



## ENVIRONMENTAL STUDY REPORT

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The Regional Municipality of Niagara

Regional Road 50 (Niagara Street)  
Bridge Replacement  
Municipal Class Environmental Assessment

FEBRUARY 2022



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# REVISIONS PAGE

Regional Road 50 (Niagara Street)  
Bridge Replacement  
Municipal Class Environmental Assessment

Client:

Engineer:

The Regional Municipality of Niagara	Associated Engineering (Ont.) Ltd.
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Revision/ Issue	Date	Description	Prepared by/ Reviewed by	Client Review
1	2021-11-12	Environmental Study Report – Draft	LM/AL	
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## EXECUTIVE SUMMARY

### INTRODUCTION

The Regional Road 50 (Niagara Street) Bridge (Structure No. 050205) is a four-span slab on concrete girder structure which carries two lanes of north and southbound vehicular traffic on Regional Road 50 (Niagara Street) over the Welland River. The bridge was constructed in 1932 and underwent rehabilitation work in 1973. The four spans of the bridge structure, from north to south are 14.3 metres (m), 14.7m, 14.8m and 14.3m, respectively. The overall bridge deck length is 68m. The bridge cross-section is 18.3m wide with two travel lanes (including shoulders) of 7m width each with sidewalks and parapet walls on both sides. Detailed bridge inspections in 2013 and 2015 and a load capacity evaluation in 2014 identified that the bridge requires replacement to address the aging infrastructure and to improve public safety of the road.

The Regional Municipality of Niagara (Niagara Region) has identified that an optimal solution must be identified to address the existing structural deficiencies of the bridge. Associated Engineering (Ont.) Ltd. (AE) was retained by the Niagara Region to assist with the completion of a Municipal Class Environmental Assessment (MCEA) for the replacement of the Niagara Street Bridge in the City of Welland (the Study). An extension of the 600mm diameter watermain on Niagara Street (RR 50) from approximately Riverbank Street to Mill Street was also considered as part of the MCEA study. The study area, as shown in Figure E-1-1, includes the Niagara Street Bridge and roadway approaches (between Riverbank Street and Mill Street).

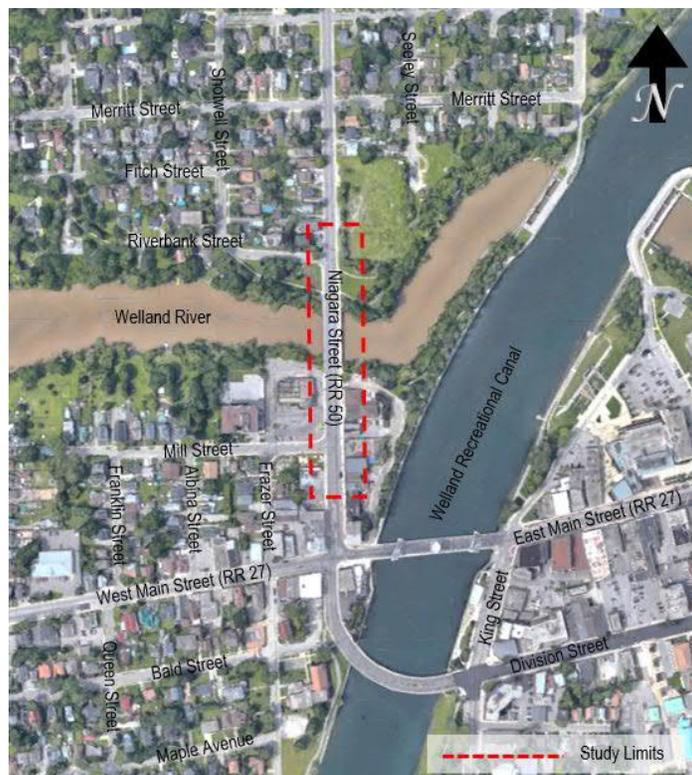


Figure E-1-1: Regional Road 50 (Niagara Street) Bridge Study Area

## STUDY OBJECTIVES

The purpose of the Study was to develop alternatives and determine the preferred solution in addressing the structural deficiencies of the bridge along with the extension of the 600mm diameter watermain on RR 50 (Niagara Street) in accordance with the MEA MCEA guidelines. The Study incorporates key planning principles including public consultation, assessment of a reasonable range of alternatives, consideration for the natural, social, economic and technical environments and provides clear documentation. In developing alternatives, the study team took into consideration the objectives of the Study:

- Address the structural deficiencies of the bridge;
- Improve public safety of all modes of transportation (vehicular, cyclist, and pedestrian); and
- Provide secure water supply to the surrounding area through the extension of the 600mm diameter watermain.

The alternatives proposed to achieve the study objectives are outlined in Section 5 as are the evaluation of the alternatives and the identification of the preferred alternative(s).

## PHASE I: IDENTIFICATION OF PROBLEMS And OPPORTUNITIES

The various analyses (e.g. geotechnical investigation, hydrogeological assessment, natural environment, cultural heritage assessment, archaeological assessment) and existing conditions provide input for and contribute to the identification and description of the problem or opportunity. The prevailing deficiencies within the Study Area can be summarized by the following statements.

### Problem Statement

The Regional Road 50 (Niagara Street) bridge structure (circa 1932) is a four span, 68m long, slab on concrete girder bridge that has been identified as needing replacement due to the age and condition of the structure. Previous structural inspections of the bridge identified severe areas of concrete spalling, cracking and deterioration on the structure.

In addition, to provide needed additional supply capacity to the area, an extension of the 600mm diameter regional transmission main at Riverbank Street to the 600mm diameter regional transmission main at Mill Street is required.

### Opportunity Statement

Given the need to replace the Regional Road 50 (Niagara Street) bridge, there is an opportunity to address structural deficiencies, improve public safety of all modes of transportation (vehicular, cyclist, and pedestrian), and provide secure water supply to the surrounding area.

## PHASE II: IDENTIFICATION & EVALUATION OF ALTERNATIVE SOLUTIONS

### Identification of Alternative Solutions – Bridge Replacement

Specific to the Regional Road 50 (Niagara Street) Bridge Replacement study, four (4) alternative solutions were identified, developed and evaluated. The alternatives include: 1) Do Nothing, 2) Replace superstructure utilizing existing piers, 3) Replace with new superstructure and substructure, and 4) Replace with new single span structure. These alternative solutions are discussed and evaluated in the following sections.

#### *Alternative 1: Do Nothing*

This alternative involves the existing Regional Road 50 (Niagara Street) bridge structure remaining in its existing condition. The interim bridge repairs completed in 2019 will prolong the bridge's service life for approximately 5 years, at which time additional bridge repairs or rehabilitation works will be required. Due to the age and condition of the structure, this alternative is not considered feasible but has been considered as a benchmark for comparison.

#### *Alternative 2: Replace Superstructure Utilizing Existing Piers*

This alternative solution involves removing and replacing the existing bridge superstructure with a 14.8m wide cross-section. The cross-section would include two 3.5m travel lanes, two 1.8m bicycle lanes, and two 1.8m wide sidewalks. The new superstructure could consist of girders, concrete deck (225mm depth) and asphalt surface. The new superstructure would have negligible impact on the road vertical profile and available freeboard. This alternative would maintain the three (3) existing piers; however, the piers would be rebuilt from the sheetpiling (above waterline). The abutment walls would also be rebuilt due to existing deterioration. Figure E-1-2 illustrates the proposed cross section while Figure E-1-3 illustrates the bridge elevation for Alternative 2.

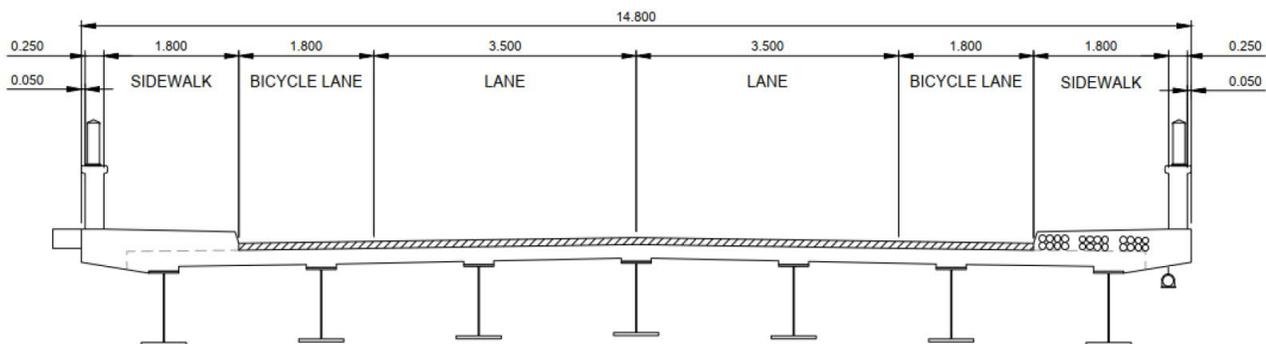


Figure E-1-2: Typical Cross Section for Alternative 2

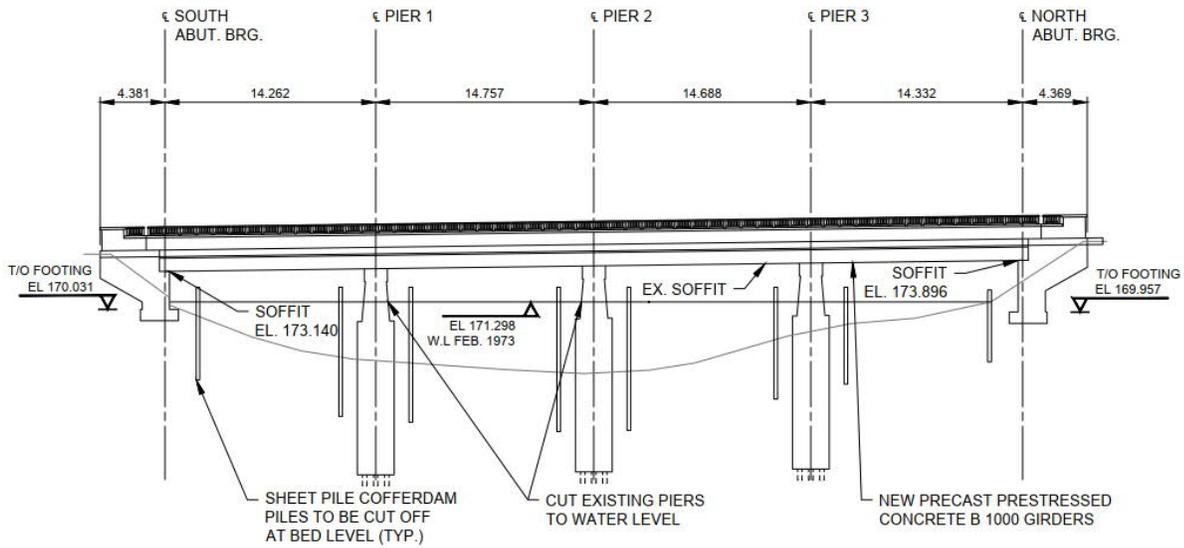


Figure E-1-3: Proposed Elevation for Alternative 2

*Alternative 3: Replace Bridge with New Superstructure and Substructure*

This alternative solution involves replacing the existing bridge with a new structure (superstructure and substructure). The bridge would have similar cross-section and width (14.8m) as Alternative 2. The existing piers would require complex removal down to the riverbed to allow for new piers (1 or 2) to be constructed. The abutment walls would also be rebuilt due to existing deterioration. The new superstructure could be either steel girder (950mm) or concrete box (B1000) with concrete deck (225mm depth with steel or 150mm depth with concrete) and asphalt surface. The new superstructure would have negligible impact on the road vertical profile and minor impact on the available freeboard. Figure E-1-4 illustrates the proposed cross section while Figure E-1-5 illustrates the bridge elevation for Alternative 3.

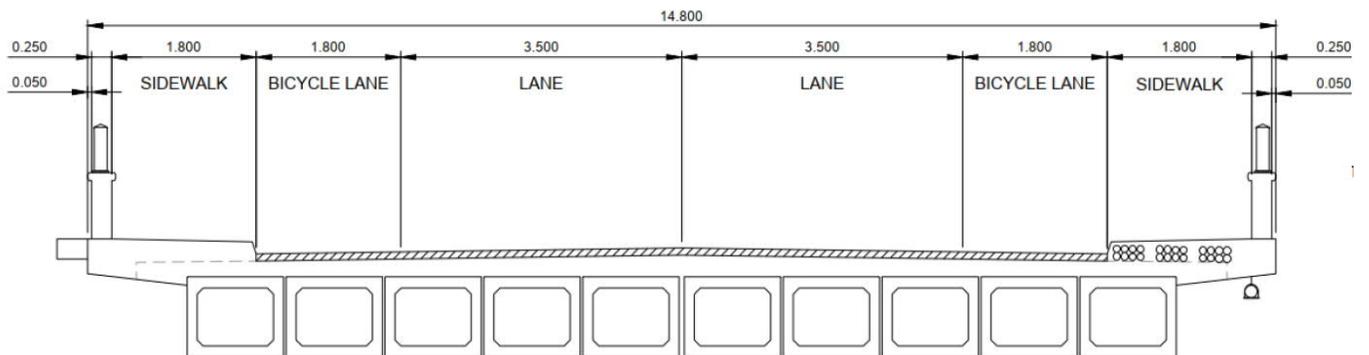


Figure E-1-4: Typical Cross Section for Alternative 3

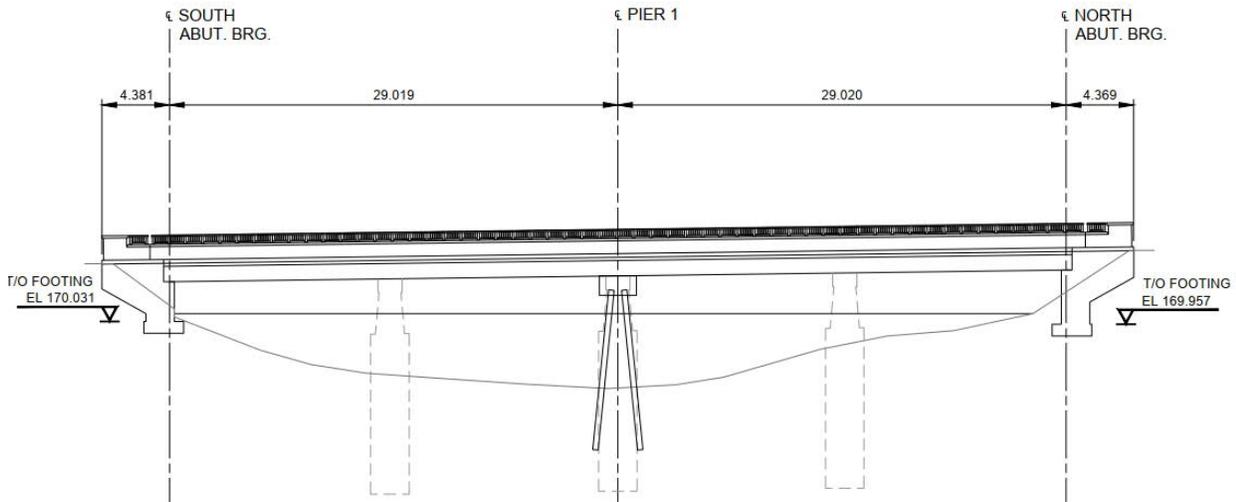


Figure E-1-5: Proposed Elevation for Alternative 3

*Alternative 4: Replace Bridge with New Single Span Structure*

This alternative solution involves replacing the existing bridge with a new single span structure (superstructure and substructure). The bridge would have similar cross-section and width (14.8m) as Alternative 2 and 3. The existing piers would require complex removal down to the riverbed and the abutment walls would also be rebuilt due to existing deterioration. The new superstructure could be either steel girder (3000mm) or steel tub (2700mm) with concrete deck and asphalt surface. The new superstructure would impact the road vertical profile and available freeboard due to the increased depth of the superstructure. Figure E-1-6 illustrates the proposed cross section while Figure E-1-7 illustrates the bridge elevation for Alternative 4.

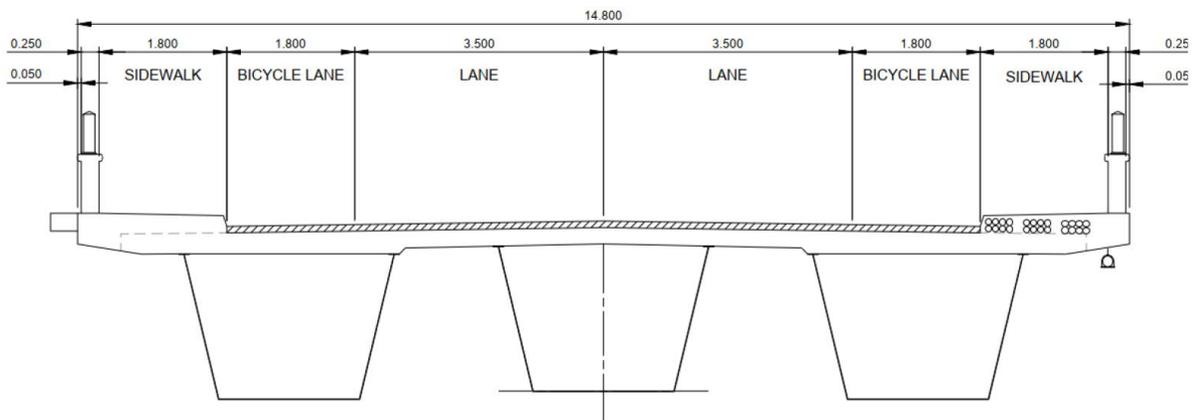


Figure E-1-6: Typical Cross Section for Alternative 4

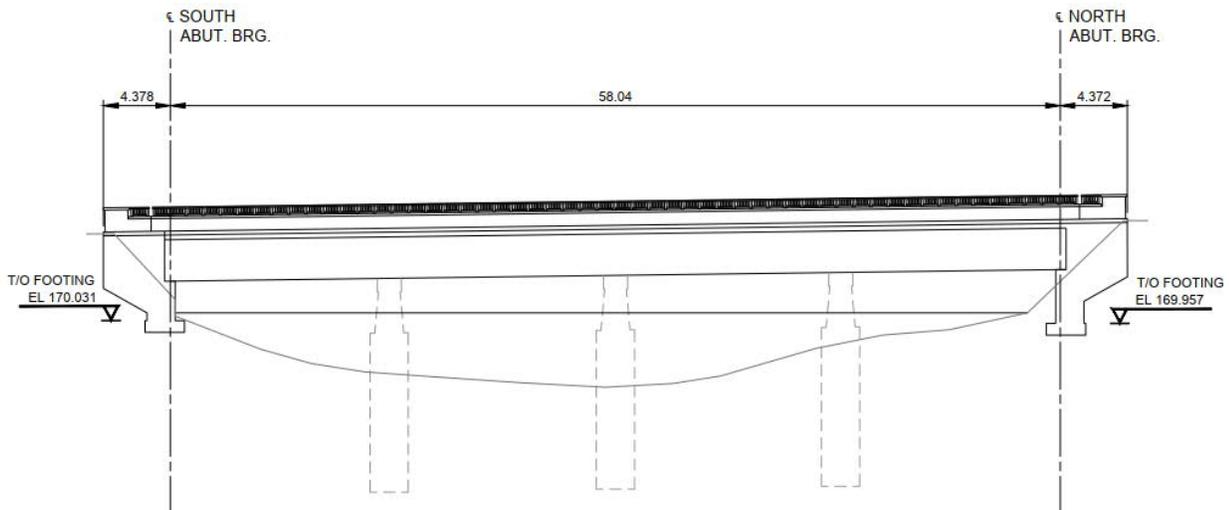


Figure E-1-7: Proposed Elevation for Alternative 4

#### Identification of Alternative Solutions – Watermain Crossing

Specific to the extension of the 600mm diameter regional transmission watermain, four (4) alternative solutions were identified, developed and evaluated. The alternatives include: 1) Trenchless crossing, 2) Independent pipe bridge, 3) Support watermain from Regional Road 50 (Niagara Street) bridge and 4) Install watermain inside steel tub girder bridge. These alternative solutions are discussed and evaluated in the following sections.

#### *Alternative 1: Trenchless Crossing*

The new 600mm diameter transmission watermain crossing would be installed via trenchless technologies. Trenchless technologies to be explored as feasible methods include Horizontal Direction Drilling (HDD) and micro-tunneling (MTBM). Key considerations will include watermain alignment, entry and exit locations and soil/ground conditions. Figure E-1-8 illustrates the horizontal directional drilling method while Figure E-1-9 illustrates the micro-tunneling method.

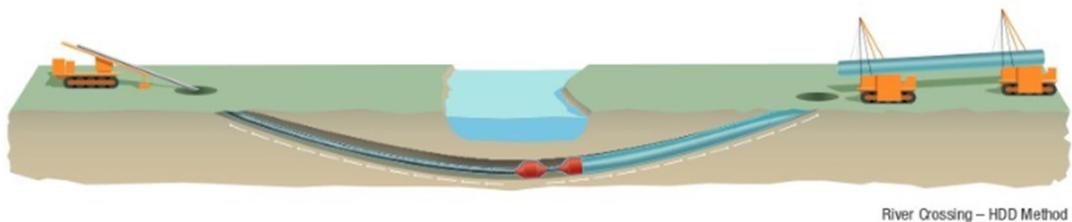


Figure E-1-8: Horizontal Directional Drilling Schematic

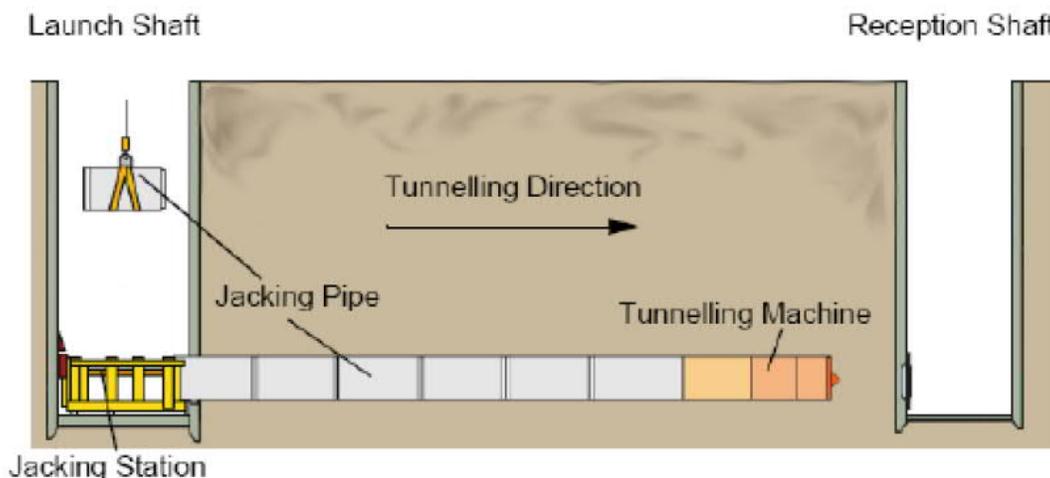


Figure E-1-9: Micro-tunneling Schematic

#### *Alternative 2: Independent Pipe Bridge*

The new 600mm diameter transmission watermain crossing will be installed on an independent pipe bridge located upstream or downstream of the Regional Road 50 (Niagara Street) bridge structure. Key considerations include location of pipe bridge, ability to accommodate additional utilities (i.e.: Enbridge), functionality of bridge (utility crossing only, pedestrian crossing, etc.) and aesthetic of bridge structure. A similar pipe bridge was constructed at the Welland Water Treatment Plant east of the Study Area as illustrated in Figure E-1-10.



Figure E-1-10: Independent Pipe Bridge Example

#### *Alternative 3: Support Watermain from the Regional Road 50 (Niagara Street) Bridge*

The new 600mm diameter transmission watermain crossing would be supported from the Regional Road 50 (Niagara Street) bridge structure, after replacement. Key considerations will include protection of the crossing from freezing and vandalism. Figure E-1-11 illustrates a watermain suspended from a bridge within the Niagara Region.



Figure E-1-11: Example of a Watermain Suspended from a Bridge

*Alternative 4: Install Watermain Inside the Steel Tub Girder Bridge*

The new 600mm diameter transmission watermain crossing will be installed inside the steel tub girders of the new Regional Road 50 (Niagara Street) bridge structure. Key considerations include accessibility for maintenance and if steel tub girders are the preferred bridge type. Figure E-1-12 shows an example of utilities installed inside a bridge girder.



Figure E-1-12: Example of Utility Installed Inside Bridge Girder

Evaluation Criteria

To evaluate the bridge replacement and watermain extension alternatives, the following set of criteria were developed.

Bridge Replacement Alternative Solutions Evaluation Criteria

Transportation

- Ability to serve the existing and future vehicular, pedestrian and cycling traffic needs

Technical

- Ability to address technical requirements (structural load, etc.)
- Ability to construct the replacement in a cost-effective manner
- Consideration to constructability and complexity of construction
- Consideration for construction length and detouring/staging

Natural Environment

- Direct and indirect impacts on the existing vegetation, water quality, watercourse, fisheries/wildlife habitat
- Consideration for hydraulic impact on Welland River

Socio-Economic Environment

- Impacts on the local community including property requirements
- Impacts on utilities
- Impact on the local businesses, residents and road users

Cultural Environment

- Potential adverse effects on the existing archaeological and heritage resources

Financial

- Capital cost of the alternative

Watermain Crossing Alternative Solutions Evaluation Criteria

Technical

- Ability to address technical requirements (demand, isolation, etc.)
- Ability to construct the crossing in a cost-effective manner
- Consideration for future maintenance and access
- Consideration for construction length

Natural Environment

- Direct and indirect impacts on the existing vegetation, water quality, watercourse, fisheries/wildlife habitat

Socio-Economic Environment

- Impacts on the local community including property requirements
- Impacts on utilities
- Impact on the local businesses, residents and road users

Cultural Environment

- Potential adverse effects on the existing archaeological and heritage resources

Financial

- Capital cost of the alternative

### Selection of Preferred Alternative Solution

#### *Bridge Replacement*

Based on findings from the analysis and evaluation of alternatives using the criteria listed above, Alternative 3: Replace with a New Superstructure and Substructure has been identified as the preferred alternative solution. A new superstructure and substructure would address all the structural deficiencies and could accommodate all modes of transportation. The hydraulic capacity could be improved by reducing the number of piers, however significant water works would be required to remove and reconstruct the piers.

#### *Watermain Crossing*

Based on findings from the analysis and evaluation of alternatives using the criteria listed above, Alternative 3: Support the Watermain from the Niagara Street Bridge has been identified as the preferred alternative solution. Supporting the watermain from the bridge would not require any easements as the watermain would be entirely within the Region right-of-way. However, pipe heat tracing and insulation would be needed in addition to stainless steel piping. The watermain would pose little maintenance accessibility issues but would be vulnerable to vandalism.

## PHASE III: IDENTIFICATION & EVALUATION OF ALTERNATIVE DESIGN CONCEPTS

### Identification of Alternative Design Concepts – Bridge Replacement

As identified above, the preferred solution for the bridge replacement is Alternative 3: Replace with a New Superstructure and Substructure. Therefore, three (3) alternative design concepts to implement the preferred solution were considered including: 1) Two-span steel I-girder bridge, 2) Two-span pre-stressed concrete girder bridge, and 3) Three-span pre-stressed concrete girder bridge.

#### *Option 1: Two-Span Steel I-Girder Bridge*

This alternative design concept involves replacing the existing bridge (both the superstructure and substructure) with a two-span, steel I-girder bridge. The bridge would have a 14.8m wide cross-section that would include two (2) 1.8m asphalt bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The existing piers would be removed to the riverbed and replaced with one (1) concrete pier. The abutment walls would be rebuilt due to the existing deterioration. The new superstructure would be constructed with steel I-girders and a concrete deck (225mm depth) with an asphalt surface. Figure E-1-13 illustrates the proposed cross section while Figure E-1-14 illustrates the bridge elevation for Option 1.

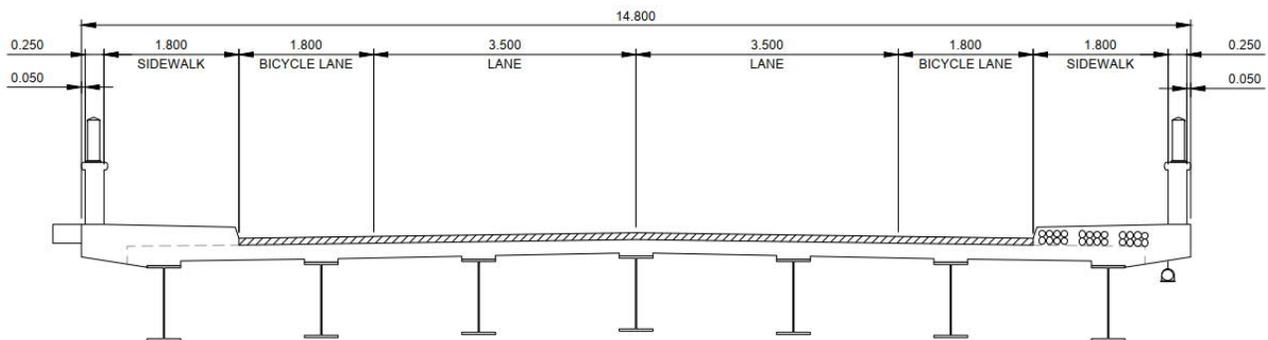


Figure E-1-13: Cross Section for Alternative Design Concept 1

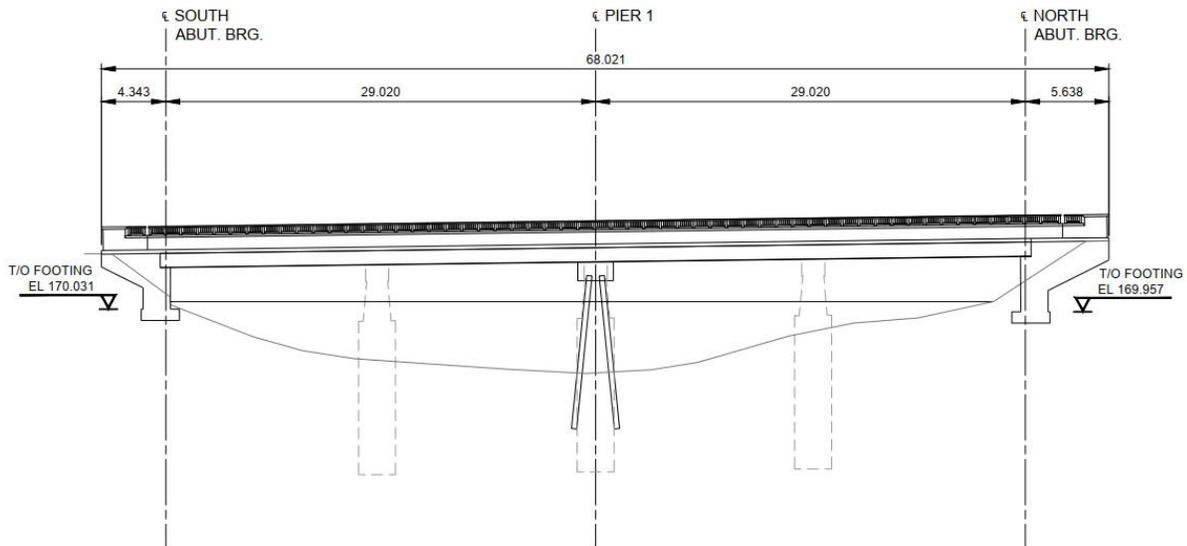


Figure E-1-14: Proposed Elevation for Alternative Design Concept 1

*Option 2: Two-Span Pre-Stressed Concrete Girder Bridge*

This alternative design concept involves replacing the existing bridge (both the superstructure and substructure) with a two-span pre-stressed concrete girder bridge. The bridge would have a 14.8m wide cross-section that would include two (2) 3.5m travel lanes, two (2) 1.8m asphalt bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The existing piers would be removed to riverbed and replaced with one (1) new concrete pier. The abutment walls would be rebuilt due to the existing deterioration. The new superstructure would be constructed with pre-stressed concrete girders (CPCI 1400) and a concrete deck (225mm depth) with an asphalt surface. Figure E-1-15 illustrates the proposed cross section while Figure E-1-16 illustrates the bridge elevation for Option 2.

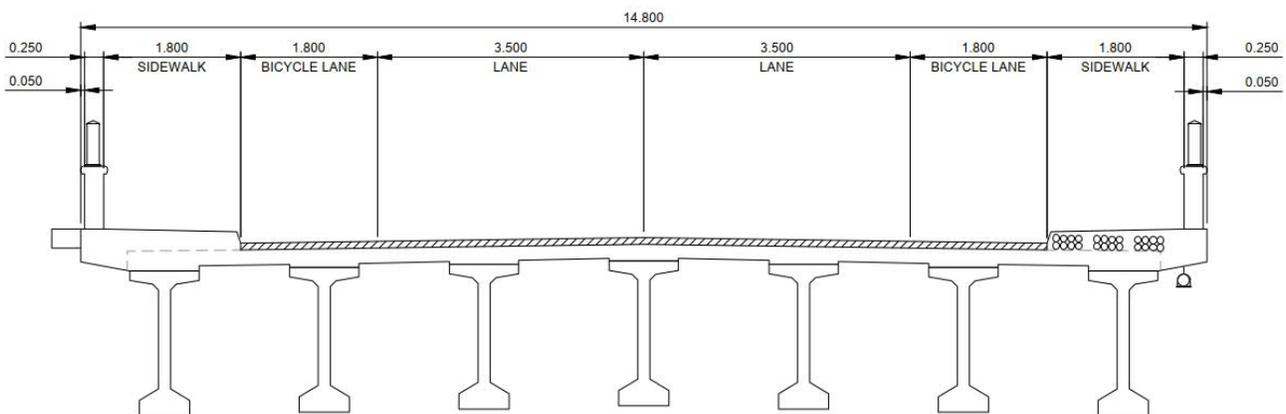


Figure E-1-15: Cross Section for Alternative Design Concept 2

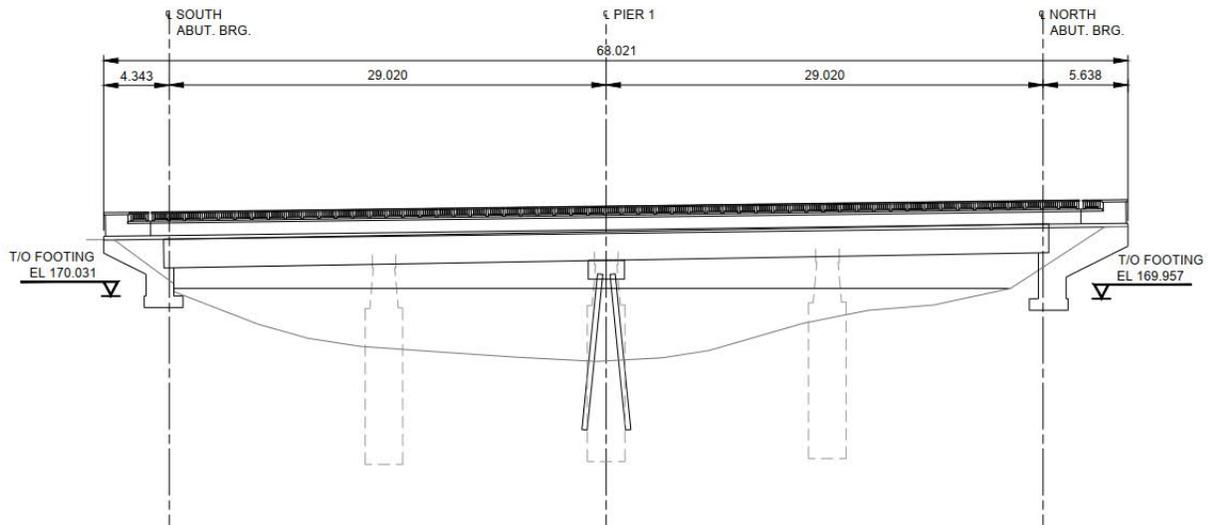


Figure E-1-16: Proposed Elevation for Alternative Design Concept 2

*Option 3: Three-Span Pre-Stressed Concrete Girder Bridge*

This alternative design concept involves replacing the existing bridge (both the superstructure and substructure) with a three-span pre-stressed concrete girder bridge. The bridge would have a 14.8m wide cross-section that would include two (2) 3.5m travel lanes, two (2) 1.8m asphalt bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The existing piers would be removed to riverbed and replaced with two (2) new concrete piers. The abutment walls would be rebuilt due to the existing deterioration. The new superstructure would be constructed with pre-stressed concrete girders (CPCI 900) and a concrete deck (225mm depth) with an asphalt surface. Figure E-1-17 illustrates the proposed cross section while Figure E-1-18 illustrates the bridge elevation for Option 3.

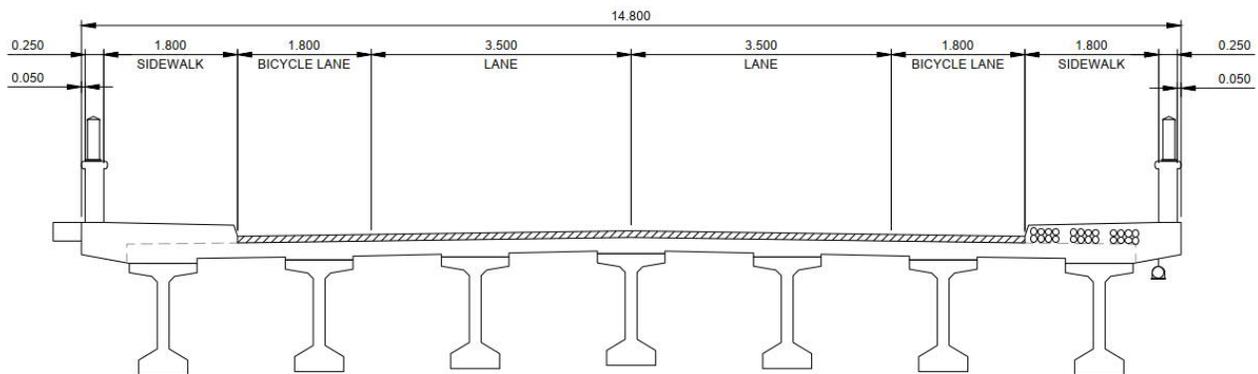


Figure E-1-17: Cross Section for Alternative Design Concept 3

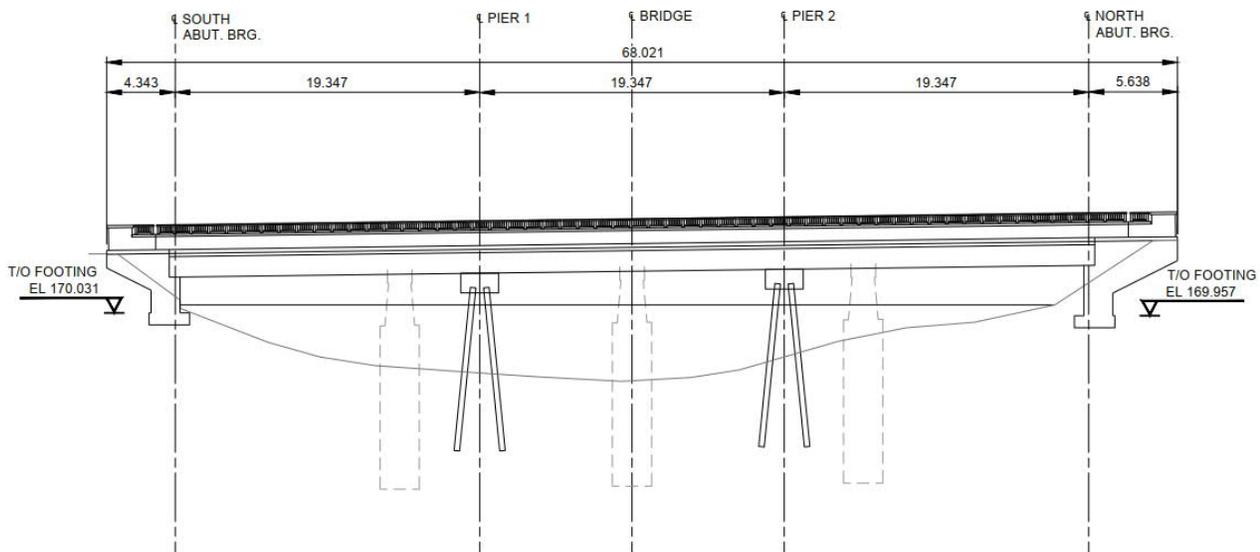


Figure E-1-18: Proposed Elevation for Alternative Design Concept 3

#### Identification of Alternative Design Concepts – Watermain Crossing

As determined during Phase 2 of the MCEA process, the new 600mm diameter watermain crossing will be supported from the Regional Road 50 (Niagara Street) bridge structure after replacement. Key considerations in design will include protection of the crossing from freezing and vandalism.

No further design options were developed for the watermain crossing as part of the MCEA study. Design details will be confirmed during implementation of the preferred solution (detailed design and construction).

#### Evaluation Criteria

To evaluate the bridge replacement alternative design concepts, the following set of criteria were developed.

##### Natural Environment

- Direct and indirect impacts on the existing vegetation, water quality, watercourse, and fisheries/wildlife habitat
- Hydraulic impact on Welland River
- Consideration for temporary impact to natural environment due to construction
- Consideration for long-term/permanent impact to environment due to new structure

##### Technical – Design Features

- Ability to address structural requirements
- Consideration for structural sustainability
- Consideration for ease of access to complete future bridge inspections
- Consideration for future maintenance needs

##### Technical – Construction

- Consideration for length of time to complete construction
- Constructability – consideration for the complexity or ease of the construction process

- Consideration for any special equipment required to complete the construction

#### Aesthetics

- Consideration for how visually appealing the alternative is

#### Cost

- Construction cost

#### Selection of Preferred Alternative Design Concept

Based on findings from the analysis and evaluation of alternatives using the criteria listed above, Alternative 1: Two-Span Steel I-Girder Bridge has been identified as the preferred alternative solution. Steel girders are less expensive to deliver and less complex to erect. However, they are also less durable meaning more maintenance may be required. The proposed construction schedule is less than a year for this type of bridge and the proposed construction cost is the lowest of the three alternatives.

## SUMMARY OF PREFERRED SOLUTION

#### Bridge Structure

The existing bridge structure will be completely removed, including the superstructure (deck and girders) and substructure (piers and abutment walls). The new bridge will be designed to meet current bridge standards as per the Canadian Highway Bridge Design Code (CHBDC), Ministry of Transportation Ontario (MTO) Structural Manual and requirements of the Niagara Region.

The new bridge structure will be a two-span structure with an overall length of 68m maintaining the horizontal alignment of the existing structure. The new bridge superstructure will consist of fourteen (14) 1000mm deep steel I-girders, with a cast-in-place concrete deck (225mm thick) and asphalt surface (90mm thick). The overall width of the bridge will be 14.8m to accommodate the preferred cross-section of two (2) 3.5m travel lanes, two (2) 1.8m wide bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The bridge will also be complete with 0.85m high decorative concrete barrier wall with hand railing (total barrier height of 1.37m) on either side in accordance with safety standards.

The bridge abutment walls will be replaced. Based on the Geotechnical Report completed by GeoPro (provided as Appendix C), the bridge abutments will be supported by driven steel H piles, founded in the competent very dense sand/shale complex or limy shale to shaly limestone and limestone bedrock. Pile installation will be completed in accordance with OPSS 903, April 2016. The existing piers would be removed to the riverbed and replaced with one (1) concrete pier installed with steel tube piles.

A preliminary general arrangement drawing of the preferred bridge design is provided in Appendix H. During the detailed design stage, the final details regarding the replacement structure will be developed including foundation details, drainage details and additional safety requirements in accordance with CHBDC, MTO and Region requirements.

#### Watermain Crossing

A 600mm diameter pressurized watermain crossing will be supported from the new Regional Road 50 (Niagara Street) bridge structure using pipe hangers. It is anticipated that the exposed portions of watermain will be stainless steel and

will require insulation to prevent freezing. During detail design, considerations to protect the watermain crossing from freezing and vandalism will be finalized.

Connection locations for the new 600mm diameter transmission main will be: 1) north of Welland River on Regional Road 50 at the existing 600mm diameter PVC stub south of existing valve chamber at Riverbank Street and Regional Road 50, and 2) south of Welland River on Regional Road 50 at the existing 600mm diameter CPP main at the existing valve chamber at Mill Street and Regional Road 50.

### Utilities

Existing utilities and municipal services were identified within the Study Area. Consultation with the City of Welland will occur during detailed design to determine the need to upgrade existing municipal underground infrastructure within the area during construction of the bridge replacement and watermain extension. The City has indicated they have planned infrastructure upgrades directly south of the project area on Niagara Street including the replacement of underground infrastructure and roadway (Niagara Street bridge to West Main Street).

Coordination will also be necessary throughout detailed design and construction with all affected utilities to confirm conflicts, relocations and/or proximity guidelines. Based on information provided by utilities during the MCEA study, consultation completed and identification of proposed works, it is anticipated that the following impacts to utilities will need to be addressed:

- Existing Enbridge gas main currently supported on the Regional Road 50 (Niagara Street) bridge structure will be relocated prior to bridge demolition;
- Existing bell ducts embedded in the existing bridge structure sidewalk will need to be temporarily supported during demolition of the bridge and embedded into the new bridge structure; and
- Shared utilities on hydro poles located on the existing bridge structure will need to be temporarily supported during demolition of the bridge and relocated on new poles located on the new bridge structure.

### Property Requirements

Property acquisition is not anticipated for the replacement of the Regional Road 50 (Niagara Street) bridge structure or transmission watermain extension. All proposed permanent works are anticipated to fit within the existing Regional right-of-way. Temporary easements may be required to facilitate temporary utility relocations; however, this will be confirmed during detailed design.

### Construction Approach

The preferred construction approach is to have a full closure of Regional Road 50 (Niagara Street) at the Welland River for ease of bridge demolition and construction, as well as the cost implication and additional construction duration associated with a staged construction approach. However, the final construction approach will be confirmed during detailed design, including coordination with the City of Welland, which has requested for one (1) lane of traffic to be maintained.

A full closure of Regional Road 50 (Niagara Street) at the Welland River would require a signed detour using regional roads. The proposed detour would be approximately 7km in length and would use Main Street West (RR 27), Prince Charles Drive North (RR 54), and Woodlawn Road (RR 41). Through consultation with the City of Welland, a local detour using First Avenue and/or Thorold Road will be discussed to reduce the length of detour for local traffic, excluding truck traffic. Localized pedestrian and cyclist detours would be provided, as well as planned local detours for emergency services (EMS, Fire, Police) and transit services. The existing structure would be demolished at one time

and the new bridge structure would then be constructed. It is estimated that with a full closure construction would span one (1) construction season, taking approximately ten (10) months to complete.

The construction approach will be confirmed and finalized during detailed design. Detours for vehicular, pedestrian and cyclist traffic will be developed and finalized during detailed design. Consultation with the City of Welland, emergency services and transit providers to identify impacts and confirm alternative routes will occur during detailed design.

### Cost Estimate

The preliminary cost estimate to implement the preferred design concept is \$4.4 million. This estimate includes all necessary bridge work, watermain work, and miscellaneous costs; however, this estimate excludes any property impacts and utility relocation costs.

## PUBLIC CONSULTATION

Throughout the project, stakeholders, including the public, property owners, Indigenous communities, authorities, agencies and utilities, were given a variety of opportunities to review and comment on the project process, key findings, proposed alternatives and recommended solution(s). The following opportunities for public and stakeholder review and/or comment were provided:

- Notice of Study Commencement;
- Notice of Public Information Centre No. 1 and No. 2;
- Public Information Centre No. 1 and No. 2; and
- Notice of Study Completion.

A virtual Public Information Centre (PIC) took place on March 4, 2021 virtually from 6:00pm to 7:00pm to present Study details. The PIC presented the following elements:

- Background information on the MCEA process;
- Background information on the Study;
- Problem/opportunity being considered for the Study;
- A high-level summary of the criteria for the evaluation of the alternatives;
- Description of the existing conditions of the project area;
- Key considerations and issues associated with the Study;
- Description of the alternative solutions;
- Evaluation of the alternative solutions;
- Project impacts and mitigations measures;
- A conceptual review of different construction approaches; and
- Next steps in the MCEA process.

Comments were received via comment form at and proceeding the PIC from several residents supporting the overall Study approach and proposed alternatives.

A second online PIC took place from June 21 to July 2, 2021 to present Study details. The material was posted online for these two weeks and the Project Team responded to any questions or comments that were sent through the project website. The PIC presented the following elements:

- Background information on the MCEA process;
- Background information on the Study;
- Problem/opportunity being considered for the Study;
- A recap of the alternative solutions presented at the first PIC;
- Summary of comments received during the first PIC comment period;
- Identification of preferred solution and construction approach;
- Description of alternative bridge design options;
- Evaluation of the alternative bridge design options;
- Identification of preferred design;
- Summary of property impacts and construction approach; and
- Next steps in the MCEA process.

No comments were received during the online PIC period.

## CONCLUSION & RECOMMENDATIONS

The preferred design solution includes the replacement of the bridge structure with a new two-span steel I-Girder bridge with a cross-section that includes sidewalks and bicycle lanes. A 600mm diameter pressurized watermain crossing will be supported from the bridge structure using pipe hangers. The preferred alternative achieves the Study objectives of addressing the structural deficiencies, improving public safety for all modes of transportation (vehicular, cyclist, and pedestrian) and providing a secure water supply to the surrounding area through the extension of the 600mm diameter watermain. Following completion of the MCEA Study, detailed design, permitting and construction will be undertaken to implement the preferred alternative and remedy the identified problems.

During the Study, recommendation for additional works and implementation measures were identified. These items should be taken into consideration during the detailed design and include the following items:

- Determine appropriate construction staging;
- Consult with City of Welland to determine construction approach, confirm need for detours, and finalize traffic detour(s) for vehicular traffic, pedestrian and cyclists, emergency services, and transit providers;
- Consult with emergency service providers, transit providers and school transportation services regarding impacts of construction on service routes and develop alternative routes, as necessary;
- Confirm utility impacts and relocation requirements and coordinate relocation works;
- Confirm design criteria for the bridge structure and watermain extension;
- Determine anticipated construction schedule and level of impact to surrounding community;
- Confirm and obtain required approvals and necessary permits;
- Confirm utility impacts and relocation requirements and coordinate relocation designs, schedule and costs with affected utility agencies;
- Determine locations tree removals and any environmental mitigations required for project design;
- Prepare a vibration monitoring plan, if necessary;
- Develop illumination requirements along project area and complete lighting design;
- Confirm servicing replacement/improvement requirements with the City of Welland including the planned infrastructure upgrades directly south of the project area on Niagara Street, between the Niagara Street bridge and West Main Street;
- Confirm transit requirements within project limits and pedestrian link to transit stop(s) along Regional Road 50 (Niagara Street);
- Finalize capital cost estimate of the project; and

- Ensure construction staging coordinates with other planned activities in the vicinity of the project area by the Region and City, including planned works on neighbouring streets, Shotwell Street and Riverbank Street.

Prior to construction, a final Public Information Centre (PIC) will be held to provide information to the public and adjacent landowners of the upcoming construction work including construction schedule, construction staging, and detour routes.

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## LIST OF ABBREVIATIONS

BHR – Built Heritage Resources  
CHER – Cultural Heritage Evaluation Report  
CHL – Cultural Heritage Landscapes  
CHRA – Cultural Heritage Resource Assessment  
DFO - Department of Fisheries and Oceans  
EAA – Environmental Assessment Act  
ESC – Erosion and Sediment Control  
ESR – Environmental Study Report  
GHG – Greenhouse Gas  
HDD - Horizontal Direction Drilling  
HVA - Highly Vulnerable Aquifers  
IPZ - Intake Protection Zones  
MCEA – Municipal Class Environmental Assessment  
MEA – Municipal Engineers Association  
MECP - Ministry of the Environment, Conservation and Parks  
MHSTCI - Ministry of Heritage, Sport, Tourism, and Culture Industries  
MNR – Ministry of Natural Resources and Forestry  
MNCFN - Mississauga of the New Credit First Nation  
MTBM – Micro-tunneling Boring Machine  
NPCA – Niagara Peninsula Conservation Authority  
OSIM – Ontario Structure Inspection Manual  
PFR – Project File Report  
PPS – Provincial Policy Statement  
PSW - Provincially Significant Wetland  
SAR – Species at Risk  
SGRA - Significant Groundwater Recharge Areas  
SPP – Source Protection Plan  
TMP – Transportation Master Plan  
WHPA - Wellhead Protection Areas

# 1 INTRODUCTION

## 1.1 Study Background and Purpose

The Regional Municipality of Niagara (Niagara Region) retained Associated Engineering Ltd. (AE) to complete a Municipal Class Environmental Assessment (MCEA) for the replacement of the Regional Road 50 (Niagara Street) Bridge (Structure No. 050205) located in the City of Welland. An extension of the 600mm diameter watermain on Niagara Street (RR 50) from approximately Riverbank Street to Mill Street was also considered as part of the MCEA study. The Study developed and evaluated a variety of bridge replacement alternatives to address structural deficiencies and consider components of the Region's Transportation Master Plan (TMP), as well as watermain extension alternatives for crossing the Welland River. In accordance with the Municipal Engineers Association's (MEA) Municipal Class Environmental Assessment (MCEA) process, this Study follows the planning process for a Schedule C.

## 1.2 Description of Study Area

The Study Area, as shown in Figure 1-1, is located entirely within the City of Welland and encompasses approximately 200 metres of RR 50 (Niagara Street) between Riverbank Street and Mill Street. The Niagara Street bridge carries vehicular and pedestrian traffic along RR 50 over the Welland River.

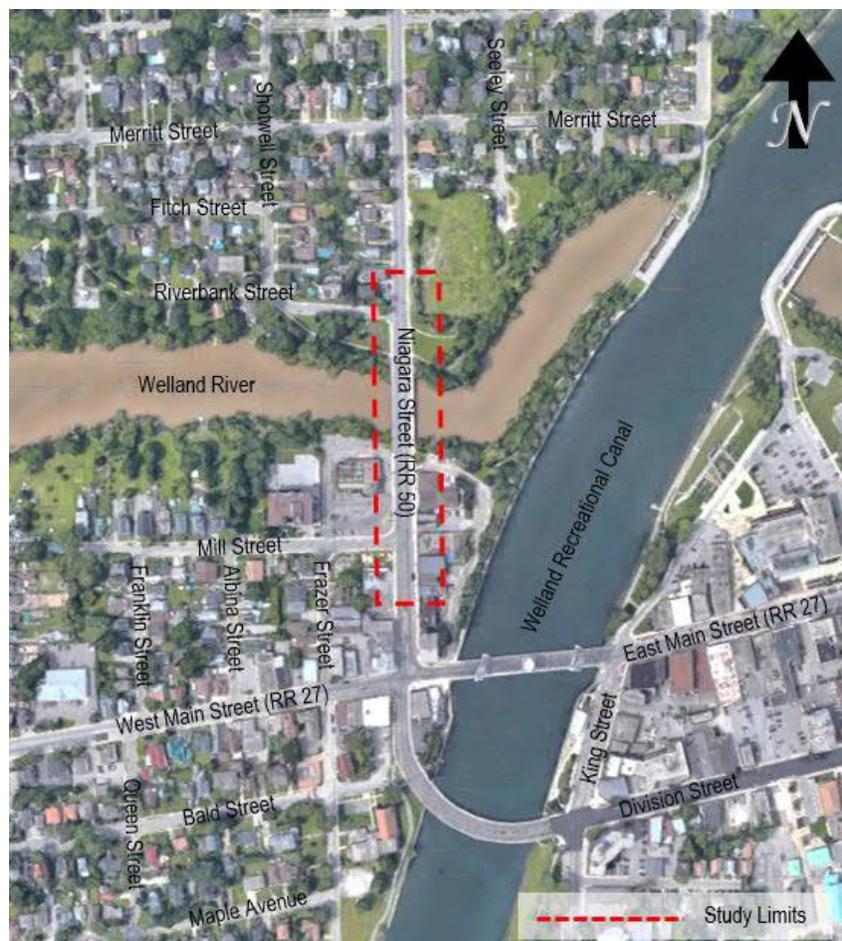


Figure 1-1: RR 50 (Niagara Street) Bridge MCEA Study Area

### 1.3 Study Objectives

The purpose of the Study was to develop alternatives and determine the preferred solution in addressing the structural deficiencies of the bridge along with the extension of the 600mm diameter watermain on RR 50 (Niagara Street) in accordance with the MEA MCEA guidelines. The Study incorporates key planning principles including public consultation, assessment of a reasonable range of alternatives, consideration for the natural, social, economic and technical environments and provides clear documentation. In developing alternatives, the study team took into consideration the objectives of the Study:

- Address the structural deficiencies of the bridge;
- Improve public safety of all modes of transportation (vehicular, cyclist, and pedestrian); and
- Provide secure water supply to the surrounding area through the extension of the 600mm diameter watermain.

The alternatives proposed to achieve the study objectives are outlined in Section 5 as are the evaluation of the alternatives and the identification of the preferred alternative(s).

### 1.4 Planning and Policy

There were several studies that were reviewed by the Study Team because of their significance to the RR 50 Bridge Replacement study area.

#### Provincial Policy Statement (2020)

The *Provincial Policy Statement (PPS) 2020* promotes densities and mixed land uses that support active transportation, transit and the efficient movement of goods. The PPS sets out the policy direction to guide land use planning and development in Ontario that support three key areas: building strong communities, wise use and management of resources, and protecting public health and safety.

The PPS also calls for safe, energy efficient transportation systems that facilitate movement of people and goods and support projected needs. It highlights the importance of connectivity of transportation systems, integration of transportation and land use planning to support sustainable transportation choices, and efficient use of existing infrastructure.

#### Growth Plan for the Greater Golden Horseshoe

The *Growth Plan for the Greater Golden Horseshoe (2019)* guides land use planning in the Greater Golden Horseshoe under the Places to Grow Act (2005). It focuses on building prosperous communities while managing rapid growth. The plan guides the transportation network by promoting more choice when it comes to travel including public transit and active transportation.

The Study Area is located within the Built-Up Area as identified in the Growth Plan for the City of Welland.

#### Region of Niagara Official Plan

The *Regional Official Plan* (Niagara Region, 2014) is a long-range, community planning document used to guide the physical, economic and social development of Niagara. In terms of transportation, among the Region's objectives is "to ensure that transportation infrastructure contributes to the development of vibrant communities; recognizes the historical context within which it is developed and enhances the public realm by designing pleasing streetscapes and supporting active transportation".

Region of Niagara Transportation Master Plan (TMP) – How We Go

The *How We Go – Transportation Master Plan* for the Region of Niagara (Niagara Region, 2017) sets out a strategic vision to guide the planning, development and renewal of a multi-modal transportation system in a manner that is consistent with projected needs and aligned with the region's growth and with the overall vision for a sustainable Niagara Region through to 2041.

City of Welland Official Plan

*The City of Welland Official Plan* (City of Welland, 2019) is a community planning document that is reviewed and updated every five (5) years. The Official Plan provides a 20-year land use vision for the community and is supported by a set of broad strategic community directions. The Plan indicates that the City will encourage and plan for an integrated transportation system which allows for cost-effective and efficient movement of people and goods in a manner compatible with existing and future land uses. Additionally, The City aims to reduce dependence on the automobile and develop a diverse transportation system which supports a variety of transportation modes, including road, rail, transit, cycling, pedestrian modes and transportation demand management modes. As indicated within the Official Plan, the Study Area falls on both High and Low Density Residential (Schedule B1) and Downtown Land Use, Open Space and Recreation, and Core Natural Heritage System (Schedule B).

## 2 STUDY PROCESS

The *Regional Road 50 (Niagara Street) Bridge Replacement MCEA* is considered to be a Schedule 'C' undertaking pursuant to the Municipal Class Environmental Assessment (MCEA) document (MEA, 2000 as amended in 2007, 2011, and 2015). The MCEA process is a process used for the planning of municipal infrastructure projects (roads, water and wastewater, and transit) to ensure that project planning and predesign proceeds in accordance with the *Environmental Assessment Act*. A Schedule 'C' project includes public and review agency consultation, an evaluation of alternative solutions and design concepts, an assessment of the impacts of the preferred solutions, and identification of measures to mitigate any adverse impacts. Figure 2-1 is an excerpt from the MCEA document and illustrates the process followed in the typical planning and design of projects covered by a MCEA. A further description of the MCEA process is provided in subsequent sections.

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

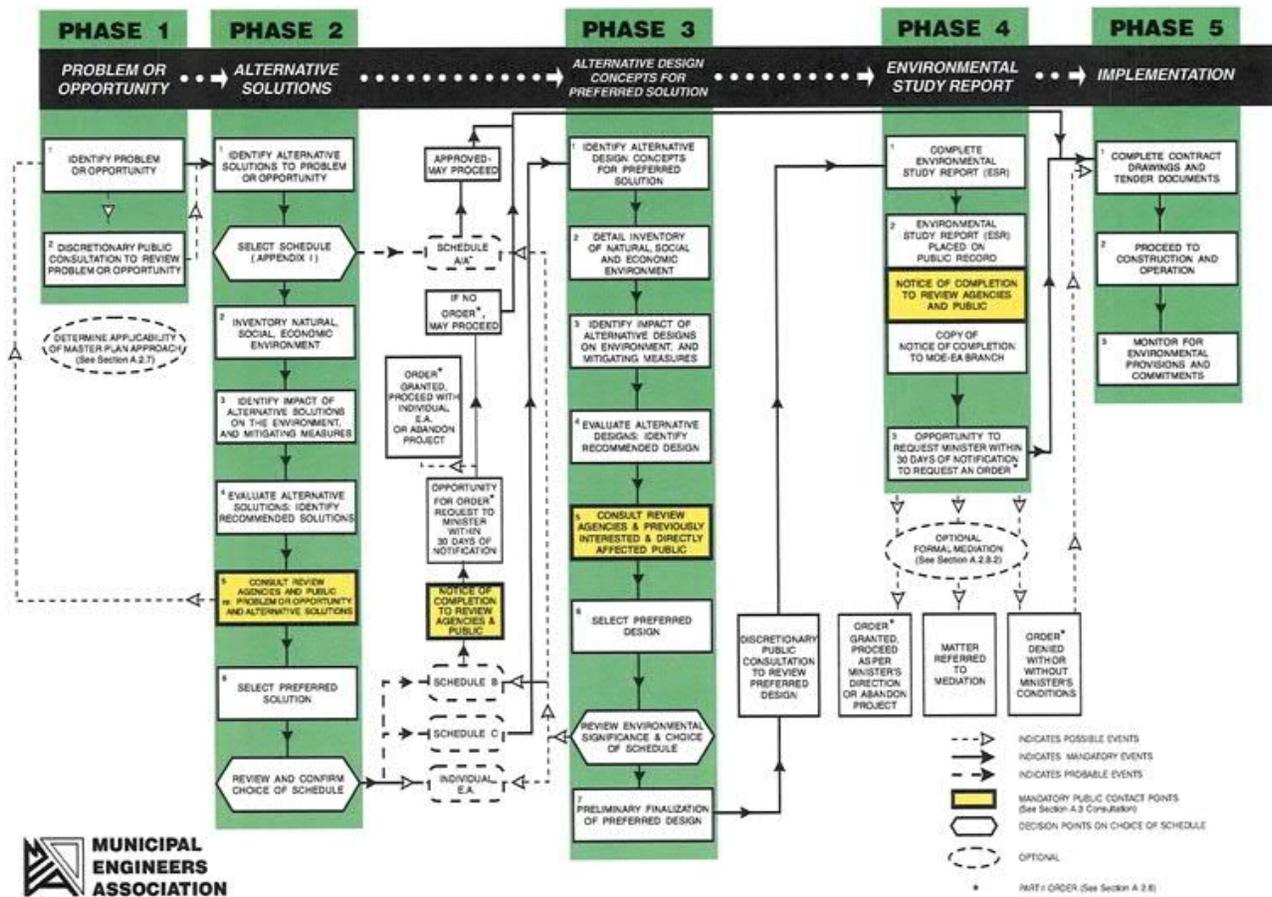


Figure 2-1: MEA MCEA Process

### 2.1 The Municipal Class Environmental Assessment Process

Every municipality in Ontario is subject to the provisions of the *Environmental Assessment Act* (EAA) and its requirements to conduct an Environmental Assessment for most public works projects. The MEA's MCEA document provides municipalities with a five-phase planning procedure approved under the EAA which provides direction on how to plan and undertake all municipal projects that recur frequently, are usually limited in scale and have a

predictable range of environmental impacts. Projects considered by the MCEA process include municipal roads and bridges, wastewater, storm water management, water and transit. The MCEA document also requires that the decision-making process followed by the municipalities in the planning and implementation of infrastructure is transparent and provides opportunity for public and stakeholder involvement.

Table 2-1 illustrates the steps followed in the planning and design of projects covered under the MCEA process. This table summarizes steps considered essential for compliance with the requirements of the EA. With increasing complexity and higher likelihood for adverse environmental impacts, projects are required to complete additional planning steps, termed 'Phases' by the MCEA document, prior to obtaining approval to proceed with a proposed project. The MCEA document provides the following description of the five phases potentially requiring completion before MCEA projects can be approved.

Table 2-1: Phases of the MCEA Process

Phase	Description
Phase 1	Identify the problem (deficiency) or opportunity.
Phase 2	Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution considering public and review agency input.
Phase 3	Examine alternative methods of implementing the preferred solution, based upon the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.
Phase 4	Document, in an Environmental Study Report a summary of the rationale, and the planning, design and consultation process of the project as established through the above phases and make such documentation available for scrutiny by review agencies and the public.
Phase 5	Complete contract drawings and documents and proceed to construction and operation; monitor construction for adherence to environmental provisions and commitments. Where special conditions dictate, also monitor the operation of the completed facilities.

Based on the MCEA document, projects are classified as either Schedule 'A', 'A+', 'B' or 'C' projects. Each of these classifications requires a different level of review to complete the requirements of the MCEA, and thus comply with the EAA, as noted below.

Schedule 'A' projects are limited in scale, have minimal adverse environmental effects and include a number of municipal maintenance and operational activities. These projects are pre-approved and may be implemented without following the MCEA process.

Schedule 'A+' projects are limited in scale and have minimal adverse environmental effects. These projects are pre-approved and may proceed directly to Phase 5 for implementation without following the other phases. However, the public is to be advised prior to project implementation.

Schedule 'B' projects have the potential for some adverse environmental effects. The proponent is required to undertake a screening process involving mandatory contact with directly affected public, Indigenous groups and

relevant government agencies to ensure that they are aware of the project and that their concerns are addressed. A Schedule 'B' activity requires the proponent to conduct two mandatory points of public contact during Phase 2. Additionally, the proponent may elect to undertake a discretionary public consultation at the end of Phase 1 to present the problem or opportunity identified.

Phases 1 and 2 of the MCEA process must be followed and a Project File Report (PFR) must be prepared and submitted for review by the public. A Notice of Completion must be submitted to review agencies and the public and a period of 30 calendar days are provided for comment and input on the PFR.

As long as there are no outstanding concerns raised by the public and/or relevant government agencies, the proponent may proceed to project implementation. However, should a person or party have a concern or objection, they are expected to consult with the proponent to try to resolve the concern.

Schedule 'C' projects are those that have the potential for significant adverse environmental impact and must proceed under the full planning and documentation procedures (Phases 1 to 5) specified in the MCEA document. A Schedule 'C' project is required to complete an Environmental Study Report (ESR), as opposed to a Project File Report for Schedule 'B' undertakings.

The proponent (i.e. The Niagara Region in the case of this MCEA) is required to undertake consultation during multiple phases during the MCEA involving mandatory contact with directly affected public, Indigenous groups and relevant government agencies to ensure that they are aware of the project and that their concerns are addressed. Schedule 'C' projects involve 4 points of mandatory public contact: twice during Phase 2, once during Phase 3 and again during Phase 4 after the ESR document is placed on public record. Schedule 'C' projects require that an ESR be prepared and submitted for review by the public. Similar to Schedule 'B' undertakings, should a person or party have a concern or objection, they are expected to consult with the proponent to try to resolve the concern.

## 2.2 Study Documentation

This Environmental Study Report (ESR) documents the planning and design process followed to determine the recommended undertaking and environmentally significant aspects for the *Regional Road 50 (Niagara Street) Bridge Replacement* MCEA Study, in accordance with the procedures for Schedule 'C' projects, setting out the planning and decision-making process, including consultation with stakeholders, technical agencies and the public, which has been followed to arrive at the preferred solution. The ESR also sets out the mitigating measures proposed to avoid or minimize environmental impacts.

The ESR is organized chronologically in such a way as to clearly demonstrate that the appropriate steps in Phases 1 through to 5 have been followed. The report is intended to be a traceable and easily understood record of the proponent's decision-making process. The ESR generally describes the following:

- The problem or opportunity and other background information;
- A description/inventory of the environment;
- The alternative solutions considered, and the evaluation process followed to select the preferred solution;
- The alternative design concepts considered for the preferred solution, and the evaluation process followed to select the preferred design;
- The mitigating measures and follow-up commitments, which will be undertaken to minimize environmental impacts including any monitoring necessary during construction; and

- The consultation process and an explanation of how concerns raised by the public and review agencies have been addressed in developing the project.

## 2.3 Part II Order

Public, review agency and Indigenous consultation is a key part of the MCEA process. In a Schedule 'C' project, such as the bridge replacement considered under this MCEA Study, the proponent is required to provide opportunity for the public to be consulted about the proposed project. Consultation is intended to inform interested and affected parties about the proposed project, the various alternative solutions and design concepts considered and their anticipated environmental impacts, as well as the preliminary preferred design. It is also intended that the public be given opportunity to provide input or raise concerns prior to completion of the MCEA process. It is intended that issues be identified early into the project by means of public involvement and that resolutions between the proponent and the person or party with the objection be achieved through consultation.

It is incumbent on the public that concerns about the environmental effects of a proposed project or the planning process being followed are brought to the attention of the proponent early in the planning process, when the proponent has greater flexibility to accommodate changes in the project development and the process. Interested persons may provide written comments to the proponent at any point during the study process and up to 30 calendar days from issuance of Notice of Completion.

In addition, a request may be made to the Ministry of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e.: requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g.: require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Aboriginal and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request.

The request should be sent in writing or by email to:

Minister  
Ministry of the Environment, Conservation and Parks  
777 Bay Street, 5<sup>th</sup> Floor  
Toronto, ON M7A 2J3  
[minister.mecp@ontario.ca](mailto:minister.mecp@ontario.ca)

Director, Environmental Assessment Branch  
Ministry of the Environment, Conservation and Parks  
135 St. Clair Ave. West, 1<sup>st</sup> Floor  
Toronto, ON M4V 1P5  
[EABDirector@ontario.ca](mailto:EABDirector@ontario.ca)

Melissa Tomascik, CET.  
Project Manager, Transportation Engineering  
Niagara Region  
1815 Sir Isaac Brock Way  
Thorold, ON L2V 4T7  
[melissa.tomascik@niagararegion.ca](mailto:melissa.tomascik@niagararegion.ca)

## 2.4 Study Organization and Project Team

The Niagara Region retained Associated Engineering (AE) to conduct the *Regional Road 50 (Niagara Street) Bridge Replacement MCEA Study*. The Study Team, as outlined in Table 2-2, consisted of Niagara Region staff, AE staff, and sub-consultants providing specific knowledge and expertise to address the requirements for this project in accordance with the *Environmental Assessment Act*.

Table 2-2: Study Team

Team Member	Role	Organization
Melissa Tomascik, CET.	Proponent (Project Manager)	Niagara Region
Andrea LaPlante, P.Eng.	Prime Consultant (Project Manager) & Environmental Assessment Coordinator	Associated Engineering (Ont.)
Pierre Burton, P.Eng.	Structural Engineer	Associated Engineering (Ont.)
Lisa Merritt, M.Sc.	Archaeologist	Archaeological Services Inc.
Lindsay Graves, MA, CAHP	Senior Heritage Specialist	Archaeological Services Inc.
David Liu, P.Eng.	Geotechnical Engineer	GeoPro Consulting Ltd.
Frank Truchon, rcsi, C.Tech	Engineering Survey Leader	Tulloch Engineering
Jason Cole, M.Sc., P.Geo.	Hydrogeologist	Palmer Environmental Consulting Group Inc.
Austin Adams, M.Sc., EP	Senior Ecologist	Palmer Environmental Consulting Group Inc.

## 2.5 Study Schedule and Consultation Process

As part of the planning process, several steps have been completed to inform government agencies, affected landowners and the local community/general public of the nature and scope of the project and to solicit any comments.

The following table (Table 2-3) outlines the key milestone dates of the project to date and projected to completion, including dates of notification to interested and affected parties and agencies. Further consultation process details are provided within Section 9 of this report.

Table 2-3: Key Milestone Dates

Schedule Item	
Initiate MCEA Study	August 2019
Notice of Study Commencement	September 12, 2019
Notice of Public Information Centre No. 1	February 18, 2021
Online Public Information Centre No. 1	March 4, 2021
Notice of Public Information Centre No. 2	June 10, 2021

Schedule Item	
Completion of Environmental Study Report	February 15, 2022
ESR 30 Day Review Period Ends	February 24 to March 25, 2022
Utility Relocations	2023

## PHASE I: IDENTIFICATION OF PROBLEMS & OPPORTUNITIES

### 3 PROBLEMS AND OPPORTUNITY STATEMENTS

The Problem and Opportunity Statements provide a clear statement of the problem and opportunities that need to be addressed for a specific undertaking. The various analyses (e.g. geotechnical investigation, hydrogeological assessment, natural environment, cultural heritage assessment, archaeological assessment) and existing conditions provide input for and contribute to the identification and description of the problem or opportunity. The prevailing deficiencies within the Study Area can be summarized by the following statements.

#### Problem Statement

The Regional Road 50 (Niagara Street) bridge structure (circa 1932) is a four span, 68m long, slab on concrete girder bridge that has been identified as needing replacement due to the age and condition of the structure. Previous structural inspections of the bridge identified severe areas of concrete spalling, cracking and deterioration on the structure.

In addition, to provide needed additional supply capacity to the area, an extension of the 600mm diameter regional transmission main at Riverbank Street to the 600mm diameter regional transmission main at Mill Street is required.

#### Opportunity Statement

Given the need to replace the Regional Road 50 (Niagara Street) bridge, there is an opportunity to address structural deficiencies, improve public safety of all modes of transportation (vehicular, cyclist, and pedestrian), and provide secure water supply to the surrounding area.

## PHASE II: IDENTIFICATION & EVALUATION OF ALTERNATIVE SOLUTIONS

### 4 EXISTING CONDITIONS

The following section documents existing conditions within the Study Area.

#### 4.1 Bridge Structure

The Regional Road 50 (Niagara Street) bridge structure (Structure 050205) carries Regional Road 50 over the Welland River. Regional Road 50 is a major north-south arterial roadway extending from the Thorold/Welland boundary to Division Street in the City of Welland. The bridge is located west of the downtown core and presently serves an average annual daily traffic (AADT) of 12,400.

The bridge structure was originally constructed in 1932 and underwent extensive rehabilitation works in 1973 (refer to original engineering drawings in Appendix A). In 2019, an OSIM (Ontario Structure Inspection Manual) Inspection was completed and interim repair works were completed on the bridge to address deficiencies for the short-term (refer to Appendix B for a copy of the OSIM Inspection Report). The existing structure is 68m long with four spans with span lengths of 14.3m, 14.7m, 14.8m and 14.3m (north to south, respectively). The bridge cross-section is 18.3m wide with two travel lanes (including shoulders) of 7m width each with sidewalks and parapet walls on both sides.

The superstructure is a reinforced concrete slab on 28 pre-stressed concrete girders with an asphalt wearing surface which was reconstructed in 1973. The substructure consists of reinforced concrete abutments and three concrete piers all supported by timber piles and are original (circa 1932). Figure 4-1 depicts the existing bridge structure.



a) Looking east



b) Looking north



c) Substructure

Figure 4-1: Regional Road 50 (Niagara Street) Bridge Structure

## 4.2 Linear Infrastructure and Utilities

Existing underground linear infrastructure within the Study Area owned by the Region and City of Welland includes:

- City owned local watermains servicing local neighbourhoods north and south of the bridge structure;
- City owned sanitary, storm and combined sewers;
- Region owned 600mm diameter (concrete pressure pipe – CPP) transmission watermain located south of the Welland River where it crosses the west aqueduct and proceeds west along Mill Street; and
- Region owned 600mm diameter (polyvinyl chloride – PVC) transmission watermain located north of the Welland River on Niagara Street to south of Riverbank Street.

Existing utilities that will need to be accommodated/relocated as part of the bridge replacement including:

- Enbridge gas main – NPS 6 inch steel gas main – crosses Welland River suspended from the existing bridge structure; and
- Bell Canada – 24 ducts crosses Welland River embedded within west sidewalk of the bridge structure.

Figure 4-2 provides an overview of linear infrastructure and utilities within the Study Area.



Figure 4-2: Existing Linear Infrastructure and Utilities

### 4.3 Geotechnical Characteristics

Field work for the geotechnical investigation was undertaken by GeoPro Consulting on July 3 and 14 to 17, 2020. During this time, five (5) boreholes (Boreholes BH1, BH2, BH5, BH7, and BH8) were advanced to depths ranging from about 0.6m to 29.0m below the existing ground surface within the Study Area.

Fill materials with varying thicknesses were encountered at all borehole locations up to depths varying from 0.3 m (Borehole BH1, i.e. Mill Street) to 4.0 m (Borehole BH7, i.e. south of the existing bridge). Underlying the fill materials, native cohesive clayey deposits, cohesionless sandy/silty/gravelly deposits, glacial tills and soil/shale complex were encountered. Probable limy shale to shaly limestone and probable limestone were encountered in Boreholes BH7 and BH8 below the sand/silt deposits. Groundwater table measured in the boreholes ranged from 2.12 m to 4.17 m below the ground surface.

As outlined in the Geotechnical Report, shallow foundations are not considered to be a desirable option since the soil strengths in the vicinity of Boreholes BH7 and BH8 are not considered to be sufficient to support the proposed bridge on a spread footing. Augered caissons (bored piles) are also considered to be not feasible due to the high groundwater tables and the presence of the cohesionless soils at the site. Therefore, consideration could be given to supporting the bridge abutments on driven steel H piles founded in the competent very dense sand/shale complex or limy shale to shaly limestone and limestone bedrock. The driven steel H-pile foundation would also permit integral abutment design.

In order to provide information on the chemical quality of the subsurface soils, selected soil samples were submitted for chemical analyses. The soil analytical results were compared with the Ministry of the Environment, Conservation and Parks (MECP) "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", April 2011, Table 1: Full Depth Background Site Condition Standards for Residential/Parkland/Institutional/Industrial/Commercial/Community Property Uses (2011 MECP Table 1 Standards); Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition (2011 MECP Table 2 Standards), and Table 3: Full Depth Generic Site Condition Standards in a non-potable Ground Water Condition (2011 MECP Table 3 Standards). Based on the analytical results, exceedances of MECP Table 1, Table 2 and Table 3 Standards were noted in the tested soil samples. It should be noted that the samples with exceedances of EC and SAR values were taken from the borehole located on the roadway. The elevated EC and SAR values in the tested soil samples may likely be attributed to the application of de-icing salt on the road. The potential source of the other elevated parameters is unknown.

Based on the results of soil sample analysis, the following disposal options were recommended:

- The soils generated at the same tested sample depth from Borehole BH2 may be disposed at facilities, which are suitable to accept salt-impacted excess soil (i.e., certain former aggregate sites, mines, etc.) or at a licensed landfill site. However, additional chemical testing may be required by these facilities;
- The soils generated at the same tested sample depth from Borehole BH7 can be re-used at a receiving site which is not considered as an environmental sensitive site and not a residential/parkland/institution property, provided that the soils will not be in contact with groundwater and would accept soil as per the test results. Additional chemical testing may be required by these sites; and
- The soils generated at the Site at the same tested sample depths from Boreholes BH5 and BH8 may be disposed at a licensed landfill site; however, additional chemical testing under O. Reg. 347/558 may be required by the landfill site

Refer to Appendix C for the complete Geotechnical Report.

#### 4.4 Hydrogeological Conditions

Palmer Environmental Consulting Group (Palmer) conducted a desktop-based preliminary hydrogeological assessment to support the Study. The assessment is focused on characterizing hydrogeological conditions within the Study Area to estimate dewatering requirements and to identify potential hydrogeological impacts or design constraints. Based on the findings of the assessment, Palmer provided the following conclusions and recommendations:

- Ontario Geological Survey surficial geology of the region reveals the native surficial geology is comprised of fine-textured glaciolacustrine deposits of silt and clay with minor sand and gravel and modern alluvial deposits of clay, silt, sand and gravel;
- MECP water well records indicate the site is underlain by at least 9.4 m of clay or silty clay, and the water table is located at approximately 2 to 4 m below ground surface;
- Based on MECP water well records, the bedrock is expected to be located approximately 30 m below ground surface and consists of the Salina Formation;
- Based on the MECP Source Water Protection Information Atlas online mapping tool, the project site is not located within any regulated source protection areas; and
- Construction dewatering values are expected in the range of 50,000 L/day or less, dependent on site specific conditions. An EASR is not expected to be required from the MECP.

Refer to Appendix D for the Hydrogeological Assessment Report.

## 4.5 Natural Environment

As shown in Figure 4-3, the Study Area crosses the Welland River and is within Niagara Peninsula Conservation Authority (NPCA) regulated lands. Preliminary review of NPCA mapping and Ministry of Natural Resources and Forestry (MNR) mapping identify wetlands and woodlots within the vicinity of the Study Area.

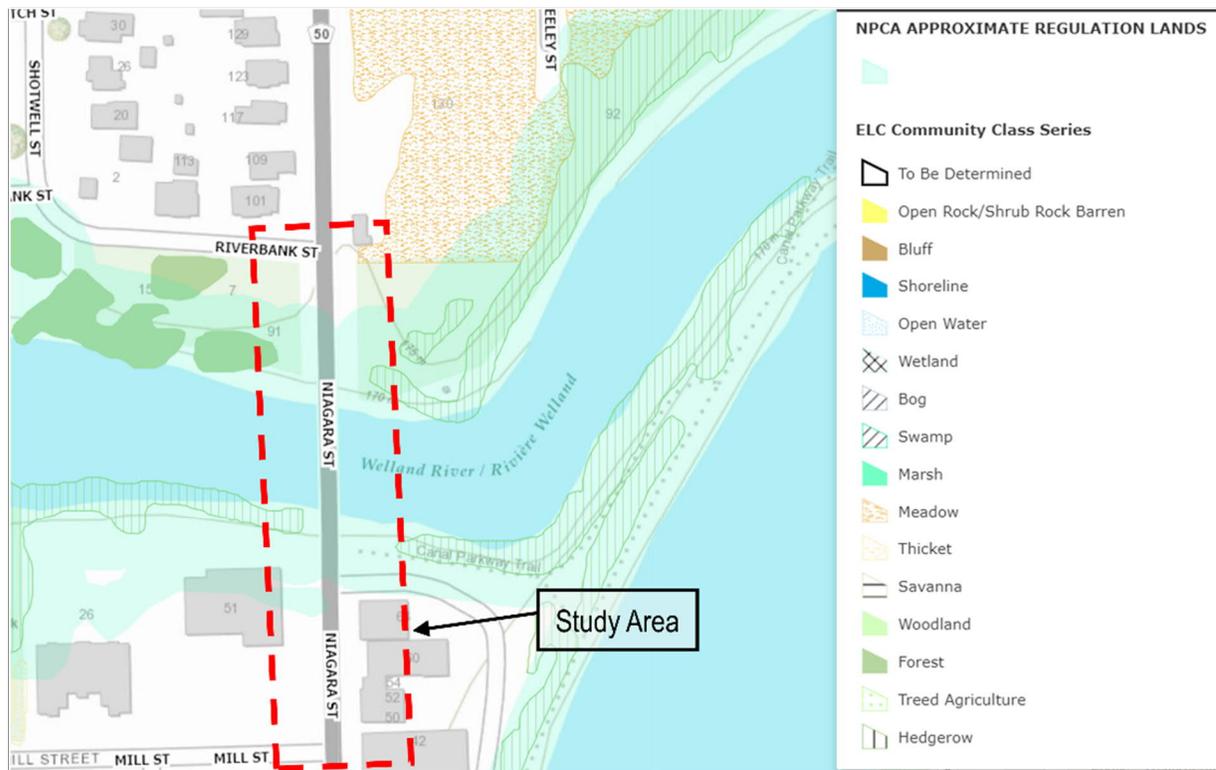


Figure 4-3: NPCA Regulated Lands

### 4.5.1 Natural Heritage Environment

Field investigations to assess the natural heritage environmental conditions, including inventory of existing vegetation communities, tree inventory and assessment of ecological features, were undertaken by Palmer in June 2020. Habitats on site were characterized and screened for evidence of or potential use by Species at Risk (SAR). Below is a summary of the findings. Refer to Appendix E for the Natural Environmental Report prepared by Palmer for more detailed information.

#### Vegetation Communities and Flora

Three (3) vegetation communities immediately adjacent to existing bridge structure were identified including:

- FOD7-4 – Fresh-moist black walnut lowland deciduous forest;
- CUW1 – Cultural woodland; and
- OAO – Open aquatic.

The communities are heavily influenced by non-native/exotic species, with all species considered locally and provincially common. A total of 51 trees were inventoried within the project area, with 57% being native species. No SAR trees were observed.

There are two (2) Provincially Significant Wetlands (PSW) within the vicinity of the area:

- Welland River West Wetland PSW; and
- Welland River Between the Canals PSW.

There are no expected impacts on these wetlands from the project.

#### Species at Risk (SAR)

Through review of existing records, site surveys and habitat screening, the following SAR have potential suitable habitat within the general Study Area:

- Birds – Barn Swallow (*Hirundo rustica*);
- Freshwater Mussels - Eastern Pond Mussel (*Ligumia nasuta*), Mapleleaf mussel (*Quadrula quadrula*);
- Bats - Eastern Small-footed Myotis (*Myotis leibii*), Little Brown Myotis (*Myotis lucifungus*), Northern Myotis (*Myotis septentrionalis*), Tri-coloured Bat (*Perimyotis subflavus*); and
- Herptiles - Snapping Turtle.

#### Aquatic Habitat

The Welland River supports a cold-warm generalist fish community. The current fish community within the Welland River watershed is comprised of generalist species tolerant of a range of habitat conditions. These species all dictate a spring/early summer spawning season. All in-water and near-water works should be completed outside the southern regions spring spawning window of March 15 to July 15 of any given year.

#### 4.5.2 Source Water Protection

Under the MECP 2006 *Clean Water Act*, municipalities are required to conform to Source Protection Plans (SPPs) to protect surface and groundwater sources to municipal drinking water systems. The Study Area for this project is within the Niagara Peninsula Source Protection Plan (SPP). The SPP identifies where there is potential for significant threat to the quality and quantity of groundwater through delineation of Wellhead Protection Areas (WHPAs), Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), and Intake Protection Zones (IPZs).

The Study Area is located outside all SPP-delineated areas and is not considered vulnerable to drinking water threats. Two (2) HVA's occur in the vicinity of the Study Area and the Welland IPZ occurs to the east of the area.

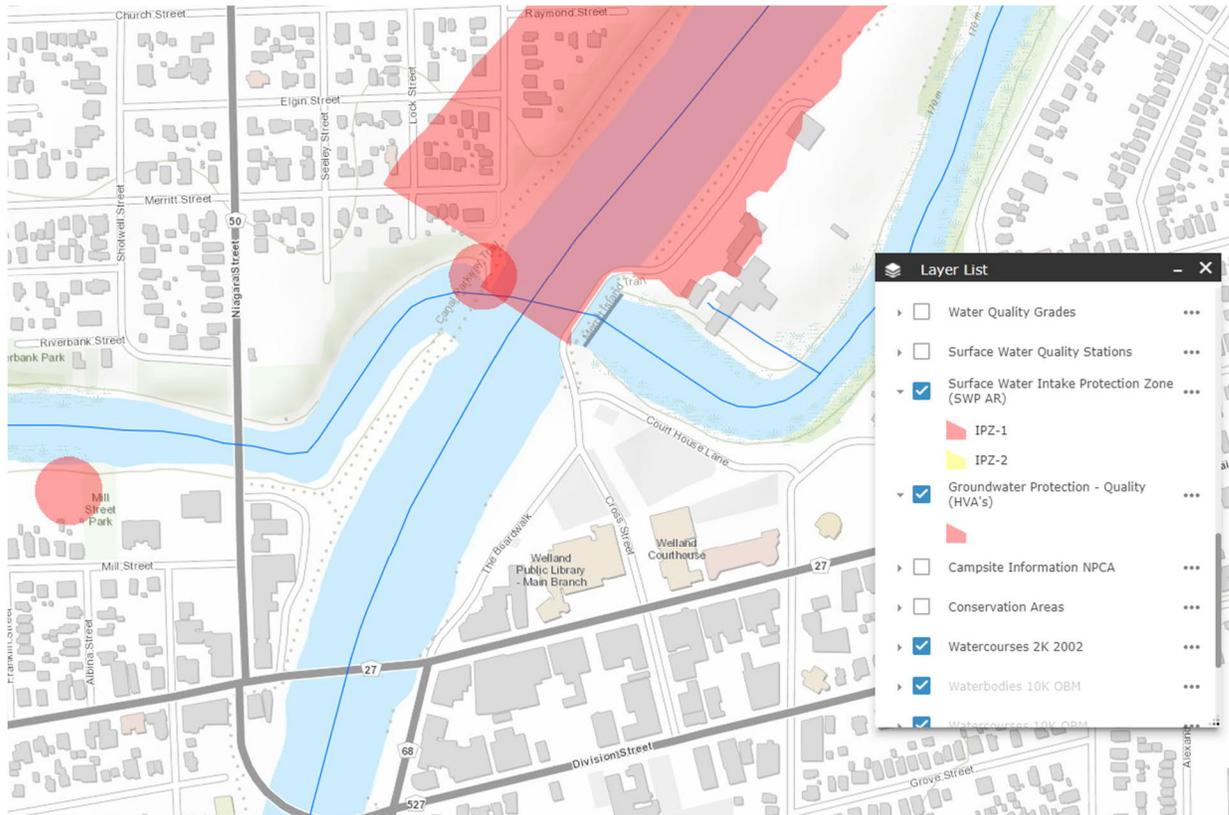


Figure 4-4: Source Water Protection Areas

## 4.6 Cultural Environment

Archaeological Services Inc. (ASI) was contracted by AE to conduct a Stage 1 Archaeological Assessment, Cultural Heritage Resource Assessment (CHRA) and Cultural Heritage Evaluation Report (CHER) for the *Regional Road 50 (Niagara Street) Bridge Replacement Study*.

### 4.6.1 Archaeological Assessment (Stage 1)

In consideration of Section 1.3.1 of the 2011 Standards and Guidelines for Consultant Archaeologists (S&G) administered by the Ministry of Heritage, Sport, Tourism, and Culture Industries (MHSTCI), which lists criteria that are indicative of archaeological potential, the Study Area meets the following criteria indicative of archaeological potential:

- Water sources (i.e. the Welland River);
- Early historic transportation routes; and
- Proximity to early settlements.

Stage 1 Archaeological Assessment field work was completed within the Study Area by ASI on February 14, 2020. The report concluded that the Study Area does not retain archaeological potential on account of deep and extensive land disturbance, low and wet conditions, or slopes in excess of 20 degrees. The section of the Welland Canal within the Study Area has been subject to extensive and intensive disturbance due to bridge construction and dredging and therefore is not subject to a marine archaeological assessment. In the event that the proposed work extends beyond the Study Area, further Stage 1 archaeological assessments should be conducted.

The Stage 1 Archaeological Assessment Report was reviewed by the MHSTCI and has been entered in the Ontario Public Register of Archaeological Records stating no further concerns. Refer to Appendix F for the Archaeological Assessment Report.

#### 4.6.2 Cultural Heritage Evaluation Report (CHER)

Field work for the Cultural Heritage Resource Assessment (CHRA) and Cultural Heritage Evaluation Report (CHER) were completed for the Study Area by ASI on February 3, 2020. Five (5) potential features (BHR – built heritage resource) were identified with cultural heritage value within the Study Area (Figure 4-5) including the Regional Road 50 bridge structure (BHR3). Based on the results of archival research, an analysis of bridge design and construction in Ontario, field investigations, and application of O. Reg. 9/06 of the *Ontario Heritage Act*, the Regional Road 50 (Niagara Street) Bridge was determined not to have cultural heritage value. Refer to Appendix G for the CHER and further details of the evaluation.



Figure 4-5: Potential Features of Cultural Heritage Value

### 4.6.3 Cultural Heritage Resource Assessment and Preliminary Impact Assessment

The purpose of the CHRA was to present an inventory of known and potential built heritage resources (BHRs) and cultural heritage landscapes (CHLs), identify existing conditions of the Study Area, provide a preliminary impact assessment, and propose appropriate mitigation measures. The results of background historical research and a review of secondary source material, including historical mapping, revealed a Study Area with a land use history dating back to the mid-nineteenth century. A review of federal, provincial, and municipal registers, inventories, and databases revealed that there are no previously identified features of cultural heritage value within the Study Area. Five potential features were identified during research and fieldwork (refer to Figure 4-5).

Based on the results of the CHRA and preliminary impact assessment, the following recommendations were provided:

- Construction activities and staging should be suitably planned and undertaken to avoid unintended negative impacts to the identified BHRs. Avoidance measures may include, but are not limited to: erecting temporary fencing, establishing buffer zones, issuing instructions to construction crews to avoid identified cultural heritage resources, etc.
- Once a preferred alternative or detailed designs of the proposed work are available, the preliminary impact assessment shall be updated with a confirmation of impacts of the undertaking on the cultural heritage resources identified within and/or adjacent to the study area and will recommend appropriate mitigation measures. Mitigation measures may include, but are not limited to, completing a property-specific heritage impact assessment or documentation report, or employing suitable measures such as landscaping, buffering or other forms of mitigation, where appropriate. In this regard, provincial guidelines should be consulted for advice and further heritage assessment work should be undertaken as necessary.
- To ensure nearby properties are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design. The results of the vibration assessment will determine if a vibration monitoring plan will have to be prepared and implemented during detailed design.
- Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

Refer to Appendix G for the CHRA and Preliminary Impact Assessment Report.

## 4.7 Socio-Economic Environment

### 4.7.1 Land Use

As indicated in Figure 4-6 from the City of Welland's Official Plan, the land use to the north of the Regional Road 50 (Niagara Street) Bridge is classed as a mix of Low Density Residential and High Density Residential, Open Space and Recreation, and Core Natural Heritage System. To the south of the bridge, the land use is classed as Downtown and Core Natural Heritage System.

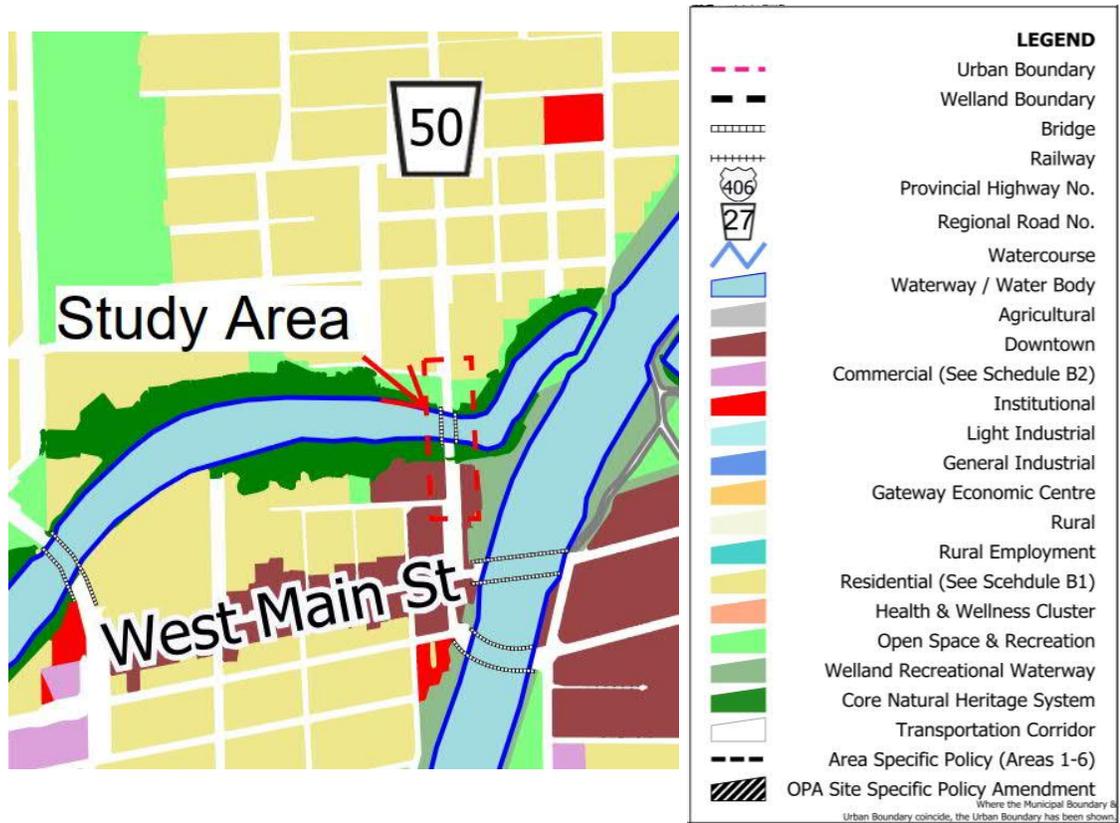


Figure 4-6: Land Use Designation (Welland Official Plan – Schedule B)

#### 4.7.2 Property Ownership

The existing Regional Road 50 (Niagara Street) Bridge structure and road right-of-way is owned by the Niagara Region. Adjacent roads are owned by the City of Welland, as well as the green spaces located to the northeast and northwest of the bridge structure (Figure 4-7). All other land adjacent to the right-of-way is privately owned with the exception of the Welland River banks which are regulated by the NPCA.



Figure 4-7: Property Ownership

## 5 ALTERNATIVE SOLUTIONS

### 5.1 Identification of Alternative Solutions – Bridge Replacement

Under Phase 2 of the MCEA planning and design process, all reasonable and feasible solutions to the problem are identified and examined. In order to address the Problem encompassing the deficiencies that were identified as part of the MCEA study, a range of reasonable and feasible “solutions” were identified as alternative ways to solve the Problem.

Specific to the Regional Road 50 (Niagara Street) Bridge Replacement study, four (4) alternative solutions were identified, developed and evaluated. The alternatives include: 1) Do Nothing, 2) Replace superstructure utilizing existing piers, 3) Replace with new superstructure and substructure, and 4) Replace with new single span structure. These alternative solutions are discussed and evaluated in the following sections.

#### 5.1.1 Alternative 1: Do Nothing

This alternative involves the existing Regional Road 50 (Niagara Street) bridge structure remaining in its existing condition. The interim bridge repairs completed in 2019 will prolong the bridge’s service life for approximately 5 years, at which time additional bridge repairs or rehabilitation works will be required. Due to the age and condition of the structure, this alternative is not considered feasible but has been considered as a benchmark for comparison.

#### 5.1.2 Alternative 2: Replace Superstructure Utilizing Existing Piers

This alternative solution involves removing and replacing the existing bridge superstructure with a 14.8m wide cross-section. The cross-section would include two 3.5m travel lanes, two 1.8m bicycle lanes, and two 1.8m wide sidewalks. The new superstructure could consist of girders, concrete deck (225mm depth) and asphalt surface. The new superstructure would have negligible impact on the road vertical profile and available freeboard. This alternative would maintain the three (3) existing piers; however, the piers would be rebuilt from the sheetpiling (above waterline). The abutment walls would also be rebuilt due to existing deterioration. Figure 5-1 illustrates the proposed cross section while Figure 5-2 illustrates the bridge elevation for Alternative 2.

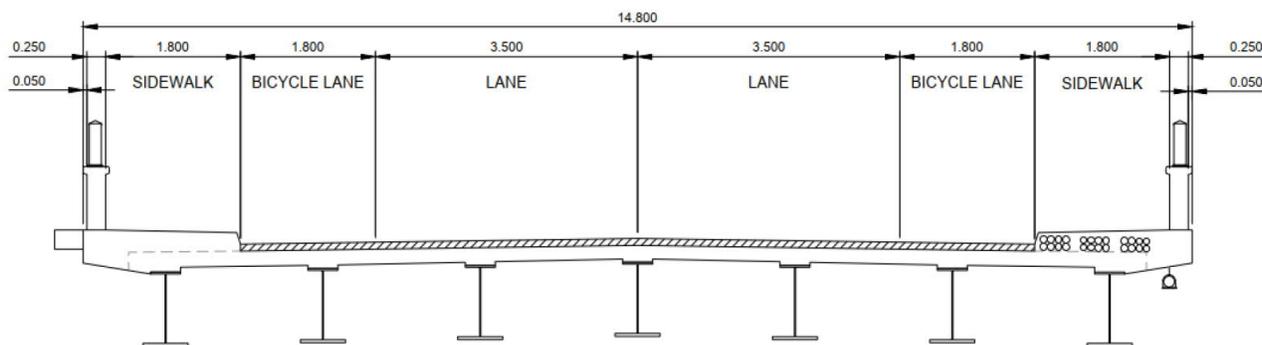


Figure 5-1: Typical Cross Section for Alternative 2

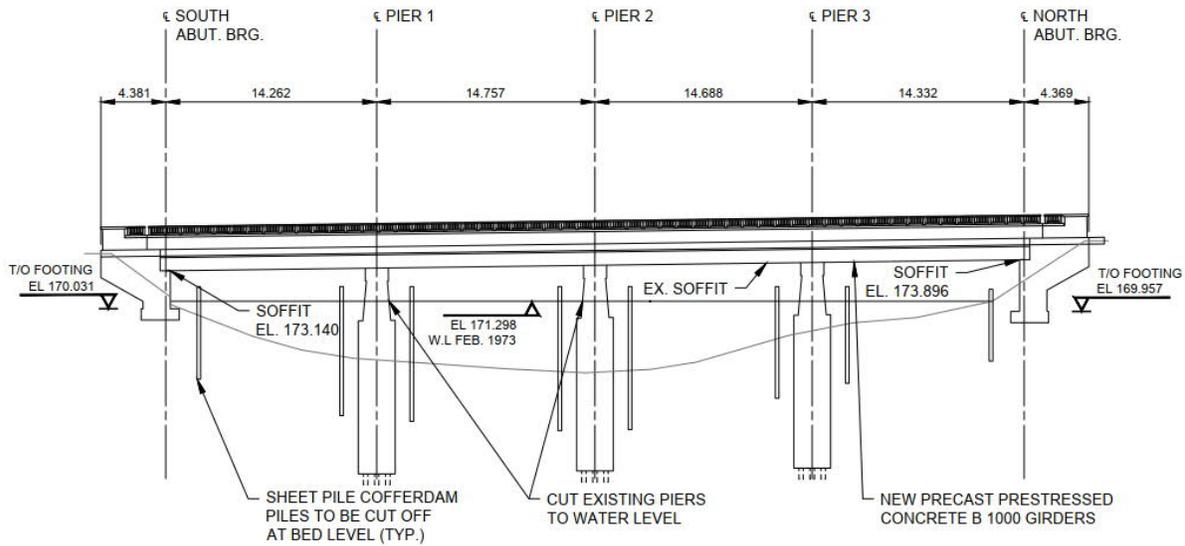


Figure 5-2: Proposed Elevation for Alternative 2

### 5.1.3 Alternative 3: Replace Bridge with New Superstructure and Substructure

This alternative solution involves replacing the existing bridge with a new structure (superstructure and substructure). The bridge would have similar cross-section and width (14.8m) as Alternative 2. The existing piers would require complex removal down to the riverbed to allow for new piers (1 or 2) to be constructed. The abutment walls would also be rebuilt due to existing deterioration. The new superstructure could be either steel girder (950mm) or concrete box (B1000) with concrete deck (225mm depth with steel or 150mm depth with concrete) and asphalt surface. The new superstructure would have negligible impact on the road vertical profile and minor impact on the available freeboard. Figure 5-3 illustrates the proposed cross section while Figure 5-4 illustrates the bridge elevation for Alternative 3.

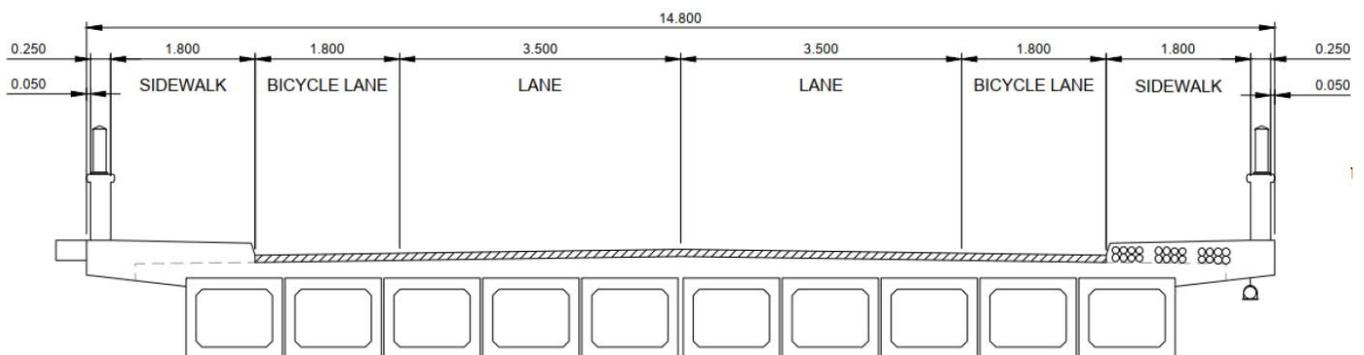


Figure 5-3: Typical Cross Section for Alternative 3

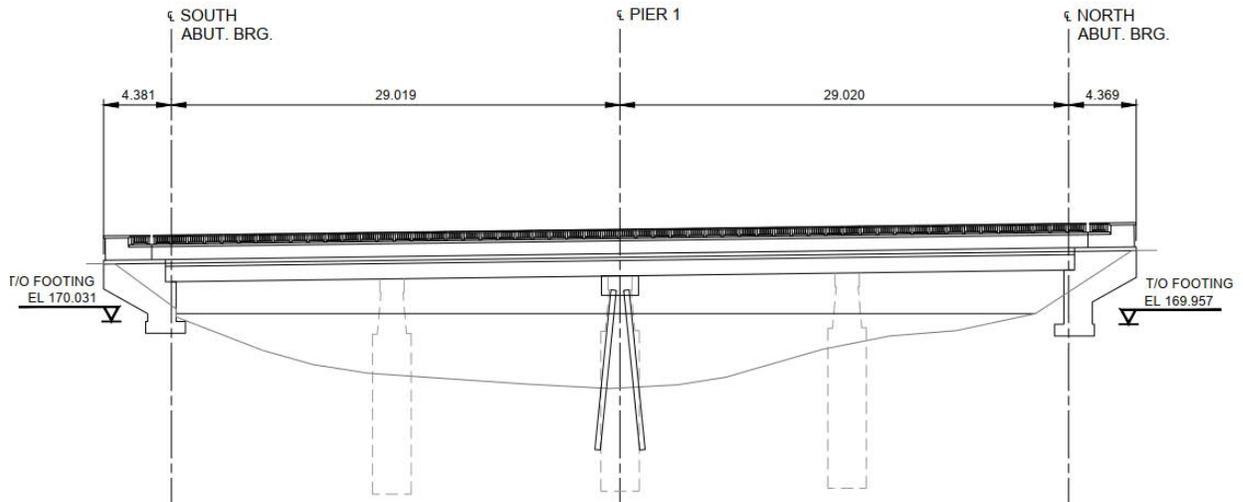


Figure 5-4: Proposed Elevation for Alternative 3

#### 5.1.4 Alternative 4: Replace Bridge with New Single Span Structure

This alternative solution involves replacing the existing bridge with a new single span structure (superstructure and substructure). The bridge would have similar cross-section and width (14.8m) as Alternative 2 and 3. The existing piers would require complex removal down to the riverbed and the abutment walls would also be rebuilt due to existing deterioration. The new superstructure could be either steel girder (3000mm) or steel tub (2700mm) with concrete deck and asphalt surface. The new superstructure would impact the road vertical profile and available freeboard due to the increased depth of the superstructure. Figure 5-5 illustrates the proposed cross section while Figure 5-6 illustrates the bridge elevation for Alternative 4.

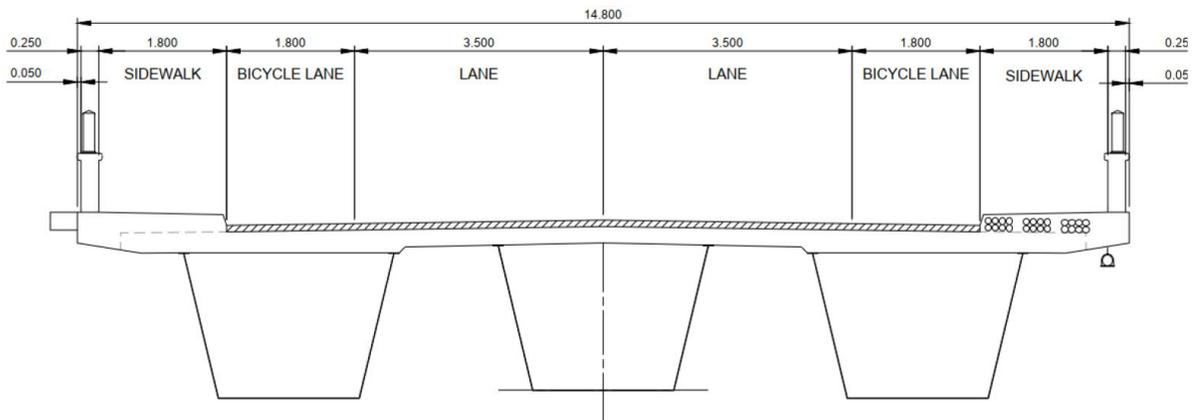


Figure 5-5: Typical Cross Section for Alternative 4

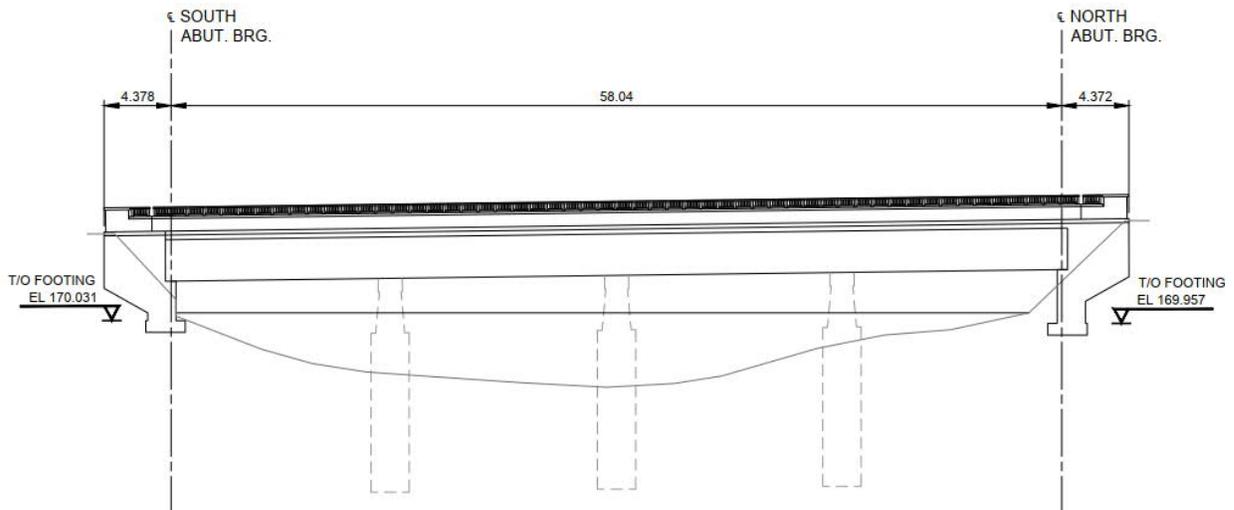


Figure 5-6: Proposed Elevation for Alternative 4

## 5.2 Identification of Alternative Solutions – Watermain Crossing

Specific to the extension of the 600mm diameter regional transmission watermain, four (4) alternative solutions were identified, developed and evaluated. The alternatives include: 1) Trenchless crossing, 2) Independent pipe bridge, 3) Support watermain from Regional Road 50 (Niagara Street) bridge and 4) Install watermain inside steel tub girder bridge. These alternative solutions are discussed and evaluated in the following sections.

### 5.2.1 Alternative 1: Trenchless Crossing

The new 600mm diameter transmission watermain crossing would be installed via trenchless technologies. Trenchless technologies to be explored as feasible methods include Horizontal Direction Drilling (HDD) and micro-tunneling (MTBM). Key considerations will include watermain alignment, entry and exit locations and soil/ground conditions. Figure 5-7 illustrates the horizontal directional drilling method while Figure 5-8 illustrates the micro-tunneling method.

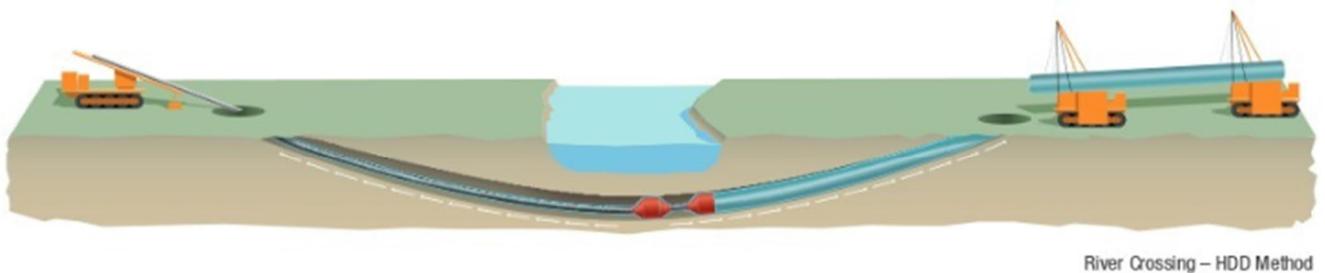


Figure 5-7: Horizontal Directional Drilling Schematic

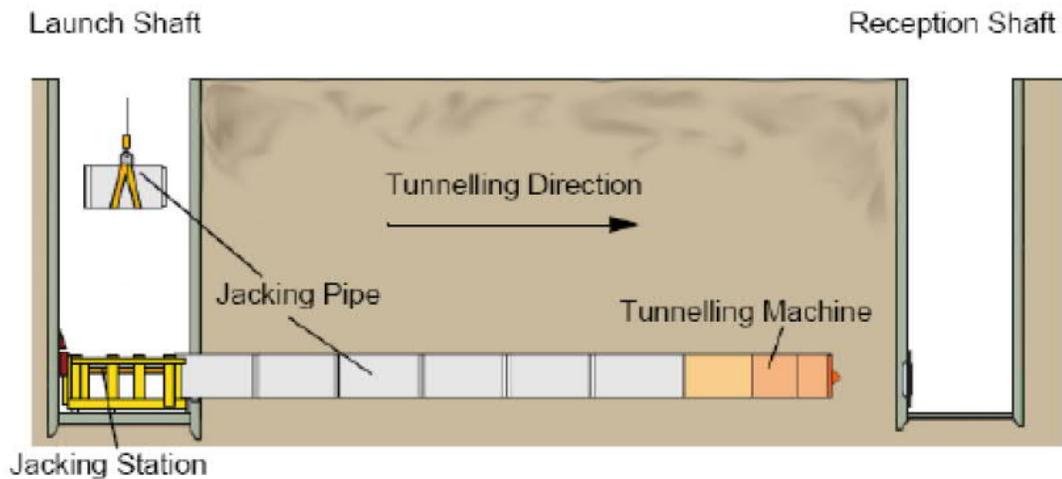


Figure 5-8: Micro-tunneling Schematic

### 5.2.2 Alternative 2: Independent Pipe Bridge

The new 600mm diameter transmission watermain crossing will be installed on an independent pipe bridge located upstream or downstream of the Regional Road 50 (Niagara Street) bridge structure. Key considerations include location of pipe bridge, ability to accommodate additional utilities (i.e.: Enbridge), functionality of bridge (utility crossing only, pedestrian crossing, etc.) and aesthetic of bridge structure. A similar pipe bridge was constructed at the Welland Water Treatment Plant east of the Study Area as illustrated in Figure 5-9.



Figure 5-9: Independent Pipe Bridge Example

### 5.2.3 Alternative 3: Support Watermain from the Regional Road 50 (Niagara Street) Bridge

The new 600mm diameter transmission watermain crossing would be supported from the Regional Road 50 (Niagara Street) bridge structure, after replacement. Key considerations will include protection of the crossing from freezing and vandalism. Figure 5-10 illustrates a watermain suspended from a bridge within the Niagara Region.



Figure 5-10: Example of a Watermain Suspended from a Bridge

#### 5.2.4 Alternative 4: Install Watermain Inside the Steel Tub Girder Bridge

The new 600mm diameter transmission watermain crossing will be installed inside the steel tub girders of the new Regional Road 50 (Niagara Street) bridge structure. Key considerations include accessibility for maintenance and if steel tub girders are the preferred bridge type. Figure 5-11 shows an example of utilities installed inside a bridge girder.



Figure 5-11: Example of Utility Installed Inside Bridge Girder

### 5.3 Evaluation Criteria

The following categories of evaluation criteria, representing a range of issues, were considered in the evaluation of the bridge replacement and watermain crossing alternative solutions independently. The evaluation criteria and their respective considerations were finalized based on input received from affected agencies, stakeholders, the public and Region staff. The criteria that was used to evaluate the bridge replacement and watermain crossing alternative solutions are summarized in Table 5-1 and Table 5-2, respectively, with no order of preference or implied importance.

Table 5-1: Bridge Replacement Alternative Solutions Evaluation Criteria

Evaluation Criteria	Considerations
Transportation	<ul style="list-style-type: none"> <li>Ability to serve the existing and future vehicular, pedestrian and cycling traffic needs</li> </ul>
Technical	<ul style="list-style-type: none"> <li>Ability to address technical requirements (structural load, etc.)</li> <li>Ability to construct the replacement in a cost-effective manner</li> <li>Consideration to constructability and complexity of construction</li> <li>Consideration for construction length and detouring/staging</li> </ul>
Natural Environment	<ul style="list-style-type: none"> <li>Direct and indirect impacts on the existing vegetation, water quality, watercourse, fisheries/wildlife habitat</li> <li>Consideration for hydraulic impact on Welland River</li> </ul>
Socio-Economic Environment	<ul style="list-style-type: none"> <li>Impacts on the local community including property requirements</li> <li>Impacts on utilities</li> <li>Impact on the local businesses, residents and road users</li> </ul>
Cultural Environment	<ul style="list-style-type: none"> <li>Potential adverse effects on the existing archaeological and heritage resources</li> </ul>
Financial	<ul style="list-style-type: none"> <li>Capital cost of the alternative</li> </ul>

Table 5-2: Watermain Crossing Alternative Solutions Evaluation Criteria

Evaluation Criteria	Considerations
Technical	<ul style="list-style-type: none"> <li>Ability to address technical requirements (demand, isolation, etc.)</li> <li>Ability to construct the crossing in a cost-effective manner</li> <li>Consideration for future maintenance and access</li> <li>Consideration for construction length</li> </ul>
Natural Environment	<ul style="list-style-type: none"> <li>Direct and indirect impacts on the existing vegetation, water quality, watercourse, fisheries/wildlife habitat</li> </ul>
Socio-Economic Environment	<ul style="list-style-type: none"> <li>Impacts on the local community including property requirements</li> <li>Impacts on utilities</li> <li>Impact on the local businesses, residents and road users</li> </ul>
Cultural Environment	<ul style="list-style-type: none"> <li>Potential adverse effects on the existing archaeological and heritage resources</li> </ul>
Financial	<ul style="list-style-type: none"> <li>Capital cost of the alternative</li> </ul>

A comparative evaluation of the alternative solutions was undertaken to determine the overall positive and negative attributes of each solution for both the bridge replacement and watermain crossing. In comparing the alternative solutions, it is recognized that more than one of the potential solutions may resolve more than one problem and the feasibility of an alternative solution will depend, in part, on a range of factors (criteria) including but not limited to the nature and location of the transportation system, the nature and location of the problem, and comparative costing of the alternative solution.

## 5.4 Summary of Evaluation Process

To provide an impartial, traceable and consistent evaluation, as required by the MCEA process, the following method was used to illustrate the highest and lowest impact of each alternative relative to the evaluation criteria. The respective alternative solutions were evaluated against the evaluation criteria using a five-point scale as shown in Table 5-3, ranging from a score of five as most preferred (shown as a black solid circle) to one as least preferred (shown as a white solid circle).

Table 5-3: Evaluation Five-Point Scale

Rating	Numerical Rating	Icon
Most Preferred	5	●
Preferred	4	◐
Neutral	3	◑
Not Preferred	2	◒
Least Preferred	1	○

Each evaluated criterion was assigned a weighting based on importance which factors into the overall score of each evaluated alternative. The alternative with the highest score is identified as the most preferred alternative and the alternatives with lower scores are identified as preferred, not preferred, least preferred or not carried forward, respectively.

### 5.4.1 Bridge Alternative Solutions Evaluation

The evaluation of alternatives has been captured in a matrix format to allow for direct comparison between the alternative solutions. Refer to Table 5-4 for the bridge replacement alternative solutions evaluation. Based on findings from the analysis and evaluation of alternatives using the criteria listed above, Alternative 3: Replace with a New Superstructure and Substructure has been identified as the preferred alternative solution.

A summary of the evaluation of alternative solutions are as follows:

*Do Nothing* – The structural deficiencies of the bridge structure would remain and continue to deteriorate leading to increased maintenance and future construction costs as well as potential impacts on traffic and local businesses. This alternative is not recommended.

*Replace Superstructure Utilizing Existing Piers* – The new superstructure would address many of the structural deficiencies and could accommodate all modes of transportation without major construction works to the substructure. By utilizing the substructure no hydraulic changes would be required, and the soffit of the bridge would remain unchanged. However, the risks associated with utilizing the substructure below the waterline are unknown and would require further investigation. This alternative is not recommended.

*Replace with New Superstructure and Substructure* – A new superstructure and substructure would address all the structural deficiencies and could accommodate all modes of transportation. The hydraulic capacity could be improved by reducing the number of piers, however significant water works would be required to remove and reconstruct the piers. This alternative is recommended to be carried forward.

*Replace with New Single Span Structure* – A new single span superstructure would address all the structural deficiencies and could accommodate all modes of transportation. The new bridge would result in significant impact to the roadway requiring property acquisition and the inclusion of retaining walls to address grade changes. The hydraulic capacity could be improved by eliminating the existing piers, however significant water works would be required to remove the existing piers down to the riverbed. This alternative is not recommended.

Table 5-4: Bridge Replacement Alternative Solutions Evaluation

Weight	Evaluation Criteria	Alternative 1: Do Nothing	Alternative 2: Replace superstructure utilizing existing piers	Alternative 3: Replace with new superstructure and substructure	Alternative 4: Replace with new single span structure
10%	Transportation	○ <ul style="list-style-type: none"> <li>Continued deterioration</li> <li>Lack of delineated cycle facilities</li> </ul>	● <ul style="list-style-type: none"> <li>New cross-section accommodates all modes of transportation</li> <li>Negligible impact on road geometrics</li> </ul>	● <ul style="list-style-type: none"> <li>New cross-section accommodates all modes of transportation</li> <li>Negligible impact on road geometrics</li> </ul>	◐ <ul style="list-style-type: none"> <li>New cross-section accommodates all modes of transportation</li> <li>Impact on road vertical profile</li> </ul>
35%	Technical	○ <ul style="list-style-type: none"> <li>Structural issues not addressed</li> <li>Bridge would continue to deteriorate</li> </ul>	◐ <ul style="list-style-type: none"> <li>Risk associated with utilizing the existing substructure as condition below waterline unknown</li> <li>Staged construction with occasional night closures</li> <li>6 to 8 months construction period (assuming cutting piers to sheet pile)</li> <li>Negligible hydraulic change</li> <li>Maintain soffit elevation</li> </ul>	● <ul style="list-style-type: none"> <li>No risk associated with utilizing existing structure(s)</li> <li>Full closure with detour would be required</li> <li>~10 month construction period</li> <li>In-water works required for complex removal of piers to river bed</li> <li>Hydraulic capacity would be improved with reduced number of piers</li> <li>Soffit elevation lower (minor)</li> </ul>	◐ <ul style="list-style-type: none"> <li>Full closure with detour would be required</li> <li>~8 month construction period</li> <li>In-water works required for complex removal of piers to river bed</li> <li>Hydraulic capacity would be improved with no piers within watercourse</li> <li>Soffit elevation lower due to increased superstructure depth</li> <li>Ideal for long-term maintenance as no in-water works would be required</li> <li>Complex launching sequence required (pre-qualify contractors recommended)</li> </ul>
15%	Natural Environment	● <ul style="list-style-type: none"> <li>No impacts to surrounding environmental features</li> </ul>	◐ <ul style="list-style-type: none"> <li>Minor in-water works for abutments</li> <li>Recommended in-water investigation of substructure</li> </ul>	◐ <ul style="list-style-type: none"> <li>Significant in-water works required for pier and abutment removal and construction</li> <li>Reduced number of piers would improve river hydraulics and natural environment footprint</li> </ul>	◐ <ul style="list-style-type: none"> <li>Significant in-water works required for pier and abutment removal and abutment construction</li> <li>Improves long term ecological footprint with no piers within watercourse</li> <li>Improves hydraulics of watercourse with no piers</li> </ul>
10%	Socio-economic Environment	◐ <ul style="list-style-type: none"> <li>Continued deterioration of the bridge may lead to impacts on traffic and local businesses</li> <li>No direct impact on private property</li> </ul>	● <ul style="list-style-type: none"> <li>Bridge would maintain same footprint with all works within existing ROW</li> <li>No property required</li> <li>Staging construction would maintain traffic flow - one-direction</li> <li>Completed in one construction season</li> </ul>	◐ <ul style="list-style-type: none"> <li>All works would be within existing ROW</li> <li>No property required</li> <li>Full closure with detour will be required - impact to local traffic and residents/businesses</li> <li>Completed in one full construction season</li> </ul>	○ <ul style="list-style-type: none"> <li>Full closure with detour will be required - impact to local traffic and residents/businesses</li> <li>Completed in one construction season</li> <li>Possible property acquisition to address elevation changes of road vertical profile</li> </ul>
10%	Cultural Environment	●	●	● <ul style="list-style-type: none"> <li>No impacts</li> </ul>	●
20%	Financial	◐ <ul style="list-style-type: none"> <li>Deteriorating bridge structure would result in increased maintenance and future reconstruction costs</li> </ul>	● <ul style="list-style-type: none"> <li>Approximate capital cost \$3.5M</li> </ul>	◐ <ul style="list-style-type: none"> <li>Approximate capital cost \$5.0M (number of piers will impact cost)</li> </ul>	◐ <ul style="list-style-type: none"> <li>Approximate capital cost \$6.0M (additional costs associated with property acquisition)</li> </ul>
<b>OVERALL</b>		58 <b>NOT PREFERRED</b>	76 <b>PREFERRED</b>	83 <b>MOST PREFERRED</b>	60 <b>LEAST PREFERRED</b>

## 5.4.2 Transmission Watermain Crossing Evaluation

Refer to Table 5-5 for the watermain crossing alternative solutions evaluation. Based on findings from the analysis and evaluation of alternatives using the criteria listed above, Alternative 3: Support the Watermain from the Regional Road 50 (Niagara Street) Bridge has been identified as the preferred alternative solution.

A summary of the evaluation of alternative solutions are as follows:

*Trenchless Crossing* – Trenchless crossing would involve the most complex construction works, would involve property easements and likely impact vegetation and recreational space. Maintenance would be difficult due to the inaccessibility of the watermain after installation and soil conditions may not be suitable for trenchless installation due to the fill from the canal. This alternative is not recommended.

*Independent Pipe Bridge* – An independent pipe bridge can positively impact the community with the option to make it a pedestrian bridge and its prefab design would require less involvement than other options. However, easements would be required as the bridge would not be within the Region right-of-way and pipe heat tracing and insulation would be needed. Additionally, construction within park areas will negatively impact the public. This alternative is not recommended.

*Support the Watermain from the Regional Road 50 (Niagara Street) Bridge* – Supporting the watermain from the bridge would not require any easements as the watermain would be entirely within the Region right-of-way. However, pipe heat tracing and insulation would be needed in addition to stainless steel piping. The watermain would pose little maintenance accessibility issues but would be vulnerable to vandalism. This alternative is recommended to be carried forward.

*Install Watermain inside the Steel Tub Girder Bridge* – This option is only viable if a single span bridge with girders is chosen (bridge replacement Alternative 4). Due to Alternative 4 not being selected as the preferred solution for the bridge replacement, this alternative is not being carried forward.

Table 5-5: Transmission Watermain Crossing Alternative Solutions Evaluation

Weight	Evaluation Criteria	Alternative 1: Trenchless Crossing	Alternative 2: Independent Pipe Bridge	Alternative 3: Support watermain from Niagara Street bridge	Alternative 4: Install watermain inside steel tub girder bridge
40%	Technical	 <ul style="list-style-type: none"> <li>• Soil conditions likely not conducive to trenchless installation due to fill from canals (TBD by geotech)</li> <li>• HDD installation considerations include bending radius and significant lay-down area required</li> <li>• Micro tunneling considerations include casing size (likely 1200mm diameter), depth of shafts, depth of cover under Welland River (~3m);                             <ul style="list-style-type: none"> <li>• Maintenance issues due to inaccessibility of watermain</li> </ul> </li> <li>• Longest and most complex construction period</li> </ul>	 <ul style="list-style-type: none"> <li>• Soil conditions will require extra consideration for foundation/piles design for bridge</li> <li>• Pre-fab design would require less installation time for bridge structure</li> <li>• Heat tracing and insulation and associated power would be required                             <ul style="list-style-type: none"> <li>• ~2 months construction - independent of bridge construction</li> </ul> </li> <li>• Access for maintenance needs to be considered                             <ul style="list-style-type: none"> <li>• Susceptible to freezing and vandalism</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>• Heat tracing, insulation would be required</li> <li>• Watermain on bridge may interfere with future bridge maintenance and rehabilitation                             <ul style="list-style-type: none"> <li>• Stainless steel pipe would be required</li> </ul> </li> <li>• Minor accessibility issues for maintenance                             <ul style="list-style-type: none"> <li>• Susceptible to freezing and vandalism</li> </ul> </li> <li>• 1-2 months construction which would proceed after bridge construction</li> </ul>	<ul style="list-style-type: none"> <li>• This alternative is only viable if single-span bridge with girders (Bridge Alternative #4) is chosen as preferred alternative for bridge replacement</li> <li>• Since Bridge Alternative #4 will not be pursued this Watermain Alternative is not carried forward due to feasibility</li> </ul>
20%	Natural Environment	 <ul style="list-style-type: none"> <li>• Impacts to vegetation depending on alignment and work area required for trenchless installation                             <ul style="list-style-type: none"> <li>• Restore/enhance post construction</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>• Impacts to vegetation due to works within park/natural areas                             <ul style="list-style-type: none"> <li>• Restore/enhance post construction</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>• No impacts to natural environment due to watermain installation</li> <li>• Any impacts would be associated with replacement of Niagara Street bridge</li> </ul>	
10%	Socio-economic Environment	 <ul style="list-style-type: none"> <li>• Will require property easements</li> <li>• Potential full road closure to complete connections                             <ul style="list-style-type: none"> <li>• Construction within park areas will impact recreational users</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>• Property easement required as pipe bridge would be outside of Region ROW                             <ul style="list-style-type: none"> <li>• Potential full road closure to complete connections</li> </ul> </li> <li>• Construction within park areas will impact recreational users</li> <li>• Potential to improve active transportation facilities within area if make bridge a pedestrian bridge</li> <li>• Opportunity to transfer utilities to pipe bridge and off Niagara Street bridge</li> </ul>	 <ul style="list-style-type: none"> <li>• All work would be completed within ROW, no property required</li> <li>• Watermain installation proceeds after bridge construction</li> <li>• Potential full road closure to complete connections</li> </ul>	
10%	Cultural Environment		 <ul style="list-style-type: none"> <li>• No impacts</li> </ul>		
20%	Financial	 <ul style="list-style-type: none"> <li>• ~80m trenchless installation</li> <li>• Microtunnel installation ~\$1.5M</li> <li>• HDD installation ~\$500K</li> </ul>	 <ul style="list-style-type: none"> <li>• ~70m bridge length</li> <li>• \$575K</li> </ul>	 <ul style="list-style-type: none"> <li>• ~80m installation</li> <li>• \$300K</li> </ul>	
OVERALL		38 LEAST PREFERRED	60 NOT PREFERRED	90 MOST PREFERRED	NOT CARRIED FORWARD

## PHASE III: IDENTIFICATION & EVALUATION OF ALTERNATIVE DESIGN CONCEPTS

### 6 ALTERNATIVE DESIGN CONCEPTS

#### 6.1 Identification of Alternative Design Concepts – Bridge Replacement

As a Schedule 'C' MCEA undertaking alternative design concepts of the preferred solution addressing the Problem Statement shall be developed, evaluated and presented. As identified in Section 5.1, the preferred solution for the bridge replacement is Alternative 3: Replace with a New Superstructure and Substructure. Therefore, three (3) alternative design concepts to implement the preferred solution were considered including: 1) Two-span steel I-girder bridge, 2) Two-span pre-stressed concrete girder bridge, and 3) Three-span pre-stressed concrete girder bridge. These alternative design concepts are discussed and evaluated in the following sections.

##### 6.1.1 Option 1: Two-Span Steel I-Girder Bridge

This alternative design concept involves replacing the existing bridge (both the superstructure and substructure) with a two-span, steel I-girder bridge. The bridge would have a 14.8m wide cross-section that would include two (2) 1.8m asphalt bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The existing piers would be removed to the riverbed and replaced with one (1) concrete pier. The abutment walls would be rebuilt due to the existing deterioration. The new superstructure would be constructed with steel I-girders and a concrete deck (225mm depth) with an asphalt surface. Figure 6-1 illustrates the proposed cross section while Figure 6-2 illustrates the bridge elevation for Option 1.

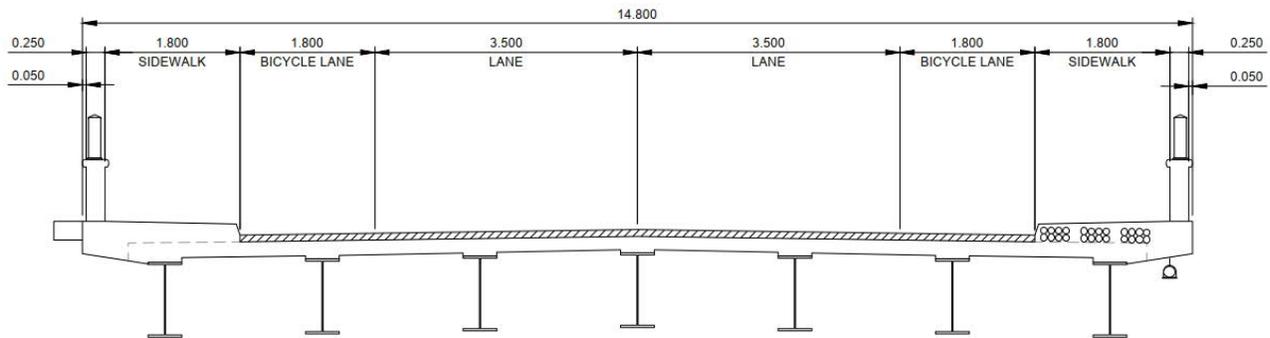


Figure 6-1: Cross Section for Alternative Design Concept 1

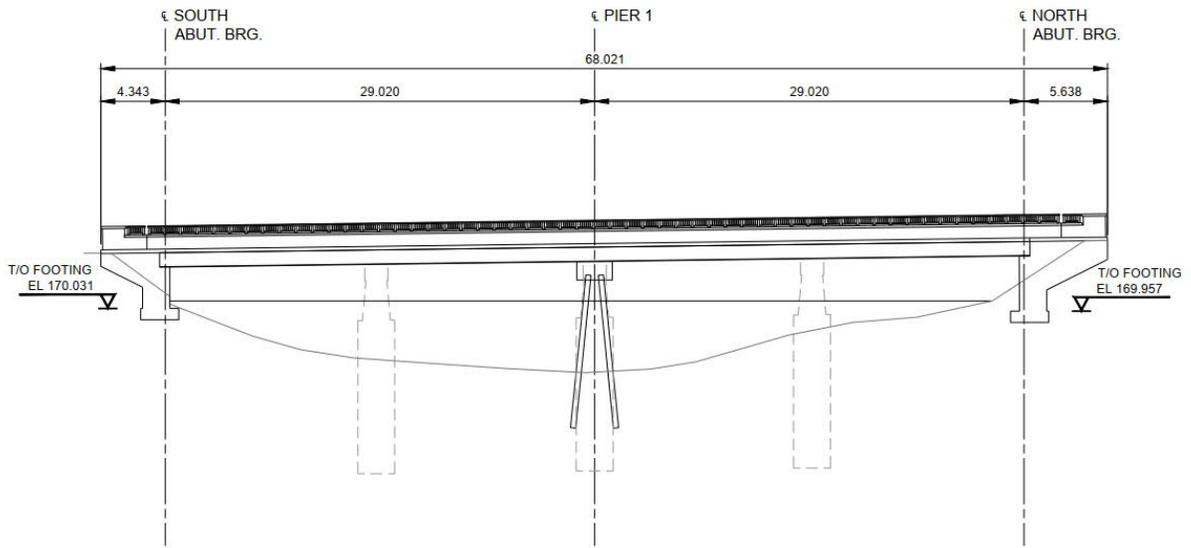


Figure 6-2: Proposed Elevation for Alternative Design Concept 1

### 6.1.2 Option 2: Two-Span Pre-Stressed Concrete Girder Bridge

This alternative design concept involves replacing the existing bridge (both the superstructure and substructure) with a two-span pre-stressed concrete girder bridge. The bridge would have a 14.8m wide cross-section that would include two (2) 3.5m travel lanes, two (2) 1.8m asphalt bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The existing piers would be removed to riverbed and replaced with one (1) new concrete pier. The abutment walls would be rebuilt due to the existing deterioration. The new superstructure would be constructed with pre-stressed concrete girders (CPC1 1400) and a concrete deck (225mm depth) with an asphalt surface. Figure 6-3 illustrates the proposed cross section while Figure 6-4 illustrates the bridge elevation for Option 2.

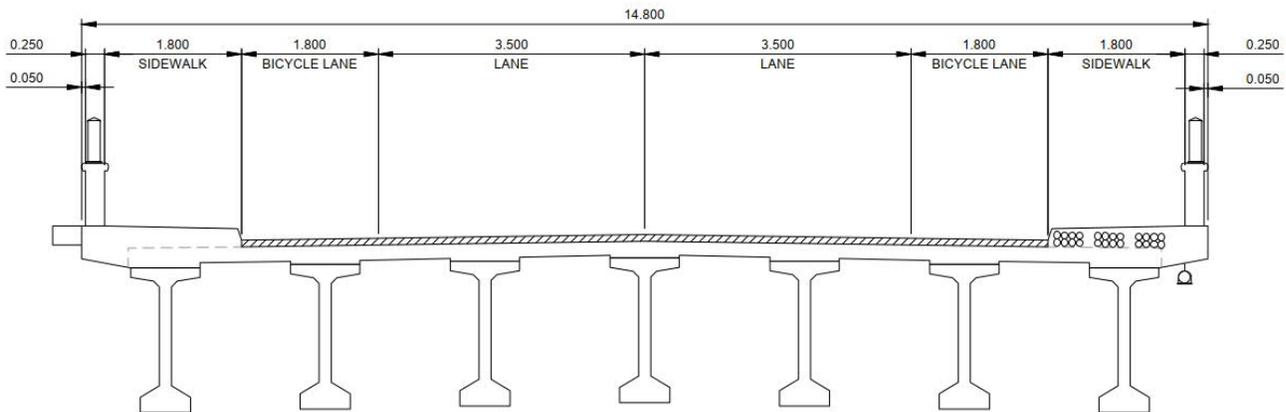


Figure 6-3: Cross Section for Alternative Design Concept 2

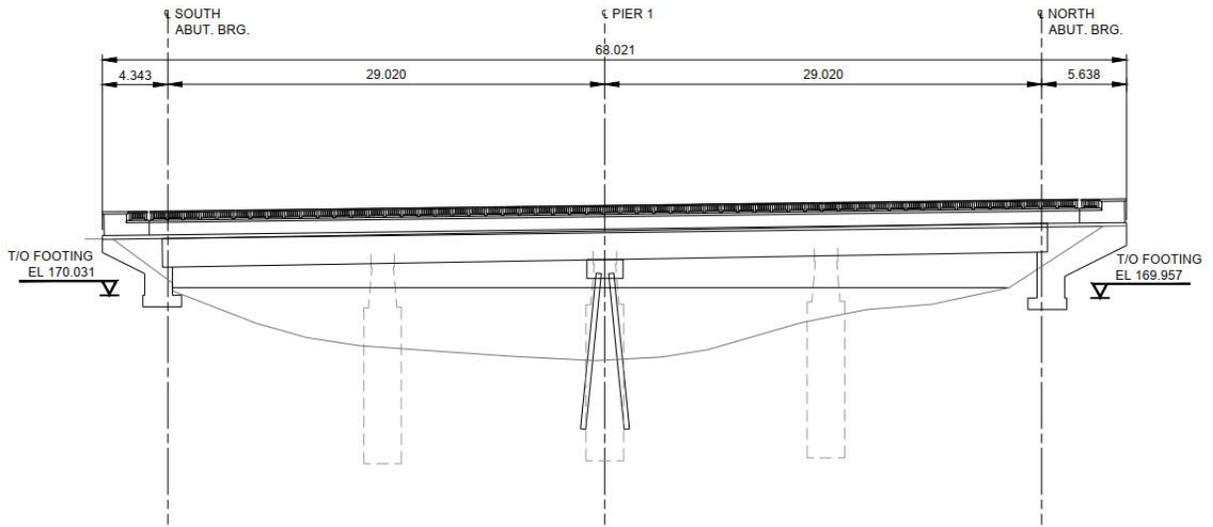


Figure 6-4: Proposed Elevation for Alternative Design Concept 2

### 6.1.3 Option 3: Three-Span Pre-Stressed Concrete Girder Bridge

This alternative design concept involves replacing the existing bridge (both the superstructure and substructure) with a three-span pre-stressed concrete girder bridge. The bridge would have a 14.8m wide cross-section that would include two (2) 3.5m travel lanes, two (2) 1.8m asphalt bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The existing piers would be removed to riverbed and replaced with two (2) new concrete piers. The abutment walls would be rebuilt due to the existing deterioration. The new superstructure would be constructed with pre-stressed concrete girders (CPCI 900) and a concrete deck (225mm depth) with an asphalt surface. Figure 6-5 illustrates the proposed cross section while Figure 6-6 illustrates the bridge elevation for Option 3.

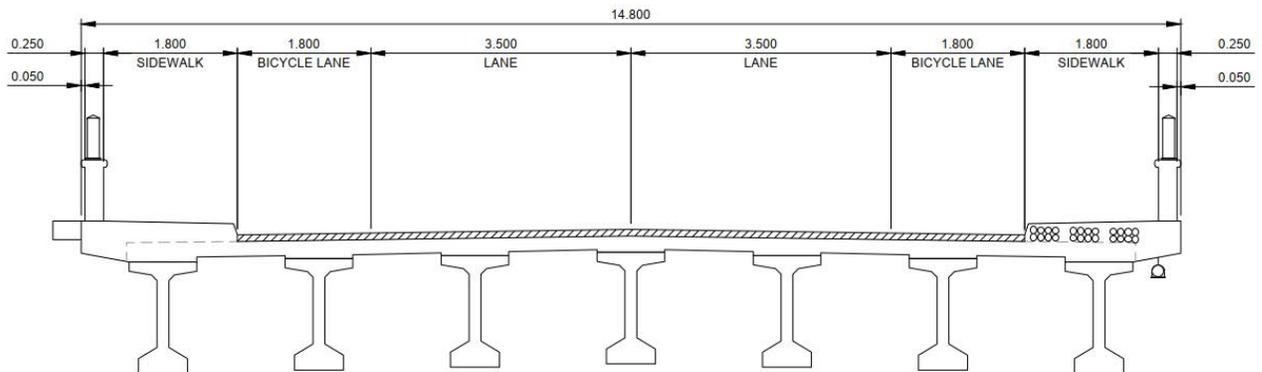


Figure 6-5: Cross Section for Alternative Design Concept 3

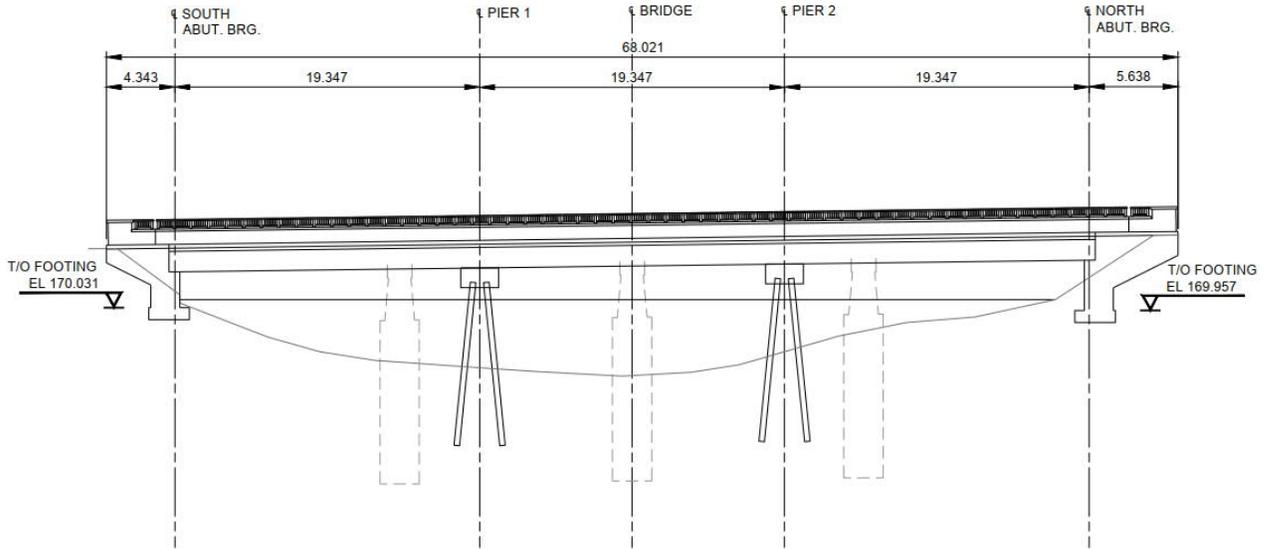


Figure 6-6: Proposed Elevation for Alternative Design Concept 3

## 6.2 Identification of Alternative Design Concepts – Watermain Crossing

As determined during Phase 2 of the MCEA process, the new 600mm diameter watermain crossing will be supported from the Regional Road 50 (Niagara Street) bridge structure after replacement. Key considerations in design will include protection of the crossing from freezing and vandalism.

No further design options were developed for the watermain crossing as part of the MCEA study. Design details will be confirmed during implementation of the preferred solution (detailed design and construction).

## 6.3 Evaluation Criteria

The following categories of evaluation criteria, representing a range of issues, were considered in the evaluation of the bridge replacement alternative design concepts. The evaluation criteria and their respective considerations were finalized based on input received from affected agencies, stakeholders, the public and Region staff. The criteria that was used to evaluate the bridge replacement alternative design concepts are summarized in Table 6-1 with no order of preference or implied importance.

Table 6-1: Bridge Replacement Alternative Design Concepts Evaluation Criteria

Evaluation Criteria	Considerations
Natural Environment	<ul style="list-style-type: none"> <li>• Direct and indirect impacts on the existing vegetation, water quality, watercourse, and fisheries/wildlife habitat</li> <li>• Hydraulic impact on Welland River</li> <li>• Consideration for temporary impact to natural environment due to construction</li> <li>• Consideration for long-term/permanent impact to environment due to new structure</li> </ul>

Evaluation Criteria	Considerations
Technical – Design Features	<ul style="list-style-type: none"> <li>• Ability to address structural requirements</li> <li>• Consideration for structural sustainability</li> <li>• Consideration for ease of access to complete future bridge inspections</li> <li>• Consideration for future maintenance needs</li> </ul>
Technical – Construction	<ul style="list-style-type: none"> <li>• Consideration for length of time to complete construction</li> <li>• Constructability – consideration for the complexity or ease of the construction process</li> <li>• Consideration for any special equipment required to complete the construction</li> </ul>
Aesthetics	<ul style="list-style-type: none"> <li>• Consideration for how visually appealing the alternative is</li> </ul>
Cost	<ul style="list-style-type: none"> <li>• Construction cost</li> </ul>

All factors relating to socio-economic and cultural environment were evaluated as part of Phase 2 of the MCEA process (refer to Section 5.4 for more details).

A comparative evaluation of the alternative design concepts was undertaken to determine the overall positive and negative attributes of each design concept for the bridge replacement. In comparing the alternative solutions, it is recognized that more than one of the potential solutions may resolve more than one problem and the feasibility of an alternative design will depend, in part, on a range of factors (criteria) including but not limited to the nature and location of the transportation system, the nature and location of the problem, and comparative costing of the alternative designs.

## 6.4 Summary of Evaluation Process

A similar method as that described in Section 5.4 was used to evaluate each alternative design concept.

The evaluation of alternative design concepts has been captured in a matrix format to allow for direct comparison between the alternative design concepts. Refer to Table 6-2 for the bridge replacement alternative design concepts evaluation. Based on findings from the analysis and evaluation of alternatives using the criteria listed above, Alternative 1: Two-Span Steel I-Girder Bridge has been identified as the preferred alternative design.

A summary of the evaluation of alternative design concepts are as follows:

All solutions presented will require significant in-water works for removal and construction of abutments and piers and will most likely require a barge for these works. The reduced number of piers from the existing structure to the new structure will improve the river hydraulics and the natural environmental footprint.

*Two-Span Steel I-Girder Bridge* – Steel girders are less expensive to deliver and less complex to erect. However, they are also less durable meaning more maintenance may be required. The proposed construction schedule is less than a year for this type of bridge and the proposed construction cost is the lowest of the three alternatives. This alternative is recommended to be carried forward.

*Two-Span Pre-Stressed Concrete Girder Bridge* – CPCI girders are more durable, which means less maintenance is required; however, they are more expensive to deliver and more complex to erect as they are heavier than steel girders. The proposed construction schedule is less than a year. This alternative is not recommended.

*Three-Span Pre-Stressed Concrete Girder Bridge* – Since this alternative has two piers, it will require the most substantial and complex in-water works. However, having three spans will allow for the shallowest girder depths, which minimizes the impact to the hydraulic opening. CPCI girders are more durable, which means less maintenance is required; however, they are more expensive to deliver and more complex to erect. Additional inspection effort will be required due to having a second pier. The proposed construction schedule is the longest of the three alternatives, meaning it will provide the longest disruption to traffic patterns. This alternative is not recommended.

Table 6-2: Bridge Replacement Alternative Design Concepts Evaluation

Weight	Evaluation Criteria	Alternative 1: Two Span Steel I-Girder Bridge			Alternative 2: Two Span Pre-Stressed Concrete Girder Bridge			Alternative 3: Three Span Pre-Stressed Concrete Girder Bridge		
15%	Environment	 <ul style="list-style-type: none"> <li>Significant in-water works for removal and construction of abutments and pier</li> <li>Reduced number of piers from existing structure will improve river hydraulics and natural environment footprint</li> <li>Two spans allow the girder depth to be small enough to not significantly impact the hydraulic opening</li> </ul>			 <ul style="list-style-type: none"> <li>Significant in-water works for removal and construction of abutments and pier</li> <li>Reduced number of piers from existing structure will improve river hydraulics and natural environment footprint</li> <li>Two spans allow the girder depth to be small enough to not significantly impact the hydraulic opening</li> </ul>			 <ul style="list-style-type: none"> <li>Most substantial in-water works for removal and construction of abutments and piers</li> <li>Reduced number of piers from existing structure will improve river hydraulics and natural environment footprint</li> <li>Three spans allows the shallowest girder depths, minimizing the impact to the hydraulic opening</li> </ul>		
25%	Technical - Design Features	 <ul style="list-style-type: none"> <li>Steel girders less durable meaning more maintenance will be required</li> <li>Steel girders provide inspectability of girders and soffit</li> </ul>			 <ul style="list-style-type: none"> <li>CPCI girders more durable meaning less maintenance will be required</li> <li>CPCI girders provide inspectability of girders and soffit</li> </ul>			 <ul style="list-style-type: none"> <li>CPCI girders more durable meaning less maintenance will be required</li> <li>CPCI girders provide inspectability of girders and soffit</li> <li>Additional inspection effort will be required due to having a second pier in water</li> </ul>		
25%	Technical - Construction	 <ul style="list-style-type: none"> <li>Delivery and erection of girders less expensive and complex as they are lighter than concrete girders</li> <li>Approx. 10 month construction schedule</li> <li>Barge may be required for in-water works</li> </ul>			 <ul style="list-style-type: none"> <li>Delivery and erection of girders more expensive and complex as concrete girders are heavier than steel</li> <li>Approx. 10 month construction schedule</li> <li>Barge may be required for in-water works</li> </ul>			 <ul style="list-style-type: none"> <li>Delivery and erection of girders more expensive and complex as concrete girders are heavier than steel, however girders are lighter than Alternative 2 due to shorter span</li> <li>Approx. 12 month construction schedule</li> <li>Barge may be required for in-water works</li> <li>More complex construction due to increased in-water works for second pier</li> </ul>		
10%	Aesthetics	 <ul style="list-style-type: none"> <li>Steel girders provide standard bridge appeal, one pier allows for minimized disruption to natural environment aesthetic</li> </ul>			 <ul style="list-style-type: none"> <li>Concrete girders provide standard bridge appeal, one pier allows for minimized disruption to natural environment aesthetic</li> </ul>			 <ul style="list-style-type: none"> <li>Concrete girders provide standard bridge appeal, two pier causes more disruption to natural environmental aesthetic</li> </ul>		
25%	Cost	 <p>Construction: \$3.7M</p>			 <p>Construction: \$4.0M</p>			 <p>Construction: \$4.4M</p>		
<b>OVERALL</b>		<b>MOST PREFERRED</b>			<b>NOT PREFERRED</b>			<b>LEAST PREFERRED</b>		
		80			70			45		

## 7 IMPLEMENTATION OF THE PREFERRED DESIGN

### 7.1 Major Features of Preferred Design

Considering the feedback received from the public and stakeholders during the MCEA study and the evaluation of the alternative solutions and bridge design options, the preferred design that will be implemented for the Regional Road 50 (Niagara Street) Bridge replacement will be a new two-span steel I-girder bridge with a cross-section that includes bicycle lanes and sidewalks. The transmission watermain will be extended from the north side to the south side of the Welland River by being supported off of the new bridge structure.

#### 7.1.1 Bridge Structure

The existing bridge structure will be completely removed, including the superstructure (deck and girders) and substructure (piers and abutment walls). The new bridge will be designed to meet current bridge standards as per the Canadian Highway Bridge Design Code (CHBDC), Ministry of Transportation Ontario (MTO) Structural Manual and requirements of the Niagara Region.

The new bridge structure will be a two-span structure with an overall length of 68m maintaining the horizontal alignment of the existing structure. The new bridge superstructure will consist of fourteen (14) 1000mm deep steel I-girders, with a cast-in-place concrete deck (225mm thick) and asphalt surface (90mm thick). The overall width of the bridge will be 14.8m to accommodate the preferred cross-section of two (2) 3.5m travel lanes, two (2) 1.8m wide bicycle lanes, and two (2) 1.8m wide concrete sidewalks. The bridge will also be complete with 0.85m high decorative concrete barrier wall with hand railing (total barrier height of 1.37m) on either side in accordance with safety standards.

The bridge abutment walls will be replaced. Based on the Geotechnical Report completed by GeoPro (provided as Appendix C), the bridge abutments will be supported by driven steel H piles, founded in the competent very dense sand/shale complex or limy shale to shaly limestone and limestone bedrock. Pile installation will be completed in accordance with OPSS 903, April 2016. The existing piers would be removed to the riverbed and replaced with one (1) concrete pier installed with steel tube piles.

A preliminary general arrangement drawing of the preferred bridge design is provided in Appendix H. During the detailed design stage, the final details regarding the replacement structure will be developed including foundation details, drainage details and additional safety requirements in accordance with CHBDC, MTO and Region requirements.

#### 7.1.2 Watermain Crossing

A 600mm diameter pressurized watermain crossing will be supported from the new Regional Road 50 (Niagara Street) bridge structure using pipe hangers, similar to those illustrated in Figure 7-1. It is anticipated that the exposed portions of watermain will be stainless steel and will require insulation to prevent freezing. During detail design, considerations to protect the watermain crossing from freezing and vandalism will be finalized.

Connection locations for the new 600mm diameter transmission main will be (refer to Figure 7-2): 1) north of Welland River on Regional Road 50 at the existing 600mm diameter PVC stub south of existing valve chamber at Riverbank Street and Regional Road 50 (Figure 7-3), and 2) south of Welland River on Regional Road 50 at the existing 600mm diameter CPP main at the existing valve chamber at Mill Street and Regional Road 50.



Figure 7-1: Watermain Pipe Hanger

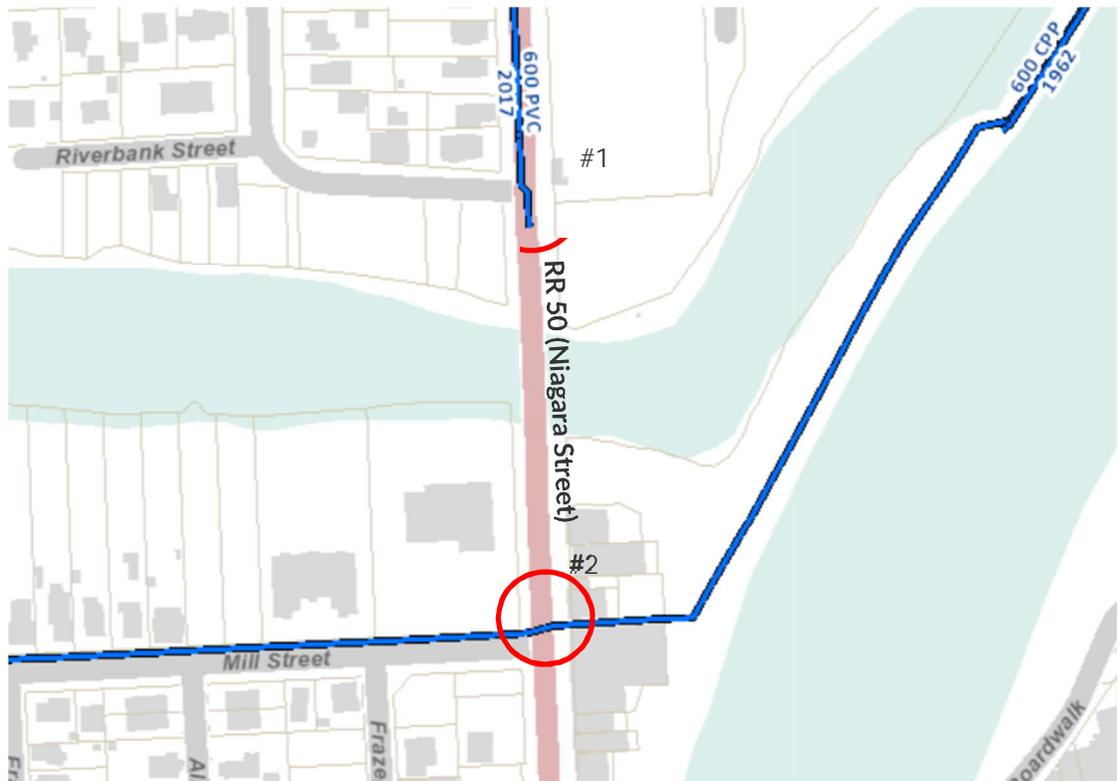


Figure 7-2: Proposed Connection Locations for Transmission Watermain

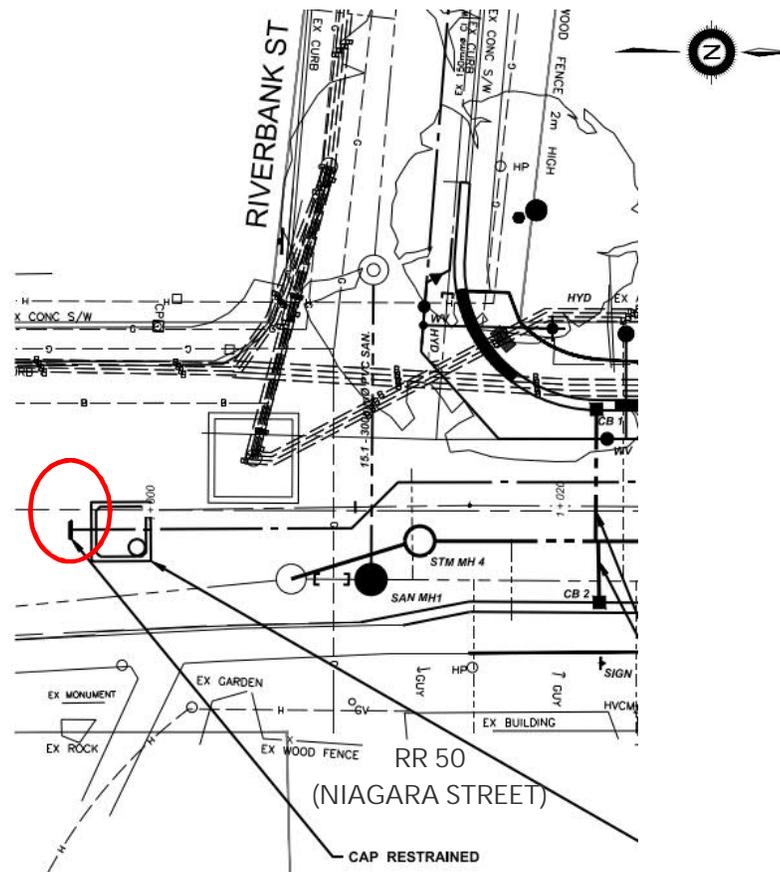


Figure 7-3: Existing Transmission Watermain Stub (North of Welland River)

### 7.1.3 Utilities and Services

Existing utilities and municipal services were identified within the Study Area as discussed in Section 4.2. Consultation with the City of Welland will occur during detailed design to determine the need to upgrade existing municipal underground infrastructure within the area during construction of the bridge replacement and watermain extension. The City has indicated they have planned infrastructure upgrades directly south of the project area on Niagara Street including the replacement of underground infrastructure and roadway (Niagara Street bridge to West Main Street). All asset replacement in this area should be coordinated with the Region and combined into one construction tender to minimize costs and construction impacts to area residents and businesses.

Coordination will also be necessary throughout detailed design and construction with all affected utilities to confirm conflicts, relocations and/or proximity guidelines. Based on information provided by utilities during the MCEA study, consultation completed and identification of proposed works, it is anticipated that the following impacts to utilities will need to be addressed:

- Existing Enbridge gas main currently supported on the Regional Road 50 (Niagara Street) bridge structure will be relocated prior to bridge demolition;

- Existing bell ducts embedded in the existing bridge structure sidewalk will need to be temporarily supported during demolition of the bridge and embedded into the new bridge structure; and
- Shared utilities on hydro poles located on the existing bridge structure will need to be temporarily supported during demolition of the bridge and relocated on new poles located on the new bridge structure.

#### Enbridge Gas

Niagara Region and AE have consulted with Enbridge Gas throughout the MCEA process to discuss gas infrastructure and relocation plans. The preferred design concept of the bridge replacement was provided to Enbridge Gas for their consideration when preparing for their infrastructure relocation. The existing 6" gas main on the existing bridge will be abandoned prior to the start of bridge construction. Enbridge is proposing to install a new 6" steel gas main to the west of the proposed bridge structure in 2022, that will be tunneled below the Welland River. Coordination with Enbridge Gas will continue to occur outside of the MCEA during the detailed design of the bridge replacement.

#### Bell

Niagara Region and AE have consulted with Bell throughout the MCEA process to confirm infrastructure and discuss relocation plans. The preferred design concept of the bridge replacement was provided to Bell for their consideration when preparing for their infrastructure relocation.

Prior to construction of the proposed bridge structure, Bell will provide a temporary aerial line to replace the existing copper and fibre lines that are encased in concrete ducts within the west sidewalk on the existing bridge. During construction, the Contractor will install new ducts within the proposed bridge structure to house new copper and fibre lines. During detailed design, coordination will continue to occur between Bell and Niagara Region regarding the temporary relocation and future placement of Bell's infrastructure.

### 7.1.4 Property Requirements

Property acquisition is not anticipated for the replacement of the Regional Road 50 (Niagara Street) bridge structure or transmission watermain extension. All proposed permanent works are anticipated to fit within the existing Regional right-of-way. Temporary easements may be required to facilitate temporary utility relocations; however, this will be confirmed during detailed design.

## 7.2 Construction Approach

The preferred construction approach is to have a full closure of Regional Road 50 (Niagara Street) at the Welland River for ease of bridge demolition and construction, as well as the cost implication and additional construction duration associated with a staged construction approach. However, the final construction approach will be confirmed during detailed design, including coordination with the City of Welland, which has requested for one (1) lane of traffic to be maintained.

A full closure of Regional Road 50 (Niagara Street) at the Welland River would require a signed detour using regional roads. The proposed detour would be approximately 7km in length and would use Main Street West (RR 27), Prince Charles Drive North (RR 54), and Woodlawn Road (RR 41). Through consultation with the City of Welland, a local detour using First Avenue and/or Thorold Road will be discussed to reduce the length of detour for local traffic, excluding truck traffic. Localized pedestrian and cyclist detours would be provided, as well as planned local detours for emergency services (EMS, Fire, Police) and transit services. The existing structure would be demolished at one time and the new bridge structure would then be constructed. It is estimated that with a full closure construction would span one (1) construction season, taking approximately ten (10) months to complete.

The construction approach will be confirmed and finalized during detailed design. Detours for vehicular, pedestrian and cyclist traffic will be developed and finalized during detailed design. Consultation with the City of Welland, emergency services and transit providers to identify impacts and confirm alternative routes will occur during detailed design.

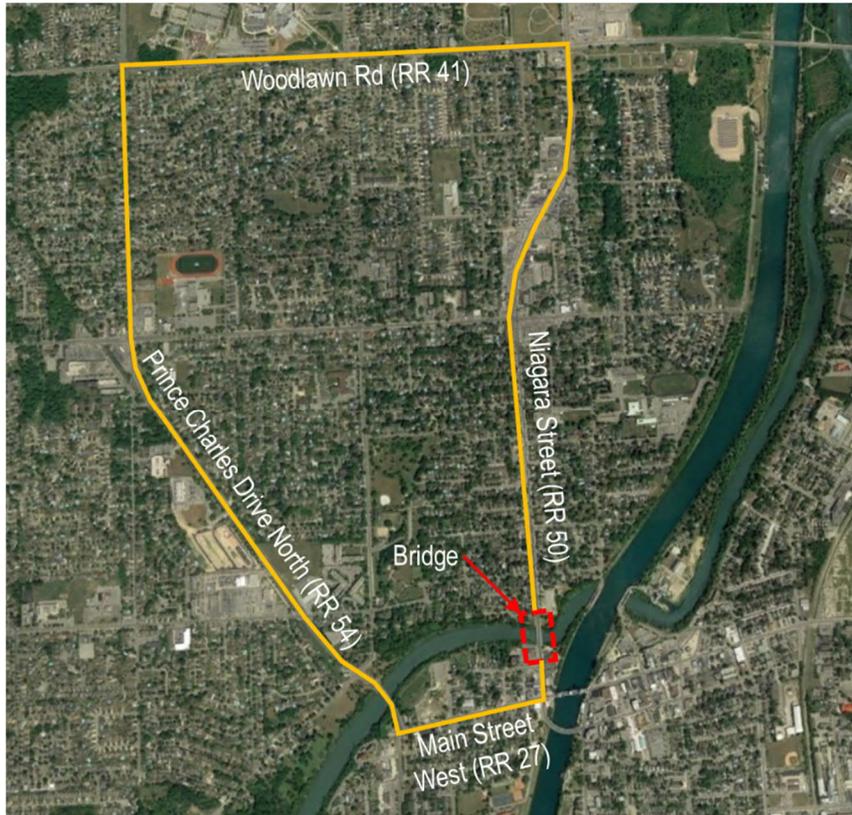


Figure 7-4: Proposed Construction Detour

### 7.3 Proposed Construction Schedule and Cost Estimate

Upon completion of the MCEA study, the following schedule has been identified:

- Detailed Design – 2022
- Utility Relocations – 2022 & 2023
- Start of Construction – 2024
- Completion of Construction – 2024 /2025

The preliminary cost estimate to implement the preferred design concept is \$4.4 million. This estimate includes all necessary bridge work, watermain work, and miscellaneous costs; however, this estimate excludes any property impacts and utility relocation costs. A cost breakdown can be found in Appendix I.

## 8 POTENTIAL ENVIRONMENTAL IMPACTS & PROPOSED MITIGATION MEASURES

This section describes the potential effects on the environment (both positive and negative) as a result of the undertaking and the mitigation measures and commitments made to either minimize or offset these effects. The actions taken to reduce the effects of the undertaking on the environment are referred to as 'Mitigation Measures'.

### 8.1 Transportation

The proposed bridge replacement supports the transportation goals and objectives of the Niagara Region's Transportation Master Plan. The upgraded cross-section, with the addition of two (2) 1.8m wide bicycle lanes and replacement of two (2) 1.8m wide sidewalks will improve safety for pedestrians and cyclists.

During construction, there will be numerous transportation impacts including traffic delays, detours, short-term obstruction of entrances/driveways, disruption of pedestrian/cyclist movements, and infiltration of traffic into surrounding neighbourhoods due to construction delays and/or detours. To help alleviate these impacts the following mitigation measures are proposed:

- Prepare Construction Phasing Plan and Detour Plan during detailed design to be included in contract package;
- Ensure successful contractor develops a Traffic Management Plan including adequately signed detour route(s);
- Develop a Communication Plan during detailed design that will be followed during construction identifying who, when and how the public and stakeholders will be notified of road closures and detours, as well as specialty signage in the vicinity of the project area identifying businesses are open and alternate access routes to local businesses;
- Inform property owners adjacent to the project area prior to construction, provide alternative parking when necessary and construct temporary alternative driveway entrances, as necessary;
- Inform local school(s) about construction in advance;
- Consult with school transportation providers and transit providers and inform them of construction phasing and detour routes in advance and throughout construction;
- Consult with emergency service providers and inform them of construction phasing and detour routes in advance and throughout construction;
- Provide alternative walkway routes to adjacent residential areas, as necessary; and
- Implement temporary traffic calming measures within surrounding neighbourhoods, as required, to reduce traffic infiltration.

### 8.2 Natural Environment

The proposed bridge replacement will be accommodated within the existing road right-of-way limits which will allow for minimal changes to the current roadway and bridge footprint, thereby minimizing potential long-term impacts to the adjacent properties and natural heritage features. Short term impacts to the natural environment are predominately associated with sedimentation and temporary disruption to the Welland River habitat, temporary impacts to wildlife and their habitats, and tree removal.

The following general mitigation and enhancement measures are provided at this conceptual design stage. Through the finalization of the detailed design and construction, mitigation and protection measures will be confirmed, refined and implemented.

- To minimize the potential for erosion and off-site transport of sediment into the Welland River, the project will implement Best Practices related to erosion and sediment control (ESC). ESC measures used by the contractor on all construction should meet guidelines as outlined in *Erosion and Sediment Control Guideline for Urban Construction* (ESC Guideline), or equivalent standards.
- At minimum, heavy-duty ESC fencing as per OPSD 219.130 is proposed to be installed and maintained around the periphery of the bridge area when cofferdams are not required.
- In certain areas, ESC fencing should be constructed in concert with the wildlife exclusion recommendations made in the Natural Environment Report (Appendix E).
- Where necessary, trees proposed to be retained will be protected by tree protection fencing.
- In the unlikely event that SAR are encountered, work will stop and the MECP will be contacted for direction.
- The protection of fish and mussel habitat during construction works is to be achieved via adherence to timing windows, wildlife relocation, and work isolation and ESC measures during all phases of the construction - related works. All in-water and near-water works should be completed outside the southern regions spring spawning window of March 15 to July 15.
- In order to avoid potential impacts to bat species, all tree removals should be completed outside the bat maternity roost season and hibernation period of April 15 to September 30.
- All exposed and newly constructed surfaces should be stabilized using appropriate means in accordance with the characteristics of the exposed soils. These surfaces should be fully stabilized and re-vegetated as quickly as possible following the completion of the works.
- All activities, including the maintenance of construction machinery, should be controlled to prevent the entry of petroleum products, debris, rubble, concrete or other deleterious substances into the natural environment. Refueling should not occur within 30m of any woodland, wetland or watercourse.

Further details regarding proposed mitigation measures are provided in the Natural Environment Report provided in Appendix E.

### 8.2.1 Air Quality, Dust and Noise

There are no noise sensitive receptors located in close proximity to the study area. There will be construction noise generated during the bridge replacement works due to the required use of heavy machinery and other construction equipment. Measures will be taken to manage construction noise including maintaining equipment to prevent unnecessary noise. Any initial noise complaint will trigger verification that noise control measures are in effect. If persistent noise complaints occur, alternative noise control measures will be considered.

Impacts of air quality during project construction are not considered to be significant. Although dust impacts from heavy construction equipment may impact air quality, this is not a recurring activity as it will be limited to the construction period. Contract provisions will minimize impacts to adjacent properties during construction. Therefore, the impacts from construction on air quality are not considered significant.

Provisions to minimize air quality impacts during construction include removal of construction-caused debris and dust through regular cleaning and maintenance of construction sites and access roads; dust suppression using non-chloride dust suppressants on unpaved roads, subject to the area being free of sensitive plant, water, or other ecosystems that may be affected by dust suppression chemicals; and prompt cleaning of paved streets/roads where tracking of soil, mud or dust has occurred.

### 8.2.2 Surface Water

During construction there is a potential impact to surface water quality due to sedimentation and through the introduction of harmful substances to the storm collection system. To mitigate this construction impact, an erosion and sediment control plan (ESCP) will be developed. This plan will include measures for managing fuel, excess materials, debris, and water flows into and out of the site appropriately.

## 8.3 Socio-Economic and Cultural Environments

The proposed bridge improvement will result in temporary disruption and/or inconvenience to users of adjacent properties. In terms of the existing commercial and residential properties, construction impacts include traffic delays, reduced drive-by traffic volume, and infiltration of traffic into surrounding neighbourhoods due to delays and/or detours. During detailed design detour route(s) will be reviewed and finalized and presented to the public prior to construction.

Methods to mitigate disruptions to property owners will include detailing a construction phasing/detour plan. The plan will consider minimizing periods of disruption to property owners. During construction, local businesses and property owners will be notified well in advance of road closures and detours. Temporary directional signage directing vehicles to businesses in the area will be added at specific locations along the detour routes and along Regional Road 50 (Niagara Street).

### 8.3.1 Archaeological Potential

The existing Study Area does not retain any archeological potential due to the deep and extensive land disturbance and slopes of 20 degrees and greater. It also does not retain any marine archeological potential due to the extensive and intensive disturbance from bridge construction and dredging in the Welland River. Based on this, no further archaeological works need to be completed, no archeological works will be impacted, and measures do not need to be put in place to mitigate potential archeological impacts.

During construction, in the event that archaeological resources or remains are found, alteration of the site must cease immediately and the Archaeology Programs Unit of the MHSTCI and the consultant archaeologist must be notified. The contract for this work should include a provisional item for Archaeological findings and the Contractor must be aware of the protocol to be followed should resources be encountered.

More information is provided in the complete Stage 1 Archaeological Assessment Report in Appendix F.

### 8.3.2 Cultural Heritage Potential

The existing Regional Road 50 (Niagara Street) bridge does not contain any cultural heritage value; however, adjacent Built Heritage Resources (BHRs) within the Study Area may receive indirect impacts meaning that avoidance measures may need to be put in place to mitigate potential heritage impacts.

Where feasible, the final design should be designed to avoid indirect impacts to these potential cultural heritage resources. To ensure the structures on these properties are not adversely impacted, construction and staging in the Regional Road 50 (Niagara Street) right-of-way should be suitably planned to avoid all impacts to these properties. Suitable mitigation measures could include the establishment of no-go zones with fencing and issuing instructions to construction crews to avoid the cultural heritage resources.

Vibration impacts during construction activities may affect BHR 1, BHR 2, BHR 4, and BHR 5 as a result of their location in close proximity to the proposed alignment. To ensure the structures on the properties at 36 Niagara Street (BHR 1), 50-52 Niagara Street (BHR 2), 101 Niagara Street (BHR 4), and 2 Riverbank Street (BHR 5) are not adversely impacted during construction, a baseline vibration assessment should be undertaken during detailed design. Should this advance assessment conclude that the any structures will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction.

## 8.4 Climate Change

Climate change is an issue that has and continues to evolve on a global scale. Governments at all levels are acknowledging the need to take actions that reduce greenhouse gas (GHG) emissions into the atmosphere to mitigate the effects of climate change. Project impacts and resiliency to climate change were taken into consideration during the study. Considering how a project contributes to climate change, through its greenhouse gas emissions or its effects on the natural environment, is important to the planning process as it allows proponents to consider climate mitigation measures to avoid, minimize, or offset such effects. As well, considering how climate change may affect a project, such as through increased flooding or drought, is also critical to the planning process through enabling proponents to make informed decisions around how to design a project to withstand such environmental conditions. Approaches for considering and addressing climate change in project planning are through 1) Reducing a project's effect on climate change; and 2) Increasing the project's resilience to climate change.

Upon review of this Study's undertaking, it is determined that the project is relatively minor in scale and will not have significant climate change impact. However, key elements that were/will be factored into the replacement of the existing Regional Road 50 (Niagara Street) Bridge and related infrastructure improvements that could serve to reduce the overall effect on climate change include:

- GHG reduction initiatives including reduced use of GHG producing materials, specifying local materials to reduce related fuel consumption, and inclusion of recycled materials, where feasible;
- Provision of active transportation features in the preferred design solution. Encouraging active transportation through increased pedestrian and cyclist facilities supports the reduced use of vehicular traffic and GHG emissions; and
- The proposed bridge replacement alternative is designed with a bridge deck built high enough above the water to account for potential rise in water levels or flooding, as well, the overall footprint of the bridge in the Welland River has been reduced due to the elimination of several piers.

## 8.5 Construction Consideration

In summary, the following potential environmental impacts may occur during the construction phase. As such, the following measures detailed in Table 8-1 are proposed to mitigate any adverse impacts.

Table 8-1: Construction Impacts and Proposed Mitigation Measures

Construction Impacts	
Traffic Delays	<ul style="list-style-type: none"> <li>• Prepare construction phasing plan/detour plan.</li> </ul>
Obstruction to Entrances/Driveways	<ul style="list-style-type: none"> <li>• Inform property owners prior to construction, provide alternative parking, construct alternative driveway entrances</li> </ul>

Construction Impacts	Proposed Mitigating Measures
Delay to School Buses and Disturbance of Students	<ul style="list-style-type: none"> <li>• Inform school(s) about construction in advance.</li> </ul>
Delayed Response Time of Emergency Service Vehicles	<ul style="list-style-type: none"> <li>• Consult with emergency service providers and inform them of construction phasing and/or detour routes in advance and throughout construction.</li> </ul>
Disruption of Pedestrian Movements Across Bridge Structure	<ul style="list-style-type: none"> <li>• Maintain continuity of pedestrian walkway system as much as possible. Provide alternative walkway routes to adjacent residential areas where necessary.</li> </ul>
Infiltration of Traffic into Surrounding Neighbourhoods due to Construction Delays and/or Detours	<ul style="list-style-type: none"> <li>• Ensure designated detour routes avoid infiltration; implement traffic calming measures within surrounding neighbourhoods, if required.</li> </ul>
Constructability of Bridge Structure	<ul style="list-style-type: none"> <li>• Develop a design and construction approach to minimize risk during construction to workers, Region, City and the public.</li> </ul>
Approval and Coordination with Affected Utilities and Regulatory Agencies	<ul style="list-style-type: none"> <li>• Acquire all necessary permits and approvals prior to construction and ensure coordination details during construction are confirmed prior to start.</li> </ul>
Air Quality Impacts from Construction Equipment	<ul style="list-style-type: none"> <li>• Develop a dust control plan, use water and dust suppressants during construction, keep idling of construction equipment to a minimum, address and monitor air quality complaints.</li> </ul>
Noise Disturbance to Residents	<ul style="list-style-type: none"> <li>• Develop a noise control plan, construction must conform to Municipal Noise By-Laws, keep idling on equipment to a minimum, address and monitor noise complaints.</li> </ul>
Temporary Disruption and/or Inconvenience to Users of Adjacent Properties	<ul style="list-style-type: none"> <li>• Notify adjacent property owners of construction scheduling; schedule construction so as to minimize period of disruption.</li> </ul>
Temporary Disruption of Open Space Use and Activities (Chippawa & Merritt Park)	<ul style="list-style-type: none"> <li>• Employ noise and dust control measures; minimize construction area footprint and ensure open space is maintained for public use, if feasible.</li> </ul>
Impacts to Surface Water Quality due to Sedimentation and Introduction of Harmful Substances to Storm Collection Systems	<ul style="list-style-type: none"> <li>• Develop an Erosion and Sediment Control Plan (ESCP), include measures for managing water flows into and out of the site, manage fuel, excess materials, and debris appropriately.</li> </ul>
Wildlife Disturbance due to Noise, Dust and Habitat Encroachment	<ul style="list-style-type: none"> <li>• Conduct wildlife sweeps prior to commencement of construction and isolate wildlife habitat. Develop a dust control plan.</li> </ul>
Tree and vegetation removal	<ul style="list-style-type: none"> <li>• Minimize impacts to mature trees during detailed design phase; any trees to be removed will require prior approval and/or input by the Region and City and consider timing restrictions to minimize wildlife impacts.</li> </ul>

## 8.6 Monitoring and Maintenance

The mitigation measures identified in this report shall be written into the contract specifications. During construction, the Region's contract administrator shall ensure that full-time monitoring/inspection of the project works be undertaken to ensure that all environmental commitments identified in this report are adhered to by the Contractor(s) and other subsequent agency approvals are met. After a period of one year following completion of the construction (i.e. post construction), a final inspection should be undertaken to ensure the effectiveness of the identified mitigation measures.

## 8.7 Detailed Design Commitments and Additional Work

Environmental concerns, anticipated impacts and proposed mitigation measures as they relate to the project, have been described in this section. Many of the concerns have been mitigated through the process by which the recommended design was selected, as described in this report. This section provides a list of specific commitments to be carried forward into Phase 5 of the MCEA process – Implementation Phase (i.e. completion of contract drawings and tender documents, construction and operation and the monitoring for environmental provisions and commitments). Additional works to be completed during the detail design phase of this project, prior to construction, include but are not limited to, the following:

- Confirm design criteria for the bridge structure and watermain extension;
- Consult with City of Welland to determine construction approach, confirm need for detours, and finalize traffic detour(s) for vehicular traffic, pedestrian and cyclists, emergency services, and transit providers;
- Consult with emergency service providers, transit providers and school transportation services regarding impacts of construction on service routes and develop alternative routes, as necessary;
- Determine anticipated construction schedule and level of impact to surrounding community;
- Confirm and obtain required approvals and necessary permits;
- Confirm utility impacts and relocation requirements and coordinate relocation designs, schedule and costs with affected utility agencies;
- Determine locations of tree removals and any environmental mitigations required for project design;
- Prepare a vibration monitoring plan, if necessary;
- Develop illumination requirements along project area and complete lighting design;
- Confirm construction staging and prepare Construction Phasing/Staging Plan to be included in contract package;
- Confirm servicing replacement/improvement requirements with the City of Welland including the planned infrastructure upgrades directly south of the project area on Niagara Street, between the Niagara Street bridge and West Main Street;
- Confirm transit requirements within project limits and pedestrian link to transit stop(s) along Regional Road 50 (Niagara Street);
- Finalize capital cost estimate of the project; and
- Ensure construction staging coordinates with other planned activities in the vicinity of the project area by the Region and City, including planned works on neighbouring streets, Shotwell Street and Riverbank Street.

## 8.8 Permits and Approvals

The following approvals have been identified as potentially being required prior to the implementation of the proposed works:

- NPCA Permitting in accordance with O.Reg. 155/06: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses;
- MECP Form 1 Application for Watermain Extension;
- DFO – Notification Form;
- City of Welland – Municipal Consent;
- A Fish and Wildlife Salvage Permit from MNRF; and
- An MNRF Application for a License to Collect Fish.

## 9 STAKEHOLDER CONSULTATION

Stakeholder consultation is a key feature of the MCEA process. Through an effective consultation program, the proponent can generate meaningful dialogue between the project planners and the public, property owners, Indigenous communities, authorities and agencies allowing an exchange of ideas and the broadening of the information base, leading to better decision-making.

### 9.1 Summary of Consultation Activities

Throughout the project, stakeholders, including the public, property owners, Indigenous communities, authorities, agencies and utilities, were given a variety of opportunities to review and comment on the project process, key findings, proposed alternatives and recommended solution(s). The MCEA requires the proponent to undertake four (4) mandatory points of public contact for a Schedule 'C' project. The Project Team met the mandatory number of public contacts, with the following opportunities for review and/or comment provided:

- Notice of Study Commencement;
- Notice of Public Information Centre No. 1 and No. 2;
- Public Information Centre No. 1 and No. 2; and
- Notice of Study Completion.

Public comments were received throughout the MCEA process and are provided in Appendix M.

#### 9.1.1 Notice of Study Commencement

The Notice of Study Commencement was prepared and issued September 12, 2019. The Notice was published in *Niagara This Week* and posted on the Niagara Region's website (<https://niagararegion.ca/projects/regional-road-50-bridge/default.aspx>). Contact letters including the Notice were mailed directly to relevant stakeholders including Indigenous communities, regulatory agencies, the City of Welland, utilities and local interest groups. In addition, the Notice was hand-delivered to all properties within the Study Impact Area including along Niagara Street, Mill Street, and Riverbank Street.

The purpose of the Notice was to introduce the project (purpose and objectives), outline the MCEA process, request public involvement and identify contact persons. Contact information for the Region's Project Manager and AE's Environmental Assessment Coordinator were made available to the public to elicit any initial feedback on the project. Several comments were received from interested parties following the distribution of the Notice.

A summary list of the stakeholder register, Notice of Commencement and a sample copy of the cover letter are provided in Appendix J. Received comments and project team responses are also provided in Appendix M.

#### 9.1.2 Notice of Public Information Centre 1

A Notice of Public Information Centre (PIC) was prepared and distributed to stakeholders and review agencies. The Notice was published in *Niagara This Week* and the *Welland Tribune* on February 18, 2021 and posted on the Niagara Region's website. Contact letters including the Notice were mailed directly to relevant stakeholders including Indigenous communities, regulatory agencies, the City of Welland, and local interest groups.

The Notice provided a description of the project, details of the PIC, and included a request for comments and input. Contact information for the Region's Project Manager and AE's Environmental Assessment Coordinator were made available to the public to encourage the submission of comments.

A copy of the Notice of Public Information Centre and a sample copy of the cover letter is provided in Appendix J.

### 9.1.3 Public Information Centre 1

A virtual Public Information Centre (PIC) took place on March 4, 2021 virtually from 6:00pm to 7:00pm to present Study details. The Project Team, including representatives from the Region, AE and City of Welland, were in attendance to answer any questions that attendees had.

The PIC presented the following elements:

- Background information on the MCEA process;
- Background information on the Study;
- Problem/opportunity being considered for the Study;
- A high-level summary of the criteria for the evaluation of the alternatives;
- Description of the existing conditions of the project area;
- Key considerations and issues associated with the Study;
- Description of the alternative solutions;
- Evaluation of the alternative solutions;
- Project impacts and mitigations measures;
- A conceptual review of different construction approaches; and
- Next steps in the MCEA process.

A copy of the PIC display panels, sign-in sheet and comment form are provided in Appendix K.

Comments were received via comment form at and proceeding the PIC from several residents supporting the overall Study approach and proposed alternatives. Received comments and project team responses are provided in Appendix M.

### 9.1.4 Notice of Public Information Centre 2

A Notice of Public Information Centre (PIC) was prepared and distributed to stakeholders and review agencies. The Notice was published in *Niagara This Week* and the *Welland Tribune* on June 10 and 12, 2021 and posted on the Niagara Region's website. Contact letters including the Notice were mailed directly to relevant stakeholders including Indigenous communities, regulatory agencies, the City of Welland, and local interest groups.

The Notice provided a description of the project, details of the PIC, and included a request for comments and input. Contact information for the Region's Project Manager and AE's Environmental Assessment Coordinator were made available to the public to encourage the submission of comments.

A copy of the Notice of Public Information Centre and a sample copy of the cover letter is provided in Appendix J.

### 9.1.5 Public Information Centre 2

An online Public Information Centre took place from June 21 to July 2, 2021 to present Study details. The material was posted online for these two weeks and the Project Team responded to any questions or comments that were sent through the project website.

The PIC presented the following elements:

- Background information on the MCEA process;
- Background information on the Study;
- Problem/opportunity being considered for the Study;
- A recap of the alternative solutions presented at the first PIC;
- Summary of comments received during the first PIC comment period;
- Identification of preferred solution and construction approach;
- Description of alternative bridge design options;
- Evaluation of the alternative bridge design options;
- Identification of preferred design;
- Summary of property impacts and construction approach; and
- Next steps in the MCEA process.

No comments were received during the online PIC period.

A copy of the PIC display panels, sign-in sheet and comment form are provided in Appendix L.

### 9.1.6 Notice of Study Completion

The Notice of Study Completion was prepared and issued on February 24, 2022. The Notice was published in *Niagara This Week* and posted on the Niagara Region's website. Contact letters including the Notice were mailed directly to relevant stakeholders including Indigenous communities, regulatory agencies, the City of Welland, utilities and local interest groups.

The Notice informs the public and stakeholders of the completion of the MCEA and provides the locations where interested parties can review the completed Environmental Study Report (ESR). The notice also informs the public of the 30-day review period associated with the conclusion of the MCEA process.

Subject to comments received as a result of the Notice and the receipt of all necessary approvals, the Region intends to proceed with the detailed design and construction as documented in the ESR.

The Notice of Completion and a sample copy of the cover letter are provided in Appendix J.

### 9.1.7 Consultation with Ministry of the Environment, Conservation and Parks

An acknowledgement letter was provided from the Ministry of the Environment, Conservation and Parks (MECP) in response to the Notice of Commencement provided to the MECP West Central Region. Several areas of interest were provided for consideration and have been included in this report.

MECP correspondence is provided in Appendix M.

### 9.1.8 Indigenous Communities Consultation

As required as part of the MCEA process, to satisfy the Crown's legal duty to consult Aboriginal communities, Indigenous communities were contacted at project initiation with the Notice of Commencement. As per the acknowledgement letter provided by the MECP, Indigenous communities contacted included Six Nations of the Grand River Territory, Haudenosaunee Confederacy Chiefs Council, and Mississauga of the New Credit.

A response was received from the Mississauga of the New Credit First Nation (MNCFN) on October 1, 2019 identifying they do not have high level of concern with the proposed project. They indicated they wish to continue to be notified of project status and if archaeological assessments (Stage 2 or higher) are required that MNCFN be included in fieldwork.

Correspondence with Indigenous Communities did not lead to the identification of any specific or comprehensive claims or litigation that materially affected the project. The identified communities will be notified of the ESR release, and the Region is committed to working with Indigenous Communities should any issues arise.

All correspondence to the Indigenous communities is provided in Appendix M.

### 9.1.9 Key Stakeholder Consultation

#### City of Welland

Correspondence between the Region, the City of Welland, and AE occurred throughout the project via email. Prior to any information being presented to the public, the City was presented all the information for their comments and feedback.

Following the Public Information Centre 2, AE received comments and key items from the City of Welland regarding future projects near the Study Area and proper measures for the construction approach and traffic management procedures. Further consultation with the City of Welland representatives will occur during the detailed design phase to coordinate servicing requirements, cost-sharing, and timing of adjacent works.

All additional stakeholder correspondence is provided in Appendix M.

## 10 CONCLUSIONS AND RECOMMENDATIONS

This study was carried out as a Schedule C project under the Municipal Class Environmental Assessment (MCEA) for Municipal Transportation Projects and is subject to the requirements of the *Environmental Assessment Act*. This document provides relevant information with respect to Phases 1 through 4 of the Environmental Assessment Process. Subsequent phases of the process will involve completion of contract drawings and documents for all proposed works together with appropriate monitoring requirements.

### 10.1 Conclusions

Based on the deteriorated condition of the existing Regional Road 50 (Niagara Street) Bridge, constructed circa 1931, the Region initiated a MCEA to determine the optimal solution for addressing the problems of the existing bridge structure. Also included in the scope of this MCEA study was the extension of the 600mm diameter transmission watermain across the Welland River to address supply demands. The Study reviewed the existing conditions of the bridge and surrounding areas, developed and evaluated alternative solutions for the bridge replacement and watermain extension, identified the preferred solutions, and developed and evaluated design concepts for the bridge replacement to identify a preferred design concept. The process included public consultation as well as individual consultation with key stakeholders.

The preferred design solution includes the replacement of the bridge structure with a new two-span steel I-Girder bridge with a cross-section that includes sidewalks and bicycle lanes. A 600mm diameter pressurized watermain crossing will be supported from the bridge structure using pipe hangers. The preferred alternative achieves the Study objectives of addressing the structural deficiencies, improving public safety for all modes of transportation (vehicular, cyclist, and pedestrian) and providing a secure water supply to the surrounding area through the extension of the 600mm diameter watermain. Following completion of the MCEA Study, detailed design, permitting and construction will be undertaken to implement the preferred alternative and remedy the identified problems.

### 10.2 Recommendations

During the Study, recommendation for additional works and implementation measures were identified. These items should be taken into consideration during the detailed design and include the following items:

- Determine appropriate construction staging;
- Consult with City of Welland to determine construction approach, confirm need for detours, and finalize traffic detour(s) for vehicular traffic, pedestrian and cyclists, emergency services, and transit providers;
- Confirm utility impacts and relocation requirements and coordinate relocation works;
- Confirm design criteria for the bridge structure and watermain extension;
- Consult with emergency service providers, transit providers and school transportation services regarding impacts of construction on service routes and develop alternative routes, as necessary;
- Determine anticipated construction schedule and level of impact to surrounding community;
- Confirm and obtain required approvals and necessary permits;
- Confirm utility impacts and relocation requirements and coordinate relocation designs, schedule and costs with affected utility agencies;
- Determine locations tree removals and any environmental mitigations required for project design;
- Prepare a vibration monitoring plan, if necessary;
- Develop illumination requirements along project area and complete lighting design;

- Confirm servicing replacement/improvement requirements with the City of Welland including the planned infrastructure upgrades directly south of the project area on Niagara Street, between the Niagara Street bridge and West Main Street;
- Confirm transit requirements within project limits and pedestrian link to transit stop(s) along Regional Road 50 (Niagara Street);
- Finalize capital cost estimate of the project; and
- Ensure construction staging coordinates with other planned activities in the vicinity of the project area by the Region and City, including planned works on neighbouring streets, Shotwell Street and Riverbank Street.

Prior to construction, a final Public Information Centre (PIC) will be held to provide information to the public and adjacent landowners of the upcoming construction work including construction schedule, construction staging, construction approach and impacts to traffic including detour routes, as required.

## CLOSURE

This report was prepared for The Regional Municipality of Niagara to satisfy the requirements of the Municipal Class Environmental Assessment process and *Environmental Assessment Act* and to set the stage for the detailed design and construction of the Preferred Alternative Solution and Design Concepts for the Study Area discussed herein.

The services provided by Associated Engineering (Ont.) Ltd. in the preparation of this report were conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions. No other warranty expressed or implied is made.

Respectfully submitted,  
Associated Engineering (Ont.) Ltd.

A handwritten signature in black ink, appearing to read 'A. LaPlante', is centered on the page. The signature is fluid and cursive, with the first letter 'A' being particularly large and stylized.

Andrea LaPlante, P.Eng.  
Project Manager/Environmental Assessment Coordinator

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