MUPs that separate pedestrians and cyclists, including Lansdowne Road between Alderbridge Way and Cedarbridge Way, and the northern extent of Sexsmith Road. The Railway Greenway and Garden City MUP (Williams Road to Francis Road) have directional separation, but not user separation between cyclists and pedestrians.

The OCP provides policy direction to improve the connectivity of pedestrian and rolling network, but does not provide direction on the design, including separation and bike calming of these facilities.

In the City of Richmond EDS, there are design regulations for traffic calming and where an off-street bike path intersects a roadway at midblock, but no specific design regulations for MUPs. However, TAC's Geometric Design Guide for Canadian Roads does provide some guidance on MUPs (Chapter 5, Sub Section 5.6.3).

Issues and Challenges with Current Facilities

There is potential for conflicts between different users on MUPs due to the speed differential between cyclists and other pathway users, and among cyclists with different skills and comfort levels. This issue has gained attention in recent years as e-bikes, e-scooters and other motorized micromobility devices widen the difference in average travel speed between users.

These issues were reiterated by various stakeholders throughout the public engagement process. The City's Advisory Committee on the Environment discussed the need for separating cyclists and pedestrians in busy areas (e.g., Steveston Boardwalk) and the Richmond Active Transportation Committee also provided comments on the need to safely share trails and pathways with pedestrians. There was discussion of this through the *Let's Talk Richmond* Ideas Board, with greater support given for separation of modes on multi-use pathways than there was for speed limits.

73% of *Let's Talk Richmond* survey respondents in Phase 2 supported separating cyclists and pedestrians as a measure to encourage more appropriate cycling speeds on shared pathways. Second was bike calming (e.g., rumble strips, raised crossings, painted warnings), with 47% support from respondents.

Considerations – User Separation

- **Pathway Context and Thresholds**: The separation of cyclists (and other similar user types) from other pathway users is based on several factors including available right-of-way width, total volume of current and anticipated pathway users, and ratio of pedestrians to all daily pathway users. The TAC Geometric Design Guide for Canadian Roads provides thresholds for user separation (Table 1).

Table 1: TAC Guidance for User Separation by MUP Width

User Ratio for Separation	Daily Anticipated User Volume for Various Pathway Widths (Users)		
	3m	3.5m	4m
More than 20% of users are pedestrians and total user volumes are greater than 33 persons per peak hour	1,000	1,200	1,400
Less than 20% of users are pedestrians and total user volume is greater than 50 persons per peak hour	1,500	1,750	2,000

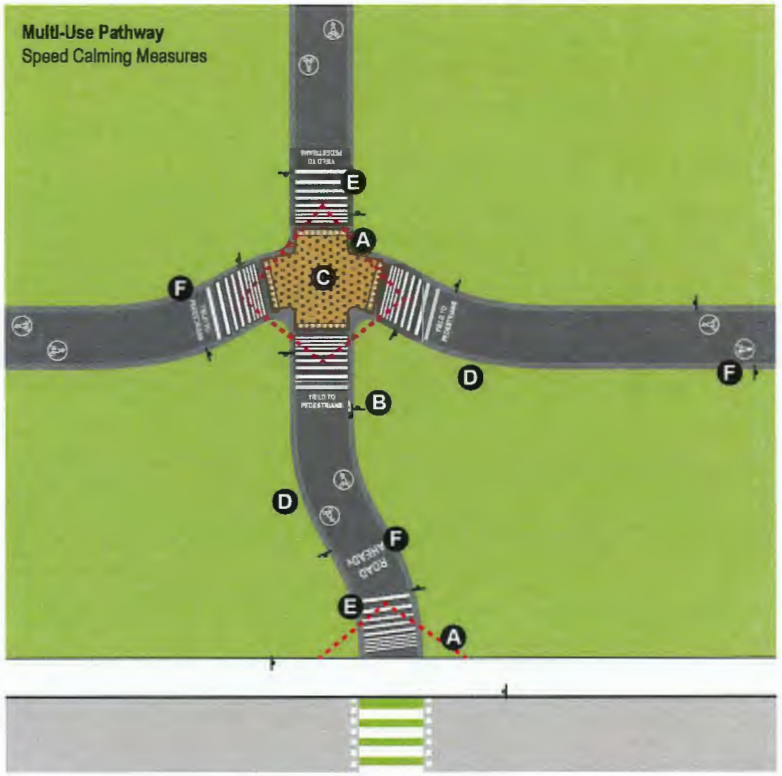
In addition to TAC, guidance from the City of Vancouver recommends separating pedestrians and cyclists if there are 1,500 combined users on a MUP that is between 3 to 4 metres in width.

- **Forward Planning:** When designing a MUP, the future context and number of users should be considered to determine when user thresholds may be reached, and if there are potential cost savings to design for these higher user volumes in present construction.
- **Cost:** Compared to shared MUPs, separated MUPs require additional space and engineering treatments, which can be more costly especially if additional property needs to be acquired.
- **Maintenance and Cleaning**: Drainage can be a concern, particularly in the winter with snow and ice accumulation. Separated facilities may require different levels of snow and ice control, including the use of specialized maintenance equipment to clear the width of the facility.
- **Design Elements:** Visual cues are needed to ensure separation is clear. In addition to visual cues, tactile cues can be provided to reinforce that there are two facilities with different user groups.

Considerations – Bike Calming Measures

- **Sight Distance**: MUP sight distance is the length of the pathway that is observable by a user (**A** in Figure 11). Providing appropriate sight distance allows the pathway user to recognize an obstruction such as debris, other pathway users, and intersections, with enough time to take the appropriate action to avoid conflict. A minimum unobstructed sightline zone starting 10 metres in advance of crossing pathway users is recommended. Directional and warning signage should be installed outside of the unobstructed sightline zone.
- **Lighting**: Additional lighting can be considered to ensure any hazards or pathway users are visible along the corridor and at crossing locations.
- **Barriers and Markings:** The use of rigid bollards or maze gates have been shown to increase the likelihood of conflicts and collisions for cyclists and are no longer recommended. Where a physical element is required to prevent vehicular access, flexible bollards or low-height centre medians should be considered instead. Non-physical measures for bike calming such as signage (**B**) and pavement markings (**F**) may be difficult to enforce in practice but can complement/reinforce other treatments.
- **Surface Treatment**: Enhanced surface treatment (e.g., unique paving materials - **C**) can reinforce the presence of a "mixing" zone.
- **Bend-in or Bend-out Intersections:** Bends (**D**) can slow cyclists and improve alignment at crossings
- **Tactile Striping:** Tactile striping (**E**) can be a cost-effective and subtle way to slow down cyclist speeds but may present further challenges for ongoing maintenance (including increased costs).

Figure 11: Bike Calming Measures for Multi-Use Paths



Further Guidance for Richmond

There are certain standards and design documents that may provide further guidance to the City for intersections with MUPs crossing including:

- Transportation Association of Canada (TAC), Geometric Design Guide for Canadian Roads, Chapter 5 – Bicycle Integrated Design (2019)
- Government of B.C., Active Transportation Design Guide, Section E – Multi-Use Facilities (2019)
- City of Toronto, Multi-Use Trail Design Guidelines (2015)

Unique Cycling Facilities at Intersections

There are cases that require special design attention as they can be areas where there is higher risk for vulnerable road users, such as those walking and cycling. For cycling, these can include motor vehicle slip lanes, on/off ramps, moving around bus stops, and how to transition from one cycling facility type to another. These cases apply to multiple types of cycling facilities (e.g., MUP, off-street bike path, bike lane, etc.)

Figure 12: Intersection of Westminster Hwy and No. 5 Road (Source: Google Earth)

New Standard: Motor Vehicle Slip Lanes and On-/Off-Ramps

Slip lanes (or channelized turn lanes) are road connections through street corners that allow motorists to make a higher speed right turn (yield only to oncoming traffic) and provide an 'island' for people walking and cycling. These turning lanes pose similar challenges to on-/off-ramps, which are lanes designed for motorists to speed up/slow down between a highway and a local road.

Current Status in Richmond

The City has several slip lanes that intersect with cycling routes including:

- Shell Road at Westminster Highway
- Garden City Road at Sea Island Way
- Garden City Road at Alderbridge Way
- Westminster Highway at No. 5 Road (Figure 12)

In addition, there are several highway on-/off-ramps in Richmond that have cycling facilities crossing them including:

- Steveston Highway to/from Highway 99
- Westminster Highway to/from Highway 99

The EDS for the City of Richmond provide direction for intersection design, and all intersections should be designed in accordance with guidelines from TAC and the Province of BC. Generally, the EDS does not provide specific guidance for slip lanes or on-/off-ramps but would also follow the same guidelines. The EDS does state that slip lanes and channelized turn lanes "shall be sufficient to provide landing areas on sidewalk for pedestrians and for signal equipment." In addition, most highway on-/off-ramps are within provincial jurisdiction.

Issues and Challenges with Current Facilities

Slip lanes and on-/off-ramps facilitate high motor vehicle speeds through the crossing areas, presenting challenges for cyclists. These locations typically have relatively poor sightlines for drivers and create an additional barrier for people walking and rolling to cross a street. In addition, the refuge island may be limited in size and provide inadequate queuing space for people walking and cycling.

Comments received during Phase 2 engagement referenced these types of crossings as being a key barrier to travel between different areas of Richmond. For example, one respondent using the *Let's Talk Richmond* Mapping Tool commented that:

> "Crossing Highway 99 at Steveston Highway is incredibly intimidating, even for experienced cyclists. It feels like there's a steady stream of cars criss-crossing everywhere. The road is narrow, and there's no accommodation for cyclists."

Considerations and Recommended Approaches for Richmond

Best practice for user safety is to redesign these intersections to be more compact, with shorter crossing distances for people walking and rolling as well as better sightlines between users. Changes may include removing slip lanes, as the City recently did at the Garden City Road-Lansdowne Road intersection. For highway on-/off-ramps, this may include using diamond interchanges, which use traffic signals and require 90-degree turns between the on-/off-ramps and cross street.

However, this type of infrastructure re-design can be expensive, take time, and may be infeasible due to existing conditions or constraints. In these circumstances, there are other lower cost but less effective design treatments that can make these crossings safer for people walking, cycling, and rolling. These design treatments may include realignment of cycling/vehicle space, additional signals and raised medians. When designing these treatments, consideration should be given to the following:

- **Motor Vehicle Speed and Volume:** Generally, for lower speed and volume roadways, crossing designs with cycling lanes should be based on the cyclist having the right-of-way by requiring drivers to yield. The opposite is applied for higher speed and volume roadways where drivers would have the right-of-way and cyclists may be required to cross during gaps in traffic flow if the crossing location is not signalized.
- **Redesigning the Intersection:** All intersection users can better see each other and have more time to react if the slip lane or on-/off-ramp approaches the intersection at an angle more perpendicular to the cross street. Bollards and other design interventions can be used to augment existing cycling facilities and to encourage cyclists to arrive at the intersection crossing at an angle approaching perpendicular (i.e., at a 90-degree angle). In instances where redesigning the intersection is not feasible, consider transitioning the cycling lane off-street in advance of the intersection. This can minimize cyclist exposure to vehicle traffic and should only be applied where adequate sightlines can be achieved and on lower speed/volume roadways where drivers would be expected to yield to people walking and cycling.
- **Additional Design Treatment: For on-/off-ramps,** adding a barrier between on-coming motor vehicles and waiting cyclists, such as a raised median or bollards, may provide an added degree of protection and comfort. In addition, adding treatments such as truck aprons may tighten turns for motor vehicles while still allowing larger vehicles to navigate the turn safely. When slip lanes can not be removed or redesigned, consider carrying the cycling facility straight through to the intersection. This option is less desirable due to a potentially long conflict area between drivers and cyclists, but it has the benefits of providing the most direct alignment for cyclists.

- **Lighting**: Additional lighting should be used for cyclists along high-speed conflict zones to improve visibility and communication. This may include improved lighting or warning devices for motorists.
- **Providing Grade Separation**: Raised crosswalks or making the median islands larger can improve visibility, safety and comfort for those walking, cycling, and rolling across.

Further Guidance for Richmond

Design standards and documents that may provide further guidance to the City of Richmond on slip lanes include:

- Government of B.C., Active Transportation Design Guide, Section G – Intersections + Crossings (2019)
- Portland Bureau of Transportation, Safe Routes to School Street Design Toolkit, Slip Lanes (2018)

For highway on-/off-ramps, further design guidance is provided by:

- Transportation Association of Canada (TAC), Geometric Design Guide for Canadian Roads, Chapter 5 – Bicycle Integrated Design (2019)
- York Region, Pedestrian and Cycling Planning & Design Guidelines, 5.4 – Freeway Crossings (2018)
- Washington State Department of Transportation, Design Manual, Chapter 1520 – Roadway Bicycle Facilities (2021)

New Standard: Bus Stops

Implementing cycling facilities along bus routes can pose additional design challenges for cycling facilities at bus stops. On-street cycling facilities share space with buses while off-street cycling facilities share space with pedestrians as they cross between the bus stop and sidewalk. Each of these choices have their own unique safety challenges for different users.

Current Status in Richmond

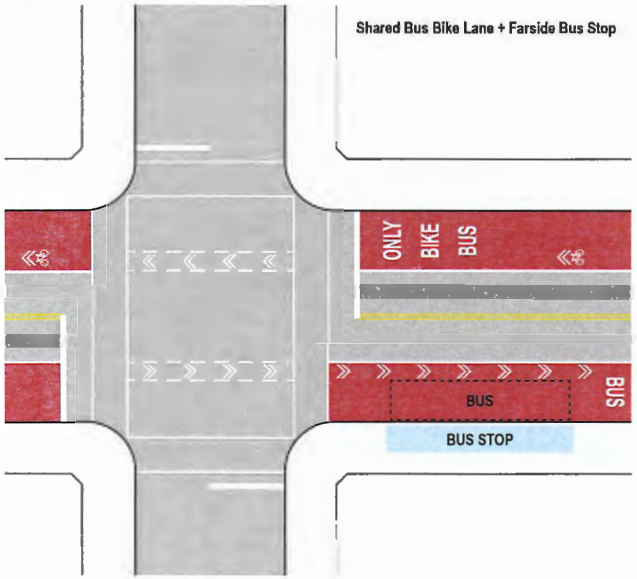
In the City of Richmond, several bus routes operate on the same streets as cycling facilities, the majority of which are on-street bike lanes. Some locations have an off-street bike path that goes behind the bus stop, such as Garden City Road at Alderbridge Way (Figure 13).

There is no policy direction in the OCP for navigating conflict between these modes, while the City Centre Area Plan encourages bicycle accommodation at bus stops.

In the City of Richmond EDS, cycling access that may conflict with transit routes is required to be identified but design requirements are primarily deferred to TransLink's "Transit Infrastructure Design Guidelines," which state "A minimum 3 m wide bus stop next to a bike lane is desirable so that a stopped bus does not impact the bike lane." In addition, "a bus stop in a bus bay adjacent to a bike lane requires longer pull-in and pull-out distances due to the additional bike-lane width that a bus needs to cross." The Geometric Design Guide for Canadian Roads by TAC provides some guidance for cycling facilities at transit stops (Chapter 5, Sub Section 5.7.4).

Figure 13: Bus Stop at Garden City Road and Alderbridge Way (Source: Google Maps)

Figure 14: Shared Bus Priority and Bike Lane



Issues and Challenges with Current Designs

On-street cycling facilities where cyclists share the same space with buses can be uncomfortable and would not be considered safe for all ages and abilities (see Figure 14 above), especially along transit corridors with curbside bus stops. At these locations, buses need to stop within the cycling lane, requiring cyclists to either stop and wait or to pass the bus in the travel lane.

The increased interactions between people cycling and transit vehicles can have a negative impact on transit operations due to the "leap-frogging" effect where cyclists pass the stopped bus when boarding and alighting, and then must be passed again by the bus between bus stops. There is also an elevated risk of collision when cyclists are passing a stopped bus. Off-street cycling facilities (Figure 15) offer separation and protection for cyclists from buses and vehicles but can create additional conflicts between cyclists and pedestrians where pedestrians need to cross the off-street cycling facility to access the bus stop.

Best practice design for integration between cycling and transit is evolving. In 2020, the B.C. Human Rights Tribunal ruled that, in Victoria, "floating" bus stops with a bike lane at street level (Figure 16) were discriminatory as they did not adequately address the issue of access across the bike lane for people who are visually impaired. In response, Victoria implemented a pedestrian controlled crossing to access the bus stop (Figure 17).

While the interaction between cycling facilities and bus stops was not explicitly mentioned through the public engagement process, stakeholders and respondents did express a desire for better separation between motor vehicles and cyclists, as well as for more integration between transit and cycling. This integration would imply having more cycling routes connect with major transit stations and routes, which may increase the presence of cycling facilities interacting with bus stops.

Figure 15: Protected Bike Lane and Far Side Bus Stop

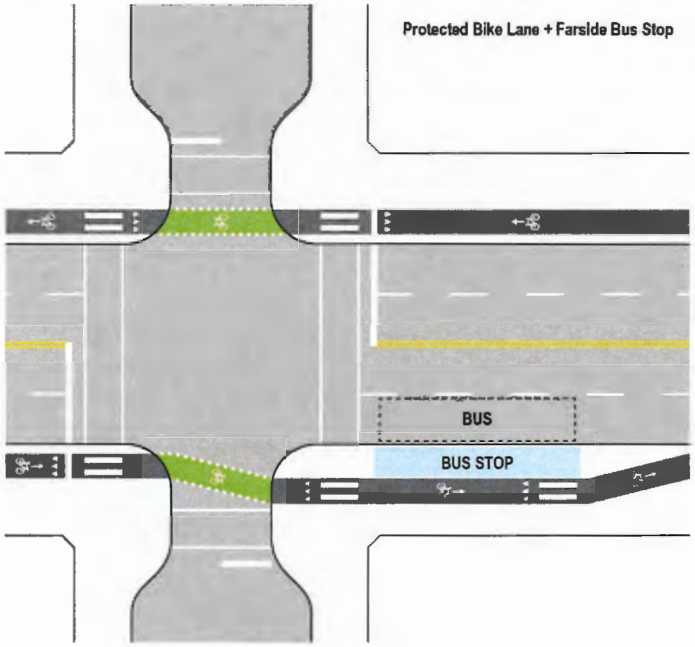
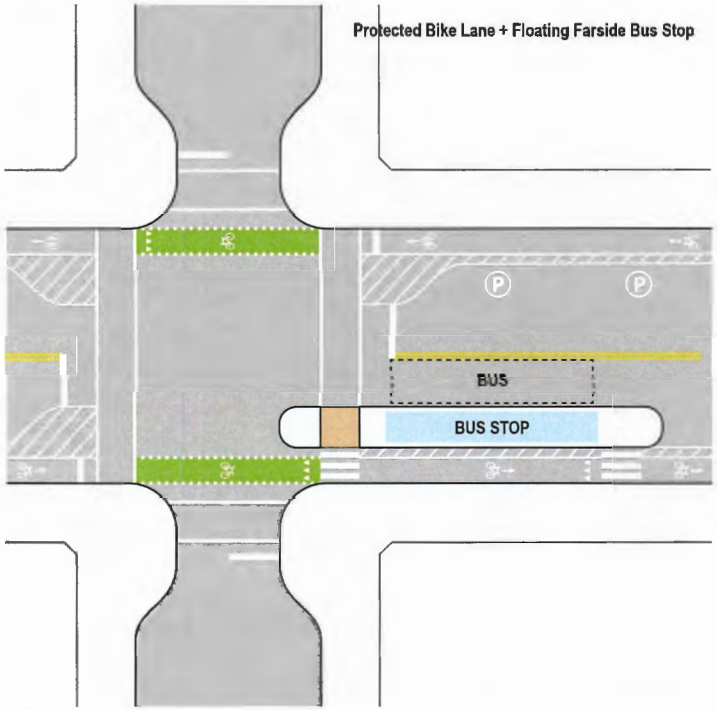


Figure 16: Protected Bike Lane and Floating Far Side Bus Stop



Considerations and Recommended Approaches for Richmond

- **Street Characteristics**: A variety of design interventions can be implemented to mitigate potential conflicts between cyclists, pedestrians and transit vehicles. Where the existing right-of-way is constrained, consider having the cycling lane at the same grade as the sidewalk, with the cycling lane going behind the bus stop (Figure 15). Where there is available right-of-way, consider using a floating bus stop separated from the sidewalk by a street level cycling lane (Figure 16). This design approach provides user separation around transit stops to simplify operations and minimize conflicts. This treatment is recommended on corridors with high transit volumes and cyclists where "leap-frogging" behaviour may occur.
- **Transit or Bus Islands:** When the cycling lane is routed behind the bus stop, there is an opportunity to create a transit or bus island. The bus island should be large enough in both width and length to comfortably allow passengers to queue and wait, as well as to accommodate users with mobility devices. Other considerations when designing bus islands include daily bus ridership, the number of routes serving the bus stop, combined headways, and peak-hour crowding.
- **Pedestrian and Cyclist Conflicts:** Potential conflicts between pedestrians and cyclists as a result of bypassing the cycling lane behind transit stops can be mitigated by providing sufficient space on the bus islands, clearly marking the cycling lane crossing with pavement treatments and signage and improving sightlines around transit stops. For floating bus stops, a raised crossing between the sidewalk and bus island also helps to provide a consistent crossing for pedestrians and slow down the speed of approaching cyclists.
- **Off-Street Cycling Facilities:** Where off-street cycling facilities would bypass behind the transit stop, physical measures may be used to delineate space between pedestrians and cyclists. This can range from bollards to plantings and may require a wider right-of-way. Different surface design treatments and textures may be used to communicate the shared use of the spaces.

Figure 17: Pandora Ave Intersection (Source: Google Maps)

Further Guidance for Richmond

As a result of the B.C. Human Rights Tribunal ruling, it is expected that best practice design regarding these facilities will evolve. When designing facilities, it is important to engage with a range of stakeholders who may have mobility challenges, and to work towards a facility type that may address concerns. In the meantime, further guidance on multi-modal integration may be found in:

- **Transportation Association of Canada (TAC), Geometric Design Guide for Canadian Roads, Chapter 5 – Bicycle Integrated Design (2019)**
- **Government of B.C., Active Transportation Design Guide, Section H.1 – Multi-Modal Integration (2019)**
- **Government of B.C., Updated Recommendation to B.C. Active Transportation Design Guide Chapter H.1 (2021)**

New Standard: Facility Transitions (Directional Cycling Lanes to Multi-Use Pathway)

Facility transitions occur when one type of cycling facility transitions to, or intersects with, another type of facility. These transitions may include:

- Uni-directional cycling lanes on either side of the street to a bi-directional cycling lane on one side of the street
- Uni-directional cycling lanes on either side of the street to a shared cycling lane (e.g., multi-use path) on one side of the street
- Bi-directional cycling lane on one side of the street to bi-directional cycling lane on the other side of the street (or shared cycling lane on one-side of the street to shared cycling lane on the other side of the street)

As these transitions all require the shifting of one or more cycling movements to the opposing side of the street, they must be planned to align with an intersection or mid-block crossing.

Cycling facilities are often built over time, section by section, depending on the timelines of other capital projects and budget. As facilities are built out, design best practices and local policy evolve. Street characteristics (such as motor vehicle volumes, speed, and parking needs) can evolve as well, altering the most appropriate cycling facility. It is important to ensure that the transitions between different types of cycling facilities are safe, clear to riders and offer a seamless connection.

Current Status in Richmond

While the OCP provides policy direction to match the type of route to road classification, it does not prescribe guidance for transitions between facility types. Similarly, the EDS does not offer any specific design recommendations for these transition areas.

Issues and Challenges with Current Facilities

Transitioning between different cycling facility types requires special consideration to ensure a safe and intuitive transition for cyclists. Sightlines should be maintained and the right-of-way should be clearly communicated to all road users.

Figure 18: Bike Facility Transition, Uni-Directional to Bi-Directional (Source: B.C. Active Transportation Design Guide)

Considerations and Recommended Approaches for Richmond

- **Facility Types**: The types of facilities that transition or intersect will determine where and the type of crossing that is required. Facility types that are ending should taper to provide a seamless and direct crossing to the new facility.
- **Intersection Characteristics**: The available right-of-way, lane configuration, and changes in motor vehicle travel patterns will determine the types of cycling facilities, as well as the design of transition facilities at intersections.
- **Selecting a Transition Point:** When transitioning to a lower order cycling facility, it is recommended that existing protection for cyclists and facility specific treatments be carried through the intersection before transitioning to the lower order cycling facility on the other side. As an additional safety precaution for cyclists and pedestrians, it may be desirable for transitions to occur in advance of larger and more constrained intersections, locating the transition at more minor intersections or at controlled mid-block crossings.
- **Wayfinding:** It is important to clearly communicate the right-of-way and ensure that signage and pavement markings are visible and clear to follow.
- **Design Elements:** Transitions should require minimal shift in the travel direction for cyclists with a maximum recommended taper of 3:1. Bike boxes, two-stage turn boxes, and/or protected corners can be installed to help transition between facilities by providing a protected space for cyclists to stop during a two-stage turning manoeuvre (see Figure 19). These spaces do require prohibiting right-turns from vehicles during a red light in cases where queuing cyclists are positioned in conflict with turning movements. Other measures for reducing interactions between cyclists and vehicles include bicycle signal heads and a protected cyclist signal phase. These measures may reduce intersection capacity and throughput but could be warranted for intersections with high cyclist volumes or right-turning movements.

Further Guidance for Richmond

There are certain standards and design documents that may provide further guidance to the City of Richmond for intersections with MUP crossings, including:

- Government of B.C., Active Transportation Design Guide, Section G.4 – On-Street Bikeway Crossings (2019)
- U.K. Department of Transport, Local Transport Note1/20 Cycle Infrastructure Design, Section 9 – Transitions Between Carriageways, Cycle Lanes and Cycle Tracks (2020)
- York Region, Pedestrian and Cycling Planning & Design Guidelines, Section 5.2.3 Facility Transitions (2018)
- City of Minneapolis, Street Design Guide, 3.7E, Two-way Bikeway Transitions (2021)

Figure 19: Bike Facility Transition, Uni-Directional to Multi-Use Path

H Comparison of Metro Vancouver Bike Parking Requirements

Use	RICHMOND		COQUITLAM		NORTH VANCOUVER CITY		VANCOUVER		NEW WESTMINSTER	
	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2
Town Housing	1.25 spaces per dwelling unit	0.2 spaces per dwelling unit	1.25 spaces per dwelling unit	6 spaces for each building entrance Exception: townhouse buildings without concealed parking are required to have 6 spaces located at a common amenity area	0-19 units: no requirement 20-59 units: 6 spaces 60 or more units: 6 spaces per every 60 units or part thereof	1.5 spaces per unit	A minimum of 1.5 spaces for every dwelling unit under 65 m2. A minimum of 2.5 spaces for every dwelling unit over 65 m2 and under 105 m2. A minimum of 3 spaces for every dwelling unit over 105 m2	A minimum of 2 spaces for any development containing at least 20 dwelling units, and one additional space for every additional 20 dwelling units.	1.25 spaces per dwelling unit	6 spaces for developments with 20 dwelling units or more
Apartment Housing										
Mixed Commercial/ Residential Uses										
General and Convenience Retail	0.27 spaces per each 100.0 m2 of gross leasable floor area greater than 100.0 m2	0.4 spaces per each 100.0 m2 of gross leasable floor area greater than 100.0 m2			6 spaces per 1,000 m2 Gross Floor Area	1 space per 250 m2 Gross Floor Area	A minimum of one space for each 340 square metres of gross floor area.	A minimum of 6 spaces for any development containing a minimum of 1,000 square metres of gross floor area.	1 space for each 750 sq. m of net floor area	6 spaces for any building with 1,000 sq. m of net floor area
Restaurant									Not required	3 spaces for each 500 sq. m of net floor area
Office			4 spaces plus 0.1 space per 100 m2 of gross floor area	6 spaces for each building entrance			A minimum of one space for each 170 square metres of gross floor area	A minimum of 6 spaces for any development containing a minimum of 2,000 square metres of gross floor area		

Note: The City of New Westminster bylaw is limited to the above uses. Hence, it is not included in subsequent tables.

Use	RICHMOND		COQUITLAM		NORTH VANCOUVER CITY		VANCOUVER	
	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2
Private Club	0.27 spaces per each 100.0 m2 of gross leasable floor area greater than 100.0 m2	0.78 spaces per each 100.0 m2 of gross leasable floor area greater than 100.0 m2						
Religious Assembly								A minimum of 6 spaces.
Indoor Recreation							A minimum of 1 space for each 500 square metres of floor area used for assembly purposes.	A minimum of 6 spaces for any portion of each 1,500 square metres of floor area used for assembly purposes
Civic				6 spaces for each building entrance for any building with 1000 m2 or more of gross floor area	6 spaces per 1,000 m2 Gross Floor Area	1 space per 250 m2 Gross Floor Area		
Assembly				6 spaces for each building entrance for any building with 1000 m2 or more of gross floor area	6 spaces per 500 m2 Gross Floor Area	1 space per 250 m2 Gross Floor Area		
Education - Elementary School	1 space for each 3 staff members	2 spaces for each 10 students		1 space for every 20 students of school capacity			A minimum of 1 space for every 17 employees and for secondary schools, universities or colleges, 0.4 space for every 10 students on a maximum attendance period	A minimum of 0.6 space for every 10 students on a maximum attendance period except that elementary schools shall provide a minimum of 1 space for every 20 students
Education - Secondary School	1 space for each 3 staff members	3 spaces for each 10 students						
University Education	1 space for each 4 staff members; plus 1 space for each 10 students	1 space for each 10 students						
Institutional				6 spaces for each building entrance for any building with 1000 m2 or more of gross floor area				

Use	RICHMOND		COQUITLAM		NORTH VANCOUVER CITY		VANCOUVER	
	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2	Class 1	Class 2
Light Industrial	0.27 spaces per each 100.0 m2 of gross leasable floor area greater than 100.0 m2	0.27 spaces per each 100.0 m2 of gross leasable floor area greater than 100.0 m2			6 spaces per 1,000 m2 Gross Floor Area	1 space per 250 m2 of Gross Floor Area		
General and Heavy Industrial				3 spaces for each building entrance for any building with 1000 m2 or more of gross floor area	6 spaces for any development containing a minimum of 1,000 m2 Gross Floor Area	1 space per 2,500 m2 of Gross Floor Area		
Hotel			1 space for every 30 sleeping units or dwelling units	6 spaces for each building entrance			A minimum of 1 space for every 30 dwelling, housekeeping or sleeping units, or any combination thereof.	A minimum of 6 spaces for any development containing a minimum of 75 dwelling, housekeeping or sleeping units, or any combination thereof
Spectator Entertainment								A minimum of 6 spaces for any portion of each 300 person seating capacity
Major Health Service							A minimum of 1 space for every 17 employees on a maximum work shift.	A minimum of 6 spaces at each public entrance
Community Care Facility, Major			0.05 space per unit of: Licensed Residential Care; Assisted Living, Registered; or Supportive Housing	6 spaces for each building entrance			A minimum of 1 space for every 100 beds.	

I Micromobility Review Memo (July 2020)

To	City of Richmond	Memo	
Cc			
From	Steer		
Date	23 July 2020		
Project	Richmond Cycling Network Plan Update	Project No.	23743801

Review of Shared Electric and Human-powered Micromobility Device Accommodations and Regulations

Introduction

Regional guidance regarding the deployment of electric and human-powered micromobility devices has recently been put forward for municipalities in Metro Vancouver. *Shared Micromobility Guidelines* were released by TransLink in July 2019 to inform the procurement and licencing of micromobility services, increasing regional coordination. In addition, the Ministry of Transportation and Infrastructure included a section on new mobility integration in the *British Columbia Active Transportation Design Guide* released in June 2019.

This memo synthesizes key information from both guidelines relevant to the establishment of an electric kick scooter (e-scooter) pilot/program in the City of Richmond. While an awareness of the latest thinking in the region is important for informing initial program design, constant innovation in the micromobility industry makes adherence to best practices for program regulation, management and evaluation an ongoing pursuit. Hence, relevant commentary is also provided where current thinking and best practices from international experiences contradict or expand on existing regional guidelines. This review concludes with a summary of key recommendations for Richmond, detailing key actions toward the six areas presented in TransLink's *Shared Micromobility Guidelines*:

1. Data and Data Sharing
2. Payments and Price Structures
3. System Planning and Design
4. Right of Way (ROW) Management
5. System Operations
6. Permit Structure and Conditions

TransLink Shared Micromobility Guidelines (2019)

The Shared Micromobility Guidelines provide a general framework and common set of considerations for planning, management and operations of shared micromobility devices. This guide classifies recommendations into five key opportunities for permitting shared micromobility:

1. A **Legislative Framework** to provide consistency across municipalities and standardize procedures
2. **Uniform Data Standards** to facilitate compliance costs and non-compliance enforcement
3. **Interoperability** to enable seamless travel across municipalities and improve user experience
4. Increased transportation options to **build Transportation System Resilience and Sustainability**
5. **Performance-based Permit Conditions** to provide flexible permit conditions to operators

1.0 Data and Data Sharing

Provision of real-time and historical data should be required from operators **as a condition of operation** and **subject to validation** by an accredited firm to ensure that data security best practices are upheld. Permit applications should **stipulate penalties for non-compliance** and a mechanism for enforcement.

Current Practices: Historical data should be shared at least monthly with secure API access.

As uniform data standards are not yet agreed upon, the Washington DC District Department of Transportation (DDOT) data format provides a suitable reporting format for the interim to ensure that data can be analysed for both short-term and long-term planning needs. The following format is recommended by the guidelines:

- Summary Table
  - i. Operator
  - ii. Date
  - iii. Trips
  - iv. Devices
  - v. Reports
  - vi. Maintenance
- Trip Table
  - i. Identification
  - ii. Date
  - iii. Location
- Event Table
  - i. Identification
  - ii. Date
  - iii. Location

For **real-time, read-only data**, the General Bike Share Feed Specification (GBFS) is recommended for use as this is emerging as a common standard among shared micromobility operators/regulators. Consumers and the municipality should have **access to a real-time GBFS stream** for locating devices that are not in use.

Additional Opportunities:
GBFS data may also include vehicle **battery charge** level, **last trip end time**, **servicing** and/or **sanitation**.

Operators should be required to **maintain an archive of historical trip data, held exclusively within Canada** without the need for transfer between other countries. Operators must also be required to demonstrate ongoing compliance with Canadian and provincial privacy laws.

2.0 Payments and Pricing Structure

Guidelines are needed to ensure fees paid by users can be clearly understood, set and collected in a fair and transparent manner. Common payment platforms for services are still only gradually emerging, and operators should demonstrate interest and evidence of **interoperability capabilities** with TransLink Compass Payment System and/or a MaaS (Mobility as a Service) payment platform when these become available.

Proposed payment systems, service options and price structures should be **inclusive to low-income users**, offering a **cash/non-credit card method of payment**. Consideration should be given to how potentially higher costs of cash handling are likely to be spread across all users.

Permit applications should encourage product and service innovation including:

- lowering existing barriers to access by making use of existing consumer devices,
- support for payment systems and technologies that increase convenience of payment and lower transactions costs for users, and
- rewards and incentives to increase feeder trips to transit.

Payment security procedures and processes should be compliant with the Payment Card Industry Data Security Standard (PCI DSS) and demonstrate consumer protections to ensure fees paid are tracked and not lost to fraud.

3.0 System Planning and Design

The guidelines provide many useful recommendations for ensuring the proposed micromobility solution successfully fills the targeted gap in regional or local transportation needs. These include **outlining long-term fleet objectives**, with a **clear plan and performance metrics** for service expansion over time and achieving Metro Vancouver urban transportation and sustainability goals. They also outline considerations for ensuring equitable distribution and access to devices, low-income initiatives, support for other languages, and accessibility features for persons with disabilities.

Current Practices: *Plans should enable flexible collaboration between service provides and different City departments (e.g., planning, communications, public works) to solve problems as they arise.*

Parameters should be established for the **minimum and maximum fleet size** on opening day and scaled as the project progresses and achieves performance and ridership targets. Operators should also outline device technical specifications, demonstrating compliance with existing regulations and supplementary technology for improving the service (e.g., GPS and wireless capabilities, speed regulator and vehicle display).

Current Practices: *Operating area should be clearly defined and considered when establishing fleet size parameters to ensure density of vehicles is sufficient to be usable for riders. Geofencing can permit different speed limit restrictions within specific zones or contexts to minimize conflicts with other users.*

A parking concept should be provided detailing compliance with existing bylaws and regulatory exemptions and agreements with private landholders that would be required to operate under the proposed concept.

Current Practices: *Consideration should be given to the need for formalized parking in high-use areas including transit station/exchanges, retail and tourist destinations, parks, recreation, and public facilities. A mechanism for introducing additional formalized parking zones should be considered in the planning phase to mitigate non-compliance as areas of higher than anticipated parking demand emerge through operations.*

The **rental fee structure** should be clearly outlined including:

- starting fee and costs per unit of time
- proposed notification process and timeline for changing fees
- plan for communicating fees to the user
- any proposed volume or membership discounts

It is recommended that operators be **required to outline a safety and education program as a condition of their permit to operate**. Key details of this program provided in the application should include the delivery method, proposed provider, program content, cost recovery mechanism, and reporting measures.

Additional Opportunities:
Education programs may also be managed by the City and in coordination with broader safety campaigns, funded in part by a fee charged to operators.

A **staffing plan** should be included as part of the permit process. Key considerations include detailing day-to-day management and 24-hour contacts, organizational hierarchy and persons employed within the local and non-local workforce, and proposed staff and contractor skills training.

4.0 Right of Way (ROW) Management

In many places around the world, insufficient regulation of dockless shared micromobility devices are negatively affecting **public perception of these devices**, potentially harming future opportunities to implement new technologies. Achieving public buy-in requires effective management of these devices within the public ROW. The permit process presents an opportunity to:

- identify desirable user behaviours, including the parking of devices
- require operators to promote responsible behaviours to users in an understandable manner
- influence operators to reward desirable behaviours and penalize undesirable behaviours
- commit operators to proactively manage parked devices to limit safety risks ands nuisance impacts

> **Additional Opportunities:**
> Early and meaningful engagement on system design and operating principles is critical to gaining **community and stakeholder support**.

Hence, a proactive ROW management strategy should be established detailing the parking needs for the proposed operating model (e.g., physical stations and/or geofenced hubs) and the **proposed areas to park and store devices** within the ROW.

Continued access and storage of devices in the ROW should be conditional on ongoing compliance with a responsible parking concept. Municipalities can improve ROW management compliance by granting an initial 'level of access' to the ROW and ensuring subsequent **increases in 'level of access' are conditional on ongoing ROW management**.

5.0 System Operations

Safety is an essential component of any operations plan including the provision of helmets that meet existing safety standards and BC helmet laws and **periodic maintenance** to ensure all devices are in working order.

Current Practices: *Service providers should be required to provide maintenance records to the City.*

Programs are likely to require plans for **recharging and rebalancing** as part of ongoing operations. Key considerations include the entity responsible for the rebalancing, thresholds for triggering a rebalancing, user incentives to undertake rebalancing, and timelines for completion.

Municipalities should consider how systems will facilitate and monitor compliance including:

- incentives and penalties for good and bad parking behaviour, together with a **system of graduated fines**
- displaying device ID number and company contact information on each unit
- outlining a **complaint management system** process for responding to complaints
- **time based targets** for responding
- a tracking and reporting process to demonstrate compliance with agreed measures and targets

> **Additional Opportunities:**
> The emergence of companies like **Sweep** has shown opportunities for cities to outsource monitoring to manage and respond to citations, relocation requests, impoundments, and to maintain an infraction dataset to understand which vendors or which areas are most problematic.

As part of any application to operate, municipalities should **require a performance bond/bank guarantee** from operators for protection from a system failure or operator withdrawal from the market.

6.0 Permit Structure and Conditions

In the absence of a long-term regulatory framework for shared micromobility, municipalities should aim to achieve a **standardized permit process and conditions**. This process should adopt standardized and defined terminology and clearly delineate:

- permit timelines and eligible organizations
- municipal recommended and mandatory requirements in application process
- any specific permit conditions

Key Performance indicators (KPIs) are an essential tool for monitoring compliance with permit conditions and penalizing operators who fail to meet minimum requirements. Potential considerations include a 'data completeness of accuracy' requirement and percentage availability of real-time data over a given period.

Desired permit length is a key consideration for any permit process. Most micromobility permit regimes are short-term in North American cities (1-2 years) and there is an emerging consensus that shared dockless devices are less attractive for long term partnerships due to their desire to capture short-term market share and revenues. Once this time period has been established, permit fees should be set by the municipality to ensure full cost recovery of set up, administration, compliance, and enforcement costs.

British Columbia Active Transportation Design Guide

Developed based on national and international best practices, the Design Guide presents active transportation facilities not currently allowed under existing federal, provincial or local laws.

Setting the Context

Guiding principles of the Design Guide envisioned active transportation networks and facilities that are **safe and stress free, context sensitive, cohesive and direct, attractive and intuitive, and inclusive.** The Design Guide was developed based on the following considerations for inclusive mobility:

- **Equitable** – the fair and appropriate distribution of impacts (benefits and costs)
- **Inclusive** – the transportation system should be inclusive to everyone, ensuring people of all socio-economic, cultural and demographic backgrounds have access to active transportation
- **Age-Friendly** – designing a system that is welcoming of all ages and their unique travel needs
- **Accessible** – using universal design principles to accommodate people of all ages and abilities
- **Safe** – providing adequate infrastructure and increasing safety in numbers of active transportation users

Multi-Use Facilities

Travel speed and willingness to make stops varies considerably for the wide variety of users of multi-use pathways. Hence, it is important to equally consider all users in the planning and design of multi-use pathways to ensure no single user group is given priority over another.

Amenities + Integration

The Active Transportation Design Guide describes **e-scooters** as single occupant vehicles with an integrated battery. Presently, B.C. does not permit the use of e-scooters (and similar small, one-person electric vehicles such as hoverboards, motorized skateboards, and self balancing electric unicycles) on public roadways or sidewalks. Municipalities can, however, enact by-laws to permit the operation of these vehicles where the B.C. Motor Vehicle Act does not apply, including **trails or pathways**.

Additional Opportunities:
Specific **age and speed restrictions** are common in other jurisdictions

Current Practices: The maximum speed of e-scooters is typically regulated to 24.9 km/h (15 mph) in shared systems. Using onboard GPS systems and geofencing technology, some programs enforce additional speed restrictions in specific locations. In the City of Calgary, a system-wide maximum speed of 20 km/h has been further reduced to 15 km/h in areas where increased conflicts were reported in the first phase of the pilot.

Without proper policies to direct how e-scooters should be used, some users end up on sidewalks where they present a **high risk to pedestrians** given their operating speeds. These speeds are well within the bounds of typical cycling speeds. Hence, e-scooters are **well-suited for operation within designated cycling facilities**. Given these operating speeds and the potential safety issues, many jurisdictions are encouraging or requiring the use of helmets for users of e-scooters.

Additional Opportunities:
While often imposed by jurisdictional regulations, **helmet requirements impose additional operational challenges** related to user education and enforcement and additional challenges and costs associated with loss, damage and theft/vandalism. Importantly, requirements for sanitation and/or provision of helmet liners will also increase operational costs.

Conflicts with other modes are likely to arise when proper parking accommodations are not made for e-scooters and other dockless small vehicles. To manage ROW space municipalities should consider:

- **fleet size caps**, limiting overcrowding in public areas with infrequently used vehicles
- stipulating **timely response to parking complaints** in service agreements (typically 2 hours)
- **user education** on the operator website, mobile app, and vehicles themselves
- designating shared **small vehicle parking zones** with geo-fenced or marked boundaries
- **fees and/or incentives** to ensure users are leaving vehicles in these designated spaces

Overregulation of small vehicle parking areas may reduce the ability of these systems to provide point-to-point connectivity and limit their convenience. **Blanket parking restrictions are discouraged**.

Dockless small vehicle parking areas should be:

- installed by the municipality for **use by all dockless services** (with costs offset through operator fees)
- clearly and **consistently signed or marked** on the pavement
- **highly visible** to device users and other roadway users

Small vehicle parking should not be permitted on sidewalks less than 2 metres wide or block curb let-downs, driveways, or street furniture. Instead, parking is recommended to be situated in the following areas:

- on wide sidewalks where a 2-metre-wide traffic zone for sidewalk users and access to existing street furniture and parking metres can be maintained
- within plazas and wider pathways in unobtrusive areas
- on raised curb extensions/bulb-outs
- in repurposed curbside parking spaces where clearly demarcated from adjacent motor vehicle parking
- on private property with permission from the property owner
- on-street in residential areas, wherever motor vehicles can legally park
- in designated areas in select public parks

Implementation Recommendations

Permit Design and Objectives

In many areas, operators are responsible for delivering on the vision of the municipality and achieving the desired outcomes highlighted in the guidelines from TransLink and the Ministry of Transportation and Infrastructure. Designing micromobility systems that achieve high standards of safety, accessibility, responsiveness, and equity come at a cost to the private operators. To counterbalance motivations for profit, these desired outcomes can be incentivized and enforced through performance-based permit conditions.

A flexible system of permit conditions achieves, monitors and enforces compliance through KPIs, penalizing operators who fail to meet minimum requirements. Frequent KPIs adopted by e-scooter programs in Europe and the US include utilization rate, fleet size, compliance with restricted access areas, maintenance and equipment standards, educational outreach, data integrity and availability, data protection, as well as parking and distribution compliance.

Municipalities are responsible for ensuring that project objectives are codified into actions and KPIs at the procurement and licensing stage, setting parameters to successfully manage micromobility systems. To assist the City of Richmond in determining the correct balance of incentives and regulations, key focus areas for permit design and measures implemented by other municipalities are summarized below.

Permit Structure and Conditions

While standardized operating conditions are important for attracting regional service providers and integrating shared mobility options, the constant innovation in the micromobility industry makes short, flexible pilot programs an appealing approach to introducing new mobility options. Many cities are embarking on flexible pilot programs where conditions can be rewritten, and permits restructured on an annual or bi-annual basis. In this rapidly changing market, municipalities should require a performance bond/bank guarantee from operators for protection from a system failure or operator withdrawal from the area. Municipalities should also ensure permit terms are enforceable and require that providers remain in good standing, allowing for indemnification in the case of service agreement violations.

Key Actions

- Determine the desired length of the permit (most service agreements are 1-2 years in North America)
- Set permit fees to ensure full recovery of set up, administration, compliance and enforcement costs

Data and Data Sharing

Consistent access to complete and accurate data is essential for program evaluation and monitoring success. Historical data enables the municipality to ensure operators are compliant with program requirements such as adherence to parking requirements. Data may also inform other policies and program changes. For instance, temporal data on pick-up and drop-off activities may be used to inform better flexible curbside management policies and planning for end of trip facilities (e.g., formalized parking, charging infrastructure). Real-time data should also be made available, allowing users to quickly locate devices. Currently, DDOT and GBFS data formats are common standards for historical and real-time data respectively. Third parties such as parking compliance companies can also add another layer of data to inform program management.

Key Actions

- Stipulate that historical data should be shared at least monthly with secure API access **(KPI)**
- Require operators to provide real-time, read-only data on device locations and information **(KPI)**
- Consider additional data needs to successfully manage the pilot

System Planning and Design

Successful system plans have a clear understanding of the operating area, long-term fleet objectives, staffing requirements, needs of vulnerable populations, and plans for equitable distribution and access to devices. When designing a pilot, operating areas should be large enough to service enough journeys but not so large that the density of shared e-scooters provided is too low to be usable for riders.

Fleet size should also be commensurate to the operating area to limit the overcrowding of some public areas with idle devices. In the City of Chicago, this issue has been mitigated by a fleet cap and reduced operating hours (5am to 10pm). The definition of "fleet size" varies across operators and systems. Specific direction should be provided as to whether e-scooters that are currently being repaired are included in the total allowed fleet. Table 1 summarizes existing fleet restrictions used in similar-sized municipalities to Richmond. Alternatively, operators prefer dynamic fleet caps based on performance metrics such as rides per vehicle per day. In such cases, fleet sizes can be adjusted based on changes to average utilization. During the pandemic, this system has allowed some cities like Santa Monica to reduce fleet size caps.

Table 1: Fleet size restrictions enforced in comparable municipalities

City	Population	Fleet Size Restrictions
Durham, NC	274,291	Cap on vehicles, ~600 e-scooters and 1,200 bikes/e-bikes
Fort Lauderdale, FL	182,595	~500 per operator
Santa Monica, CA	91,411	City-wide cap of 3,250 devices (2,500 e-scooters and 740 e-bikes) – 750 per operator

Geo-fencing enables cities to restrict scooter usage to the permitted operating areas and limit parking to designated locations, in addition to setting different speed restrictions to fit varying contexts within the operating area (including no-go zones where scooter power is turned off). Such restrictions may be necessary to minimize conflicts with other users, reduce street clutter, and maintain desirable public spaces. However, experiences from San Diego, Los Angeles, Fort Collins, Denver, and Portland found that there are limitations to GPS precision. For example, vehicles parked alongside a geofenced area may turn into false positives, with riders unable to lock or unlock vehicles. This may be resolved by stipulating a buffer zone (e.g., 50m) to set back parking locations from boundaries. Generally, smartphone-based GPS systems are accurate to approximately +/-5m, diminishing indoors, near large buildings or trees, and a due to weather events.[1]

Key Actions

- Define initial operating area and fleet size parameters
- Stipulate that any planned expansions beyond the initial fleet size or operating area should be contingent on achieving and maintaining KPIs
- Consider limitations on speed, operating hours or service areas for devices (enforceable via geo-fencing)

Right of Way (ROW) Management

Achieving public buy-in requires effective management of e-scooters within the public ROW, in addition to early engagement and communications plans for both the system planning and operational phases. The permit process presents an opportunity to commit operators to proactively manage undesirable user behaviours and parked devices, rather than narrowing the scope so much that it makes it too difficult for an operator to provide service. A proactive ROW management strategy is essential but can be successfully delivered in various arrangements. The B.C. Active Transportation Design Guide advocates for municipalities to establish small vehicle parking zones, while parking plans may also be primarily operator driven when clear

[1] *GPS Accuracy*, U.S. Air Force. https://www.gps.gov/systems/gps/performance/accuracy/

guidance is provided by the municipality. Regardless, continued access and storage of devices in the ROW should be conditional on ongoing compliance with responsible ROW management.

One of the primary factors in the City of Montreal's decision not to renew their e-scooter pilot in 2020 was poor compliance with parking requirements after it was found that devices were parked improperly 80% of the time.[2] However, operators also noted that the 410 parking zones within the city were insufficient and were not conveniently located. Widespread and convenient parking is essential to achieving compliance.

Key Actions

- Establish a proactive ROW management strategy detailing the parking needs for the proposed operating model and areas to park and store devices within the ROW
- Commit operators to proactively manage parked devices and undesirable user behaviours
- Consider contracting a third-party to assist with parking compliance and to report on infractions

System Operations

A hands-on service agreement should be constructed to promote and monitor operator compliance and pressure operators in the case of poor performance. This is facilitated through devising clear expectations regarding periodic maintenance, establishing a complaint management system, setting timelines for responding to needs for rebalancing and recharging, and requiring periodic reporting on measures and targets provided to the city.

Without proper policies to direct how e-scooters should be used, some users end up on sidewalks where they present a high risk to pedestrians given their operating speeds. E-scooter speeds have been reduced to 10 mph (16 km/h) in Washington, DC while Paris (France) imposes limits of 8 km/h in dense pedestrian areas. While speeds may be reduced, service providers are partnering with the City of San Jose to develop innovative methods to prevent e-scooters from riding on sidewalks including Bluetooth beacons, cameras and educational outreach.[3] Many jurisdictions are encouraging or requiring the use of helmets for users of e-scooters, while most providers prohibit riders under the age of 18 in their user agreements. Spin and Bird also offer programs to subsidize the costs of a helmet for riders.

Distribution of devices is likely to be unequal in the absence of rebalancing requirements. Moreover, maintaining access for underserved communities requires active intervention from the city. This may also be achieved through incentives. In Los Angeles, operators were offered the opportunity to increase their fleet size from 3,000 to 5,000 units by serving the disadvantaged communities in San Fernando Valley.

Key Actions

- Stipulate timely responses to parking complaints in service agreements (typically 2 hours) **(KPI)**
- Require service providers to conduct periodic maintenance and share records with the city **(KPI)**
- Consider additional safety measures such as reducing device speeds, mandating age and helmet requirements, and providing a safety and education program
- Establish prompt requirements for rebalancing devices with consideration for safeguarding access for disadvantaged communities **(KPI)**

---

[2] *Règlement relatif aux VNILSSA*, City of Montreal. https://ville.montreal.qc.ca/documents/Adi_Public/CE/CE_DA_ORDI_2020-02-19_08h30_Presentation_Reglement_relatif_aux_vehicules_non_immatricule_en_libre-service_sans_ancrage.pdf

[3] *Sidewalk Riding Prohibition Technology*, City of San Jose. https://www.sanjoseca.gov/your-government/departments-offices/transportation/micro-mobility/sidewalk-riding-prohibition-technology

Payments and Pricing Structure

Payment methods and pricing structures may restrict access to these new micromobility options for lower income groups. Instead, payment systems should increase convenience and maintain lower transaction costs for users to minimize access barriers. These systems should also be inclusive to low-income users who may not have access to credit or a smart phone device by offering an unbanked or cash method of payment. However, as the City of Chicago learned through consultation with stakeholders, users may still have difficulty accessing these programs from some providers and more prescriptive and rigorous requirements may be necessary.[4] For instance, the municipality may mandate that all operators offer a text-to-ride option (payment via SMS) or cash payment locations, similar to what has been offered by Bird and Lime in Portland, OR. Finally, payment options and rental fee structures should be clearly communicated, with all options presented on the operator's website and app.

Key Actions

- Stipulate that unbanked methods of payment be accessible for low-income users
- Require service operators to report on usage of low-income payment options **(KPI)**
- Consider defining eligibility criteria for low-income users or prescribing low-income payment systems

System Sustainability

Ensuring that e-scooters contribute to a sustainable transportation system is key to long-term deployment of these technologies in cities. A research study by Hollingsworth *et al* 2019[5] highlighted that the major environmental costs of these schemes concerns the impacts associated with daily overnight collection and materials and manufacturing burdens.

Several cities are currently identifying ways to reduce the environmental impacts of e-scooter operations by:

- Developing sustainability guidance within the RFP (e.g., **City of San Francisco's Sustainability guidelines and requirements**[6]) to support best practices on battery requirements, energy usage and efficiency, life-cycle requirements, zero waste goals, etc.
- Developing KPIs and requiring companies to track overall environmental footprint, reporting on redistribution, charging and maintenance activities and energy source and use
- Improving e-scooter collection practices, modifying the requirement that all devices be picked up every night (e.g. City of San Francisco and Chicago) or limiting collection to those with low battery
- Expanding investments in bike, e-scooter and pedestrian facilities to support travel behaviors shifts from car-based trips to micromobility modes

[4] *E-Scooter Pilot Evaluation*, City of Chicago. https://www.chicago.gov/content/dam/city/depts/cdot/Misc/EScooters/E-Scooter_Pilot_Evaluation_2.17.20.pdf

[5] *Are e-scooters polluters? The environmental impacts of shared dockless electric scooters.* https://iopscience.iop.org/article/10.1088/1748-9326/ab2da8

[6] *Powered Scooter Share Permit Program: Appendix 4 Data Reporting Guidelines and Requirements*, San Francisco Municipal Transportation Agency. https://www.sfmta.com/sites/default/files/reports-and-documents/2019/07/appendix_4_-_data_reporting_guidelines_and_requirements.pdf

Control Information

Prepared by	Prepared for
Steer Suite 1030 – 999 W Hastings Street Vancouver, BC V6C 2W2 Canada +1 (604) 629 2610 www.steergroup.com	City of Richmond 6911 No. 3 Road Richmond, BC V6Y 2C1 Canada

Steer project/proposal number	Client contract/project number
23743801	6897532

Author/originator	Reviewer/approver
M. Fitzgerald	G. England

Other contributors	Distribution
J. Kosch (Steer) A. Doran (Steer) A. Safari (Steer) S. Bagg (Steer) P. Sun (Binnie)	Client: City of Richmond Project Team Steer: Internal Project Team

Version control/issue number	Date
Draft Cycling Network Update v1.0	March 22, 2022
Draft Cycling Network Update v2.0	May 5, 2022
Draft Cycling Network Update v3.0	May 19, 2022
Cycling Network Plan Update v4.0	May 27, 2022

PMT - 196

steer

QUALITY SYSTEM CERTIFICATION
DNV·GL
ISO 9001:2015

steer

steergroup.com

Summary of Phase 2 Engagement Results

Phase 2 Engagement - Overview

60% Strongly Agreed or Agreed that existing busy MUPs should be upgraded to separate cyclists and pedestrians

Priority destinations for new cycling routes – Canada Line Stations (1st), Schools (2nd), Parks (3rd), Community Centres (4th) and City Centre (5th)

Ideas Board

"Shift focus from cyclists to active transport"
2 comments 7

"Reduce residential speed limits"
5

"Need for secure, dry, parking standards"
3 comments 5

Mapping Tool

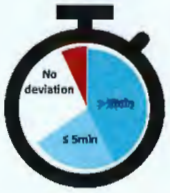
9 | April 2022

steer

Phase 2 Engagement

89% Strongly Agreed or Agreed that physically separated facilities should be prioritized in high traffic and high density areas (e.g., City Centre, major streets)

Safer crossings at major streets was the top choice (56%) to improve the comfort level of neighbourhood bikeways



Nearly 2/3 willing to deviate up to 5 minutes or 1500 metres to ride in a fully protected facility for 20 minute trip

2 km of Protected Bike Lanes

4 km of Unprotected Bike Lanes

6 km of Neighbourhood Bikeways

1 km of Multi-Use Pathway

36% ranked 2 km of protected bike lanes as their first priority. 47% ranks 1 km of MUPs as their last priority.

Adding new protected bike lanes and completing existing gaps were somewhat preferred to other network improvements

[2] Build New Routes

[1] Complete Existing Gaps

[3] Add Protection to Existing Routes

[4] Upgrade Intersections on Existing Routes

43% ranked complete gaps in the existing cycling network as their top priority

8 | April 2022

steer

Short-Term Priorities – Funding Status

Project Location	Description	Funded?	Notes
Alderbridge Way west of No. 4 Road	Complete gap in multi-use path	No	Private property impacts Potential Implementation: 2025-2026
Westminster Hwy and No. 5 Road	Separate eastbound bike lane from the right turn lane approaching the intersection	Yes	2022 Capital Budget Status: In design Potential Implementation: 2024
Garden City Road (Cook Road to Citation Drive)	Add green paint treatment for cyclists crossing right turn lane for Citation Drive	Yes	Minor upgrade that can be accommodated in approved budgets Potential Implementation: 2023
Westminster Hwy at SB Hwy 99 On-Ramp	Add green paint treatment for cyclists crossing on-ramp)	No	Dependent on MoTI
Saunders Road and No. 3 Road	Widen off-street pathway on Woodwards-Saunders Neighbourhood Bikeway	Yes	2021 Capital Budget Status: In design Potential Implementation: 2023
Odlin Road and Shell Road	Provide new cycling connection between cul-de-sac and Shell Road	No	Dependent on MoTI
Alderbridge Way and Shell Road	Upgrade busy, wide intersection to connect bi-directional MUP facilities	No	Proposed for 2024 Capital Budget Potential Implementation: 2026
Lucas Road and No. 3 Road	Improvements to off-set intersection on Crosstown Neighbourhood Bikeway	No	Proposed for 2023 Capital Budget Potential Implementation: 2024
Lynas Lane and Westminster Hwy	Upgrades to support cyclist turning movements (e.g., bike boxes)	Yes	2021 Capital Budget Status: In design Potential Implementation: 2024
Williams Road at No. 3 Road	Separate bike lanes from the right turn lane in both directions approaching the intersection	Partial	Westbound: secured via development Status: In construction Eastbound: future Capital Budget Potential Implementation: 2023
Minoru Gate and Granville Avenue	Improvements to connect cyclists from Moffatt Road to travel westbound on Granville Avenue	No	Future Capital Budget Potential Implementation: 2025-2026
Bamberton Drive and Steveston Hwy	New pedestrian signal to connect Midtown Neighbourhood Bikeway and Steveston Highway MUP	No	Proposed for 2023 Capital Budget Potential Implementation: 2024
McCutcheon Place and Schaefer Gate at Francis Road	Improvements to off-set intersection on Midtown Neighbourhood Bikeway	Yes	2022 Capital Budget Status: In Design Potential Implementation: 2024
Mortfield Gate and Steveston Hwy	Upgrade existing intersection with cyclist push buttons and green paint	Yes	2019 Capital Budget Status: In design Potential Implementation: 2023
Saunders Road and No. 3 Road	Upgrade to pedestrian signal on Woodwards-Saunders Neighbourhood Bikeway	Yes	2021 Capital Budget Status: In design Potential Implementation: 2023
Shell Road (Alderbridge Way to River Road)	Extend existing MUP north of Highway 99 to River Road	Partial	Design: 2020 Capital Budget Construction: Proposed for 2024 Capital Budget Status: In design Potential Implementation: 2025-2026
Sexsmith Road and Brown Road (Beckwith Road to Browngate Road)	Alternative route to access Bridgeport Station and the Canada Line Bridge (to Vancouver)	Yes	2022 Capital Budget Status: In design Potential Implementation: 2024

Short-Term Priorities – Funding Status

Project Location	Description	Funded?	Notes
Charles Street (Existing MUP to Van Horne Way)	Improves connections between Sexsmith Road-Brown Road and nearby routes	No	Future Capital Budget Potential Implementation: 2025-2026
Browngate Road (Hazelbridge Way to No. 3 Road)	Improves connections between Sexsmith Road-Brown Road and nearby routes	Yes	2021 Capital Budget Status: In design Potential Implementation: 2024
Gilbert Road (Elmbridge Way to Granville Avenue)	Extend bike route with connections to Minoru Park, Richmond General Hospital and Brighouse Elementary	Partial	Design: 2020 Capital Budget Construction: Proposed for 2025 Capital Budget Status: In design Potential Implementation: 2025-2026
Lansdowne Road (Pearson Way to Gilbert Road)	Completes network gap, extending connections to the Middle Arm Greenway	Yes	2021 Capital Budget Status: In design Potential Implementation: 2023
Lucas Road – Bowcock Road – Dayton Avenue	Completes east-west Crosstown Neighbourhood Bikeway	No	Proposed for 2023 Capital Budget Potential Implementation: 2024
Westminster Hwy (Lynas Lane to No. 2 Road)	Safer connection southbound from the No. 2 Road Bridge to Granville Avenue via Lynas Lane	Yes	2021 Capital Budget Status: In design Potential Implementation: 2024
Moffatt Road – Deagle Road – Bamberton Drive	Short-term north-south Midtown Neighbourhood Bikeway	Partial	Steveston Hwy-Francis Rd: complete Francis Rd-Granville Ave: future capital budget Potential Implementation: 2025-2026
River Road (McCallan Road to Middle Arm Greenway)	Extending paved segments of the Middle Arm Greenway to the Railway Greenway	Yes	2022 Capital Budget Status: In Design Potential Implementation: 2024
Steveston Hwy (Railway Avenue to Shell Road)	Direct east-west connection between Ironwood and Steveston, and recreational routes	Partial	Phase 1 Shell Road-Mortfield Gate: 2019 Capital Budget Phase 2 Mortfield Gate-No. 2 Road: 2020 Capital Budget Phase 3 No. 2 Road-Railway Ave: • Design: 2020 Capital Budget • Construction: Proposed for 2023 Capital Budget Status for all Phases: In Design Potential Implementation: • Phase 1: 2023 • Phase 2: 2023 • Phase 3: 2024
Westminster Hwy (Fraserside Gate to Smith Cres)	Priority upgrade of shared road facilities identified in Phase 1 engagement	Yes	2020 Capital Budget Status: Construction to commence summer 2022
Garden City Road (Francis Road-Steveston Hwy)	Complete gaps in the existing MUP south of Francis Road	Yes	2022 Capital Budget Status: In design Potential Implementation: 2024
No. 2 Road (Williams Road to Steveston Hwy)	New northern extension of No. 2 Road MUP as a key route in the cycling network	Yes	2022 Capital Budget Status: In design Potential Implementation: 2024

Attachment 4

Executive Summary

City of Richmond
Cycling Network Plan Update

2022

Richmond

Executive Summary
Table of Contents

- Introduction 1
- Existing Cycling Network 2
- Evaluation Process 2
- Approach to Cycling Improvements 3
- Future Cycling Network Priorities 4
- Cycling Policies, Programs and Initiatives 6

Introduction

The City of Richmond's Official Community Plan (OCP) identifies the need to reduce vehicle trips by 34% between 2008 and 2041 to achieve local mobility, air quality and liveability goals. The Community Energy & Emissions Plan 2050 (CEEP 2050), adopted in February 2022, accelerates OCP targets to increase cycling mode share from 1% in 2008 to 10% by 2030.

This update to the Cycling Network Plan (CNP) will help the City respond to its policy objectives by identifying what the future cycling network will look like in 15 years and a phased implementation strategy to achieve it.

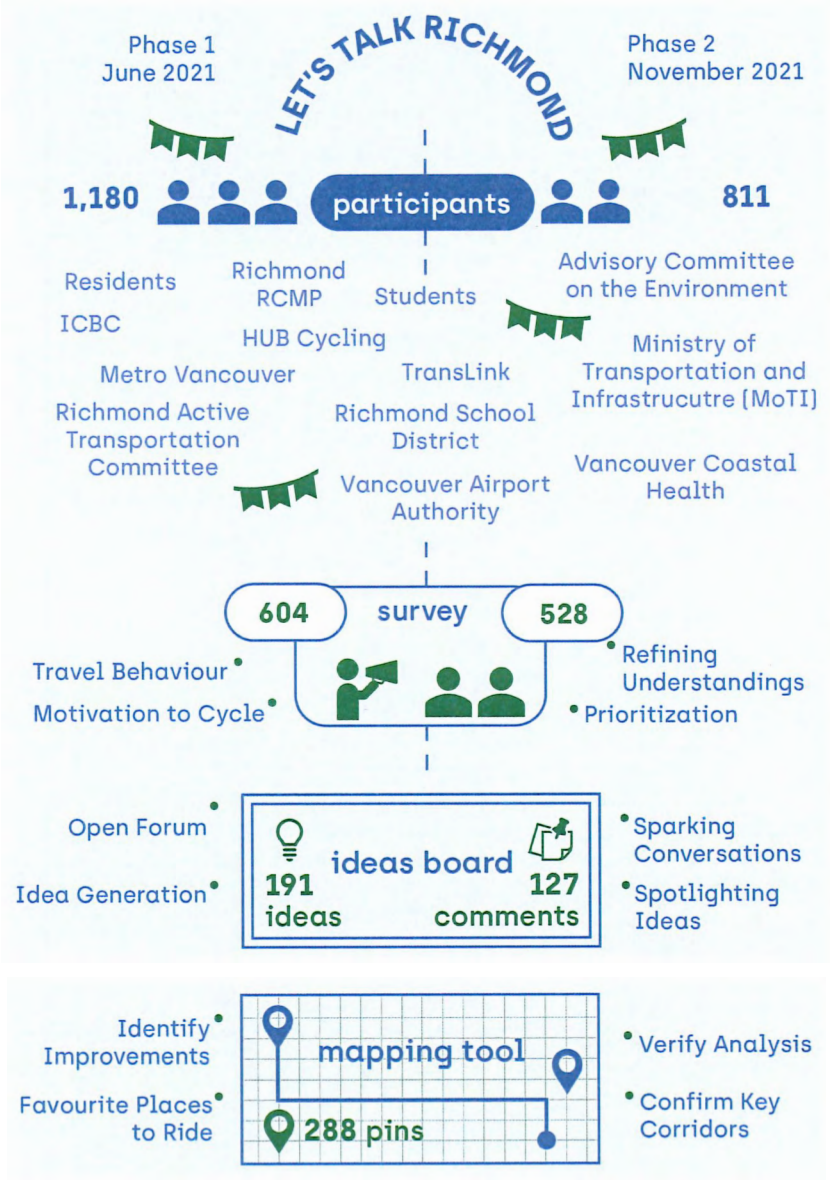
Project Phases

The development of the CNP was divided into three phases to **explore** the existing conditions, **evaluate** and update the future cycling network plan, and **execute** a final Cycling Network Plan by prioritizing investments through an implementation strategy.

A multi-phase approach to engagement was used to be more responsive to community feedback and to better address regional, local and site-specific considerations at the prioritization and implementation phase.

Phase 1 engagement focused on gathering public and stakeholder input on existing conditions and recommendations for future improvements. Phase 2 engagement targeted three major objectives:

- Validating findings from the route-level evaluation
- Refining feedback heard during Phase 1 engagement
- Understanding how stakeholders and the public prioritize between different improvements and connections at the implementation stage



Existing Cycling Network

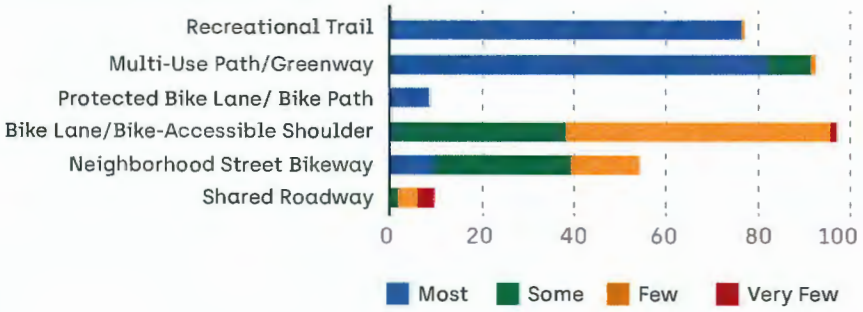
The current cycling network is composed of a mix of facility types covering over 330 lane kilometres. Some facility types are more common than others. In Richmond today, off-street leisure facilities like trails and paths are most common while most facilities on roads are not protected by physical barriers.

TransLink and and HUB Cycling's 2019 Benchmarking the State of Cycling in Metro Vancouver report highlights that cyclists are most comfortable when physically separated from other modes.

While 50% of the existing cycling network in Richmond can be classified as 'comfortable for most' according to these criteria, the breakdown of comfort level by facility type highlights that this is primarily achieved by Recreational Trails and Multi-Use Paths/Greenways.

Most of the on-street cycling facilities are considered comfortable for some or few. This mainly reflects the shortcomings of unprotected bike lanes/bike-accessible shoulders, which may not be viewed as a safe or viable option by potential users, particularly inexperienced cyclists, youth and older adults.

Figure 1: Cyclist Comfort Level by Facility Type



Evaluation Process

Together, the Official Community Plan and City Centre Area Plan present a roadmap for the ultimate cycling network. To identify priorities for the 15-year timeline of this plan, cycling investments were evaluated to assess their potential benefits. Evaluation criteria were distilled from feedback during Phase 1 engagement.

Table 1: Evaluation Criteria

Objective	Evaluation Criteria
Community Support	Priority project/corridor identified during engagement
Safety	Improves cycling comfort by adding new cycling facility or adding separation to an existing facility
Social Equity	High percentage of households spending 30% or more of income on housing
	High percentage of low-income households based on Statistics Canada low-income measure
	High percentage of population identifying as Indigenous
Connectivity	Major Bike Route (TransLink), Regional Greenway (Metro Vancouver) or entry point for adjacent municipalities
	Provides a direct connection to at least one neighbourhood centre
	Provides a direct connection to/from East Richmond
	Creates or extends an east-west or north-south corridor
Network Gaps	Completes a gap in the existing cycling network or upgrades an existing shared road facility
Utility / Convenience	Improves access to activity centres, transit hubs, schools, employment centres, population centres, and parks
Feasibility	Project is within municipal jurisdiction
	Overlaps with planned projects in the current capital plan
	Likelihood of requiring further right of way expansion

Approach to Cycling Improvements

The results of engagement and the priority network evaluation provided considerable insight to projects with high potential benefits. To move forward with implementation, a series of planning principles were distilled from engagement and evaluation trends. These priorities have informed the current prioritization process and should continue to inform future decision-making regarding cycling investments in Richmond.

Figure 2. Cyclists on River Parkway

Safety and Comfort

- Design for **all ages and abilities**, prioritizing separation from traffic whenever feasible.
- **Future proof** facilities by considering the spatial requirements of both emerging and increasing walking and rolling needs.
- Address **intersection conflicts**, recognizing that the intersection and the mid-block conditions both contribute to cycling safety and comfort.
- Strive to provide a **consistent facility type** along a corridor. Where transitions between facility types are necessary, locate them where they are safe, clear to all users, and offer a seamless connection.

Minor Routes

- Prioritize **new neighbourhood street bikeways** to align with existing and long-term planning priorities.
- Improve **intersections with major roads** where hourly traffic volumes exceed 500 vehicles in any travel direction or where **local streets are "off-set"** and do not directly connect at the intersection.
- To **improve cyclist visibility and wayfinding**, a wider, low-cost program of upgrades to neighbourhood bikeway intersections with lower traffic volumes should be considered.

Major Routes

- Emphasize transecting and **multi-purpose routes** that can serve both commuting and recreational cycling needs.
- Improve **local and regional connectivity**, including connections to Hamilton, Ironwood, Steveston, and Burkeville.
- Develop a **core network** that locates most residents within 800 metres of a major cycling route.
- Establish a **finer grain network in the City Centre**, given the greater density of jobs and destinations, increased prevalence of high-traffic routes and higher presence of equity seeking groups.

Action Planning

- **Pilot improvements** as a cost effective and quick means to provide separation to existing routes. Candidate routes include Granville Avenue, Garden City Road, Westminster Highway, and Williams Road.
- **Phase fixing of shared road segments** and provide connections to Canada Line stations and schools as top priorities.
- **Stewardship** with considerations for maintenance and asset management once facilities are implemented (e.g., bike counters).
- Use of **street reallocation** to extend limited cycling infrastructure funding and enable timely completion of new facilities.

Future Cycling Network Priorities

Short-Term 2022-2026

City Centre
Development of core protected cycling network in the City Centre

Neighbourhood Bikeways
Completion of parallel local street bikeways as alternatives to long-term routes on Gilbert Road and Blundell Road

Major Roads
Completion of Shell Road and Steveston Highway in preparation for medium- and long-term connections

Medium-Term 2027-2031

Community Connections
Connections to Sea Island via. No. 2 Road Bridge, Steveston, Ironwood, East Cambie, and the future Fraser River Crossing

Central Loop
Completion of central loop of directional bike lanes on Garden City Road, Williams Road, Railway Avenue, and Granville Avenue

City Centre
Increased connectivity and protection in the City Centre

Redevelopment or Collaboration
Projects dependent on redevelopment or collaboration with other agencies

Long-Term 2032-2036

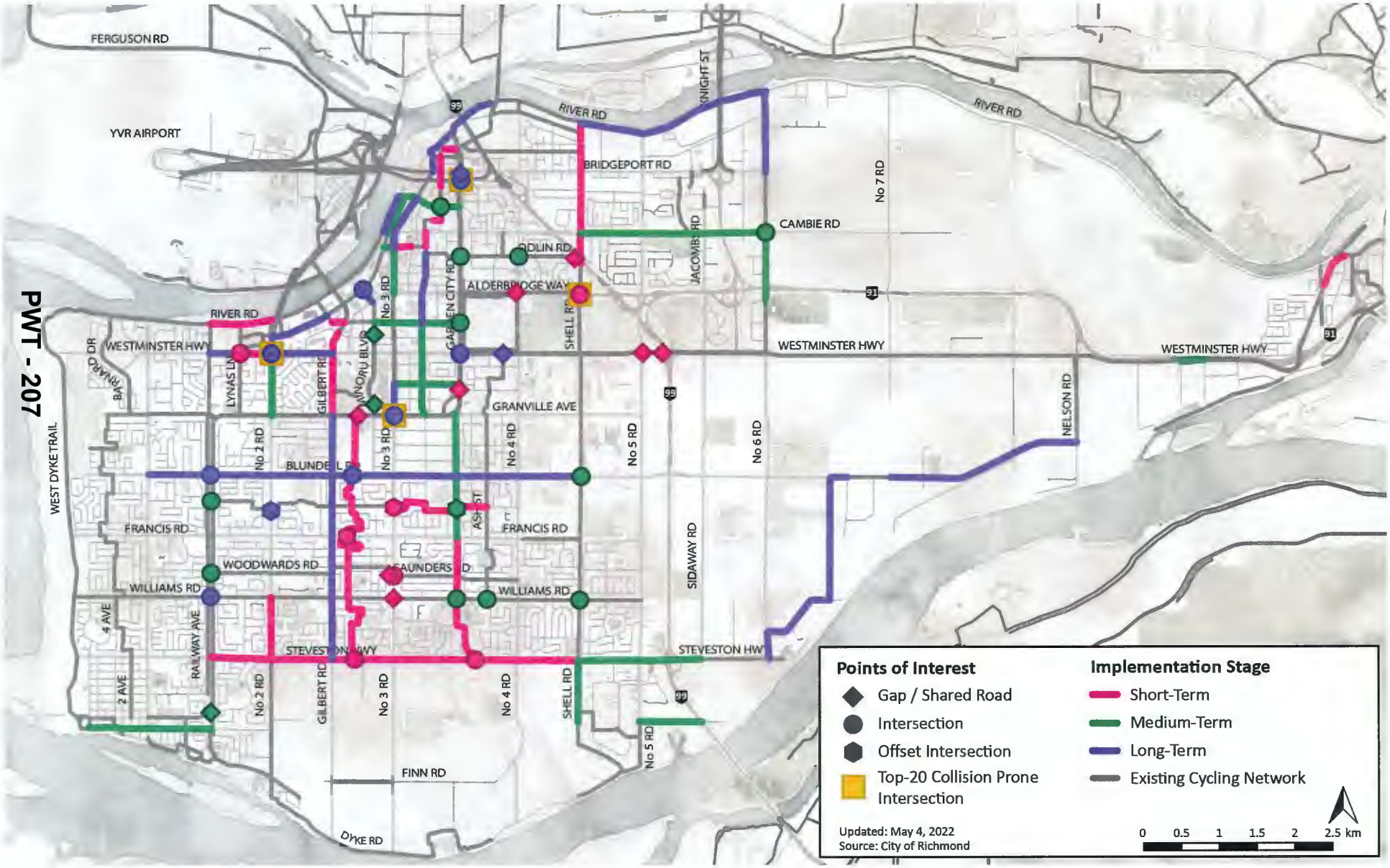
Redevelopment or Collaboration
Projects dependent on redevelopment or collaboration with other agencies

City Centre
Further connectivity and protection in the City Centre

Major Roads
Completion of new east-west (Blundell Road) and north-south (Gilbert Road) corridors

Community Connections
Enhanced connections to Hamilton and Southeast Richmond

Figure 3. Map of Implementation Plan- Short-, Medium- and Long-Term Priorities



Policies, Programs and Initiatives

The focus areas developed in this plan reflect policy needs and challenges identified through public, stakeholder and City staff engagement, as well as elements with a strong connection to encouraging/enabling cycling behaviours that are well suited for the City of Richmond context. Some of the key recommendations include:

Bike Parking

- Minimum Bike Parking Requirements
  - » Align **residential bike parking requirements** with unit square footage or number of bedrooms to better match the number of household occupants
  - » Advocate to TransLink for more long-term secure **bike parking at transit stations**
  - » Work with stakeholders to develop and implement safe, secure and convenient bike **parking requirements at key public destinations**
- Accommodate Micromobility and Non-Standard Bike Sizes
  - » Create bike parking requirements that can accommodate a **range of micromobility devices** (e.g., cargo bikes, e-scooters and other small electric mobility devices)
  - » Ensure more bike parking spaces have access to **electrical outlets**
  - » Designate parking locations for **public shared micromobility devices**
- Bike Parking Room Design and Access
  - » Expand **flexibility around the description of bike parking room** requirements and locations where this enables larger and more optimal bike room dimensions and designs
- End of Trip Facilities
  - » Adopt requirements for **end of trip facilities** (e.g., bike maintenance facilities, showers, change rooms, and clothes lockers)

Figure 4. Secure Automated Bike Parking, Minoru Centre For Active Living

Figure 5. Cyclist on Lansdowne Road

Programs and Initiatives

- Education and Skills Training
  - » Advocate for **cycling education** to be more prominent in driver training and school curricula
  - » Support the development of a local **'bike kitchen'** for affordable access to training and parts for bicycle repairs
  - » Support and expand **multilingual options** for cycling education
- Community Events
  - » Further integrate cycling into **community-wide festivals** and encourage themed bike events to locate in the city
  - » Permit **community-led open streets** to encourage active travel and the use of the street as public space
- Marketing and Information
  - » Explore developing a **cycling brand for the city** to encourage cycling locally and foster cycling tourism
  - » Create an **Employer Outreach Program** to help local employers encourage their staff to travel by active and sustainable modes
  - » Recognize **bike friendly businesses** who offer services like rentals, discounts and bike parking to cyclists with an award program award program
- School Active Travel Planning
  - » Expand **safe routes to school initiatives** - infrastructure, education and advocacy - and measure progress and achievements
  - » Champion **local participation** in provincial programs and partnerships including the Active School Travel Pilot Program
  - » Support **education on the safety and benefits** of active travel for parents, guardians and Richmond School District staff

Lighter, Quicker, Cheaper / Pilot Projects

- Expand the use of **pilot projects** to test new ideas quickly and cheaply, demonstrate proof of concept and build community support

Wayfinding

- Establish a **bicycle wayfinding strategy** for the city that is integrated with pedestrian wayfinding and aligns with TransLink design guidance
- Support the **development of a 'Tour de Richmond'** as a designated cycling route around Richmond that connects key tourism and destinations

Enhanced Safety

- Continue efforts to **reduce motor vehicle speed limits** on local streets with a focus on providing comfortable neighbourhood bike routes
- Expand **safe systems approaches** to improve road safety for pedestrians and cyclists, particularly at intersections

Equity

- Advance bike facility designs which are suitable for **all ages and abilities**
- Apply a **Gender-Based Analysis Plus** (GBA+) lens to new cycling policy and facility designs to consider impacts on all members of the community, particularly those who have been historically underrepresented in cycling
- Encourage **cash/non-credit card options** and discounted fares for public shared micromobility devices to reduce financial barriers to low-income users

Data Collection

- Consider conducting an **annual cycling survey** of residents and visitors
- Continue to install **bike counters** and explore new technologies to better track cycling activity
- Continue to require public shared micromobility device operators to **share data** as a condition of operation in the city

Richmond

City of Richmond
Cycling Network Plan Update

Prepared by
steer

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	June 20, 2022
From:	Lloyd Bie, P.Eng. Director, Transportation	**File:**	10-6460-03/2022-Vol 01
Re:	**Provincial E-Scooter Pilot Project – Annual Report for Participating Municipalities**		

Staff Recommendation

That the report titled "Provincial E-Scooter Pilot Project – Annual Report for Participating Municipalities" dated June 20, 2022 from the Director, Transportation be received for information.

Lloyd Bie, P.Eng.
Director, Transportation
(604-276-4131)

Att. 2

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Parks	☑	Acting General Manager
Sustainability & District Energy	☑	
RCMP	☑	
SENIOR STAFF REPORT REVIEW	**INITIALS:**	**APPROVED BY CAO**

Staff Report

Origin

In June 2021, Council endorsed implementation of the City's E-Scooter Pilot Project (the Project) subject to approval by the Province of BC. Following Provincial approval of the City's Project, Council approved final adoption of amendments to several bylaws to enable implementation of the Project in July 2021.

Municipalities participating in the Province's e-scooter pilot project are required to provide an annual report to the Province related to the use and operation of e-scooters. The Ministry of Transportation and Infrastructure sent its Annual Report Form to the City in early May 2022 with a completion deadline of June 5, 2022. Staff completed and sent the Form to the Province by the deadline (Attachment 1). This report provides a status update on the City's Project as submitted to the Province.

This report supports Council's Strategic Plan 2018-2022 Strategy #2 A Sustainable and Environmentally Conscious City:

> *Environmentally conscious decision-making that demonstrates leadership in implementing innovative, sustainable practices and supports the City's unique biodiversity and island ecology.*
>
> *2.2 Policies and practices support Richmond's sustainability goals.*

This report supports Council's Strategic Plan 2018-2022 Strategy #4 An Active and Thriving Richmond:

> *An active and thriving community characterized by diverse social and wellness programs, services and spaces that foster health and well-being for all.*
>
> *4.1 Robust, affordable, and accessible sport, recreation, wellness and social programs for people of all ages and abilities.*

This report supports Council's Strategic Plan 2018-2022 Strategy #6 Strategic and Well-Planned Growth:

> *Leadership in effective and sustainable growth that supports Richmond's physical and social needs.*
>
> *6.3 Build on transportation and active mobility networks.*

Analysis

<u>E-Scooter Pilot Project Scope</u>

As of July 27, 2021, e-scooters can be legally operated in Richmond on some municipal streets and paved pathways shared with pedestrians as defined by regulations within the City's Traffic Bylaw No. 5870 and Public Parks and School Grounds Regulation Bylaw No. 8771. These

bylaws identify the conditions of where and how e-scooter users may operate in Richmond during the Project. E-scooters are permitted to operate only on the following routes:

- Streets with cycling facilities such as bike lanes
- Local streets without cycling facilities, defined as a street without lanes lines or a directional dividing line and a maximum speed limit of 50 km/h or less
- Streets without cycling facilities that have a directional dividing line and a maximum speed limit of 30 km/h
- Off-street paved pathways next to the roadway or in parks that are signed and marked for shared use with pedestrians

E-scooters are not permitted on sidewalks or on unpaved trails and helmets are required when riding. Maximum speeds are:

- 20 km/h on roadways
- 15 km/h on paved pathways shared with pedestrian

The City regularly posts messaging on its social media channels to raise awareness of the Project's operating regulations and encourage safe riding behaviour.

E-Scooter Safety

Vancouver Coastal Health (VCH) is in the process of developing and validating data collection and analysis of emergency room visits to Richmond General Hospital and other health outcomes related to e-scooters. According to surveillance data from the entire VCH region that includes Richmond, emergency room visits involving e-scooters are increasing along with the growing awareness and popularity of e-scooter ridership. Seasonality plays a role as the number of visits in 2021 peaked during summer months. A small portion of e-scooter related visits were hospitalized. While most of the data from VCH is at a regional level, in Richmond, the ratio of e-scooter related emergency department visits compared to bicycle related visits is approximately 1 to 12.

E-Scooter Enforcement

As with bicycles, the enforcement of e-scooter regulations when riding is within the mandate of Richmond RCMP. From the start of the Project to Victoria Day, Richmond RCMP have not received any complaints regarding e-scooter usage nor recorded any enforcement activities. The City has received a few comments regarding e-scooter usage, primarily regarding sidewalk riding.

Shared E-Scooter and E-Bike Pilot Program

As part of the City's Project, Council approved the award of a contract for a shared e-scooter and e-bike pilot program to Lime Technology, Inc (Lime) in September 2021. The service allows the City to explore and evaluate the potential of a public shared system to advance expanded travel choices in support of the City's mobility goals and targets in a cost-effective manner.

Service Area

Following execution of an agreement with the City, Lime launched operations on May 4, 2022 within the City Centre as its initial deployment area with 15 parking corrals and a fleet of 75 devices comprised of 50 e-scooters and 25 e-bikes (Attachment 1, page 5). Starting in the City Centre allows for access to community services and transit, and enables Lime and the City to confirm system use, safety and assess any operational issues. As demand for the shared service continues to grow, service expansion will be considered jointly by staff and Lime to increase coverage area in the City (Attachment 1, page 6).

Parking and Operations

A helmet is provided with each vehicle using Lime's on-vehicle helmet lock mechanism. All parking corrals are located on roadways with cycling facilities and each parking corral has a bike rack to maintain a tidy fleet. All parking corrals are geo-fenced and riders can only end their rides in a designated parking corral.

The GPS capability of the devices enables geo-fence technology to ensure speed limits and "no go" zones consistent with the City's bylaws. A mandatory "Training Mode" reduces a first-time user's maximum speed to 12 km/h for the first three trips while they become more confident riders. As part of the launch, Lime Patrol teams have been deployed as on-the-ground ambassadors to educate the public and provide customer support.

Ridership

At this time, ridership data for privately owned devices is challenging to collect beyond observations of e-scooter usage in Richmond continuing to increase since the Project launch in summer 2021. A Let's Talk Richmond survey, planned in fall of 2022, will collect feedback from the public regarding e-scooters, including e-scooter riders, other motorists and pedestrians.

Conversely, the shared e-scooter service collects ridership data. Highlights of shared e-scooter usage during the 21-day period of May 4 through May 24, 2022 include (Attachment 2):

- Total of 1,415 trips or an average of 67 trips per day
- Average trip length of 2.5 km and average trip duration of 25 minutes
- Highest usage on Fridays and Saturdays
- Total of 3,444 users have signed up for membership
- Total of 1,318 active users with total of 1,191 unique rider first trips
- Most popular parking corral is located at Hollybridge Way-Lansdowne Road

User Training

In partnership with HUB Cycling, Lime is offering in-person First Ride events, which are recurring, interactive hour-long safety sessions to educate riders on best practices to safely ride and properly park an e-scooter. The first event was held May14, 2022 and further events are planned throughout the summer. Lime will also offer monthly First Ride training in partnership with HUB Cycling for users seeking a supervised first trip.

Lime has not received any notifications of an incident involving an injury since the launch of service in May 2022.

Next Steps

During fall 2022, staff intend to use the City's engagement platform, Let's Talk Richmond, to obtain community feedback on the Project. The City is participating with other BC jurisdictions who are part of the Province's e-scooter pilot project to develop a consistent set of questions for the survey. Targeted consultation of shared e-scooter users will be undertaken by Lime on a regular basis.

Financial Impact

None.

Conclusion

The City's e-scooter pilot program permits the use of both personal and shared e-scooters on selected streets and shared pathways in the city. The Project supports a new low carbon mobility option for Richmond residents, employees and visitors, and encourages transit use with a solution for the first and last mile trip. To date, usage of e-scooters indicates that the community is interested in trying out this new travel option.

Data collection is integral to monitoring and assessing the outcomes to safety and alternate mode share in Richmond. Through the shared e-scooter program, detailed trip information can be obtained from Lime. To better understand the operation of privately owned e-scooters, staff will continue to seek feedback from the public and other sources such as Richmond RCMP and VCH. Staff will report back annually on the status the City's E-Scooter Pilot Project concurrent with the City's required reporting to the Province.

Sonali Hingorani, P.Eng.
Transportation Engineer
(604-276-4049)

Joan Caravan
Transportation Planner
(604-276-4035)

JC:jc

Att. 1: Provincial Annual Report – Electric Kick Scooter Pilot Project
2: Lime Shared E-Scooter Ridership for May 4-24, 2022

BRITISH COLUMBIA | Ministry of Transportation and Infrastructure

MOTOR VEHICLE ACT PILOT PROJECT ANNUAL REPORTING FORM

INTRODUCTION

The electric kick scooter pilot project provides an opportunity for participating communities and the B.C. government to research, test and evaluate the safety and efficiency of electric kick scooters in supporting expanded active transportation networks and CleanBC.

The **Electric Kick Scooter Pilot Project Regulation** sets out broad provincial rules and requirements (including helmet, minimum age, and bylaw requirements) for the use of electric kick scooters on roads in pilot communities currently listed in the schedule of the regulation.

This document is to be completed by employees acting on behalf of communities listed as a participating community in the Schedule of the Regulation.

As per the agreement Section 20 – "Within 60 days of the end of each 12 month period following the coming into force of this regulation on April 5, 2021 or as otherwise specified by the minister, a pilot community must provide a report to the minister related to the use and operation of electric kick scooters within the boundaries of the pilot community, on matters including the following:

(a) the extent to which electric kick scooter use promotes active transportation;
(b) the safety of electric kick scooter users and other highway users;
(c) compliance with and enforcement of this regulation and the bylaws of the pilot community;
(d) the provision and use of electric kick scooter rental services and their regulation by the pilot community."

All costs associated with preparing this report and the proposed pilot project are the responsibility of your local community.

If you have questions regarding the electric kick scooter pilot project, please contact:

Email: MVA.Pilot.Project@gov.bc.ca **Phone: 778-974-5469**

HOW TO COMPLETE THIS DOCUMENT

Please provide responses immediately below each question or attach a summary report. Please refer to attached supplements if additional space is needed. Please provide any reports that have been submitted to your council.

PART 1 - COMMUNITY CONTACT INFORMATION

Name/Location of Community: City of Richmond

Contact Name:	Phone:	Email:
Sonali Hingorani	604-276-4049	shingorani@richmond.ca

PART 2 - OVERVIEW OF YOUR COMMUNITY'S PILOT

2.1 Please provide information about your community's pilot project including: (1) pilot duration, (2) pilot location (attach a map of the geographic boundaries) and, (3) any proposed or current partnerships with adjacent local or Indigenous governments

Council approved final adoption of City bylaw amendments on July 27, 2021, which permit the operation of e-scooters on selected municipal roadways and paved pathways shared with pedestrians as defined by regulations within the City's Traffic Bylaw No. 5870 and Public Parks and School Grounds Regulation Bylaw No. 8771. E-scooters are permitted to operate only on the following routes:
- streets with cycling facilities such as bike lanes;
- local streets without cycling facilities, defined as a street without lanes lines or a directional dividing line and a maximum speed limit of 50 km/h or less;
- streets without cycling facilities that have a directional dividing line and a maximum speed limit of 30 km/h;
- off-street paved pathways next to the roadway or in parks that are signed and marked for shared use with pedestrians.

The areas of operation and the lower operating speeds are additional mitigative measures designed to address potential safety concerns beyond the provincial regulations. The pilot duration of 3 years is the same as the Electric Kick Scooter Pilot Project Regulation. The pilot location is the municipal boundary of Lulu Island in the City of Richmond (see attached map). On May 4,

2.2 Consultation/public review and comment

- If applicable, has there been any public or stakeholder consultation in preparation for the pilot and/or, any plans for public or stakeholder consultation after the pilot is complete.

In preparation for the pilot, City staff in Transportation consulted internally with other departments (e.g., Parks, Engineering, Community Bylaws) as well as externally with the following agencies: Richmond RCMP, Vancouver Coastal Health, City of Kelowna, City of Vancouver. A report to Council seeking approval to join the Provincial pilot program was presented in June 2021, which provided an opportunity for the public to comment. A report to Council seeking approval to award the contract for a shared e-scooter and e-bike pilot project was presented in September 2021, which provided an opportunity for the public to comment. Information on the City's pilot project is available on the City's website at: https://www.richmond.ca/services/ttp/cycling/e-scooter.htm

There will be public and stakeholder consultation during and after the pilot is complete. Broad public consultation is planned using the City's engagement platform, Let's Talk Richmond, and targeted consultation of shared e-scooter users will be undertaken by Lime on a regular basis. The City is participating with other BC jurisdictions who have pilot projects to develop a consistent set of questions for the surveys.

PART 3 - SECTION 20 (a): *extent to which electric kick scooter use promotes active transportation*

3.1 How has your community been monitoring the number of electric kick scooter trips/use?

The City has not actively monitored the use of privately owned e-scooters from July 27, 2021 to date. Starting May 4, 2022 with the launch of the public shared e-scooter pilot project, the City has access to Lime data to monitor shared e-scooter activity. During summer 2022, counts are planned for selected streets with bike lanes to record the number of privately owned and public shared e-scooters.

3.2 Have you seen an increase in active transportation use through the implementation of this pilot and if so, how was that measured and what were the details?

Data from Lime for the period May 4, 2022 (launch date) to May 24, 2022 indicates (see attachments):
- 39 devices deployed with 1,415 trips
- average trip length of 2.5 km and average trip duration of 25 minutes
- total of 3,444 users have signed up for membership
- total of 1,318 active users
- total of 1,191 unique rider first trips
- highest usage on Fridays and Saturdays

PART 4 - SECTION 20 (b): *safety of electric kick scooter users and other highway users*

4.1 Please report any quantitative health and safety data available such as emergency room visits associated with electric kick scooters.

Vancouver Coastal Health is in the process of developing and validating data collection and analysis of emergency room visits and other health outcomes related to e-scooters. On this basis, the City expects that the next annual report will be able to provide quantitative safety data. For the shared e-scooter pilot program, Lime data indicated 0 injured riders reported for the period May 4-24, 2022. Lime held a First Ride safety event on May 14, 2022 and will hold further events over the course of Summer 2022. The City also undertakes regular safety-related messaging using its social media channels.

4.2 Please report any known collisions, injuries, and fatalities involving electric kick scooters.

The City is not aware of any collisions, injuries or fatalities involving e-scooters.

PART 5 - SECTION 20 (c): *compliance with and enforcement of this regulation and the bylaws of the pilot coummunity*

5.1 Please provide the bylaws your community enacted pertaining to electric kick scooter use. You may refer to an attached supplement if necessary.

See attached - amended sections are highlighted in yellow.

5.2 How has your community been tracking compliance and enforcement of the pilot project regulation and your community's bylaws on electric kick scooters?

The enforcement of e-scooter regulations when riding is within the mandate of Richmond RCMP. Since the start of the Project, Richmond RCMP have not recorded any enforcement activities. Shared e-scooters use geo-fencing to ensure compliance with City bylaws regarding maximum speeds and "no go" zones.

5.3 Please provide compliance and enforcement data pertaining to electric kick scooters.

Since the start of the Project, neither Richmond RCMP nor the City have received any complaints regarding e-scooter usage.

PART 6 - SECTION 20 (d): *the provision and usee of electric kick scooter rental sercices and their regulation by the pilot community*

6.1 Did you use any third-party service providers to allow public access to electric kick scooters and if so, how were they implemented and regulated?

Following an RFP process, Council approved award of a contract for shared e-scooter and e-bike pilot program to Lime Technology, Inc on Sept 27, 2021. A legal agreement between the City and Lime governs operation of the pilot including fees and payments; vehicle specifications, equipment and maintenance; vehicle operations; corral siting; vehicle parking; fleet size; customer service; insurance; and data reporting. The pilot is for 18 months with an option to renew for another 18 months pending the status of the Provincial pilot program.

The shared service launched May 4, 2022 in the City Centre as the initial service area with 15 parking corrals and a fleet of 75 devices (50 e-scooters and 25 e-bikes). Starting in the City Centre allows for access to community services and transit, and enables Lime and the City to confirm system use, safety and assess any operational issues. If operations within this test area are deemed successful, expansion will occur to cover the majority of Richmond's population and key points of interest including but not limited to waterfronts, community centres and shopping centres.

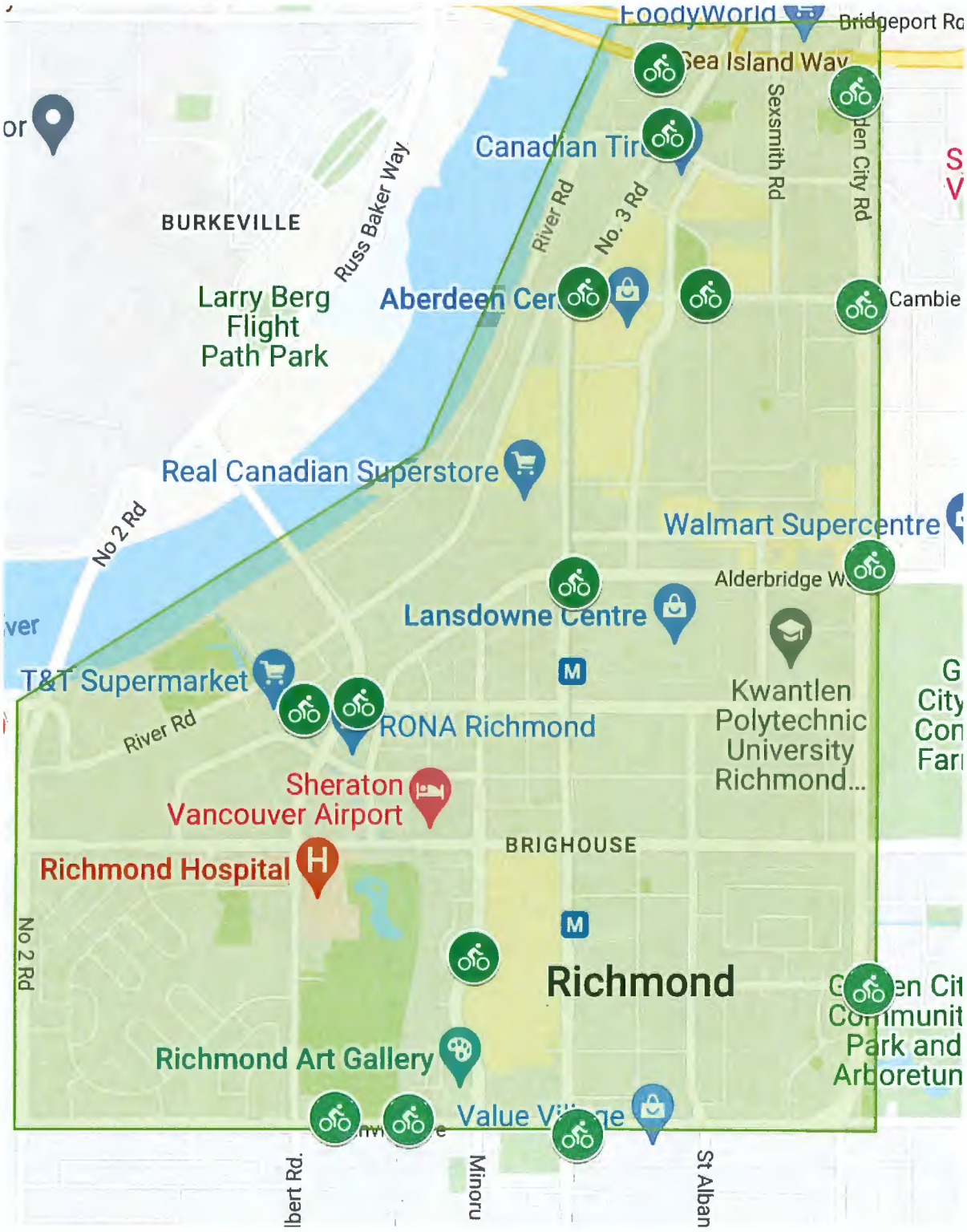
The GPS capability of the devices enables geo-fence technology to ensure speed limits and "no go" zones consistent with the City's bylaws. A mandatory "Training Mode" reduces a first time user's maximum speed to 12 km/h for the first three trips while they become more confident riders. Sidewalk detection technology reminds riders to stay off the sidewalk; penalties increase

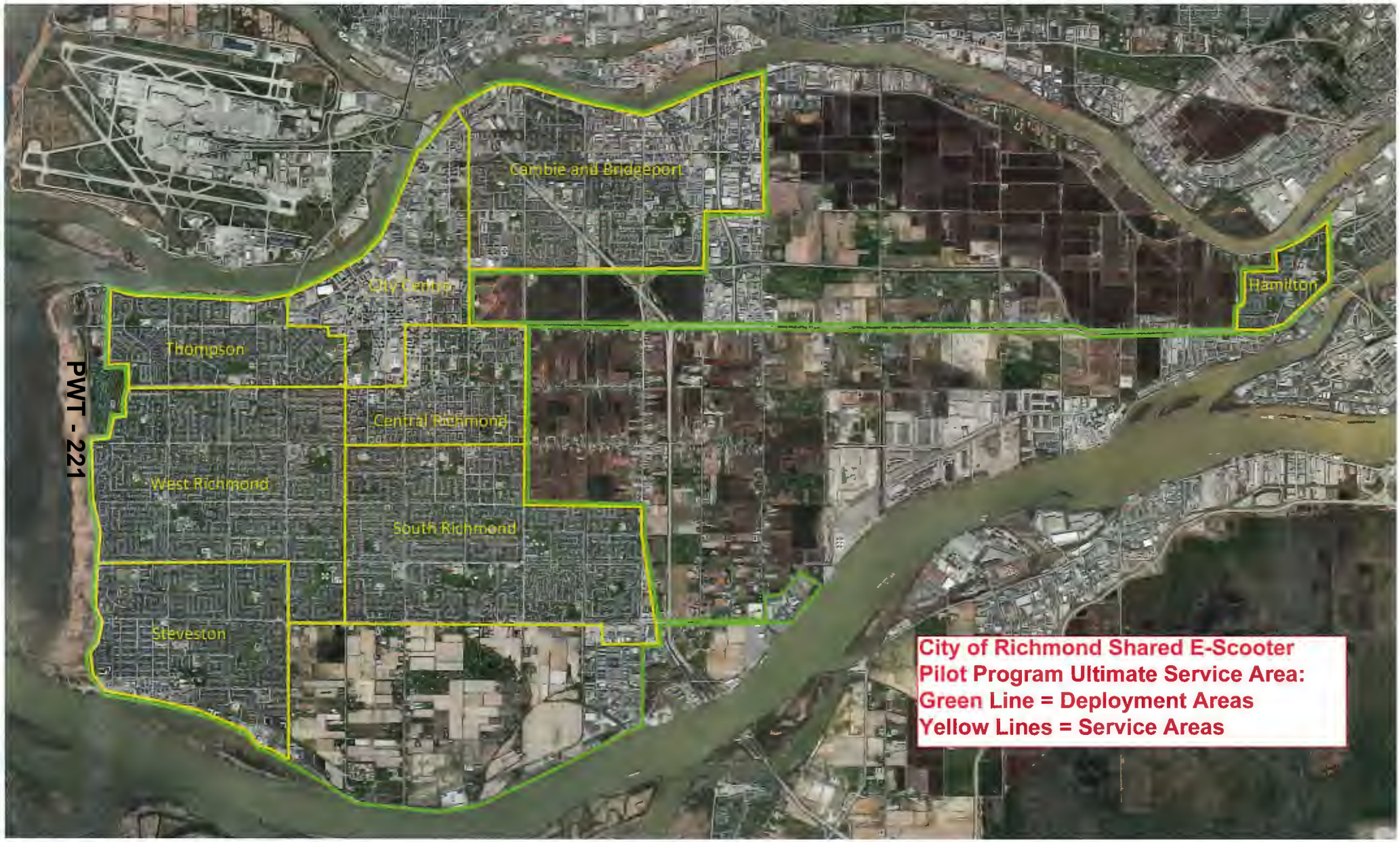
PART 7 - OTHER COMMENTS OR INFORMATION

If you have any comments or information that relate to your implementation, please feel free to provide them here.

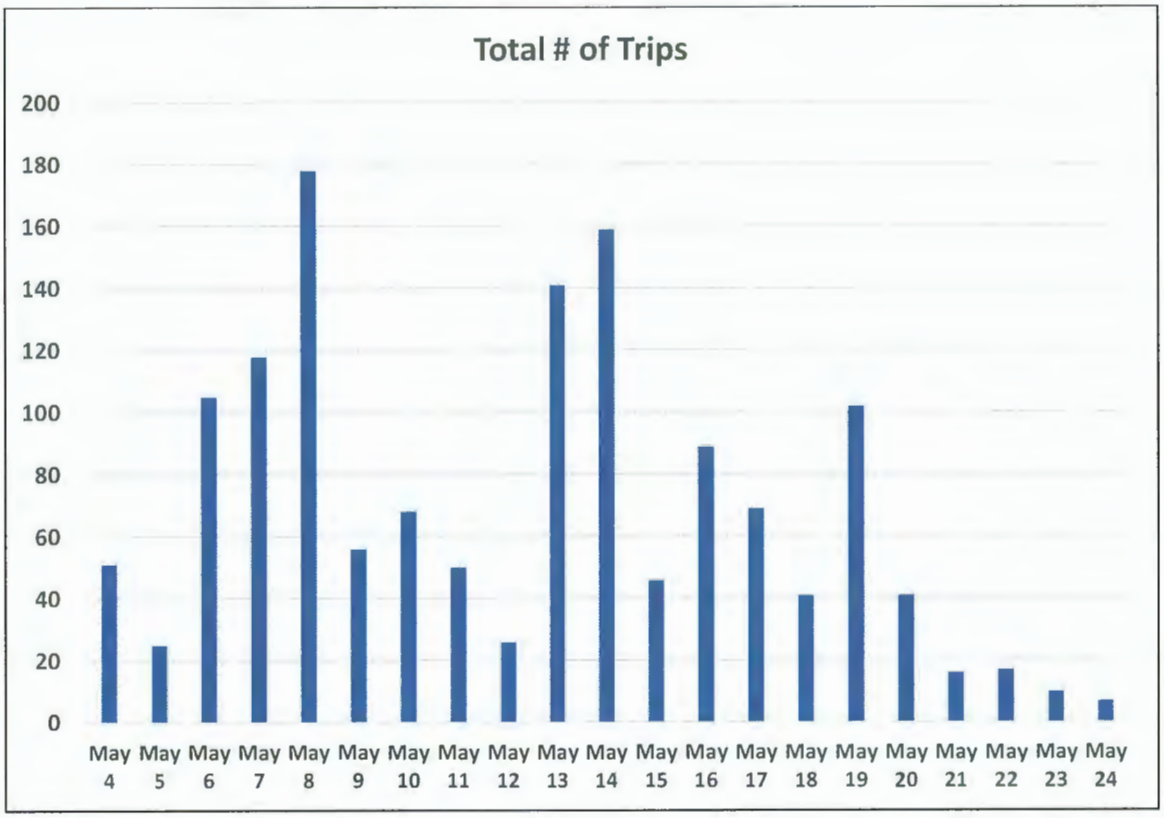
City of Richmond E-Scooter Pilot Program: Geographic Boundary

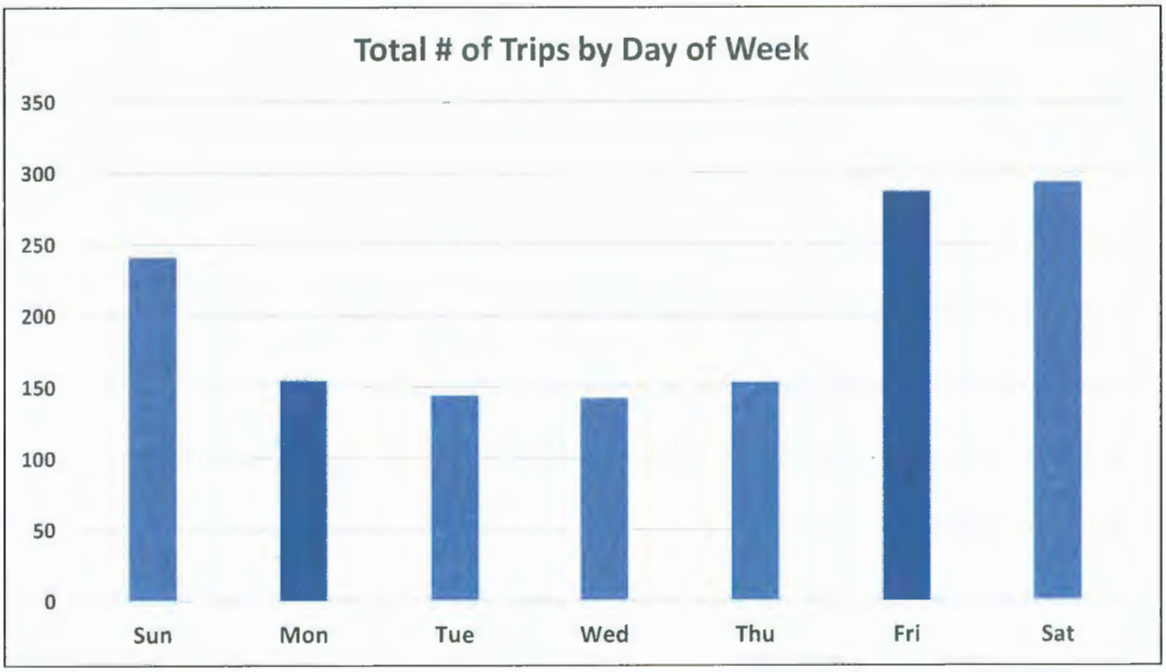
Lime Shared E-Scooter and E-Bicycle Pilot Program: City Centre Service Area



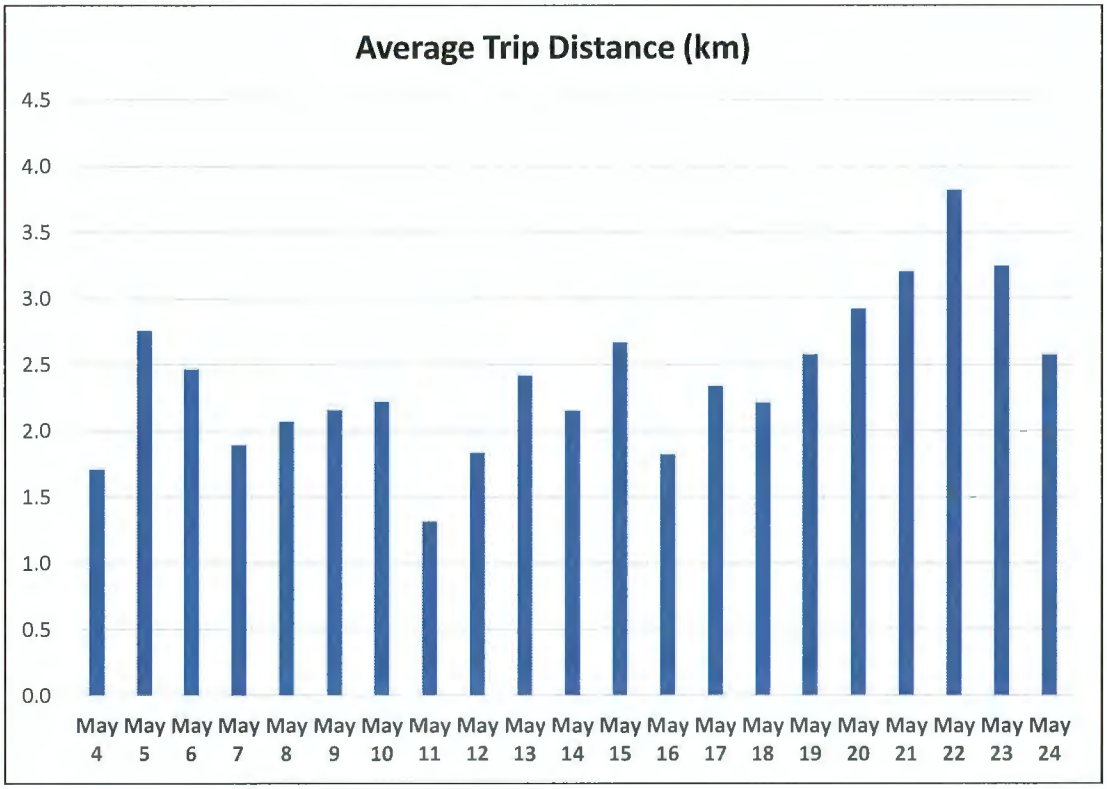

Cambie and Bridgeport
City Centre
Hamilton
Thompson
Central Richmond
West Richmond
South Richmond
Steveston
City of Richmond Shared E-Scooter
Pilot Program Ultimate Service Area:
Green Line = Deployment Areas
Yellow Lines = Service Areas

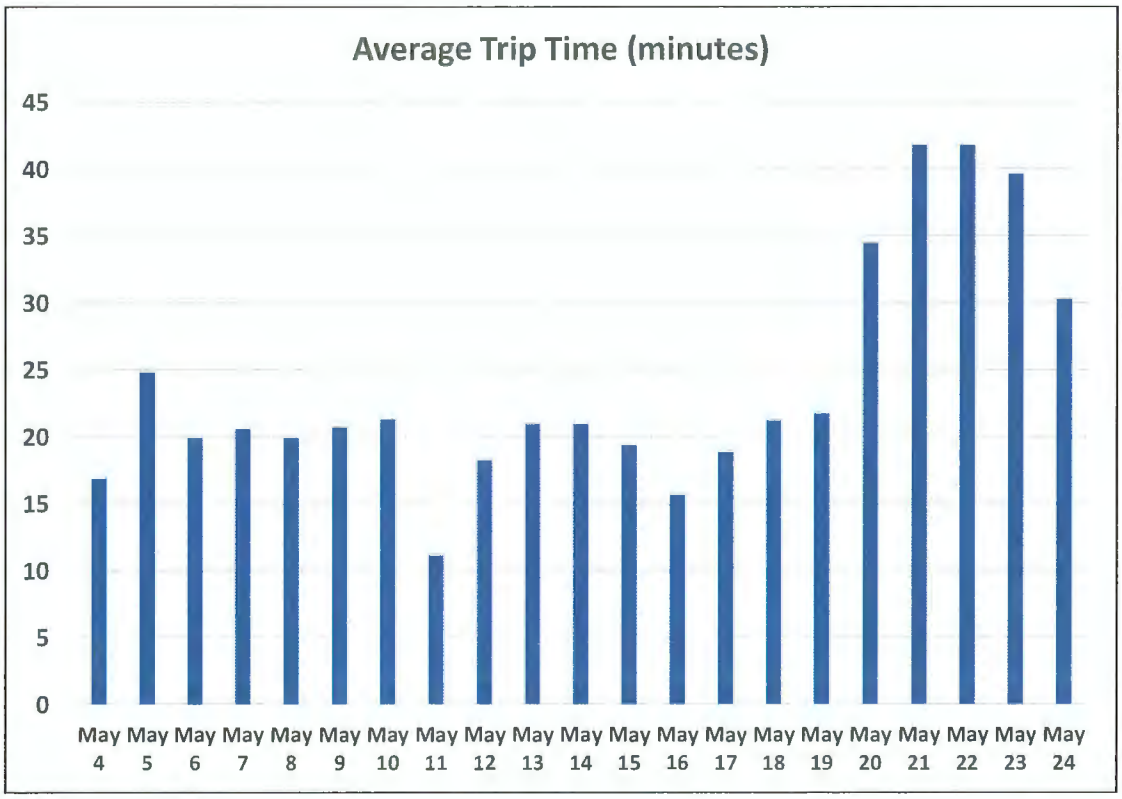
Lime Shared E-Scooter Usage: May 4-24, 2022





Lime Shared E-Scooter Usage: May 4-24, 2022





City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	June 13, 2022
From:	Suzanne Bycraft Director, Public Works Operations	**File:**	02-0780-03/2022-Vol 01
Re:	**Extension to Contract 6917Q - Public Works Lease Vehicles**		

Staff Recommendation

That staff be authorized to issue a change order to Purchase Order 96440 to increase the value of the current contract between the City of Richmond and Zeemac Vehicle Lease Ltd. by $244,794, bringing the new contract value to $700,000, and extending the contract end date to July 1, 2023.

Suzanne Bycraft
Director, Public Works Operations
(604-233-3338)

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Finance Department	☑	
Purchasing	☑	
SENIOR STAFF REPORT REVIEW	**INITIALS:**	**APPROVED BY CAO**

Staff Report

Origin

The City maintains a base complement of vehicles and equipment to support corporate operations. There are currently 473 fleet units inclusive of 405 diesel/gasoline units, 19 battery electric units, 16 plug-in hybrid electric units, 32 regular hybrid units, and 1 hydrogen fuel cell unit to service all City business areas, plus an additional 163 non-fueling assets (trailers, machine attachments, salt inserts, etc.).

Fleet Operations supports Public Works and Parks in meeting increased operational requirements associated with seasonal operating demands and capital work by supplementing its fleet with additional vehicles or equipment under lease for variable periods, typically ranging between three to nine months. During the onset of the COVID-19 pandemic and following public health orders, the City formed COVID-19 safety plans to protect its workers. As part of these safety plans, vehicle occupancy limits were capped at 50% of available seats. This strategic approach has helped to minimize the spread of COVID-19 among staff, thereby ensuring services to the community have been able to be delivered without interruption. As a result, of 37 units currently under lease, there are 15 vehicles leased in the first quarter of 2020 under Contract 6917Q that have had to be retained for considerably longer than anticipated.

There is high demand in the marketplace for these units in light of supply chain challenges. Returning these units and attempting to source from other vendors is not an option due to scarcity issues in the marketplace. Therefore, it remains prudent to extend these leases to ensure no negative impacts to service levels. This report seeks to extend the lease arrangement between the City and Zeemac Vehicle Lease Ltd. for the 15 units retained under Contract 6917Q through July 1, 2023, at which point our expectation is that there will be greater clarity surrounding requirements related to COVID-19 as it impacts vehicle occupancy limits.

This report supports Council's Strategic Plan 2018-2022 Strategy #1 A Safe and Resilient City:

> *Enhance and protect the safety and well-being of Richmond.*
>
> *1.3 Ensure Richmond is prepared for emergencies, both human-made and natural disasters.*

Analysis

Prior to administering the contract, staff sought bids and determined that Zeemac Vehicle Lease Ltd. was the only vendor able to provide all of the required vehicles, while offering the lowest market price per unit. As noted, the duration of these seasonal lease vehicles has far exceeded expectations due to vehicle occupancy limits currently at 50%. Typically lease vehicles are returned after capital and seasonal operating demands have ended.

Staff conducted an audit of the user group's requirements and determined that it is necessary to retain these units to meet demands while adhering to capacity limits. This review is ongoing with the objective of returning any units no longer deemed required at the earliest possible opportunity. Due to high demand and low availability in the rental market, there would be a

minimum three to six month delay or longer plus negative impacts to service levels and capital work if these units were to be returned and a new bid process undertaken.

To ensure user groups can meet operational and seasonal operating demands, and given that maximum spending authority under Officer and General Manager Bylaw No. 8215 has been reached for these 15 units, staff are seeking approval to issue a change order to Purchase Order 96440 to increase the value of the current contract with Zeemac Vehicle Lease Ltd. by $244,794, bringing the new contract value to $700,000 as outlined in Table 1. This will also extend the end date of the contract to July 1, 2023.

Table 1: Purchase Order Totals – Current Costs vs. Estimated

Vendor	Purchase Order	Current Contract Value (April 1, 2019 – June 30, 2022)	Monthly Charges (15 Units)	Value Increase (12 months)	Contingency	Estimated Contract Value (To July 1, 2023)
Zeemac Vehicle Lease Ltd.	96440	$455,206	$18,954.75	$227,457	$17,337	$700,000

Financial Impact

Costs for vehicles and equipment required to support capital construction projects are included as part of approved capital project budget allocations. Lease costs are charged to Fleet Operations' budget and billed quarterly to the various departmental projects they support.

Conclusion

Due to the uncertainty and complexity of COVID-19 restrictions, Public Works sections were required to retain lease vehicles for longer than anticipated. These vehicles must be retained to adhere to safety plans for capacity restrictions, meet departmental needs, and effectively maintain service levels.

It is recommended that staff be authorized to issue a change order to Purchase Order 96440 to increase the value of the current contract between the City of Richmond and Zeemac Vehicle Lease Ltd. by $244,794, bringing the new contract value to $700,000, and extend the end date of the contract to July 1, 2023. Staff will continue to monitor vehicle needs associated with COVID-19 safety plans and return any vehicles deemed no longer required, if and when possible.

Brandon Olson
Acting Manager, Fleet Operations
(604-244-1252)

City of Richmond

Report to Committee

To:	Public Works and Transportation Committee	**Date:**	June 8, 2022
From:	Milton Chan, P.Eng. Director, Engineering	**File:**	10-6060-01/2022-Vol 01
Re:	**Ageing Utility and Road Infrastructure Planning – 2022 Update**		

Staff Recommendation

That the staff report titled, "Ageing Utility and Road Infrastructure Planning – 2022 Update", dated June 8, 2022, from the Director, Engineering be received for information.

for

Milton Chan, P.Eng.
Director, Engineering
(604-276-4377)

Att. 5

REPORT CONCURRENCE		
ROUTED TO:	**CONCURRENCE**	**CONCURRENCE OF GENERAL MANAGER**
Finance Department	☑	
Roads & Construction	☑	
Sewerage & Drainage	☑	
Water Services	☑	
Transportation	☑	
SENIOR STAFF REPORT REVIEW	**INITIALS:**	**APPROVED BY CAO**

Staff Report

Origin

Staff regularly reports to Council on the estimated long-term capital requirements for age-related infrastructure renewal. The last report was brought forward in 2019. This report updates those estimates to reflect current inventory, new inspection data, and changing infrastructure replacement costs.

This report supports the following strategies within Council's Strategic Plan 2018-2022:

Strategy #1 A Safe and Resilient City:

> *Enhance and protect the safety and well-being of Richmond.*
>
> *1.2 Future-proof and maintain city infrastructure to keep the community safe.*

Strategy #4 An Active and Thriving Richmond:

> *An active and thriving community characterized by diverse social and wellness programs, services and spaces that foster health and well-being for all.*
>
> *4.2 Ensure infrastructure meets changing community needs, current trends and best practices.*

Strategy #5 Sound Financial Management:

> *Accountable, transparent, and responsible financial management that supports the needs of the community into the future.*
>
> *5.1 Maintain a strong and robust financial position.*
>
> *5.2 Clear accountability through transparent budgeting practices and effective public communication.*

Background

This report outlines the current and long-term financial requirements for maintaining and replacing the City's ageing infrastructure. The goal is to ensure that the City has the capacity to meet the financial challenges of the present as well as the future, while maintaining current service levels.

The ageing utilities and roads infrastructure analysis is based on standard and observed service life of specific types of infrastructure. There are several local factors that can impact the actual useful life of a piece of infrastructure, such as soil type and quality of original installation. The long-term analysis is essential for long-term budget projections, but has limited use for identifying exact replacement dates for specific pieces of infrastructure. The 5-year capital plan identifies near-term infrastructure requirements through field observation and inspection results and is a better gauge of short-term infrastructure needs. The graphs that predict long-term

infrastructure requirements are basic guides on what the City should anticipate for long-term infrastructure costs, while the 5-year capital plans more accurately identify short-term budget requirements.

Existing Infrastructure

In managing the City's extensive network of infrastructure services, staff have developed water, sanitary, drainage, and pavement management computer models to predict infrastructure performance, upgrade requirements, replacement cycles, and replacement costs. Coupled with field-verified condition inspection and performance review, model data plays a key role in determining the City's infrastructure replacement and upgrade programs.

Table 1 is a summary of the City's inventory of water, sanitary, drainage, diking, and roads infrastructure. The replacement value assumes that infrastructure will be replaced or upgraded to meet the City's current requirements. Table 2 identifies current approved capital budget, funding sources, and reserve balances.

Long-term capital funding requirements have been updated to reflect changes in infrastructure replacement costs, inventory changes resulting from growth or capacity improvements, and new inspection data.

Table 1. Infrastructure Inventory

Infrastructure	Components	Funding Source	Replacement Value (2022 Dollars)
Water	636 km Pipes 13 PRV Chambers 60 Valve Chambers	Water Utility	$938M
Sanitary	569 km Pipes 153 Pump Stations	Sanitary Utility	$921M
Drainage and Diking	595 km Pipes 39 Pump Stations 61 km Culverts 155 km Watercourses 49 km Dikes	Drainage & Diking Utility	$2,235M
Roads and Road Assets (Non-MRN)	1,338 lane km asphalt 12 Bridges[1] 11,551 street lights[2]	General Revenue	$678M
Total			**$4,772M**

[1] Includes only bridge structures managed by the City's Engineering & Public Works department outside of the Major Road Network (MRN).
[2] Excludes BC Hydro lease lights not maintained by the City.

Table 2. 2022 Funding Levels and Reserves

Infrastructure Type	2022 Approved Utility Budget for Capital	Funding Source	Uncommitted Reserve Balance (May 31, 2022)
Water	$7.5M	Water Utility	$47.1M
Sanitary	$5.8M	Sanitary Utility	$32.0M
Drainage and Diking	$10.9M	Drainage & Diking Utility	$29.0M
Road and Road Assets (non-MRN)	$4.4M	General Revenue	N/A
Total	**$32.3M**		**$108.1M**

The infrastructure programs for Water, Sanitary, and Drainage & Diking are funded by the Watermain Replacement Reserve, Sanitary Sewer Reserve, and Drainage Improvement Reserve, respectively. Each reserve receives an annual contribution from the corresponding utility budget. Table 2 summarizes the current funding levels included in the 2022 Utility Budget along with the Uncommitted Reserve Balance as at May 31, 2022. Required annual funding levels are assessed as part of this report. There is a funding gap that will need to be addressed through future Utility Budgets. Going forward, staff will continue to present annual budget options to close existing funding gaps and, ultimately, maintain utility funding within the identified target range. Road and road assets (paving, street lights, and bridges) are not part of a utility and are funded from the City's General Revenue.

Analysis

Total Replacement Value and Schedule

Infrastructure replacement costs for the City's water, sanitary, drainage and diking, and road infrastructure over the next 100 years have been estimated and graphed in Attachments 1 to 4. The charts also present the current capital funding levels as well as the estimated long-term average annual capital funding levels (in 2022 dollars, excluding inflation) that are required to perpetually replace assets. Given the volatility of construction costs, infrastructure projects do not always follow general inflation trends. Therefore, inflation has not been included in the analysis and staff recommend the analysis continue to be reviewed regularly to identify and integrate changes in construction costs.

The current analysis indicates that construction cost increases have been significant in recent years, with cost inflation being well above the consumer price index (CPI). As a result, replacement values have been updated to account for this continuing trend.

The funding requirement range represents the estimated level of uncertainty in the long-term annual capital funding levels, which is due to a number of variables, including:

- potential overlap with capacity-based improvements due to development or climate change;

- variability in the potential service life of the infrastructure;
- variability in economy and the cost of infrastructure replacement; and
- unanticipated or emergency events that initiate early infrastructure replacement or repairs in excess of operating budget provisions.

Water

Staff estimate a long-term annual capital funding requirement of $10.4 million (Attachment 1) for the City's water infrastructure. Since 2001, Council has endorsed increases in annual Water Utility capital funding from $3.0 million to its current level of $7.5 million. Achieving the long-term annual capital funding requirement will facilitate proactive management of the City's water assets, reducing overall costs while reaching a high level of service. Proactive replacement programs have mitigated ageing infrastructure issues and maintained a low watermain break rate, minimizing service disruptions and property damage from broken watermains.

The primary focus of the City's watermain replacement program is the replacement of ageing asbestos cement (AC) water pipes with new PVC or HDPE pipes, which offer longer service lives, better seismic resilience, and higher chemical resistance in Richmond's corrosive soil conditions. Approximately 36% of the City's watermains are AC pipes. Since 2011, the watermain replacement program has replaced 74 kilometers of AC pipes, which is approximately 25% of the AC pipe inventory. Replacement of ageing AC pipes will remain the primary focus of the City's watermain replacement programs for approximately the next 30 years.

Water pressure management extends the service life of AC watermains. The City introduced a pressure management program in 2014. The program has resulted in a 7% decrease in water losses through reduced pipe cracking and leakage in the water distribution system. This reduction in water losses results in approximately $1.5 million in cost savings to the City each year through reduced Metro Vancouver water purchase costs. Staff will continue to review costs and benefits of additional pressure management strategies to maximize system efficiency.

The City's water meter program is funded through the Water Utility and has been very successful. To date, 100% of single-family, 50% of multi-family, and 100% of industrial, commercial and institutional (ICI) properties have been metered. One of the benefits of water metering is the ability to identify property-side water leakage and provide incentives for leak repair. Since 2015, 1,601 properties have repaired leaks and applied for leak rebates, totalling approximately two million cubic metres in annual leak reduction. This represents $1.6 million in savings on Metro Vancouver water purchases. Additionally, the fixed base meter reading network has now been universally deployed to read and gather real-time consumption data from 97% of the City's water meters, further improving the City's ability to detect private-side leakage.

Sanitary

Staff estimate a long-term annual capital funding requirement of $12.2 million for the Sanitary Utility (Attachment 2). Sanitary Utility capital funding has increased from $0.5 million annually in 2001 to a current capital funding level of $5.8 million annually. Bridging the funding gap will

be an important consideration for future utility budgets, in order to reduce deferral of the financial obligation to future years and the associate burden on future rate payers.

Inflow and infiltration (I&I) of rainwater and groundwater into the sanitary system reduces available system capacity for domestic sewage and municipal growth. I&I management is an important strategy for deferring or avoiding capacity-based system upgrades. The City maintains one of the lowest rates of I&I in Metro Vancouver, and this is a result of proactive sanitary sewer assessment and rehabilitation programs. The City assessed its complete gravity sewer inventory between 2002 and 2015. The assessment indicated the City's gravity sewers are generally in excellent condition and the defects identified have been addressed proactively through the capital program. The next cycle of assessments is in progress.

The City operates and maintains 153 sanitary pump stations. In the past 18 years, the City has constructed eight new sanitary pump stations, rebuilt five sanitary pump stations, performed upgrades on 15 sanitary pump stations and installed new pumps at 91 pump stations.

The impact of grease on municipal sanitary sewer collection systems is an on-going concern for the City. Following the Lansdowne Road sanitary forcemain failure due to a grease blockage in 2011, pressure sensors were installed throughout the sanitary system to identify grease build-up. Identifying grease build-up before it becomes critical facilitates a proactive grease maintenance program for forcemains and maintains a high level of service. Staff continue to conduct grease inspection for food establishments throughout the City and educate the public on the proper way of grease disposal.

Drainage and Diking

As identified in Attachment 3, staff estimate a long-term annual capital funding requirement of $30.3 million for drainage and diking infrastructure and the current annual capital allocation from the Drainage and Diking Utility is $10.9 million. Based on the Council endorsed accelerated flood protection program, the Drainage and Diking utility will be increased gradually to meet the target level of $30 million by 2031. Acceleration of the City's flood protection program allows for continual upgrades and improvements to address climate change induced sea level rise as well as anticipated increase in duration and intensity of storm events to increase flood resilience for the City.

Drainage

The required drainage capital funding level has increased due to inflation, emerging early box culvert deterioration issues, and improved understanding of drainage pump station costs.

The City has approximately 57 kilometers of box culverts, the majority of which are 40 to 50 years in age. The concrete box culverts have a design life of 100 years; however, some joints are failing prematurely which has led to the development of sinkholes, often in highly travelled routes. Staff are proactively managing the condition of box culverts by identifying and repairing deteriorating joints early on to extend their useful service life and minimize long-term replacement costs. The box culverts are inspected on a 7-year preventative maintenance cycle. In

addition, Council has supported a number of capital projects related to box culvert repairs. Since 2015, approximately $11.2 million have been allocated to repairs of failed box culverts.

In 2018, condition assessments were completed for 39 drainage pump stations. The estimated replacement costs have increased due to increased seismic mitigation and regulatory requirements, along with significant increases in construction costs.

Since the early 2000s, the City has rebuilt or performed significant upgrades on 19 of 39 drainage pump stations. The Horseshoe Slough, Shell Road North and No. 7 Road South drainage pump stations have been upgraded recently while the construction for the drainage pump stations at Steveston Highway and Gilbert Road and Steveston Highway and No. 3 Road are nearing completion. The City's capital program includes seven additional pump station replacements proposed over the next five years. The remaining Lulu Island drainage pump stations will be rebuilt or receive significant upgrades over the next 20 years provided that capital funding levels are maintained or improved. Pumping capacity upgrades and requirements are identified using the City's drainage system computer hydraulic model.

The City continues to adapt and mitigate the impacts of climate change through upgrades of pump stations, storm sewers, agricultural drainage and irrigation, and implementation of stormwater retention infrastructure.

Diking

The City is, on average, one meter above mean sea level and protected by 49 kilometers of dike. Current climate change science estimates that sea levels will rise by 1.0 metre by 2100 and 0.2 metre of subsidence is expected over the same time period. The Flood Protection Management Strategy identifies strengthening and raising the City's perimeter dike to 4.7 metres geodetic elevation (approximately 1.2 metre above current elevations) as the priority response to sea level rise. All new dikes are designed to accommodate a further height increase to 5.5 metres to address sea level rise beyond 2100.

The City's Dike Master Plan addresses this need by recommending dike upgrade options for each dike section throughout the City. Dike Master Plan Phases 1, 2, 3 and 5 have been developed, and public and stakeholder consultation for Phase 4 is currently in progress.

The City raised 650 metres of the south dike, between No. 3 Road and Gilbert Road, in 2020, and is currently upgrading 1.5 kilometres from No. 3 Road to 400 m West of No. 4 Road and near No. 9 Road. Upcoming upgrades include 1.2 kilometres of the south dike between No. 4 Road and No. 5 Road. Moving forward, the City aims to upgrade approximately one kilometre of dike each year.

Staff will continue to upgrade the perimeter dike in accordance with the Dike Master Plan and bring forward accelerated projects as a part of the annual capital program for Council consideration. Provincial and international studies on climate change will continue to be monitored and reviewed, and any significant changes will be assessed and incorporated into

future iterations of the Flood Protection Management Strategy and Dike Master Plan for Council consideration.

Drainage and Diking Funding

In the early 2000s, Council endorsed the Drainage and Diking Utility and has progressively increased annual capital funding levels from $0.6 million to its current level of $10.9 million. Through the Drainage and Diking Utility and senior government grant funding, the City has dedicated over $120 million to completing flood protection projects, including pump station and dike upgrade projects, over the past 10 years.

As outlined in the staff report titled, "Accelerated Flood Protection Program Update", dated March 4, 2022, from the Director, Engineering, a target annual revenue level of $30 million by 2031 was endorsed for the Drainage and Diking Utility, in order to support a 50 year implementation period, improving the City's diking infrastructure well in advance of the current anticipated climate change impacts. In order to achieve the required capital funding level, the Flood Protection System fee will be increased through the annual utility budget and rates process beginning in 2023.

The total cost to complete the dike upgrades is currently estimated at $1 billion, which includes costs associated with land acquisition, design and construction, and restoration along the perimeter dike. This estimated value should be used as an order of magnitude reference, considering highly variable factors such as construction and real estate costs, superdikes, and regulatory requirements. Staff will be able to further refine these cost estimates as the program develops and more projects are completed.

Historically, the City has seen significant cost savings and effective dike improvements through development along the dike corridor. An estimated 20% of dike improvements through development has been included in the funding calculations, and increasing the amount of development-assisted dike upgrades would reduce the required capital funding from the City.

Road and Road Assets

Staff estimate a long-term annual capital funding requirement for roads and road assets, including road pavement, street lights, and overpasses and bridges, to be $10.6 million, as identified in Attachment 4. Road and road assets are not part of a utility and are funded from the City's General Revenue. Since 2006, Council has endorsed increases in annual roadway capital funding levels from $2.6 million to its current value of $4.4 million. Achieving the long-term annual capital funding requirement will enable proactive road asset management by facilitating upgrades and replacements on a continual basis, ultimately reducing overall costs.

Road Pavement

The City's Asphalt Re-Paving Capital Program re-paves sections of City-owned non-Major Road Network (non-MRN) roads on an annual basis. The long-term annual re-paving funding

requirement for the City's non-MRN roads is estimated at $7.7 million, using average paving prices and predictions of road re-paving needs from the City's computerized Pavement Management System. Paving prices are heavily influenced by oil prices, which have had significant fluctuations over the past years. The fluctuating price of paving has a significant impact on the long-term capital funding requirements of the City's road network.

As identified in the March 29, 2017 staff report titled "Post Winter Roads and Paving Program Update", harsh winter conditions can have significant impacts on the condition of the City's roadways. Staff will continue to monitor on-going climate change weather trends and incorporate the impacts of any identified trends in subsequent infrastructure reporting. The results from the road condition data collected in 2017 have been used to refine both projections of annual capital funding levels and paving program priorities for capital planning.

Street Lighting

The City's street lighting system consists of approximately 11,500 streetlights and continues to grow with new development. The LED Replacement Capital Program replaced approximately 3,800 end-of-life high pressure sodium (HPS) light fixtures with LEDs to reduce energy consumption and improve efficiency. All four phases of this program have been completed and staff will continue to upgrade the remaining luminaires to LED through future capital programs.

The long-term annual capital funding requirement for the replacement of street lighting systems is approximately $2.7 million. Staff note that there could be significant variability in the useful service life of street lighting infrastructure based on the level of deterioration and that the service life used to inform the current analysis may be conservative. Additionally, decorative street lighting replacement is significantly more expensive than standard street lights and adding decorative street lights to the City's inventory will increase the cost associated with the replacement program.

Going forward, condition assessments will be performed for street lighting systems nearing the end of their service life to inform the street light replacement strategy and future capital programs. Results of this assessment will be incorporated into future ageing infrastructure reporting.

Overpasses and Bridges

The City owns 12 non-MRN overpasses and bridges, maintained by Engineering and Public Works. These include:

- 5 roadway overpasses or bridges; and
- 7 pedestrian bridges.

A table listing the non-MRN overpasses and bridges is included as Attachment 5.

The City's various non-MRN overpasses and bridges are inspected regularly, the results of which inform annual capital funding requirement projections. Regular inspection and maintenance will

extend the lifespan of the structure, thereby reducing overall lifecycle costs and enhancing user safety and comfort.

Distributed assets, such as roadway paving and street lighting, require annual capital funding from General Revenue, which allows a percentage of the assets to be replaced each year. The bridge assets, however, are point assets that require short, intense rehabilitation or replacement and are better completed on a one-time basis as required. Attachment 5 outlines an overpass and bridge maintenance strategy that highlights the one-time nature of bridge upgrades or replacement projects. Staff predict that a long-term annual capital funding of $0.19 million is required for routine maintenance and inspection of bridge assets, and a total of $18.5 million will be required over the next 100 years for major bridge rehabilitation and replacements.

The No. 2 Road Bridge, Bridgeport Road Overpass, and Cambie Road Overpass at Knight Street are significant pieces of municipal infrastructure with a total replacement value of approximately $101 million. These structures are situated within the region's Major Road Network (MRN), which is designed to connect provincial highway systems with local road networks, and are eligible for regional maintenance and replacement funding.

The City receives regional funding for the operation, maintenance, and rehabilitation of pavement and bridge decks within the MRN. TransLink awarded the City grant funding to upgrade the Cambie Road Overpass at Knight Street in 2019 through the MRN Structures Funding Program. The construction of the project was substantially completed in Spring 2022. City staff also participate in Translink's Operation, Maintenance and Rehabilitation Sub-Committee and will continue to work with TransLink to secure adequate bridge maintenance and rehabilitation funding.

Road and Road Asset Funding

The total long-term annual capital funding requirement for roads and road assets is currently estimated to be $10.6 million, as identified in Attachment 4.

Based on typical roadway design life information, significant road paving will be required over the next five years. Area-specific verification will be completed as part of the 5-year capital planning process. The results from the City-wide asphalt surface condition assessment inform the City's existing and future capital paving programs. Staff will continue to bring forward paving program funding recommendations that will include on-going capital funding combined with one-time allocation of surpluses to meet the five year capital needs of the roadway paving program.

Private development servicing agreements contribute significantly to the City's re-paving needs. Over the past five years, the City has secured an average of approximately $9 million per year in roadway assets through servicing agreements. While parts of this involve the introduction of new assets through new road construction, some of this work rebuilds or expands existing roadways that would otherwise require repaving through the City's annual paving program. Unlike utility infrastructure where development-driven replacement work does not typically coincide with infrastructure that is beyond its useful life and hence does not significantly impact long term capital funding requirements, road pavement has a much shorter lifespan of 15 to 35 years. As

such, paving completed through development activities has notable impacts on ageing infrastructure replacement plans.

The overpasses, bridges and street lighting assets have begun to require increased capital funding as they are starting to show signs of deterioration and have been the focus of recent capital upgrade and replacement programs. These re-investments include a $1.1 million Bridgeport Road Overpass renovation project, $1.35 million Cambie Overpass at Knight Street approach rehabilitation project, and the four phase LED Street Replacement Plan totaling $1.3 million. The asset deterioration model indicates that these projects are the beginning of upgrade and replacement projects for overpasses bridges and street lighting assets. There is no dedicated capital funding for bridge asset replacements and street light LED upgrade program. The funding for them is determined as part of the annual budget process.

Roadway paving and street lighting assets are distributed assets that require ongoing dedicated capital funding, while bridge asset replacements are best funded through one-time expenditures. On this basis, roads and road assets will ultimately be funded through a combination of annual funding and one-time funding. Both on-going re-paving and street lighting programs, and one-time bridge repair projects will be included in capital and operating programs for Council's consideration.

Required Capital Funding Levels

Table 3 summarizes current and required annual infrastructure replacement capital funding levels, in 2022 dollars, as well as the current ageing infrastructure funding gaps. The City has made considerable infrastructure funding gains since initiating its strategy to close the funding gap in 2006.

Table 3: Capital Funding Levels

Infrastructure Type	2022 Approved Utility Budget for Capital	Required Annual Capital Funding Level	Target Funding Range	Funding Source	Estimated Additional Capital Funding Required
Water	$7.5M	$10.4M	$8.4M - $12.3M	Water Utility	$2.9M
Sanitary	$5.8M	$12.2M	$9.2M - $15.2M	Sanitary Utility	$6.4M
Drainage & Diking	$10.9M	$30.3M	$28.3M - $32.2M	Drainage & Diking Utility	$15.7M
Road and Road Assets (non-MRN)	$4.4M	$10.6M	$9.6M - $11.6M	General Revenue	$6.2M
Totals	**$32.3M**	**$63.5M**			**$31.2M**

Funding Strategies

Adequate annual capital funding levels will allow the City to implement proactive and sustainable infrastructure replacement programs. This enables the City to sequence utility replacement and use competitive bidding to ensure the optimal utilization of funding. Replacing failed infrastructure has proven to be considerably more expensive and disruptive to residents and City services than proactive replacement.

In recent years, the City has successfully applied for federal and provincial grants from programs such as the Community Emergency Preparedness Fund, National Disaster Mitigation Program, Disaster Mitigation and Adaptation Fund, Emergency Management BC Flood Protection Program, etc. and will continue seek such opportunities in the future. While grant funding has been helpful over the last few years, as a funding source, grants will always be unpredictable.

Development also facilitates significant infrastructure replacement that has a positive impact on the City's overall ageing infrastructure. However, development is subject to external forces such as the economy and does not always coincide with infrastructure that is beyond its useful life. Therefore, development is also not considered a sustainable resource for ageing utility infrastructure replacement.

Staff will present funding options and make a recommendations to Council as part of the annual utility rate review and budget process.

Financial Impact

None.

Conclusion

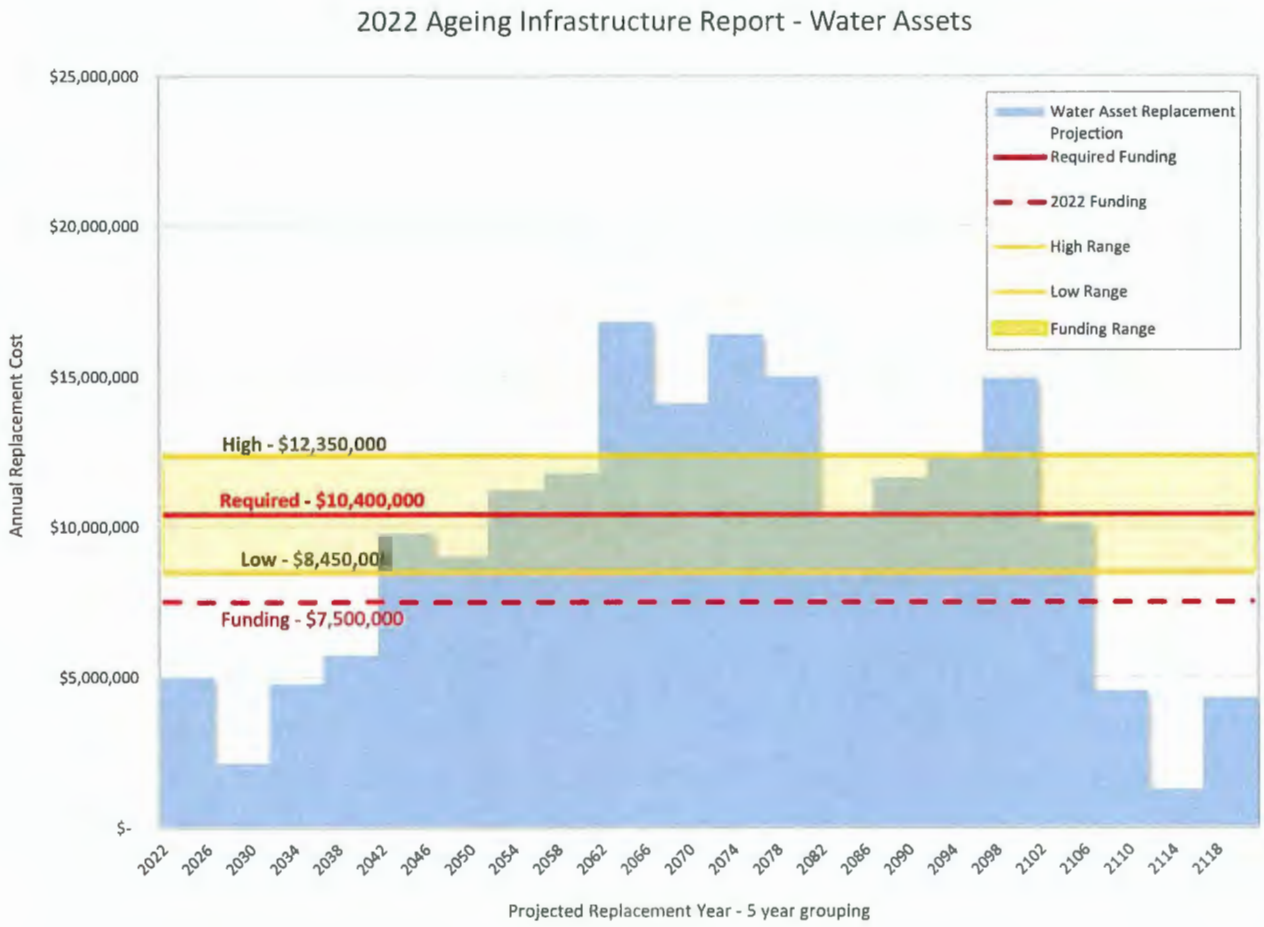
Staff will continue to refine and update infrastructure replacement requirements, and explore new technologies and best practices to positively impact lifecycle infrastructure costs. Additionally, staff will continue to address utility funding gaps through annual budgeting processes. The rate of increase and timeframe to close the funding gaps will be impacted by Metro Vancouver's regional charges for water and sewer, which are non-discretionary costs imposed on the City. The capital funding shortfalls outlined in this report should be considered in conjunction with the City's Long-Term Financial Management Strategy.

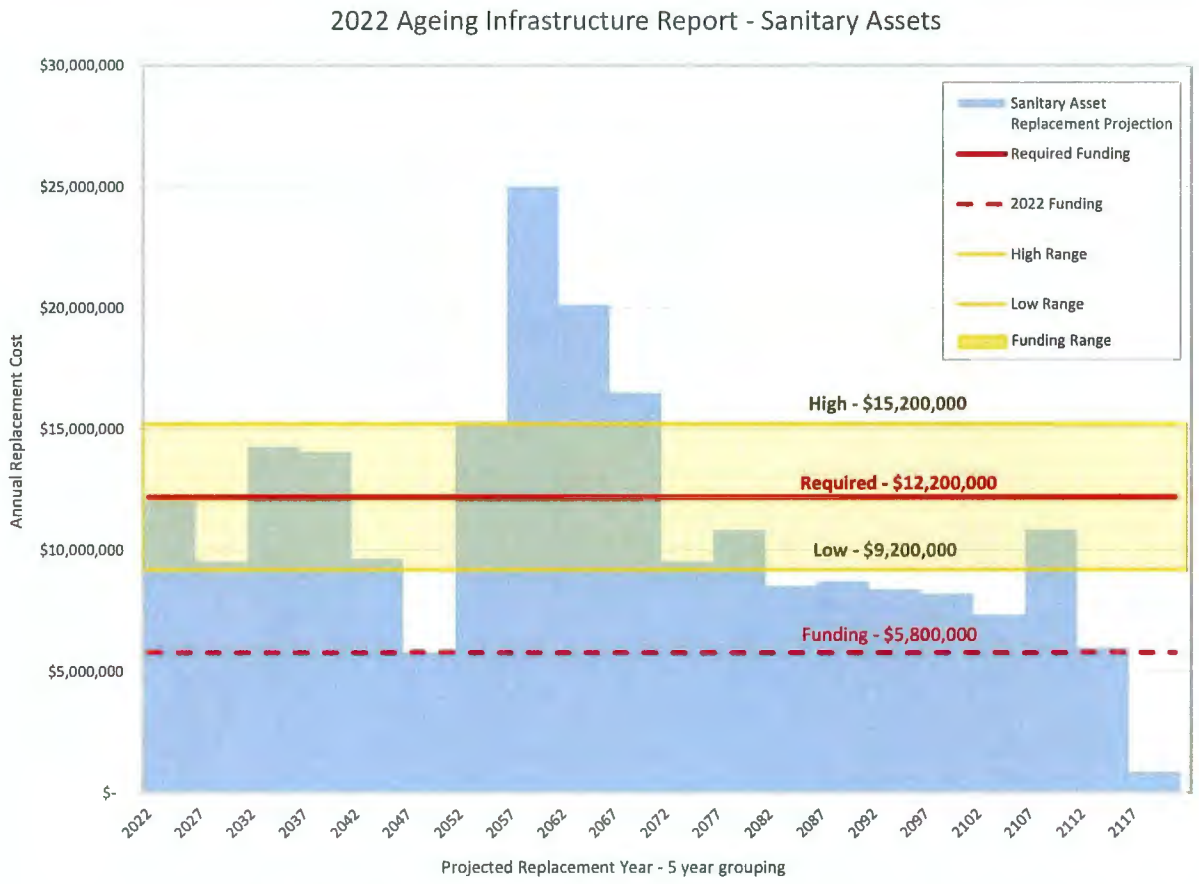
Jason Ho, P.Eng.
Manager, Engineering Planning
(604-244-1281)

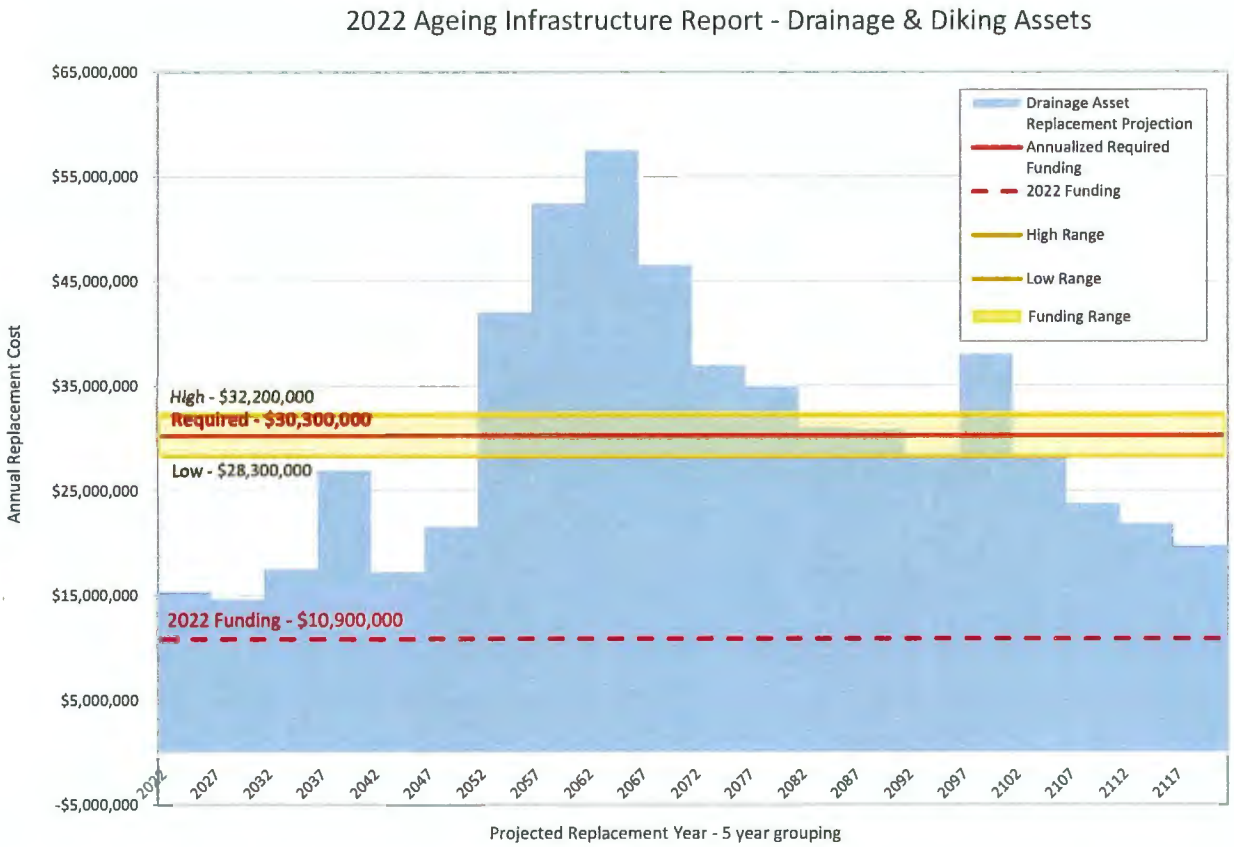
JH:rd

Att.1: 2022 Ageing Infrastructure Report – Water Assets
Att.2: 2022 Ageing Infrastructure Report – Sanitary Assets

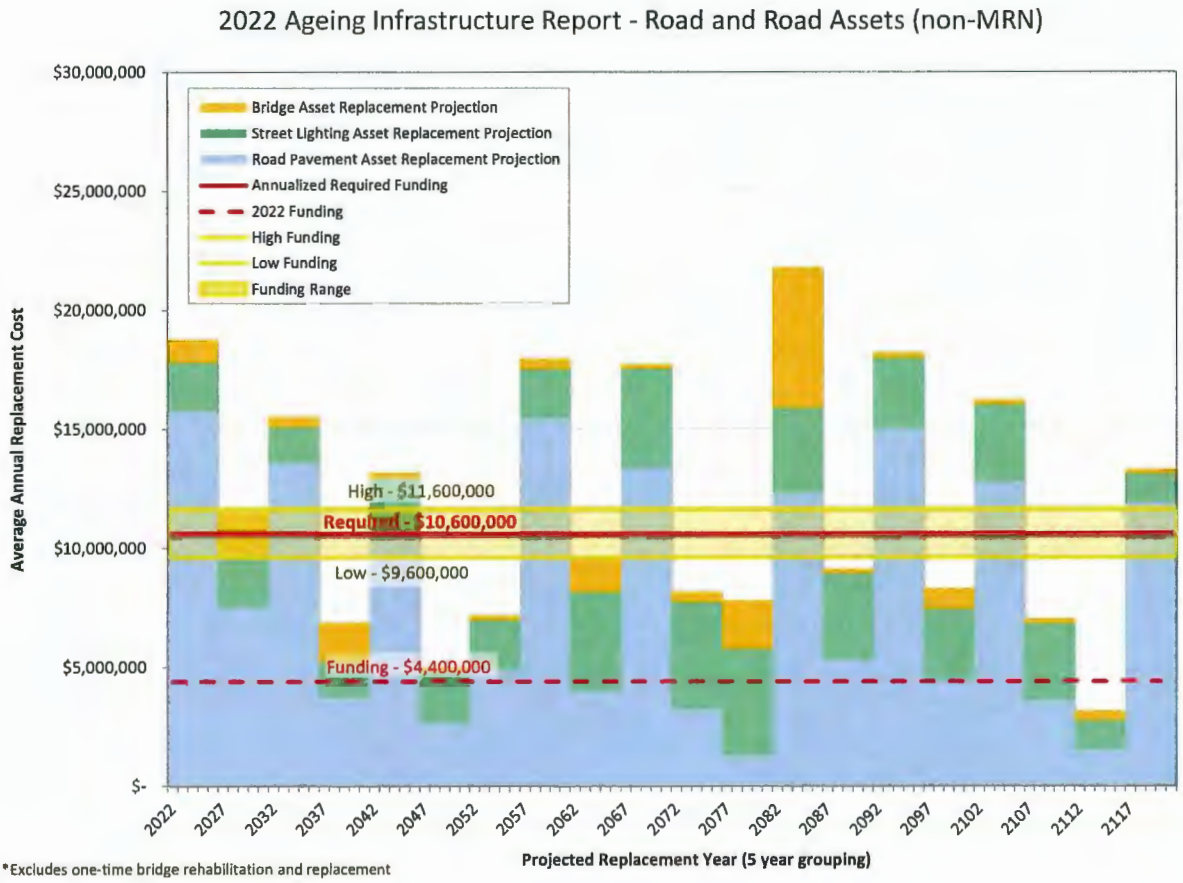
Att.3: 2022 Ageing Infrastructure Report – Drainage & Diking Assets
Att.4: 2022 Ageing Infrastructure Report – Road and Road Assets (non-MRN)
Att.5: Overpasses and Bridge


2022 Ageing Infrastructure Report - Water Assets
$25,000,000
$20,000,000
$15,000,000
$10,000,000
$5,000,000
$-
Annual Replacement Cost
Water Asset Replacement Projection
Required Funding
2022 Funding
High Range
Low Range
Funding Range
High - $12,350,000
Required - $10,400,000
Low - $8,450,000
Funding - $7,500,000
2022
2026
2030
2034
2038
2042
2046
2050
2054
2058
2062
2066
2070
2074
2078
2082
2086
2090
2094
2098
2102
2106
2110
2114
2118
Projected Replacement Year - 5 year grouping


2022 Ageing Infrastructure Report - Sanitary Assets
$30,000,000
$25,000,000
$20,000,000
$15,000,000
$10,000,000
$5,000,000
$-
Annual Replacement Cost
Sanitary Asset Replacement Projection
Required Funding
2022 Funding
High Range
Low Range
Funding Range
High - $15,200,000
Required - $12,200,000
Low - $9,200,000
Funding - $5,800,000
2022
2027
2032
2037
2042
2047
2052
2057
2062
2067
2072
2077
2082
2087
2092
2097
2102
2107
2112
2117
Projected Replacement Year - 5 year grouping



*Annualized Required Funding level may decrease upon the award of senior government grant funding



*Excludes one-time bridge rehabilitation and replacement

Overpasses and Bridges

List of Non-MRN Overpass and Bridge Inventory

Name	Location	Feature Crossed	Type
Bird Road Bridge	11040 Bird Road & Shell Road Rail Crossing	Watercourse	Pedestrian
Chatsworth Road Bridge	6380 Chatsworth Road	Watercourse	Pedestrian
Finn Road East Bridge	13020 Gilbert Road	Watercourse	Roadway
Fraserside Gate Bridge	Fraserside Gate & Westminster Highway	Watercourse	Roadway
Hollybridge Way Bridge	River Road & Hollybridge Way	Watercourse	Roadway
Horseshoe Place Bridge	Horseshoe Place South of Horseshoe Way	Watercourse	Roadway
Lancing Road Bridge	5440 Lancing Road	Watercourse	Pedestrian
Princess Street Bridge	Dyke Road fronting and Princess Street	Watercourse	Pedestrian
West Dyke Trail Bridge 1	West End of Francis Rd (West Dyke Trail)	Watercourse	Pedestrian
West Dyke Trail Bridge 2	West End of Williams Rd (West Dyke Trail)	Watercourse	Pedestrian
West Dyke Trail Bridge 3	10431 Springhill Crescent	Watercourse	Pedestrian
Woodward Slough Bridge	No. 4 Road and Finn Road	Watercourse	Roadway

Bridges and Overpasses Maintenance Strategy

The table below illustrates a high-level rehabilitation and replacement strategy for the City's bridge inventory over the next 100 years. The strategy involves routine inspection and maintenance of the structures at an annualized cost of $43,000 each year, replacement of the structure at the end of its service life, and a major rehabilitation to extend the service life for larger bridges.

Name	**Estimated Replacement Cost**	**Estimated Rehabilitation Cost**	**Replacement Year**	**Rehabilitation Year**
Bird Road Bridge	$145,683	$29,137	2035	2060
Chatsworth Road Bridge	$56,907	$11,381	2025	N/A
Finn Road East Bridge	$693,069	$138,614	2030	2080
Fraserside Gate Bridge	$1,460,624	$292,125	2040	2030
Hollybridge Way Bridge	$3,300,631	$660,126	2085	2065
Horseshoe Place Bridge	$1,153,324	$230,665	2030	2065
Lancing Road Bridge	$40,973	$8,195	2025	N/A
Princess Street Bridge	$113,815	$22,763	2080	2030
West Dyke Trail Bridge 1	$796,704	$159,341	2085	2065
West Dyke Trail Bridge 2	$212,075	$42,415	2065	2045
West Dyke Trail Bridge 3	$144,292	$28,858	2025	N/A
Woodward Slough Bridge	$430,347	$86,069	2025	2060
Total	**$8,548,445**	**$1,709,689**		

The annual capital funding level requirement of $190,000 for bridges and overpasses is calculated as the total rehabilitation and replacement cost averaged over each asset's service life. This value presents an average annual expenditure only and does not reflect actual recommended annual capital funding levels. Unlike linear infrastructure such as piping or road pavement, replacement of each bridge structure must occur as a singular project and cannot be divided into annual components. For example, replacement of the Hollybridge Way Bridge must be carried out as a one-time expenditure of approximately $3.3 million. The delivery of the replacement program over 100 years is illustrated in Figure 1 below.

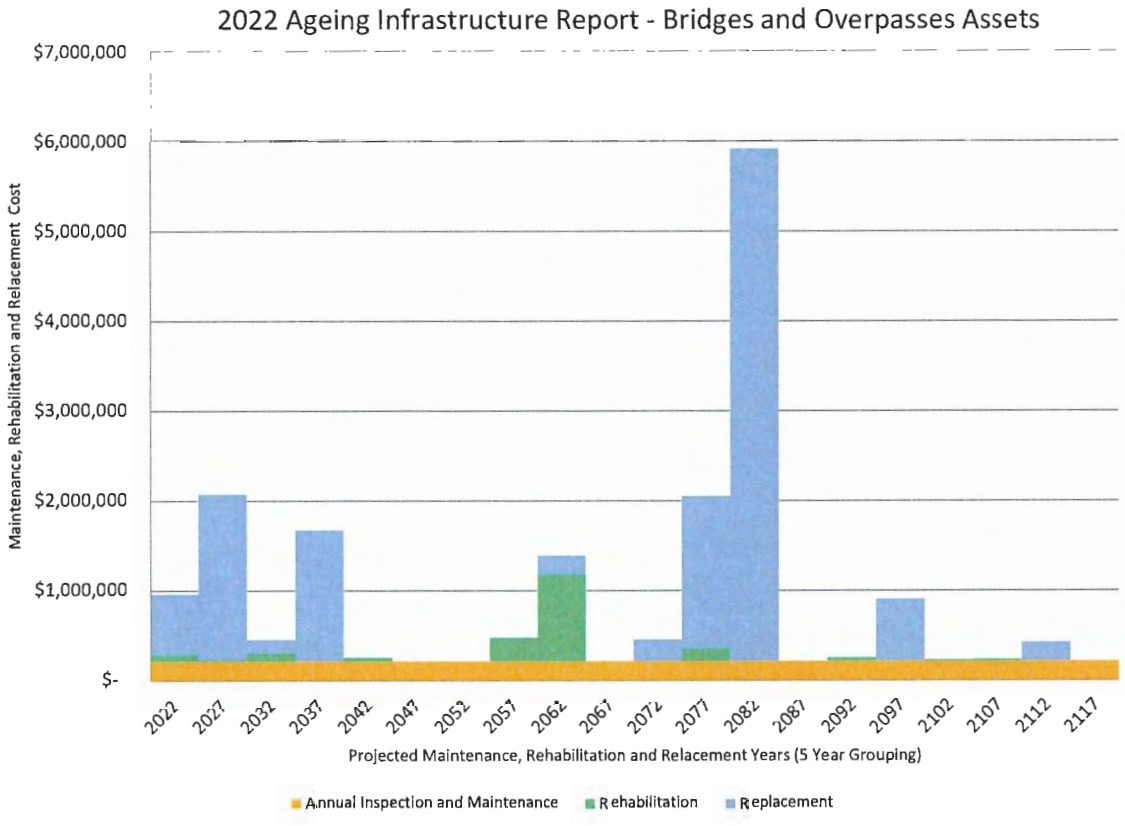


Figure 1. Delivery of the replacement program over 100 years

Based on the high level strategy established, annualized capital funding of approximately $43,000 should be allocated towards routine inspection and maintenance of bridge assets, and requests for one-time expenditures for rehabilitation or replacement of bridge structures would come forward in 2025, 2030, 2040, 2080, 2085, and 2100. Where replacement of multiple structures is required within the same year, such as in 2085, staff will review the potential to distribute work over several years. The maintenance strategy will continue to be refined as ongoing inspection work is completed to assess the remaining lifespan of the structures.