

BRIDGE No.11 (GREENOCK)

Schedule 'B' EA: Phase 2

Presentation to Council
Preliminary Recommended Solution
Municipality of Brockton
January 22, 2019

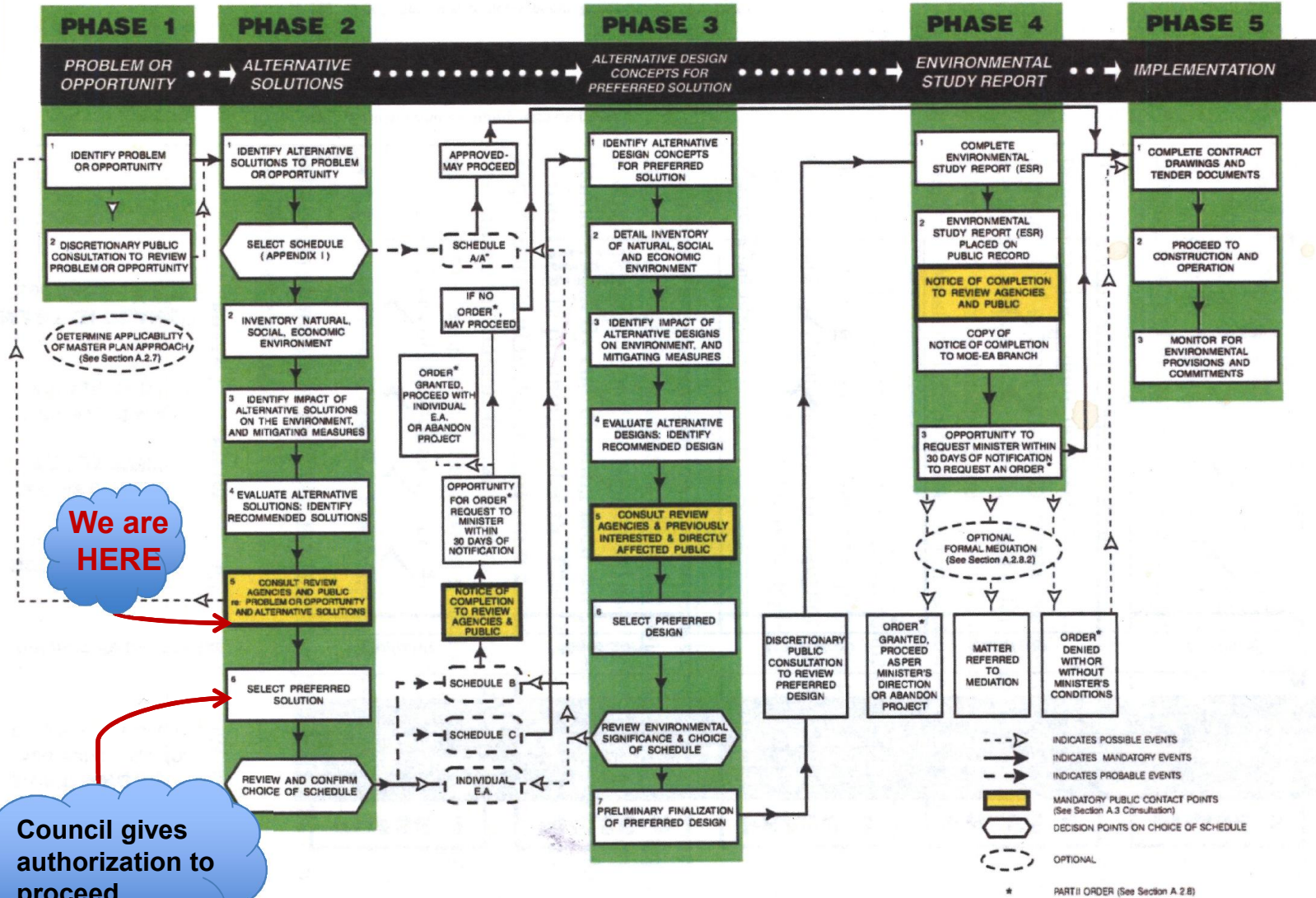


AGENDA

1. Overview of Municipal Class EA Process.
2. Problem Definition.
3. Initial Consultation: Summary of Comments.
4. Overview of Alternative Solutions Considered.
5. Evaluation and Assessment of Alternative Solutions.
6. Preliminary Recommended Solution.
7. Next Steps (EA Process and Timeline).

EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



PROJECT STATEMENT

Inspection Reports for the aging Bridge No.11 note advanced deterioration of the superstructure and substructure to a point where the bridge may no longer be able to fulfill its intended function and, therefore, consideration should be given to addressing a long-term solution with consideration also to address the deficient road approaches.



BACKGROUND



Bridge:

- Poor condition.
- Low traffic volume, estimated to be ± 150 vehicles per day.
- Retains cultural heritage value.

Concession Road 20/2A:

- Narrow gravel road.
- Steep road approaches do not meet any design criteria, which reduces driver safety.
- Load postings: large emergency vehicles not permitted.
- Speed limit = 30 km/hr

INITIAL PUBLIC CONSULTATION

May 17, 2018: Notice of Project Initiation issued to the public, First Nations groups and various agencies.

June 4, 2018: PIC No.1 presented the initial findings and requested public and agency feedback to help further inform the process.

Alternative Solutions Presented included:

1. Do Nothing;
2. Bridge Rehabilitation;
3. Various Bridge Replacement Options that did not simultaneously address the road profile deficiencies; and
4. Bridge Removal.

Initial assessment of alternatives considered that bridge rehabilitation, removal and replacement with a single-span structure were all potential alternatives.

PUBLIC FEEDBACK: General Summary

Concerns outlined during the information session and in the seven (7) comments received included:

1. Steep road approaches and resulting visibility constraints.
2. Operational challenges due to steep approaches (i.e. snow removal).
3. Accessibility to property parcels owned on either side of the river.
4. Concession Road 20/2A 'links' Bruce Roads 1 and 3. Rationale to maintain this link included the following:
 - ❑ Bruce Road 1 to Paisley is treacherous in the winter, particularly on windy days.
 - ❑ Emergency vehicle usage and added travel time.
 - ❑ Travel distance and time associated with alternate routes.
 - ❑ Pending Paisley bridge replacement. Without Bridge No.11 alternate route would be 'onerous'.

The majority of respondents cited bridge replacement with a two-lane structure as their preferred option.

One respondent stated:

'complete replacement with a new 2-lane bridge that would be up to proper (including looking at the challenge of the slope of the road) specifications OR close the bridge permanently'.

CONSULTATION: BRUCE COUNTY



Following the initial consultation period, additional requests specific to issues identified were pursued with the County, as follows:

- The County has no planned initiatives to address winter visibility on Bruce Road 1, between Concession 20 and Paisley.
- Additional consultation with Bruce County was sought to confirm the 'strategic value' of Concession 20/2A as a direct link between County Roads 1 & 3, as considered in the Master Plan.
- In cooperation with Arran-Elderslie, an exchange in jurisdiction of Concession 20/2A, between Bruce Road 1 and 3 (including Bridge No.11) for Bruce Road 1 into Paisley was proposed. Bruce County did not support the exchange.
- County considered it reasonable to request that the bridge and road section be brought up to County Standards before accepting responsibility.

ALTERNATIVE SOLUTIONS

ALTERNATIVE 1: Do Nothing

ALTERNATIVE 2: Bridge Rehabilitation

- ❑ Complete repairs to the 'deficient' elements of the structure to maintain its functionality as a single-lane vehicular bridge and extend its useful life.
- ❑ Would not address the noted deficiencies with the approach road profiles.

ALTERNATIVE 3: Bridge Replacement

- ❑ Complete removal and replacement with a structure that meets the Standards/Design Code.
- ❑ Would need to address the noted deficiencies with the approach road profiles.
- ❑ Replacement options consider multiple variables starting with the physical geometry of the bridge required to achieve its intended function while simultaneously addressing the issue of the steep road approaches.

ALTERNATIVE 4: Bridge Removal

- ❑ Bridge would be removed.
- ❑ Turn-around opportunities would be provided on both sides (cul-de sacs).
- ❑ River banks would be restored to a more natural condition.

BRIDGE REPLACEMENT OPTIONS

The existing bridge and road approaches do not meet any design criteria, which reduces driver safety.

The posted speed limit is currently 30 km/hr.

TAC Geometric Design Guide:

- ❑ States that '*a design speed of 80 km/hr and a posted speed of 80km/hr is the normal practice for rural municipal roads*'.
- ❑ Provides design classification for Rural, Local and Undivided (RLU) roads with a minimum design speed of 50 km/hr.
- ❑ Encourages 'Operating Speed Uniformity'.

Updated bridge replacement options also consider correcting the road approaches to an appropriate design standard.

BRIDGE REPLACEMENT OPTIONS

Road design options considered to address the steep road approaches include, but are not limited to, the following:

- i. Lowering the elevation at the top of the slope(s) (i.e. cutting the banks);
- ii. Raising the surface grade along the river banks by adding fill within the floodplain; or
- iii. Raising the surface grade of the bridge along the river banks without adding fill within the floodplain (i.e. increased bridge span).

Bridge replacement options that simultaneously address the issue of the steep road approaches included the following:

OPTION	Design Speed	# of Lanes	Bridge Span	Grade (Elevation)	Design Option
A	<50 km/hr	Single lane	Single	Same as existing	Cut Banks
B	50 km/hr	Two-lane	Single	Same as Existing	Cut Banks
C	50 km/hr	Two-lane	Single	Raised to ±231 masl	Infilling
D	50 km/hr	Two-lane	Multiple	Raised to ±231 masl	Cut Banks

Note: 80 km/hr design speed is unlikely to be financially, if even technically, achievable due to significant earth works.

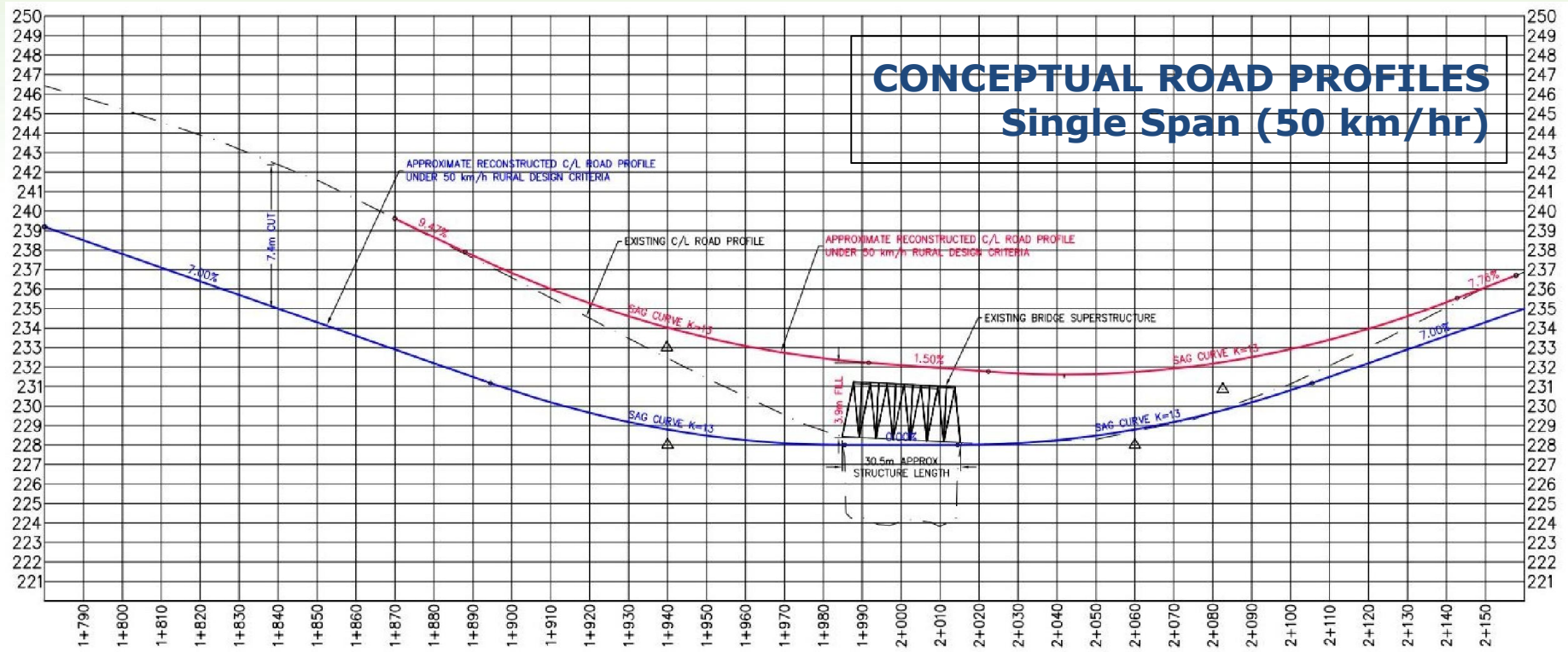
BRIDGE REPLACEMENT: Option A

Single-lane, single-span structure

- ❑ Geometric profile of bridge would be similar to existing.
- ❑ Structure would not meet Design Standards.
- ❑ Posted speed limit on approach roads of less than 50 km/hr is considered sub-standard.
- ❑ Estimated cost to replace bridge with a single-lane structure of \$1.0M would only be marginally lower than replacement with a two-lane structure*.

-Not Supported-

BRIDGE REPLACEMENT: Options B and C



Maintain Bridge at Existing Grade:

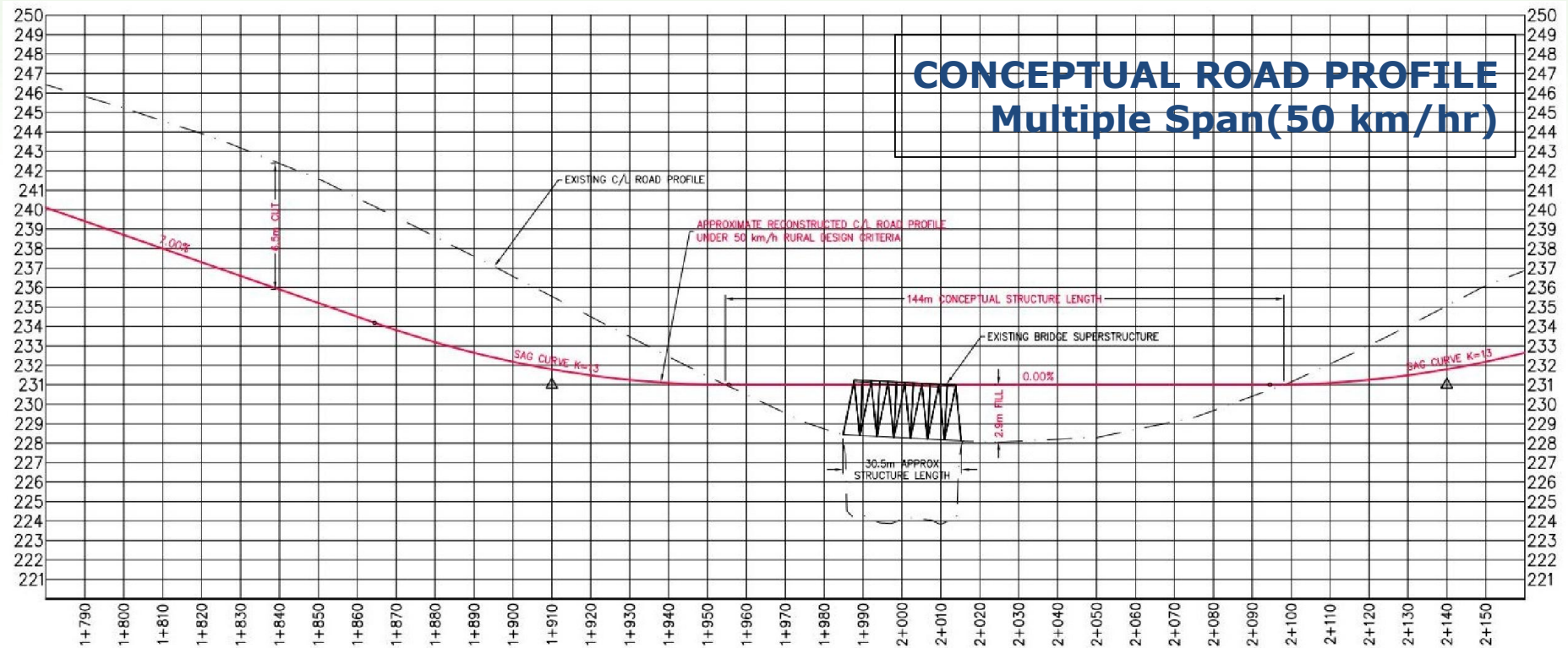
- ❑ Greater than 7 meter cut to the west.
- ❑ An estimated 1-2 meter cut to the east.
- ❑ Would require a wider Right-of-Way (i.e. property acquisition).

Raise Elevation to Intersect Road Profile:

- ❑ Would require up to an estimated 4 meters of infilling on both sides of the river.
- ❑ Would require a wider Right-of-Way.
- ❑ Would require additional floodline mapping and approval from the SVCA.

Cost for replacement with a two-lane single span bridge is estimated to be \$1.07M*

BRIDGE REPLACEMENT: Option D



Implications:

- ❑ Would require significant earth works on the east and west approaches to achieve geometric design standards (6.5 meters to the west and greater than 4 meters to the east).
- ❑ Would require a wider Right-of-Way (i.e. property acquisition).
- ❑ Would have limited encroachment on the Teeswater River.
- ❑ Complexity of bridge construction, and costs, increases with bridge length.

Cost for replacement with a multi-span structure is estimated to be \$4M*

BRIDGE REPLACEMENT

Preliminary Favoured Option

A two-lane single-span structure, at an elevation that would balance cut and fill volumes and maintain the existing bridge span, is the favoured bridge replacement option.

This was carried forward into the overall assessment of alternatives.

COST ESTIMATES*

1. Cost estimates provided are for bridge replacement alone.
2. Improvements along approach roads are estimated to be greater than \$1.5M.
3. Estimates do not include property severance and land acquisition costs.

Therefore, it is estimated that cost for replacement with a single-span structure and the road improvements would be greater than \$3M.

ASSESSMENT OF ALTERNATIVES

TECHNICAL 'ENVIRONMENT'

DESCRIPTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
	REHABILITATION	REPLACEMENT	REMOVAL
DESIGN STANDARDS			
Bridge Geometry	One-lane	Two-lane	<ul style="list-style-type: none"> Would eliminate requirement to meet Standards/Code. Limited road improvements, such as Cul-de Sacs.
Load Postings	Maintained to Reduced	None	
Road Approaches & Improvements	Would remain deficient.	Could be corrected to appropriate Standard.	
Speed Limit	30km/hr (Existing)	50km/hr ⁽¹⁾	
OTHER CONSIDERATIONS			
Longevity of Solution	On-going restoration & eventual replacement.	Would provide a long-term solution to the road deficiencies and structural issues noted.	
Complexity of Construction (Bridge/Road)	Repairs may involve unique & difficult construction practices.	Major earth works required to address road approaches.	Bridge removal and road improvement efforts would be simple.
EA Process ⁽²⁾	Schedule 'B' (<2.4M)	Schedule 'C' (>2.4 M)	Schedule 'B' (<2.4M)
OVERALL	1	2	3 (Favoured)

- With direction from the Road Authority (i.e. the Municipality), road approaches could be designed to a reduced Standard/Code for 50 km/hr. This would still require extensive modification.
- Bridge No.11 was found to have Cultural Heritage Value, therefore a Schedule 'B' or 'C' process is likely required. A Schedule 'C' process would be applied to projects estimated to cost greater than \$2.4M.

ASSESSMENT OF ALTERNATIVES

CULTURAL 'ENVIRONMENT'

DESCRIPTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
	REHABILITATION	REPLACEMENT	REMOVAL
Archaeological	Study area does not retain Archaeological potential.	Additional assessment required to address area impacted by road improvements.	Study area does not retain Archaeological potential.
Cultural	Retaining the bridge and restoring the missing/deteriorated elements is preferred.	Replacement with a 'sympathetically' designed structure may be considered.	Mitigation for bridge removal may include placing a commemorative plaque.
TOTAL	3 (Favoured)	1	2



ASSESSMENT OF ALTERNATIVES

NATURAL 'ENVIRONMENT'

DESCRIPTION	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
	REHABILITATION	REPLACEMENT	REMOVAL
Flood Elevation	1. Elevation of existing bridge deck is in the range of 228.1 to 228.5 masl 2. 100-year flood water surface elevation = 228.86 masl 3. Regional flood water surface elevation = 229.97 masl		
	Existing bridge deck is subject to flooding during Regional and 100-year flood events.	<ul style="list-style-type: none"> A bridge deck below 230 masl will experience flooding. Infilling may cause backwater effects. 	Potential for river encroachment would be eliminated.
Aquatic Habitat and Fish Passage (i.e. river flow and channel processes)	Minimal: Bridge remains in-situ	Infilling would result in a permanent alteration to river flow and fish habitat	Impacts would be eliminated. Potential for improvement.
Natural Heritage (i.e. vegetation, wildlife, SAR)	No significant long-term negative impacts.	Impacts proportional to area effected. Road and bridge works would impacts the large area.	<ul style="list-style-type: none"> No significant long-term impacts. River banks could be re-naturalized.
OVERALL	2	1	3 (Favoured)

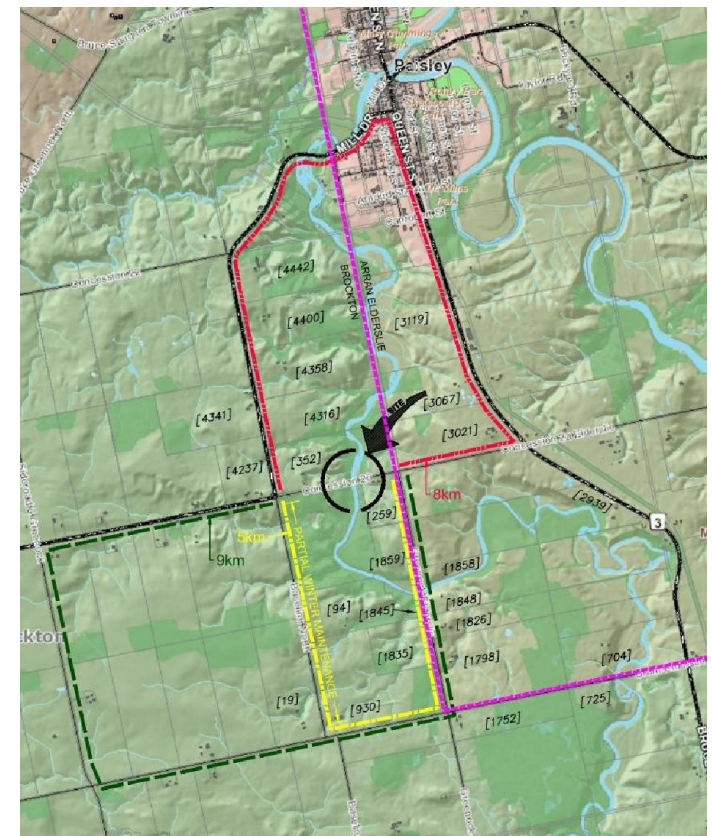
1. SAR = Species at Risk.
2. masl = meters above sea level.
3. Flood water surface elevations obtained from the 'Existing Conditions Flood Study (GMBP, April 2018).

ASSESSMENT OF ALTERNATIVES

SOCIAL 'ENVIRONMENT': Traffic Movements

ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
REHABILITATION	REPLACEMENT	REMOVAL
1. Impact to Local Residents		
<p>Would maintain local traffic movements and ease of access to adjacent and nearby properties.</p>		<ul style="list-style-type: none"> Travel to adjacent and nearby properties may take longer. A limited number of properties would be directly affected.
<p>A single lane structure would maintain existing condition.</p>	<p>A two-lane structure would improve upon the existing condition.</p>	
2. Regional Transportation Network		
<p>Would maintain a river crossing along Concession 20/2A, between Bruce Roads 1 and 3. However, based on the low traffic volumes, this east-west connection is not considered to be part of the regional road network.</p>		<ul style="list-style-type: none"> Traffic volumes are \pm 150 vehicles/day. Although not quantified, would not likely have a significant impact.

Alternate Routes:

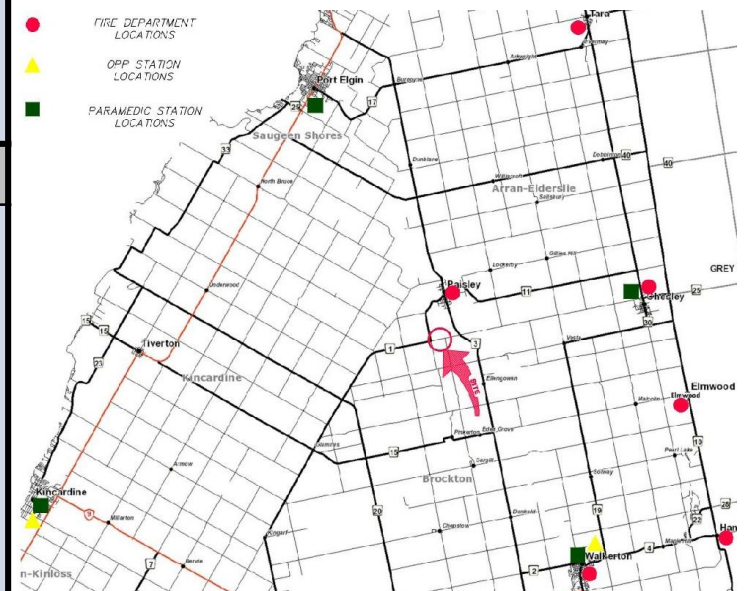


ASSESSMENT OF ALTERNATIVES

SOCIAL 'ENVIRONMENT': Safety and Emergency Access

ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
REHABILITATION	REPLACEMENT	REMOVAL
3. Safety		
Does not address the sub-standard road design and visibility constraints.	Bridge and road profile may be designed to Standards/Design Code.	Removal would address the safety concerns noted.
4. Emergency Vehicle Access		
<ul style="list-style-type: none"> Likely to remain inaccessible to larger emergency vehicles. Speed limit of 30km/hr increases travel time. 	<ul style="list-style-type: none"> Would permit use by all emergency vehicles. Speed limit of 50km/hr would still impact travel time. 	Based on the location of the emergency services, Conc. 20/2A does not provide for significantly reduced travel times.
OVERALL		
1	3 (Favoured)	2

Emergency Services:



ASSESSMENT OF ALTERNATIVES

ECONOMIC 'ENVIRONMENT'

DESCRIPTION (Cost Estimates)	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
	REHABILITATION	REPLACEMENT	REMOVAL
Bridge	Option 1: \$360K (+\$680K) Option 2: \$770K (+\$370K)	\$1.07M	\$150K to \$200K
Road Works	None	Greater than \$1.5M	Less than \$100K
Land Acquisition	None	Greater than \$500K	None
Bridge 'Life Cycle'	\$\$\$	\$	⊖
TOTAL	\$1.0M to \$1.2M (not incl. 'life cycle' costs)	Greater than \$3M	\$200K to \$300K

'Life Cycle' costs consider future costs such as maintenance, major rehabilitation, restoration, component or element replacement and/or eventual bridge replacement.

1. Bridge rehabilitation costs are similar to bridge replacement (not including road works) and do not include for the eventual bridge replacement.
2. Provincial Funding:
 - Bridge rehabilitation would not likely receive funding.
 - Bridge replacement would be dependent upon significant provincial funding to proceed.

In consideration of both capital and future 'life cycle' costs,
bridge removal is the least costly alternative.

PRELIMINARY RECOMMENDED SOLUTION

EVALUATION OF ALTERNATIVES:



ENVIRONMENT	ALTERNATIVE 2	ALTERNATIVE 3	ALTERNATIVE 4
	REHABILITATION	REPLACEMENT	REMOVAL
Technical	1	2	3
Cultural	3	1	2
Natural	2	1	3
Social	1	3	2
Economic	1	2	3
OVERALL	8	9	13

Notes:

1. Based on preliminary assessment of bridge replacement options a single span two-lane structure, at or above existing grade, is considered under Alternative 3.
2. Evaluation is based on Table 4B provided in the Project File (Version 2: January 22, 2019).

**BRIDGE REMOVAL IS THE
PRELIMINARY RECOMMENDED SOLUTION**

COUNCIL DECISION

ALTERNATIVE:

With the direction of Council as the Road Authority, a road profile based on a reduced design speed of 50 km/hr could be considered in greater detail. This would trigger a Schedule 'C' EA Process, which would require a detailed review of the design alternatives.

At minimum, this would include the following:

- i. Additional topographic survey to include/identify lands that would be affected by the cut/fill.
- ii. Determination of a road profile which would balance cut/fill volumes and maintain the existing bridge span.
- iii. In consultation with the SVCA, assessment of impacts to the floodplain due to infilling.
- iv. Additional Archaeological Assessment.
- v. Additional Environmental Impact Assessment.
- vi. Completion of Phases 3 and 4 if the EA process including a detailed review of alternative designs, additional consultation, and preparation of an Environmental Study Report (ESR).

NEXT STEPS

- ❑ Receive Comments from Public, First Nations, and Agencies until February 15, 2019.
- ❑ Compile and assess comments received.
- ❑ Update Project File and recommend a *Preferred Solution* to Council.
- ❑ Council Endorsement of *Preferred Solution* (or otherwise).
- ❑ Finalize Project File.
- ❑ Advertise Notice of Completion.
- ❑ 30-day Public Review Period to satisfy Part II Order Request Period.
- ❑ Proceed to tender and construction.

Your Feedback is Important

Please provide any comments you have by completing a comment sheet or by submitting comments via mail, phone, fax, or email to the Project Team members below:

Please Provide
Comments by
**February 15,
2019**

Municipality of Brockton

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Thank You!

Your involvement is essential to the successful completion of this project.
We welcome your comments.