Project Report

December 2, 2019

City of Kingston - Third Crossing of the Cataraqui River Parks Canada Environmental Impact Analysis

Detailed Impact Analysis Report - Section 1

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1. Introduction and Project Scope

The City of Kingston - Third Crossing of the Cataraqui River Project (hereinafter referred to as “the Third Crossing” or “the Project”) involves the construction of a new, two-lane bridge spanning 1.2 km over the Cataraqui River, which forms part of the historic Rideau Canal. The Project Location is provided in Figure 1.1. The Universal Transverse Mercator (UTM) coordinates, taken near the mid-point of the Project Location, is generally UTM 18T 382402 metres (m) East, 4901531 m North. At this location, the Cataraqui River forms part of the Rideau Canal, a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site, National Historic Site of Canada (NHSC), Canadian Heritage River, and a Federally regulated navigable waterway. The bridge includes shared and active transportation links such as:

- a multi-use pedestrian and bike pathway with rest areas.
- sidewalks and cycle lanes on the road approaches.
- connections to waterfront trails on either side of the Cataraqui River, providing increased opportunities for walking and cycling for residents and visitors to Kingston.

The Project consists of two lanes for vehicle traffic that extend over the Cataraqui River and continue on John Counter Boulevard on the west shore and Gore Road on the east shore; widening of roadway approaches to connect the bridge with the land, accommodate active transportation and provide appropriate turning lanes that connect Montreal Street with Highway 15. Approximately 800 m of roadway, intersection and shoreland improvements will form the roadway component of the Project. Those include:

- Approximately 270 m of roadway from the bridge abutment on the west shore to the intersection at John Counter Boulevard and Montreal Street.
- Approximately 530 m of roadway from the bridge abutment on the east shore to the intersection at Dalgleish Avenue and MacLean Court.
- 4-m multi-use pathway(s) provided along the south side of the bridge deck for active transportation and look-out and interpretive areas. These pathways will span the bridge deck and end at the intersections of John

Counter Boulevard and Montreal Street to the west and Gore Road and Highway 15 to the east.

- Barriers for public safety to separate the vehicle traffic and the multi-use path.
- Public viewing areas on the east alignment of the bridge.

The City of Kingston (City) has retained a project team consisting of Peter Kiewit Sons ULC (Kiewit), Hatch Ltd. (Hatch) and SYSTRA International Bridge Technologies (SYSTRA) as the primary proponents (Integrated Project Delivery (IPD) Team) to prepare the enclosed Parks Canada Environmental Impact Analysis (EIA) Report. At the City's direction, the IPD team has coordinated the transfer of the Report from the Pre-Design team, lead by JL Richards (JLR), to update the report to reflect the bridge design and construction methodology developed during the IPD validation phase. The City has chosen an IPD model to steer the Project forward in a timely and cost-effective manner.

The IPD Team is supplemented by specialized industry experts Brownlie Ernst and Marks (BEaM), Vertechs Designs, Moon-Matz, Tulloch and Bergman. The DIA focuses on a bridge over the Cataraqui River and associated land works within the City that will link John Counter Boulevard on the west side and Gore Road on the east side (Project/Project Location).

An Ontario Municipal Class Environmental Assessment (Municipal Class EA) commenced in 2009 and approved in 2013 by the Province of Ontario. As such, the City's Action Plan, which was prepared in 2013 and updated in 2015, outlines the process needed to advance the Project from the Municipal Class EA.

1.1 Canadian Environmental Assessment Act, 2012 (CEAA 2012)

The riverbed within and adjacent to the Project Location is owned by the Federal Government and managed by Parks Canada. As such, the Municipal Class EA was in process of addressing the Federal EA framework, until Federal changes to the CEAA in 2012 suspended this requirement.

Section 67 of CEAA 2012 requires federal land managers to make a determination on whether a project for which they must authorize is likely to cause significant adverse environmental effects. Parks Canada's 'Directive on Impact Assessment' outlines the legislative and policy requirements and

accountabilities for the assessment of impacts of proposed projects within Parks Canada protected heritage places, which includes the Rideau Canal. In keeping with its mandated priorities, Parks Canada's EIA process examines how a project may lead to adverse effects on:

- Natural resources, including Species at Risk, air, ground and surface water, soils, habitat features, as well as plants and animals found in the vicinity of a project or otherwise potentially affected by the project.
- Cultural resources, including potential adverse effects to heritage value and character defining elements of known cultural resources, and risks to areas with high potential to contain cultural resources where no inventory has yet been completed.

In addition, the PCA EIA process requires consideration of how the effects of a proposed project on natural resources may in turn cause:

- Adverse effects to characteristics of the environment important to key visitor experience (how the Project is anticipated to affect activities and/or visitors' enjoyment and connection to place, in relation to defined objectives for the protected heritage place).
- Adverse effects to health and socio-economic conditions of Indigenous Peoples and non-Indigenous communities.
- Adverse effects to Indigenous peoples' current use of lands and resources for traditional purposes.

The proposed Project is subject to Parks Canada Agency's EIA process, developed to fulfill this agency's requirements as a federal land manager under the Canadian Environmental Assessment Act (CEAA), 2012 (S.C. 2012, c.19, s. 52) as well as its legal and mandated obligations to protect Canada's natural and cultural heritage.

Given the nature of the Project and the sensitivity of the Project Location, PCA's Director of Waterways has determined that the Detailed Impact Analysis (DIA) pathway is to be used for the Parks Canada EIA. The DIA is the most comprehensive level of assessment, intended for complex projects that require applied analysis of project interactions with Valued Components that may affect a particularly sensitive environmental setting or threaten one

or more sensitive Valued Components. In addition, the DIA requires public engagement and consultation, including:

- Notification from PCA to relevant parties (the public, stakeholders, Indigenous peoples) of the decision to undertake a DIA for a project, and provide information on the planned EIA, including a project summary, an overview of the Valued Components to be assessed, and an outline of planned review, engagement and consultation opportunities.
- Opportunity to review and comment on this DIA.

PCA, in consultation with the City and Project Team, prepared a Scoping Document for the DIA for this Project, which is included in Appendix A. The Scoping Document outlines the roles and responsibilities for the Federal Agencies and the proponent, which are provided in the following sections.

This report includes a description of:

- the proposed Project, including a discussion of the Project background and Proponent.
- the existing natural and socioeconomic environments within the Study Area.
- the potential adverse effects of the Project.
- mitigation measures to be implemented to prevent/minimize adverse effects.
- residual effects that will remain following implementation of mitigation and assesses the significance of adverse residual effects.
- cumulative effects and the significance of any residual cumulative effects.
- Public, Stakeholder and indigenous Consultation.
- proposed construction, operational and follow-up monitoring programs.

1.1.1 Parks Canada Agency

As the federal land manager in charge of the bed of the Rideau Canal National Historic Site, Parks Canada is responsible for making a determination on the likelihood of the proposed Project to cause significant adverse environmental effects as per Section 67 of CEAA 2012.

Parks Canada will provide guidance to the proponent, both written and verbally, to support the proponent in preparing a draft report that will cover all of the key considerations highlighted in this scoping document. This includes participation in meetings and teleconferences, written correspondence, and comments and recommendations on drafts submitted for review.

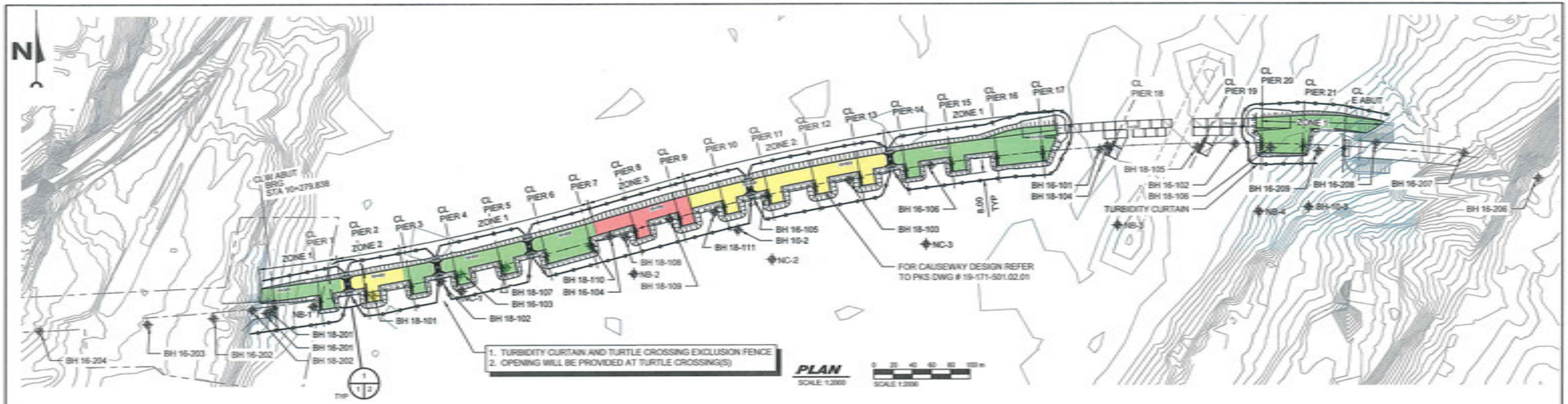
1.1.2 Other Responsible and Expert Federal Authorities

Other federal agencies having responsibilities as they relate to permitting and requirements under Section 67 of CEAA 2012 include Fisheries and Oceans Canada (DFO) and Transport Canada (TC). See Appendix A for the summary of specific regulations. Additionally, Environment and Climate Change Canada (ECCC) supports the federal authorities by providing input and scientific advice during the review of the DIA.

1.1.3 Proponent (City of Kingston)

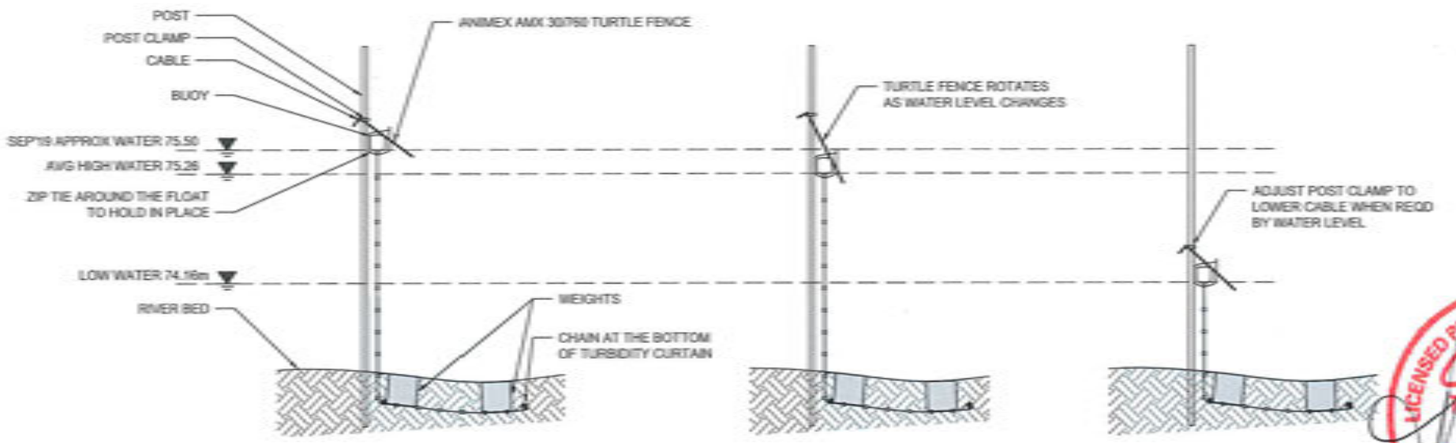
The proponent is responsible for preparing a DIA report and providing supporting documentation that will be submitted to the federal departments for a joint determination of the likelihood of the Project to cause significant adverse environmental impacts to their respective areas of responsibility.

There may be permits or authorizations required by other departments or agencies to complete the Project. The proponent is responsible for determining these requirements and obtaining any necessary authorizations.



GENERAL NOTES:

1. ALL DIMENSIONS, UNITS, AND ELEVATIONS IN METERS UNLESS NOTED OTHERWISE
2. EACH TURTLE PASSAGE CONSISTS OF FOUR (4) [12.2 m (40') LONG STANDARD CONEX BOXES; TWO GROUPINGS OF TWO BOXES PLACED END TO END, WITH A 2.0 m UNDISTURBED GAP BETWEEN THEM TO CREATE THE PASSAGEWAY FOR THE TURTLES
3. DECKING WILL CONSIST OF TWO (2) LAYERS OF 6.1 x 3.6 x 0.3 m THICK TIMBER MATS, WITH STEEL GRATING TO PROVIDE PATHWAY FOR LIGHT TO ENTER THE PASSAGE. GRATING SHALL BE ORIENTED ALONG THE DIRECTION OF TRAVEL.
4. THE CONEX BOXES WILL BE PLACED ON THEIR SIDE WITH THE BOTTOM OF THE BOXES FACING THE TURTLE PASSAGE
5. EACH CONEX SHALL HAVE TWENTY (20) Ø75 mm (3") HOLES CUT OUT OF THE BOTTOM FACE TO ALLOW ENTRY OF WATER SO THAT THEY CAN BE LOWERED INTO THE WATER. THE NUMBER AND/OR SIZE OF THE HOLES MAY BE ADJUSTED TO FACILITATE SPEED OF PLACEMENT AS NEEDED.
6. FIVE 1.2 x 1.2 m (4'x4') HOLES WILL BE CUT OUT OF THE TOP PANEL TO ALLOW PLACEMENT OF BALLAST MATERIAL (SAND / ROCKFILL)
7. ALL STRUCTURAL STEEL SHALL BE FABRICATED, ERECTED, AND INSTALLED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (ANSI/AISC 360-10), AND CODE OF STANDARD PRACTICE (AISC 303-10)
8. STRUCTURAL STEEL SHALL BE THE FOLLOWING TYPE/GRADE:
   A. ANGLES: CSA G40.21 300W [FY=36 ksi] OR BETTER
   B. PIPE: ASTM A500 GRADE C FY=317 MPa [FY=46 ksi] OR BETTER
9. EQUIPMENT PERMITTED TO ACCESS ACROSS THE TURTLE PASSAGE SHALL BE AS FOLLOWS:
   A. ON THE TIMBER DECKING
      3-AXLE TRUCK (FULLY LOADED), CAT 349F, CAT 325, D6T LGP DOZER, XTREME 2045, TERREX RT 90, DELMAG RH 34, BAUER BG 39, RTC 8090, LIEBHERR LB 28, LTR 1100, LR 1200, LR 1300, HS 895, SCHWING S61SX CONCRETE PUMP (OR EQUIVALENT).
   B. ON THE STEEL GRATING
      SCHWING S61SX CONCRETE PUMP (OR EQUIVALENT), LIGHT VEHICLES (PICK-UP TRUCKS), RTC 8090, TERREX RT 90, 3-AXLE TRUCK (FULLY LOADED).
10. ALL MANUFACTURED ITEMS SHALL BE INSTALLED PER MANUFACTURERS GUIDELINES AND SPECIFICATIONS
11. CONTRACTOR TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO COMMENCING WORK. ANY ERRORS, OMISSIONS, OR UNUSUAL CONDITIONS ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
12. THE WORK PLAN PROPOSED FOR INSTALLATION OF THE TURTLE CROSSING SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL



TYPICAL CROSS SECTION OF TURBIDITY CURTAIN AND TURTLE EXCLUSION FENCE

N.T.S.

LICENSED PROFESSIONAL ENGINEER
T.J. SABOURIN
100147273
PROVINCE OF ONTARIO

REV.	DATE	BY	DESCRIPTION	CHK'D
2	11-04-19	M.A.	RE-ISSUED FOR CONSTRUCTION	T.J.S.
1	10-10-19	M.A.	ISSUED FOR CONSTRUCTION	T.J.S.

Kiewit

DESIGNED BY	T.H.
DRAWN BY	M.A.
CHECKED BY	T.J.S.

PRINT IS ONE HALF INDICATED SCALE

SCALE	AS NOTED
IF SHEET IS LESS THAN 22"x34" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY	
DATE (mm-dd-yy)	10-10-19

Think! SAFETY BEGINS WITH ME!

PROJECT TITLE	KINGSTON THIRD CROSSING BRIDGE IPD
PROJECT LOCATION	KINGSTON, ON
JOB NO.	19-171
PROJECT TASK	TURTLE ECOPASSAGE
TASK NO.	551.04
DRAWING SUBJECT	TYPICAL TURTLE PASSAGE PLAN & SECTION
SHEET NO.	1 OF 3

1.2 Project Committees

Decision making and consultation activities in support of the pre-design phase were facilitated by the following committees:

- A Senior Management Committee to oversee the overall project direction.
- A Technical Advisory Committee (TAC) to provide technical guidance for decision making.
- An Indigenous Consultation Sub-Committee to facilitate consultation and engagement with Indigenous Peoples having an interest in the Project.
- A Public Engagement Committee to provide guidance and input for public consultation activities.

1.3 Public, Stakeholder and Indigenous Consultation

A comprehensive consultation plan has been implemented to facilitate meaningful input from the public, Indigenous peoples, and various agencies during the pre-design and validation phases; receive and consider input in the Project design; and document what was heard and how it was considered.

1.3.1 Public and Stakeholder Consultation

Extensive public consultation has occurred since the Municipal Class EA process. This will continue into the final design and construction phases of the Project. Public consultation has been facilitated through:

- Maintaining an up-to-date Project website at www.cityofkingston.ca/third-crossing.
- Preparing regular Project updates through various social media platforms.
- Facilitating three Public Open Houses at key Project milestones.
- Holding a Sustainability Charrette with stakeholders on sustainability-specific design considerations for the Project.
- Engaging in consultations with other stakeholders on specific Project considerations.

1.3.1.1 Indigenous Consultation

Since the undertaking of the Municipal Class EA, and consistent with its commitment to Indigenous Peoples, the City has undertaken consultations with Indigenous communities through:

- Document sharing, notification of opportunities for community participation, and regular Project updates with Indigenous communities whose interests may be directly affected by the Project.
- Archaeological monitoring of the in-water geotechnical fieldwork by representatives of the Huron-Wendat, the Mohawks of the Bay of Quinte, Tyendinaga and Wendaki First Nation communities.

On February 21, 2018, responsibility for the Project was transferred to the City's Major Projects Office who is currently in the process of retaining a number of Indigenous consultancies with specific areas of expertise to enhance consultation with affected Indigenous communities.

1.4 Background Information

1.4.1 The Municipal Class EA

As discussed above, the Project was subject to a Municipal Class EA, which was engaged in 2009 on behalf of the City by a team led by JLR. Its purpose was to evaluate the need for and the feasibility of implementing additional transportation capacity across the Cataraqui River within the City. The Municipal Class EA Study Area extended along the shoreline adjoining the Cataraqui River from the existing LaSalle Causeway-Highway 2 crossing in the City's downtown area in the south, to the existing Highway 401 crossing, 6 kilometres (km) to the north.

The Municipal Class EA proceeded as a Schedule 'C' Municipal Class EA as per the Ontario Municipal Class EA process. As the riverbed in the Municipal Class EA Study Area is owned by the Federal Government, the Municipal Class EA was also in process of addressing the Federal EA framework, until Federal changes to the CEAA in 2012 suspended this requirement.

As per City requirements, the Municipal Class EA proceeded in 2 stages. Stage 1 focused on evaluating the need for and the feasibility of implementing additional transportation capacity across the Cataraqui River within the

Municipal Class EA Study Area, and the assessment of the following alternative solutions:

- **Retain the status quo or do nothing:** This option was not a viable solution since the LaSalle Causeway is operating at capacity and is expected to experience increased congestion during peak traffic periods as population and employment growth continues.
- **Increase the capacity of the LaSalle Causeway:** Though widening the LaSalle Causeway-Highway 2 corridor was not a viable solution due to technical constraints, traffic modelling done at the time confirmed that a series of Transportation Demand Management and Transportation Systems Management strategies could be a viable interim solution, subject to future monitoring of traffic conditions by the City.
- **Increase the capacity of Highway 401 from Montreal Street to Highway 15:** The Highway 401 crossing was not a viable solution, given its primary role as an inter-city freeway; the trip demand patterns of vehicles that favour crossing the Cataraqui River via the LaSalle Causeway to the south; and the related out-of-way travel and additional delays that would result from diverting local traffic 6 km north to use the Highway 401 crossing.
- **Implement a new crossing at a location between the LaSalle Causeway and Highway 401 by either a tunnel or bridge:** The Municipal Class EA Study Area was subdivided into 6 corridor areas with crossing alignment options based on potential connections to existing roads. The six corridor areas were then evaluated, and two areas were short-listed for further assessment. Based on this exercise:
  - A tunnel was not a viable alternative solution due to technical and capital cost constraints.
  - The preferred solution was a bridge linking John Counter Boulevard (west side) and Gore Road (east side) within Area 4. This solution provided the best opportunities to improve transportation network connectivity; enhance public transit and other municipal services; promote active transportation; and accommodate planned future growth. At this location, the Cataraqui River forms part of the Rideau Canal.

Stage 2 completed the Municipal Class EA by focusing on the preparation of: three bridge design concepts; shore land and approach roadway designs; mitigation measures for bridge construction, operations and decommissioning activities; capital and maintenance costs; and the Environmental Study Report (ESR), which documented the Municipal Class EA process. An Arch With V-Piers bridge concept was recommended.

The Municipal Class EA recommended dredging a channel for construction barge access as the preferred solution to facilitate in-water bridge construction.

City Council approved the ESR in May 2012, following which, as part of the mandatory public and agency review period, 4 Part II Order requests were received by the Ontario Ministry of Environment and Climate Change (MOECC). In June 2013, the MOECC notified the City that the ESR had been officially accepted by the Province, and that the Project could continue to advance toward the implementation phase.

1.4.2 City of Kingston Action Plan

The City's Action Plan, which was prepared in February 2013 and updated in September 2015, outlines the next steps needed to advance the Project to 'shovel-ready' status, namely:

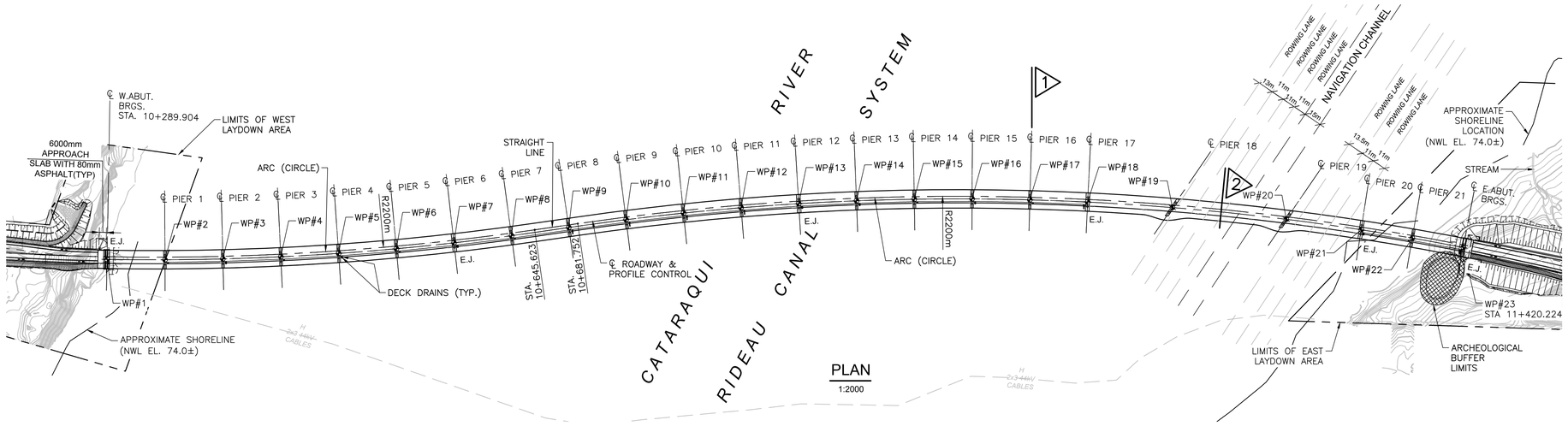
1. **Phase 1:** The completion of the Development Charges By-Law update and the 2015 Kingston Transportation Master Plan (KTMP), the latter of which confirmed that a 2-lane bridge and a 2-lane cross-section for the approach roadways are needed.
2. **Phase 2:** The completion of the pre-design project phase.
3. **Phase 3:** The completion of the Business Plan which was undertaken by others on parallel timelines to the pre-design project phase. The Business Plan focused on cost-benefit and economic impact analyses of the Project; project funding sources; and a preferred project delivery model. It recommended that the detail design and construction phases of the project be merged into a Design-Build Integrated Project Delivery procurement model (Design-Build IPD). This model offers an opportunity for designers and builders to work in a collaborative setting in order to maximize the design through technological and construction industry innovations, while striving to reduce overall project impacts and costs.

4. **Phase 4:** The preparation of the final design for the Project and the securing of associated permits and approvals prior to construction.

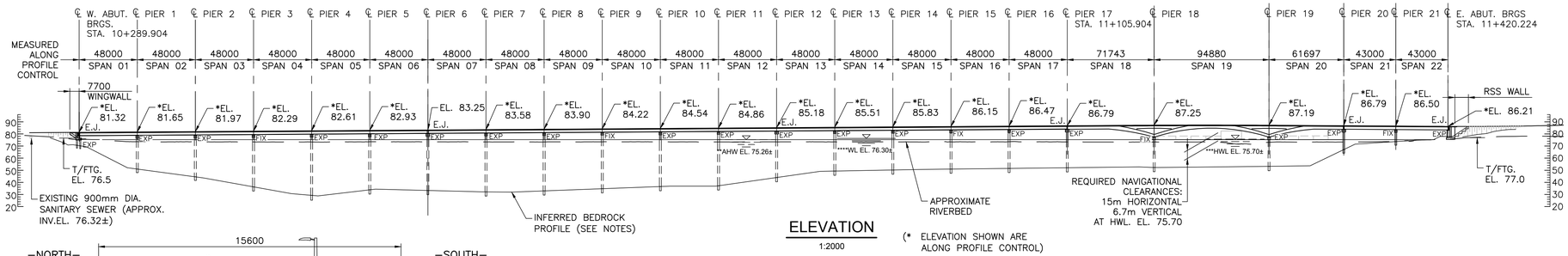
1.5 Project Description

The Third Crossing involves the construction of a new, two-lane vehicular bridge spanning 1.2 km over the Cataraqui River and extending approximately 750 m on land to the east and west designed for a minimum 100-year design life. The following section provides a brief description of the current preferred bridge and approach roadway design. A detailed description of the preferred, current design as well its evolution (from the design presented in the ESR to the preferred current design) is provided in Appendix B. The current descriptions represent the design at approximately 40%. The General Arrangement of the Project is presented in Figure 1.2.

METRIC

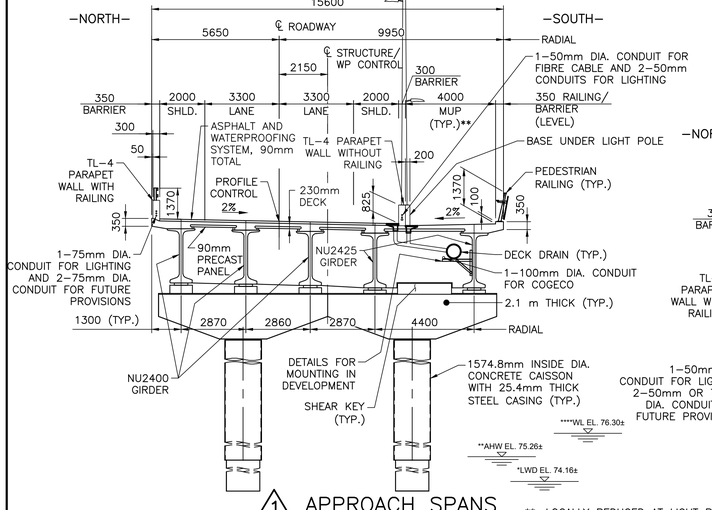


PLAN
1:2000



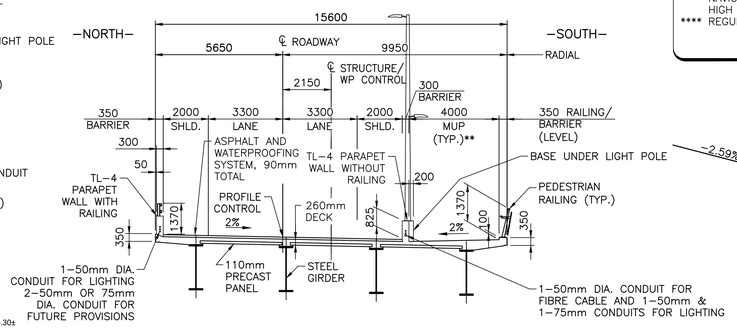
ELEVATION
1:2000

(* ELEVATION SHOWN ARE ALONG PROFILE CONTROL)



1 APPROACH SPANS AT TYPICAL PIER
SCALE 1:125

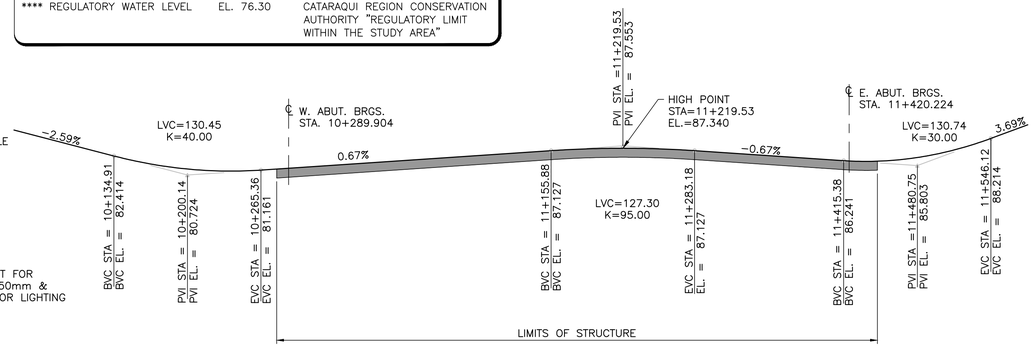
** LOCALLY REDUCED AT LIGHT POLE LOCATIONS. MINIMUM MULTI–USE PATH WIDTH OF 3000mm REQUIRED.



2 MAIN BRIDGE TYPICAL SECTION
SCALE 1:125

NOTE:

*	LOW WATER DATUM	EL. 74.16	CANADIAN HYDROGRAPHIC SERVICE (LAKE ONTARIO)
**	AVERAGE HIGH WATER	EL. 75.26	MINISTRY OF NATURAL RESOURCES (LAKE ONTARIO)
***	NAVIGATION CHANNEL HIGH WATER LEVEL	EL. 75.70	PARKS CANADA
****	REGULATORY WATER LEVEL	EL. 76.30	CATARAQUI REGION CONSERVATION AUTHORITY "REGULATORY LIMIT WITHIN THE STUDY AREA"



PROFILE CONTROL (ROADWAY)
N.T.S.

NOTES
1. FOR GENERAL NOTES SEE SHEET S0001.
2. UNLESS OTHERWISE NOTED, DESIGN IS CONDUCTED AND ALL DIMENSIONS AND COORDINATES PROVIDED IN THE PROJECT'S K3C GROUND BASED REF. SYSTEM.
3. MAINTAIN FULL NAVIGATIONAL CLEARANCE THROUGHOUT CONSTRUCTION.
4. INFERRED BEDROCK PROFILE IS BASED ON 2018 BOREHOLE INVESTIGATION BY TULLOCH ENGINEERING AND BOREHOLE LOGS FROM GOLDER ASSOCIATES REPORT ENTITLED "PRELIMINARY GEOTECHNICAL INVESTIGATION – THIRD CROSSING OF CATARAQUI RIVER – JOHN COUNTER BOULEVARD TO GORE ROAD, KINGSTON, ONTARIO", DATED MARCH 2017, REPORT NO. 1541774/2000/003.

INTEGRATED PROJECT DELIVERY TEAM:

HATCH · SYSTRA INTERNATIONAL BRIDGE TECHNOLOGIES · PKS Kiewit · KINGSTON

No.	DATE	REVISIONS	BY	CHECKED

DESIGN COMPANY: HATCH

DESIGN:	MA
DRAWN:	YZ
CHECKED:	MA
DATE:	11–18–19
SCALE:	N.T.S.

KINGSTON THIRD CROSSING
DIA REPORT
GENERAL ARRANGEMENT

DRAWING NO. 1.1.14.1
SHEET NO.
REVISION

DRAWING NAME: Drawing 1.1.14.1.dwg
SAVE DATE: 11/18/2019 9:41 AM
PLOT DATE: 11/18/2019 10:00 AM
SAVED BY: ZHAO857409

1.5.1 Permanent Bridge Structure

The permanent bridge structure consists of:

- A bridge deck cross-section width of 15.6 m.
- 21 piers; 19 of which are supported by two 1626 mm outer diameter steel cased concrete caissons with the remaining two for the main navigation span, supported by three 1626 mm outer diameter steel cased concrete caissons.
- Concrete approach spans consisting of five NU precast prestressed concrete girders with span lengths of 48 m on the west approach and span lengths of 43 m on the east approach.
- The main navigation span consisting of four Atmospheric Corrosion Resistant (ACR) steel plate haunched girders. The 95 m navigation channel span and its 66 m back spans (measured along southern edge) form an arch under deck.
- A vertical profile at a 0.67% grade to the abutments with high point located approximately at the center of the navigation channel span, allowing stormwater on the bridge deck to drain from the high point to the stormwater management facilities on-land.
- A clearance envelope for the navigation span.

The heights of the piers for the approach spans vary (increasing in height from the abutments towards the back spans of the navigation channel span) while the approach span lengths remain consistent. More specific design requirements and standards pertaining to the vertical bridge clearance include:

- a minimum 6.7 m Federally regulated vertical clearance requirement for the navigable channel [or elevation 82.4 m, based on a water surface elevation (WSEL) 75.7 m] for the entire 15 m navigation channel horizontal width based upon the highwater datum used for the Highway 401 bridge north of the proposed bridge
- a minimum 1 m vertical clearance above the normal water level outside the navigable channel, as per the CHBDC [or elevation 76.26 m, based on WSEL 75.26 m Average High Water level (AHW)]

- a minimum 3 m vertical clearance within the navigation channel and adjacent rowing lanes based on discussions with the Kingston Rowing Club [or elevation 78.26 m, based on WSEL 75.26 m (AHW)].

1.5.2 Bridge Abutments

The west abutment will be reinforced concrete with wingwalls and the RSS wall behind on the south side, founded on ten 915-mm diameter caissons rock socketed into the bedrock. The east abutment will be reinforced concrete with wingwalls and RSS walls behind, founded directly on the bedrock.

The top of the abutment footing elevations will be above the lower water datum (74.16 m) at elevation 76.5 m for the west abutment and elevation 77.0 m for the east abutment, and also above the regulatory water level of 76.3 m.

1.5.3 Bridge Deck

The preferred bridge deck cross-section of 15.6 m is comprised of the following main features:

- Roadway Section: a 2-lane vehicular roadway (1 lane for eastbound travel and 1 lane for westbound travel) with two 2 m wide shoulders adjacent to the vehicular lanes, for temporary snow storage, drainage, cyclist travel and passing (should there be a vehicle break-down or maintenance vehicle stopped on the bridge).
- Multi-use Pathway: a 4 m wide multi-use pathway, except at the navigation channel span where the multi-use pathway (MUP) curves outward at both piers to provide twin pedestrian overlooks with a varying width of up to 7 m over a distance of 40 m at each pier. Along the pedestrian overlook at the navigation channel span, benches will be planned to define and separate the multi-use pathway and look-out area.
- Roadway Barriers: MTO standard TL-4 concrete barriers will be used for the roadway section of the bridge for driver safety while facilitating an unimpeded view of the landscape, with barrier widths of 0.35 m along the north side and 0.3 m on the center barrier, separating the MUP and roadway. The barriers will accommodate a railing fastened on top to protect cyclists on the north side barrier.

- Pedestrian and Cyclist Barrier on South Side: an open railing system will be developed in detailed design to optimize viewing opportunities from the bridge and will have a barrier width of 0.35 m.
- Roadway and MUP Illumination: light standards will be integrated into the center barrier. Where provided, the multi-use pathway is narrower than 4 m, but wider than the City's 3-m wide multi-use pathway design standard. Illumination will be provided for both the roadway and MUP by two luminaires attached to the same pole. The spacing of the light poles will be consistent with the spacing of the approach span piers and spaced evenly and symmetrically over the navigation channel span and its back spans.
- Deck Drainage: the vehicular portion of the bridge as well as the MUP portion of the bridge will have constant 2% cross-falls sloping downwards towards the center barrier, which will further facilitate the collection of stormwater on the bridge deck through cycle-friendly deck drain inlets located on both sides of the center barrier on the bridge approach spans. The deck drains will feed into a deck drain pipe underneath the bridge deck connecting to the stormwater management system on-land via sleeves through the abutment walls.
- Bridge Navigation Lighting: provisions are in place to accommodate navigational lighting on the north-and-south-facing sides of the bridge deck, directly above the navigation channel. This lighting would be used to supplement the buoy markers currently in use for the portion of the navigable channel affected by the bridge footprint.
- Deck Surface at the Navigation Channel Span (and Back Spans): a 260 mm concrete deck will include a combination of cast-in-place concrete and partial depth 110 mm precast prestressed panels between 4-steel girder superstructure.
- Deck Surface at the Approach Spans: a typical 230 mm concrete deck with 250 mm concrete deck between the two most southern girders, will include a combination of cast-in-place concrete and partial depth 90 mm and 110 mm precast prestressed panels between 5-concrete girder superstructure.

- Roadway Wearing and Waterproofing System: the deck concrete will be protected by a hot-applied asphalt waterproofing system and protection boards as well as two layers of asphalt, for a total thickness of 90 mm.

1.5.4 Permanent On-Shore Project Components

The bridge deck features will extend and integrate into the existing road network on-shore with:

- 3.5 m wide basic through traffic lanes with auxiliary lanes.
- Multi-use trail linkages both north and south of the bridge.
- Urban cross-sections including raised curbs and gutters along the edge of pavement.
- Catch-basins required for stormwater management which will include cycle-friendly grating or side-inlets.
- Concrete sidewalks or paved multi-use trails (MUT) located adjacent to, or offset from, the vehicular lanes.
- Various underground and above ground utility accommodations, including the relocation of overhead electrical transmission lines along John Counter Boulevard.
- Signalized intersections at John Counter Boulevard-Montreal Street; Gore Road-Point St. Mark Drive-Gore Road Library entrance; and Gore Road-Highway 15.
- Ascot Lane is reconfigured as a perpendicular intersection to John Counter Boulevard and is also signalized to allow both cyclists and pedestrians to cross at the intersection on the west side of the bridge and to service turning traffic into and out of the reconfigured intersection.
- Extensive landscaping design for restoration works with use of native plant materials to provide landscape variety and hardiness and observation look-out/interpretive areas near-shore.

1.5.5 Rationale for Changes from ESR to the Preferred Design

During the validation phase, design review considerations for the preferred design focused on reducing the permanent bridge in-water footprint as well as the visual impact by proposing a bridge that is lower and lighter than the ESR bridge design, while ensuring that the preferred design would comply with

bridge design standards, codes and requirements; satisfy PCA design guidelines; and optimize capital expenditures by reducing material costs and construction effort.

Reduction in adverse visual impact and overall in-water footprint of the preferred design from that proposed within the ESR, is based on the following:

- Reduction of bridge deck cross-section width from 22.9 to 15.6 m.
- Replacing v-piers with vertical modified conventional piers in a repetitive series of uniform spans of constant depth girders for the approach spans. The shape of the modified conventional pier cap having a less heavy and more open visual appearance compared to v-piers.
- Optimization of the bridge spans arrangement. Having consistent span lengths to create construction efficiencies.
- Optimization of the location of the abutments (shifted inwards towards the River). The east abutment centreline has been shifted to approximately 40 m from the approximate shoreline (elevation 74.0± m) while the west abutment centreline has shifted to approximately 18 m from the approximate shoreline.
- Lowering of the vertical profile with a change in grade from 1.77% (west of high point) and 1.00% (east of high point) to 0.67% (west and east of high point). Reducing the high point of the bridge lowering from elevation 92.5 to 87.34 m (5.16 m lower than the design proposed in the ESR). The high point of the bridge has been refined from the east side of the arch to the approximate center of the navigation channel span allows for: repeatability in the haunched girder arch pier design (as the grade on both sides of the high point is the same); stormwater drainage from the center of the arch to stormwater management facilities on-land; and further showcasing the haunched girder arch as the focal point of the bridge.
- Compared to the vertical profile which was previously proposed, the preferred vertical profile decreases the height of the piers and abutments resulting in material cost efficiencies and simplifies construction. The maximum height of the piers, measured from the low water-mark (LWM) has been reduced from approximately 15.5 to 9.5 m.

- Due to the circular shape of the columns and absence of footings at the river level less ice loading is anticipated on the conventional piers. Accordingly, the foundation requirements are reduced significantly, from five 2400-mm diameter caissons to two 1626-mm diameter caissons for the approach span piers; and from eight 2100-mm diameter caissons (previously proposed for the arch span piers) to three 1626-mm diameter caissons for the preferred design's navigation channel span piers. The associated in-water footprint from the foundations are also therefore reduced.
- The preferred design's approach span piers are simple compositions in which the twin piles are extended up to a shaped concrete pier-cap. The standard piers have also been shaped to maximise the perception of lightness to the deck. The pier caps will be coded in pairs to break down their visual mass and tapered to minimise bulk. No pile-cap at water level will be required fostering the perception that the bridge will "touch the water lightly".
- The preferred design's navigation channel span piers can share a similar tapered form to the approach span piers but have a wide base at water level to give these piers a more grounded appearance or can have vertical-face sides. While the approach span pier caps and the navigation span pier caps do have different functions and are shaped differently for visual and structural reasons, they should nonetheless be understood as the same "family" of components as both are concrete. The shape of the navigation span piers will be confirmed during detailed design where design considerations will include aesthetics, safety, permanent in-water footprint, and clearance to the adjacent rowing lanes. Advantages to the vertical-face sides shape include improved construction safety, lower concrete material volume which in turn lowers the permanent in-water footprint and provides greater clearance to the adjacent rowing lanes than provided with the tapered shape.
- The preferred design of the piers as proposed, represents a permanent in-water footprint reduction by over 50% from the previous design, and a corresponding reduction in potentially adverse effects to the environment.

Figure 1.3, Figure 1.4 and Figure 1.5 provide graphical renderings of the proposed Project.

Figure 1.3: Bridge Rendering from the Elliott Avenue Parkette

Figure 1.4: Bridge Rendering Looking South (close to Buoy S33)

Figure 1.5: Bridge Rendering Looking from Point St. Mark during Winter

1.5.6 Construction and Operation Phases

The following sections provide a description of the construction activities associated with the Project.

1.5.6.1 Site Preparation Works and Activities

The physical works and activities associated with the site preparation phase of the Project are presented in Table 1.1 below.

Table 1.1: Site Preparation Works and Activities

Core Project Components	Physical Works and Activities
Establish Work Zone and Staging Areas	• Install site signage and perimeter fencing (on-land) and navigational signage (on-water). • Confirm utility locates. • Confirm low, medium, high impact construction site areas (e.g. parking, offices, material storage, active material assembly/construction) on-land and on-water work zone limits. • Clear lands for installation of construction site access, staging and laydown areas. • Install temporary electrical and communications services (potentially on utility poles) for site trailers, and construction site traffic controls. • Install temporary stormwater management works. • Confirm and obtain Category A (Routine Oversize / Overweight Loads) permits and/or Category B (Non-Routine Oversize/Overweight Loads) permits for any pre-fabricated bridge components that exceed any of the following limitations (including the transportation vehicle): ◆ Length = 19 m ◆ Width = 3.5 m ◆ Height = 2.6 m ◆ Weight = 30,000 kg

1.5.6.2 Construction Works and Activities

Table 1.2 summarizes the physical works and activities associated with the construction phase of the Project. Options have been cited for selected physical works and activities with the intent to provide flexibility to the Contractor in order to promote the selection of creative, sustainable and cost-effective construction methods.

Table 1.2: Construction Works and Activities

Core Project Components	Physical Works and Activities
Earthworks and Stormwater Management	• Strip topsoil. • Install permanent surface water outlets, culverts and stormwater management dry pond facilities. • Engage storm sewer and underground utilities installation/relocations. • Install retaining walls. • West abutments to be founded on 10 - 1000 mm caissons socketed into bedrock and the East Abutment founded directly on bedrock, and will require earth excavation of all peat, silty clay and clayey silt within each footprint as these soils are compressible, and would be expected to settle under increased loads: • West Abutment: Excavation at ~2.1 m with up to 4 m of backfill from the existing grade of John Counter Boulevard to the west abutment; and • East Abutment: Excavation at ~0.6 m, with up to 9 m of backfill from the existing grade of Gore Road to the east abutment. • The use of suitable fill such as Select Subgrade Material or rock will need to be confirmed during the future detail design phase.
Causeway-Trestle Solution (See Section 1.5.6.3 below)	• Layout of the Causeway-Trestle Solution construction approach (presented in 1.5.6.3). • Installation of temporary causeways on west and east shorelines. • Installation of temporary trestle piles and top sections at either end of navigation channel. • Setup of material and equipment ferry barge or lifting span bridge across the navigational channel.

Core Project Components	Physical Works and Activities
Permanent Bridge Foundation and Substructure	• Crane mobilization. • Installation (first from the east side-to-the-navigable channel; and then from the west side-to-the-navigable channel) via the temporary trestle of the: ◆ Caissons: liners will be driven through the overburden and seated firmly into bedrock; the material will be excavated from within the liner; rock sockets will be drilled into the bedrock ◆ a reinforcing cage will be lowered into the caisson ◆ concrete will be poured into the caisson from a concrete pump. • Modified Conventional Piers: ◆ standard steel/timber formwork will be used to form the pier cap.
Permanent Bridge Superstructure	• Girder installation will coincide with installation of permanent bridge foundation and substructure. • NU-concrete girders supporting the approach structure over the 17 spans on the West and the two spans on the East can either be: ◆ Lifted into place by the cranes on the causeway, or temporary trestle bridge. • 2 options are available for installing the bridge deck: ◆ Cast-in-place via concrete pump with stay in place forms and overhang brackets; or Precast panels, which: ▪ could either be: full depth precast supported on the girders with cast-in-place concrete at the joints; or partial depth precast with a cast-in-place concrete overlay on top; and these panels could be erected either from the new bridge deck, from causeway, or from a crane on an equipment barge. • Bridge deck installation will follow the installation of the permanent bridge superstructure.

Core Project Components	Physical Works and Activities
Steel Navigation Span and two back spans along with bridge deck	• The steel navigation channel span and the two 66m back spans will be erected from cranes on the trestle. The erection sequence and the crane location for each pick is shown in Appendix B. • 2 options are available for installing the bridge deck: • Cast-in-place via concrete pump with stay in place forms and overhang brackets; or Precast panels, which: ◆ could either be: full depth precast supported on the girders with cast-in-place concrete at the joints; or partial depth precast with a cast-in-place concrete overlay on top; and these panels could be erected either from the new bridge deck, from causeway, or from a crane on an equipment barge. • Bridge deck installation will follow the installation of the permanent bridge superstructure.
Bridge Finishes	• Install lighting (bridge deck and navigational), electrical and communications systems. • Engage paving and installation of barriers, railings, signs and markings.
Approach Utilities, Paving and Intersections	• Rough grading. • Finalize installation/relocations of storm sewer and underground utilities. • Concrete pads and pole bases. • Pavement granulars. • Intersection staging. • Curbs and pathways. • Pavement surfaces. • Install barriers, signs, markings, lighting and traffic signals.

The site restoration and rehabilitation phase, which follows the construction phase, focuses on the east and west side lands as well as an in-water area near the temporary causeways and temporary trestle.

1.5.6.3 Causeway Trestle Solution Construction Approach

The Causeway-Trestle Solution (CTS) is a hybrid construction approach involving a combination of temporary causeways and a temporary work bridge (trestle) to access the piers and superstructure. A ferry barge or lifting span bridge will be used to transport equipment and material over the navigable channel when needed. In the case of the ferry barge, low draft (~1.2 m) segmental barges would be configured to act as a ferry barge, transporting material across the navigation trestle channel when needed, without impacting navigation.

The temporary causeways and working platforms (for installing the pier caissons) would act as the means of access to Piers 1 to 17 and 20 and 21, from the west and east banks, respectively. The causeways and working platforms would have the following characteristics: a side slope between 2H:1V and 1.5H:1V that extends to the organic layer at an elevation ranging between 72.7 and 73.4 m, assuming the causeway crest is at an elevation of 76.5 m. Based on the peat layer thickness of the river bed of a specific section of causeway, the causeway area has been classed into three zones where three causeway designs are proposed to be utilized. The proposed cross-sections of the causeway zones are shown in Figure 1.6, Figure 1.7 and Figure 1.8, respectively.

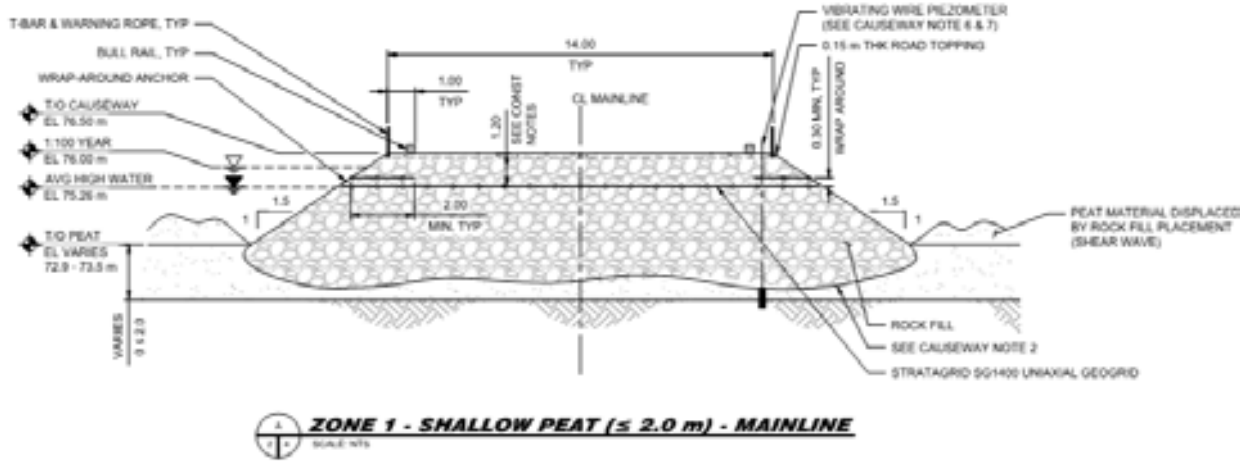


Figure 1.6: Causeway Zone 1 Cross Section

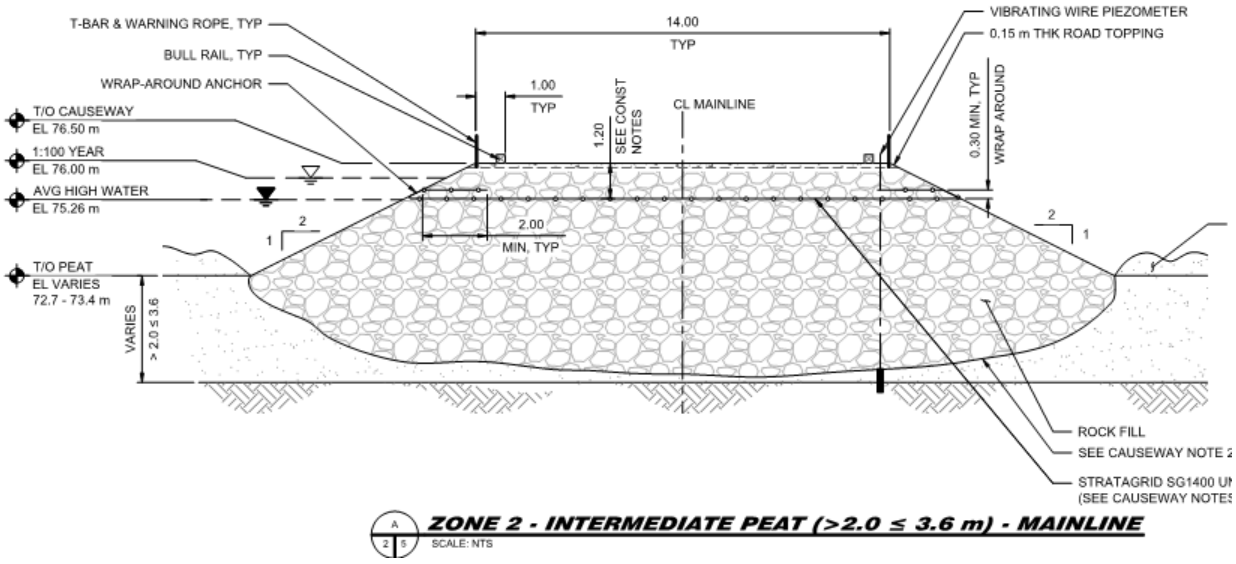


Figure 1.7: Causeway Zone 2 Cross Section

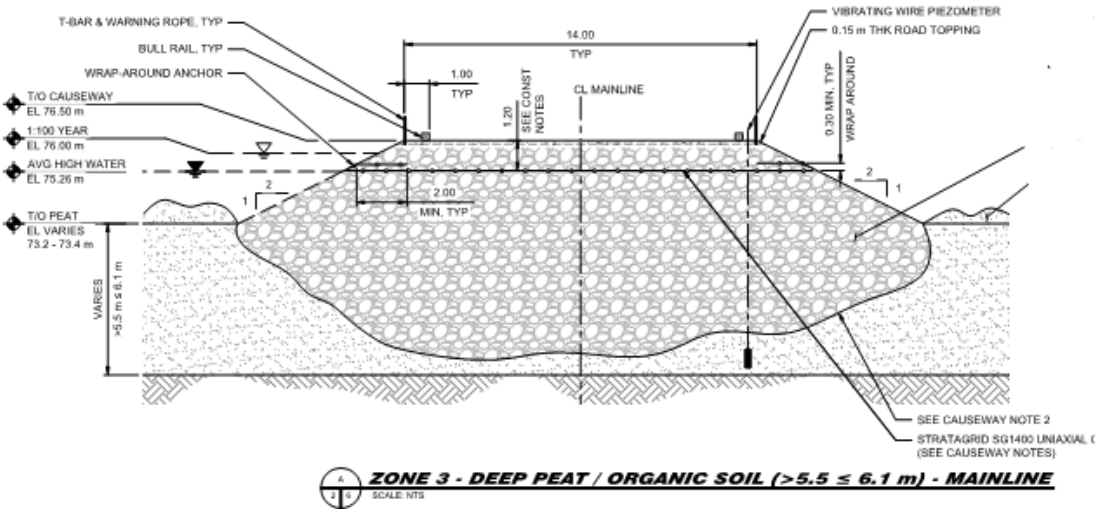


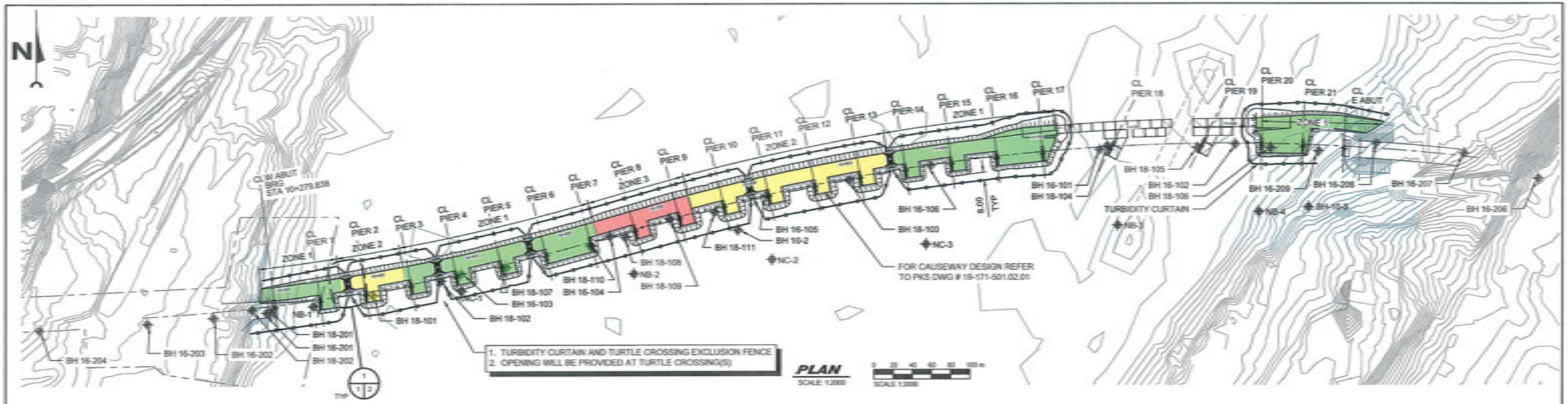
Figure 1.8: Causeway Zone 3 Cross Section

The temporary causeways would have a footprint of approximately 32,475 m^2, with 3,690 m^2 on the east bank and 28,785 m^2 on the west bank. The combined footprint of the causeways and the surrounding turbidity curtain is approximately 47,793 m^2 (Figure 1.11).

PCA approved preliminary in-water works for the Project on September 4, 2019 under permit Rideau 2019 8520 – 751. Rideau 2019 8520 – 751 approved an exclusion system, designed to exclude turtles and maintain in-water turbidity. Specifications of the Aquatic Exclusionary Turbidity Curtain (AETC) combined industry standards for both the turbidity curtain (OPSS 805 and OPSD 219.260) and land-based reptile exclusion from construction areas (MNRF 2013 – Version 1.1 Reptile and Amphibian Exclusion Fencing). In addition to these standards PCA (with input from Environment and Climate Change Canada) added additional specifications, including but not limited to specification prescribing turbidity curtain thickness and turtle fence material). Further details regarding the AETC are provided in Section 4.19.

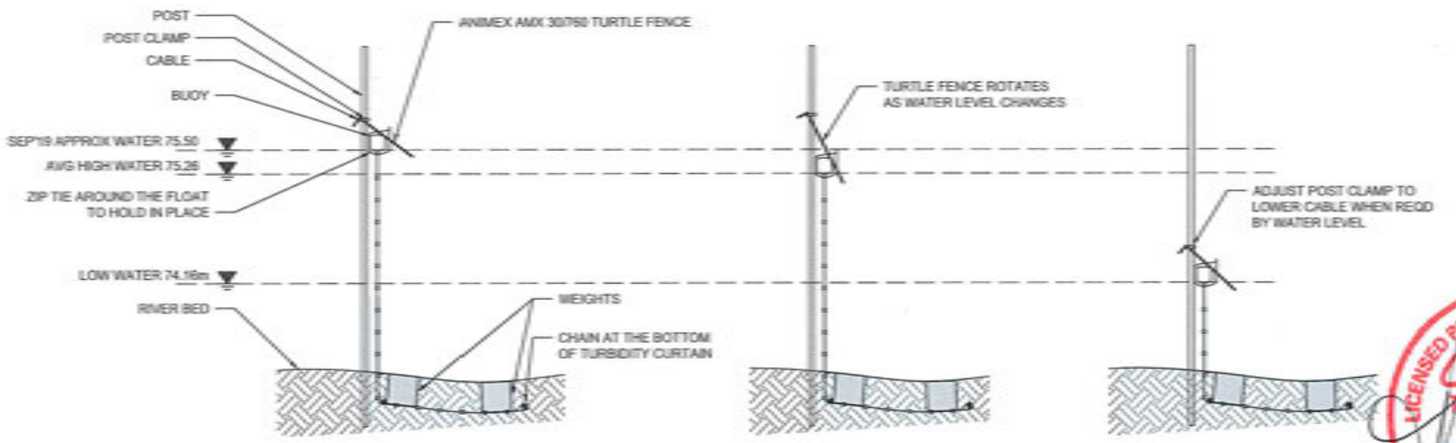
The AETC has been installed in in seven discrete areas or “cells”, numbered from west to east. Six cells are located west of the navigational channel with a single cell along the eastern shore with ecopassages provided between these cells. Figure 1.9 provides the detailed drawings of the ecopassages.

On the West portion of the Project alignment, a group of underwater 44kV hydro lines run from immediately south of the West abutment of the new bridge, towards the South-East on the bottom of the Cataraqui river. There is also a spit of land that extends out into the Cataraqui River immediately south of the causeway (under the new bridge alignment). In order to establish the first ecopassage (nearest to the West shore) at an elevation that will be partially submerged regardless of water level (Water level in Lake Ontario can vary seasonally by up to 1.2m) the first opportunity is just after the first causeway finger. At this location the ecopassage can be installed without significant excavation. The geometry of the causeway closer to shore and river bathymetry would not permit the installation of an ecopassage any closer to shore without undermining the 44kV underwater hydro lines due the extent of excavation that would be required.



GENERAL NOTES:

1. ALL DIMENSIONS, UNITS, AND ELEVATIONS IN METERS UNLESS NOTED OTHERWISE
2. EACH TURTLE PASSAGE CONSISTS OF FOUR (4) [12.2 m (40') LONG STANDARD CONEX BOXES; TWO GROUPINGS OF TWO BOXES PLACED END TO END, WITH A 2.0 m UNDISTURBED GAP BETWEEN THEM TO CREATE THE PASSAGEWAY FOR THE TURTLES
3. DECKING WILL CONSIST OF TWO (2) LAYERS OF 6.1 x 3.6 x 0.3 m THICK TIMBER MATS, WITH STEEL GRATING TO PROVIDE PATHWAY FOR LIGHT TO ENTER THE PASSAGE. GRATING SHALL BE ORIENTED ALONG THE DIRECTION OF TRAVEL.
4. THE CONEX BOXES WILL BE PLACED ON THEIR SIDE WITH THE BOTTOM OF THE BOXES FACING THE TURTLE PASSAGE
5. EACH CONEX SHALL HAVE TWENTY (20) Ø75 mm (3") HOLES CUT OUT OF THE BOTTOM FACE TO ALLOW ENTRY OF WATER SO THAT THEY CAN BE LOWERED INTO THE WATER. THE NUMBER AND/OR SIZE OF THE HOLES MAY BE ADJUSTED TO FACILITATE SPEED OF PLACEMENT AS NEEDED.
6. FIVE 1.2 x 1.2 m (4'x4') HOLES WILL BE CUT OUT OF THE TOP PANEL TO ALLOW PLACEMENT OF BALLAST MATERIAL (SAND / ROCKFILL)
7. ALL STRUCTURAL STEEL SHALL BE FABRICATED, ERECTED, AND INSTALLED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL, SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS (ANSI/AISC 360-10), AND CODE OF STANDARD PRACTICE (AISC 303-10)
8. STRUCTURAL STEEL SHALL BE THE FOLLOWING TYPE/GRADE:
   A. ANGLES: CSA G40.21 300W [FY=36 ksi] OR BETTER
   B. PIPE: ASTM A500 GRADE C FY=317 MPa [FY=46 ksi] OR BETTER
9. EQUIPMENT PERMITTED TO ACCESS ACROSS THE TURTLE PASSAGE SHALL BE AS FOLLOWS:
   A. ON THE TIMBER DECKING
      3-AXLE TRUCK (FULLY LOADED), CAT 349F, CAT 325, D6T LGP DOZER, XTREME 2045, TERREX RT 90, DELMAG RH 34, BAUER BG 39, RTC 8090, LIEBHERR LB 28, LTR 1100, LR 1200, LR 1300, HS 895, SCHWING S61SX CONCRETE PUMP (OR EQUIVALENT).
   B. ON THE STEEL GRATING
      SCHWING S61SX CONCRETE PUMP (OR EQUIVALENT), LIGHT VEHICLES (PICK-UP TRUCKS), RTC 8090, TERREX RT 90, 3-AXLE TRUCK (FULLY LOADED).
10. ALL MANUFACTURED ITEMS SHALL BE INSTALLED PER MANUFACTURERS GUIDELINES AND SPECIFICATIONS
11. CONTRACTOR TO VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO COMMENCING WORK. ANY ERRORS, OMISSIONS, OR UNUSUAL CONDITIONS ARE TO BE REPORTED TO THE ENGINEER IMMEDIATELY.
12. THE WORK PLAN PROPOSED FOR INSTALLATION OF THE TURTLE CROSSING SHALL BE SUBMITTED TO THE ENGINEER OF RECORD FOR REVIEW AND APPROVAL



TYPICAL CROSS SECTION OF TURBIDITY CURTAIN AND TURTLE EXCLUSION FENCE

N.T.S.

LICENSED PROFESSIONAL ENGINEER
T.J. SABOURIN
100147273
PROVINCE OF ONTARIO

REV.	DATE	BY	DESCRIPTION	CHK'D
2	11-04-19	M.A.	RE-ISSUED FOR CONSTRUCTION	T.J.S.
1	10-10-19	M.A.	ISSUED FOR CONSTRUCTION	T.J.S.

Kiewit

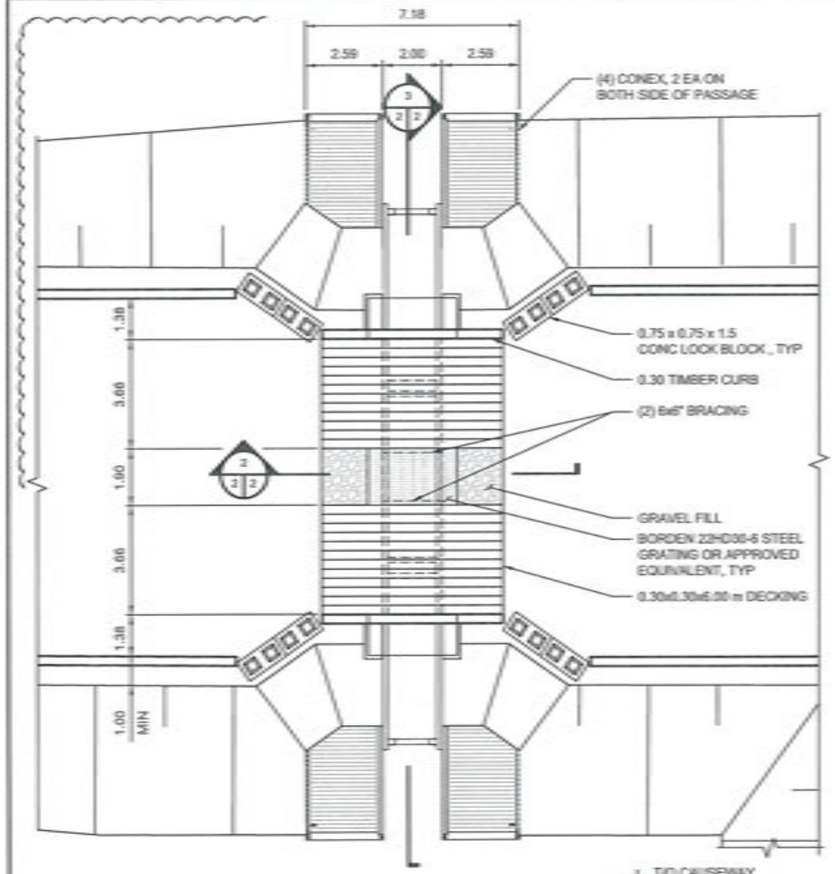
DESIGNED BY	T.H.
DRAWN BY	M.A.
CHECKED BY	T.J.S.

PRINT IS ONE HALF INDICATED SCALE

SCALE	AS NOTED
IF SHEET IS LESS THAN 22"x34" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY	
DATE (mm-dd-yy)	10-10-19

Think! SAFETY BEGINS WITH ME!

PROJECT TITLE	KINGSTON THIRD CROSSING BRIDGE IPD
PROJECT LOCATION	KINGSTON, ON
JOB NO.	19-171
PROJECT TASK	TURTLE ECOPASSAGE
TASK NO.	551.04
DRAWING SUBJECT	TYPICAL TURTLE PASSAGE PLAN & SECTION
SHEET NO.	1 OF 3



PLAN @ SURFACE
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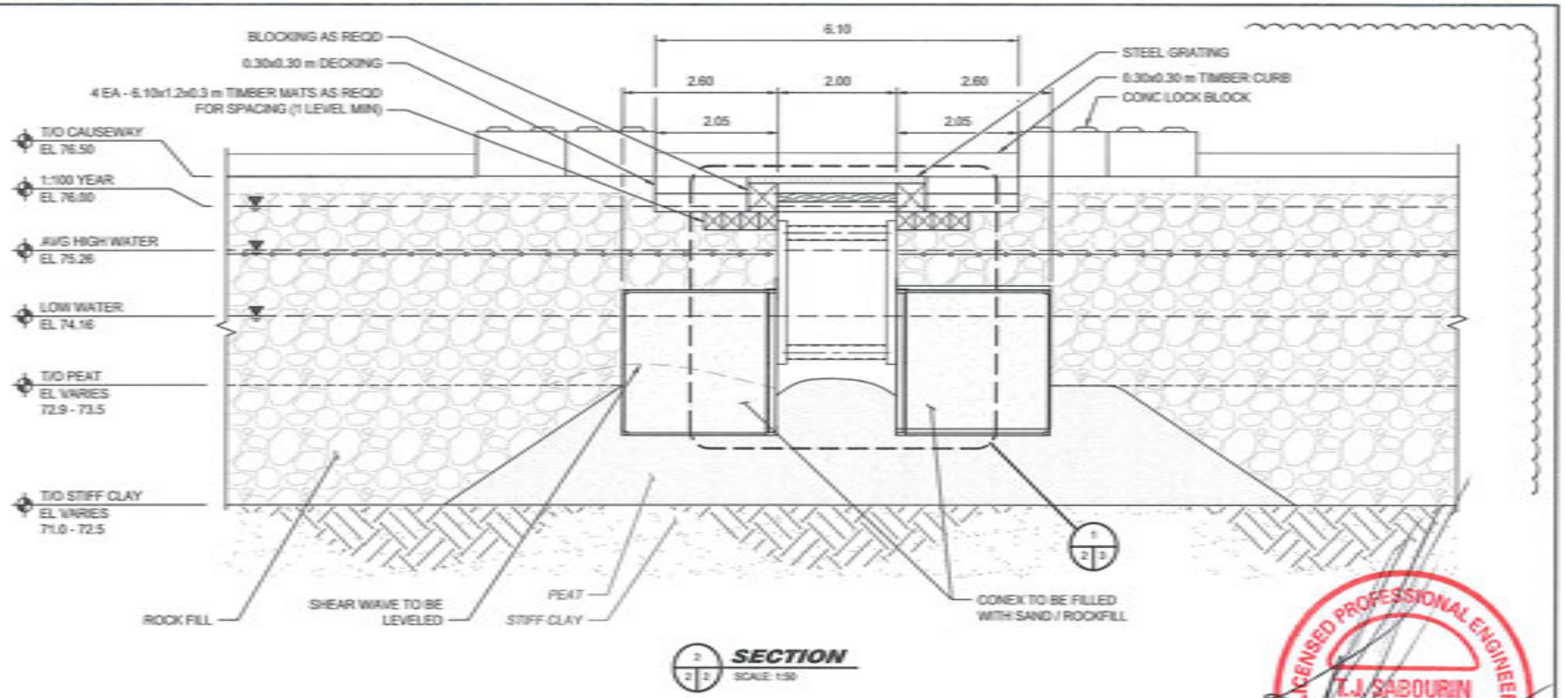

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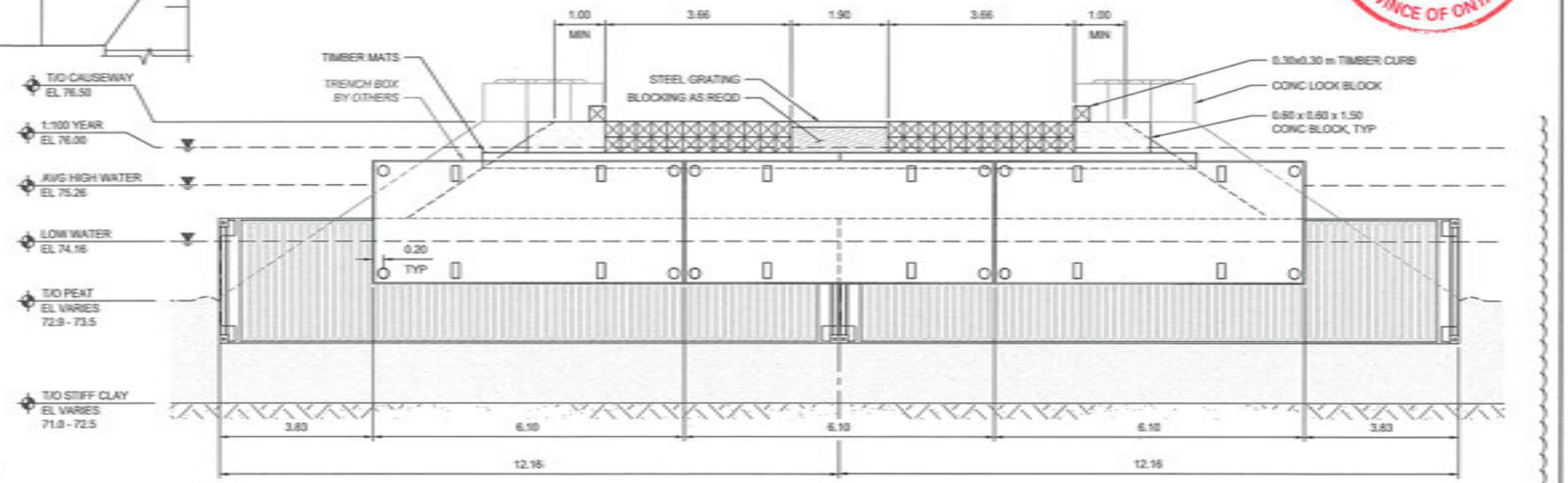

SECTION
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NOTES:

1. TIMBER DECKING MAY BE 6.10, 9.14, OR 12.19 m IN LENGTH (2 LAYERS REQD)
2. TOP OF TRENCH BOX MUST BE MINIMUM OF 0.15 m BELOW BOTTOM OF DECKING AT ALL TIMES
3. CENTER OF BOTTOM STRUT MUST BE LOCATED A MINIMUM OF 0.8 m BELOW THE TOP OF CONEX
4. SO LONG AS NOTES 2 AND 3 ARE SATISFIED, HEIGHT OF TRENCH BOX MAY BE REDUCED TO SMALLER STANDARD SIZES AS NEEDED.

REV.	DATE	BY	DESCRIPTION	CHK'D
2	11-04-19	M.A.	RE-ISSUED FOR CONSTRUCTION	T.J.S.
1	10-10-19	M.A.	ISSUED FOR CONSTRUCTION	T.J.S.

Kiewit

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DRAWN BY	M.A.
CHECKED BY	T.J.S.

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DATE (MM-DD-YY)	10-10-19

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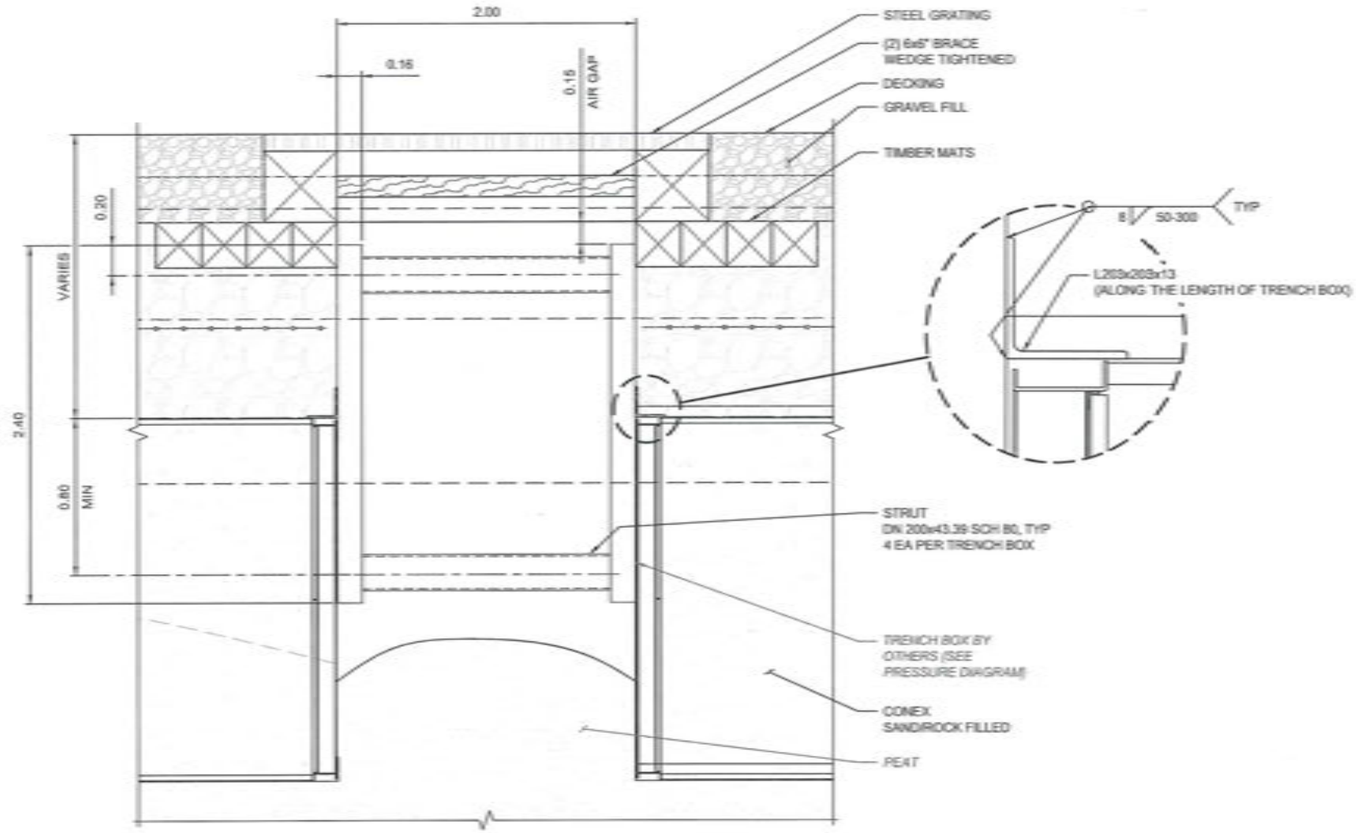
PROJECT TITLE: KINGSTON THIRD CROSSING BRIDGE IPD	PROJECT LOCATION: KINGSTON, ON	JOB NO. 19-171	
PROJECT TASK: TURTLE ECOPASSAGE		TASK NO. 551.04	
DRAWING SUBJECT: TYPICAL TURTLE PASSAGE PLAN & SECTION		SHEET NO. 2 OF 3	



DETAIL
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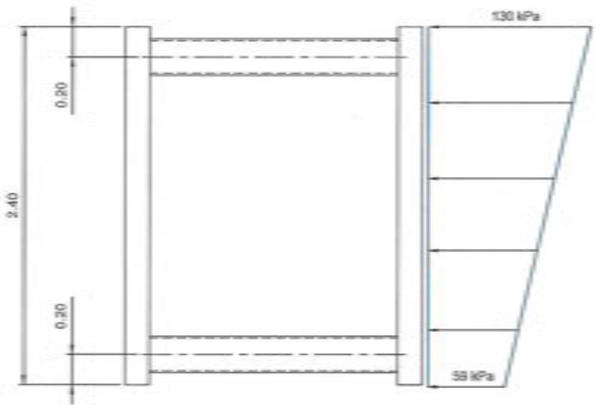

PRESSURE DIAGRAM
SCALE: NTS
NOTE: PRESSURE SHOWN IS UNFACTORED

REV.	DATE	BY	DESCRIPTION	CHK'D
2	11-04-19	M.A.	RE-ISSUED FOR CONSTRUCTION	T.J.S.
1	10-10-19	M.A.	ISSUED FOR CONSTRUCTION	T.J.S.

Kiewit

DESIGNED BY	T.H.
DRAWN BY	M.A.
CHECKED BY	T.J.S.

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SCALE	AS NOTED
IF SHEET IS LESS THAN 22"x34" IT IS A REDUCED PRINT SCALE REVISED ACCORDINGLY	
DATE (MM-DD-YY)	10-10-19

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PROJECT TITLE: KINGSTON THIRD CROSSING BRIDGE IPD	PROJECT LOCATION: KINGSTON, ON	JOB NO. 19-171
PROJECT TASK: TURTLE ECOPASSAGE		TASK NO. 551.04
DRAWING SUBJECT: DETAILS		SHEET NO. 3 OF 3

The causeways would be progressively placed and removed between 2019 to 2022, with removal completed as early as the end of 2022, depending on timing of approvals required to begin in water works. The rockfill material (Granular B) for the causeway will be quarried, crushed in a primary crusher (jaw run) to eliminate everything above 150mm, screened to reduce the fines to 2%, and transported to the project; Fines are defined in the Unified Soil Classification System (Howard, 1986). The 17 working platforms will be constructed with finer grained material (D50 equal to 50 mm minus) to enable the caissons to be installed through the placed material down to desired depth below the riverbed with the pier constructed from the work platform. The intent is to construct the causeway access using locally sourced material suitable for long term placement within the river. For full construction schedule to sequence and details see Appendix B (Bridge Design and Construction Methodology):

- Install turbidity curtain.
- Place Granular B layer with dump truck on embankment.
- Push and compact Granular B layer through embankment with dozer.
- Place two layers of geogrid followed by larger rockfill.
- Place and compact Granular B/A capping.

1.5.6.4 Causeway Removal

Upon completion of the construction the majority of the causeway will be removed by excavators. It is expected that rock material will settle into the soft organic substrates and the causeway rockfill will be excavated to 100mm below the elevation of the surrounding substrate. The Causeway will compress the existing underlying sediments, removal of the granular material to 100 mm below the existing river bed level will leave a portion of the granular material behind and will not require the removal of the sediments. The sequence of causeway removal will involve:

- Excavate road toping, rockfill, and geogrids. Excavate the Granular B to 100 mm below original riverbed bathymetry. Excavation will be of Granular B only due to settlement of peat (see Figure 1.10).
- Excavator with Trimble 3D Grade Control System to be used to achieve design elevation.

- Removed causeway material will be re-used within Project on the east approach.

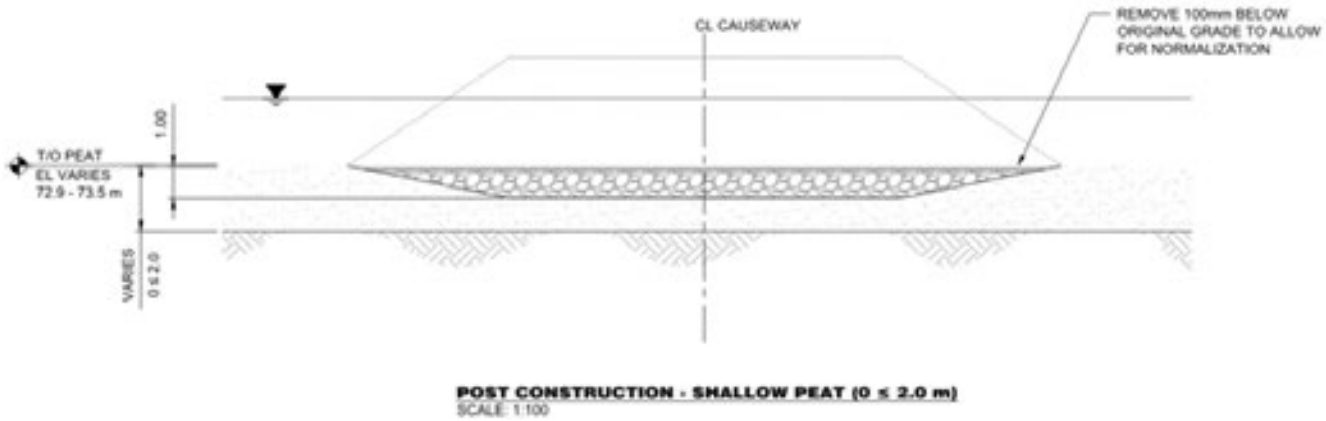
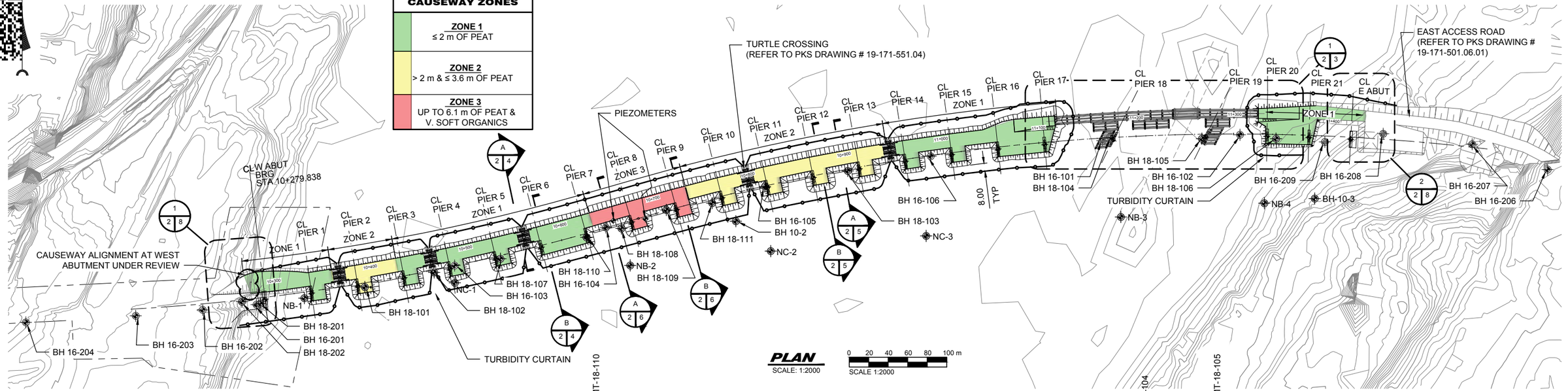
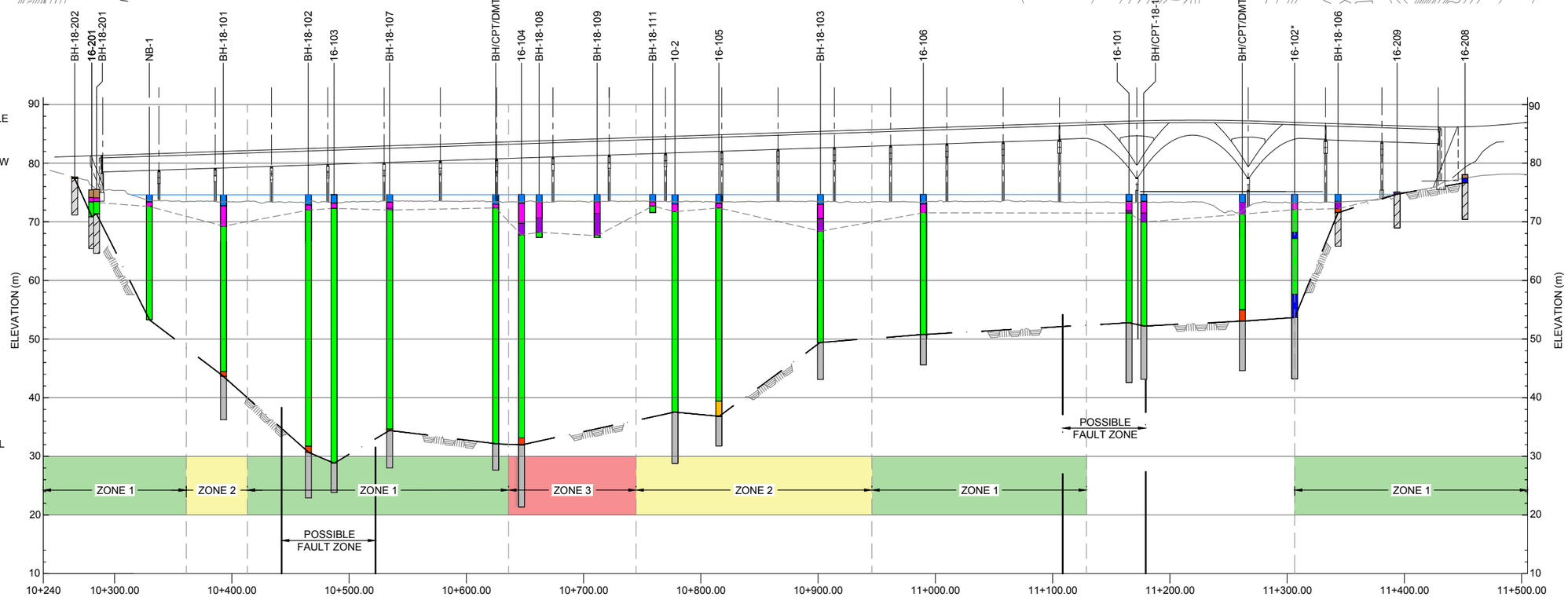


Figure 1.10: Causeway Removal Cross-Section (Zone 1)



LEGEND:

- BH-18-101 — BOREHOLE
- INFERRED BEDROCK PROFILE
- INFERRED BOUNDARY BELOW ORGANIC DEPOSITS
- WATER
- PEAT
- ORGANIC SOIL / SILT
- SILTY CLAY TO CLAY
- SILT AND SAND
- COHESIVE GLACIAL TILL
- NON-COHESIVE GLACIAL TILL
- GRANITE / GNEISS
- LIMESTONE / DOLOSTONE
- FILL



SECTION

HORIZONTAL SCALE: 1: 2000
VERTICAL SCALE: 1:400

REV.	DATE	BY	DESCRIPTION	CHK'D
0	10-11-19	J.R.P.	ISSUED FOR CONSTRUCTION	T.J.S.

Kiewit

DESIGNED BY: A.E.M.
DRAWN BY: J.R.P.
CHECKED BY: T.J.S.

PRINT IS ONE HALF INDICATED SCALE

SCALE: AS NOTED
IF SHEET IS LESS THAN 22"x34" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY
DATE (MM-DD-YY): 10-11-19

SAFETY BEGINS WITH ME

PROJECT TITLE: KINGSTON THIRD CROSSING BRIDGE IPD
PROJECT LOCATION: KINGSTON, ON
JOB NO.: 19-171
PROJECT TASK: TEMPORARY ACCESS CAUSEWAY
TASK NO.: 501.02.01
DRAWING SUBJECT: CAUSEWAY PLAN & GEOTECHNICAL PROFILE
SHEET NO.: 2 OF 12

The trestle will be located alongside the location of the permanent bridge between Piers 17 and 20, connecting to east and west causeways as shown in Figure 1.12. The trestle consists of two temporary components, the main trestle span and trestle fingers that will allow access to the piers. In total 78 piles with a diameter of 900mm will be required for the trestle. Resulting in a temporary footprint of 50 m^2, due to the main span and fingers.

To support the construction of the navigation channel span temporary main span piles known as falseworks or bents will be installed between Piers 17 and 20. The twenty-four 600mm diameter falsework piles will represent a footprint of about 7 m^2. It is expected with the shorter length of pile (~20 m) all piles will be removed, however if a pile is unable to be removed with the equipment on site, the pile will be cut off below the river bed and left in place with the coordinates of the pile recorded.

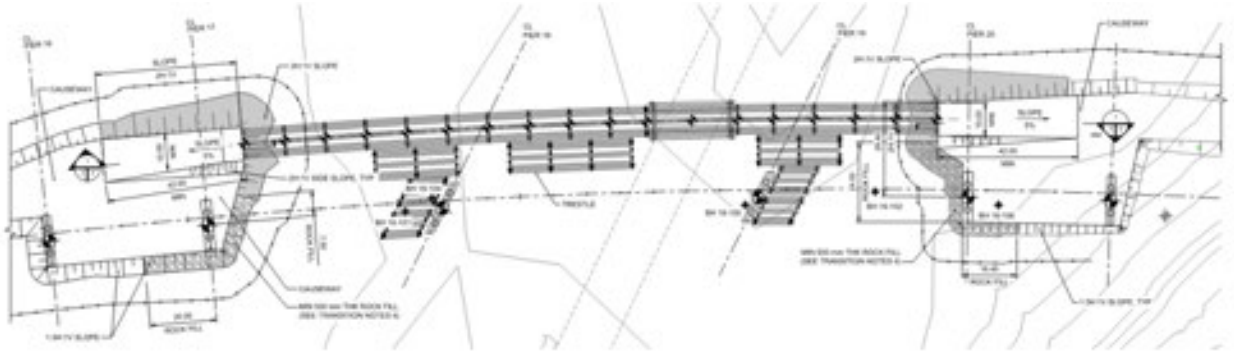


Figure 1.12: Temporary Trestle Arrangement

Access across the Navigation Channel will for the most part be serviced with a trestle lift span. Occasionally a barge may be used to ferry material or equipment across the navigational channel, however the barge would not be stationed within the navigation channel for any significant duration and is not planned to be the principal means of access in this location. Construction of the marine access located within the navigational channel (trestle lift span) is scheduled during the navigational closure calendar to avoid interference to marine traffic.

1.5.7 Site Restoration

The main components of the landscape designs are as follows:

- The constant gradual s-curve of the bridge, which lands north of the Point St. Mark neighbourhood, which offers opportunities for:
  - Reduced potential noise and visual impacts on Point St. Mark residents.
  - 'Softer landscaping' along the Gore Road right-of-way.
- Grounding the bridge structure dramatically and distinctively at each abutment using materials and proportions that reference and enhance the cultural landscape without overt imitation of heritage architecture.
- The use of native plant materials to provide landscape variety and hardiness.
- The incorporation of observation look-out/interpretive areas.

1.5.8 Operation

The operations phase will follow the site restoration and rehabilitation phase an include maintenance activities to ensure the long-term safety and viability of the Project. Activities during operation include:

- Snow removal. Since salt-laden snow deteriorates concrete and affects the service life of infrastructure, there are no obstructions on the roadway or multi-use pathway to impede the efficient removal of snow from the bridge deck. The following design considerations have been incorporated:
  - On the multi-use pathway, a small concrete curb is provided at the base of the barrier on the south side of the bridge deck to enable snow plows to ride against it without damaging the railing system and prevent snow/water from entering the River.
  - In the case of heavy snowfall or built up windrows, snow plowing within the multi-use pathway area can push snow to the center barrier. The windrows can then be blown over the barrier and into trucks for transport off the bridge.
  - The roadway and multi-use pathway are both sloped towards the center barrier to facilitate the flow of snowmelt to the deck drains.

- Stormwater management (to ensure post-development flows will be managed in accordance with regulatory requirements).
- Compensation measures required to address residual fish habitat impacts.
- Bridge maintenance activities include:
  - sweeping and washing the bridge deck and multi-use pathway;
  - Cleaning joints and resealing expansion joint seals;
  - Cleaning the bridge drainage systems; and
  - Replacing roadway waterproofing membrane and wearing surfaces.

1.5.9 Decommissioning

Decommissioning of the Project is not included as part of the scope of this DIA given the anticipated bridge will have a life span of more than 100 years. If and when decommissioning is required, such works will be subject to an impact assessment as per regulations current to that time.

1.6 Project Schedule

The Project schedule is presented in Figure 1.13 below as a linear (Time Location System or TILOS) schedule. The Y-axis shows time, moving chronologically from bottom to top, while the X-axis shows location (survey chainage) along the Project, moving west (left) to east (right). A Project plan view and location information is provided at the top of the schedule, generated as a visual aid to present the sequencing of construction. The drawing associated with this plan view is presented in full as Figure 1.2, above.

1.6.1 Restricted Activity Timing Windows

As presented in Table 1.3 below, there are a number of restricted activity timing windows which apply to the Project Location.

Table 1.3: Restricted Activity Timing Window

Environmental Component	Restricted Activity Timing Window	
	Start	End
Fish Restricted Timing Window*	March 15th	June 30th
Rideau Canal Navigation Season	Victoria Day	Thanksgiving
Bird Restricted Timing Window	April 1th	August 31st

Environmental Component	Restricted Activity Timing Window	
	Start	End
SAR Bat Maternity Roost Season	May 1st	September 30th
Turtle Over Wintering Period*	October	March
Turtle Nesting Season	Late May	Early July

As presented in the Proposed Construction Schedule (Figure 1.12) the Proponent is working with relevant authorities to obtain necessary approvals to proceed with construction during selected restricted activity timing windows (denoted with * in Table 1.3 above) based on the determination that the Project will not have an unacceptable Significant residual adverse effect to the environment.

Construction planning activities during Project development has determined that the overall construction period can be reduced by approximately 1 year by working through the restricted timing window for fish. Reducing the overall construction period from 46 to 34 months, representing an approximate 25% decrease. This is reflected in the corresponding overall reduction in the duration of environmental effects as described in Section 5 (Significance of Residual Adverse Effects).

Beyond the environmental benefits that result from a shortened construction schedule, there are social benefits that have also been considered. One of the needs justification for building the Third Crossing was the ability for the new bridge crossing to provide improved access for emergency services. Periodic closures of the LaSalle Causeway for maintenance works have created a concern for the additional travel that would be required for emergency services who would need to use Highway 401 in these circumstances. This concern is further exacerbated if Highway 401 is closed due to an accident and traffic within the City of Kingston is gridlocked as motorists avoid a lengthy Emergency Detour Route approximately 30 km north of Highway 401. More recent discussions with the Public Services and Procurement Canada (PSPC), who are the federal agency that own and operate the LaSalle Causeway, have indicated that the age and condition of the Bascule bridge section of the LaSalle Causeway will necessitate major maintenance and repair work over the next several years. Work plans for the LaSalle Causeway are being developed by PSPC in an effort to try to avoid

works that would require long-term partial or full closure until the Third Crossing is complete. As a result, the ability to shorten the construction schedule for the Third Crossing helps to open this transportation connection sooner thereby minimizing the risks of having closures of the LaSalle Causeway (and possibly Highway 401) at the same time as the Third Crossing is under construction.

Additional details forwarded in support of obtaining necessary approvals to work within selected restricted activity timing windows are provided in Sections 3.1.2, 4.19.1, 5.1.2 and 5.1.9.

Kingston Third Crossing Schedule

Chainage: 10,000 | 10,200 | 10,400 | 10,600 | 10,800 | 11,000 | 11,200 | 11,400 | 11,600

Section: Site Work West | Span 1 | Span 2 | Span 3 | Span 4 | Span 5 | Span 6 | Span 7 | Span 8 | Span 9 | Span 10 | Span 11 | Span 12 | Span 13 | Span 14 | Span 15 | Span 16 | Span 17 | Span 18 | Span 19 | Span 20 | Span 21 | Span 22 | Site Work East

2022: Dec Nov Oct Sep Aug Jul Jun May Apr Mar Feb Jan

2021: Dec Nov Oct Sep Aug Jul Jun May Apr Mar Feb Jan

2020: Dec Nov Oct Sep Aug Jul Jun May Apr Mar Feb Jan

2019: Dec Nov Oct Sep Aug Jul Jun May Apr Mar

Site - Mob		Deck - Girder		Arch - false Works		Finish - Elect		Site - SWMP		Commissioning	
Site - Causeway		Deck - Form		Arch - Steel		Trestle - Install		Site - Roadway		Design Sub-Civil	
Abutment		Deck - Rebar		Arch - Bolt		Trestle - Remove		Site - Landscape		Design SuperS.	
Foundation		Deck - Concrete		Finish - Barrier & Railing		Site - Earth Work		Paving		Site - Causeway Preload	
Pier		Deck - Strip		Finish - Mech		Site - Utility		Waterproofing		Site - Turtle Crossing	

Kingston
3rd Crossing

11.07.2019

1.7 Valued Components

This DIA describes and assess potential interactions (including timing, frequency, duration, residual effects, cumulative effects and mitigation) between the phases of the Project and various environmental components within the vicinity of the Project. As outlined in Table 1.4 below, the environmental components are categorized as:

- Valued Components, which represent the main focus of the DIA.
- Secondary Components, which represent the secondary focus of the DIA, but are still reflective of PCA's mandate.

Based on the anticipated zone of influence (ZOI) of the Project, the geographical boundaries of the Study Area are:

- The LaSalle Causeway-Highway 2 corridor, which crosses the Cataraqui River at the southerly confluence of the Cataraqui River and Lake Ontario in the City's downtown area. The LaSalle Causeway is comprised of a 2-lane cross section and a series of structures (i.e., a fixed truss, rigid frame structure with a Bascule Lift Bridge portion that is raised to accommodate recreational boat traffic), under the jurisdiction of Public Works and Government Services Canada.
- The Highway 401 corridor, which crosses the Cataraqui River approximately 6 km north of the LaSalle Causeway. Highway 401 is owned by the Province of Ontario through the Ministry of Transportation Ontario (MTO). It is a 4-lane inter-city Freeway that extends through the City. The MTO is currently widening Highway 401 from 4 to 6 lanes west of Sydenham Road to west of Montreal Street as part of a broader provincial strategy to twin Highway 401 from the City of Windsor to the Quebec border in response to traffic volume growth and traffic collision incidents.
- Montreal Street and the Canadian National Railway (CNR) line on the west side lands.
- Highway 15 to the east side.

The Study Area is presented in Figure 1.1.

Table 1.4 provides a listing of the Valued and Secondary Components as well as the geographic and temporal boundaries of this effects assessment. The geographic scope of this assessment focuses on the assessment areas defined in the Municipal Class EA; and the assessment of the Project Location and associated surrounding offset areas defined in the validation phase. As such, the ESR is referenced as appropriate, where previous assessment have been conducted.

The temporal scope of the assessment focuses on the phases of the Project as defined in Section 1.5.6 above.

Table 1.4: Valued and Secondary Components; Geographic and Temporal Boundaries of the Assessment

	Temporal Scope			Geographic Scope
	Preparation Phase	Construction Phase	Operation Phase	
Valued Components:				
Greater Cataraqui Marsh Provincially Significant Wetland (PSW)	Figures 3 and 4.2 in Appendix A.			
Fish and Fish Habitat				
Migratory Birds and Habitat				
Species at Risk				
Surface Water Quality and Quantity				
Aquatic Habitat Quality				
Aquatic Wildlife and Vegetation				
Cultural Landscape				
Rideau Canal's Commemorative Integrity (NHSC)				
Rideau Canal's Outstanding Universal Value (UNESCO World Heritage Site)				
Visitor Experience and Recreational Opportunities	Figure 3 in Appendix A. Refined validation concept.			
Aesthetic Values				
Navigation				
Hydrologic Processes	Figures 3 and 4.1 in Appendix A.			
Submerged Cultural Resources				
Secondary Components:				
Groundwater Quality and Quantity	Figures 3, 4.1 and 4.4 in Appendix A.			
Terrain, Geology, and Soils				
Other Terrestrial Wildlife	Figures 3 and 4.2 in Appendix A.			
Terrestrial Vegetation				
Climate Change and Air Quality	Figures 3 and 4.3 in Appendix A.			

1.8 Proponent and Project Team

The Project proponent is the City of Kingston:

City of Kingston
216 Ontario Street
Kingston, Ontario K7L 2Z3
Dan Franco, P.Eng.
Project Manager - Third Crossing
Phone: (613) 546-4291, extension 3226
E-mail: dfranco@cityofkingston.ca

As summarized in Table 1.5, the IPD Project Team for the Validation, Detailed Design and Construction Stages of the Project consists of the following firms.

Table 1.5: IPD Project Team

Team Partner	Team Role
Peter Kiewit Sons ULC	Project Constructability Review and Cost Estimates, Construction and Construction Coordination
Hatch Ltd.	Roadways, Drainage, Traffic Analysis, Utilities, Approach Spans and Other Structures, Environmental, Consultation Support, Building Information Model (BIM) Management, Computer Aided Design (CAD) Management, Document Control and Overall Design Project Management
SYSTRA International Bridge Technologies	The Bridge Navigation Channel Span and Back Spans
Brownlie Ernst and Marks	Bridge Architecture
Vertech Designs	Landscape Architecture
Moon-Matz	Electrical & Traffic Signals
Tulloch	Geotechnical and Pavement Engineering
Bergman	Temporary Bridge Design

The Preliminary Design Project Team consisted of the following firms as summarized in Table 1.6.

Table 1.6: Preliminary Design Project Team

Team Partner	Team Role
J. L. Richards & Associates Limited	Project Management and Coordination, Transportation Planning and Engineering, Project Constructability Review and Cost Estimates, Permits and Approvals, Public and First Nations Consultation, Financial Plan Liaison
Parsons Inc.	Bridge Design, Project Constructability Review and Cost Estimates
Golder Associates Ltd. JASCO Applied Sciences	Geotechnical Engineering, Hydrogeological and Geo-environmental Sciences, Natural Environment Sciences, Cultural and Heritage Sciences and Construction and Transportation Bio Acoustic and Transportation Human Noise assessments. The above disciplines provided input to the project design for these specific specialty areas in terms of project design, project construction cost estimates and Permits and Approvals.
CSW Landscape Architects Ltd.	Landscape Architecture
Leslie Higginson Surveying Ltd.	Legal and Topographic Survey

IPD Project Team contact information is as follows:

Hatch
2800 Speakman Drive
Mississauga, Ontario K7L 5N4
Mark Armstrong, M.E.Sc, P.Eng., PMP
Environmental Lead
Phone: (905) 940-5487
E-mail: mark.armstrong@hatch.com