Subject: Kinsmen Pedestrian Bridge
Report Number: OPD 21-46
Department: Operations and Development Department
Submitted by: Shayne Reitsma, Manager of Engineering
Meeting Type: Council Meeting
Meeting Date: Tuesday, November 23, 2021

RECOMMENDATION

THAT report OPD 21-46 Kinsmen Pedestrian Bridge be received as information;

AND THAT Council direct staff to implement ____:

Option 1 – Do Nothing: Initial costs $25,000 – plus average yearly costs over 10 years $122,000; or

Option 2 - Bridge Rehabilitation: Initial costs $4,220,000 – plus average yearly costs over 30 years $20,000; or

Option 3 - Bridge Superstructure Reconstruction (Like-for-Like Replacement): Initial costs $4,820,000 – plus average yearly costs over 60 years $24,666; or

Option 4 - Bridge Replacement (Prefabricated Pedestrian Bridge): Initial costs $4,500,000 – plus average yearly costs over 80 years $16,250

BACKGROUND

The Kinsmen Bridge is a nine-span wood deck on steel plate girder structure with a southwest-northeast orientation and a substructure that features cut stone masonry block piers and abutments. The bridge was constructed in 1888 to carry GWR CAL railway over Stoney Creek, and was converted to a pedestrian bridge following the abandonment of the railway in the 1990's.

As part of the provincially mandated Ontario Structural Inspections (OSIM) the Town hired GM Blue Plan consulting for the completion of the OSIM's and they completed further analysis of the Kinsmen Pedestrian Bridge in conjunction with previous reports provided by ASI and Vallee which were presented to Council March 22, 2021.

The report provided by GM Blue Plan to the Town outlining design/maintenance options is attached.

DISCUSSION

Option 1 – Do Nothing

If the Town of Tillsonburg were to do nothing to the bridge, lacking the initiation of a major rehabilitation within the noted time frame of less than five (5) years, it is anticipated that the structure will require closure or removal for the public's safety in less than ten (10) years. Residents would be required to walk down Baldwin or Concession Street in order to get to the downtown core or use public transportation. An estimated cost of $25,000 would be required for the closure and removal would cost $1,220,000. A Pro and Con table has been provided:

PRO	CON
- Lowest cost solution of $1,245,000	- Removal of a key pedestrian access point to the downtown core
- Promotes usage of public transportation	- Removal of a noticeable feature within the Town of Tillsonburg
- Promotes active transportation	- Does not address need for updated pedestrian barrier within remaining 10 year lifespan
- No Schedule EA required	

Option 2 – Bridge Rehabilitation

The bridge rehabilitation option consists of rehabilitation of the existing structure to extend its service life, and ensure the structure is generally compliant with provincial and federal structural codes. The bridge rehabilitation option includes isolated structural steel member replacement, steel coating and new bridge deck for the implementation of an updated pedestrian barrier. A Pro and Con table has been provided:

PRO	CON
- Key pedestrian access point to the downtown core is maintained	- Cost of $4,820,000
- Noticeable feature within the Town of Tillsonburg is maintained to current look	- Schedule C Environmental Assessment required (Depending on Heritage Impact Assessment, HIA)
- Addresses need for updated pedestrian barrier	- Estimated service life of 25-30 years.
	- Equating to $160,667.00 per year (Total cost over service life)

Option 3 - Bridge Superstructure Reconstruction (Like-for-Like Replacement)

Option 3 consists of reconstructing the existing steel superstructure like-for-like. Like-for –like represents demolishing the existing steel components of the bridge, but then reconstructing a new steel structure that's looks almost identical as the current bridge

complete with new bridge deck for the implementation of an updated pedestrian barrier. To keep cost down the existing concrete piers would be left intact. A Pro and Con table has been provided:

PRO	CON
- Key pedestrian access point to the downtown core is maintained	- Cost of $6,120,000
- New structure that mimics current look	- Schedule C Environmental Assessment required (Depending on HIA)
- Addresses need for updated pedestrian barrier	- Estimated service life of 50-60 years if concrete piers left.
	- Equating to $102,000 per year (Total cost over service life)

Option 4 – Bridge Replacement (Prefabricated Pedestrian Bridge)

This option consists of the replacement of the bridge in its entirety including superstructure, piers, abutments, and existing foundations with a new prefabricated pedestrian bridge at the same elevation as the existing bridge, complete with reinforced concrete piers (2) and abutments. This option allows for new designs that has potential for new park like features. A Pro and Con table has been provided:

PRO	CON
- Key pedestrian access point to the downtown core is maintained	- Cost of $5,800,000
- New Structure designed to current needs	- Schedule C Environmental Assessment required (Depending on HIA)
- Addresses need for updated pedestrian barrier	- Estimated service life of 75-80 years
- Potential for new park like features	- Equating to $72,500 per year (Total cost over service life)

CONSULTATION

Director of Operations and Development, Manager of Public works and Director of Finance were consulted.

FINANCIAL IMPACT/FUNDING SOURCE

Depending on the option as listed in the table below, a debenture for the upfront capital cost would be incurred in 2022 or in the year construction would commence. On a 30-year debenture, the highest amount of option 3 (for illustrative purposes) would result in annual principal and interest payments of $137K.

Option	Description	Estimated Costs (2021 Dollars)			Estimated Service Life
		2021 Capital Costs	Maintenance and Rehabilitation Costs (over Estimated Service Life)	Total Costs (over Estimated Service Life)	
Option 1	Do Nothing	$25,000	$1,220,000	$1,245,000	<10 years
Option 2	Bridge Rehabilitation	$4,220,000	$600,000	$4,820,000	25-30 years
Option 3	Bridge Superstructure Reconstruction (Like-for-Like Replacement)	$4,820,000	$1,300,000	$6,120,000	50-60 years
Option 4	Bridge Replacement (Prefabricated Pedestrian Bridge)	$4,500,000	$1,300,000	$5,800,000	75-80 years

CORPORATE GOALS

How does this report support the corporate goals identified in the Community Strategic Plan?

☐ Lifestyle and amenities
☐ Customer service, communication and engagement
☐ Business attraction, retention and expansion
☐ Community growth
☒ Connectivity and transportation
☐ Not Applicable

Does this report relate to a specific strategic direction or project identified in the Community Strategic Plan? Please indicate section number and/or any priority projects identified in the plan.

Goal – Tillsonburg residents and businesses will be connected to each other, regional networks, and the world through effective traditional and digital infrastructure.

Strategic Direction – Provide alternatives to automobile travel through active transportation and public transit.

Priority Project – Asset Management Plan

ATTACHMENTS

Appendix A – GM BluePlan – Kinsmen Pedestrian Bridge Preliminary Design Report

Prepared By:

GMBluePlan ENGINEERING

Town of Tillsonburg

Kinsmen Pedestrian Bridge Preliminary Design Report

GMBP File: 521015-1

October 2021

Tillsonburg CONNECTED. ENRICHED. INSPIRED.

GUELPH | OWEN SOUND | LISTOWEL | KITCHENER | LONDON | HAMILTON | GTA

235 NORTH CENTRE ROAD, SUITE 103 LONDON, ON N5X 4E7 P:519-672-9403
F: 519-800-8301 WWW.GMBLUEPLAN.CA

EXECUTIVE SUMMARY

GM BluePlan Engineering Limited (GM BluePlan) was retained by the Town of Tillsonburg to prepare a preliminary design report for the Kinsmen Pedestrian Bridge. The purpose of this report is to provide a conceptual review of rehabilitation and replacement options associated with this structure including estimated rehabilitation costs, estimated structure replacement costs, and estimated remaining service life of the structure both before and after rehabilitation or replacement. The scope of this assessment is strictly focused on the conceptual design review of the bridge and does not include for the inspection and assessment of each individual structural element.

The scope of this report includes a background review of the bridge's known history and existing conditions, a review of rehabilitation and replacement options including EA implications, environmental impacts, heritage considerations, and estimated construction costs, as well preparation of conceptual design drawings.

The Kinsmen Pedestrian Bridge is believed to be constructed prior to 1910, is positioned in an east-west orientation and is located along the Veterans Memorial Walkway in the Town of Tillsonburg. The nine-span structure consists of a wood deck wearing surface on top of timber deck ties connected to a steel superstructure consisting of steel girders, cross bracing, pier columns complete with horizontal and diagonal bracing between columns. The superstructure is supported by two masonry block abutments and 16 masonry block piers. The structure was originally constructed as a train bridge and has since been converted for pedestrian use only.

An enhanced structural inspection was completed in 2019 by G. Douglas Vallee Limited that involved a hands-on inspection and detailed assessment of each bridge element. The results of this enhanced inspection were reviewed and generally agreed with during GM BluePlan's 2021 OSIM inspection of the structure. The severe corrosion and section loss noted throughout the steel superstructure highlights that many elements have reached the end of their service life. Overall, the structure is in fair to poor condition with multiple elements including the steel girders, piers, diaphragms, horizontal and diagonal pier bracing, steel bearings and wood bearing seats, masonry block abutments and piers, timber deck, and chain link fencing, requiring rehabilitation or replacement withing 1-5 years.

As requested by the Town, GM BluePlan reviewed four options and associated capital cost estimates for rehabilitation/replacement of the Kinsmen Pedestrian Bridge. Capital cost estimates presented within the report are presented in 2021 dollar values and do not include HST; however, cost estimates do include associated costs such as engineering design, construction administration and inspection fees, Municipal Class Environmental Assessment requirements, and contingencies. The four options reviewed within this preliminary design report include:

- **Option 1:** Do Nothing
- **Option 2:** Bridge Rehabilitation
- **Option 3:** Bridge Superstructure Reconstruction (like-for-like replacement)
- **Option 4:** Bridge Replacement (prefabricated pedestrian bridge)

TABLE OF CONTENTS

APPENDICES

KINSMEN PEDESTRIAN BRIDGE PRELIMINARY DESIGN REPORT

TOWN OF TILLSONBURG

OCTOBER 2021

GMBP FILE: 521015-1

1. INTRODUCTION

GM BluePlan Engineering Limited (GM BluePlan) was retained by the Town of Tillsonburg to prepare a preliminary design report for the Kinsmen Pedestrian Bridge. The purpose of this report is to provide a conceptual review of rehabilitation and replacement options associated with this structure including estimated rehabilitation costs, estimated structure replacement costs, and estimated remaining service life of the structure both before and after rehabilitation or replacement. The scope of this assessment is strictly focused on the conceptual design review of the bridge and does not include for the inspection and assessment of each individual structural element.

The scope of this report includes a comprehensive background review of the bridge's known history and existing conditions, a review of rehabilitation and replacement options including EA implications, environmental impacts, heritage considerations, and estimated construction costs, as well preparation of conceptual design drawings.

The options for capital works are summarized in the sections below, complete with cost estimates attached. Capital costs have been estimated based on our recent experience with similar bridge construction projects, including recent tender prices received by GM BluePlan, and discussions with suppliers and contractors. The capital cost estimates are presented in 2021 dollar values and do not include HST; however, cost estimates do include associated costs such as engineering design, construction administration and inspection fees, efforts towards satisfying the Municipal Class Environmental Assessment requirements, and contingencies. The estimated costs contained in this report should be considered as preliminary, as no pre-design work has been completed that may influence costs of items such as environmental considerations, transportation requirements, geotechnical conditions, regulatory authority requirements, as well as any ancillary work beyond the limits of the bridge.

2. BACKGROUND

The Kinsmen Pedestrian Bridge is believed to be constructed prior to 1910, is positioned in an east-west orientation and is located along the Veterans Memorial Walkway in the Town of Tillsonburg. The nine-span structure consists of a wood deck wearing surface on top of timber deck ties connected to a steel superstructure consisting of steel girders, cross bracing, pier columns complete with horizontal and diagonal bracing between columns. The superstructure is supported by two masonry block abutments and 16 masonry block piers. The structure was originally constructed as a train bridge and has since been converted for pedestrian use only.

Prior to completing this preliminary design report, GM BluePlan reviewed the background information provided by the Town including the 2019 Enhanced OSIM Report by G. Douglas Vallee Limited, and the 2017 OSIM report completed by GM BluePlan Engineering.

The timber deck ties were replaced in 2010 and the existing wood decking was reinstalled on top.

We understand the Town has no drawings or records for the existing structure.

2.1 Existing Conditions

An enhanced structural inspection was completed in 2019 by G. Douglas Vallee Limited that involved a hands-on inspection and detailed assessment of each bridge element. The results of this enhanced inspection were reviewed and generally agreed with during GM BluePlan's 2021 OSIM inspection of the structure.

The severe corrosion and section loss noted throughout the steel superstructure highlights that many elements have reached the end of their service life. Overall, the structure is in fair to poor condition with multiple elements including the steel girders, piers, diaphragms, horizontal and diagonal pier bracing, steel bearings and wood bearing seats, concrete abutments and piers, timber deck, and chain link fencing, requiring rehabilitation or replacement within 1-5 years.

The existing wood decking has been identified by the Town as a safety concern for pedestrians due to slippery conditions, therefore, rehabilitation or replacement with a non-slip wearing surface will be included in our review.

The existing chain link fence does not meet today's loading standards for pedestrian barriers as outlined within the Canadian Highway Bridge Design Code (CHBDC), therefore as part of our preliminary review, replacement of the existing fencing or the addition of an approved barrier will be considered.

2.2 Utilities

GM BluePlan has consulted with the appropriate utility agencies for all potential existing underground services within and around the project location. There is an exiting utility service running on the south side of the deck anchored to the top of the timber deck ties. The status of this utility is unknown and will likely need to be temporarily supported or relocated during construction.

Tillsonburg Hydro identified an ariel distribution hydro service running along the south side of the bridge between timber poles on the east and west approaches.

Rogers has provided information indicating they have no existing infrastructure within or around the project location.

Bell has provided information indicating they have no existing infrastructure within or around the project location.

Enbridge has not provided any information on their existing services within the area at the time of preparing this preliminary design report.

2.3 Environmental Considerations

The Kinsmen Pedestrian Bridge is located in the Long Point Conservation Authority (LPCA) spanning a natural woodland area. As the scope of rehabilitation or replacement work is not known our recommendation is to liaise with the conservation authority during detailed design to obtain their input and complete any required approvals.

A preliminary screening for species at risk (SAR) within the project area was completed utilizing the "Client's Guide to Preliminary Screening for Species at Risk" updated by the MECP in 2019. Our preliminary screening involves an online records review of the following resources to determine the potential of SAR in the project area.

- MNRF Species at Risk Website
- DFO's Aquatic Species at Risk Mapping
- Natural Heritage Information Centre (NHIC)
- Land Information Ontario
- Ontario Reptile and Amphibian Atlas
- Ontario Breeding Bird Atlas
- iNaturalist
- eBird

Our review identified that the following SAR have a potential to habitat within the project location:

- Spiny Softshell Turtle
- Eastern Sand Darter
- Eastern Fox Snake
- Chimney Swift
- Barn Swallow
- Bank Swallow
- Cerulean Warbler
- Acadian Flycatcher
- Bobolink
- Eastern Meadowlark

The current SAR mitigation process is largely proponent driven and the proponent is responsible for identifying any potential impacts and mitigating/monitoring to ensure no harm to SAR or destruction / alteration of habitat occurs. Therefore, based on the number of SAR identified through our preliminary screening, we recommend that the Town retain the services of a qualified biologist to complete site-specific SAR surveys, and develop a site-specific mitigation plan to minimize the effects on the identified species. These surveys will more accurately identify the SAR or SAR habitats that potentially exist within the area and will help define the appropriate mitigation measures to be followed during construction.

3. REHABILITATION AND REPLACEMENT OPTIONS FOR CONSIDERATION

As part of this preliminary design report, at the request of the Town, GM BluePlan has completed a review of four rehabilitation/replacement options:

- Do Nothing
- Bridge Rehabilitation
- Bridge Superstructure Reconstruction (like-for-like utilizing the existing piers, abutments and foundations),
- Bridge Replacement (prefabricated pedestrian bridge)

The capital cost estimates associated with each option are presented in 2021 dollar values and do not include HST; however, cost estimates do include associated costs such as engineering design, construction administration and inspection, and contingencies. Costs additionally include efforts to satisfy the Municipal Class Environmental Assessment requirements which are discussed further in **Table 3 of Section 4.0**. The estimated costs contained in this report should be considered as preliminary, as no pre-design work has been completed that may influence costs of items such as environmental considerations, geotechnical conditions, regulatory authority requirements, as well as any ancillary work beyond the limits of the bridge.

Further to estimates of capital costs related to the noted rehabilitation or replacement options, attempts have been made to additionally show probable costs of maintenance or minor rehabilitation tasks expected during the lifespan of each option. These tasks are in addition to the capital cost estimates and represent potential costs accrued prior to major rehabilitation or replacement of the structure. These additional probable costs are also noted in 2021 dollar values.

3.1 Deck Wearing Surface

The existing timber deck has been identified as a safety concern during slippery conditions, therefore alternative decking materials were considered for both rehabilitation/replacement Options 2 and 3 only. The deck chosen for Option 4 will be largely dependent on the options available through the selected prefabricated bridge manufacturer.

3.1.1 Timber Deck

The most cost-effective option is replacement of the timber deck boards in a horizontal orientation to improve slip resistance. The change in deck board orientation would mean they are installed parallel the deck ties below and would require the installation of an additional timber subfloor. The costs for a timber deck are detailed further in **Appendix B**.

We understand existing timber deck ties were replaced in 2010 and are still in good to fair condition therefore, further cost savings could be realized through material supply costs if the Town choses to salvage and reinstall the existing members.

3.1.2 Reinforced Concrete Deck

A reinforced concrete deck would offer the most conventional bridge deck replacement and would provide the highest level of protection for the steel elements below. A concrete deck may also provide the Town the opportunity to use a snow removal machine during the winter, versus hand snow removal. Based on the reduced loading requirements from railway bridges to pedestrian bridges, the installation of a heavier concrete deck is a feasible consideration for options 2 and 3. However, a detailed structural review of the existing steel members will need to be completed during detailed design to better understand the appropriate connections, anchorage and concrete reinforcement. The costs for a concrete deck are similar to the costs of a timber deck and are detailed further in **Appendix B**.

3.1.3 Steel Grating Deck

A second alternative to wood deck, as highlighted in the 2019 Enhanced OSIM report, is the installation of a steel grating deck. This option would be more costly; however, it would provide a longer service life compared to the wood options and would potentially remove the requirement for snow removal. Additionally, steel gratings (supplied by ALGRIP or equivalent) can be manufactured to include surface welded beads to improve traction during slippery conditions. The costs for a steel grating deck are roughly twice the costs of a timber deck are detailed further in **Appendix B**.

Table 1: Comparison for Deck Replacement Options

Deck Replacement Option	Advantages	Disadvantages
Timber	• Lowest estimated construction cost • Allow reuse of the existing timber deck ties (if preferred) • Maintains potentially significant heritage value associated with the existing timer decking	• Continues to create slippery conditions during cold and wet weather unless a non-slip coating is applied • May require the application of a non-slip wearing surface • Does not allow for the use of snow removal machine • Least durable compared to steel or concrete • Shortest estimated service life
Reinforced concrete	• Provides greatest protection to steel elements below • Similar construction costs to wood deck • Allows the use of a snow removal machine • Eliminates slippery conditions during cold and wet weather • Longer estimated service life than timber • Increased constructability for barrier installation	• May require additional steel reinforcement of diaphragms and girders below • Removes potentially significant heritage value associated with existing timber decking • Requires this installation of a drainage system to prevent ponding water
Steel Grating	• Potentially eliminates the need for snow removal • Eliminates slippery conditions during cold and wet weather • Most durable compared to wood or concrete • Longer estimated service life than timber	• Highest estimated construction cost • Provides little protection for steel elements below • More difficult to install approved pedestrian barrier • Removes potentially significant heritage value associated with existing timber decking

3.2 Pedestrian Barrier

Understanding the existing chain-link fencing does not satisfy the loading standards for pedestrian barriers as outlined within the CHBDC, we have coordinated replacement options with known local pedestrian barrier suppliers to highlight the options available and their associated estimated construction costs. The pedestrian barriers below are representations of a high range, mid range and low range replacement options for consideration by the Town. Each option detailed below is mainly intended for rehabilitation/replacement Options 2 and 3. The pedestrian barrier design for Option 4 will be largely dependent on the available pedestrian barrier options through the selected prefabricated bridge manufacturer.

3.2.1 High Range Pedestrian Barrier

The option shown below represents a high range pedestrian barrier that was selected during the design of the Glen Road Pedestrian Bridge in the City of Toronto. The barrier is designed to reducing climbing/falling hazards and incorporates lighting to improve visibility and pedestrian safety at night. Due to it's specific anchorage requirements, this option is limited to the concrete deck replacement option detailed above. The additional costs for a high range pedestrian barrier are detailed further in **Appendix B.**

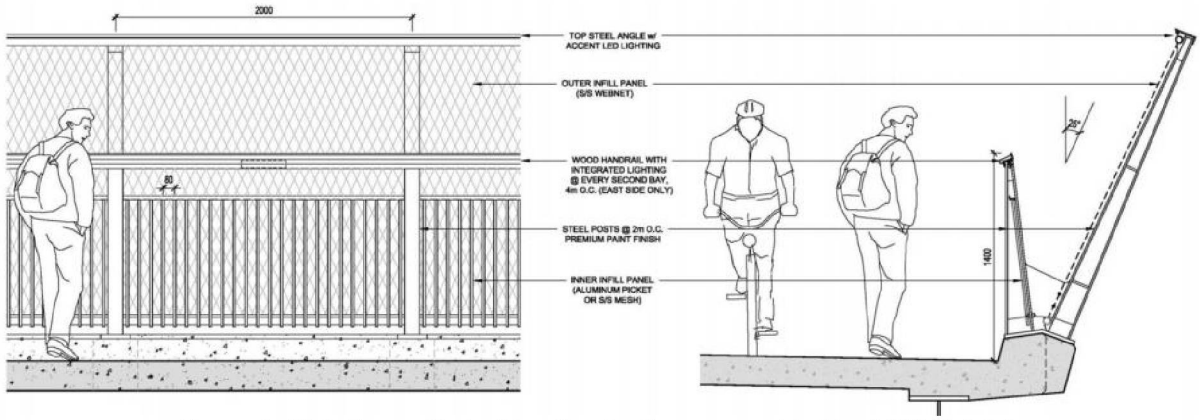


Figure 1: High Range Pedestrian Barrier (image provided by AMG Metals)

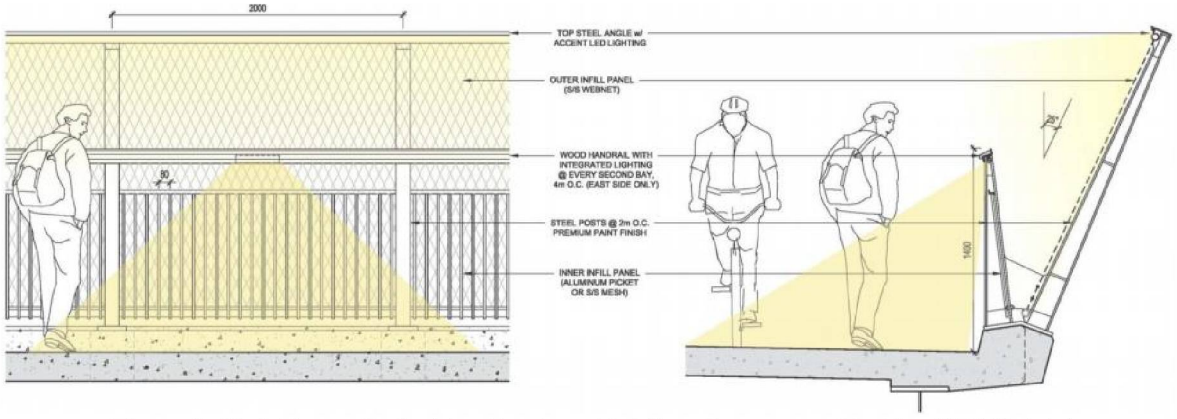


Figure 2: High Range Pedestrian Barrier – Lighting (image provided by AMG Metals)

3.2.2 Mid Range Pedestrian Barrier

The option shown below represents a mid range pedestrian barrier that was selected for the Doon valley Pedestrian Bridge over Highway 401 in the Kitchener Area. The barrier is designed to eliminate climbing/falling hazards, prevent debris from being thrown on the traffic below and can be retrofitted with lighting to improve visibility and pedestrian safety at night. This barrier option can be included on each of the deck replacement options detailed above. The additional costs for a mid range pedestrian barrier are detailed further in **Appendix B.**

Figure 3 & 4: Mid Range Pedestrian (image provided by AMG Metals)

3.2.3 Low Range Pedestrian Barrier

This option involves replacement of the existing steel chain-link fence with the addition of a steel pedestrian barrier to support the loading outlined in the CHBDC (see **Appendix A** for conceptual details). The barrier is designed to eliminate climbing/falling hazards and can be retrofitted with lighting to improve visibility and pedestrian safety at night. This barrier option can be included on each of the deck replacement options detailed above. The costs for a low range pedestrian barrier are detailed further in **Appendix B.**

3.3 Option 1 – Do Nothing

Option 1 consists of completing no rehabilitation work, with complete removal of the existing bridge within the next ten (10) years. As this option does not include any major rehabilitations, the 2021 capital costs associated with this option are minimal and have been provided in Table 2 below, with a more detailed cost estimate presented in **Appendix B**. Total costs for this option include efforts to close and block off the existing bridge to the public and future removal costs to completely remove the existing bridge including abutments and piers.

3.4 Option 2 – Bridge Rehabilitation

Option 2 consists of rehabilitation of the existing structure to extend its service life, and ensure the structure is generally compliant with the CHBDC. Items which would be included in the scope of rehabilitation to address the deficiencies include:

Structural Rehabilitation Work:

- Removal and replacement of approach asphalt wearing surface;
- Removal and replacement of timber deck boards;
- Remove and replace timber deck ties;
- Removal and replacement of chain link fencing;
- Supply and install approved pedestrian barrier;
- Temporary bridge jacking to facilitate abutment bearing replacement;
- Abutment bearing replacement;
- Removal and replacement of steel diaphragms;
- Removal and replacement of steel bracing beneath timber deck ties;
- Removal and replacement of steel lattice on horizontal members between piers;

- Removal and replacement of steel lattice on pier columns;
- Removal and replacement of structural connections(PROVISIONAL);
- Concrete and masonry repairs on abutments and piers, and
- Installation of erosion control measures around the wingwalls and in front of each abutment.

Coating Rehabilitation Work:

- Cleaning and painting of the existing structure's remaining steel components;
  - Steel girders
  - Steel pier columns
  - Steel bracing between pier columns (horizontal and diagonal);
  - Steel pier cap strapping
  - Structural connections
- Seal structural steel joints and connections with epoxy sealer.

Under this rehabilitation option it has been assumed to replace the existing timber deck ties with ones of equivalent size and capacity, however we understand from the 2019 enhanced inspection report that the existing ties are not capable of supporting a snow removal machine and the bridge will require snow removal by hand. Should the Town prefer to not remove snow by hand, an evaluation of the existing ties can be completed to determine the appropriate sizing capable of supporting a snow removal machine.

In certain rehabilitation projects the actual condition of steel members can be hidden behind layers of pack rust that has built up over time. Therefore, we have shown the replacement of structural connections as a provisional item should they require replacement following the completion of sand blasting. It should be noted that the steel members identified to be coated may also require replacement should their condition be worse than anticipated following the completion of sand blasting, which could add significant costs.

The existing structure was originally designed for train loading scenarios and we understand from the Town that the replacement structure will continue to service pedestrian traffic only. Therefore, based on the reduced loading from train to pedestrian loading preliminary structural reviews have been completed to review the existing structures capacity to support additional design considerations such as:

- Installation of a more "conventional" reinforced concrete deck;
- Widening of the walkway from 2.6m to 3.0m;
- More efficiently sized steel girders to suit the reduced loading, and;
- Installation of an additional pedestrian barrier.

Our review identified that all the above design considerations are technically feasible, however, the specific implementation of each additional design element beyond an exact replacement of the existing structure will need to be reviewed further during detailed design. The above listed design considerations are also applicable under Option 3 below.

The estimated remaining service life of the structure for this option is 25 – 30 years. To reach this estimated service life, it is anticipated that one future minor rehabilitation of the structure will be required. This future rehabilitation is anticipated to include minor concrete and masonry patch repairs to the abutments, wingwalls, piers, and further coatings repairs. Following the estimated 25 – 30 year service life, further inspection and evaluation would be required to determine the condition of the structure and if bridge elements have remaining service life. We foresee the structure requiring another major rehabilitation at that time, however full replacement is anticipated.

Estimated life span costs for this option are provided in Table 2 below, with a more detailed cost estimate presented in **Appendix B**. Life span costs for this option include typical bridge maintenance required between now and the future rehabilitation or replacement.

3.5 Option 3 – Bridge Superstructure Reconstruction (like-for-like replacement)

Option 3 consists of reconstructing the existing steel superstructure like-for-like. Items which would be included in the scope of rehabilitation to address the deficiencies include:

- Removal and replacement of approach asphalt wearing surface;
- Removal and replacement of timber deck ties;
- Removal and replacement of timber decking;
- Removal and replacement of existing chain link fence;
- Supply and installation of approved pedestrian barrier;
- Removal and replacement of steel girders, diaphragms, and bracing, complete;
- Removal and replacement of steel pier columns;
- Removal and replacement of horizontal and diagonal bracing between steel pier columns;
- Removal and replacement of all structural connections;
- Removal and replacement of steel strapping on each pier cap;
- Removal and replacement of pier and abutment bearings;
- Concrete and masonry patch repairs of the existing abutment and piers, and;
- Installation of erosion control measures around the wingwalls and in front of each abutment.

The 2019 enhanced OSIM and 2021 OSIM results note the existing masonry and concrete piers, and abutments are generally still in good condition, requiring partial depth concrete and mortar repairs to extend their overall service life. Therefore, we recommend consideration be made to salvage and reuse the existing piers and abutments. However, in order to re-use the existing substructure, post-construction loading must not exceed the loading currently experienced by these bridge elements. A dead load mass balance comparison between pre-construction and post-construction was completed to understand the limitations to potentially widen the structure, or to potentially add dead weight.

Although not required, replacement of the existing piers can be considered if preferred by the Town. The estimated construction costs for replacement of the existing piers are provided in **Appendix B**.

The estimated remaining service life of this structure would be 50 – 60 years depending on the performance of the existing abutments, piers, and foundation. To reach the estimated service life, it is anticipated that the bridge may require one minor rehabilitation and one major rehabilitation at the approximate 20-year and 40-year marks respectively. Following the 50 – 60 year service life the original bridge elements (substructure) will be over 150 years old. Inspection and evaluation of the structure would be required at that time to determine the feasibility of re-using any of the original bridge elements, however full structure replacement is anticipated.

The cost estimate for this option including engineering and contingency, is provided in Table 2 below with a more detailed cost estimate provided in **Appendix B**. Life span costs for this option include typical bridge maintenance required between now and the future rehabilitation or replacement.

3.6 Option 4 – Bridge Replacement (Prefabricated Pedestrian Bridge)

Option 4 consists of the replacement of the bridge in its entirety including superstructure, piers, abutments, and existing foundations with a new prefabricated pedestrian bridge at the same elevation as the existing bridge, complete with reinforced concrete piers (2) and abutments. For the purposes of cost estimating, a deep pile foundation has been assumed to support the replacement structure, however, geotechnical investigation is required to determine the feasibility of using a pile foundation which has not been completed at this time.

Construction of temporary site access roads will be required for a complete bridge replacement to remove both the existing superstructure and substructure. The large embankments at each end of the existing structure make truck, machinery and crane access difficult and this mainly contributes to the significant costs associated with site access.

The barrier selected for this replacement option will be dependent on the options available through the selected prefabricated bridge manufacturer.

Assuming this structure would be constructed of concrete and/or steel elements, as per the CHBDC the estimated service life for the new structure is 75 – 80 years. To reach this estimated service life, it is anticipated that one minor rehabilitation and one major rehabilitation will be required for the structure. Assuming a steel truss bridge with a concrete deck, minor and major rehabilitations are anticipated to be completed at the approximate 25-year and 50-year marks respectively.

Following the 75 – 80 year service life inspection and evaluation would be required, however it is anticipated that the substructure could be re-used through a major rehabilitation.

The cost estimate for this option including engineering and contingency, is provided in Table 2 below with a more detailed cost estimate provided in **Appendix B**. Life span costs for this option include typical bridge maintenance required between now and the future rehabilitation or replacement.

Table 2: Estimated Capital and Life Span Costs

Option	Description	Estimated Costs (2021 Dollars)			Estimated Service Life
		2021 Capital Costs	Maintenance and Rehabilitation Costs (over Estimated Service Life)	Total Costs (over Estimated Service Life)	
Option 1	Do Nothing	$25,000	$1,220,000	$1,245,000	<10 years
Option 2	Bridge Rehabilitation	$4,220,000	$600,000	$4,820,000	25-30 years
Option 3	Bridge Superstructure Reconstruction (Like-for-Like Replacement)	$4,820,000	$1,300,000	$6,120,000	50-60 years
Option 4	Bridge Replacement (Prefabricated Pedestrian Bridge)	$4,500,000	$1,300,000	$5,800,000	75-80 years

4. CLASS ENVIRONMENTAL ASSESSMENT IMPLICATIONS

All municipalities in Ontario, including the Town of Tillsonburg, are subject to the provisions of the *Environmental Assessment Act* (EAA) and its requirements to prepare an Environmental Assessment for applicable public works projects. The Ontario Municipal Engineer's Association (MEA) "Municipal Class Environmental Assessment" document (2000 as amended in 2007, 2011, and 2015) provides municipalities with a five-phase planning process approved under the EAA to plan and undertake all municipal infrastructure projects in a manner that protects the environment as defined in the EAA. The MEA Class EA document provides a framework by which transportation projects including water crossings are classified as Schedule A, A+, B, or C, based on a variety of factors including cost, the general complexity of the project, level of investigation required, and the potential impacts on the natural and social environments that may occur.

Schedule A projects are limited in scale, have minimal adverse impacts on the natural and social environments. These projects are pre-approved and may be implemented without following the procedures outlined in the Class EA planning process or undertaking public consultation. Schedule A projects generally include normal or emergency operational and maintenance activities.

Schedule A+ projects are similarly pre-approved but require that proponents notify potentially affected parties prior to implementation. The public has a right to comment to a municipal official or their council regarding the project; however, since these projects are pre-approved, there is no formal appeal process to the Minister of the Environment, Conservation and Parks.

Schedule B projects have the potential for some adverse environmental and social effects, and do not exceed the cost threshold of $2.6M. Proponents are thus required to undertake a screening process involving mandatory contact with potentially affected members of the public, Indigenous Communities, and relevant review agencies to ensure that they are aware of the project and that their concerns are addressed. Schedule B projects require the completion of Phases 1

and 2 of the Class EA planning process, which is documented in a Project File that is submitted for a mandatory 30-day public review period. If concerns are raised that cannot be resolved, any member of the public may appeal to the Minister of the Environment, Conservation and Parks to issue an order to comply with Part II of the EAA, bumping up the status of the project. Schedule B projects generally include improvements and minor expansions to existing facilities.

Schedule C projects have the potential for significant environmental impacts, exceed the $2.6M cost threshold and therefore must follow the full planning process specified in the Class EA document including Phases 1 through 4. The project is documented in an Environmental Study Report (ESR), which is then filed for review by the Public, review agencies, and Indigenous communities. If concerns are raised that cannot be resolved, the Part II Order procedure may be invoked. Schedule C projects generally include the construction of new facilities and major expansions to existing facilities.

We have utilized a revised cost threshold of $2.6M for schedule B and C projects based on the clarifications provided MCEA through their online website.

As indicated in Item 30, page 1-6 of the “Municipal Class Environmental Assessment” document, projects involving:

> *Reconstruction or alteration of a structure or the grading adjacent to it when the structure is over 40 years old (where the proposed work will alter the basic structural system), which after appropriate evaluation is found to have cultural heritage value requires a Schedule B Class EA if project costs do not exceed $2.6M and requires a Schedule C Class EA if project costs exceed $2.6M.*

As the Kinsmen Pedestrian Bridge is over 40 years old (constructed prior to 1910) and is anticipated to have cultural heritage value, any reconstruction or rehabilitation activities will require a Cultural Heritage Evaluation Report (CHER) and Heritage Impact Assessment (HIA). The costs for these studies to support an Environmental Assessment are estimated at $20,000 and have been included in the EA schedule costs outlined in Table 3.

The subsequent EA schedule required will be dependent on the impacts to the existing heritage value determined through the HIA, proposed rehabilitation/replacement activities and overall project costs. As highlighted in Table 3 below, all rehabilitation and replacement Options are estimated to exceed the cost threshold of $2.6M and assuming all of the rehabilitation and replacement Options will have significant impacts to the existing heritage component of the bridge, this project is anticipated to require a either a Schedule C Class EA.

Table 3: Class EA Implications

Option	Description	Estimated Capital Costs (2021 Dollars)	Class EA Schedule Required	Class EA Schedule Costs
Option 1	Do Nothing	$25,000	N/A	N/A
Option 2	Bridge Rehabilitation	$4,220,000	Schedule C *(Dependent on CHER/HIA)*	$95,000+HST
Option 3	Bridge Superstructure Reconstruction (Like-for-Like Replacement)	$4,820,000	Schedule C *(Dependent on CHER/HIA)*	$95,000+HST
Option 4	Bridge Replacement (Prefabricated Pedestrian Bridge)	$4,500,000	Schedule C	$95,000+HST

Although not yet approved, it should be noted that under the proposed 2020 amendments to the Class Environmental Assessment process, there will be changes to the way in which various road and bridge projects are classified. Our understanding of the proposed amendments is that many road and bridge projects that are currently schedule B or C will be reclassified to schedule A or A+ dependent on existing cultural heritage value and scope of reconstruction or replacement work. At the time of writing this report we have used the existing classification process, however once the

proposed amendments are approved, the Town should review the schedule classification of the Kinsmen Pedestrian Bridge.

5. LIMITATIONS

This report is intended exclusively for the Client(s) named in the report. The material in it reflects our best judgment in light of the information reviewed by GM BluePlan Engineering Limited at the time of preparation. Unless otherwise agreed in writing by GM BluePlan Engineering Limited, this report shall not be used to imply warranty as to the fitness of the structure for a particular purpose. This report is not a certification of compliance with past or present regulations. No portion of this report may be used as a separate entity, it is written to be read in its entirety.

Only the specific information identified has been reviewed. The Consultant is not obligated to identify mistakes or insufficiencies in the information obtained from the various sources or to verify the accuracy of the information. The Consultant may use such specific information obtained in performing its services and is entitled to rely upon the accuracy and completeness thereof.

This assessment does not wholly eliminate uncertainty regarding the potential for existing or future losses in connection with the structure. No physical or destructive testing has been performed unless specifically identified. Conditions existing but not recorded were not apparent given the level of study undertaken. We can perform further investigation on items of concern if so required.

6. SUMMARY

GM BluePlan completed a review of four rehabilitation/replacement options including associated estimated capital costs and Class EA implications for the Kinsmen Pedestrian Bridge. The results of the rehabilitation and replacement options, can be summarized as follows:

- Four rehabilitation/replacement options were reviewed, as described below:
    - **Option 1 – Bridge Rehabilitation.** This option includes removal of the existing bridge completely. The estimated remaining service life for the structure for this option is less than 10 years, and the associated estimated 2021 capital cost is $25,000. The total estimated cost over the service life of this option is 1.125M.
    - **Option 2 – Bridge Rehabilitation.** This option includes the replacement of steel bracing beneath the deck and between pier columns, as well as a full deck replacement including all ancillary components. The remaining member not replaced will be blast cleaned and coated. The estimated remaining service life for the structure for this option is 25 – 30 years, and the associated estimated 2021 capital cost is $4.22M. The total estimated cost over the service life of this option is 4.82M.
    - **Option 3 – Bridge Superstructure Reconstruction (Like-for-Like Replacement).** This option includes for reuse of the existing foundations, piers, and abutments with a new bridge superstructure including new pier columns, girders, and deck. As part of this work, concrete and masonry patch repairs to the abutments would be required as well. The estimated remaining service life for the structure for this option is 50 – 60 years, and the associated estimated capital cost is $4.82M. The total estimated cost over the service life of this option is 6.12M.
    - **Option 4 – Bridge Replacement (Prefabricated Pedestrian Bridge).** This option includes for a full structure replacement including bridge piers, abutments, and foundations in their entirety. The estimated service life for this new structure is 75 – 80 years, and the associated estimated capital cost is $4.5M. The total estimated cost over the service life of this option is 5.80M.

We trust our report provides the information that you require at this time. If you have any questions, or if we may be of further assistance, please do not hesitate to contact us.

All of which is respectfully submitted.

GM BLUEPLAN ENGINEERING LIMITED

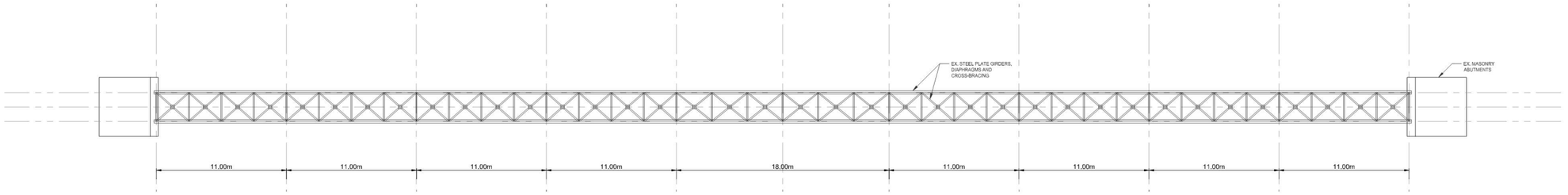
Per:

Brad Walt, C.E.T.
Project Manager

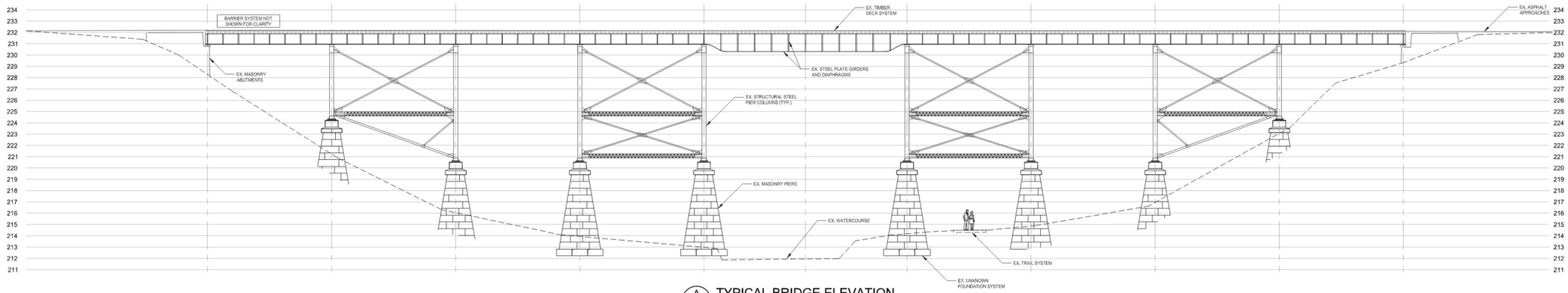
Brandon Clark, E.I.T
Project Designer

BluePlan ENGINEERING

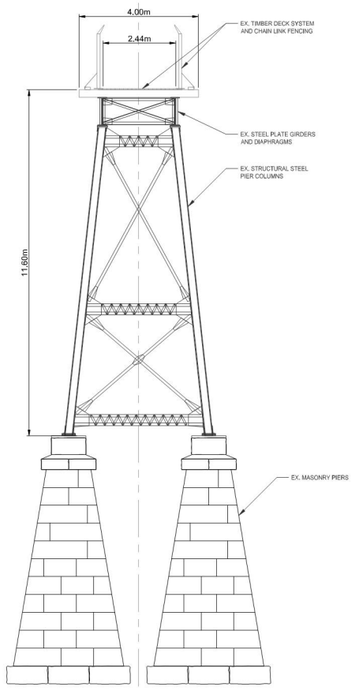
Appendix A – Conceptual Design Drawings



A 01 PLAN VIEW
1:200



A 02 TYPICAL BRIDGE ELEVATION
1:200

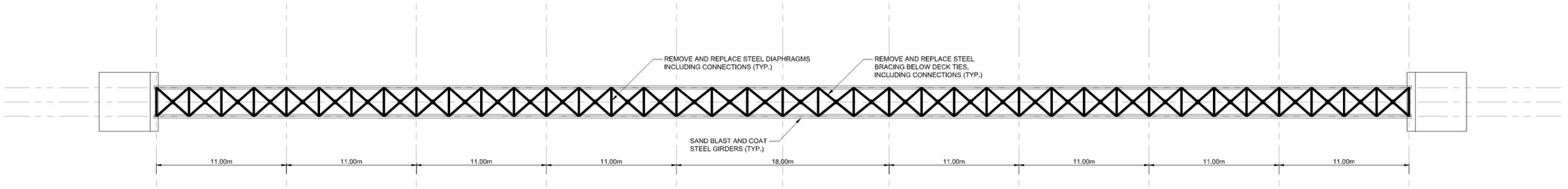


A 03 TYPICAL BRIDGE SECTION
1:100

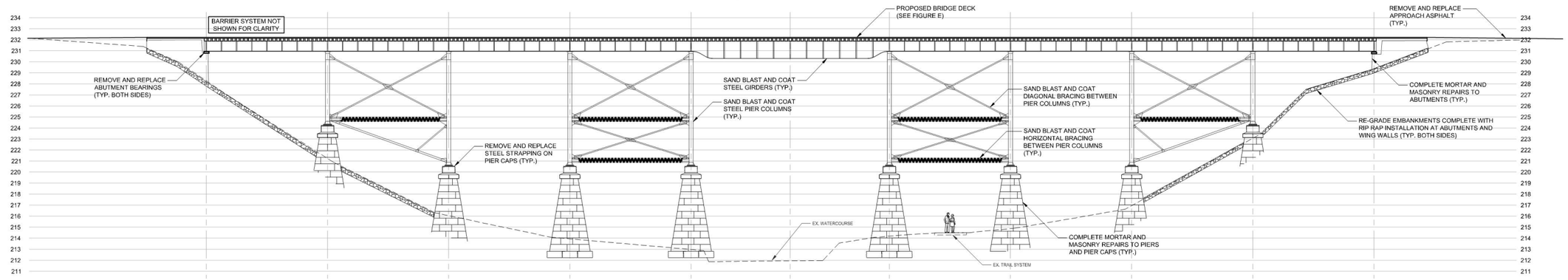
KINSMEN PEDESTRIAN BRIDGE

TOWN OF TILLSONBURG

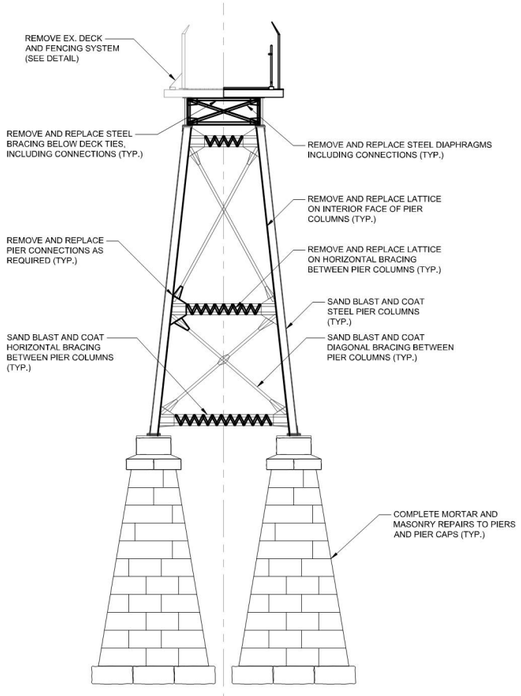
FIGURE A
EXISTING CONDITIONS



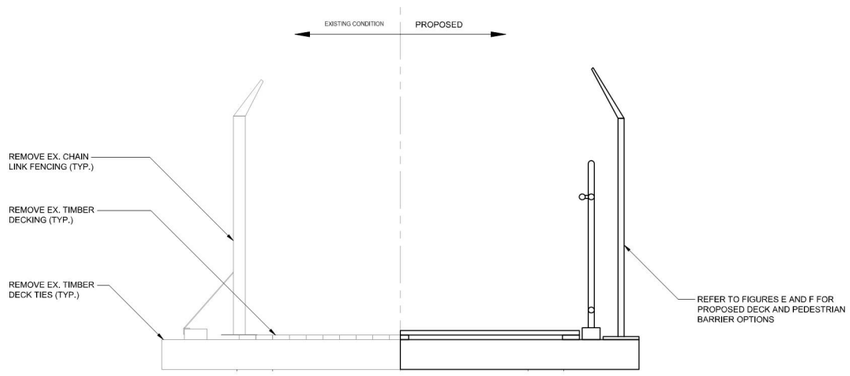
B 01 PLAN VIEW
1:200



B 02 TYPICAL BRIDGE ELEVATION
1:200



B 03 TYPICAL BRIDGE SECTION
1:100

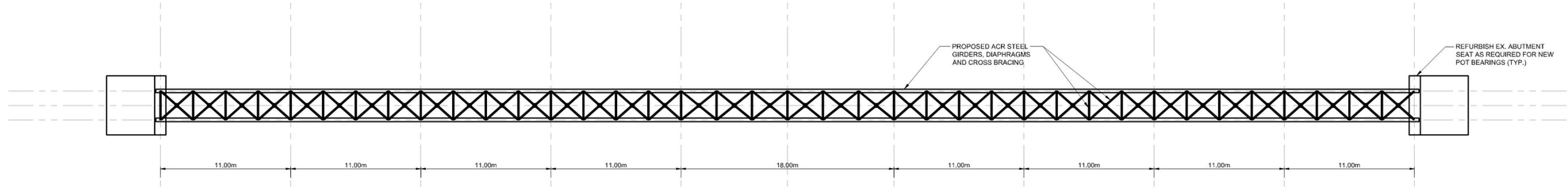


B 04 DECK AND PEDESTRIAN BARRIER DETAIL
1:25

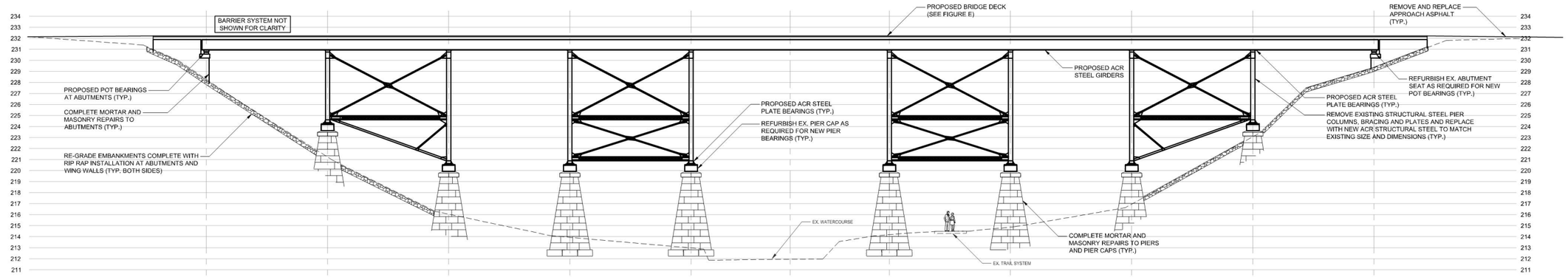
KINSMEN PEDESTRIAN BRIDGE

TOWN OF TILLSONBURG

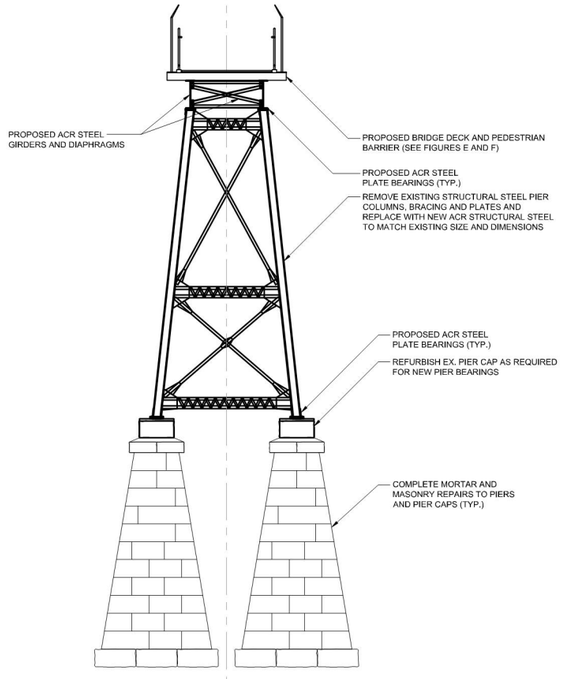
FIGURE B
OPTION 2 - BRIDGE REHABILITATION



C 01 PLAN VIEW
1:200



C 02 TYPICAL BRIDGE ELEVATION
1:200

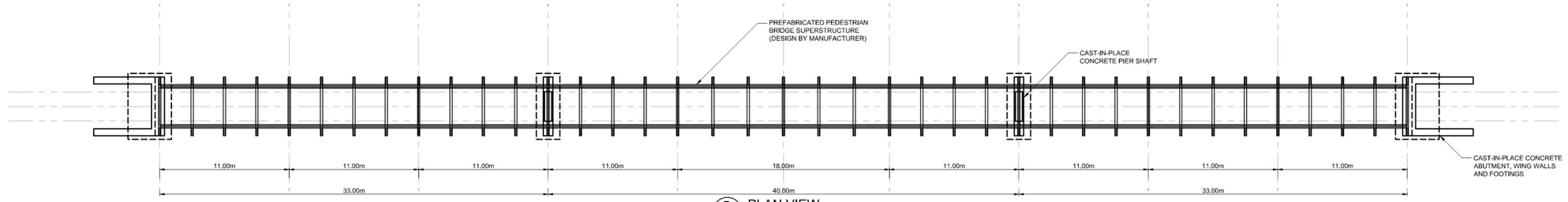


C 03 TYPICAL BRIDGE SECTION
1:100

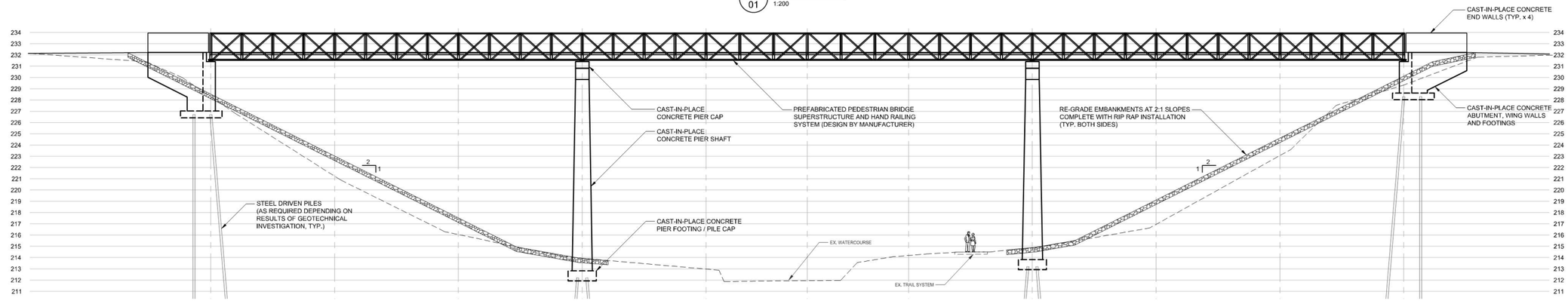
KINSMEN PEDESTRIAN BRIDGE

TOWN OF TILLSONBURG

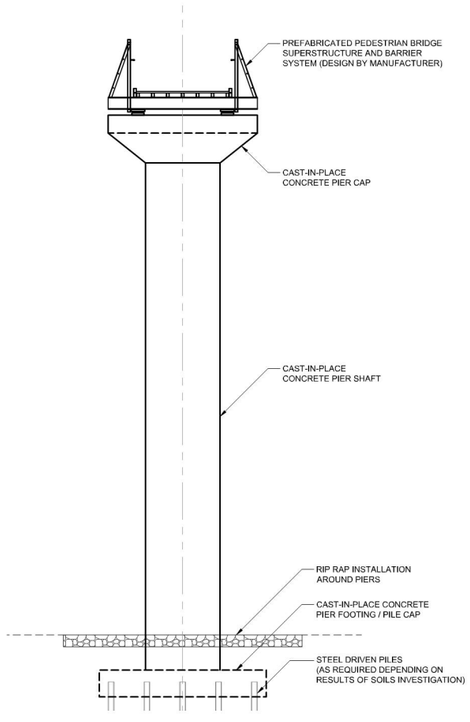
FIGURE C
OPTION 3 - BRIDGE SUPERSTRUCTURE RECONSTRUCTION (LIKE-FOR-LIKE REPLACEMENT)



D 01 PLAN VIEW
1:200



D 02 TYPICAL BRIDGE ELEVATION
1:200



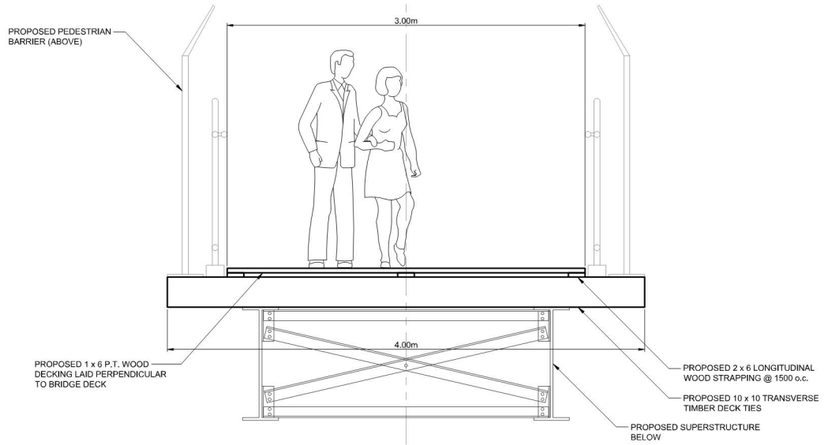
D 03 TYPICAL BRIDGE SECTION
1:100

KINSMEN PEDESTRIAN BRIDGE

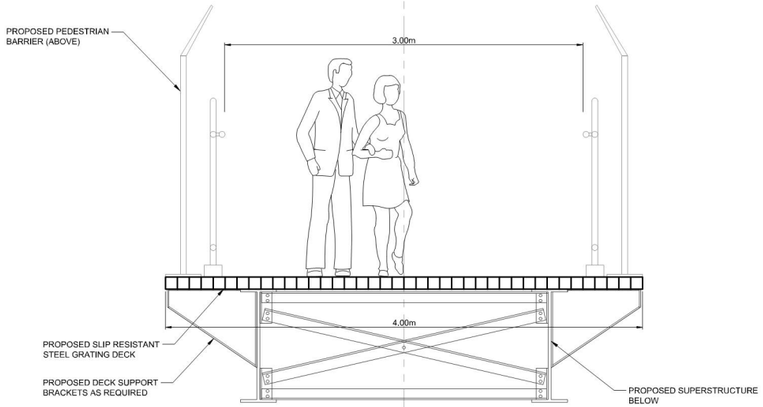
TOWN OF TILLSONBURG

FIGURE D

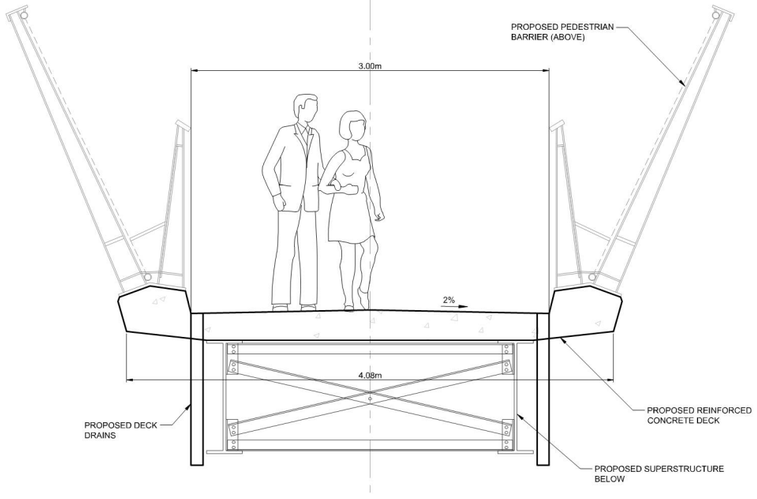
OPTION 4 - BRIDGE REPLACEMENT (PREFABRICATED PEDESTRIAN BRIDGE)



E 01 DECK OPTION 1 - WOOD DECK
1:25



E 03 DECK OPTION 3 - STEEL GRATING DECK
1:25

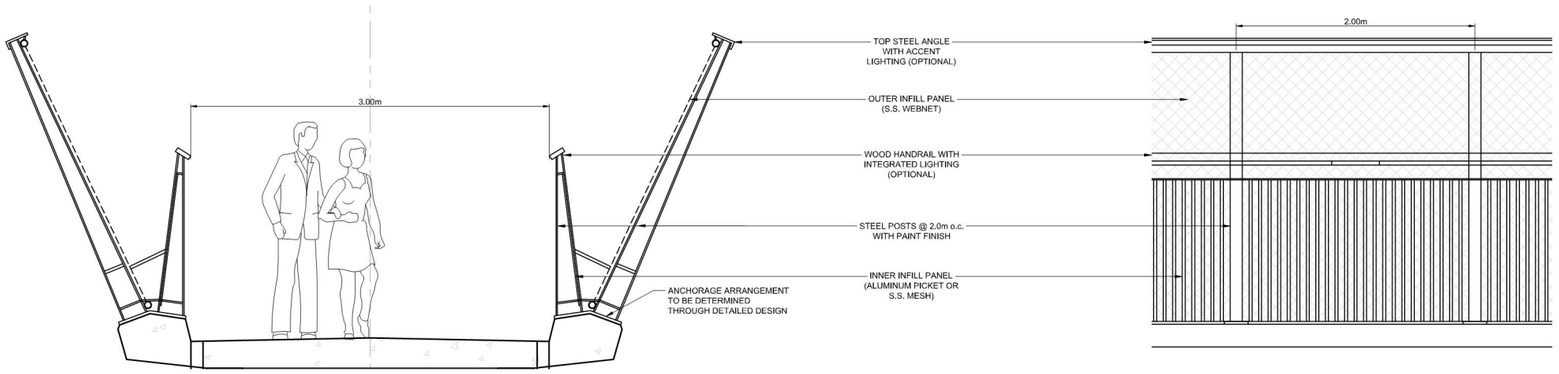


E 02 DECK OPTION 2 - CONCRETE DECK
1:25

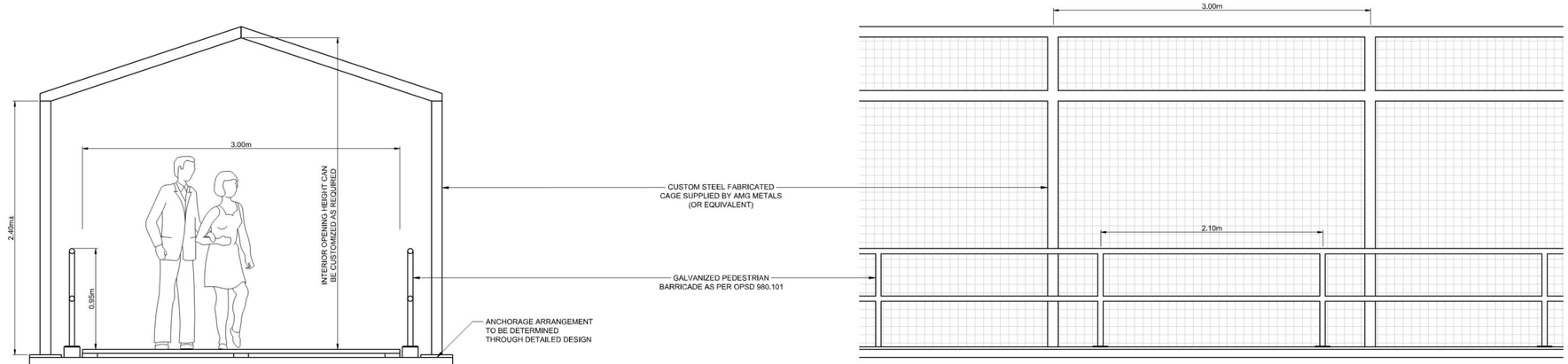
KINSMEN PEDESTRIAN BRIDGE

TOWN OF TILLSONBURG

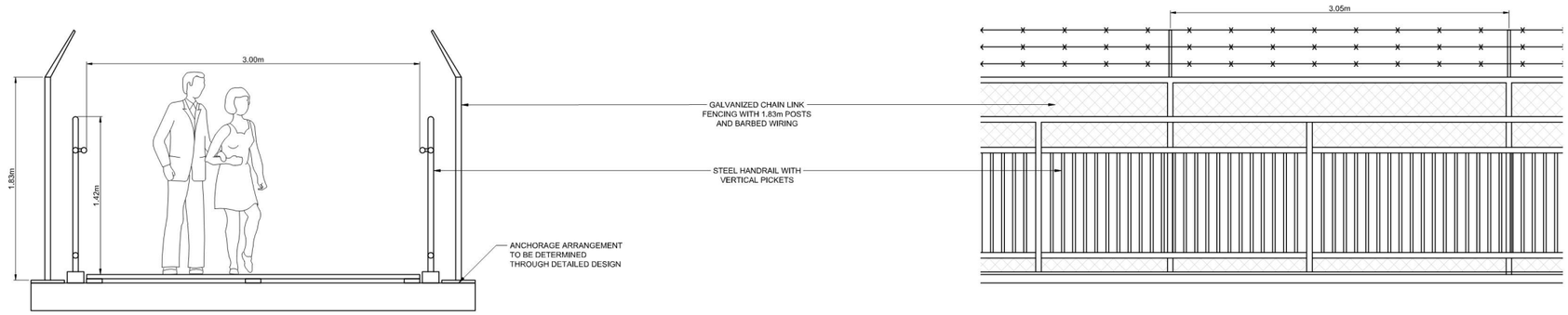
FIGURE E
DECK REPLACEMENT OPTIONS



F 01 HIGH RANGE PEDESTRIAN BARRIER (SUPPLIED BY AMG METALS)
1:25



F 02 MID RANGE PEDESTRIAN BARRIER
1:25



F 03 LOW RANGE PEDESTRIAN BARRIER
1:25

KINSMEN PEDESTRIAN BRIDGE

TOWN OF TILLSONBURG

FIGURE F
PEDESTRIAN BARRIER OPTIONS

BluePlan ENGINEERING

Appendix B – Cost Estimates

BluePlan ENGINEERING

KINSMEN PEDESTRIAN BRIDGE
TOWN OF TILLSONBURG
PRELIMINARY CONCEPTUAL DESIGN COST ESTIMATES

OPTION 1 - DO NOTHING

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL AMOUNT
ESTIMATED COSTS TO CLOSE THE BRIDGE					
	Bridge closure, barricades and fencing	100%	L.S.	$ 25,000.00	$ 25,000.00
				2021 CAPITAL COSTS - OPTION 1	**$ 25,000.00**
FUTURE ESTIMATED COSTS TO REMOVE THE EXISTING BRIDGE					
A MOBILIZATION AND PROJECT PREPARATION					
A.1	Mobilization, demobilization and miscellaneous project costs	100%	L.S.	$ 40,000.00	$ 40,000.00
A.2	Bonding and insurance	100%	L.S.	$ 20,000.00	$ 20,000.00
A.4	Environmental protection measures	100%	L.S.	$ 30,000.00	$ 30,000.00
A.5	Construction site access - temporary road access	100%	L.S.	$ 200,000.00	$ 200,000.00
A.6	Site restoration	100%	L.S.	$ 40,000.00	$ 40,000.00
SUB-TOTAL SECTION A					**$ 290,000.00**
B REMOVAL WORK					
B.1	Removal of approach asphalt, bridge deck, barriers, complete	100%	L.S.	$ 75,000.00	$ 75,000.00
B.2	Removal of steel superstructure, complete	100%	L.S.	$ 250,000.00	$ 250,000.00
B.3	Removal of concrete abutments, piers, and pile caps, complete	100%	L.S.	$ 450,000.00	$ 450,000.00
SUB-TOTAL SECTION B					**$ 780,000.00**
				SUB-TOTAL SECTION A-B	**$ 1,070,000.00**
C PROVISIONAL AND CONTINGENCY ITEMS					
C.1	Engineering design, construction administration and inspection fees	100%	L.S.	$ 50,000.00	$ 50,000.00
C.2	Contingency allowance (10%)	100%	L.S.	$ 100,000.00	$ 100,000.00
SUB-TOTAL SECTION C					**$ 150,000.00**
				FUTURE ESTIMATED REMOVAL COSTS	**$ 1,220,000.00**
				TOTAL COSTS OVER ESTIMATED SERVICE LIFE - OPTION 1	**$ 1,245,000.00**

BluePlan ENGINEERING

KINSMEN PEDESTRIAN BRIDGE
TOWN OF TILLSONBURG
PRELIMINARY CONCEPTUAL DESIGN COST ESTIMATES

OPTION 2 - BRIDGE REHABILITATION

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL AMOUNT
A MOBILIZATION AND PROJECT PREPARATION					
A.1	Mobilization, demobilization and miscellaneous project costs	100%	L.S.	$ 100,000.00	$ 100,000.00
A.2	Bonding and insurance	100%	L.S.	$ 75,000.00	$ 75,000.00
A.3	Pedestrian traffic control - full bridge closure	100%	L.S.	$ 20,000.00	$ 20,000.00
A.4	Environmental protection measures	100%	L.S.	$ 30,000.00	$ 30,000.00
A.5	Temporary access system	100%	L.S.	$ 500,000.00	$ 500,000.00
A.6	Supply and install bird netting	100%	L.S.	$ 20,000.00	$ 20,000.00
A.7	Coordination with utilities	100%	L.S.	$ 5,000.00	$ 5,000.00
A.8	Contractor Layout	100%	L.S.	$ 5,000.00	$ 5,000.00
SUB-TOTAL SECTION A					**$ 760,000.00**
B REMOVAL WORK					
B.1	Removal of approach asphalt, bridge deck, barriers, complete	100%	L.S.	$ 75,000.00	$ 75,000.00
SUB-TOTAL SECTION B					**$ 75,000.00**
C STRUCTURE REHABILITATION WORK					
C.1	Supply and install timber deck boards	320.0	m2	$ 500.00	$ 160,000.00
C.2	Supply and install timber deck ties	100%	L.S.	$ 70,000.00	$ 70,000.00
C.3	Temporary bridge jacking	100%	L.S.	$ 200,000.00	$ 200,000.00
C.4	Remove and replace abutment bearings	4.0	Ea.	$ 15,000.00	$ 60,000.00
C.5	Remove and replace deteriorated steel web stiffeners at on girders	100%	L.S.	$ 30,000.00	$ 30,000.00
C.6	Remove and replace steel diaphragms beneath the deck	100%	L.S.	$ 200,000.00	$ 200,000.00
C.7	Remove and replace steel bracing beneath the deck	100%	L.S.	$ 150,000.00	$ 150,000.00
C.8	Remove and replace steel lattice on pier columns	100%	L.S.	$ 50,000.00	$ 50,000.00
C.9	Remove and replace lattice on horizontal bracing between steel piers	100%	L.S.	$ 50,000.00	$ 50,000.00
C.10	Replacement of structural connections (provisional)	114.0	Ea.	$ 1,500.00	$ 171,000.00

C.11	Concrete and masonry motar repairs				
C.11.1	Abutments	100%	L.S.	$ 10,000.00	$ 10,000.00
C.11.2	Wingwalls	100%	L.S.	$ 10,000.00	$ 10,000.00
C.11.3	Piers	100%	L.S.	$ 50,000.00	$ 50,000.00
C.12	Supply and install chain link fence	225.0	m	$ 75.00	$ 16,875.00
C.13	Supply and install approved pedestrian barrier over bridge deck and approaches (low range barrier)	225.0	m	$ 350.00	$ 78,750.00
SUB-TOTAL SECTION C					**$ 1,310,000.00**
D COATING REHABILITATION WORK					
D.1	Environmental containment and contaminant removal	100%	L.S.	$ 400,000.00	$ 400,000.00
D.2	Abrasive blast cleaning and coating on structural steel				
D.2.1	Main plate girders (Approx. 750m^2)	100%	L.S.	$ 250,000.00	$ 250,000.00
D.2.2	Horizontal bracing between piers (Approx. 400m^2)	100%	L.S.	$ 110,000.00	$ 110,000.00
D.2.3	Diagonal bracing between piers (Approx. 350m^2)	100%	L.S.	$ 100,000.00	$ 100,000.00
D.2.4	Pier columns (Approx. 340m^2)	100%	L.S.	$ 95,000.00	$ 95,000.00
D.2.5	Structural connections (Qty = 114)	100%	L.S.	$ 90,000.00	$ 90,000.00
D.2.6	Pier Bearings (Qty = 16)	100%	L.S.	$ 30,000.00	$ 30,000.00
D.3	Seal structural steel joints and connections with epoxy sealer	100%	L.S.	$ 40,000.00	$ 40,000.00
SUB-TOTAL SECTION D					**$ 1,120,000.00**
E ROAD WORKS AND SITE RESTORATION					
E.1	Remove and replace asphalt approaches	100%	L.S.	$ 20,000.00	$ 20,000.00
E.2	Earth excavation, backfill and grading	100%	L.S.	$ 25,000.00	$ 25,000.00
E.3	Supply and install R-50 rip rap on embankments and at abutment faces	100%	L.S.	$ 50,000.00	$ 50,000.00
E.4	Site restoration	100%	L.S.	$ 30,000.00	$ 30,000.00
SUB-TOTAL SECTION E					**$ 125,000.00**
				SUB-TOTAL SECTION A-E	**$ 3,390,000.00**

F ENGINEERING AND CONTINGENCY ITEMS					
F.1	Engineering design, construction administration and inspection fees (10%)	100%	L.S.	$ 330,000.00	$ 330,000.00
F.2	Contingency allowance (15%)	100%	L.S.	$ 500,000.00	$ 500,000.00
SUB-TOTAL SECTION F					**$ 830,000.00**
				2021 CAPITAL COSTS - OPTION 2	**$ 4,220,000.00**
				FUTURE MAINTENANCE AND REHABILITATION COSTS (OVER ESTIMATED SERVICE LIFE)	**$ 600,000.00**
				TOTAL COSTS OVER ESTIMATED SERVICE LIFE - OPTION 2	**$ 4,820,000.00**
	Additional costs for concrete deck	100%	L.S.	$ -	$ -
	Additional costs for steel grating deck	100%	L.S.	$ 275,000.00	$ 275,000.00
	Additional costs for mid range pedestrian barrier	225.0	m	$ 200.00	$ 45,000.00
	Additional costs for high range pedestrian barrier	225.0	m	$ 500.00	$ 112,500.00
	Additional costs for decorative lighting	100%	L.S.	$ 75,000.00	$ 75,000.00

*Additional costs noted above are above and beyond the costs within the estimate and should be added to the total for comparison purposes.

BluePlan ENGINEERING

KINSMEN PEDESTRIAN BRIDGE
TOWN OF TILLSONBURG
PRELIMINARY CONCEPTUAL DESIGN COST ESTIMATES

OPTION 3 - BRIDGE SUPERSTRUCTURE RECONSTRUCTION (LIKE-FOR-LIKE REPLACEMENT)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL AMOUNT
A MOBILIZATION AND PROJECT PREPARATION					
A.1	Mobilization, demobilization and miscellaneous project costs	100%	L.S.	$ 125,000.00	$ 125,000.00
A.2	Bonding and insurance	100%	L.S.	$ 100,000.00	$ 100,000.00
A.3	Pedestrian traffic control - full bridge closure	100%	L.S.	$ 20,000.00	$ 20,000.00
A.4	Environmental protection measures	100%	L.S.	$ 30,000.00	$ 30,000.00
A.5	Temporary access system	100%	L.S.	$ 500,000.00	$ 500,000.00
A.6	Coordination with Utilities	100%	L.S.	$ 5,000.00	$ 5,000.00
A.7	Contractor Layout	100%	L.S.	$ 5,000.00	$ 5,000.00
SUB-TOTAL SECTION A					**$ 790,000.00**
B REMOVAL WORK					
B.1	Removal of approach asphalt, bridge deck, barriers, complete	100%	L.S.	$ 75,000.00	$ 75,000.00
B.2	Removal of steel superstructure, complete	100%	L.S.	$ 250,000.00	$ 250,000.00
SUB-TOTAL SECTION B					**$ 325,000.00**
C STRUCTURE REHABILITATION WORK					
C.1	Supply and install timber deck boards	320.0	m2	$ 500.00	$ 160,000.00
C.2	Supply and install timber deck ties	100%	L.S.	$ 70,000.00	$ 70,000.00
C.3	Supply and install steel girders	18.0	Ea.	$ 45,000.00	$ 810,000.00
C.4	Supply and install steel diaphragms beneath the deck	100%	L.S.	$ 200,000.00	$ 200,000.00
C.5	Supply and install steel bracing beneath the deck	100%	L.S.	$ 150,000.00	$ 150,000.00
C.6	Supply and install steel pier columns	100%	L.S.	$ 210,000.00	$ 210,000.00
C.7	Supply and install horizontal bracing between steel piers	100%	L.S.	$ 150,000.00	$ 150,000.00
C.8	Supply and install diagonal bracing between pier columns	100%	L.S.	$ 225,000.00	$ 225,000.00
C.9	Supply and install structural connections	114.0	Ea.	$ 1,500.00	$ 171,000.00
C.10	Remove and replace steel strapping on pier caps	16.0	Ea.	$ 1,000.00	$ 16,000.00
C.11	Supply and install pier and abutment bearings	20.0	Ea.	$ 15,000.00	$ 300,000.00

C.12	Concrete and masonry motar repairs				
C.12.1	Abutments	100%	L.S.	$ 10,000.00	$ 10,000.00
C.12.2	Wingwalls	100%	L.S.	$ 10,000.00	$ 10,000.00
C.12.3	Piers	100%	L.S.	$ 50,000.00	$ 50,000.00
C.13	Supply and install chain link fencing	225.0	m	$ 75.00	$ 16,875.00
C.14	Supply and install approved pedestrian barrier over bridge deck and approaches (low range barrier)	225.0	m	$ 350.00	$ 78,750.00
SUB-TOTAL SECTION C					**$ 2,630,000.00**
D ROAD WORKS AND SITE RESTORATION					
D.1	Remove and replace asphalt approaches	100%	L.S.	$ 20,000.00	$ 20,000.00
D.2	Earth excavation, backfill and grading	100%	L.S.	$ 35,000.00	$ 35,000.00
D.3	Supply and install R-50 rip rap on embankments and at abutment faces	100%	L.S.	$ 50,000.00	$ 50,000.00
D.4	Site restoration	100%	L.S.	$ 30,000.00	$ 30,000.00
SUB-TOTAL SECTION D					**$ 140,000.00**
				SUB-TOTAL SECTION A-D	**$ 3,890,000.00**
E PROVISIONAL AND CONTINGENCY ITEMS					
E.1	Engineering design, construction administration and inspection fees (10%)	100%	L.S.	$ 380,000.00	$ 380,000.00
E.2	Contingency allowance (15%)	100%	L.S.	$ 550,000.00	$ 550,000.00
SUB-TOTAL SECTION E					**$ 930,000.00**
				2021 CAPITAL COSTS - OPTION 3	**$ 4,820,000.00**
				FUTURE MAINTENANCE AND REHABILITATION COSTS (OVER ESTIMATED SERVICE LIFE)	**$ 1,300,000.00**
				TOTAL COSTS OVER ESTIMATED SERVICE LIFE - OPTION 3	**$ 6,120,000.00**
	Additional cost to remove and replace abutments and piers	100%	L.S.	$ 1,500,000.00	$ 1,500,000.00
	Additional costs for pile foundation	100%	L.S.	$ 500,000.00	$ 500,000.00
	Additional costs for concrete deck	100%	L.S.	$ -	$ -
	Additional costs for steel grating deck	100%	L.S.	$ 275,000.00	$ 275,000.00
	Additional costs for mid range pedestrian barrier	225.0	m	$ 200.00	$ 45,000.00
	Additional costs for high range pedestrian barrier	225.0	m	$ 500.00	$ 112,500.00
	Additional costs for decorative lighting	100%	L.S.	$ 75,000.00	$ 75,000.00

*Need geotechnical investigation to confirm replacement foundation costs

*Additional costs noted above are above and beyond the costs within the estimate and should be added to the total for comparison purposes.

BluePlan ENGINEERING

KINSMEN PEDESTRIAN BRIDGE
TOWN OF TILLSONBURG
PRELIMINARY CONCEPTUAL DESIGN COST ESTIMATES

OPTION 4 - BRIDGE REPLACEMENT (PREFABRICATED PEDESTRIAN BRIDGE)

ITEM NO.	DESCRIPTION	ESTIMATED QUANTITY	UNIT OF MEASURE	UNIT PRICE	TOTAL AMOUNT
A MOBILIZATION AND PROJECT PREPARATION					
A.1	Mobilization, demobilization and miscellaneous project costs	100%	L.S.	$ 100,000.00	$ 100,000.00
A.2	Bonding and insurance	100%	L.S.	$ 75,000.00	$ 75,000.00
A.3	Pedestrian traffic control - full bridge closure	100%	L.S.	$ 20,000.00	$ 20,000.00
A.4	Environmental protection measures	100%	L.S.	$ 30,000.00	$ 30,000.00
A.5	Construction site access - temporary road access	100%	L.S.	$ 500,000.00	$ 500,000.00
A.6	Dewatering	100%	L.S.	$ 50,000.00	$ 50,000.00
A.7	Coordination with utilities	100%	L.S.	$ 5,000.00	$ 5,000.00
A.8	Contractor Layout	100%	L.S.	$ 5,000.00	$ 5,000.00
SUB-TOTAL SECTION A					**$ 790,000.00**
B REMOVAL WORK					
B.1	Removal of approach asphalt, bridge deck, barriers, complete	100%	L.S.	$ 75,000.00	$ 75,000.00
B.2	Removal of steel superstructure, complete	100%	L.S.	$ 250,000.00	$ 250,000.00
B.3	Removal of concrete abutments, piers, and pile caps, complete	100%	L.S.	$ 450,000.00	$ 450,000.00
SUB-TOTAL SECTION B					**$ 780,000.00**
C STRUCTURE REPLACEMENT WORK					
C.1	Form and pour concrete pile caps, complete	80.0	m^3	$ 1,500.00	$ 120,000.00
C.2	Form and pour concrete piers and pier caps including reinforcement, complete	165.0	m^3	$ 1,500.00	$ 247,500.00
C.3	Form and pour concrete abutments including reinforcement, complete	80.0	m^3	$ 1,500.00	$ 120,000.00
C.4	Supply and install abutment and pier bearings	8.0	Ea.	$ 15,000.00	$ 120,000.00
C.5	Supply prefabricated pedestrian bridge complete with deck, curbs, barriers, complete	100%	L.S.	$ 800,000.00	$ 800,000.00
C.6	Install prefabricated pedestrian bridge complete with deck, curbs, barriers, complete	100%	L.S.	$ 300,000.00	$ 300,000.00
C.7	Supply and install cast-in-place concrete endwalls at each approach	4.0	Ea.	$ 5,000.00	$ 20,000.00
SUB-TOTAL SECTION C					**$ 1,730,000.00**

D ROAD WORKS AND SITE RESTORATION					
D.1	Remove and replace asphalt approaches	100%	L.S.	$ 50,000.00	$ 50,000.00
D.2	Earth excavation, backfill and grading	100%	L.S.	$ 150,000.00	$ 150,000.00
D.3	Supply and install R-50 rip rap on embankments and at abutment faces	100%	L.S.	$ 50,000.00	$ 50,000.00
D.4	Site restoration	100%	L.S.	$ 100,000.00	$ 100,000.00
SUB-TOTAL SECTION D					**$ 350,000.00**
	SUB-TOTAL SECTION A-D				**$ 3,650,000.00**
E PROVISIONAL AND CONTINGENCY ITEMS					
E.1	Engineering design, construction administration and inspection fees (10%)	100%	L.S.	$ 350,000.00	$ 350,000.00
E.2	Contingency allowance (15%)	100%	L.S.	$ 500,000.00	$ 500,000.00
SUB-TOTAL SECTION E					**$ 850,000.00**
	2021 CAPITAL COSTS - OPTION 4				**$ 4,500,000.00**
	FUTURE MAINTENANCE AND REHABILITATION COSTS (OVER ESTIMATED SERVICE LIFE)				**$ 1,300,000.00**
	TOTAL COSTS OVER ESTIMATED SERVICE LIFE - OPTION 4				**$ 5,800,000.00**
	Pile foundation* (PROVISIONAL)	100%	L.S.	$ 500,000.00	$ 500,000.00
	Additional costs for decorative lighting	100%	L.S.	$ 75,000.00	$ 75,000.00

*Need geotechnical investigation to confirm replacement foundation costs

*Additional costs noted above are above and beyond the costs within the estimate and should be added to the total for comparison purposes.