

REPORT

Engineering Services

To: Mayor Johnstone and Members of Council
Date: November 18, 2024

From: Lisa Leblanc
Director, Engineering Services
File: 05.1035.10
(Doc# 2597035)

Item #: 2024-644

Subject: **Response to Motion: Options for Accelerating Sidewalks in Queensborough**

RECOMMENDATION

THAT Council provide staff with feedback and any relevant direction on the costing information provided on the potential of accelerating the implementation of sidewalks in Queensborough based on the options presented in this report.

PURPOSE

To respond to Council's motion on the potential options for accelerating the implementation of sidewalks in Queensborough and seek Council feedback based on the completed detailed reference design of Fenton Street.

SUMMARY

On May 27, 2024, in conjunction with endorsing the Queensborough Transportation Plan, Council approved the following motion:

THAT Council direct staff to bring back a range of options for Council's consideration to accelerate sidewalk installations in residential areas of Queensborough that are currently underserved and impacted by open ditches.

In preparation to respond to this motion, staff moved forward with a detailed reference design of the Fenton Street Streetscape to determine the extent of construction work

required and the associated costs for building out the Fenton Street streetscape to match design standards for similar residential streets on the Mainland.

Staff have prepared this report and workshop presentation summarizing the findings from the detailed reference design of the Fenton St Streetscape, including a Class A Cost Estimate. A discussion and analysis have been provided for a high-level range of options for Council's consideration to accelerate sidewalk installations in Queensborough.

BACKGROUND

Queensborough Historic Area Drainage Update

Queensborough is located on the low-lying Lulu Island in the Fraser River floodplain. Due to the risk of seasonal flooding, the area is now protected by a perimeter diking system constructed in the last century. The Queensborough diking system is integrated with the City of Richmond's diking system. The diking system is serviced by drainage pump stations, which pump water conveyed by the internal ditch and canal network to the Fraser River. The internal drainage network was designed as an open ditch "collector" system that flows into larger canals before being pumped to the river by the four large drainage pump stations.

The City requires ditch crossings for adjacent properties to cross the contiguous ditch network. Traditionally, these ditch crossing driveways were 6 m wide and were built and maintained by the City. Over the past two decades, some Queensborough residents have expressed their desire to enclose the open ditch network and create an urban streetscape. Some residents have even independently covered roadside ditches to widen their driveways and create additional parking spaces on their frontage. In the last decade, the City has been actively removing unauthorized ditch crossings, as the crossings impede water flow in ditches, leading to upstream flooding and impeding City maintenance efforts.

As the community developed over the last 3 decades, the originally adequate drainage system built to service rural Queensborough has started to show signs of strain. This is especially true in the low-lying historic area of Queensborough, bound by Ewen Avenue, Boyd Street, Johnston Street and Wood Street. Fenton Street is the lowest of all streets and has experienced periodic flooding over the past decade. Staff have met with representatives of the neighbourhood and individual property owners and have worked towards improving drainage through a comprehensive, multi-phased approach.

Phase 1 works commenced in 2018, and it included work on the major drainage system such as:

- Wood Street Pump Station replacement
- Wood Street Canal dredging, widening and stabilization
- Boyd Street canal storm sewer improvements, culvert crossing replacement and other upgrades
- Major ditch maintenance.

Phase 2 of the improvements addressed more localized drainage barriers and improved problem areas. It included identifying local drainage barriers and removing unauthorized culvert crossings and ditch coverings. This phase is ongoing as of 2024.

As a result of the work mentioned above, drainage in the Historic Queensborough area has improved. Flooding complaints have reduced; however, the desire for an overall streetscape improvement by enclosing ditches, adding sidewalks and trees and improving lighting exists. For this reason, and spurred on by the May 27th, 2024 Council motion, staff have developed a detailed reference design for Fenton Street to include all the above-mentioned urban streetscape features. More information is provided in a subsequent section.

In the last 10 years, in response to resident requests, the City has worked on allowing resident-driven ditch covering. A Queensborough Functional Plan for the Wood Street Catchment has been developed to provide a functional plan to inform designs for ditch enclosures on Johnston Street, Fenton Street, Pembina Street and Boyne Street. Staff have utilized this functional plan to assist residents and developers in answering queries during the design process in this area.

An implementation approach to ditch enclosures (found [here](#)) has been developed as a guide to describe the process and permitting requirements to infill a municipal ditch fronting a property. Using this approach, ditch enclosures may be implemented through either:

- 1. Local Area Service Program (LASP);
- 2. Subdivision Development;
- 3. Building Permit Application; or
- 4. Request by Property Owner(s).

A Local Area Service Program (LASP) is a neighbourhood improvement initiative paid for by the benefiting properties' owners to provide or enhance specific engineering infrastructure. A LASP has been implemented on Wood, Boyd and Boyne Street (Gurdwara Temple) and on Howes Street in Queensborough.

Queensborough Transportation Plan, June 2024

In May 2024, Council endorsed the Queensborough Transportation Plan ("Plan"). The Plan recommends the implementation of an improved walking network in Queensborough via a range of methods including:

- **Quick-build Treatments** - To facilitate walking and cycling facilities in Queensborough in the shorter term.
- **Coordinate Projects with other Capital Infrastructure Projects** – To include, where possible, implementation of Plan projects with other infrastructure projects, such as sewer and water line upgrades or dike system maintenance, that are being completed by the City or other government entities to achieve economies of scale.

- **Coordinate Projects with Development Sites** – To include, where possible, implementation of Plan projects with completion of development applicants' off-site improvements, as required through the City's Subdivision and Development Control Bylaw.

During the second round of public engagement for the Plan, completed in Fall 2023, four walking network options were presented, and participants were asked to prioritize and rank all four. The four options and the resultant rankings are outlined below in Table 1.

Table 1: Walking network options and survey rank

Rank by most preferred option	Option	Description
1	Priority Routes with Standard Sidewalk Treatments and Multi-use Pathways	Completes gaps in the walking network in a prioritized manner with concrete sidewalks and curbs. Priorities are determined based on criteria shown below in Figure 2.
2	Mid-Island Trail Connection	Provides east/west off-street walking route between Ewen Avenue and Salter Street, from Boundary Road to Derwent Way, and an east/west route between Wood Street and Derwent Way, between Ewen Ave and Boyd Street, utilizing existing City rights-of-way.
3	Priority Routes with Quick-Build Treatments	Completes gaps in the walking network in a prioritized manner using quick-build methods through reallocation of existing road space (e.g., parking) with temporary materials.
4	Complete Sidewalk Network on All Streets	Completes sidewalk network with concrete sidewalks and curbs in all areas.

Given the engagement responses, the Plan includes a walking network direction that states:

- **W1.** Implement, *in a prioritized manner*, a walking network that connects people to neighbourhood destinations.

Specific actions identified to support this direction include:

- **Action W1.1:** Complete gaps in the walking network on priority routes
- **Action W1.2:** Continue to complete pedestrian network gaps through required development frontage improvements
- **Action W1.5:** In implementing the walking network, ensure natural ecosystem systems, and ecologically sensitive areas are protected.

Priority routes confirmed through the engagement process are provided in Figure 1, below.

Figure 1: Priority Pedestrian Network Gaps



PRIORITY PEDESTRIAN NETWORK GAPS

- - - Pedestrian Gap Location
- - - Pedestrian Gap Location Beside Watercourse

Priority routes were identified based on the criteria in Figure 2 below, which were also confirmed through the engagement process.

Figure 2: Walking Route Prioritization Criteria

- PRIORITY ROUTES WERE IDENTIFIED BASED ON:**
- Proximity to transit
 - Proximity to schools
 - Proximity to other community destinations (library, community centre, Gurdwara Sahib Sukh Sagar, commercial, retail, etc.)
 - Network connectivity (connects to an existing sidewalk or multi-use pathway)
 - Scale of impact (based on number of people impacted/served)
 - Safety improvement (level of comfort, presence of ICBC report collisions)

Source: Queensborough Transportation Plan, p. 16

Fenton Street detailed reference drainage design

Fenton Street has been selected for a detailed reference design as part of the response to this motion and based on the historical incidences of flooding issues and resident complaints. Although Fenton Street is not among the priority routes identified in the Queensborough Transportation Plan, it has been subject to frequent flooding and represents a 'worst-case' reference point for estimating the level of effort and cost to implement urban streetscapes with sidewalks on other Queensborough streets.

Increasing development activity in the form of subdivisions of properties, which require frontage upgrades, creates a disjointed network of ditch coverings and sidewalks. Over time, shorter and shorter sections of drainage ditches will be left uncovered, and these short sections will be difficult and inefficient for City staff to maintain and will become a public safety concern.

Additional background and history of Queensborough ditches and drainage can be found in previous Council reports and technical reports as follows:

Queensborough Streetscape Configurations and Cost Estimates, 2013 – Associated Engineering

Implementation of Ditch Infill and Urban Streetscape in Queensborough, 2015

Ditch Infill and Urban Streetscape in Queensborough Strategies and Community Feedback, 2016

Queensborough (within Wood Street Drainage Catchment) – Functional Drainage Design Brief, 2019 - Parsons

Staff can provide these reports upon request.

DISCUSSION AND ANALYSIS

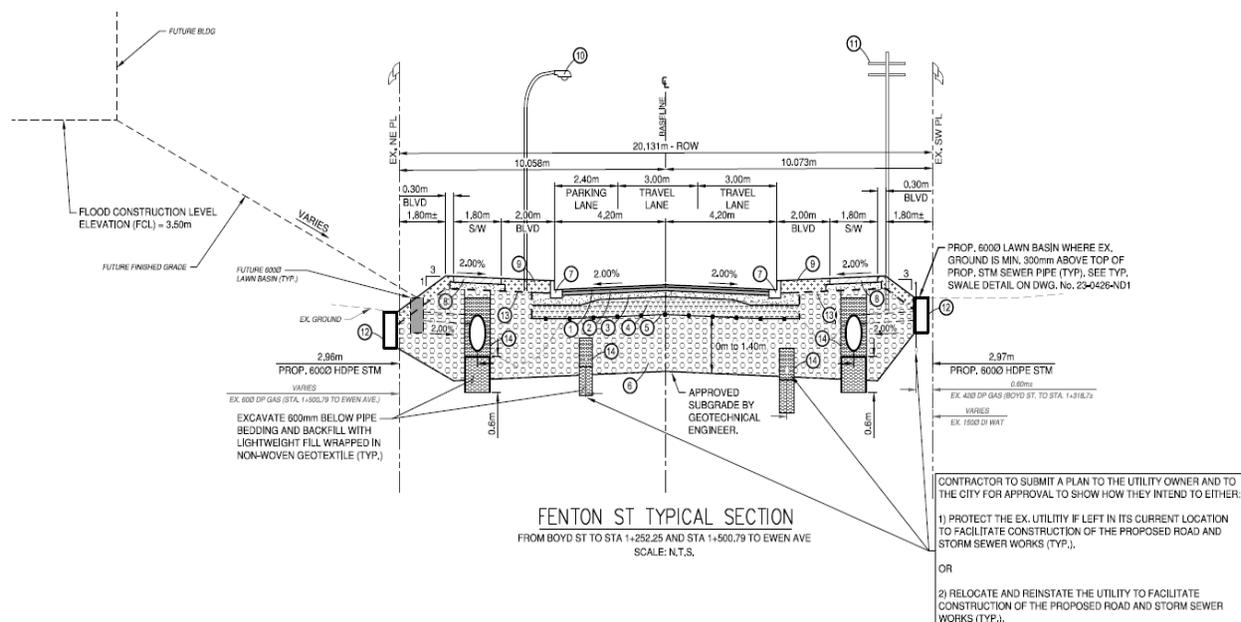
Fenton Street Streetscape Detailed Reference Design Project

Binnie was retained as the civil engineering design consultant to complete the detailed reference design of Fenton Street. Fenton Street is a local road located within the Wood Street Drainage Area. The design area is Fenton Street between Boyd Street and Ewen Avenue (approximately 410 linear metres). The project design scope included:

- A wider road (to accommodate some on-street residential parking),
- Sidewalk(s) on at least one side of the road,
- Driveway crossings,
- Street lighting and,
- Undergrounding of the existing open ditch drainage system.

Figure 3 below shows the final typical detailed reference design cross-section for Fenton Street designed to the standards used for local streets on the mainland.

Figure 3: Fenton Street Typical Section



Metro Testing Engineering completed a geotechnical investigation as part of the detailed reference design. Based on the field investigation and resultant findings of the existing soils and groundwater conditions along Fenton Street between Boyd Street and Ewen Avenue, the geotechnical engineer concluded that significant soil remediation works using lightweight fill would be required to support the proposed street upgrades.

To raise the road elevation and ensure adequate drainage, a significant portion of the work would be focused on introducing imported lightweight fill to decrease the weight of the overall road structure and minimize further ground settlement in the future. The higher the road needs to be elevated, the greater the amount of lightweight fill is required. Table 2 below summarizes the depth of lightweight fill required for different road elevation increases.

Table 2: Lightweight Fill below Pavement Structure

Planned Increase Above Existing Road (mm)	Lightweight Fill to be Placed Below New Pavement Structure (mm)
500	1400
600	1800
700	2200
800	2600
900	3000
1000	3500
2000	6800

1. Figures presented above are based on assumption that the average existing pavement structure and fill layer (with an assumed average density of 2200 kg/m³) is about 0.6 m thick and resting directly above the peat layer with an assumed density of 1225 kg/m³
2. Calculations were made assuming LWF consists of pumice stone with an assumed density of 830kg/m³ when dry, and 980 kg/m³ when saturated.

A lightweight fill structure wrapped in geotextile is also required to support the proposed storm sewers. An alternative design would be to construct the storm sewers on pile foundations, which have more complex constructability issues and are costlier compared to lightweight fill.

Financial analysis

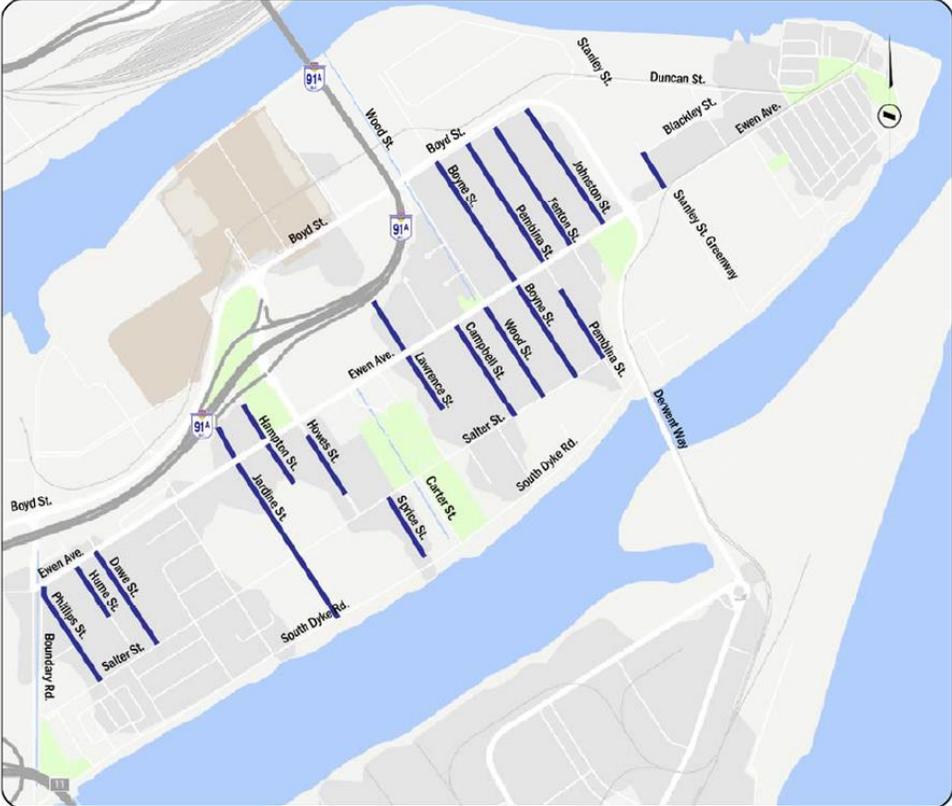
The consultant's 'Class A' cost estimate for constructing the full build-out of the Fenton Street streetscape and new storm sewers to replace the infilled ditches for 410m of Fenton Street is estimated at **\$7,356,000**. The cost estimate includes a 15% contingency. Of note, approximately 38.5% of the project's total cost is allocated to lightweight fill (assumed pumice), used to raise the road elevation and to replace fill for pipe trenches. This results in a unit cost of approximately \$17,950 per linear metre of complete streetscape.

Using this linear cost as a reference cost estimate and applying it across the Queensborough community, the following extrapolated costs can be identified:

- **\$79.2M** to construct a) 3.4 km of streets with existing ditches in Historic Queensborough (i.e. low-density single-family neighbourhoods in the east of Queensborough and b) 1.0 km of streets in low-density single-family neighbourhoods in the remainder of Queensborough for a total of 4.4 km.

Figure 4 below shows the proposed ditches for enclosure as identified in the Queensborough Integrated Rainwater Management Plan (IRMP), 2017.

Figure 4: Proposed Ditch Enclosures – Queensborough IRMP



As noted previously, public engagement on the Queensborough Transportation Plan indicated support for prioritizing infrastructure improvement based on the criteria shown in Figure 2. Applying the linear cost to this prioritized subset of streets results in the following cost estimate:

- **\$32.4M** to construct 1.8 km of streets identified in the Queensborough Transportation Plan for the Priority Pedestrian Network Gaps. This estimate excludes Boyd St and Derwent Way, which would likely require sizing more similar to Ewen Ave and Salter St instead of Fenton St as they are “collector ditches”. Furthermore, these ditches are yellow-coded watercourses with Riparian Area Regulation (RAR) requirements and do not front residential homes. Based on the larger sizes and more stringent regulatory requirements, the per-linear metre unit cost for these areas is expected to exceed the Fenton St cost estimate.

Quick-build treatments to implement walking facilities within the existing road rights-of-way, built using modular curbing (as used extensively in the City of Victoria and District of Saanich for cycling infrastructure), would likely cost approximately \$250,000 per km. Handrails would be required to be installed to improve pedestrian safety in close proximity

to the open ditches at a cost of \$290,000/km. The total cost of a quick-build treatment would thus be approximately \$540,000 per km.

It should be noted that implementing a quick-build curbed system within an existing road right-of-way will impact either one or both sides of existing parking on the road or involve conversion of streets to one-way operation, requiring extensive public engagement and communications. Applying the quick-build linear cost to the prioritized subset of streets results in the following cost estimate:

- **\$1.0M** to construct 1.8 km of quick-build curbed streets identified in the Queensborough Transportation Plan for Priority Pedestrian Network Gaps (excludes Boyd St and Derwent Way)

Options for consideration

Based on the above financial analysis, four options arise that respond to Council’s request to bring a range of options to accelerate sidewalk installations in residential areas of Queensborough.

- **Option 1:** The complete streetscape rebuild of all roads with ditches in Queensborough to the mainland streetscape standard. The cost of this option would be approximately **\$79M** to implement.
- **Option 2:** A value-engineered option where the complete streetscape from Option 1 is minimized to reduce costs by removing/revising some elements (e.g., sidewalk on only one side of the road; remove standalone streetlights, reduce road height and lightweight fill). Typical value engineering exercises can reduce costs by 20-30%. The cost of this option would be in the range of **\$55-63M** to implement.
- **Option 3:** Build out of the prioritized subset of streets as per the Queensborough Transportation Plan (i.e. excluding Fenton Street). The cost of this option would be approximately **\$32M**.
- **Option 4:** A quick-build treatment on the existing road right-of-way of the prioritized subset of streets, per the Queensborough Transportation Plan. The cost of this option would be approximately **\$1M** to implement, but it would have the impact of reducing the existing road width and removing some or all of the existing on-street parking or converting streets to one-way operation.

With the above options contemplated, staff would like to bring forward the following questions for Council feedback:

1. If Council should choose to move ahead with accelerating sidewalk installations in Queensborough, which option would Council prefer staff to investigate further and bring back for Council consideration?
2. Should the City fund the complete cost of the preferred option, or should the City encourage residents to participate in the Local Area Service Program (LASP), which would require a 50% contribution from residents to the project according to the existing LASP policy?
3. How would Council like staff to communicate the suggested next steps to the residents?

These questions will guide the workshop discussion with Council.

SUSTAINABILITY IMPLICATIONS

Although most ditches in Queensborough have been identified as not being fish-bearing, other environmental impacts occur when ditches are enclosed. Infill of ditches or removal of above-ground flood storage within a floodplain or flood-prone area will potentially decrease the level of service, resulting in increased nuisance flooding and increased intensity of damage for more significant flood events. The impacts will be felt unequally and inequitably as properties and areas that have not redeveloped to current flood construction levels will experience greater impacts.

With climate change causing longer duration multi-day rainfall events at higher rainfall intensities, the removal of overland flood storage (in this case, the open ditches) may negatively impact climate adaptation and resilience within the drainage system. Other climate adaptation and resilience mechanisms will be required to counteract this negative impact.

FINANCIAL IMPLICATIONS

Based on Council’s feedback on the options presented, staff will prepare an analysis of the financial implications to the City and residents for further discussion with Council.

The Engineering five-year capital plan includes a Drainage Program (BU 10943) that allocates \$500k in 2024, \$450K in 2025 and \$250K in 2026 for the removal of drainage culverts and other drainage projects across the City. The Engineering 5-year capital plan does not contain any budget allocations for constructing ditch enclosures or streetscape improvements, including new sidewalks in Queensborough.

Should any of the options in this report be considered by Council, supplemental capital funding resources would be required to be brought forward for approval, or funding would need to be reallocated from approved capital projects.

INTERDEPARTMENTAL LIAISON

The preparation of this report has been coordinated by staff in the Transportation and Infrastructure Planning divisions within the Engineering department and staff in the Finance department.

OPTIONS

Options for Council's consideration include:

1. That Council provide staff with feedback and any relevant direction on the costing information provided on the potential of accelerating the implementation of sidewalks in Queensborough based on the options presented in this report.
2. Provide staff with alternate direction.

Staff recommend Option #1.

COMMUNITY COMMUNICATION AND NEXT STEPS

Based on the feedback received from the Council, staff propose that the information and next steps be shared with the residents of Queensborough via a number of communication channels, including our City web page and in-person meetings with residents.

Staff have heard that the community would like us to meet them on-site to further discuss ditch enclosures and sidewalks. Staff propose that the Council feedback received as part of the presentation be shared with the residents at this time.

Staff will be asking Council how they would like staff to communicate next steps with the community. This feedback will guide the next steps.

ATTACHMENTS

Attachment 1 – Class A Construction Cost Estimate for Fenton St Streetscape

APPROVALS

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