

Township of Centre Wellington

Bridge and Transportation Network Study for Four Bridges

Public Open House #2

Centre Wellington Community Sportsplex - Gord Brown Hall
December 2, 2024
6:00 – 8:00 p.m.

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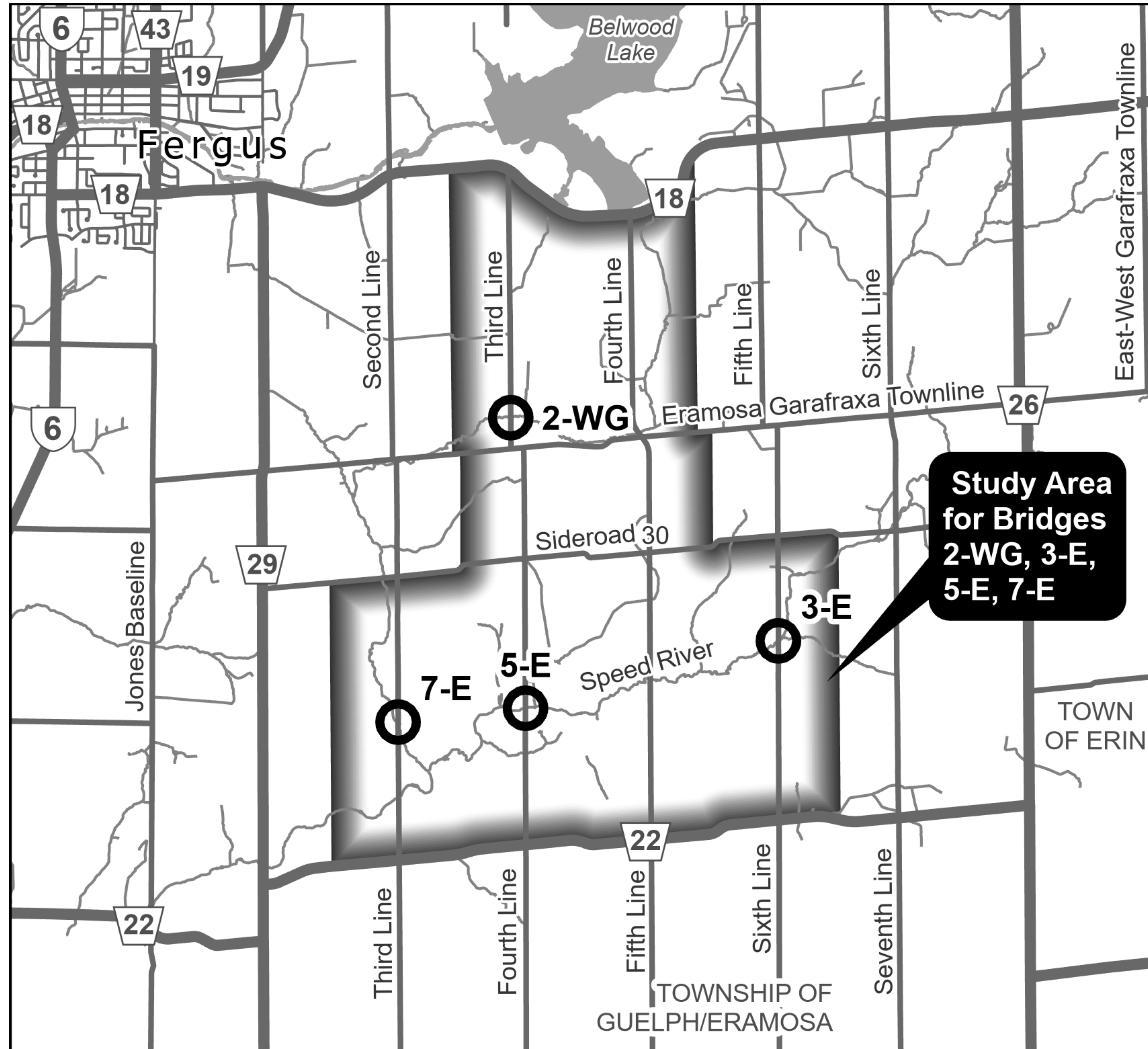
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Project Study Area:



- List of scenarios was narrowed down based on high-level criteria determined through the Transportation Study:
 - Existing conditions (only 2-WG open) always considered in studies
 - Closure of all bridges is used as the base line for comparison
 - 2-WG to remain opened as there is no alternative for farm equipment to using Wellington 8 to get to south
 - If 7-E is not opened, properties would be landlocked if closure of 8-E is required in future.

ALTERNATIVE SOLUTIONS:

- DO NOTHING**
 - Leave the existing structures in their current deteriorating state and take no action. Bridge 2-WG remains open but load limited, until eventual closure when it further deteriorates. Structures remain in place until they collapse
- ALL BRIDGES CLOSED & REMOVED**
 - Remove structures to eliminate risk to the public and impacts of potential future collapse.
- REPLACE ALL BRIDGES**
- REPLACE BRIDGES 2-WG, 3-E & 7-E**
 - Remove Bridge 5-E and construct turn-arounds at removed structure location
- REPLACE BRIDGES 2-WG, 5-E & 7-E**
 - Remove Bridge 3-E and construct turn-arounds at the removed structure location
- REPLACE BRIDGES 2-WG & 7-E**
 - Remove Bridges 3-E and 5-E and construct turn-arounds at the removed structure locations

Cross-Community Travel :

- Evaluates travel from north of bridges to communities south of study area (Rockwood, Guelph, Erin) & from south of bridges to communities north of study area (Belwood, Fergus, Elora)

Individual Bridges:

Bridges Open	2-WG	3-E	5-E	7-E
Avg Time Saved (mins)	2.1	1.3	1.8	1.4
Score	3.50	4.00	2.40	3.00
Rank	1	4	2	3

Key Findings:

- Opening Bridge 2WG results in the most time/distance savings
- Opening Bridge 3E results in the least time / distance savings

Transportation Network Alternatives:

Alternative	1	2	3	4	5	6
Bridges Open	2-WG	None	All	2-WG, 3-E & 7-E	2-WG, 5-E & 7-E	2-WG & 7-E
Avg Time Saved (mins)	2.1	0.0	6.6	4.8	5.3	3.5
Traffic Volume Benefited	50	0	270	220	170	120
Score	0.51	0.00	4.00	3.15	2.78	1.94
Rank	5	6	1	2	3	4

Emergency Response Time:

- Evaluates travel from emergency response originating in Fergus or Rockwood (whichever is closest) to destinations each side of bridge

Individual Bridges:

Bridges Open	2-WG	3-E	5-E	7-E
Avg Time Saved (mins)	0.0	0.0	2.1	0.9
Properties Benefited	0	0	11	8
Score	0.00	0.00	4.00	1.22
Rank	3	3	1	2

Key Findings:

- Properties north of bridges are not impacted
- Opening Bridge 2-WG does not provide benefit because of proximity to Eramosa-Garafraxa Townline
- Properties south of 3-E have faster response times from Rockwood stations and therefore are not impacted by closure

Transportation Network Alternatives:

Alternative	1	2	3	4	5	6
Bridges Open	2-WG	None	All	2-WG, 3-E & 7-E	2-WG, 5-E & 7-E	2-WG & 7-E
Avg Time Saved (mins)	0.0	0.0	1.6	0.9	1.6	0.9
Properties Benefited	0	0	19	8	19	8
Score	0.00	0.00	4.00	0.94	4.00	0.94
Rank	5	6	1	3	1	3

Slow Moving Vehicles:

- Evaluates impacts associated to agricultural equipment travel within community
- Uses non-arterial routes (no Wellington Roads or Fifth Line Eramosa), where alternative is available

Individual Bridges:

Bridges Open	2-WG	3-E	5-E	7-E
Max Time Saved (mins)	14.6	28.9	28.7	32.2
Same-Ownership Farms impacted	6	1	2	1
Score	4.0	2.3	3.2	2.6
Rank	1	4	2	3

Notes: Travel times based on 25 km/h speed for slow moving vehicles
Scoring of 2-WG increased because it requires Wellington Road 18 still be used

Key Findings:

- There is no alternative to using Wellington Road 18 if 2-WG closed
- Open at least one of 5-E or 7-E to avoid travel on arterial routes
- Bridge 2-WG has most parcels of land with a single owner that are bisected by the bridge

Transportation Network Alternatives:

Alternative	1	2	3	4	5	6
Bridges Open	2-WG	None	All	2-WG, 3-E & 7-E	2-WG, 5-E & 7-E	2-WG & 7-E
Total Time Saved (mins)	44.0	0	205.0	139.1	157.5	101.9
Same-Ownership Farms impacted	6	0	10	8	9	7
Score	1.8	0.0	4.0	3.0	3.4	2.4
Rank	5	6	1	3	2	4

Note: Total Time Saved is a measure for comparison only, based on the seven routes analyzed as part of the study. This time savings is not for one specific route. The individual time saved per route varies.

Local Community Travel:

- Analysis of travel routes with origins and destinations within the study area.
- Represents impacts to delivery and collection services, buses, snow-ploughs, etc.

Individual Bridges:

Bridges Open	2-WG	3-E	5-E	7-E
Total Time Saved (mins)	14.1	5.5	6.7	6.0
Score	4.0	1.6	1.9	1.7
Rank	1	4	2	3

Note: Total Time Saved is a measure for comparison only, based on the seven routes analyzed as part of the study. This time savings is not for one specific route. The individual time saved per route varies.

Key Findings:

- Opening 2-WG provides the most time savings by a large margin
- Compounding benefits for opening 2-WG in combination with any of the other 3 bridges

Transportation Network Alternatives:

Alternative	1	2	3	4	5	6
Bridges Open	2-WG	None	All	2-WG, 3-E & 7-E	2-WG, 5-E & 7-E	2-WG & 7-E
Total Time Saved (mins)	14.1	0	34.4	24.3	26.9	18.8
Score	1.6	0.0	4.0	2.8	3.1	2.2
Rank	5	6	1	3	2	4

Note: Total Time Saved is a measure for comparison only, based on the seven routes analyzed as part of the study. This time savings is not for one specific route. The individual time saved per route varies.

Transportation Evaluation Summary:

Individual Structure Evaluation:

Criteria / Alternative	2-WG	3-E	5-E	7-E
Cross-Community Travel	3.5	4.0	2.4	3.0
Emergency Response	0.0	0.0	4.0	1.2
Slow-Moving Equipment	4.0	2.3	3.2	2.6
Local Community Travel	4.0	1.6	1.9	1.7
TRANSPORTATION	11.5	7.9	11.5	8.5

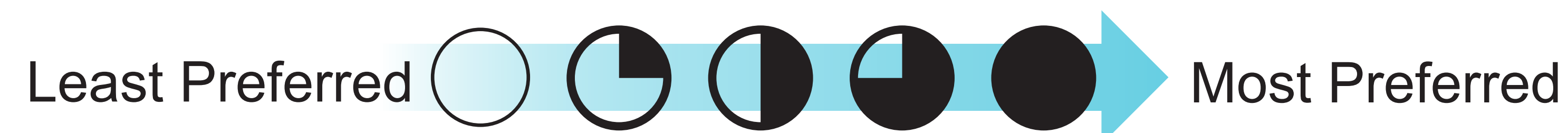
TRANSPORTATION RANKING:



Key Findings:

- Replacement of 7-E was determined to be required in order to not land-lock properties upon Bridge 8-E requiring replacement.
- Bridge 2-WG is required to remain open to provide alternative routes to Wellington 18 for farm equipment / slow-moving vehicles.

Transportation Network Evaluation:



Criteria / Alternative	2-WG Open	All Closed	All Open	2WG, 3E & 7E Open	2WG, 5E & 7E Open	2WG & 7E Open
Cross-Community Travel						
Emergency Response						
Slow-Moving Equipment						
Local Community Travel						
TRANSPORTATION						
Numerical Rating	1.18	0.00	4.00	2.42	3.45	1.93

TRANSPORTATION RANKING:



Key Findings:

- Opening more structures is preferred from a transportation perspective
- For the options which consider opening 3 bridges, opening 2-WG, 5-E & 7-E provides the most overall benefit to the transportation network

Evaluation of Structure Types:

Rehabilitation and several bridge replacement types were evaluated to determine the most suitable option for opening of the bridge to vehicular traffic

Structure Type Evaluation Matrix

Criteria	Weight	Rehabilitation	Single Span Slab on Girder	Single Span Precast Rigid Frame	Twin Cell Box Culvert	Multi-Cell CSP	Single Lane Modular Bridge
Achievable Spans	N/A	Existing	34m	16m	2 x 6.4m	4 x 3m	20m +/-
Driving Platform Width	5	1	5	5	5	5	3
Road Profile	5	3	2.5	2.5	2.5	2.5	2.5
Load Capacity	5	1.5	5	5	5	5	5
Maintenance	5	3	5	5	5	5	1
Property Impacts	5	5	3	3	2	2	5
Environmental	5	4.5	4	4	2	1	4
Hydraulics	5	1.5	4	3.5	3	1.5	4
Heritage	5	5	3	3	1	1	1
Pedestrian Use	5	2	4	4	4	4	2.5
Construction Cost	5	5	1.8	2.3	2.9	4.1	2.9
Construction Duration	5	5	3	3.5	4.5	5	4.5
Service Life	5	1	5	5	5	3.4	5
TOTAL:	/ 60	37.5	45.3	45.9	41.9	39.5	41.6

EXAMPLE VISUAL OF BRIDGE TYPES:



Multi-Cell Corrugated Steel Pipe



Precast Concrete Box Culverts



Corrugated Steel Pipe Open-Footing Arch Culverts



Single Span Precast Concrete Rigid Frame



Single Span Prestressed Girder Bridge



Prefabricated Modular Bridge

Key Findings:

- Large corrugated steel culverts (open-footing arch shapes) were not hydraulically efficient enough to provide the required capacity for the watercourse & weren't carried forward in evaluation.
- Replacement with Two-lane Bridge is preferred over narrow platform as it provides additional clearance for farm equipment and allows pedestrians to safely use the shoulders
- Single-span structure is preferred over multi-cell culverts, as it provides the most efficient hydraulic opening and is less prone to blockage, reducing the risk of upstream flooding
- The scoring difference between the slab-on-girder bridge and the pre-cast rigid frame is marginal and sensitive to minor adjustments to cost and hydraulics. Confirmation of structure type should be further evaluated during detailed design when costs and hydraulics are more refined.

⁽¹⁾ Required span is based on preliminary hydraulics and may be further refined during detailed design.

⁽²⁾ For 15m spans, a Concrete Slab on Prestressed Solid-Slab S500 girders may also be considered during detailed design. Preferred structure type may vary depending on more refined cost and hydraulic performance determined during detailed design

Recommended Improvement (if opening preferred):

Bridge	Required Span ⁽¹⁾	Preferred Structure Type	Skew	Design Speed	Estimated Cost
2-WG	15.0m	Precast Concrete Rigid Frame ⁽²⁾	0 deg	60 km/h	\$1.5M
3-E	18.0m	Slab on Prestressed B700 Box Girders	15 deg	50 km/h	\$1.8M
5-E	15.0m	Precast Concrete Rigid Frame ⁽²⁾	10 deg	60 km/h	\$1.5M
7-E	11.5m	Precast Concrete Rigid Frame	5 deg	60 km/h	\$1.25M

Natural Environment:

Species at Risk:

- Confirmed Barn swallow habitat at 3-E & 2-WG would be impacted with replacement or removal.
- Potential Habitats for Canada Warbler, Barn Swallows, Whip-poor-Will, Wood-pewee, Monarchs, Snapping Turtles and Western Chorus Frogs at various structures would be impacted with construction activities surrounding bridges.

Wetlands:

- Non-Provincially Significant Wetlands immediately adjacent to bridges 2-WG, 3-E & 7-E potentially impacted if bridge replaced.

Significant Woodlands:

- Potential tree removals along right-of-way within significant woodlands along right-of-way for road widening at 3-E, 5-E & 7-E

Aquatic Habitat:

- Opportunity for improvements to soft-bottom at 2-WG and 3-E
- Evidence of groundwater upwelling at Bridge 5-E. Needs to be maintained with open bottom structure.
- Opportunity to provide slope bank stability to reduce erosion potential at 5-E
- Existing conditions provide good fish habitat at 7-E

Note: Impacts to the Natural Environment will be mitigated to the extent possible during the detailed design by minimizing excavation limits, tree removals and disturbances to habitats.

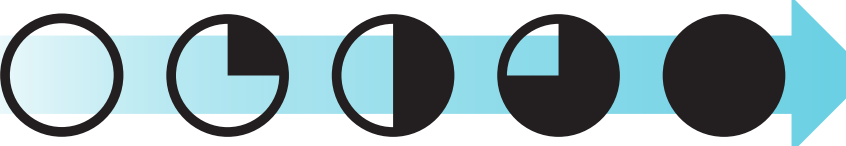
Built & Cultural Heritage Assessment:

- Bridge 3-E has been identified to meet one criteria for Cultural Heritage Value or Interest:
 - Represents one of the few remaining 'rainbow arch bridges' that Wellington County was once known for.
 - Designed by Fergus architect Charles Mattaini, who built close to 70 bowstring bridges in Southern Ontario

Potential Impacts to Built or Cultural Heritage	Potential Mitigations
Loss of defining elements, including 'Rainbow Arch' truss and decorative railing panels if Bridge 3-E is removed.	- Salvage elements of bridge for conservation work or displays. - Use similar structure type (concrete bridge) and consider the use of commemorative elements, such as a decorative arch or commemorative plaque. - Document original structure in historical records prior to removing.
The context of a bridge historically being present at that crossing is no longer prevalent if structure is removed	Document each structure prior to removal and deposit in a publicly accessible repository.

- ## Archeological:
- Stage 1 Archeological study was completed and determined that all areas have been previously disturbed and are have low potential of archeological assessment

Evaluation Matrix:

Highest Impact /
Least Preferred  Least Impact /
Most Preferred

Criteria	Do Nothing	Remove All	Replace All	Replace 2-WG, 3-E & 7-E	Replace 2-WG, 5-E & 7-E	Replace 2-WG & 7-E
TRANSPORTATION						
Cross-Community Travel						
Emergency Response Times						
Slow Moving Vehicle Accommodation						
Local Community Travel						
TRANSPORTATION SUMMARY						
NATURAL ENVIRONMENT						
Environmentally Sensitive Areas						
Terrestrial Habitat						
Fisheries / Aquatic Habitat						
Species at Risk						
NATURAL ENVIRONMENT SUMMARY						
SOCIAL & CULTURAL ENVIRONMENTS						
Social Environment						
Archaeological						
Cultural & Built Heritage						
Community Preference						
SOCIAL & CULTURAL SUMMARY						
ECONOMIC ENVIRONMENT						
Capital Costs						
Maintenance & Operational Costs						
ECONOMICS SUMMARY						
OVERALL RANKING (EQUAL WEIGHTING)	6	2	4	5	1	3
OVERALL RANKING (SENSITIVITY ANALYSIS)	6	5	2	4	1	3

Criteria Weighting & Sensitivity Analysis

- The 'pies' shown are a simplified visualization of the numerical rating system used. Options with the same 'pie' graphic do not necessarily have the exact same numerical rating.
- The 'Overall Ranking (Equal Weighting)' is provided based on equal weighting for each criteria (25% Transportation, 25% Natural Environment, 25% Social & Cultural Environments and 25% Economic Environment)
- The 'Overall Ranking (Sensitivity Analysis)' is based on the combined results of a series of scenarios ran with different weighting criteria for each of the categories.
- The preferred alternative was consistent across the equally weighted and sensitivity analysis rankings.

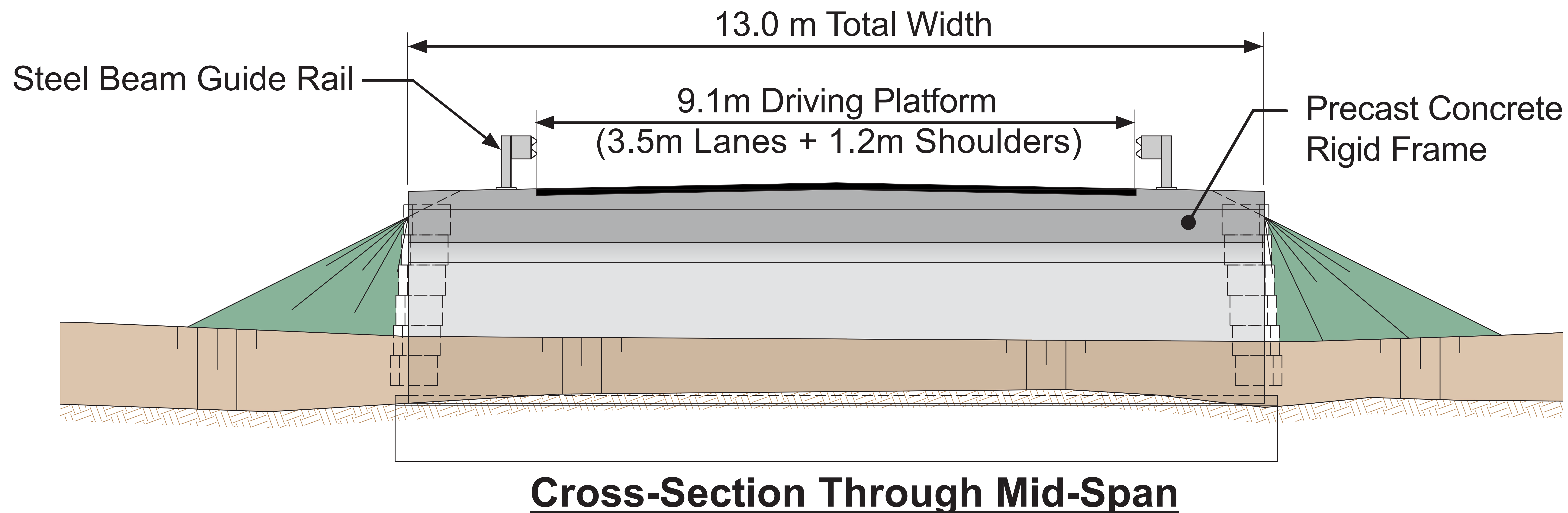
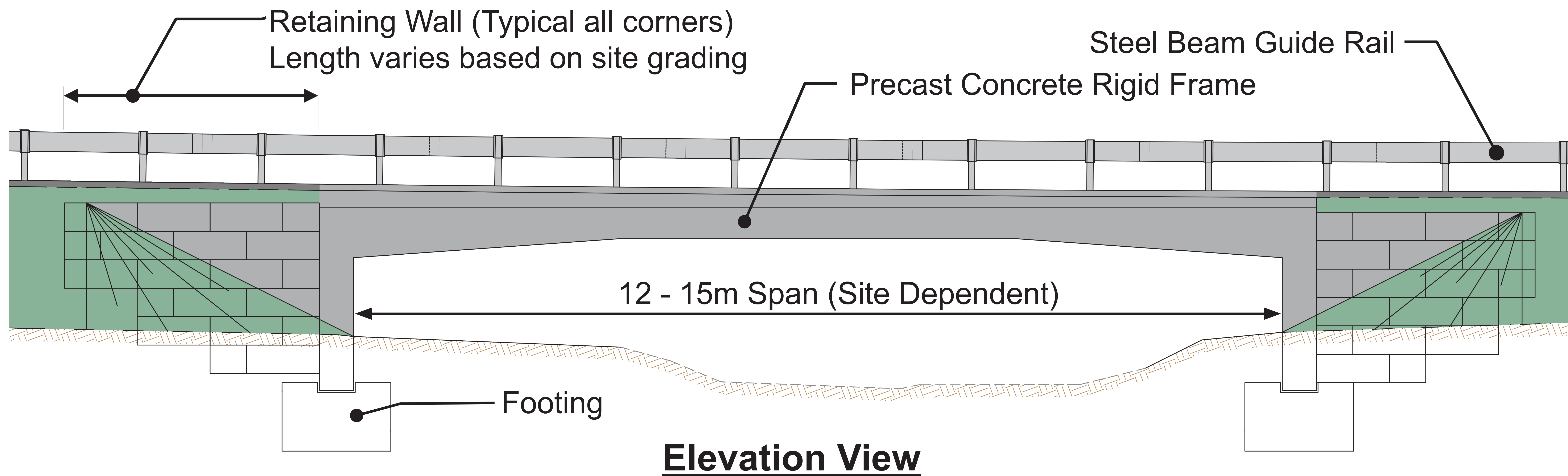
Preferred Alternative:

REPLACEMENT OF BRIDGES 2-WG, 5-E & 7-E

- Replaces all structures that benefit emergency response times
- Replaces 3 bridges with the most benefit to:
 - Travel times with agricultural equipment
 - Simplified routes for deliveries, buses, municipal services, etc.
 - Commute times for local residents to surrounding areas
- Eliminates need for travel on arterial routes.
- Provides opportunity for use as emergency detour routes during closures of County roads
- Areas of opportunity for improvements to fisheries and erosion concerns identified at 2-WG and 5-E can be addressed with replacement
- Highest Cost-Benefit ratio
- Bridge 3-E can be maintained as a pedestrian crossing, allowing its heritage to be prolonged, until it further deteriorates to a point where it can no longer carry pedestrian loads.

Design Concept

Precast Rigid Frame



Invitation to Participation

We want to hear from you!

You are invited to provide comments by completing a comment sheet and submitting it to the comment box today or by mailing or emailing one of the Project Team members below before December 20th, 2024:

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The display boards and a recorded presentation will be available on the project webpage after the Open House.

www.connectcw.ca/bridge-transportation-network-study-four-bridges

If you would like to request access to the files by another means other than through the website, please contact one of the Project Team Members above

Open
House
(Today)



Next Steps:

Review
comments

Confirm
Preferred
Solution

Draft Project
File Report

Township
Review &
Approval

Project File
Report

Public
Comment
Period

Study Completion
(Winter 2025)

