Sixth Street Multi-Use Bridge Options

City Council Meeting January 27th, 2020

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Council Direction

Council's resolution of September 24, 2019:

"Moved by Cole-Hamilton and seconded by Frisch that Council direct staff to expedite delivery of a range of options and stakeholder engagement for the Sixth Street multi-use pedestrian-bike bridge concept to provide greater information related to the design cost, public safety features and funding source options simultaneously with the Fifth Street Bridge rehabilitation project update, and bring forward for consideration at a future Council meeting in January 2020."

Background

- The Sixth Street Multi-Use Bridge concept has been discussed over the past 10 years.
- In 2015, Outlook Land Design and 3D Design prepared a Design Brief detailing a cable-stayed structure that was 4.5m wide that connected Simms Millennium Park and Sixth Street.
- A Sixth Street Multi-Use Bridge is included in the recently completed Parks & Recreation Master Plan and referenced in the Transportation Master Plan. The bridge is listed as a long-term improvement in the Parks & Recreation Master Plan. The Downtown Courtenay Playbook also notes an additional crossing at Sixth Street should be explored further.
- A Sixth Street Multi-Use Bridge would connect downtown and Simms Millennium Park as well as connect to the future cycling network along Sixth Street, Anderton Avenue, the Courtenay Riverway Trail, and the pathway connection to the Lewis Centre.

Design Criteria

Following British Columbia Active Transportation Design Guide

- Facility Functional Width = 3.5m to 4m (+0.5m shy distance)
- Bridge Span Length = ~60m
- Pathway Grade = <4% (ideal), <5% (sufficient)

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Potential Options

Four bridge types were reviewed to provide a range of aesthetic appeal and costs:

- Option 1: **Pre-Engineering Truss Bridge (Bowstring)**
- Option 2: **Modular Panel Bridge**
- Option 3: **Network Arch Bridge**
- Option 4: **Cable Stayed Bridge**

Option 1:
Pre-Engineered Truss Bridge (Bowstring)

- Conventual Structure with average aesthetic value
- Comfortable for cyclist and pedestrians
- Shorter construction period
- Least expensive
- Minimal operations and maintenance considerations

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Option 2 : Modular Panel Bridge

- Low aesthetic value – temporary looking in nature
- Less comfortable for cyclists and pedestrians – steel decking
- Average construction period
- Less Expensive Option
- Minimal operations and maintenance considerations
- Shorter Lifespan

Option 3 : Network Arched Bridge

- High aesthetic value – signature structure
- Comfortable for cyclists and pedestrians
- Shorter Construction Period
- More Expensive
- Increased operation and maintenance costs – painting and overcoat

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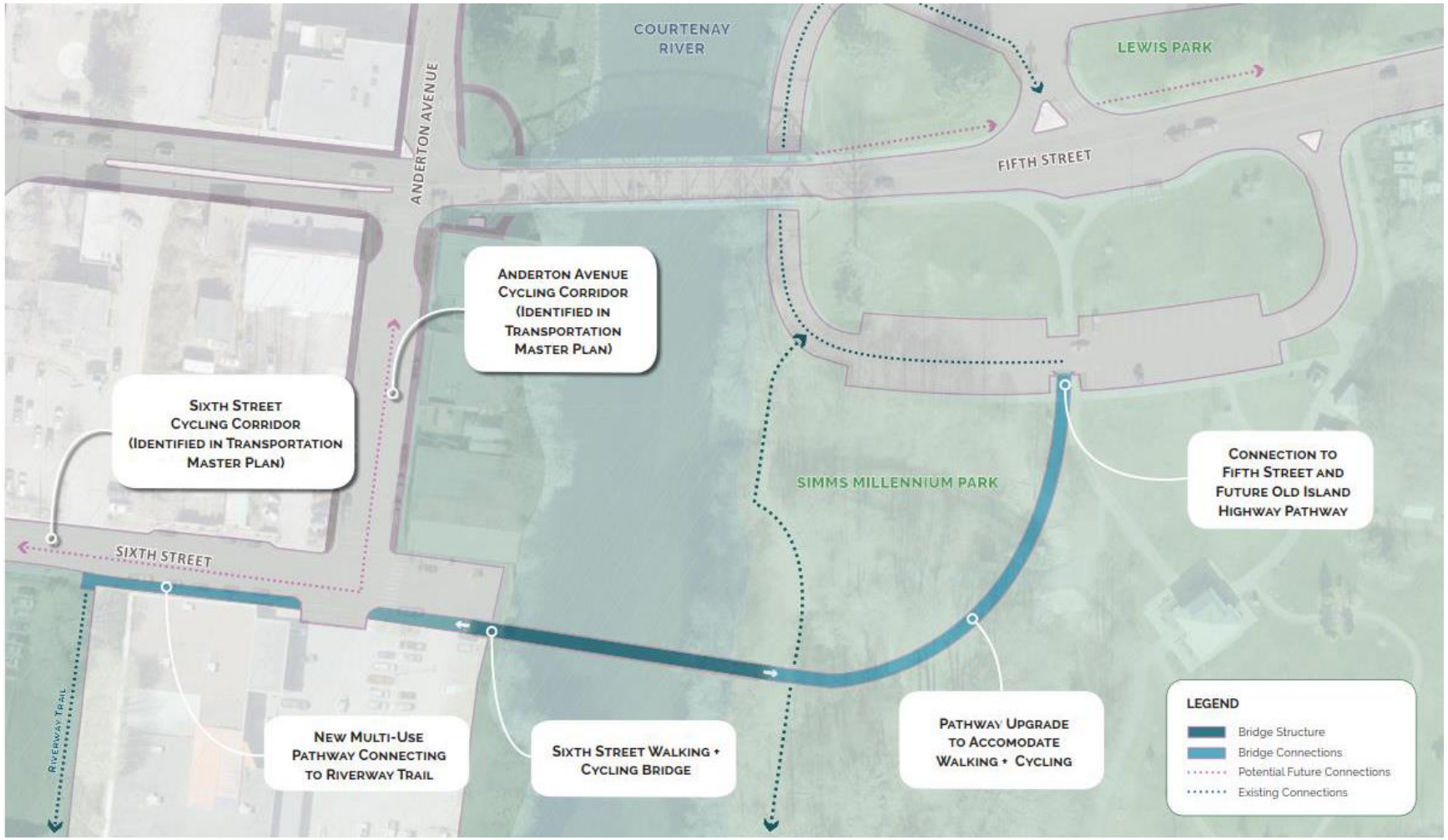
Option 4 : Cable-Stayed Bridge

- Previous (2015) design report option
- High aesthetic value – signature structure
- Less comfortable for cyclists and pedestrian – wood decking
- Greater Impact to park due to cable tie backs
- Longest Construction Period
- Most Expensive Option
- Increased operation and maintenance costs – specialized equipment for tall structure and cables

Sixth Street Connectivity



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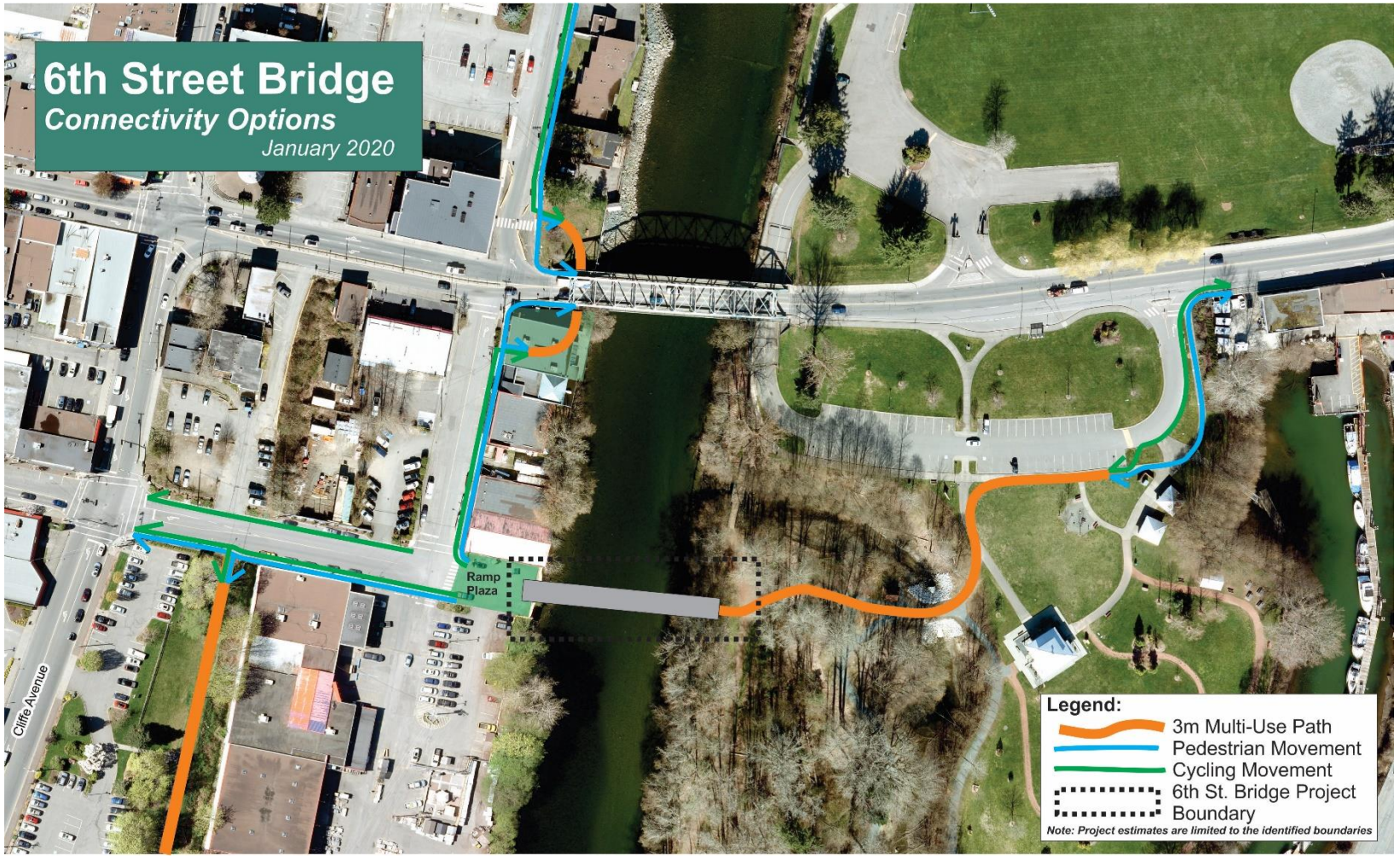

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Construction Costs/Duration

Project Element	Pre-engineered Truss	Modular Panel Bridge	Network Arch Bridge	Cable Stayed Bridge
Construction Duration	4.5 to 6 months	5.5 to 7 months	4.5 to 6 months	5.5 to 7 months
Costs				
Bridge Structure Costs	$0.65 - $0.75 M	$0.8 - $0.935 M	$1.3 - $1.5 M	$1.4 - 1.6 M
Abutments[1]	$1.1 M	$1.1 M	$1.1 M	$1.1 M
Geotechnical Ground Remediation (Allowance)	$0.5 M	$0.5 M	$0.5 M	$0.5 M
Connectivity to Existing Networks	$0.35 M	$0.35 M	$0.35 M	$0.35 M
Engineering and Project Management	$0.4 M	$0.45 M	$0.5 M	S0.55 M
Total	**$3 - $3.1 M**	**$3.2 - $3.335 M**	**$3.75 - $3.95 M**	**$3.9 - $4.1 M**

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Evaluation Criteria

Each bridge option is being evaluated against various criteria to help understand a preferred crossing option.

The following criteria are the basis for the evaluation:

- Aesthetic Value
- Pedestrian / Cyclist Comfort / Experience
- Environmental Impact
- Constructability Considerations
- Capital Cost
- Lifecycle Considerations (operations and maintenance)

Evaluation

	Pre-engineered Pedestrian Truss Bridge (Bowstring)		Modular Panel Bridge		Network Arch Bridge		Cable Stayed Bridge	
Aesthetic Value	Convention structure with truss systems	3	Convention structure with truss systems. Typically used for temporary structures.	1	Signature Structure	4	Signature Structure	5
Pedestrian / Cyclist Comfort / Experience	Comfortable with smooth decking and safe railing design. Design grade at or below 4%.	4	Semi comfortable with smooth steel decking and safe railing design. Design grade at or below 4%.	3	Comfortable with smooth decking and safe railing design. Design grade at or below 4%.	4	Proposed wood decking would be uncomfortable for wheeled users and others with mobility challenges. Design grade at or below 4%.	2
Environmental Impact	Minimal. Mitigation methods can be implemented.	3	Minimal. Mitigation methods can be implemented.	3	Minimal. Mitigation methods can be implemented.	3	Minimal. Mitigation methods can be implemented. Additional tree clearing required on the east side due to the need for concrete anchor system.	2
Constructability Considerations	Constructing the bridge during colder months would cost more due to heating and conditioning of contained workspace. Significant laydown space required.	3	Constructing the bridge during colder months would cost more due to heating and conditioning of contained workspace. Significant laydown space required.	3	Constructing the bridge during colder months would cost more due to heating and conditioning of contained workspace. Significant laydown space required.	3	Higher construction risks for this bridge option because of its complexity.	2
Capital Cost	$$	4	$$	4	$$$	2	$$$$	1
Lifecycle Considerations (operations and maintenance)	Minimal First maintenance touch-up painting at 10 years Full overcoat of structure at thirty years	3	Minimal maintenance required. Temporary structure that won't last as long as a standard bridge.	3	Increased future inspection & maintenance efforts First maintenance touch-up painting at 10 years Full overcoat of structure at thirty years	2	Increased future inspection & maintenance efforts Special equipment is required for tall bridge tower and cable inspections	1
Total Score	**20**		**17**		**18**		**13**	

Questions?