



Public Works and Transportation Committee

Anderson Room, City Hall
6911 No. 3 Road

Wednesday, September 18, 2019
4:00 p.m.

Pg. # ITEM

MINUTES

PWT-3 *Motion to adopt the **minutes** of the meeting of the Public Works and Transportation Committee held on July 17, 2019.*



NEXT COMMITTEE MEETING DATE

October 23, 2019, (tentative date) at 4:00 p.m. in the Anderson Room

PLANNING AND DEVELOPMENT DIVISION

1. **TRANSPORT 2050 - PHASE 1 CONSULTATION**
(File Ref. No. 01-0154-04) (REDMS No. 6236611 v. 10)

PWT-7

See Page PWT-7 for full report

Designated Speaker: Lloyd Bie

STAFF RECOMMENDATION

That the attached report titled “Transport 2050 – Phase 1 Consultation” dated August 22, 2019 from the Director, Transportation be forwarded to TransLink for consideration as part of its Phase 1 consultation for the development of Transport 2050.



Pg. # ITEM

2. **AMENDMENT TO TRAFFIC BYLAW NO. 5870 TO ESTABLISH A FEE FOR ISSUANCE OF PERMITS RELATED TO USE OF CITY STREETS**

(File Ref. No. 10-6450-19-01) (REDMS No. 6247261)

PWT-19

See Page PWT-19 for full report

Designated Speaker: Lloyd Bie

STAFF RECOMMENDATION

- (1) *That Traffic Bylaw No. 5870, Amendment Bylaw No. 10076, to establish a fee for the issuance of permits to external agencies for the processing of traffic management plans and lane closure requests, be introduced and given first, second and third reading.*
- (2) *That Consolidated Fees Bylaw No. 8636, Amendment Bylaw No. 10079, which quantifies the fee for the issuance of various permits established in Traffic Bylaw No. 5870, be introduced and given first, second and third reading.*



ENGINEERING AND PUBLIC WORKS DIVISION

3. **AGEING UTILITY AND ROAD INFRASTRUCTURE PLANNING – 2019 UPDATE**

(File Ref. No. 10-6060-01) (REDMS No. 6203674)

PWT-27

See Page PWT-27 for full report

Designated Speaker: Jason Ho

STAFF RECOMMENDATION

That the staff report titled, “Ageing Utility and Road Infrastructure Planning – 2019 Update”, dated August 16, 2019, from the Manager, Engineering Planning be utilized as input in the annual utility rate review and budget process.



4. **MANAGER’S REPORT**

ADJOURNMENT





Public Works and Transportation Committee

Date: Wednesday, July 17, 2019

Place: Anderson Room
Richmond City Hall

Present: Councillor Chak Au, Chair
Councillor Linda McPhail
Councillor Kelly Greene
Councillor Alexa Loo
Councillor Michael Wolfe

Also Present: Councillor Bill McNulty
Councillor Harold Steves

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 June 19, 2019, be adopted as circulated.

CARRIED

NEXT COMMITTEE MEETING DATE

September 18, 2019, (tentative date) at 4:00 p.m. in the Anderson Room

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Wednesday, July 17, 2019

DELEGATIONS

1. Jonathan Moser, Head of Environment and Public Affairs, Lafarge Canada Inc., provided a presentation (copy on-file, City Clerk's Office) on sustainability initiatives and highlighted:

- LaFarge circular economy products;
- request that the City of Richmond consider the use of limestone cement, which is of similar strength as regular cement with a lower carbon footprint;
- use of low carbon fuel at the Richmond plant; and
- Richmond community investments.

In response to questions from the Committee, LaFarge representatives provided the following information:

- the Richmond and Delta plants are able to utilize 100,000 to 150,000 tonnes of diverted material per year, including plastics;
- Council members are welcomed to visit the Richmond plant;
- continuous emission statistics from the Richmond plant are provided to Metro Vancouver on a quarterly basis;
- the Richmond and Delta plants utilize municipal water;
- the source of raw materials for the circular economy products; and
- the Richmond plant utilizes scrubbing technology to capture one tonne of carbon dioxide per day.

In response to a question from the Committee, staff advised that City demolition policies are in place.

PLANNING AND DEVELOPMENT DIVISION

2. **PEDESTRIAN SAFETY AT INTERSECTIONS**

(File Ref. No. 10-6450-09-01) (REDMS No. 6201418 v. 2)

In response to questions from the Committee, Donna Chan, Manager, Transportation Planning, and Lloyd Bie, Director, Transportation, provided the following information:

- expectation that the automated speed enforcement camera at the intersection of Garden City and Cambie Roads will be installed by the BC Ministry of Transportation and Infrastructure before the end of summer 2019;

Public Works & Transportation Committee

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- pedestrian priority traffic signals are currently being piloted;
- in-street pedestrian zone markers are in place in eight school zones;
- plans to implement additional safety initiatives at schools in the next year; and
- action on traffic safety issues in subdivisions are initiated by public complaints.

It was moved and seconded

That the report titled "Pedestrian Safety at Intersections" dated June 28, 2019 from the Director, Transportation be received for information.

CARRIED

3. **AMENDMENT TO TRAFFIC BYLAW NO. 5870 TO REVISE SPEED LIMITS IN STEVESTON**

(File Ref. No. 10-6450-15-01) (REDMS No. 6197217 v. 2; 6198708)

In response to questions from the Committee, Sonali Hingorani, Transportation Engineer, provided the following information:

- enforcement actions planned for the new speed limits in Steveston; and
- Coast Mountain Bus Company (CMBC) and TransLink were consulted on the design of the intersection at No. 1 Road and Moncton Street.

It was moved and seconded

That Traffic Bylaw No. 5870, Amendment Bylaw No. 10049, to revise the posted speed limit on selected street sections in the Steveston area, be introduced and given first, second and third reading.

CARRIED

ENGINEERING AND PUBLIC WORKS DIVISION

4. **FRASER RIVER FRESHET AND FLOOD PROTECTION UPDATE 2019**

(File Ref. No. 10-6060-01) (REDMS No. 6205173 v. 5)

Jason Ho, Manager, Engineering Planning, reviewed the staff report and highlighted:

- low freshet flows in the spring of 2019;
- the frequency and intensity of rainfall events have been increasing in recent years, consistent with climate change impacts on local weather patterns; and
- the importance of building up the fund for flood protection.

3.

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In response to questions from the Committee, Mr. Ho provided the following information:

- there are numerous investments that could be initiated with increased senior government funding; and
- opportunities to assist residents to mitigate the cost to dispose of fill.

It was moved and seconded

That the report titled, "Fraser River Freshet and Flood Protection Update 2019", dated June 25, 2019, from the Acting Director, Engineering be received for information.

CARRIED

5. OTHER BUSINESS

Cllr. Loo requested that staff provide the cost of extending the existing cycling network by various distances (e.g. two, five and ten kilometres) as part of the 2020 capital budgeting process.

6. MANAGER'S REPORT

None.

ADJOURNMENT

It was moved and seconded

That the meeting adjourn (4:45 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, July 17, 2019.

Councillor Chak Au
Chair

Carol Lee
Recording Secretary



City of Richmond

Report to Committee

To: Public Works and Transportation Committee
From: Lloyd Bie, P.Eng.
Director, Transportation
Re: Transport 2050 - Phase 1 Consultation

Date: August 22, 2019
File: 01-0154-04/2019-Vol
01

Staff Recommendation

That the attached report titled "Transport 2050 – Phase 1 Consultation" dated August 22, 2019 from the Director, Transportation be forwarded to TransLink for consideration as part of its Phase 1 consultation for the development of Transport 2050.

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

Att. 3

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Parks Services	<input checked="" type="checkbox"/>	
Engineering	<input checked="" type="checkbox"/>	
Sustainability	<input checked="" type="checkbox"/>	
Policy Planning	<input checked="" type="checkbox"/>	
Recreation	<input checked="" type="checkbox"/>	
Project Development	<input checked="" type="checkbox"/>	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: 	APPROVED BY GAO

Staff Report

Origin

TransLink is leading the phased development of Transport 2050, an update of the current Regional Transportation Strategy (Transport 2040) for Metro Vancouver. At the same time, Metro Vancouver is developing Metro 2050, an update to the regional growth strategy. Together, these strategies will shape the region over the next 30 years.

For Phase 1, TransLink is seeking “big ideas” that will make Metro Vancouver’s transportation system work better for everyone today and into the future. As TransLink is responsible for transit service in the region, the Phase 1 consultation provides an opportunity for the City to identify desired outcomes, particularly with respect to new rapid transit routes. As such, this report also responds to the following referrals arising from discussion of the staff report titled “Potential Transit Exchange as part of Steveston Community Centre and Branch Library Replacement Project” at the July 2, 2019 meeting of the General Purposes Committee:

That staff comment on possible LRT terminus options and potential routes in Steveston.

That staff prepare options for LRT across Richmond to an LRT Transit Tunnel at Massey Tunnel utilizing the Shell Road Railway Line from Bridgeport, or a connection to the Canada Line, or a combination of both.

This report supports Council’s Strategic Plan 2018-2022 Strategy #5 Sound Financial Management:

- 5.4 *Work cooperatively and respectfully with all levels of government and stakeholders while advocating for the best interests of Richmond.*

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

- 6.3 *Build on transportation and active mobility networks.*

Analysis

Transport 2050

Transport 2050 is an opportunity for the region to prepare for potential factors that will fundamentally change how residents move around, such as climate change and increased automation, and ensure that the benefits of new mobility options are both sustainable and equitable. Development of Transport 2050 will be in three phases and will be completed in Fall 2020 prior to the completion of Metro 2050, which is anticipated in 2022.

Phase 1: Share values and ideas, develop vision (Spring-Summer 2019)

In May 2019, TransLink launched the first phase of public engagement seeking input on residents’ values, transportation priorities and ideas for the future of transportation in the region. As of early August 2019, over 14,000 surveys have been completed and over 1,600 ideas shared at transport2050.ca. Phase 1 consultation ends in September 2019.

Phase 2: Consider ideas and trade-offs (Spring 2020)

During Phase 2 engagement, TransLink will present different options for future transportation. These options will include projects, policies and programs drawn from Phase 1 feedback. As the options will offer different benefits and costs, input will be sought on how to weigh the choices.

Phase 3: Draft new Regional Transportation Strategy (Fall 2020)

In Phase 3, TransLink will share the draft strategy. Following Phase 3 engagement, TransLink will take the strategy to the Mayors' Council on Regional Transportation for approval.

Phase 1 Ideas for Richmond

For the Phase 1 consultation, staff have developed a number of ideas and concepts for transportation improvements in Richmond (Attachment 1). The concepts generated provide a transportation system that accommodates a growing regional population and economy with modes and policies that are sustainable, equitable, safe, and reliable. The City's paramount objective is to achieve mode shifts such that at least 50% of all trips in Richmond are by transit and active transportation by 2050, consistent with the goals of the following key City plans:

- Official Community Plan (OCP): in addition to the afore-mentioned mode shift targets, the OCP and the City Centre Area Plan identify higher density development along Frequent Transit Network¹ (FTN) corridors, reinforcing the land use-transportation link.
- Community Energy and Emissions Plan (CEEP): the existing CEEP and the current CEEP renewal focus on a wide range of greenhouse gas (GHG) emission reduction initiatives. Given that light duty vehicle gasoline use contributed 42.6% of total GHG emissions in Richmond in 2015, new and upgraded low carbon travel options are necessary to help the City achieve its GHG emission reduction targets.

Rapid Transit

The transit-related ideas are grounded in three principles of transit network design and management:

1. maximize ridership,
2. encourage long-term ridership growth, and
3. provide access to transit service across the region.

Rapid transit technologies can range from bus- to rail-based (Attachment 2). Given the higher cost of rail- or bus-based rapid transit relative to conventional bus services, ridership is a key consideration to ensure an effective and productive service. Thus, the deployment of rapid transit service typically follows a progression over time from conventional bus, conventional bus with FTN service levels, bus rapid transit, and rail rapid transit (LRT or ALRT/SkyTrain) as ridership grows.

¹ Frequent Transit Network (FTN) denotes transit service that operates at least every 15 minutes in both directions throughout the day and into the evening, every day of the week.

To that end, higher density and active areas with a mix of uses generate greater transit demand and justify higher levels of service. Bus rapid transit services could potentially be upgraded to rail rapid transit as population and employment densities increase along the corridors.

Transport 2040 identifies a future FTN concept where the proposed rapid transit routes can be either bus or rail (Attachment 3). The FTN concept shown in Richmond is consistent with the Mobility and Access chapter of the OCP. The proposed ideas below go beyond Transport 2040 and TransLink's Southwest Area Transport Plan (SWATP).²

Connection to South of the Fraser River

Consistent with Transport 2040, a new rapid transit service is needed that will connect the Canada Line to the south of the Fraser River region via the planned new Massey Crossing. Staff have identified three potential alignment options through Richmond (Table 1). All alignment options will have implications for adjacent land use to better support rapid transit.

**Table 1: Preliminary Comments on Rapid Transit Alignment Options
from Richmond to South of the Fraser River**

Option	Alignment	Land Use & Ridership	Current Transit Use
Bridgeport Station via Highway 99	<ul style="list-style-type: none"> • Reallocation of shoulder bus lanes to operation in centre median • Use of existing Ministry of Transportation & Infrastructure right-of-way (ROW) • Relatively low impact to road users 	<ul style="list-style-type: none"> • Corridor has relatively lower density and mixed uses • Primarily serves regional trips 	<ul style="list-style-type: none"> • 9 bus routes currently operate on Highway 99 • Combined average daily weekday boardings of 15,900 passengers
Bridgeport Station via CN Rail Lulu Island Spur	<ul style="list-style-type: none"> • Primarily use of existing CN Rail ROW that currently has 4 trains per day • Notice on CN Rail website identifies section between Steveston Highway and Vulcan Way-Viking Way to be dismantled but timing is unclear • Relatively low impact to road users 	<ul style="list-style-type: none"> • Corridor lacks higher density and mixed uses • Primarily serves regional trips 	<ul style="list-style-type: none"> • N/A
Richmond-Brighthouse Station via No. 3 Road-Steveston Highway	<ul style="list-style-type: none"> • OCP and SWATP identify FTN service levels along these corridors • Given existing ROW widths, alignment will likely require change in the use of travel lanes, median treatments and/or additional property for stations 	<ul style="list-style-type: none"> • Corridor has relatively higher density and mixed uses including Broadmoor and Ironwood future neighbourhood centres³ • Primarily serves local trips 	<ul style="list-style-type: none"> • 403 bus ranked #44 out of 213 bus routes in region for ridership (2018) • Average daily weekday boardings of 6,360 passengers

² The Southwest Area Transport Plan, developed by TransLink in partnership with the City and endorsed by Council in March 2018, serves as a blueprint for how resources can best be allocated over the next decade to improve transit and transportation in the area.

³ Per the OCP, future neighbourhood service centres are densified shopping centres that accommodate the retail, restaurant, office, personal service, business, arts, culture, entertainment, recreational, institutional and community facility and service needs of area residents and may include residential uses.

Connections to North of the Fraser River

- Upgrade of Canada Line: As part of the fully funded Phases 1 and 2 of the Mayors' Council's 10-Year Vision, Canada Line capacity will increase by up to 30% with the deployment of 24 new cars starting in 2021. Further upgrades are required to meet continued growing demand and maximize the quality of experience so that riding the train is a comfortable and convenient option. Improvements include lengthening the platforms to accommodate longer trains, complementary station upgrades to improve passenger circulation and provide public washrooms, and doubling the single track south of Lansdowne Station to increase capacity.

Phase 3 (Years 6-10) of the 10-Year Vision, which is currently unfunded, identifies Canada Line station upgrades to "improve capacity, accessibility, and customer amenities" (total of \$52.4 million in 2015\$) but does not provide any details of the scope of improvements.

- City Centre-Vancouver via Granville Street: This alignment mirrors the former 98 B-Line service and provides a complementary service to the Canada Line along a high demand corridor⁴ that improves access to/from Vancouver while also enhancing resiliency in the transit network. The existing #10 bus route that operates along Granville Street provides FTN level service and in 2018 ranked #17 out of 213 bus routes in the region in terms of average daily weekday boardings (15,860 passengers).
- City Centre-New Westminster via Highway 91A: Upgrade of the existing #410 bus service that connects to the Expo Line at 22nd Street Station. The #410 currently provides FTN level service and in 2018 ranked #12 out of a total of 213 bus routes in terms of average daily weekday boardings (18,510 passengers).

Connections within Richmond

Consistent with Transport 2040, the existing bus service linking the City Centre and Steveston is proposed to be upgraded to a higher tier of bus- or rail-based rapid transit. Staff have identified two potential alignment options (Table 2). Both alignment options will have implications for adjacent land use to better support rapid transit.

Table 2: Preliminary Comments on Rapid Transit Alignment Options
from City Centre to Steveston

Option	Alignment	Land Use	Current Transit Use
Westminster Highway-No. 1 Road	<ul style="list-style-type: none"> • Consistent with current RTS and SWATP that identify corridors for FTN service • Given existing ROW widths, alignment will likely require change in the use of travel lanes, median treatments and/or additional property for stations 	<ul style="list-style-type: none"> • Serves area with relatively higher residential density and employment including Terra Nova and Seafair future neighbourhood centres 	<ul style="list-style-type: none"> • 401 bus ranked #33 out of 213 bus routes in region for ridership (2018) • Average daily weekday boardings of 9,130 passengers

⁴ Per TransLink, the corridor served by the #10 bus route has a population of 101,000 and employment of 135,000.

Option	Alignment	Land Use	Current Transit Use
Granville Avenue-Railway Avenue	<ul style="list-style-type: none"> • Use of existing ROW (road and former interurban corridor) • Relatively low impact to road users 	<ul style="list-style-type: none"> • Corridor has relatively lower density and mixed 	<ul style="list-style-type: none"> • 406 bus ranked #46 out of 213 bus routes in region for ridership (2018) • Average daily weekday boardings of 6,020 passengers

Should transit ridership between the City Centre and Steveston continue to grow and warrant the progression of higher orders of transit service from bus rapid transit to rail rapid transit, the location of a rail terminus in Steveston depends upon the rapid transit alignment and the ultimate site of the planned transit exchange upgrade (identified in Phase 3 of the Mayors' Council's 10-Year Vision).

New Forms of Transit Service

- On-Demand Transit: This service can be seen as a hybrid of regular public transit services (fixed route, fixed schedule) and personalized taxi services (flexible route, flexible schedule). TransLink recently completed a pilot program on Bowen Island in July-August 2019 that involved passengers using a smartphone app, web browser, or phone to book a seat on the on-demand shuttles servicing the island. This type of service may be appropriate in low density areas of Richmond that are underserved by transit such as residential areas within the Agricultural Land Reserve and/or industrial areas such as Mitchell Island and Fraserport.
- Water-based Services: Increasing residential, commercial and industrial development along both sides of the north arm of the Fraser River presents an opportunity for fixed route ferries or on-demand water taxis to serve both commuter and recreational trips. The City Centre Area Plan (CCAP) identifies water taxi access at a number of locations along the Middle Arm of the Fraser River between Oval Village and Bridgeport Village. Seamless links to transit services at each stop will be critical to ensure first-/last-mile connectivity.

Active Transportation

- New and Upgraded Crossings: As an island city, water crossings designed for cyclists and pedestrians are a necessary component of an active transportation network to support local and regional trips. As the Massey Crossing project team has confirmed that pedestrian and cycling facilities will be part of the planned new Massey Crossing, additional proposed new and upgraded links include:
 - Richmond-Vancouver via Sea Island: Pedestrians are not permitted on the existing Arthur Laing Bridge, which is under the jurisdiction of the Vancouver Airport Authority (VAA), and the existing shoulder bike lanes do not provide any physical protection from adjacent vehicle traffic. A new separate pedestrian-cyclist crossing in this corridor will increase the safety and comfort level of users and provide a more direct connection to the Arbutus Greenway in Vancouver. The YVR 2037 Master Plan does not identify this connection.
 - City Centre-Sea Island: The CCAP identifies a new pedestrian-cycling bridge at Aberdeen Village in the vicinity of the west end of Cambie Road to Sea Island across the Middle Arm of the Fraser River near BCIT. If built, the planned new bridge will enhance

connectivity to the City Centre and the Canada Line for Burkeville residents and BCIT students who currently have relatively limited transit access.

- Dinsmore Bridge: Gilbert Road on either side of the Dinsmore Bridge has bike lanes but the bridge itself has no cycling facilities and a sidewalk on the south side only. The bridge is under the jurisdiction of VAA and while the YVR 2037 Master Plan identifies “replace or upgrade the Dinsmore Bridge to seismic standards while maintaining a two lane structure with the addition of separated cycling and pedestrian pathways,” the YVR Master Plan does not indicate a timeline for this work.
- Knight Street Bridge: The existing sidewalks are relatively narrow and cannot comfortably accommodate both pedestrians and cyclists. The bridge is under the jurisdiction of TransLink; to date the agency has not identified any upgrades to the structure to better serve active transportation modes. Improved cycling connections to/from the bridge on the Richmond side will be a necessary complement.
- Micro Mobility: New and emerging micro mobility services such as dockless bike sharing and electric-assist bicycles and scooters (both private and shared) offer alternative options to complete the first-/last-mile to transit stations while also promoting safe, healthy, clean, and compact communities. In July 2019, TransLink released “Micromobility Guidelines” that were developed in collaboration with local municipalities including the City. The Guidelines provide a framework for regional coordination to ensure a unified and efficient system. Within this framework, there is an opportunity for TransLink to examine the need for consistent regulation by municipalities of micro mobility devices on different types of active transportation infrastructure given the speed and weight differentials of these devices compared to pedestrians and pedal cyclists.

Goods Movement

- Urban Freight Delivery: Given the increased use of home-delivery services, new methods of goods movement should be considered such as encouraging the electrification of urban freight vehicles that travel relatively shorter distances and the development of new distribution centres with electric vehicle charging stations.
- Short Sea Shipping: This concept would enable the movement of containers from existing marine container terminals by barge to a central logistics facility on the Fraser River for distribution. These operations would benefit businesses and communities across the region by minimizing truck traffic on roads and decreasing the environmental impacts of cargo movement. The Port of Vancouver recently secured grant funding from the federal government towards the development of a viable short sea shipping concept for the region.

New Technology

- Mobility as a Service: This concept (MaaS) is the integration of a range of public and private shared use transportation modes (e.g., public transit, ride-share, car-share, bike-share, taxi) into one application platform that allows the user to plan, book and pay for a trip through a single channel. Key to the development and deployment of a MaaS application is ensuring

that the application is an open platform that offers all information and mobility options available to a user.

- *Smart Transportation Systems*: The application of technologies (computers, electronic sensors and communication devices) in transportation to can improve safety and save time, money and energy. New developments in the convergence of automation, connectivity, electrification, and shared use mobility will provide opportunities to create a regional network of “smart” corridors that improve safety and reliability through the use of technology such as automated incident detection systems, vehicle-to-roadside communication systems, intersection cameras and real-time information on road conditions, real-time bus arrival times, and transit signal priority.
- *Regional Road Safety Plan*: Development of a coordinated regional approach to enhance road safety for all road users. For example, based on results in other jurisdictions, an aggressive expansion of intersection safety cameras for both red light and speed enforcement across the region would achieve a significant reduction in casualty crashes.⁵ Coordination would be required with the Province, as the current red light camera and automated speed enforcement programs are within provincial jurisdiction.

Funding

- *Mobility Pricing*: This concept refers to a suite of fees for using transportation services such as transit fares and road usage charges. The City’s OCP supports a shift to a more equitable user-pay system to manage travel demand at its source to reduce private vehicle trips. Mobility pricing on the road network would help generate funding to implement transportation improvements across the region, incentivize behaviour change and shift taxation away from the fuel sales tax, which is a declining revenue source due to increased vehicle efficiency and growing electric vehicle sales.

In May 2018, the Mobility Pricing Independent Commission released a report that suggested principles for formulating a mobility pricing policy and descriptions of two high-level concepts: point charge and distance-based charge. As the City would be concerned with a point charge system at crossings, further assessment is required regarding affordability and equity impacts.

- *Ride-Hailing*: A number of studies conducted in US cities have found that ride-hailing services have led to increased congestion, higher traffic fatalities and declines in transit ridership.⁶ The City of Vancouver’s feedback to the Province regarding ride-hailing legislation includes exploration of a regional per trip levy to help minimize congestion that would be directed back towards transit and active transportation improvements. Such a fee should become part of a future larger mobility pricing framework within the region.

⁵ An automated speed enforcement pilot program in Saskatchewan reduced vehicle speeds by 17% and speed related casualty collisions by 63%. Quebec reported reduced average speeds by 13.3 km/h and crashes by 15% to 42%.

⁶ Disruptive Transportation: The Adoption, Utilization, and Impacts of Ride-Hailing in the United States, University of California Davis, October 2017. The New Automobility: Lyft, Uber and the Future of American Cities, Schaller Consulting, July 2018.

Financial Impact

None.

Conclusion

TransLink is seeking input from local municipalities for Phase 1 of the development of Transport 2050, which is the update of the current Regional Transportation Strategy (Transport 2040). This report identifies a number of ideas and concepts to improve Metro Vancouver's transportation system in line with local and regional goals to increase sustainable travel modes. Staff recommend that this report be forwarded to TransLink for consideration. With Council endorsement, staff will promote the ideas and concepts throughout the multi-phase Transport 2050 process.



Joan Caravan
Transportation Planner
(604-276-4035)
JC:jc

- Att. 1: Transport 2050 Phase 1 Consultation – Ideas for Richmond
- Att. 2: Types of Rapid Transit Technologies
- Att. 3: Transport 2040 – Concept of Future Frequent Transit Network

Transport 2050 Phase 1 Consultation - Ideas for Richmond



Types of Rapid Transit Technologies



Bus Rapid Transit

About BRT

Driver-operated bus technology that provides faster, more frequent and more reliable service than conventional bus service such as B-Line or even frequent bus service. Unique branding sets BRT apart, making the system easy to identify and reflecting community character.

Power source: Diesel, compressed natural gas (CNG) or hybrid diesel-electric. Electric trolley buses can be used with overhead lines.

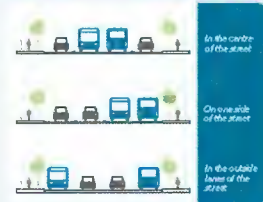
Right of way: Typically operates in the street but in separate lanes from other traffic at an average speed of 30 km/h. Most BRT systems run on the surface; however, they can also run in tunnels or on elevated structures.

Frequency: Typically high; as frequent as every 2 minutes. Dedicated lanes, moderately spaced stops and signal priority at intersections improve travel time and reliability.

Capacity: Typically medium; up to 3,500 passengers per hour per direction.

Vehicles: Typically 18 meter-long articulated buses. Vehicles use low-floor, kneeling technology and/or ramps for easy and universal accessibility.

Typical Operating Environments



BRT examples from around the world

BRT systems are in operation around the world in cities such as Ottawa, Toronto, Curitiba and Lyon.



Light Rail Transit

About LRT

Driver-operated rail technology using trains that utilize unique vehicle and station design to help the system integrate into the communities it serves.

Power source: Electric power from overhead lines.

Right of way: Typically operates in the street, but in separate lanes from other traffic at an average speed of 30 km/h. Most LRT systems run on the surface; however, they can also run in tunnels or on elevated structures.

Frequency: Typically high; as frequent as every 2 minutes. Dedicated rights of way, widely-spaced stops in lower-density areas and signal priority at intersections improve travel time and reliability.

Capacity: Typically high; up to 15,000 passengers per hour per direction.

Vehicles: Light Rail Vehicles (LRVs) range in size from 25 - 80 m long and can operate singly or in trains of up to four cars. Vehicles and platforms are designed to allow level boarding for easy and universal accessibility.

Typical Operating Environments



LRT examples from around the world

LRT systems are in operation around the world in cities such as Portland, Houston, Paris, Berlin and Lyon.



Rail Rapid Transit

About RRT

Driver-operated or driverless rail technology that has a high passenger capacity. RRT operates completely separated from other traffic, which improves travel time and reliability.

Power source: Electric power from a rail beside the track.

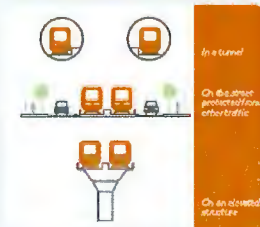
Right of way: Typically operates in a tunnel or on an elevated structure at an average speed of 40 km/h. Surface level operation is possible, however, it must be fully segregated for safety.

Frequency: Typically high; as frequent as every 2 minutes. Complete segregation from other traffic provides fast and reliable journeys.

Capacity: Typically high; Metro Vancouver's SkyTrain system is built to carry up to 25,000 passengers per hour per direction. Other systems around the world use different vehicles and operations to accommodate more passengers.

Vehicles: Mark II SkyTrain vehicles are 17 m long per car and can operate in 2- or 4-car trains. 3- and 5-car trains are possible in the future. Vehicles and platforms are designed to allow level boarding for easy and universal accessibility.

Typical Operating Environments



RRT examples from around the world

Metro Vancouver's Canada Line and SkyTrain are smaller examples. Large-scale RRT systems are found in major cities worldwide, including Toronto, New York, London, Tokyo, and Beijing.



Common features of rapid transit systems



Some examples of common features include:

- Stations are sheltered and feature ticket vending machines, closed circuit TV for security, real-time information and wayfinding.
- Tickets or electronic fare media are purchased off the vehicle (in future, more efficient boarding).
- Multiple doors and level boarding make getting on and off rapid transit vehicles faster, more efficient, and universally accessible.
- Systems can be designed to integrate with the communities they serve, including station locations and how the vehicles and vehicles look.

Transport 2040: Concept of Potential Frequent Transit Network



Concept of Potential Frequent Transit Network




City of Richmond

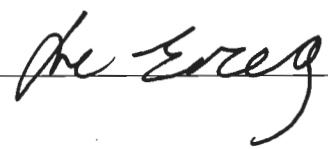

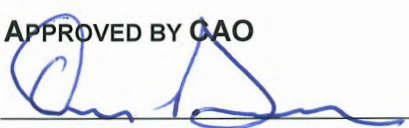
Report to Committee

To: Public Works and Transportation Committee **Date:** August 6, 2019
From: Lloyd Bie, P.Eng.
Director, Transportation **File:** 10-6450-19-01/2019-
Vol 01
Re: **Amendment to Traffic Bylaw No. 5870 to Establish a Fee for Issuance of
Permits related to Use of City Streets**

Staff Recommendation

1. That Traffic Bylaw No. 5870, Amendment Bylaw No. 10076, to establish a fee for the issuance of permits to external agencies for the processing of traffic management plans and lane closure requests, be introduced and given first, second and third reading.
2. That Consolidated Fees Bylaw No. 8636, Amendment Bylaw No. 10079, which quantifies the fee for the issuance of various permits established in Traffic Bylaw No. 5870, be introduced and given first, second and third reading.


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

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Law	<input checked="" type="checkbox"/>	
Engineering	<input checked="" type="checkbox"/>	
Finance	<input checked="" type="checkbox"/>	
Community Bylaws	<input checked="" type="checkbox"/>	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: 	APPROVED BY CAO 

Staff Report

Origin

This report proposes an amendment to Traffic Bylaw No. 5870 to enable cost recovery to the City pursuant to the issuance of permits to external agencies for the processing of traffic management plans and lane closure requests.

This report supports Council's Strategic Plan 2018-2022 Strategy #5 Sound Financial Management:

5.1 Maintain a strong and robust financial position.

Analysis

Proposed New Fee for Issuance of Permits for Use of City Streets

The City regularly receives requests from external agencies such as developers and utility contractors to accommodate work within City road rights-of-way. As Section 6.2 of the Traffic Bylaw requires the issuance of a City permit for such work, considerable staff resources are expended related to the review and processing of traffic management plans and lane closure requests to support issuance of the permit. Over the 2015-2018 period, staff processed an annual average of 1,090 applications, each requiring approximately one to two hours of staff time. The trend is increasing and based on applications received to date, staff project a total of approximately 1,400 requests for 2019.

Currently, the City does not charge a fee for this service, resulting in significant impacts to staff resources by limiting the ability to address other customer concerns and City priorities. A review of the City's peer municipalities indicates that all surveyed cities charge a fee towards permit processing and administration costs (Table 1).

Table 1: Lane Closure Permit Fees in Peer Municipalities

Municipality	Permit Fee
Surrey	\$85.00
Vancouver	\$62.30
Coquitlam	\$75.00
Burnaby	\$103.00
Delta	\$101.00

Based on the average staff time to process an application and the average permit fee of other surveyed municipalities, staff propose a fee of \$100.00. The proposed fee will apply to permits issued pursuant to all works undertaken by external agencies for private or utility works that require traffic control on City road rights-of-way, which account for an average of 96% of all applications. The proposed fee will not apply to the balance of the applications related to City capital works projects that are conducted by either City forces or contractors hired by the City to perform the works for the City.

The proposed fee will allow an expanded and appropriate allocation of staff resources thereby improving customer service related to the processing of traffic management plans and lane closure requests.

Implementation of Proposed New Fee

The permit fee is proposed to be effective the first day of the first month following final adoption of the Amendment Bylaw. Staff will update on-line forms and post an information bulletin on the City's website to advise of the new fee. Staff recommend adding the fee as a schedule to the Consolidated Fees Bylaw No. 8363 to enable the fee to be adjusted annually based on projected Vancouver Consumer Price Index increases.

Existing Permit Fees for Use of City Streets

The City currently collects fees for the issuance of the following permits for the use of City roads per Traffic Bylaw No. 5870:

- Containers: \$30.00 per day for the temporary placement of a container.
- Shared Vehicle Parking: \$300.00 annual fee for the reserved use of an on-street parking space for a shared vehicle (i.e., car-share vehicle).
- Oversize/Overweight Vehicle Trips: \$25.00 per vehicle for a single trip permit and \$100.00 per vehicle for a multiple trip permit.
- Building Moves: \$50.00 per building move plus \$25.00 for any re-issuance of the permit required as a result of requested changes to the original permit.
- Construction Loading Zones: \$300.00 plus \$30.00 per day and \$0.25 per metre of roadway to which the permit applies per day for the duration of the permit.

As the fees for existing permits issued by the City reflect cost recovery and are generally consistent with other municipalities in the region for the same services, staff do not propose any revisions to the existing fees. Staff recommend removing the existing fees described above from Traffic Bylaw No. 5870 and adding them as a schedule to the Consolidated Fees Bylaw No. 8636 to enable the fees to be adjusted annually based on projected Vancouver Consumer Price Index increases.

Housekeeping

The amendment bylaw will also address the following two housekeeping items for Traffic Bylaw No. 5870:

- Misspelling of "Highway": Correction of spelling error found in the title of Part V (Traffic Under Special Highway Conditions) and the title of Section 27 (Spilling of Vehicle Loads on Highways; Securing of Loads); and
- Update of Provincial Traffic Control Manual: Section 18.4 references the Ministry of Transportation and Highway's "Traffic Control Manual for Work on Roadways – June 1991." This clause will be revised to reference the Ministry of Transportation and Infrastructure's updated "2015 Interim Traffic Management Manual for Work on Roadways."

Financial Impact

For the proposed new fee, an annual average of approximately \$110,000 could be recovered given the proposed permit fee of \$100.00 and the processing of the estimated annual average of 1,100 total applications (2015 to 2019) for lane closure requests from external agencies. The Operating Budget will be adjusted to reflect this accordingly.

Conclusion

The processing of applications and issuance of permits to external agencies to conduct works in City road rights-of-way is time-consuming and projected to increase year-over-year. The proposed bylaw amendments enable cost recovery to the City for the issuance of permits related to the processing of traffic management plans and lane closure requests, which in turn will allow an expanded and more efficient allocation of staff resources to better support the City's vision.



Joan Caravan
Transportation Planner
(604-276-4035)



Cameron Robertson
Traffic Technician 2
(604-276-4388)

JC:jc



**Traffic Bylaw No. 5870
Amendment Bylaw No. 10076**

The Council of the City of Richmond enacts as follows:

1. **Traffic Bylaw No. 5870**, as amended, is further amended by adding a new Section 6.3 as follows, and renumbering subsequent sections accordingly:

6.3 The **General Manager, Engineering & Public Works** is hereby authorized to charge a fee for permits issued pursuant to Section 6.2 above in the amount set out from time to time in the *Consolidated Fees Bylaw No. 8636*.

2. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting Section 9A.3(c) and replacing it with the following:

9A.3(c) The **General Manager, Engineering & Public Works** is hereby authorized to charge a fee for permits issued pursuant to Section 9A above in the amount set out from time to time in the *Consolidated Fees Bylaw No. 8636*.

3. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting Section 12C.4 and replacing it with the following:

12C.4 The **General Manager, Engineering & Public Works** is hereby authorized to charge a fee for permits issued pursuant to Section 12C.1 above in the amount set out from time to time in the *Consolidated Fees Bylaw No. 8636*.

4. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting the title of PART V and replacing it with the following:

PART V – TRAFFIC UNDER SPECIAL HIGHWAY CONDITIONS

5. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting Section 18.4 and replacing it with the following:

18.4 The Council hereby approves the appropriate designs set out in the “2015 Interim Traffic Management Manual for Work on Roadways,” as published by the Provincial Ministry of Transportation and Infrastructure, as signs to be used by the **General Manager, Engineering & Public Works** when acting pursuant to Subsections 18.1 and 18.2 of this Bylaw.

6. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting Section 25.1 and replacing it with the following:

25.1 The **General Manager, Engineering & Public Works** is hereby authorized to charge a fee for permits issued pursuant to Section 24 above in the amount set out from time to time in the *Consolidated Fees Bylaw No. 8636*.

7. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting Section 27 and replacing it with the following:

27. SPILLING OF VEHICLE LOADS ON HIGHWAYS; SECURING OF LOADS

8. **Traffic Bylaw No. 5870**, as amended, is further amended by deleting Section 42.2(b) and replacing it with the following:

42.2(b) The **General Manager, Engineering & Public Works** is hereby authorized to charge a fee for permits issued pursuant to Section 42.1 above in the amount set out from time to time in the *Consolidated Fees Bylaw No. 8636*.

9. This Bylaw is cited as "**Traffic Bylaw No. 5870, Amendment Bylaw No. 10076.**"

FIRST READING

SECOND READING

THIRD READING

ADOPTED

MAYOR

CORPORATE OFFICER

CITY OF RICHMOND
APPROVED for content by originating dept. <i>U3</i>
APPROVED for legality by Solicitor <i>LB</i>



**Consolidated Fees Bylaw No. 8636
Amendment Bylaw No. 10079**

The Council of the City of Richmond enacts as follows:

1. The **Consolidated Fees Bylaw No. 8636**, as amended, is further amended by adding Schedule A attached to and forming part of this bylaw as a schedule to Consolidated Fees Bylaw No. 8638, in alphabetical order.
2. This Bylaw is cited as “**Consolidated Fees Bylaw No. 8636, Amendment Bylaw No. 10079.**”

FIRST READING

SECOND READING

THIRD READING

ADOPTED

MAYOR

CORPORATE OFFICER

CITY OF RICHMOND
APPROVED for content by originating dept. <i>CS</i>
APPROVED for legality by Solicitor <i>Ac</i>

SCHEDULE – USE OF CITY STREETS**Traffic Bylaw No. 5870**

Obstruction of Traffic – Traffic Management Plan Review and Lane Closure Permit
Section 6.3

Description	Fee
Application Review Fee	\$100.00

Traffic Bylaw No. 5870

Containers – Temporary Placement Permit
Section 9A

Description	Fee
Permit Fee	\$30.00 per day

Traffic Bylaw No. 5870

Shared Vehicle Parking Space – Permit
Section 12C

Description	Fee
Permit Fee	\$300.00 per year

Traffic Bylaw No. 5870

Oversize Vehicles and Building Moves – Permit
Section 25.1

Description	Fee
Individual Vehicle Trip	\$25.00
One Vehicle for More than One Trip	\$100.00
One Building Move	\$50.00
Re-issuance of Building Move Permit as a Result of Changes Requested to Original Permit	\$25.00

Traffic Bylaw No. 5870

Construction Zones – Permit
Section 42.1

Description	Fee
Permit Fee	\$300.00
* per day *Plus	\$30.00
** per metre of roadway to which permit applies, per day **Plus	\$0.25



City of Richmond

Report to Committee

To: Public Works and Transportation Committee **Date:** August 16, 2019
From: Jason Ho, P.Eng.
Manager, Engineering Planning **File:** 10-6060-01/2019-Vol 01
Re: **Ageing Utility and Road Infrastructure Planning – 2019 Update**

Staff Recommendation

That the staff report titled, "Ageing Utility and Road Infrastructure Planning – 2019 Update", dated August 16, 2019, from the Manager, Engineering Planning be utilized as input in the annual utility rate review and budget process.

Jason Ho, P.Eng.
Manager, Engineering Planning
(604-244-1281)

Att. 6

REPORT CONCURRENCE		
ROUTED TO:	CONCURRENCE	CONCURRENCE OF GENERAL MANAGER
Finance Department	<input checked="" type="checkbox"/>	
Roads & Construction	<input checked="" type="checkbox"/>	
Sewerage & Drainage	<input checked="" type="checkbox"/>	
Water Services	<input checked="" type="checkbox"/>	
Transportation	<input checked="" type="checkbox"/>	
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: 	APPROVED BY CAO

Staff Report

Origin

Staff have previously reported to Council on the estimated long-term capital requirements for age-related infrastructure renewal on a biennial basis. The last report was brought forward in 2017. This report updates those estimates to reflect current inventory, new inspection data, evolving theory on infrastructure service life, and changing infrastructure replacement pricing.

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.

1.2 Future-proof and maintain city infrastructure to keep the community safe.

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.

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 the City has the capacity to meet the financial challenges of today and the future, while maintaining current levels of service.

The ageing utilities and roads infrastructure analysis is based on typical or standard service life for specific types of infrastructure, modified based on the City's experience. There are a number of 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 sanitary, drainage, water and pavement management computer models to predict infrastructure performance, upgrade needs, 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 to meet the respective service level defined by Council. For example, the defined service level for drainage infrastructure is the 10-year storm. With climate change, the rainfall volume and intensity of the 10-year storm is increasing; therefore, replacement infrastructure typically needs to be larger to maintain the service levels. Table 2 identifies current capital funding levels, funding sources, and reserve balances.

Staff have reported ageing infrastructure assessments to Council in 2001, 2006, 2011, 2013, 2015 and 2017. The 2001 and 2006 reports to Council identified that infrastructure replacement funding levels were insufficient to maintain existing service levels over the long term. The 2006 report proposed a number of strategies to address funding shortfalls, and a strategy of gradual rate increases to close the identified funding gaps was adopted. Substantial progress has been made since 2006.

Long-term funding requirements have been updated to reflect changes in infrastructure replacement pricing, inventory changes through growth or capacity improvements, new inspection data, and evolving estimates of infrastructure service life.

Table 1. Infrastructure Inventory

Infrastructure	Components	Funding Source	Replacement Value (2019 Dollars)
Water	634 km Pipes 13 PRV Chambers 56 Valve Chambers	Water Utility	\$800M
Sanitary	569 km Pipes 153 Pump Stations	Sanitary Utility	\$705M
Drainage and Diking	585 km Pipes 39 Pump Stations 61 km Culverts 165 km Watercourses 49 km Dikes	Drainage & Diking Utility	\$1,748M ¹
Roads and Road Assets (Non-MRN)	1285 lane km asphalt 12 Bridges ² 11,551 street lights ³	General Revenue	\$796M
Total			\$4,049M

¹ Includes the cost to upgrade the City's perimeter dike to maintain flood protection service levels with sea level rise.

² Includes only bridge structures managed by the City's Engineering & Public Works department outside of the Major Road Network (MRN). Structures maintained by the City's Parks department are excluded.

³ Excludes BC Hydro lease lights not maintained by the City.

Table 2. Annual Capital Infrastructure Funding and Reserves

Infrastructure Type	2019 Funding	Funding Source	Uncommitted Reserve Balance (July 31, 2019)
Water	\$7.5M	Water Utility	\$44.9M
Sanitary	\$5.3M	Sanitary Utility	\$33.5M
Drainage and Diking	\$12.1M ¹	Drainage & Diking Utility	\$25.7M
Road and Road Assets (non-MRN)	\$5.0M	General Revenue	N/A
Total	\$29.9M		\$104.1M

¹ \$12.1 million is collected from the Drainage and Diking Utility. \$11.6 million is directed towards drainage and diking capital works while \$500,000 is directed towards provision accounts to fund the dyke repair and box culvert maintenance programs.

Water, sanitary, and drainage and diking assets have independent utility funding streams. Required funding levels are assessed as part of this report and achieved through the annual utility rate review process. 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 lighting 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 road infrastructure over the next 100 years have been estimated and graphed in Attachments 1 to 4. The charts also show current funding levels as well as the estimated long-term average annual funding levels (in 2019 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 be reviewed every two years to identify and integrate changes in construction costs.

The current analysis indicates that construction cost increases have been significant in recent years. Recent iterations of ageing infrastructure analysis utilized the consumer price index (CPI) to account for construction cost increases; however, construction cost inflation has been well above CPI and this trend has persisted for several years. 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 funding levels, which is due to a number of variables, including:

- potential overlap between capacity-based improvements due to development or climate change;

- variability in the potential service life of the infrastructure;
- variability in the 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 funding requirement of \$9.2 million (Attachment 1) for the City's water infrastructure. Since 2001, Council has endorsed increases in annual Water Utility funding from \$3.0 million to its current level of \$7.5 million. Achieving the long-term annual 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 watermain.

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 aggressive soil conditions. Approximately 38% of the City's watermains are AC pipes. Since 2011, the watermain replacement program has replaced 59 km of AC pipes, which is approximately 19% 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. Between 2060 and 2080, replacement costs may exceed the long-term required funding level and, as a result, may require utilization of reserves and borrowing. In the long term, reaching the required funding level will repay debts incurred and allow for continued water infrastructure renewal.

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.

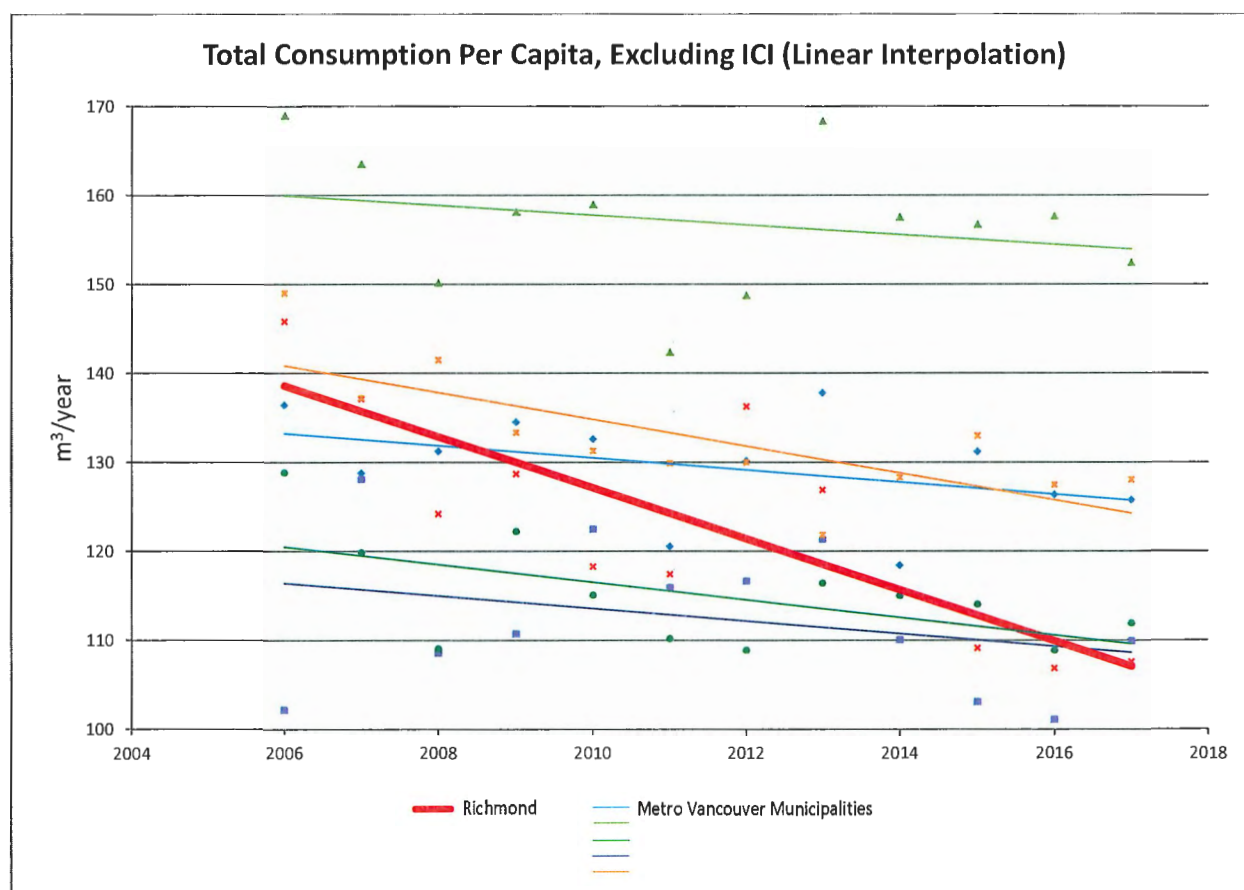
The City's water meter program is funded through the Water Utility and has been very successful. To date, 100% of single-family, 46% of multi-family, and 100% of industrial, commercial and institutional (ICI) properties have been metered. One of the benefits of water metering is the ability to identify property-side water leakage and provide incentives for leak repair. Since 2015, 573 properties have repaired leaks and applied for leak rebates, totalling approximately 940,000 m³ in annual leak reduction. This represents \$683,000 in annual savings on Metro Vancouver water purchases. The fixed base meter reading network will be universally deployed this year 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.

Figure 1 shows the total consumption per capita, excluding ICI, for Richmond and neighbouring (mainly unmetered) municipalities since 2006. ICI consumption has a significant effect on total consumption per capita, typically accounting for one-third of a municipality's total consumption.

An ICI property that reduces or shuts down its production would artificially give the perception that individual water consumption has decreased. The analysis shown in Figure 1 removes the variability of ICI consumption and provides a more accurate illustration of residential consumption and water savings from residential water metering.

As illustrated, Richmond is reducing consumption at a much greater rate than unmetered municipalities. This is strong evidence that water metering is effective for reducing consumption, likely through leak identification and reduction, as well as behavioural changes and conservation.

Figure 1. Comparison of Total Consumption Per Capita, Excluding ICI



As illustrated in Figure 1, Richmond is reducing consumption at a much greater rate than unmetered municipalities. This is strong evidence that water metering is effective for reducing consumption, likely through leak identification and reduction, as well as behavioural changes and conservation.

Sanitary

Staff estimate a long-term annual funding requirement of \$8.4 million for the Sanitary Utility (Attachment 2). Sanitary Utility funding has increased from \$0.5 million annually in 2001 to a current funding level of \$5.3 million annually. While current funding levels are adequate for short- to medium-term sanitary infrastructure replacement needs, the funding shortfall defers the

financial obligation to future years, which will place additional burden on future rate payers. As such, bridging the funding gap will be an important consideration for future utility budgets.

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 in excellent condition and identified defects that have been addressed proactively through the capital program. The next cycle of assessments will begin in the next few years.

In the past 15 years, the City has constructed seven new sanitary pump stations, rebuilt four sanitary pump stations, performed upgrades on 13 sanitary pump stations and installed new pumps at 69 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 are currently reviewing opportunities for implementing grease extraction facilities in the City's sanitary sewer system to address the issues of grease build-up.

Drainage and Diking

Drainage

The required drainage 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 61 km 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. Failed joints, if left unrepaired, ultimately lead to box culvert and roadway failure. Staff are proactively managing the condition of box culverts by identifying and repairing deteriorating joints early on to extend the lifecycle of the culverts and minimize long-term replacement costs. Council has supported a number of capital projects related to box culvert repairs. Over the past four years, approximately \$7.4 million have been allocated to repairs of failed box culverts.

As part of the 2017 Utility Budgets and Rates, Council supported the implementation of a box culvert preventative maintenance program that inspects the box culverts on a 7-year cycle. Through this program, staff perform minor repairs and identify culverts that require significant repair, lining or replacement. Information collected through this program is used to inform future capital programs and update funding levels required to maintain the City's box culverts.

In October 2017, the City was awarded grant funding to be used for flood mitigation planning, which involved a condition assessment for its 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 due to market conditions.

Over the past 15 years, the City has rebuilt and performed significant upgrades for 11 of 39 drainage pump stations. The Horseshoe Slough pump station is currently under construction and is expected to be complete by the end of 2019. The City's capital program includes six 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 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 pump station upgrades, storm sewer maintenance and upgrades, laneway drainage, agricultural drainage, agricultural irrigation and implementation of stormwater retention infrastructure.

Diking

The City is on average one meter above mean sea level and protected by 49 km of dike. Climate change scientists estimate that sea levels will rise by 1.0 m by 2100 and 0.2 m of subsidence is expected over the same time period. To accommodate climate change-induced sea level rise and ground subsidence, the Dike Master Plans are used to guide the City's dike raising efforts. The City's target dike elevation for 2100 is 4.7 m geodetic (approximately 1.2 m above current elevations) with the ability to increase to 5.5 m geodetic.

The Flood Protection Management Strategy 2019 (FPMS 2019), endorsed by Council on June 24, 2019, provides updated information on climate change science and strategies to further improve Richmond's flood protection program. A key action in the FPMS 2019 implementation program is to continue upgrades to the City's perimeter diking system. Dike Master Plan Phases 1, 2, 3 and 5 have been completed, and Dike Master Plan Phase 4 is anticipated to be completed and presented for Council consideration within the next year.

Following the recommendations from Dike Master Plan Phase 1, staff utilized grant funding to complete preliminary geotechnical and concept assessments to inform the Steveston Island dike alignment. Findings from this assessment were presented to Council for information and staff will continue to work on acquiring land tenure, completing detailed assessments and establishing strategic partnerships.

The FPMS 2019 addresses anticipated climate change impacts and further indicates that Richmond will need to improve its dike network in advance of sea level rise. There is considerable variability in climate change science on the rate of sea level rise. Latest information from the United States Department of Commerce National Ocean Service Center indicates that there is a 17% probability of 1.0 m of sea level rise by 2100 in the business-as-usual scenario (continued greenhouse gas generation) and a 96% chance that 0.5 m of sea level

rise will be realized under the same scenario. It also indicates that significantly lower levels of sea level rise can be facilitated through global reductions in greenhouse gas production.

The Ministry of Forest, Lands and Natural Resource Operations and Rural Development identifies a range of 0.5 m to 1.4 m of sea level rise by 2100 in their 2011 Climate Change Adaptation Guidelines for Sea Dikes and Coastal Flood Hazard Land Use. Forecasts generally agree that the City can expect a minimum of 0.5 m of sea level rise by 2100 but have less certainty regarding more rapid levels of sea level rise.

Climate change science also indicates that while snow packs may decrease in the future, there is uncertainty in the melting rates and subsequent impact on river flows. The high water design event for 80% of Richmond's dikes is based on king tide and storm surge, while the remaining 20% (eastern end of Lulu Island) is based on freshet; therefore, the City's long-term dike raising strategy will largely be based on sea level rise. The current strategy to address this risk is based on raising the dikes by 1.2 m, and the specific timing and scope of work will adjust as climate change science advances and new information becomes available.

Drainage and Diking Funding

In 2003, Council endorsed the introduction of the Drainage and Diking Utility. Since 2003, Council has approved increasing annual funding levels for Drainage and Diking from \$0.6 million to its current level of \$12.1 million in 2019. However, climate change-induced sea level rise is an emerging issue and implementation of the Dike Master Plan will require additional allocations to dike improvements. Drainage and diking improvements are interconnected and, while there are synergies, additional funding to meet long-term needs is required.

The high-level estimated cost to upgrade the dike to address the predicted 2100 sea level rise scenario is \$420 million. This value is higher than previously noted, as more detailed assessments have been completed, and reflects increased seismic mitigation and regulatory requirements, as well as construction cost inflation due to current market conditions. Consistent with previous reports and the current funding strategy, a minimum of 50% in funding assistance from senior government grants and partnerships is being pursued to perform the upgrades in the required timespan.

Provided senior government grants can be obtained, the City's share of dike raising costs will be \$2.5 million to \$7.6 million per year, depending on the realized rate of sea level rise. In 2019, the City received \$13.8 million in grant funding from the Disaster Mitigation and Adaptation Fund for multi-year drainage and diking improvements. Staff will continue to look for opportunities to secure additional funding sources for flood protection work.

Historically, the City has seen significant cost savings and effective dike improvements through development along the dike corridor. An estimated 10% 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 funding from the City.

Staff estimate a long-term annual funding requirement of \$19.5 million for drainage and diking infrastructure and the City currently allocates \$12.1 million from the Drainage and Diking

Utility, which is below the target range. Based on the above, it is recommended that the Drainage and Diking Utility be increased gradually over the long term. Future Ageing Utilities Infrastructure reporting will continue to update Council on the progress of grant funding, developments and their impact on overall diking improvement funding requirements.

As identified in Attachment 3, the forecasted drainage and diking improvement requirement over the next ten years is approximately \$14.2 million. Within this timeframe, the City will gain more certainty regarding the rate of sea level rise. However, Council should consider incremental increases to the Drainage and Diking Utility Rate to prepare for sea level rise scenarios beyond the minimum and meet the long-term drainage and diking needs. This would correspond with strong feedback received through the public consultation process for the FPMS 2019, where there was strong support for increasing flood protection fees to accelerate the flood protection program. Staff will bring forward funding options and capital projects for Council's consideration as part of the utility rates process and capital planning process that address the long-term dike funding gap and facilitate implementation of the Dike Master Plan ahead of predicted sea level rise.

Road and Road Assets

Road Pavement

The City's Asphalt Re-Paving Capital Program re-paves sections of City-owned 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 \$5.0 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 funding requirements of the City's road network. Attachment 5 shows the fluctuating cost of asphalt paving between 2008 and 2018.

As identified in the March 29, 2017 report to Council 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 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. In 2017, approximately 200 street light poles in the Seafair and Richmond Gardens subdivisions were found to have reached the end of their 40-50 year service life and were replaced through phases 1 and 2 of the LED Replacement Capital Program. Phase 3 of the program was approved by Council in 2018 and Phase 4 is scheduled to be brought forward for Council's consideration in the 2020 – 2024 Roads Capital Plan. Staff note that there is currently no significant backlog of poles that require replacement.

Since the 2017 Ageing Infrastructure Report, staff have completed an evaluation on the City's street lighting inventory. The long-term annual funding requirement is approximately \$2.4 million for the replacement of street lighting systems, based on a service life consistent with the age of the deteriorated poles at Seafair and Richmond Gardens. Staff note that there could be significant variability in the deterioration of street lighting infrastructure and that the current analysis based on identified deterioration may be conservative. Additionally, decorative street lighting replacement is significantly more expensive than standard street lighting and adding decorative street lighting to the City's inventory will increase the cost associated with the replacement program. Going forward, the condition of street lighting systems nearing the end of their service life will be assessed to refine the recommended replacement strategy. Replacement projects will be brought forward through the capital program when poles requiring replacement are identified. Results of this assessment will be incorporated into future ageing infrastructure reporting.

Overpasses and Bridges

The City owns 12 overpasses and bridges, maintained by Engineering and Public Works that are non-MRN. These include:

- 5 roadway overpasses or bridges; and
- 7 pedestrian bridges.

A table listing of overpasses and bridges is included as Attachment 6.

Staff completed inspections on six of the City's non-MRN overpasses and bridges in 2013. Results of the inspection were used to update the City's capital program. In 2015, Council endorsed capital projects to rehabilitate the Bridgeport Road Overpass, Fraserside Gate Bridge and Woodward's Slough Bridge. Inspection of the remaining structures, which consists primarily of smaller pedestrian bridges, was completed in 2017. Results of the inspection have been used to update projections of annual funding requirements. Following this inspection cycle, it is recommended that bridge structures be inspected every one to five years, depending on the material, age and condition of the bridge. The completion of regular inspection and maintenance will extend the lifespan of the structure, thereby reducing overall lifecycle costs, as well as enhancing safety and comfort for users.

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 \$88 million. These structures are situated within the region's 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 has approved the MRN Structures Funding Program for the rehabilitation and seismic retrofit of structures for 2017 to 2019. City staff are participating on Translink's Operation, Maintenance and Rehabilitation Sub-Committee and will continue to work with TransLink to secure adequate bridge maintenance and rehabilitation funding.

Distributed assets, such as roadway paving and street lighting, require annual funding from General Revenue, which allows a percentage of the asset 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 6 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 funding of \$0.1 million is required for routine maintenance and inspection of bridge assets, and a total of \$63 million will be required over the next 100 years for major bridge rehabilitation and replacements.

Road and Road Asset Funding

The total long-term annual funding requirement for road and road assets is currently estimated to be \$8.4 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 in 2017 have been utilized by staff to confirm and inform paving recommendations for the City's existing and future capital paving programs. Staff will continue to bring forward paving program funding recommendations that will include on-going funding combined with one-time allocation of surpluses to meet the five year capital needs of the roadway paving program.

Private development servicing agreements contributes 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 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 re-investment 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 and two years of a five-year street light replacement program totaling \$252,000 for the first two years. The asset deterioration model indicates that these projects are the beginning of upgrade and replacement projects for overpasses bridges and street lighting assets.

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 funding levels from \$2.6 million to its current value of \$4.3 million. With the inclusion of in-kind contributions to roadway repaving programs through development, 2019 funding levels for road and road asset replacements is estimated at \$5.0 million. Roadway paving and street lighting assets are distributed assets that require ongoing dedicated 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 repaving and street lighting programs, and one-time bridge repair projects will be included in capital and operating programs for Council's consideration.

Required Funding Levels

Table 3 summarizes current and required annual infrastructure replacement funding levels, in 2019 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: Infrastructure Funding Levels

Infrastructure Type	2019 Funding Level	Required Annual Funding Level	Funding Range	Funding Source	Estimated Additional Funding Required
Water	\$7.5M	\$9.2M	\$8.6M - \$10.4M	Water Utility	\$1.7M
Sanitary	\$5.3M	\$8.4M	\$7.8M - \$9.1M	Sanitary Utility	\$3.1M
Drainage & Diking	\$12.1M	\$19.5M ¹	\$17.3M - \$20.4M	Drainage & Diking Utility	\$7.4M
Road and Road Assets (non-MRN)	\$5.0M	\$8.4M	\$7.5M - \$9.5M	General Revenue	\$3.4M
Totals	\$29.9M	\$45.5M			\$15.6M

¹Required funding may decrease upon the award of senior government grant funding.

Funding Strategies

Adequate annual funding levels will allow the City to implement proactive and sustainable infrastructure replacement programs. The proactive replacement of infrastructure enables the City to sequence utility replacement and use competitive bidding to ensure the best value for money. Replacing failed infrastructure has proven to be considerably more expensive and disruptive to residents and City services than proactive replacement.

Staff have pursued available federal and provincial grants from programs such as the Community Emergency Preparedness Fund and National Disaster Mitigation Program and will continue to do so. While grant funding has been helpful over the last few years, as a funding source, grants will always be unpredictable and therefore non-sustainable.

Development also facilitates significant infrastructure replacement that has a positive impact on the City's overall ageing infrastructure picture. 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 not considered as a sustainable resource for ageing utility infrastructure replacement.

Staff will present funding options and make a recommendation to Council as part of the annual utility rate review and budget process. Significant progress has been made over the last decade in closing the funding gap, and continuation on this path will allow the City to effectively mitigate the challenge of ageing infrastructure.

Financial Impact

None.

Conclusion

Staff will continue to gather information to further refine and update infrastructure replacement requirements and will continue to explore new technologies and best practices that will positively impact lifecycle infrastructure costs. 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 funding shortfalls outlined in this report should be considered in conjunction with the City's Long-Term Financial Management Strategy.

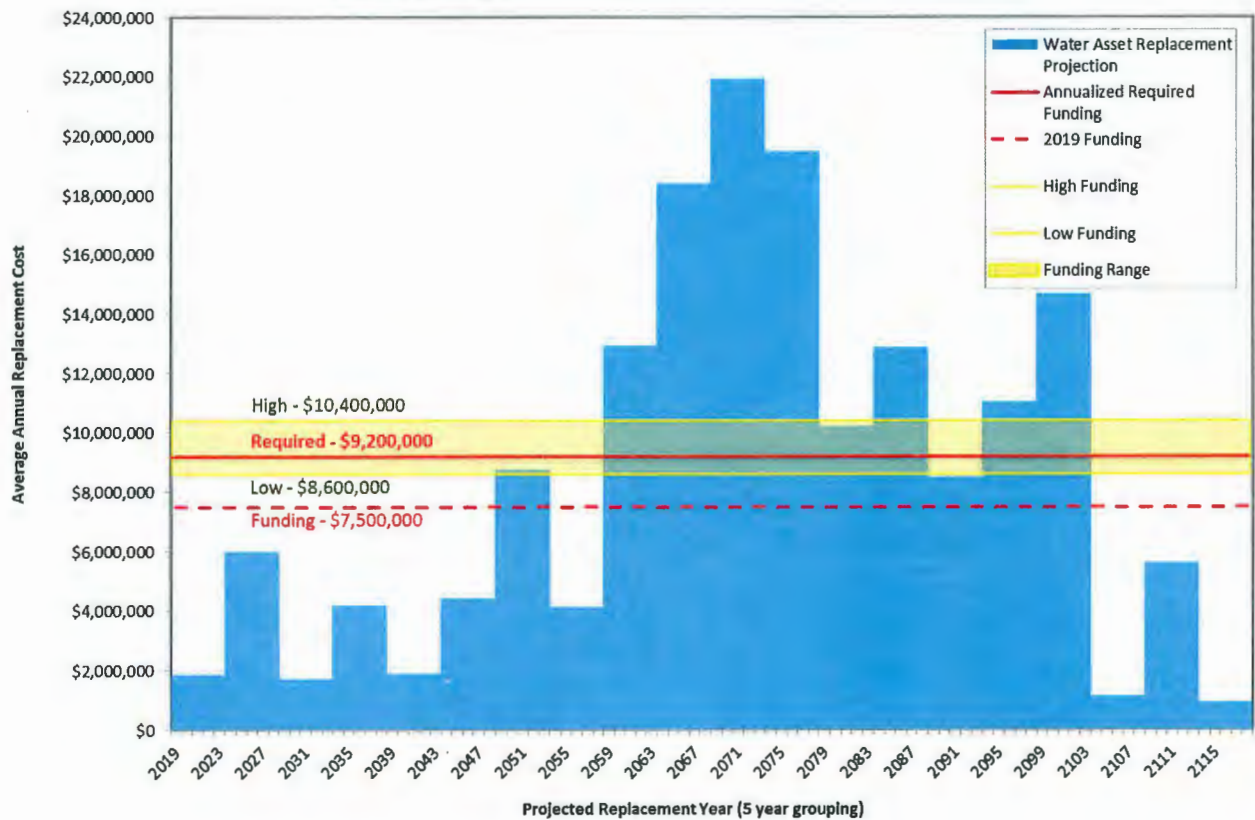


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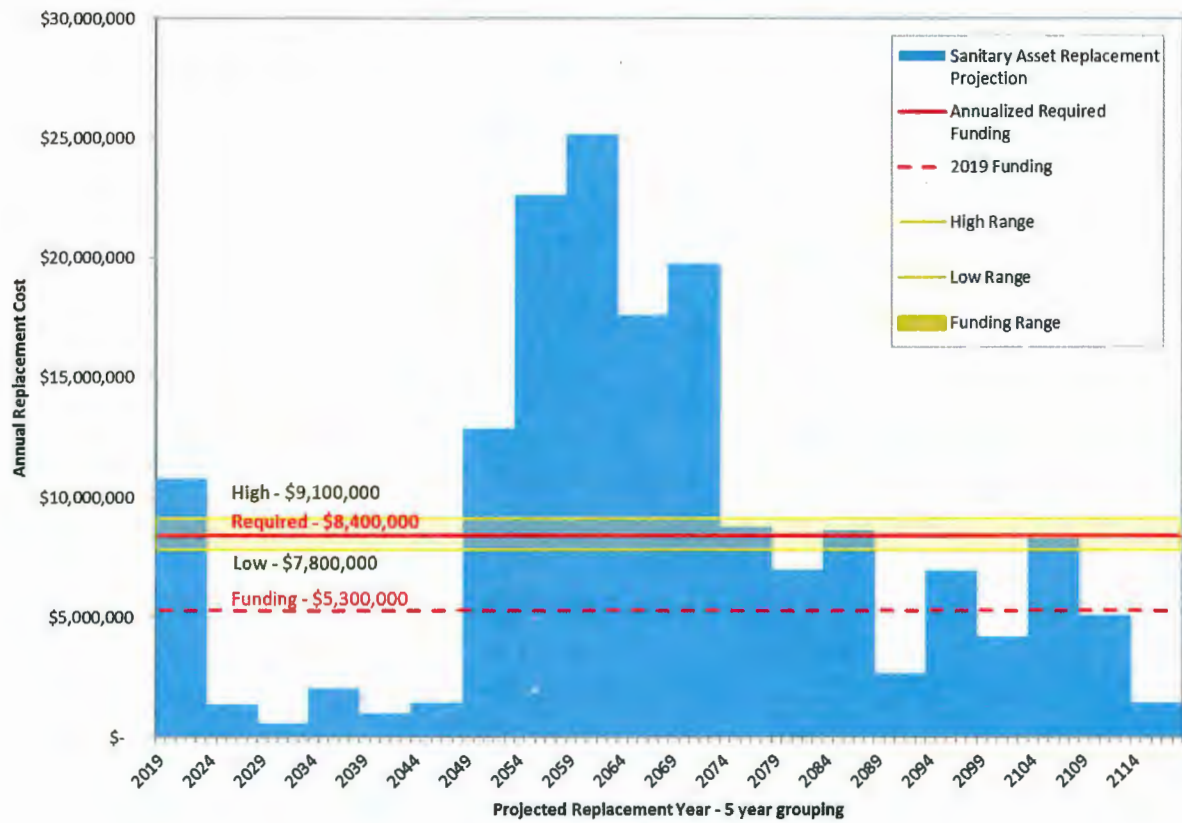
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- Att.1: 2019 Ageing Infrastructure Report – Water Assets
- Att.2: 2019 Ageing Infrastructure Report – Sanitary Assets
- Att.3: 2019 Ageing Infrastructure Report – Drainage & Diking Assets
- Att.4: 2019 Ageing Infrastructure Report – Road and Road Assets (non-MRN)
- Att.5: Historical Costs for Capital Paving Program (2008 – 2018)
- Att.6: Overpasses and Bridges

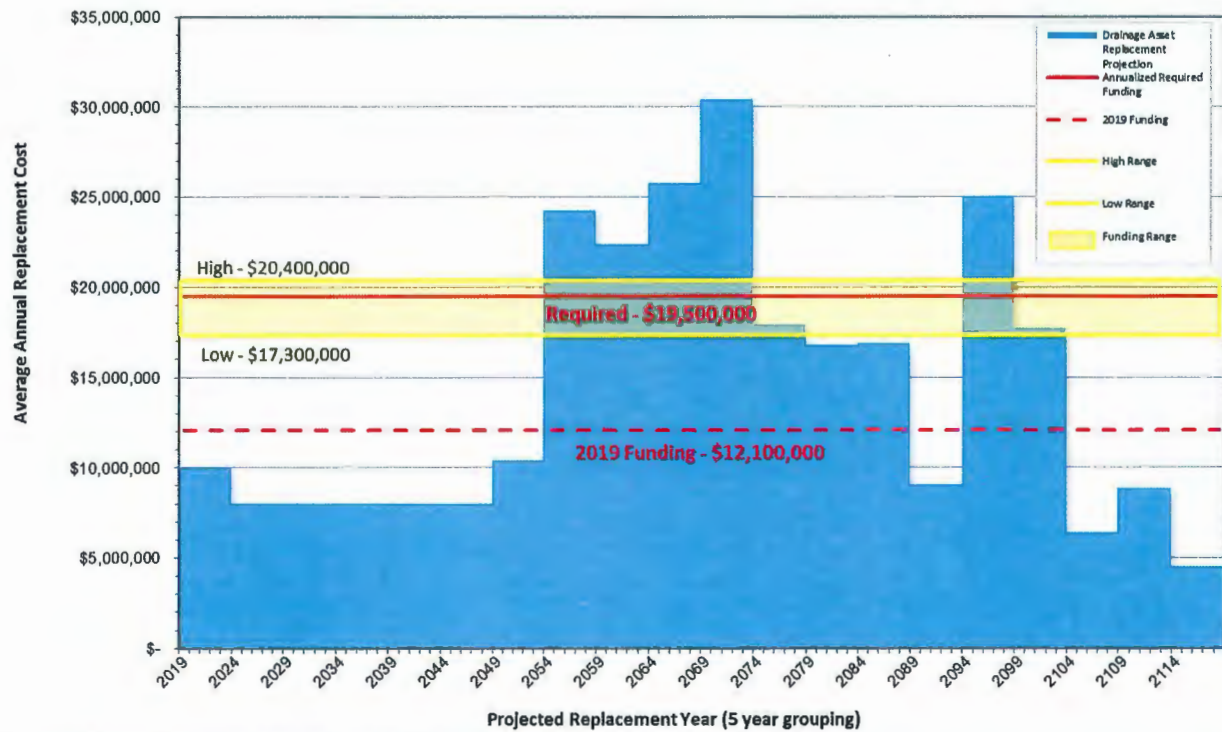
2019 Ageing Infrastructure Report - Water Assets



2019 Ageing Infrastructure Report - Sanitary Assets

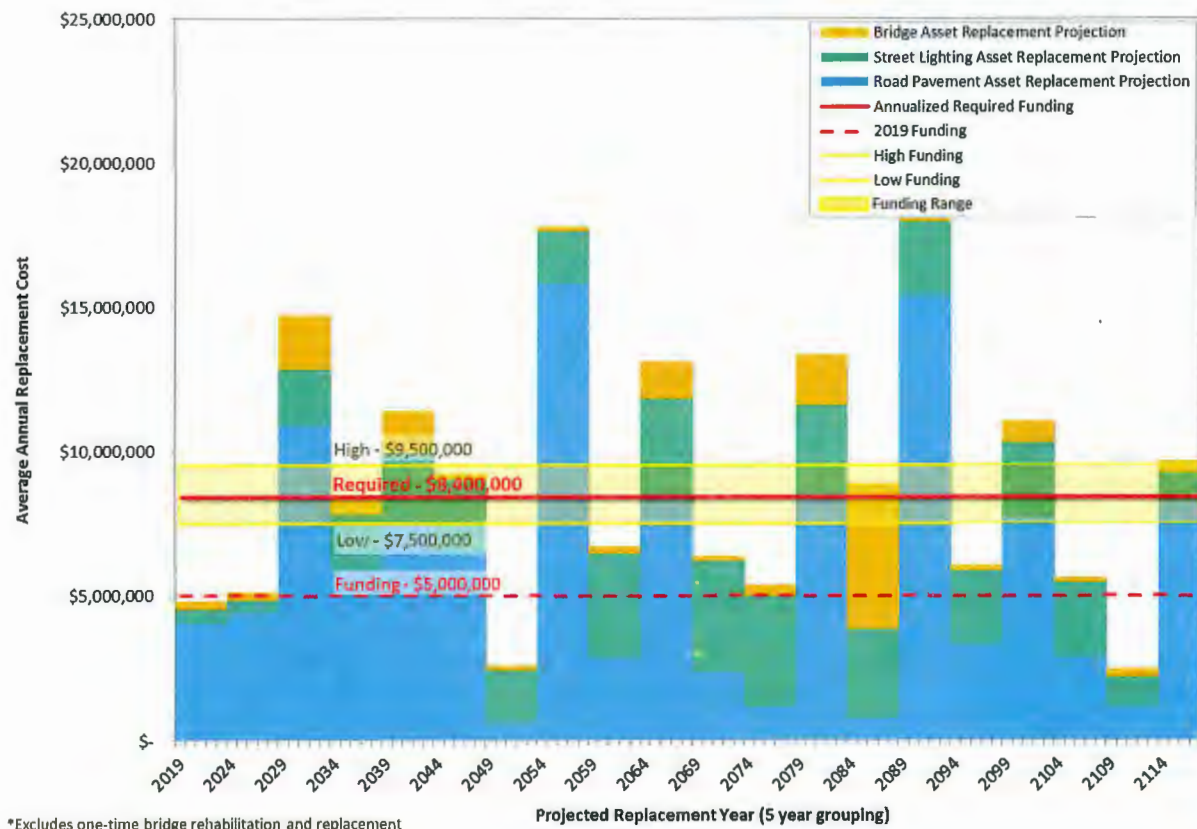


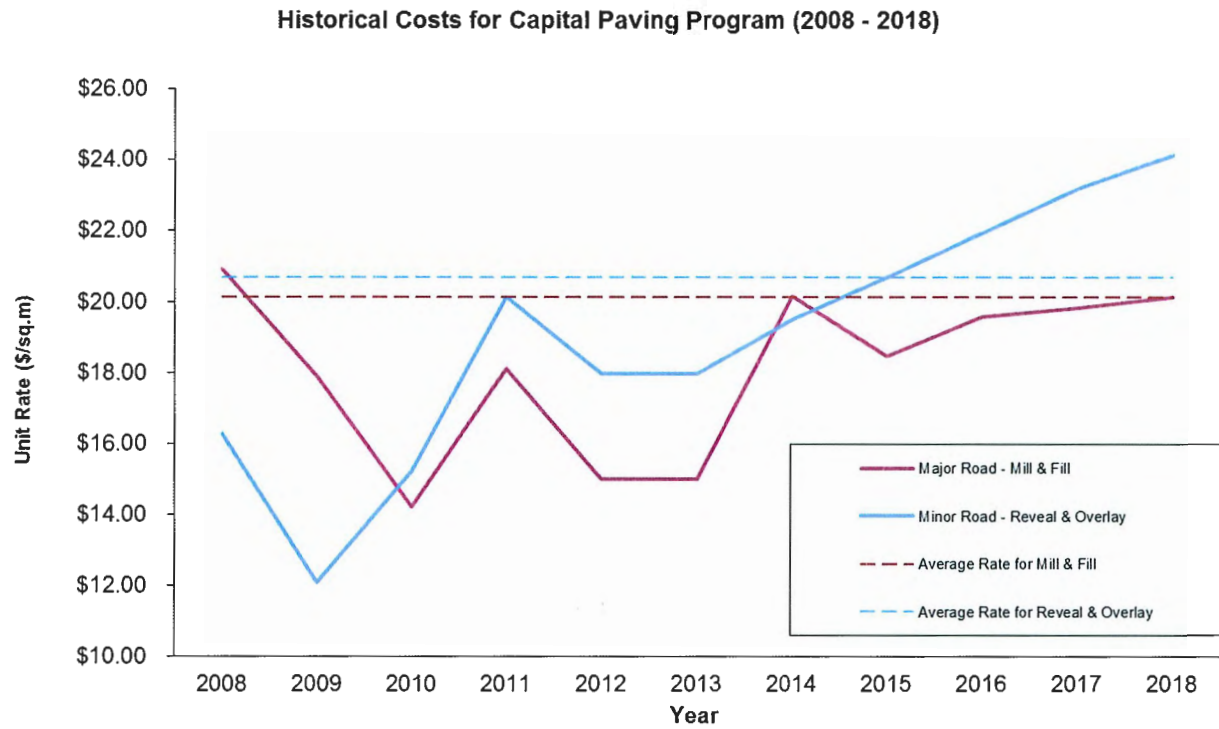
2019 Ageing Infrastructure Report - Drainage & Diking Assets



*Annualized Required Funding level may decrease upon the award of senior government grant funding.

2019 Ageing Infrastructure Report - Road and Road Assets (non-MRN)





Overpasses and Bridges

Listing of Non-MRN Overpass and Bridge Inventory

Name	Location	Feature Crossed	Type
Fraserside Gate Bridge	Fraserside Gate & Westminster Hwy	Watercourse	Roadway
Horseshoe Place Bridge	Horseshoe Place south of Horseshoe Way	Watercourse	Roadway
Woodward Slough Bridge	No. 4 Rd and Finn Rd	Watercourse	Roadway
Finn Road East Bridge	13020 Gilbert Rd	Watercourse	Roadway
Hollybridge Way Bridge	River Rd & Hollybridge Way	Watercourse	Roadway
Chatsworth Road Bridge	6380 Chatsworth Rd	Watercourse	Pedestrian
Bird Road Bridge	11040 Bird Road & Shell Road rail crossing	Watercourse	Pedestrian
Lancing Road Bridge	5440 Lancing Rd	Watercourse	Pedestrian
Princess Street Bridge	Dyke Rd fronting Princess St	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 Cres	Watercourse	Pedestrian

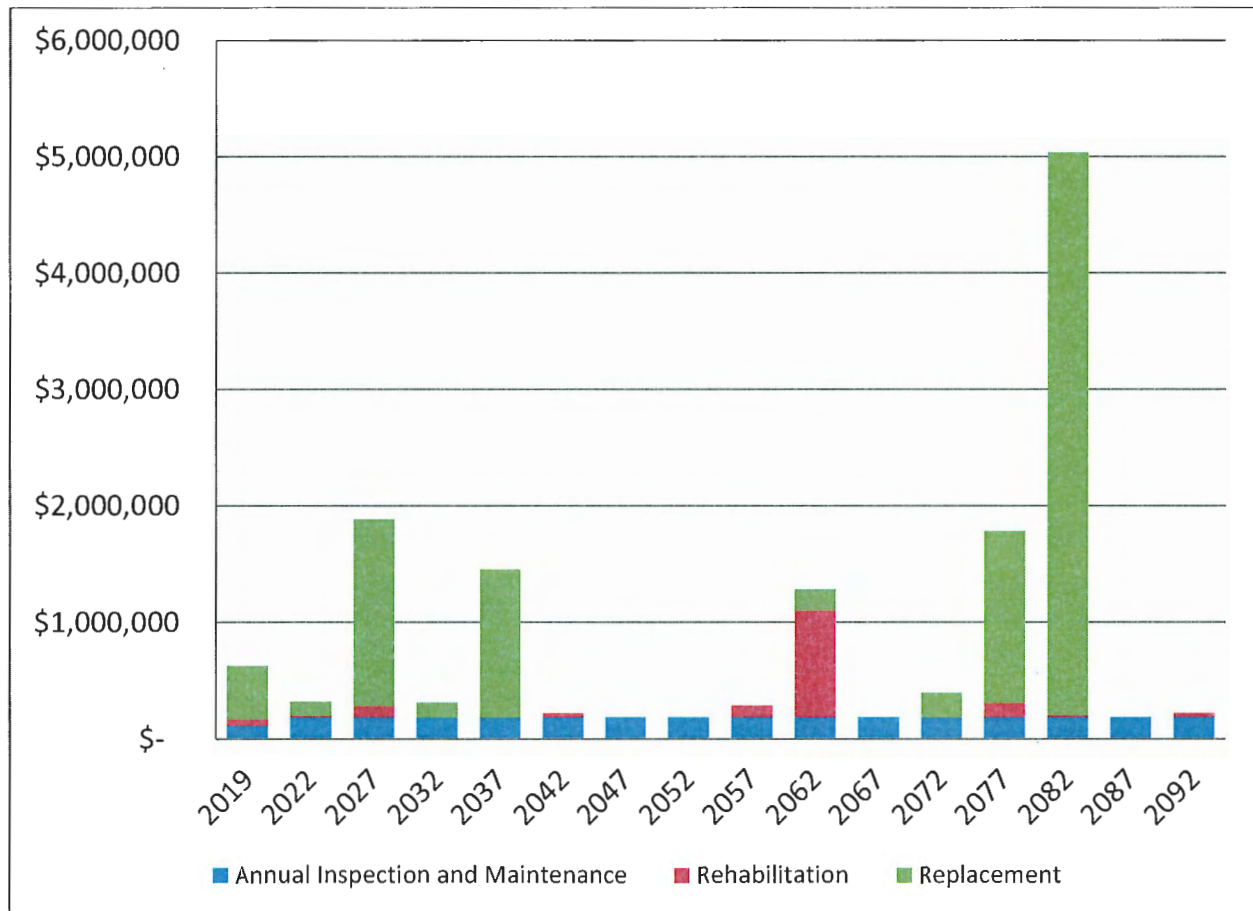
Bridges and Overpasses Maintenance Strategy

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 \$38,000 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
Fraserside Gate Bridge	\$1,270,500	\$137,500	2040	2080
Horseshoe Place Bridge	\$1,003,200	\$200,640	2030	2065
Woodward Slough Bridge	\$374,330	\$74,866	2020	2060
Finn Road East Bridge	\$602,855	\$120,571	2030	2080
Hollybridge Way Bridge	\$2,871,000	\$574,200	2085	2065
Chatsworth Road Bridge	\$49,500	-	2020	N/A
Bird Road Bridge	\$126,720	\$44,000	2035	2060
Lancing Road Bridge	\$35,640	-	2020	N/A
Princess Street Bridge	\$99,000	\$22,000	2080	2030
West Dyke Trail Bridge 1	\$693,000	\$138,600	2085	2065
West Dyke Trail Bridge 2	\$184,470	\$36,894	2065	2045
West Dyke Trail Bridge 3	\$125,510	-	2025	N/A
Total	\$7,435,725	\$1,349,271		

The annual funding level requirement of \$160,000 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 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 \$2.8 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 funding of approximately \$38,000 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 2020, 2030, 2040, 2060, 2075, 2080, 2085. Where replacement of multiple structures is required within the same year, such as in 2080, 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.