

Report To: Committee of the Whole

Meeting Date: March 6, 2023

Subject: Forty Mile Creek Pedestrian Bridge Design
Information Report

Recommendation(s)

1. That report DCS-23-05, Forty Mile Creek Pedestrian Bridge Design Information Report, dated March 6, 2023 be received for information.

Purpose

To provide Council with an update on the Forty Mile Creek Pedestrian Bridge design.

Although bringing all park design work to Council is not typical, this project is unique and significant to the community and Town staff believe it would be beneficial to provide this information to Council for their information.

Background

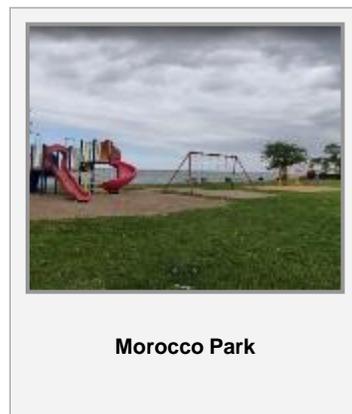
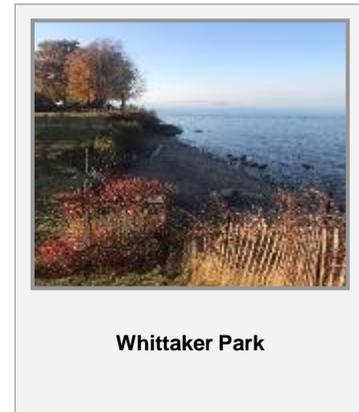
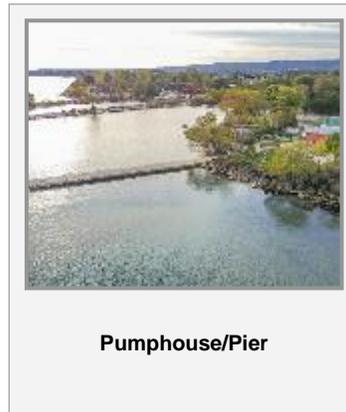
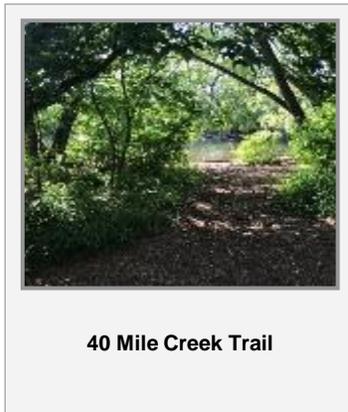
Site Context

Forty Mile Creek Park contains a large open space, a canoe/kayak launch, a large parking lot, and the 1812 Bicentennial Peace Gardens. This part of Grimsby is a popular destination for enjoying the waterfront, the creek, and the trail system. The historic Elizabeth Street Pumphouse is also at this location, which is a popular destination for small weddings, family gatherings, and other community rentals.

The trail is a significant feature in Grimsby that requires active intervention to limit the continued forest loss. The community desires to continue using the path along the creek, as it is a key recreational area in Grimsby with solid historical ties. The trail traces the banks of the forty-mile creek and is surrounded by a forested area that is small, narrow, and fragmented. However, the trail does have the potential to be part of a walkable connector trail that leads to the Bruce Trail once the bridge is replaced.

The surrounding site has main features including: Whittaker Park, Elizabeth Street Pumphouse Pier, and Forty Mile Creek. In addition, the park's location is a central connection point to various large community parks such as Murray Street, Morocco, and Forty Mile Field.

Image 1: Various community features located near Forty Mile Creek Park.



Design Consultant

Through a Request for Proposal process, staff selected Moon-Matz Ltd., a Canadian company, to design the bridge replacement and create detailed construction-ready drawings/documents. The contract was awarded in August 2022, and work, as outlined in the tender, began shortly after.

Moon-Matz Ltd. has provided technical expertise internationally to public and private sectors since its establishment. Moon-Matz Ltd.'s multi-disciplinary team offers mechanical, electrical, and structural engineering services. From the conceptual stages to the finished product, Moon-Matz Ltd. provides expert services in all phases of project development. Over the last few decades, Moon-Matz Ltd. has completed over 5,000 projects ranging from retrofit work to large-scale multimillion-dollar projects.

Timeline Overview

The current Forty Mile Creek pedestrian bridge is a wooden bridge that crosses Forty Mile Creek. The bridge was constructed using materials such as old telephone poles through a community partnership as part of a Bruce Trail connection. The community worked together to build the bridge, which held up for many years! Unfortunately, the bridge was closed in previous years due to safety concerns with the structure. With the bridge being closed, it has limited access to the trail. As a result, the community is highly invested in seeing the bridge replaced to improve trail usability.

Image 2: Images of the existing bridge.



Project Timeline

Date		Details
2021	Q1	<ul style="list-style-type: none"> • Engineer assessment to see if the bridge can be retrofitted to allow for use for the short term • The bridge was deemed unsafe, and no retrofits were possible
	Q3	<ul style="list-style-type: none"> • Report DRS21-21 Forty Mile Creek Park Pedestrian Bridge Replacement Design was brought forward to Council to proceed with the preliminary design work • Council approved the recommendation, and staff began work on creating a RFP
2022	Q2	<ul style="list-style-type: none"> • RFP posted to award engineering and design work to the successful proponent for the project, including: <ul style="list-style-type: none"> ○ Technical analysis to ensure proper design – topographic and geotechnical survey + analysis ○ Consultation with Niagara Peninsula Conservation Authority ○ Concept renderings and cost estimates for consideration ○ Final design product that can be used for the next steps
	Q3	<ul style="list-style-type: none"> • Contract awarded to Moon-Matz Ltd. • The project team is formed and starts on design work
	Q4	<ul style="list-style-type: none"> • Development of concept plans based on investigation • Revision work on initial concepts continues

Date		Details
2023	Q1	<ul style="list-style-type: none"> The project team finalizes the general layout of the bridge as well as the location along the creek Detail refinement begins, and recommendations are brought forward to the Council for information

Analysis/Comments

Bridge Design Considerations

The design team has narrowed down the options for the pedestrian bridge and chose to proceed with the design that contains a new prefabricated bridge complete with abutments and revetments, including a wood boardwalk. The bridge structure is proposed to be constructed with weathering steel and pressure-treated wood decking. The design considerations for the bridge have been outlined below.

Location of the Bridge

At the beginning of the project, staff investigated the potential location options for the bridge but decided to replace the bridge in a similar location (a few meters south) as the existing one for the reasons outlined below:

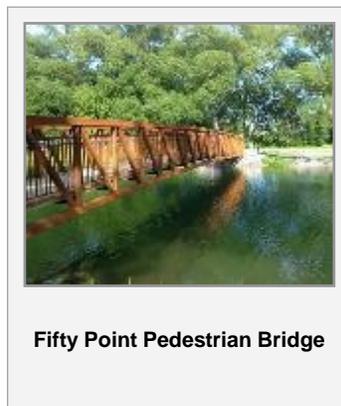
- Recreational Connection: Requires minimal realignment once the bridge is installed. It can include space for an accessible lookout area, viewpoint and rest spot.
- Environmental Impacts: Reduced vegetation removal is required, limiting the construction impact on the surrounding trees.
- Impacts on Floodway: Allows for the concrete abutments to be placed further back on the creek bank, limiting the in-water work impacts and permitting requirements.
- Constructability: Route of most minor destruction for heavy equipment entering the site to install the bridge.
- Community Connection: Many residents are connected to the current bridge location and frequently visit.
- Cost: Overall, by limiting the rework required in the other categories, the price will be reduced.

Structure Material

Based on the span configurations and typical crossing type (pedestrian), the recommendation is to proceed with a truss bridge with either weathered or galvanized steel. The team decided to advance with the weathered steel option as outlined below:

- Aesthetic Value: weathered steel provides a more natural look than galvanized steel and will better fit the surrounding conditions. Weathered steel is frequently used on similar pedestrian bridges in a similar landscape, so it is appropriate for this project.

Image 3: Examples of weathered steel being used.



Bridge Decking

During the design process, multiple materials were discussed for the bridge deck material, including pressure-treated wood, composite planks, Kebony, or recycled plastic planks. The decision was made to proceed with the pressure-treated wood for the reasons below:

- Aesthetic Value: The proposed material modernizes the current bridge (telephone poles and wood) while maintaining the feel of the natural area.
- Pedestrian Experience: Accessible for wheeled users and meets AODA requirements.
- Lifecycle and Cost Considerations: Cheaper upfront cost than alternative materials. The decking can be replaced as necessary, extending the lifecycle of the wood decking to the lifecycle of the bridge itself. If the replacement of individual boards is required, the material is readily available and reasonably inexpensive.

Railing Configuration

As part of the discussion about the bridge configuration, a decision was needed on the railing height. The design requirements depend on whether the railing is intended for foot traffic only or includes cyclists. If designed to consider cycling the height required is 1.375 m and 1.07 m for pedestrian foot traffic only. The option selected for the design reflects the height requirement for both pedestrian foot traffic and cyclists for the following reasons:

- Use Case: Various user groups along the trail will be using the bridge, including cyclists. Although we do not encourage the trail as a biking route, we know it occurs.
- Risk and Liability: The railing should be tall and strong enough to hold back a pedestrian, cyclist, or wheelchair user who has strayed from their path of travel. It will be encouraged for bikers to dismount when crossing. Still, selecting the cyclist railing height helps reduce the risk of injuries.
- Design Variations: A higher height does not mean that viewpoints must be significantly impacted. The design takes into consideration various elevations and allows views from multiple locations.
- Cost: The cost difference of the higher railing height is minimal as part of the original construction. Adding a higher railing height later would be much more costly.

Build Technique

As part of the design, it was essential to consider what the installation would require. Therefore, when constructing the structure, the options were to prefabricate the entire bridge in one piece at an offsite location or install it on-site in various segments. The team has decided to proceed with prefabricating the bridge offsite as the build technique based on the below recommendations:

- Installation Time: Prefabrication allows for less on-site time – faster installation using pre-assembled components.
- Quality and Durability: More durable end product than a bridge built/pieced together on site. Higher precision in the design details can occur in an offsite fabrication, resulting in better tolerance control.
- Design Complexity: Ability to create complex geometry (or slight variations in members for horizontal curves or bridge slopes).

- Install Mobilization: A crane can be used to place the bridge, which is the most cost-effective installation type. In addition, the team is working to develop a plan that disrupts the least amount of vegetation along the construction access route from Lake Street.
- Construction Access: Large machines will have an easier time navigating through the Lake Street access than entering from the Pumphouse Parking Lot and continuing along the trail.

Accessibility

The trail leading to the bridge is currently not conditioned for accessibility standards. However, we hope to develop a barrier-free travel route in future park works. The options for the bridge were to create a bridge following the standard for trails in Ontario or to create a bridge that meets AODA standards. The decision was made by the team to create a bridge design that meets all accessibility standards to ensure that future opportunities are not limited by decision choices today. The plan that was developed not only meets the minimum requirements but exceeds them. We incorporated an additional turnaround area that also serves as a lookout area which will be explained in a later section.

Restoration and Partnerships

In Fall 2022, staff collaborating with Niagara Peninsula Conservation Authority began the phased restoration work along 40 Mile Creek. The property required a strategic approach to enhance ecological restoration through human interception. The project actively repairs the disturbed ecosystem, starting with reforestation in phase one (the adjacent open field and creek area). Phase two is scheduled for the Fall of 2023, focusing on the mouth of the trail.

The restoration work will be continued as part of Phase 3 to significantly improve the social and ecological benefits of the Forty Mile Creek green space. The goal is to increase the quality of the existing flora and fauna by reintroducing native species to improve canopy coverage and refine recreational opportunities to contain the risk of human disturbance. To install the bridge, removing some of the existing vegetation is necessary. However, we are confident that following the bridge construction, with the help of the NPCA, we can increase the percentage of the forest, interior and streamside coverage.

Financial Impact

The design work is part of the 2022 budget and does not include the construction and installation of the bridge. The construction budget for this project has been put forward as a capital project in the 2023 budget year. Subject to Council's approval through the budget process, staff are hopeful to have the construction occur mainly this year.

The funding source for this work will be the Parks, Playground and Green Infrastructure Asset Rehabilitation & Renewal reserve. The capital project for construction has been put forward at \$450,000, including the site preparation, demolition, abutment work, bridge structures (including ramps and lookout area), site restoration and landscaping. The final cost will depend upon the design details, the cost of materials at construction, and any additional installation considerations.

Public Input

Once a more firm plan is in place, we will communicate to park visitors through signage with immediate residents and the general community via our usual channels.

Conclusion

The Forty Mile Creek trail and pedestrian bridge form part of a beautiful waterfront park in Grimsby. This trail and bridge have been a very well-utilized park amenity, and the community is very eager to see this bridge replaced. Therefore, the design work is recommended to proceed with construction administration and drawing finalization, subject to the approval of the 2023 budget.

Respectfully prepared by,



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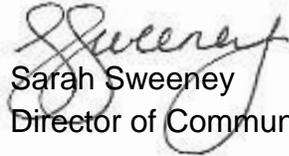
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