WELCOME

to Public Consultation Centre #2 for

West Montrose Covered Bridge

Township of Woolwich



Region of Waterloo

June 2022

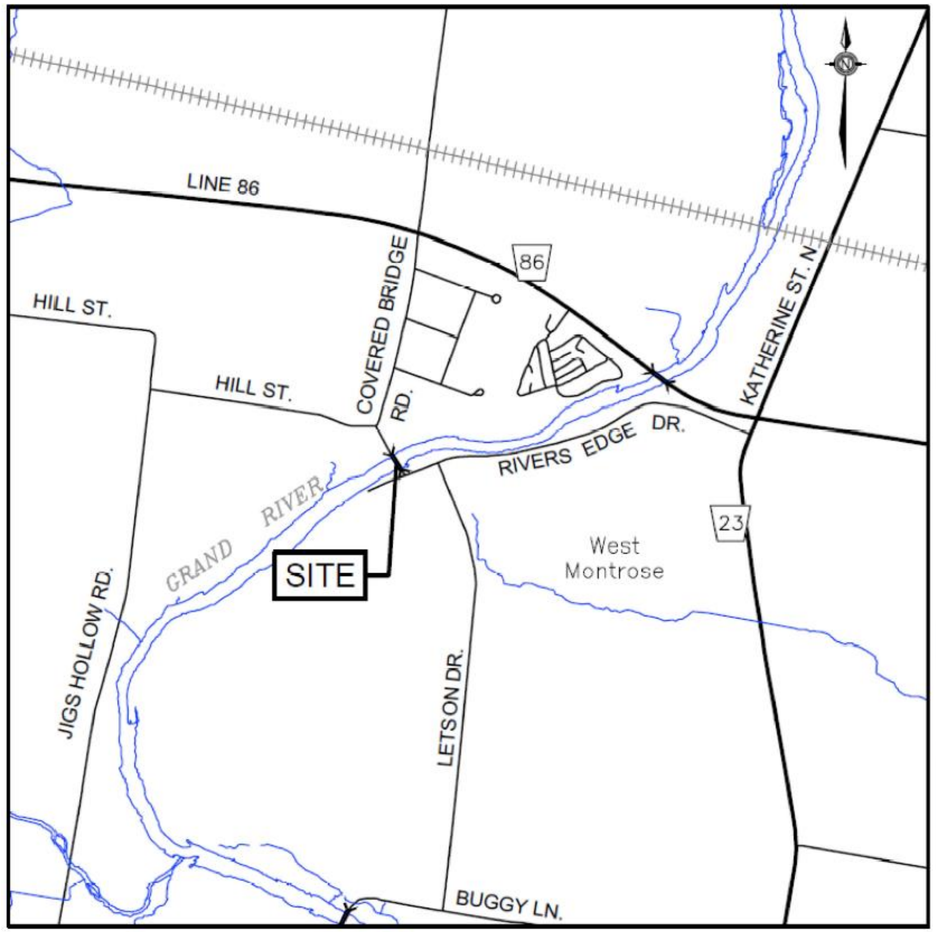
Study Introduction

Purpose

The West Montrose Bridge requires a complete structural rehabilitation in order to ensure that the structure will continue to serve the public through the current century.

Study Area

West Montrose Covered Bridge



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Study Team

Region of Waterloo

Sandy Shantz
Regional Councillor

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Skylar van Kruistum
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WOOLWICH TOWNSHIP

Murray Martin
Councillor
Ward 3

Larry Shantz
Councillor
Ward 3

Jared Puppe
Director of Infrastructure Services

DDA

(Consultant)

Doug Dixon, P.Eng.
President, Senior Bridge Engineer

Kevin Li, E.I.T.
Junior Bridge Designer

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Study Process

This study follows the Municipal Class EA Process and is classified as a Schedule A+ Project

Ongoing Studies

Study	Considerations
Natural Environment Study	Potential impacts on terrestrial species, vegetation, birds, amphibians, bat habitat, aquatic habitat, and fish
Stage 1 Archaeological Assessment	Potential impacts on previously registered archaeological sites or sites with archaeological potential
Cultural Heritage Resource Assessment	Cultural heritage preservation of the bridge

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Project Need

The 2014 Preservation Strategy for the West Montrose Covered Bridge and ongoing structural monitoring of the bridge has identified the need to:

- Remove the Bailey truss system and provide a single robust load bearing system capable of supporting all loads on the bridge.
- Repair the roof and exterior cladding.
- Mitigate other risk factors to the bridge including damage by oversize vehicles, loss by fire, flooding, ice and/or snow damage.

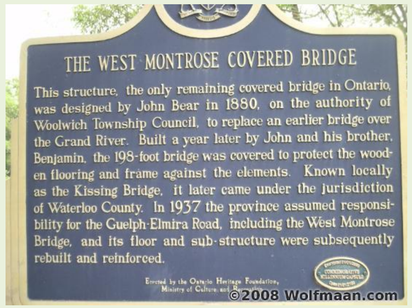
Project Opportunities

Structure Rehabilitation



Strengthen the overall structural system to support bridge loads and ensure public safety

Heritage Conservation



Preserve the heritage designation of the bridge

Ongoing Maintenance



Minimize future maintenance requirements

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Existing Challenges



Natural risks (wind, flood, snow, and ice damage)



Overloading of the bridge by oversize vehicles



Risk of Vandalism

Water supply for a fire suppression system



Deterioration of the structural timber with time



Protection of the wooden truss

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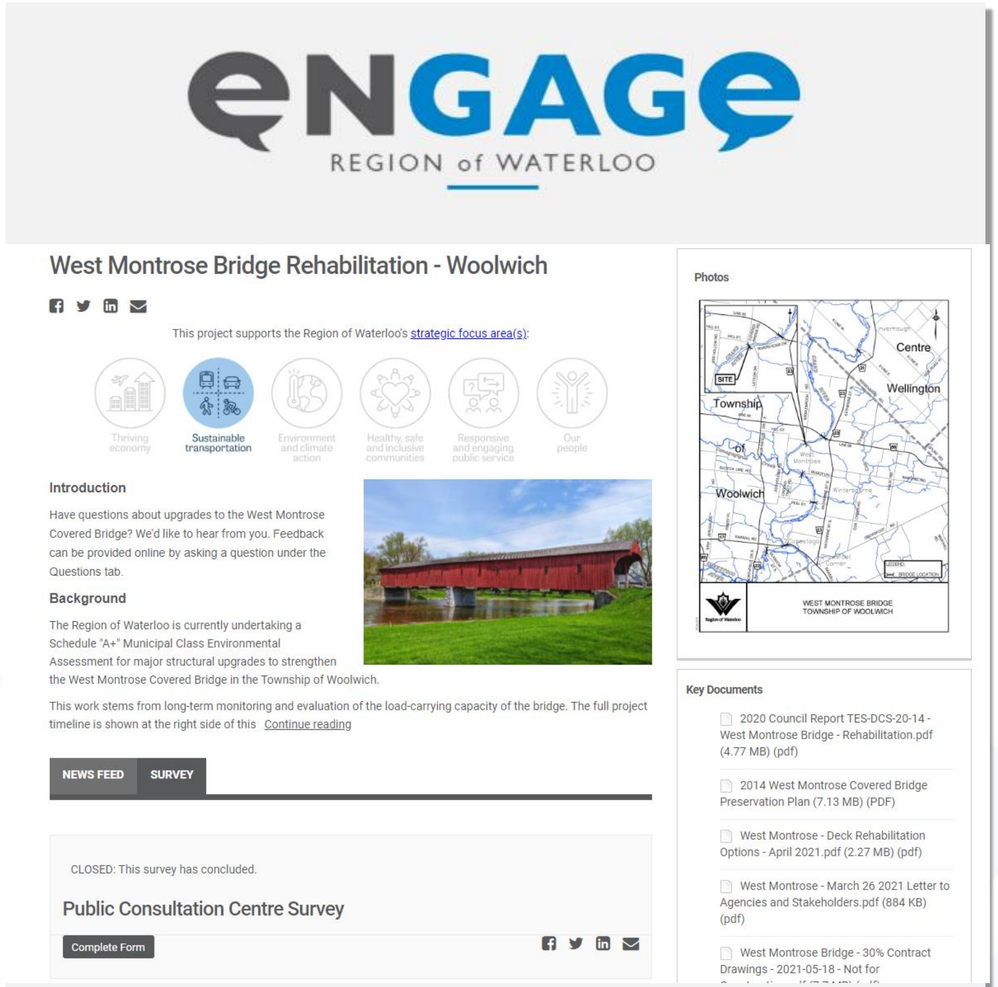
Public Consultation Centre #1

October 2021

- Virtual Public Consultation Centre hosted on the Region's EngageWR Website

Participants were encouraged to:

- Complete the survey
- Submit questions via the Question and Answer (Q&A) page
- Submit comment forms / emails
- Contact the project team



95 Site Visits

- The study webpage on EngageWR was visited 95 times during PCC #1

36 Surveys and comments received

- Through EngageWR website and email

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Public Consultation Centre #1

Participation



252 Aware Visitors

Viewed at least one page
(Includes Informed and Engaged Visitors)



95 Informed Visitors

Viewed documents, images or multiple pages
(Includes Engaged Visitors)



36 Engaged Visitors

Participated in the survey or asked a question

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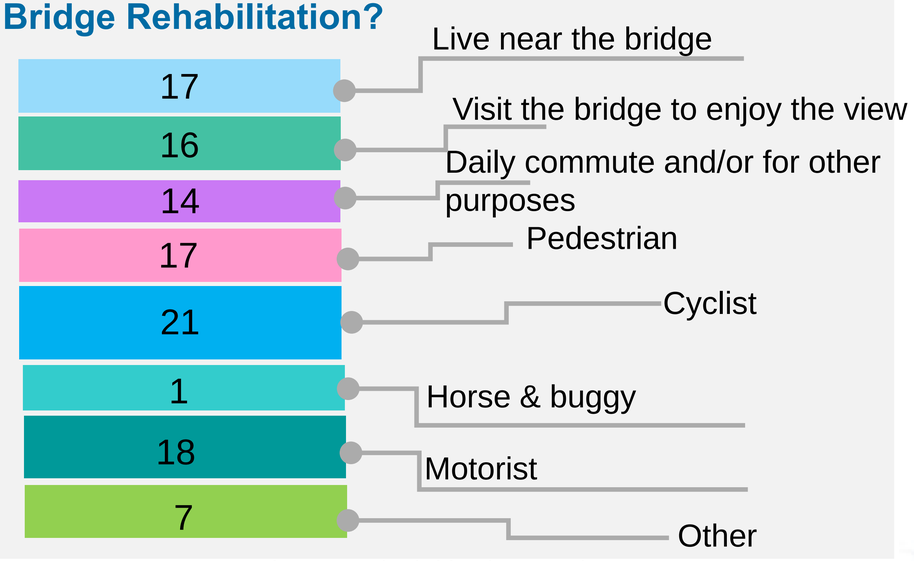
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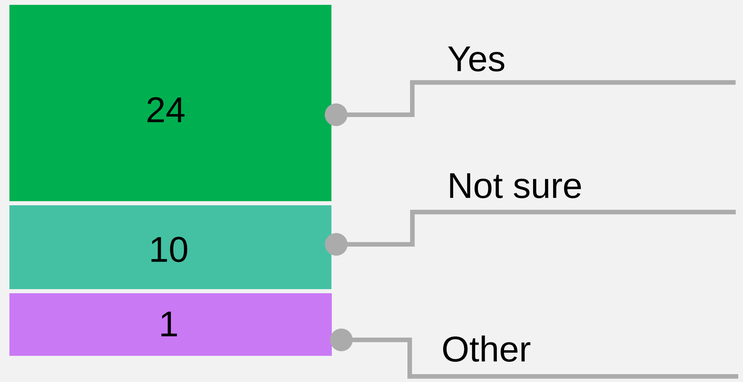
Public Consultation Centre #1 – Respondent Profile

Q1. What is your relationship to the West Montrose Bridge Rehabilitation?

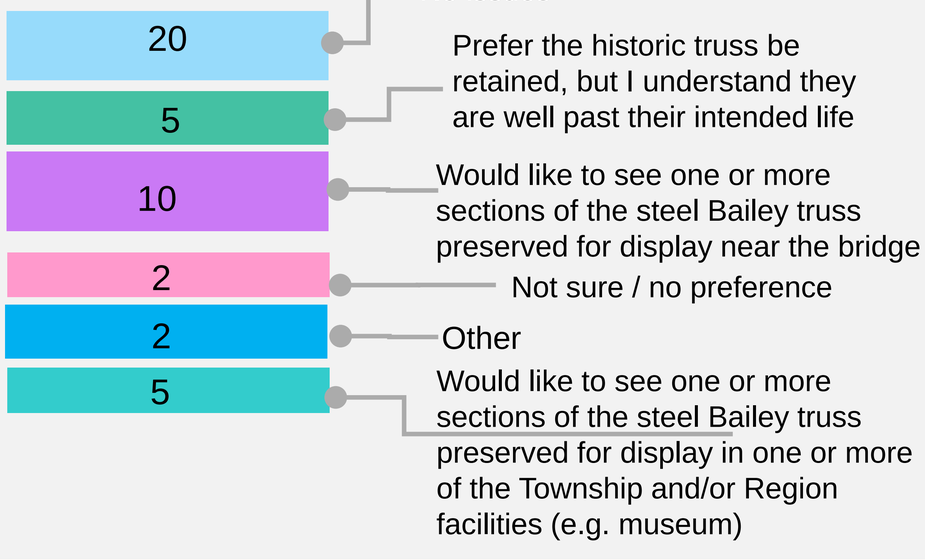


Note: Some respondents use the bridge in more than one way

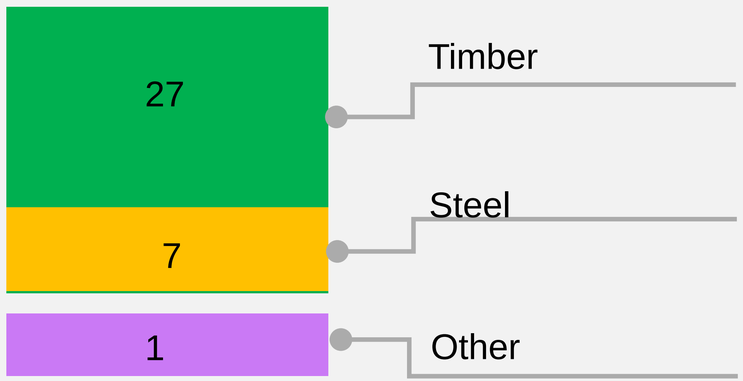
Q2. Are you in favour of the general plan for the West Montrose Bridge Rehabilitation?



Q3. What are your feelings about the removal of the 1944 steel Bailey trusses and replacement with new purpose-built girders that will support the weight of the bridge?



Q4. Do you have a preference for the deck system to be implemented?



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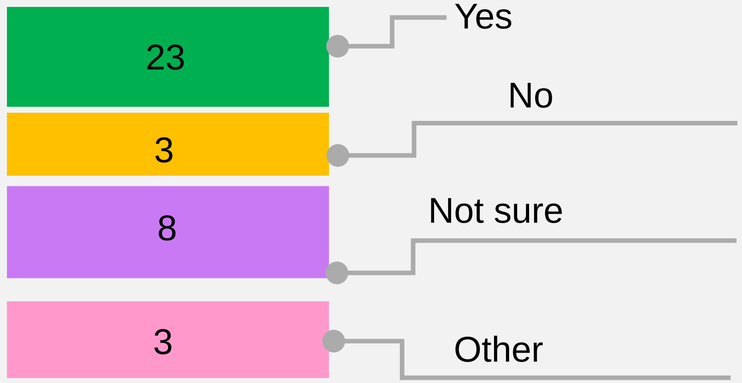
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Public Consultation Centre #1 – Respondent Profile

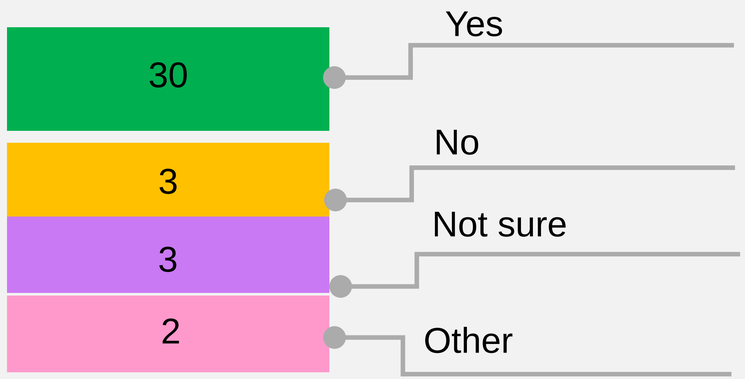
Q5. To prevent large vehicles from gaining access to the West Montrose Bridge, additional roadside features would be required. Are you in favour of this?



Q6. What are your thoughts on maintaining the existing sag in the roof line?



Q7. The roadway within the bridge has developed a pronounced sag in each span, with a pronounced hump over the central pier. Would you support the elimination of this roadway sag?



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Public Consultation Centre #1 – Community Priorities



Repurpose material from restoration work



Install fire suppression system



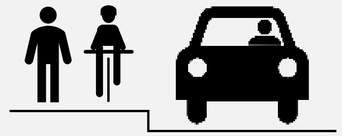
Limit impacts on Letson Park during construction



Install fibre optic cable to the community



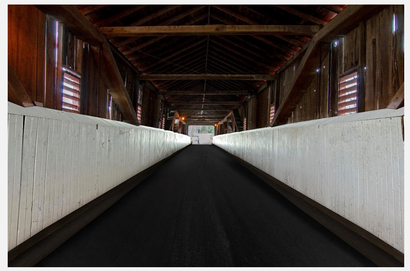
Bridge capacity and load limit



Provide traffic calming for horse & buggies on Line 86



Install security cameras



Wearing surface



Keep non-functional cross-bracing in place

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Alternative Rehabilitation Solutions

The following alternative solutions for the bridge rehabilitation were considered by the Project Team:

Alternative	Description	Addresses Rehabilitation Needs	Heritage Preservation and Conservation	Minimize Ongoing Maintenance	Comment
Do Nothing	Leave the existing Bailey Truss in place. Continue to perform ongoing maintenance.	✗	✗	✗	Eliminate – does not address the project Objectives
Restrict the bridge to pedestrians and cyclists only	Restrict motor vehicles from using the bridge.	✗	✗	✗	Eliminate – does not address the project Objectives. Bridge would still require rehabilitation.
Post-tensioning the bottom chord of the Truss	Installation of high-strength steel tensioning rod along the bottom chord of the timber truss.	✗ 1	✓	✗	Not carried forward
Steel Girder Reinforcement (Presented in PCC#1)	Remove the existing Bailey trusses and replace with new steel girders. The new steel girder would be hidden from view by the white interior cladding.	✓	✓	✓	Carry forward for further assessment as **Alternative A**
Timber Truss Reinforcement (Preferred)	Remove the existing Bailey truss and strengthen the existing wooden truss with high strength fiber-reinforced polymer.	✓	✓	✓	Carry forward for further assessment as **Alternative B**

Note 1: Fluctuation of temperature and moisture can affect the effectiveness of this strengthening method.

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Rehabilitation Alternatives –

Alternative

A

Steel Girder Reinforcement

- Remove Bailey trusses and replace with steel girders
- Replace interior white cladding
- Width of driving lane would become slightly more narrow



Alternative

B

Timber Truss Reinforcement

- Remove Bailey truss and strengthen existing wooden truss with high-strength fibre-reinforced polymer (FRP)
- Increase to height of bridge by 300mm (1 foot) due to increased depth of bottom chord of truss
- Remove interior white cladding
- Install timber guardrail to protect wooden truss



Common to Both Alternatives

- New timber glue-laminated deck with tar & chip wearing surface
- Height-restriction device current posted load limit maintained
- Replace exterior cladding
- Replace roof shingles
- Remove longitudinal tensioning rods
- Install utility duct for fibre-optic cable
- Rehabilitate the bridge abutments and pier

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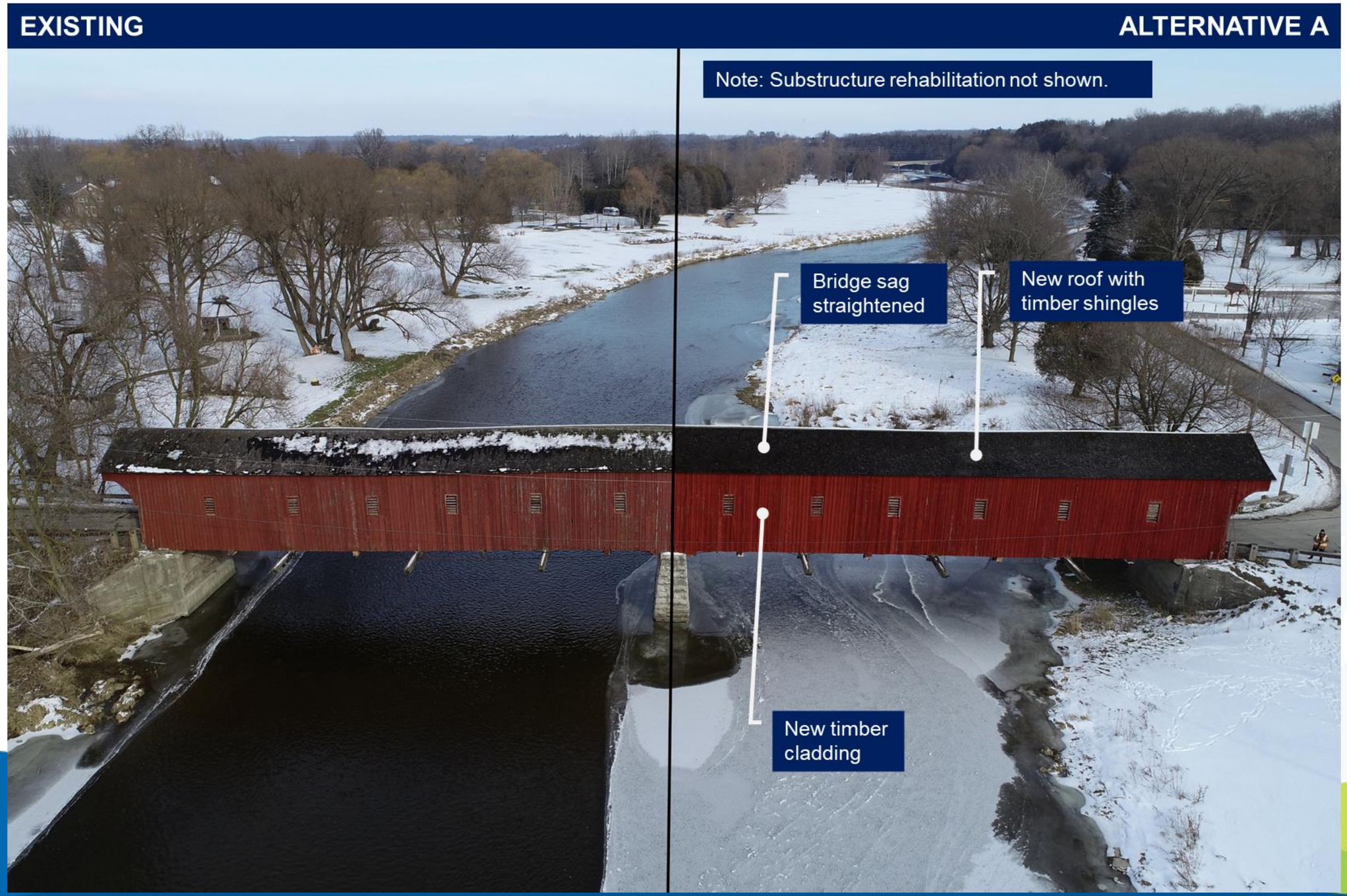
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Alternative A – Elevation View



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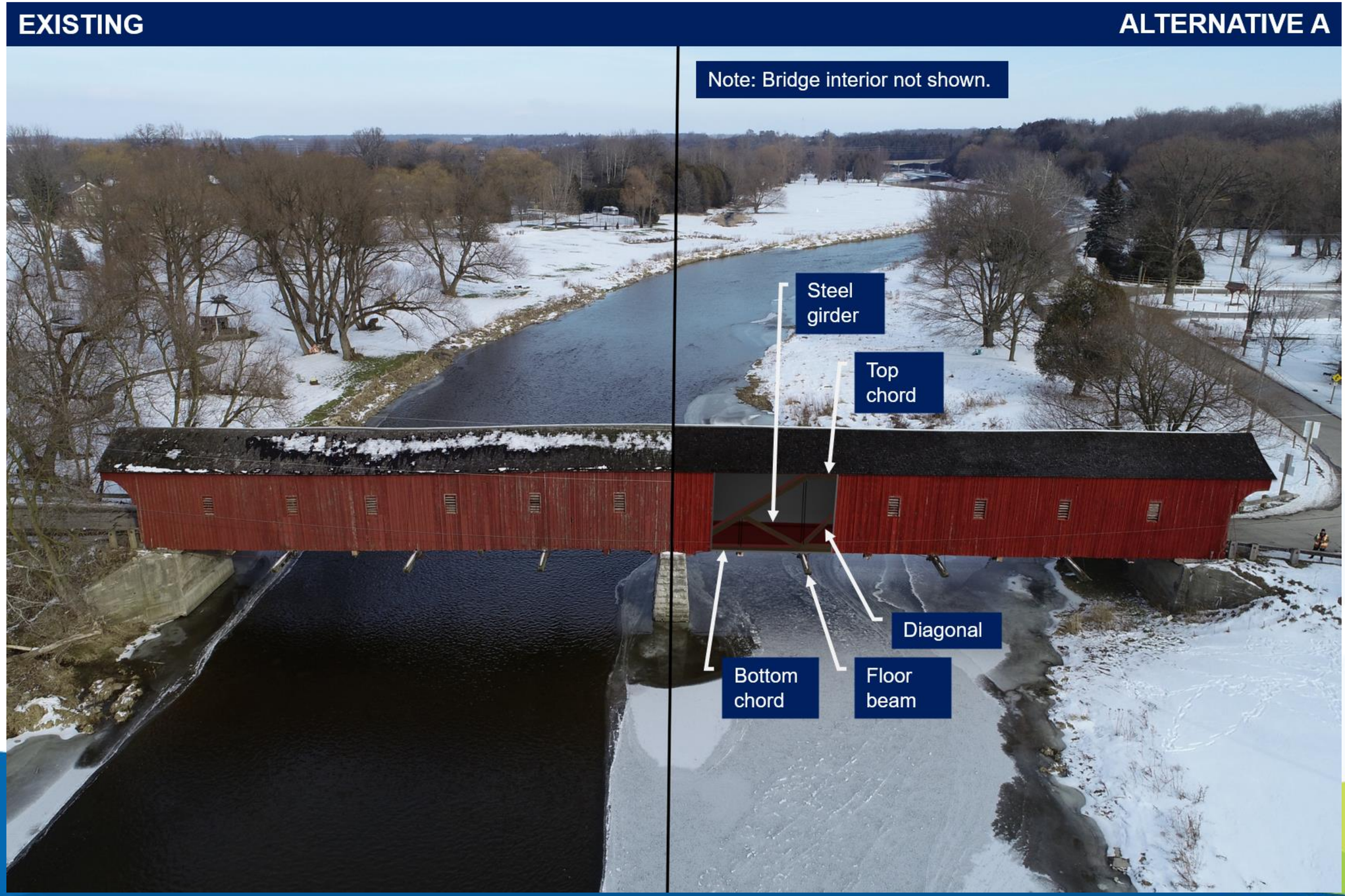
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Alternative A – Elevation View



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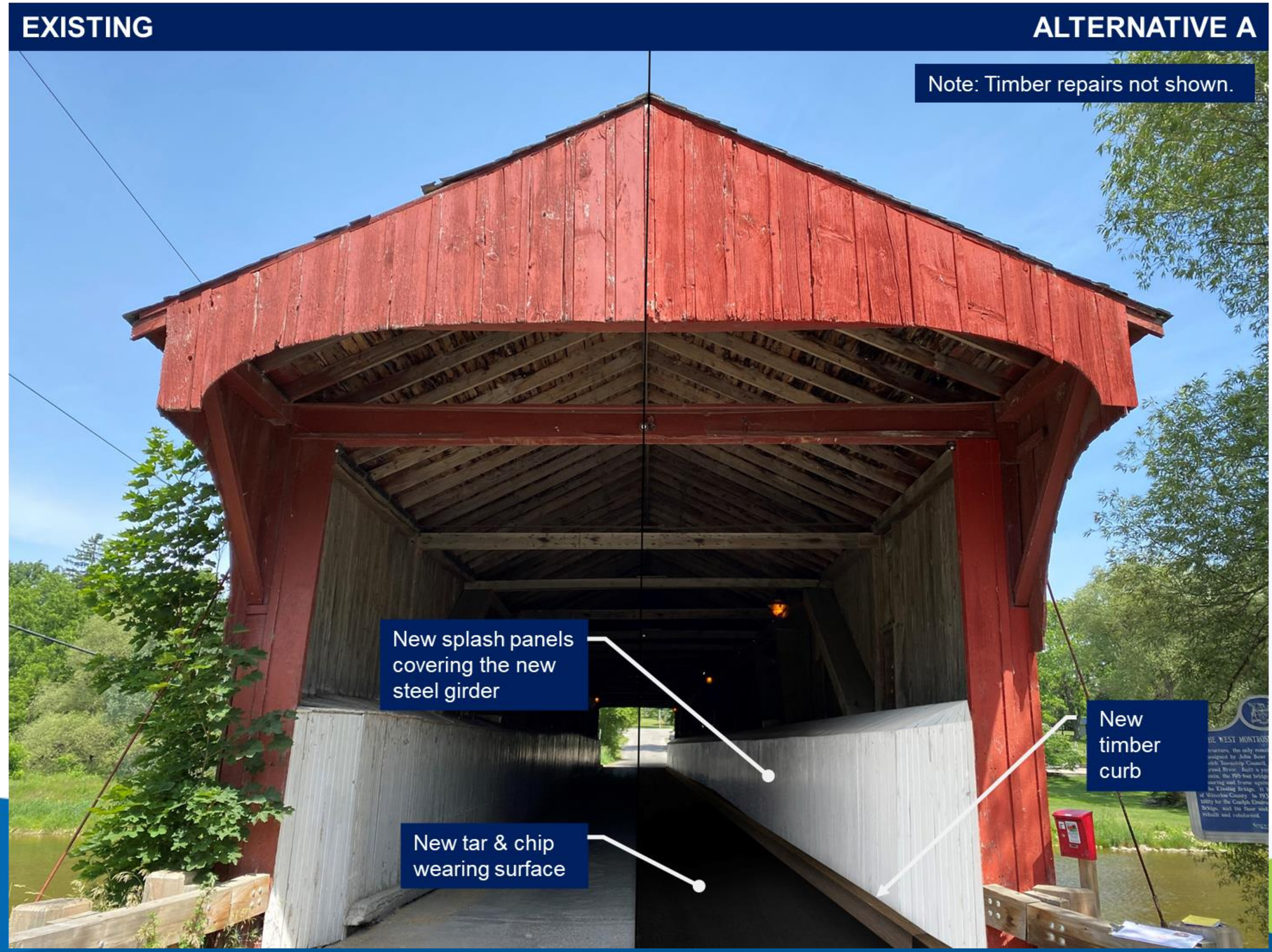
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Alternative A – Front View



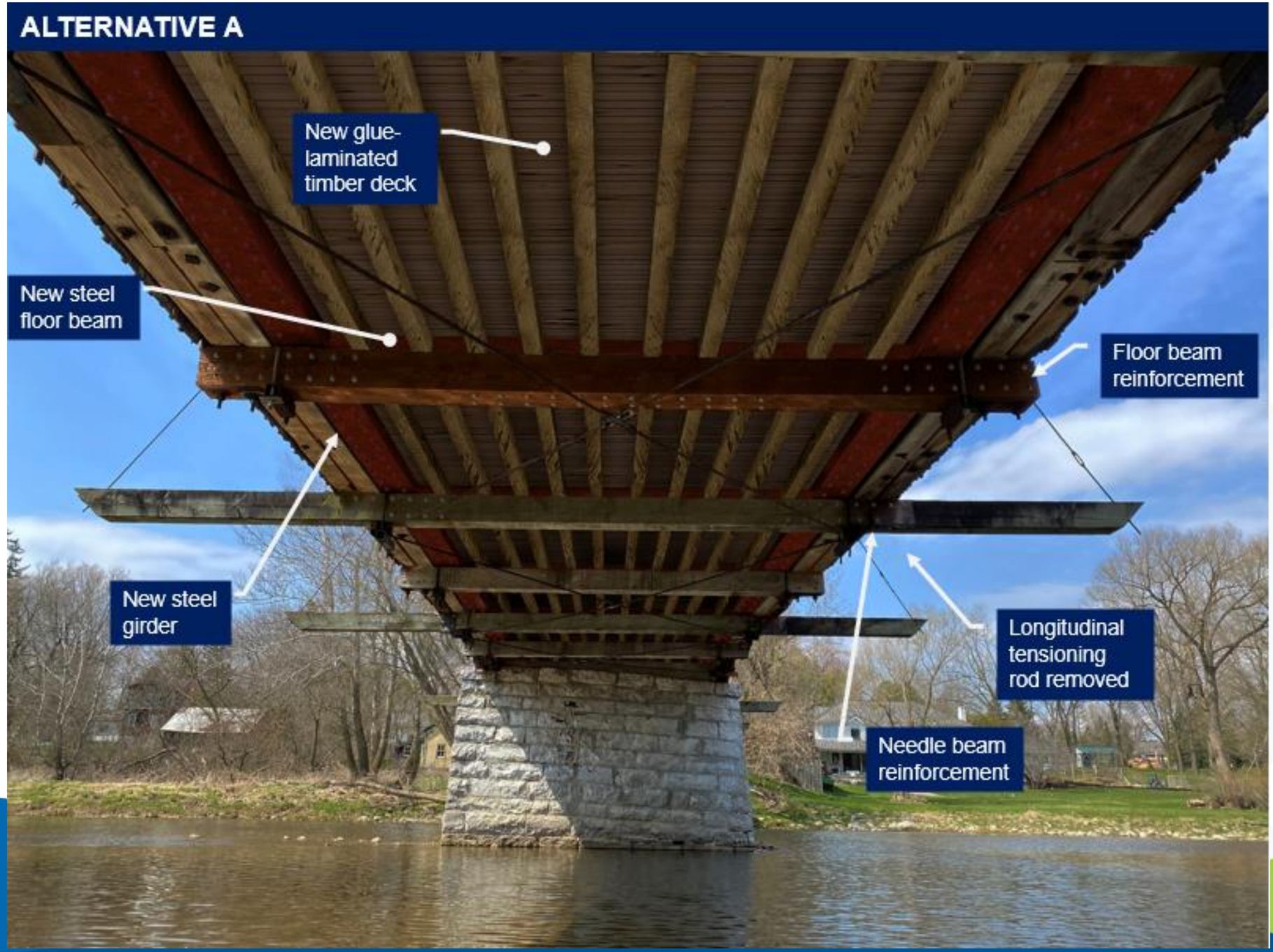
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Alternative A – Interior View



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Alternative A – Underside View



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Alternative B – Elevation View



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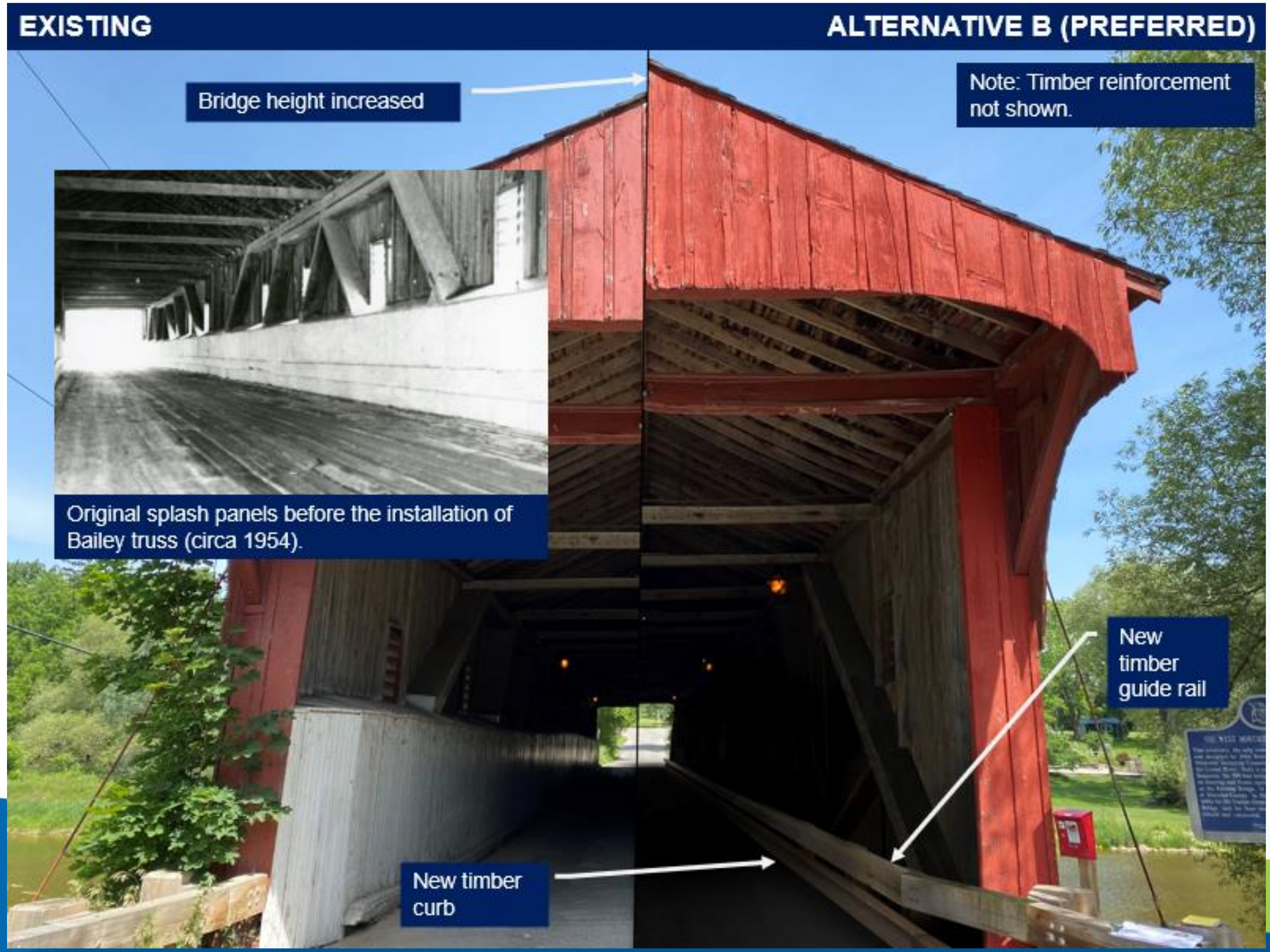
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Alternative B – Front View



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Alternative B – Interior View



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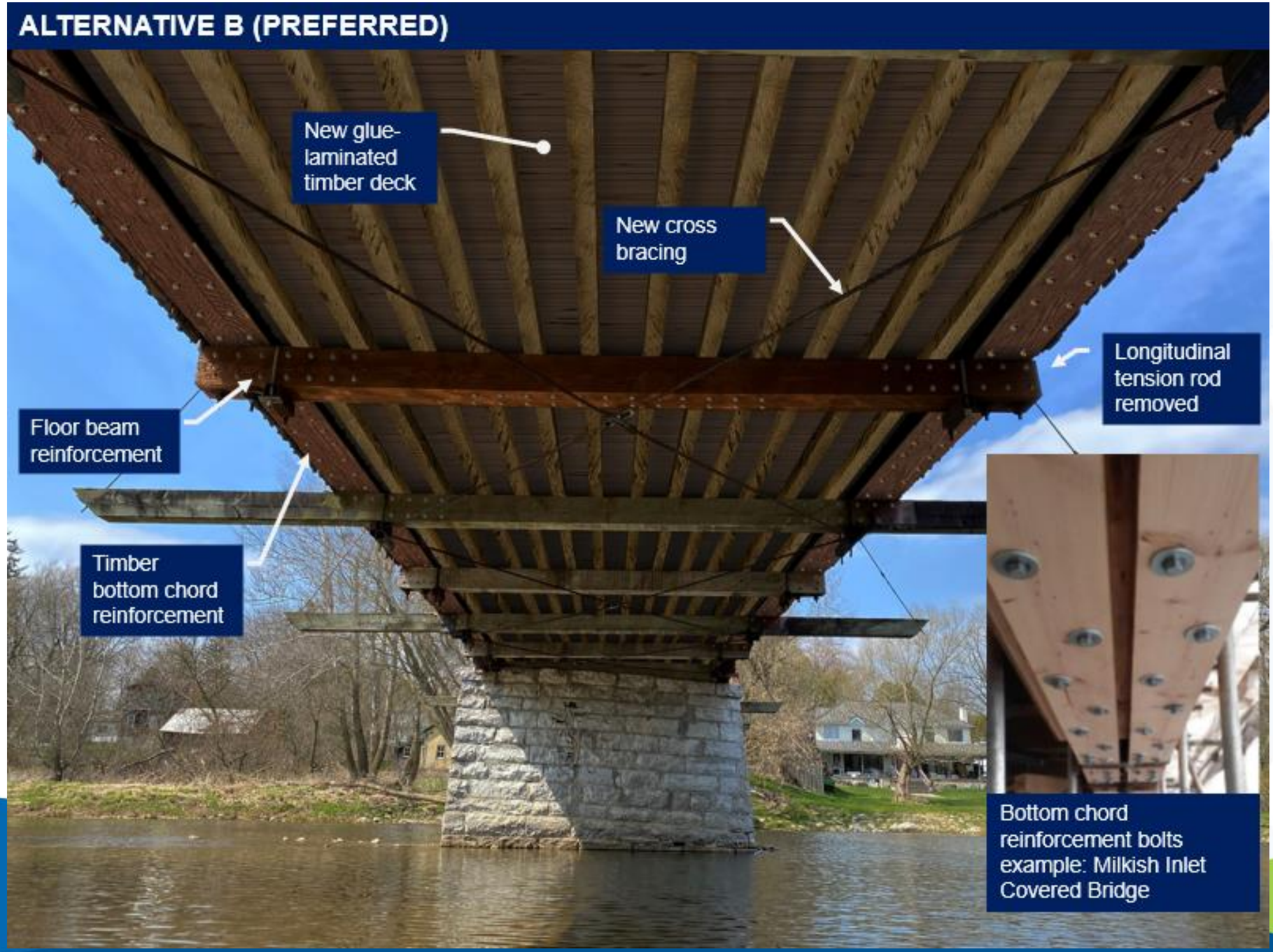
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Alternative B – Underside Deck View



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Alternative Rehabilitation Methods - Evaluation Process

The evaluation of each alternative rehabilitation method considers:

Structural Performance	The ability of the alternative to meet structural design requirements, and its structural reliability and durability.
Constructability	Consideration for ease of construction and impact to the public and environment.
Cultural Heritage	Does the alternative preserve the cultural heritage of the bridge?
Aesthetics	How visually appealing is the alternative?
Sustainability	Which Alternative requires less energy to construct and produces the least amount of greenhouse gas emissions?
Life-cycle Cost	What is the cost of the alternative over the design life, including construction costs and the costs for future maintenance requirements?

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Alternative Rehabilitation Methods – Assessment

Structural: The ability of the alternative to meet structural design requirements, and its structural reliability and durability.

ALTERNATIVE A STEEL GIRDER REINFORCEMENT	ALTERNATIVE B TIMBER TRUSS REINFORCEMENT
Pros: •Steel is a more reliable material and is not subjected to organic decay such as rot. Protection provided by the covered bridge and coating will prevent the steel girders from corrosion with minimal maintenance. •Steel is a more ductile material. Signs of failure can be observed prior to total failure. Cons: •Due to the distinct material properties between steel and timber, the steel structural system may not behave in unison with the timber structural system, leading to secondary stress in the timber truss. •Increased loads on foundation due to weight of steel.	Pros: •Pure timber truss system of Alternative B is lighter than Alternative A. This means less force on the foundation due to dead load. The excess capacity from the foundation can be used to carry additional live load if desired. Cons: •Timber and FRP reinforcement are brittle and are prone to sudden failure under overloading. To prevent overloading, it is prudent to install a **height-restriction device** to limit large (and usually over-weight) vehicles from entering the bridge as part of this alternative.
●	◕

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Alternative Rehabilitation Methods – Assessment

Constructability: Consideration for ease of construction and impact to the public and environment.

ALTERNATIVE A **STEEL GIRDER REINFORCEMENT**	ALTERNATIVE B **TIMBER TRUSS REINFORCEMENT**
• Pedestrian traffic can be maintained by installing a platform on the temporary support beams, apart from a short period to allow the installation of the new deck. • Nature of the work requires the installation of a work platform beneath the entire span of the bridge for the duration of construction. • Lead time for both materials are similar. • Impact on natural environment similar for both alternatives	
◕	◕

Aesthetics: how visually appealing is the alternative?

ALTERNATIVE A **STEEL GIRDER REINFORCEMENT**	ALTERNATIVE B **TIMBER TRUSS REINFORCEMENT**
• Bridge interior will look similar to the way it does today • Due to larger sized steel girders, the cross-section width of the interior splash panel is now larger and the roadway driving width is reduced. • Steel girder and steel floor beam is observable from the soffit (underside) of the bridge.	• Exposed timber truss could be seen as more visually appealing • Existing **bridge height** will be marginally **increased by approximately 300mm (1 foot)** to accommodate the new timber truss reinforcement. • Timber truss chords and diagonal reinforcement will be noticeable from the bridge interior.
◕	●

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Alternative Rehabilitation Methods – Assessment

Cultural Heritage: Does the alternative preserve the cultural heritage of the bridge? Is the alternative reversible?

ALTERNATIVE A STEEL GIRDER REINFORCEMENT	ALTERNATIVE B TIMBER TRUSS REINFORCEMENT
Pros: • Structure appearance from the bridge approaches and bridge deck will look similar to existing. • No changes to existing bridge dimensions. • Similar to the current bridge which has the steel bailey truss.	Pros: • Pre-bailey truss bridge interior can be restored. • Restores the historical structural system of the bridge. Cons: • Likely not reversible. Removal of epoxy-adhered reinforcements would be impractical and there will be numerous lag bolt holes in the original truss.
●	●

Sustainability: Which Alternative requires less energy to construct and produces the least amount of greenhouse gas emissions?

ALTERNATIVE A STEEL GIRDER REINFORCEMENT	ALTERNATIVE B TIMBER TRUSS REINFORCEMENT
➢Using timber is generally more sustainable than steel.	
◕	●

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Life-cycle Cost: What is the total cost of the alternative, including construction costs and the costs for future maintenance requirements ?

ALTERNATIVE A STEEL GIRDER REINFORCEMENT		ALTERNATIVE B TIMBER TRUSS REINFORCEMENT	
Construction cost: (Project Setup, General construction, deck replacement, cladding replacement, roof replacement, substructure work, including contingency)	$2,800,000	Construction cost (project setup, general construction, truss reinforcement, localized timber repairs, deck replacement, cladding replacement, roof replacement, substructure work, includes contingency)	$2,600,000
Miscellaneous Items (Fire suppression system, utility duct)	TBD	Miscellaneous Items (Fire suppression system, utility duct	TBD
➢ Under timber covers, steel elements will be protected and can be expected to last for 75+ years.		➢ Replacement elements will be preservative treated to slow down future decay. ➢ Rehabilitation will be designed to provide 75+ years of design life, however, if the bridge is not properly maintained, the life-span of the bridge may be less than 75 years. ➢ Removal of interior splash panels will more readily allow individuals to climb the truss and open up more areas of the bridge interior to vandalism and graffiti.	
●		●	

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Alternative Rehabilitation Methods – Assessment

CRITERIA	ALTERNATIVE A REPLACE EXISTING BAILEY TRUSS WITH STEEL GIRDER	ALTERNATIVE B REMOVE EXISTING BAILEY TRUSS AND REINFORCE TIMBER TRUSS
STRUCTURAL	●	◕
CONSTRUCTABILITY	◕	◕
CULTURAL HERITAGE	●	●
AESTHETICS	◕	●
SUSTAINABILITY	◕	●
LIFE-CYCLE COST	●	●
RECOMMENDED ALTERNATIVE	Not carried forward.	Carried forward as the preferred rehabilitation alternative. ✓

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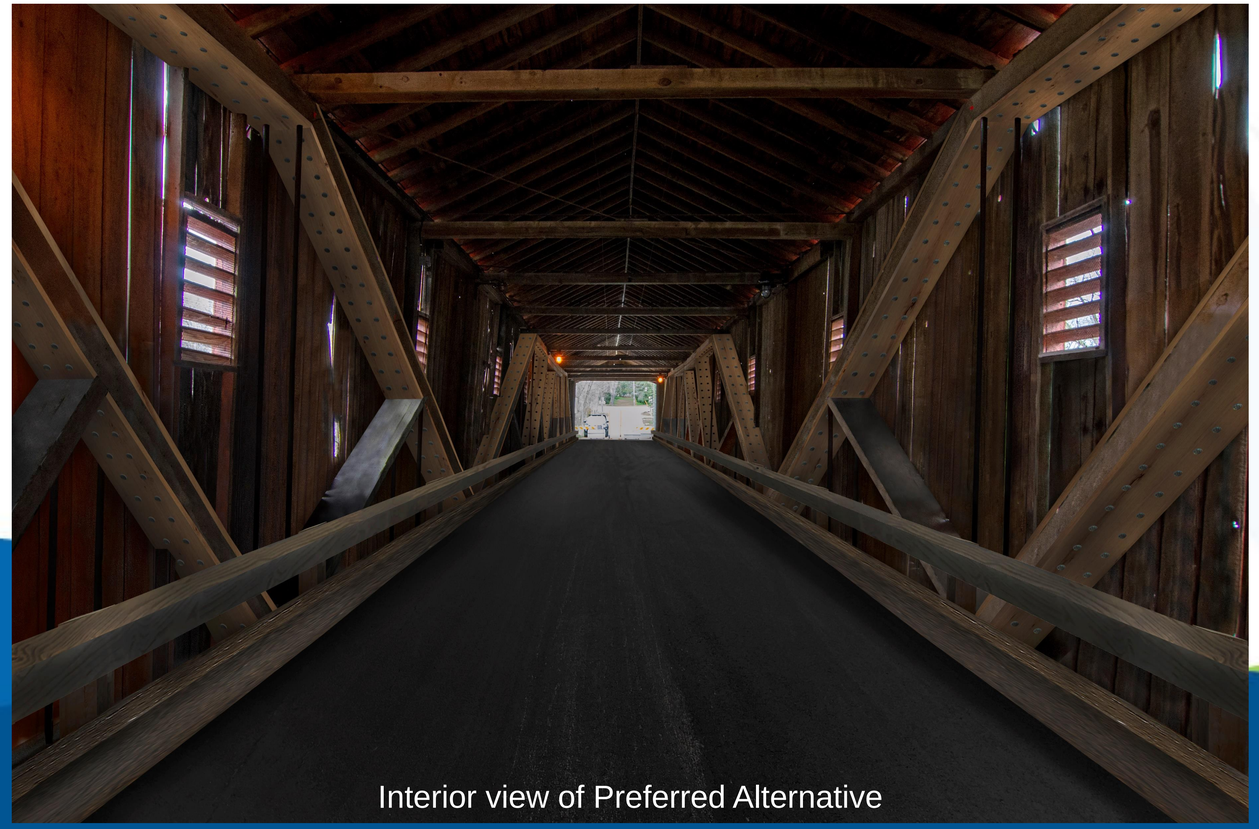
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Project Team Recommended Rehabilitation Alternative

Removal of the existing Bailey truss and strengthening of the existing wooden truss with high-strength fiber reinforcement, including:

- Increase the height of the bridge by approximately 300mm (1 foot) due to reinforced bottom chord
- Height restriction bars to prevent heavy vehicles from using the bridge
- Reinstatement of the tar and chip wearing surface
- Replacement of the existing wooden deck with a timber glue-laminted deck; and
- Removal of the interior white cladding and installation of a timber guiderail to protect the wooden truss



Interior view of Preferred Alternative

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Height Restriction Bar – Option 1



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Height Restriction Bar – Option 2



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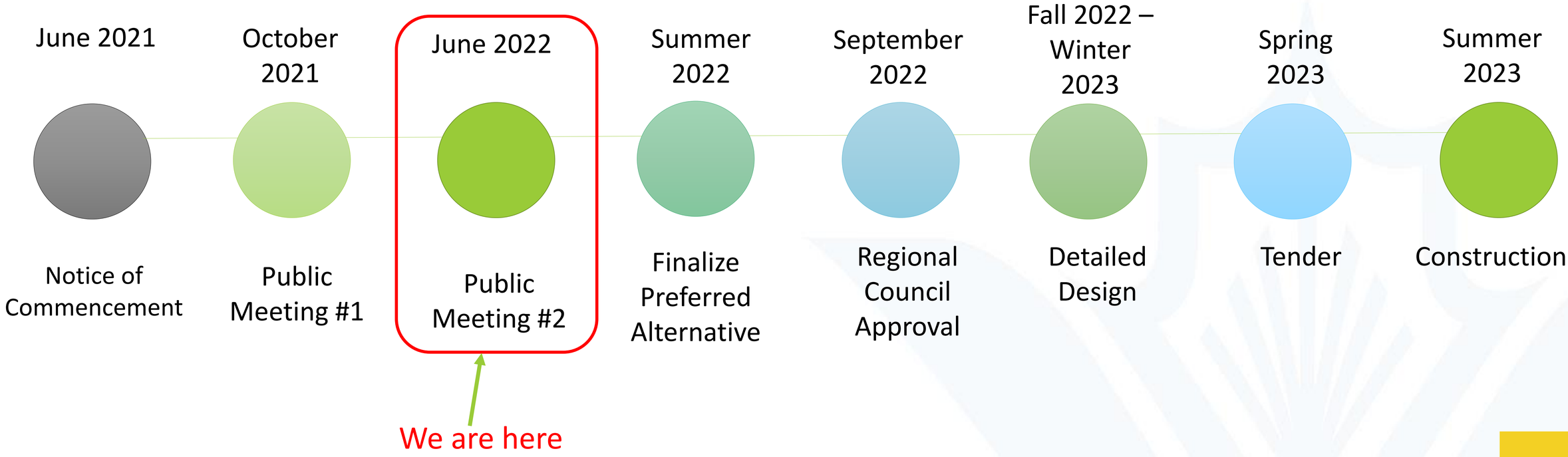
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Thank you for your Interest!

Have Your Say by July 4!

Complete the survey
Email your comments
Join our mailing list

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Study Webpage

Follow the Study: engagewr.ca/west-montrose

eNGAGE
REGION of WATERLOO

Online Survey #2

Click here to take the survey

Please submit comments and/or complete the online survey by July 4, 2022

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