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A. Preface

This document represents the final report for the City of Kingston’s Third Crossing Business Plan that will be presented to City Council on June 13, 2017. A draft business plan and associated appendices was posted on the City’s webpage on May 8, 2017 to share project information with stakeholders in order to receive feedback on its content and provide additional information prior to finalizing the business plan. The final business plan was developed in a manner that is consistent with business plans for other large-scale capital infrastructure projects across North America. The final business plan addresses the public need for the infrastructure and also gives consideration to both the technical and economic feasibility of the project. The results of the feasibility analyses are used to provide evidence to support whether the project represents a good investment for both the funding partners and the community. For simplicity purposes, this document will be referred to as ‘business plan’ here on out.

Within the section of the business plan that describes the Strategic Case for the Third Crossing, the reader is provided with information on why the Third Crossing project is needed and how the project is considered in the context of the overall strategic plan for the City of Kingston. This section revisits policy directives that relate to the Third Crossing, conclusions of the Environmental Assessment (EA) process, and the development of the Third Crossing Action Plan with the goal of positioning the project to be ready for construction. This section of the business plan also reviews additional considerations that have been part of the public discourse on the Third Crossing during the period of time following the conclusion and final approval of the EA in 2013.

The reader is provided with Project Background information and a chronology of various studies and reports that have aided in the development of a comprehensive knowledge base for the proposed Third Crossing.

The Communications, Public Engagement, and Feedback section of the business plan provides the reader with a summary of communications efforts that have been undertaken to provide project related information and promote awareness and understanding of the Third Crossing project. This section of the report also highlights the public engagement work and helps the reader understand the input that was sought from the general public on specific matters related to the preparation of the preliminary design and business plan, and how input from the public was utilized by the project team.

The principal elements of the business plan for the Third Crossing relate to both the Technical Feasibility and Economic Feasibility of the project. The Technical Feasibility section of the report recaps efforts that were undertaken during the EA phase that considered the need and justification for the project and the preferred solution to build a new bridge crossing the Cataraqui River to connect between John Counter Boulevard and Gore Road. The work undertaken as part of the preliminary design work and associated updates to the capital and operating costs further support the analysis of the technical feasibility for the Third Crossing.
The Economic Feasibility of the project is undertaken in a manner consistent with other large-scale transportation projects. In this section of the report, the reader is provided with information related to the cost-benefit analysis, economic impact analysis, and procurement options analysis. The reader is also provided with information and results on how the City’s long-term financial plans have considered the Third Crossing project. An ‘industry-standard’ approach is used to guide each of these components of the business plan, with the results used to help inform the overall economic feasibility of the project.

The business plan has been prepared by City of Kingston staff and has been based upon contributions of works from various internal City departments and external consultants. The City of Kingston acknowledges the contributions of J.L. Richards & Associates and their work efforts that have supported the technical feasibility of the Third Crossing project. J.L. Richards & Associates was the lead engineering consultant in the preparation of the EA completed in 2012. J.L. Richards & Associates, along with support from sub-consultants Parsons Corporation, DTAH, Golder Associates, and CSW Landscape Architects, were also the lead for the preparation of the preliminary design and updated project cost estimates. A separate “Preliminary Design Summary Report” prepared by the J.L. Richards team has been referenced and highlights those major findings into this business plan document. This report will commonly be referred to as the Preliminary Design Summary Report in various sections of the following business plan. The City also acknowledges the contributions of Collins Barrow, Dillon Consulting and Infrastructure Ontario for their work which has supported elements in the economic feasibility of the Third Crossing project. Collins Barrow was the consulting firm responsible for the development of the cost-benefit and economic impact analysis for the project, Dillon Consulting provided information from the City of Kingston’s transportation model, and Infrastructure Ontario provided support in the analysis of various procurement options. The reader is invited to review the full reports which are provided as appendices to this business plan document. The City further acknowledges the support provided by Cumming & Company and their work to support the communications and public engagement efforts. A full report on this work entitled “Public Engagement Feedback Report, Phases 2 and 3 of the Third Crossing Action Plan” will accompany the staff report to council that will be presented to City Council on June 13, 2017. Internal City of Kingston departments including Financial Services, Planning Building & Licensing, Fire & Rescue Services, Legal Services, Transportation Services, Public Works, and Recreation & Leisure are acknowledged for their input and support. Frontenac Paramedic Services and Kingston Police also provided input from an emergency services perspective and Financial Services provided key support in the development of the financial plan for the Third Crossing project.

The business plan is intended to provide key information that will support Kingston City Council to make sound decisions regarding the next phase of the Third Crossing Action Plan. The business plan will also serve as a useful document to communicate with funding partners including the federal and provincial governments in the pursuit of grant funding for the project. The business plan will remain as a living document that can be updated based upon new project information that may become available.
B. Executive Summary

The business plan for the Third Crossing describes the strategic case for the project including the planning and policy work that guide the transportation infrastructure requirements for the City of Kingston. Smart cities build infrastructure that supports a high quality of life for everyone. These investments are used to support improvements in transportation, water, wastewater, recreation, social, and health services that residents rely on every day. This interconnected system fosters Kingston’s economic foundation and future growth. Transportation is an essential link that supports the City’s broader vision of sustainability and connectivity and helps residents be active participants both socially and economically in the community. Transportation investments in Kingston provide choice, convenience and access for residents to travel to their destinations and activities. This requires a multi-modal approach to how we view the transportation network and the methods people use to travel throughout the City. Efforts are being focused on new and expanded transit services and support for pedestrian and cycling facilities that provide increased access and alternatives to traditional commuter options. Transportation improvements are also being considered to support the City’s sustainability and environmental goals by providing attractive alternatives to reduce single-occupant car travel and reducing the carbon footprint and greenhouse gas emissions of the City’s transportation system. At the same time, the transportation system needs to be safe and efficient and built with consideration for how the City will grow and develop into the future. The Third Crossing is also part of this strategic vision and another important link within the overall transportation network that serves the current and future needs of the City and maximizes the value of infrastructure investments already made and future investments in the City’s long-term plan.

1. Third Crossing Action Plan

The Third Crossing Action Plan established a four phase work plan that described a list of activities that were required to bring the Third Crossing project to a “shovel-ready” status. The work that has been undertaken includes the completion of an EA (Phase 1) and an assessment of the technical and economic feasibility through the development and completion of a preliminary design and an accompanying business plan (Phase 2 and 3 of the Action Plan). Upon completion of these works, and subject to Council approval, the execution of the final Phase 4 of the Action Plan would then follow suit in which it describes activities that are necessary in order to complete the design and construction of the Third Crossing.

2. Preliminary Design

Following the conclusion of the EA of the Third Crossing, the technical feasibility of the project has been further evaluated through the development and completion of the preliminary design including: the evolution of the design and construction cost estimate from the EA’s concept stage; and the updated construction cost estimate for the Third Crossing. The Preliminary Design Summary Report prepared by the lead engineering consultant J.L. Richards recaps the development of the conceptual design as part of the
EA and traces the progression of the design through the preliminary design phase. Public input has been an important component in the development of the preliminary design and has helped shape and guide the evolution of the design from the concept developed in the 2012 EA. There has been tremendous interest and public engagement on the Third Crossing, starting from the EA and looking at the need for the crossing through to the preliminary design and business plan. Part of the public engagement during the preliminary design and business plan included a public survey in 2016. When asked to consider the Third Crossing in the context of the natural environment and the City’s sustainability goals, a majority of respondents indicated strong support for protection of the natural environment. There was also an equally strong desire to see the bridge constructed in the most economical and practical way possible. Respondents also wanted to have an aesthetically pleasing bridge design balanced with an affordable design that is within the City’s financial means. The project team has taken the public input and reflected this information in a refined preliminary design that has optimized elements of the bridge, provided additional measures to protect the natural environment, and aimed to minimize overall project lifecycle costs to the maximum extent possible without compromising the features important to the community.

Construction Cost Information

The work completed as part of the preliminary design included an update of the EA’s construction cost estimate in order to understand the impacts of inflation from the previous six years. The EA determined that the construction cost estimate for a 2-lane bridge was $121 M dollars (in 2011 dollars). A cost inflation exercise found that the EA’s cost estimate of $121 M increased by approximately $19.5 M dollars most in part by the impacts associated with construction price indexing (inflation). Another aspect of the preliminary design was to propose the appropriate construction means to build the bridge. The EA discussed the merits of using a temporary work bridge but ultimately recommended the use of a dredged channel. However, discussions with major stakeholders and the feedback received in the public survey in 2016, it became evident that environmental sustainability was paramount if the Third Crossing was to move forward. Therefore, the preliminary design recommended the use of a temporary work bridge which has a significantly less impact on the environment compared to the dredged channel. The temporary work bridge is more costly than the dredged channel and therefore the preliminary design needed to offset the cost increase by offering a design modification from the EA’s conceptual design. An alternative pier design has been proposed and yields a cost savings compared to the original EA’s pier design. Through this cost balancing exercise that occurred as part of the evolution of the preliminary design, the construction cost of the project has increased by approximately $20.5 M dollars (in 2017 dollars). Therefore, the current construction cost estimate for the preliminary design is $161 M dollars (in 2017 dollars).

3. Business Plan

The business plan for the Third Crossing evaluated the economic feasibility of the project and how it has been considered and included in the City’s long-term financial plans. The work related to the cost-benefit, economic impact and the procurement
options analyses for the Third Crossing were used to support whether the project represents a good investment for the Kingston community.

a. **Financial Plan and Project Cost Information**

The Third Crossing has been planned for and integrated into the City’s strategic priorities and financial plan for many years. There is no requirement for a dedicated tax increase to pay for the construction or the on-going operation and maintenance of the Third Crossing. The funding for the bridge is based on an equal contribution from the federal, provincial and municipal governments with each contributing $60 M for a total of $120 M in grant funding which is aligned with senior level government priorities for shovel-ready infrastructure. The City would also contribute $60 M of which $30 M will be funded from development charges (DC) and $30 M from municipal taxes.

DC’s have been collected since 1999 for municipal services and infrastructure including the Third Crossing. If construction starts in 2019, the city will have collected $20 M in DC for the bridge by the end of construction, with the balance of $10 M to be collected from development occurring beyond that timeframe. The City will pay its share of the $30 M through a combination of 50% through regular taxes in cash and the remaining 50% through debt issuance.

The earliest year that construction could take place would be 2019 if approval to proceed with Phase 4 was received by mid-2017 and grant funding was secured prior to construction. For the purposes of the business plan and generation of the project cost estimate, we have assumed the anticipated year of construction is 2019.

The project cost information should be considered an ‘all-in’ cost to carry out Phase 4 of the Third Crossing Action Plan. The total project cost estimate for Phase 4 is $180 M dollars (in 2019 dollars) which includes the detailed design and construction costs, land acquisition costs, non-refundable portion of HST, and 2 years of inflation assuming construction commences in 2019. The sunk costs that have been spent-to-date from 2009 to 2017 (Phases 1, 2, and 3) are $6.48 M dollars and have not been included in the $180 M dollars.

b. **Cost Benefit Analysis**

The main objective of the cost-benefit analysis was to assess whether the benefits of the Third Crossing outweigh the project cost estimate of $180 M dollars. The cost-benefit analysis (CBA) determined that investing in the Third Crossing is a good use of resources and provides benefits that are greater than its implementation cost and should be pursued because it provides an overall net benefit for society as a whole.

The values that were used in the CBA model referenced the City’s traffic model which calculated that over 63 million fewer kilometers travelled with an overall time saving of over 3.4 million hours on an annual basis could be realized if a Third Crossing was built. The present value of the cumulative costs for the Third Crossing over the 30 year period is estimated to be approximately $178 M dollars and includes the initial cost of construction and operation and maintenance over the 30 year period. The present value
of the cumulative benefits over the same period for both the users and non-users of the Third Crossing is estimated to be approximately $1,284 M dollars. When isolating just the user benefits, the present value of the total benefits for this group alone is approximately $548 M dollars. These benefits are primarily provided through decreased travel time and reduced vehicle operating expenses.

This cost-versus-benefit comparison is more simply demonstrated through an exercise called a cost-benefit ratio (CBR). The Third Crossing CBR shows a range of 5.83 to 7.23 when considering both the user and non-user benefits combined. When isolating the user benefits, the Third Crossing CBR shows a range between 2.82 to 3.49.

These CBA values provide a strong indicator that the project is a good use of resources since approximately 48% of the total benefits of the Third Crossing accrue to the users and 52% flow to non-users. This result demonstrates that the benefits of the Third Crossing are dispersed widely across the City of Kingston and that users and non-users benefit almost equally.

The cost-benefit analysis work that was undertaken followed a conservative approach that was liberal in attributing costs to the project while being more conservative against the values that contribute to project benefits. The CBA used a time horizon of 30 years; included sunk costs; added the full construction contingency; added a benefit penalty to account for the potential of induced demand; and has increased the inflation values of the ongoing maintenance and ongoing repair costs. Even with these conservative assumptions, the monetized benefits of the Third Crossing still outweigh the costs by a significant margin. The Third Crossing compares favourably to other transportation projects across North America and can be considered a good use of resources. The results of the CBA indicate that the Third Crossing has a “payback” period within 10 years.

c. Economic Impact Analysis

An economic impact analysis (EIA) was undertaken for the Third Crossing project and determined the local and regional economic impacts of implementing a Third Crossing. The total economic impact equals the sum of the direct, indirect and induced economic impacts. The one-time impacts during construction are estimated to generate roughly $10.0 M in GDP and 89 jobs on an average annual basis in Kingston.

Interviews with various business organizations and leaders within the community suggested that the development of the Third Crossing would be a catalyst to facilitate and accelerate the development of the east end of the City of Kingston and in particular the St. Lawrence Business Park, where employment land development was viewed as limited as a result of lack of easy access to the rest of the City. The EIA considered the full build-out and development of the St. Lawrence Business Park, which would result in on-going economic impacts including the creation of 276 jobs and approximately $29 M in GDP on an annual basis.
d. **Procurement Options Summary**

A review of various procurement options has been carried out as part of the business plan for the Third Crossing. This review was intended to assist in determining the preferred design and construction administration to be used by the City. The review considered both traditional models including design-bid-build and design-build, and non-traditional models including various forms of public private partnerships (P3). The examination of procurement options typically relies on the combined findings of a quantitative and qualitative analysis with the objective of selecting the procurement option that maximizes both value and efficiency while protecting the City from risk.

The project team’s review of project delivery models, along with the consideration of public feedback, has determined that the Design-Build Integrated Project Delivery model is the appropriate project delivery model for the Third Crossing.

4. **Next Steps**

Phase 1, 2, and 3 of the Third Crossing Action Plan has determined that the project is both technically and economically feasible and would benefit the City of Kingston if implemented.

The information provided in the Final Preliminary Design Summary Report and the Final Business Plan will support a summary staff report to Kingston City Council on June 13, 2017. The staff report will also provide City Council with recommendations in relation to the next steps associated with the implementation of the Third Crossing project.
C. Strategic Case for the Third Crossing

1. Mission Statement

Municipal infrastructure is commonly referred to as the ‘foundation’ upon which communities are built. Core infrastructure, which includes roads, bridges, water supply, sewers, electricity, and telecommunications, are used to support the daily activities for those who work, live and play in any community. The City of Kingston has set a vision of being a smart and livable 21st century city that will further support efforts to become Canada’s most sustainable city.

Smart investments in the City’s transportation infrastructure will continue to be a necessity to ensure that Kingston has a transportation system that meets both current and future needs. The City’s transportation system, including the supporting policies, programs, and infrastructure, will need to be safe, efficient, and adaptable. Moreover, smart investments will need to consider both the effective management of existing assets and the provision of new and/or expanded transportation infrastructure assets.

Investments in infrastructure have been and continue to be a key priority for both past and current City councils. Invest in Infrastructure has been identified as one of the six strategic priorities that Kingston City Council has established in recognition that strong and robust infrastructure ensures a high quality of life for Kingstonians. It also provides the City with the foundation needed to support a sustainable community. Embedded within this strategic priority was the direction to advance work on the Third Crossing of the Cataraqui River and to bring the project to a “shovel-ready” status in order to commence construction.

2. Policy Directives

In a similar manner to other municipal jurisdictions in the Province of Ontario, the City of Kingston uses a hierarchical approach to planning for the community. The Official Plan is the pre-eminent document that establishes the land use planning goals and policies that guide the physical development and redevelopment, protection of natural and cultural heritage, resource management, and necessary supporting infrastructure for the City of Kingston over the next 20 years. The Official Plan is shaped by input from the community as a whole, including residents, landowners, land developers, staff, and council. In preparing the new Official Plan for City of Kingston in 2015, the Ontario Provincial Policy Statement and updates to the Ontario Planning Act were reflected along with the results of many individual background studies including:

- Population, Employment, Housing Studies
- Employment Land Development Strategy
- Natural Heritage Strategy
- Waterfront Strategy
- Urban Growth Strategy
- Others
The Urban Growth Strategy completed in 2004 was an important part of shaping the City’s Official Plan. The Urban Growth Strategy evaluated planning and servicing issues associated with five different growth alternatives. The work was guided by four key initiatives that included (1) limit costly infrastructure improvements and expansions, (2) land supply for development to be carefully tied to Kingston’s projected growth rate, (3) accommodate growth without unnecessary outward expansion, and (4) establish Princess Street as a new mixed-use corridor with higher density development that is transit-supportive. The result of this work was the adoption of a strategy that focused on development within the existing urban growth boundary, which has subsequently been reflected with the City’s Official Plan.

The Official Plan provides land use planning direction to inform the development of Zoning Bylaws and Secondary Plans. The Official Plan also provides infrastructure planning direction to inform the development of Master Plans for physical infrastructure, including but not limited to transportation, municipal water, and sanitary sewer utilities. More specific to transportation, the Official Plan sets out the following policy goal statement:

“To increase sustainable means of travel and reduce reliance on the automobile, the City will promote a compact form of development within the Urban Boundary having a mix of uses that reduce the need for travel, and will also promote increased densities that are supportive of public transit alternatives. Increasing opportunities for active transportation and improving the maintenance of pedestrian and cycling routes will increase usage, safety and access for all.”

The Kingston Transportation Master Plan (KTMP) is the master planning-level document that aims to achieve this goal. The KTMP is a 20-year plan that provides strategic direction to meet travel demand by making efficient use of the existing infrastructure and by providing the facilities and services to encourage walking, cycling and transit as priority modes, before building new or widened roads to accommodate vehicular traffic. The KTMP is informed by the City’s Official Plan and also uses information contained in a number of other City strategic and master planning documents (including those used to inform the City’s Official Plan). The KTMP is updated on a 5-year basis based upon new information related to growth and travel demand gathered through household travel surveys and other appropriate data resources. The original KTMP was developed in 2004 and updated in 2009 and 2015.

The KTMP is used to provide direction and establish policies, programs and infrastructure to support key components of transportation within the City of Kingston including:

- Active Transportation Plan
- Transit Plan
- Parking Plan
- Transportation Demand Management Plan
- Transportation Systems Management Plan
- Strategic Road Safety Plan
• City Roads Program

The City’s Roads Program addresses both (1) the asset management requirements related to the existing roads system and (2) the provision of new roads based upon recommendations within the KTMP. New road projects are further evaluated through the Provincial (Municipal-Class) Environmental Assessment (EA) process to determine preferred solution, mitigation measures for adverse environmental impacts, and project implementation.

The Third Crossing project has been referenced in many of the aforementioned policy and planning documents. More specifically, the KTMP developed in 2004 with updates prepared in 2009 and 2015 have all addressed the Third Crossing and consistently confirmed the needs justification for a new additional transportation capacity across the Cataraqui River. In addition, the needs justification for the Third Crossing was also validated as part of the EA work completed and approved in 2012.

The policy and planning work undertaken following the amalgamation of the former City of Kingston, Pittsburgh Township and Kingston Township has had a significant impact on shaping the City of Kingston since 1998. Many of the significant infrastructure investments that have been made in the community since this time have been based upon these policy directives. Major projects such as the expansion of the Ravensview Wastewater Treatment plant and the transportation improvements and road widening along John Counter Boulevard, are examples of significant projects that have been completed, or are in the process of the being completed, based upon the strategic vision and plans for growth and associated travel demand within the City of Kingston. The Third Crossing should be viewed in the same manner as being an important element of the transportation network that will serve the current and future needs of the City, wherein the absence of this transportation link may in fact limit the derived value of those infrastructure investments that have already been made.

3. Considerations for the Third Crossing

The Environmental Study Report that was completed in 2012 as part of the EA for the Third Crossing captured many of the considerations that were both important to the community and relevant to the project. Even though there is policy direction to move forward with the implementation of the Third Crossing, which is supported by the conclusions and recommendations of the approved EA, there are a number of considerations that have been part of the on-going community discussion with respect to the project.

**How does the Third Crossing relate to the City’s goals for Active Transportation?**

On-going engagement within the community continues to look for ways the City can make further progress towards shifting the modes of transportation within the community by encouraging more trips to be made by walking and cycling and fewer trips to be made by single occupant motor vehicles. New mode share targets over the next 20-year period were established as part of the 2015 Kingston Transportation Master Plan. An aggressive mode share target of 20% was established for active
transportation, meaning that by the mid-2030s, one in every five trips during the peak travel period will be by walking or cycling.

The City now has 130km of cycling facilities, over 450km of sidewalk and 60km of trails. In both 2012 and 2016, Kingston received its second “Bike-Friendly Community Bronze” recognition from the Share the Road Cycling Coalition, and in 2017, the City received the “Bronze Walk Friendly Community” designation from Canada Walks and the Department of Green Communities. These accomplishments serve as catalyst for the City to continue develop and expand active transportation policies, programs and infrastructure that will enable the City to achieve the 20% target.

The Third Crossing can be viewed as a critical piece of the road network to promote the use of non-automobile modes of transportation. A multi-use pathway with rest and lookout areas on the bridge structure; the inclusion of sidewalks and cycle lanes on the road approaches; and connections to future waterfront trails on either side of the Cataraqui River offers the opportunity to increase the number of walking and cycling trips. The benefits for cyclists, in particular, may be significant with the provision of safe and attractive infrastructure to use. Figure 1 shows the portion of the transportation network that can be accessed by pedestrians assuming a commute time of either 30 or 60 minutes. Figure 2 shows the potential for cyclists within a reasonable travel time from the center of the Third Crossing assuming travel speed of 20 km/hr over a distance of 7 km.

Figure 1: Third Crossing Walk Commute Catchment Area
How does the Third Crossing relate to the City’s goals for Kingston Transit?
The Kingston Transportation Master Plan has also established a mode share target of 15% for the use of transit. Even though this is an aggressive target, considerable progress has been made over the course of the last 5+ years. Kingston Transit has experienced significant growth over this period, with 5.2 million passenger trips in 2016 compared with 3.5 million passenger trips in 2011. This represents almost a 50% increase in transit use over this period of time. The City recently approved a new 5-year service plan for Kingston Transit that incorporates service expansion and improvements to continue progress towards achieving the 15% target.

At present Kingston Transit provides service to the east side of the City with routing through the downtown and across the LaSalle Causeway to Highway 2 and the developed areas along Highway 15. The existing express and local service has been designed to operate within the current delays experienced during the peak traffic periods. As traffic congestion and delays increase in this area over time, additional fleet and resources will likely be required to maintain the current service levels. The Third Crossing would provide an alternate route that would reduce traffic volumes on the existing transit routes which would improve schedule adherence and reliability. In instances where the LaSalle Causeway is closed (scheduled or unscheduled) the Third Crossing would provide a detour that would be preferred to the current option of the Highway 401.

The Third Crossing would also provide a new transit option for east-west express and local routes across the City without the need to travel through the downtown. This routing option would provide an opportunity for direct connections from residential to
commercial and industrial employment lands which are established and planned for these areas of the City.

**How does the Third Crossing relate to the City’s Road Network requirements?**

The EA for the Third Crossing that was completed in 2012 determined that ‘doing nothing’ or relying on the available capacity of Highway 401 and LaSalle Causeway would not address the transportation deficiencies for travel across the Cataraqui River even with capacity optimization and increases in the use of public transit.

The new targets for various components of the transportation system have been incorporated into the City’s transportation model in order to re-assess the performance of the network and identify capacity deficiencies within the transportation system. Chapter F provides an analysis of the results from the transportation model and a summary of how the Third Crossing relates to the City’s road network requirements.

**How does the Third Crossing relate to provision of Emergency Services?**

The consideration of a future Third Crossing has been largely based on the need to provide additional transportation capacity to meet travel demand across the Cataraqui River as the City continues to grow over the next 20 years. However, access to emergency services has also been identified as a catalyst for the construction of the Third Crossing to better connect residents to the services they need when they need them.

**Paramedic Services**

Frontenac County delivers paramedic services for the City of Kingston. In discussion and consultation with Frontenac County, closures of the LaSalle Causeway were viewed as a risk that would have a significant impact on emergency response times to Kingston east including the Royal Military College, CFB Kingston and the Barriefield neighbourhood. Although less probable, the risk and impact to emergency response times would be severely impacted if both the LaSalle Causeway and Highway 401 were closed at the same time.

The Third Crossing was viewed by Frontenac County as a needed transportation link that would play an important role in adding needed redundancy to the transportation network crossing the Cataraqui River and providing access to Kingston General Hospital for both the patients who need to be transported quickly, and for the medical staff on call who may be needed on an emergency basis. Physicians are required to be no more than 20 minutes away from the hospital when on call, and any closure of the Lasalle Causeway may make this standard a challenge. In emergency care, time is of the essence in many cases (heart attacks, bleeding injuries), and that the extra time that it takes to get up to HWY 401, even if only the Lasalle Causeway is closed may make the difference for some patients. These concerns were also provided to the city in the form of a council motion from Frontenac County Council.

**Kingston Health Sciences Centre**

Kingston Health Sciences Centre (KHSC) is Southeastern Ontario’s largest acute-care academic hospital. Consisting of the Hotel Dieu Hospital site and Kingston General Hospital site, as well as the Cancer Centre of Southeastern Ontario, they care for more
than 500,000 patients from across the region. Kingston General Hospital (KGH) is also the leading tertiary care hospital in Southeastern Ontario for acute and specialty care. It is the lead trauma hospital between Ottawa and Toronto and spans the region from east of Brockville, west of Trenton and north to Bancroft.

As the only trauma center between Ottawa and Toronto, KGH has the responsibility of providing high-level care including initial assessment and treatment 24-hours a day. For residents in Kingston east, the LaSalle Causeway is the primary route for access to the hospital and any traffic congestion and/or closures on the LaSalle Causeway can impact emergency response times.

KHSC acknowledged the challenge of access to emergency services during closures on the LaSalle Causeway. They felt the Third Crossing has the potential to reduce reliance on the LaSalle Causeway thus increasing efficiency on this primary route and providing an alternate route for emergency services.

It was also recognized that for day-to-day emergency crises, such as heart attacks, increased reliance on air ambulance is not a sustainable option for a variety of reasons: demand of these limited services from other communities across Ontario, availability of these services with the unpredictability of weather conditions and increased demand locally without access to the Lasalle Causeway.

**Fire & Rescue Services**
A Master Fire Plan was developed for the City in 2010 and Council adopted a policy recommendation which anticipated construction of a Third Crossing over the Cataraqui River. In that plan, Kingston Fire & Rescue Services identified the LaSalle Causeway as a limitation to their emergency response agencies gaining access to resources in the core area of the City when required to support the east side of the City in a timely way. In discussion and consultation with Kingston Fire & Rescue, the Third Crossing was viewed as an opportunity to further evaluate and optimize these essential services.

Kingston Fire & Rescue has indicated that fire units from the central part of the City were dispatched and responded to approximately half of the emergency calls on the east side of the City based on response requirements. As a result, Kingston Fire & Rescue has identified significant concern with the potential for blockages or obstructions to access to the east side, given half of the time the required complement of response crews required on the east side alone would not be meeting approved staffing levels for emergency response. Without the Third Crossing, there will be the need to provide additional services for the Gore Road fire station with an additional annual expense to the City’s operating budget for fire services of approximately $3M per year.

**Police Services**
Kingston Police has also identified concern with the condition of the LaSalle Causeway, the potential for increased closures and the impact on response times for providing police services for the east side of the City. Police resources are provided from the central and west area of the City to provide back-up or additional support if required when responding to service calls in Kingston east. When the LaSalle Causeway is
closed, the ability to provide additional resources from the central and west areas of the City is significantly impacted.

With the proposed addition of the Third Crossing, Kingston Police will be able to manage resources within the central and west zones in the City to supplement resources in the east zones of the City when required. Without the Third Crossing, they will need to provide additional dedicated resources to provide the necessary police services for the east side of the City.

**How does the Third Crossing relate to Induced Demand?**

Residents have inquired about induced demand and the potential of the Third Crossing to increase the amount of car trips that would be made if it were built and how it could impact the mode share targets the City is trying to achieve. There are two elements of induced demand that need to be considered: *local* and *global*.

Local induced demand is the re-routing of travelers that are already making trips within the City's transportation network. New transportation infrastructure such as the Third Crossing does not cause the traveler to switch from walking, cycling or taking the bus to instead use their car. Nor does the Third Crossing create or promote more trips to be made within the transportation network. Instead, local induced demand is simply a result of travelers changing their route while their mode choice does not change. As the model results indicate, the Third Crossing is a well utilized transportation link attracting trips due to efficiencies of reduced travel distance. Without a Third Crossing, those trips would otherwise have used either Highway 401 or the LaSalle Causeway.

Global induced demand is the shift of travel mode and/or the creation of new trips that would not have otherwise occurred within the transportation network. In this sense the Third Crossing, which is an improvement to the overall transportation network, may result in travelers shifting from current mode of transportation such as transit or walking to another mode of transportation such as automobile or cycling with the potential for increasing their amount of trips. In other words, there is concern that more automobile travel will be induced by the construction of the Third Crossing which could impact the City reaching their mode share targets. It is understood that new population and employment growth in the City generates new trips in the road network. Global induced demand that is generated by growth and development should be considered beneficial for Kingston which is striving to attract more residents and businesses. Another form of global induced demand is the potential shifting of trips that have used transit or active transportation back to the car upon expansion of the road network. This type of global induced demand would not be beneficial for the City and would increase congestion unnecessarily when other options can be instituted to counteract this issue. There is a low potential for this negative type of induced demand to occur as a result of the Third Crossing since most of the new trips that will be generated will be a result of expected growth in the City. In addition, the City's Transportation Demand Management (TDM) strategy is intended to address any remaining global induced demand concerns through the development of policies, programs and infrastructure that promotes the use and attractiveness of alternate (non-automobile) modes of transportation. The focus on providing convenient, safe, and attractive options for walking, cycling, and transit, which is part of the design of the Third Crossing, is
conducive to promoting these modes of transportation. The Third Crossing’s connectivity and multi-use pathway has been identified as a critical TDM component that will help the City reach its mode share goals of increasing walking/cycling and transit use in Kingston.

The traffic model results have determined that a significant distance and time savings can be realized if the Third Crossing is implemented. The traffic model outputs for travel time and distance has been converted into dollar values (monetized) as part of the cost benefit analysis. The cost benefit model has taken a conservative approach and applied an induced demand penalty against the monetized benefits in the event that TDM goals are not being realized. Nevertheless, the cost benefit ratio for the Third Crossing yields a strong indication that the project is a good use of taxpayer money even with induced demand being considered. Induced demand has been accounted for in the business plan which determined that induced demand, if it does occur with a Third Crossing, will not be significant enough to deter the benefits that the Third Crossing project can provide the City.

How does the Third Crossing relate to changes in the City’s Population forecasts?
Additional consideration has been given to changes to the population and demographic profile of Kingston. Forecasts for population, housing and employment are important components to the development of the City’s transportation model. The last forecast study completed in 2013 (using Census data provided in 2011), indicated that the Kingston area will grow for two decades followed by a gradual population decline shortly after 2031. More recent data from the 2016 Census indicates that population growth over the past 5-year period was lower than forecasted. Forecasts for population growth is a key parameter to assist the municipality in developing various long-range plans including infrastructure requirements.

Underestimates for population growth may result in infrastructure and associated municipal services that are not able to meet service level requirements, whereas overestimates for population growth may result in redundant infrastructure and/or excess capacity for the needs of the community. The Population, Housing and Employment study completed in 2013 also revealed changes in the demographic profile for the Kingston area. As expected, an aging Baby Boom generation will result in a significant growth in percentage of the population over the age of 75 by the mid-2030s. The study also revealed that the employed share of the population between the ages of 20 to 75 will also increase over the next two decades reflecting the fact that many Baby Boomers will be working past the age of 65.

The current population projection forecast a peak population in mid-2030s followed by a decline, which is an important consideration given that the service life of the Third Crossing is designed to be over 100 years. If there is a continued decline in population after the mid-2030s, there is a risk that the transportation benefits of the Third Crossing would start to diminish with the potential over-supply of transportation capacity.

The City is developing strategies aimed at continuing to grow the local population and to attract more people into the City. The City’s strategic vision for growth and investment
can already be seen with the recent announcement of Frulact - a Portuguese food processor. Frulact is opening a new North American plant and research and development facility in Kingston and have acquired 15 acres of development land in the Cataraqui Estates Business Park in the City’s west end with an option for additional expansion space. Construction is underway on the 75,000 square foot plant slated to open in 2017 with approximately 50 employees to be hired when the facility opens. Another significant recent announcement includes Feihe International selecting Kingston as the home for a new Canadian infant formula manufacturing operation. Kingston will be home to this world-class intelligent manufacturing plant planned on 40 acres of development land in the Cataraqui Estates Business Park in the City’s west end. The project represents a $225 M investment, with the approximately 300,000 square foot processing plant slated to break ground in 2017. Approximately 200 new full time employees will be hired when the plant begins operations.

Work is also underway by the City to develop a Workforce and In-Migration Strategy. This strategy is aimed at helping to ensure that the predicted labour shortages in Kingston are filled with a skilled labour force. This strategy will contribute to an increase in the population as a number of individuals will be relocating from other areas within Canada and from other countries. A number of other initiatives are also part of the strategy will help to contribute to an increased population through both in-migration and immigration.

**How does the Third Crossing relate to changes in Transportation Technologies?**

The rapid pace of technological advancement will continue to have the potential for significant effects on transportation systems. The City of Kingston is monitoring the development of future transportation technologies that are focused on improving road safety and transportation capacity. Of particular interest are the recent advancements in both autonomous and connected vehicles that may provide a safer environment for all roadway users and the ability to significantly increase the transportation capacity of existing roads. The City of Kingston has recently joined as a member of the Municipal Alliance for Connected and Autonomous Vehicles in Ontario (MACAVO), which is affiliated with the Ontario Goods Roads Organization in order to collaborate with other Ontario municipalities in the research, testing, policy and infrastructure development that will be necessary to support connected and autonomous vehicles. The City will continue to work with groups such as MACAVO that will be helping municipalities prepare for the anticipated growth in the use of autonomous and connected vehicles including an understanding of how the technology will interact with municipal infrastructure. The extent to which municipal infrastructure will need to change and/or how the technology will develop to utilize existing infrastructure remains to be seen.

In the context of the Third Crossing project, the preliminary design of the bridge crossing meets or exceeds the current best practice for design established by the Ontario Ministry of Transportation as well as guidelines provided by the Transportation Association of Canada. The proposed Third Crossing would provide travel distance and time savings throughout the road network that would benefit users of autonomous and connected vehicles.
How does the Third Crossing relate to the City’s efforts to protect the environment and help reach Kingston’s Climate Action Plan goals?

The goal for Kingston to become Canada’s most sustainable city has continued to heighten awareness of the importance of the natural environment and the need to avoid, minimize, and compensate for negative impacts. The EA completed in 2012 and the on-going work associated with the development of the preliminary design for the Third Crossing has provided a good understanding of the existing natural environment and the importance of the coastal wetland environment in which the proposed Third Crossing is situated. Both the EA and the preliminary design address the impact on the natural environment and the corresponding mitigation measures. As discussed in the Preliminary Design Summary Report, the evolution of the Third Crossing design from the conceptual stage has been driven in large part due to considerations for protection of the natural environment.

Greenhouse gas (GHG) emissions and climate change have also been a topic of discussion within the Kingston community. In the context of the Third Crossing, one perspective considers the proposed bridge crossing as a benefit to reducing GHG emissions by reducing travel distance and travel time for trips within the transportation network while providing additional mode choice for active transportation and transit rider users. Another perspective considers the proposed Third Crossing as a contributing source of GHG emissions as a result of the bridge construction activities, the promotion of increased vehicular traffic, and the promotion of urban sprawl in the east side of the City of Kingston. The Preliminary Design Summary Report has evaluated the carbon footprint for the Third Crossing construction and provides a series of mitigation measures that can be considered during the construction phase to reduce the carbon footprint of the Third Crossing and thereby reduce the overall GHG emissions. In addition, new technologies are part of innovative construction methods with examples such as carbon negative concrete being researched at McGill University and carbon neutral building practices by Ellis Don in Toronto. The cost-benefit analysis that has been undertaken for the Third Crossing project used the information from the carbon assessment for the preliminary design and has quantified and monetized the GHG emissions in consideration of the Third Crossing and its impact on the environment. The results of this analysis indicate that over the long-term, the Third Crossing provides a net benefit with respect to GHG emissions and further determined that the construction phase emissions are small when compared to the motor vehicle emission savings that can be realized with the bridge in service.

The construction of the Third Crossing would add a one-time generation of approximately 2300 metric tonnes of GHG emissions due to construction processes of building the Third Crossing. On the other hand, the Third Crossing would provide travel distance savings of over 60 million kilometers per year which amounts to a reduction of approximately 14,000 metric tonnes of GHG emissions due to shorter travel distances. As a result, the potential GHG net benefit could be realized within the first year of the Third Crossing being in service. However, the emission benefit will reduce as clean fuel technology progresses over time. Nevertheless, the Third Crossing can contribute to Kingston’s Climate Action Plan goals of reducing GHG emissions of 2011 levels by 15% by year 2020. Achievement of this target will require the reduction of approximately
195,000 metric tonnes of GHG per year across all community sectors identified that of which 33% or 64,000 metric tonnes are generated from the transportation sector. After construction, the 14,000 metric tonnes per year reduction provided by the Third Crossing represents approximately 7% of the City’s 2020 reduction goals and approximately 21% of the transportation sector goal as identified in Kingston’s Climate Action Plan.

4. Project Goal and Objectives

The goal for the Third Crossing project has been established by Kingston City Council as part of the strategic planning work undertaken in 2015. Based upon an overarching priority to invest in infrastructure as a means of ensuring a high quality of life for Kingstonians and the foundation needed to support a sustainable community, the specific goal statement for this project reads as follows:

“To make the Third Crossing shovel ready to commence construction.”

In order to support the Third Crossing and achieve the project goal, the City developed a number of objectives that have been laid out in the Third Crossing Action Plan (Action Plan). The Action Plan, originally prepared in February 2013, and provided to City Council as part of Report 13-097, provides updates on completed, current, and future activities, including time and capital budget requirements, in order to position the Third Crossing to be ready for construction. The Action Plan was developed based on four phases of work including:

Phase 1

This work entailed the completion of updates to both the Kingston Transportation Master Plan and City of Kingston Development Charges By-Law. The objective of the work undertaken as part of the Kingston Transportation Master Plan update was to re-validate the need and justification of the Third Crossing based upon updated information since the development of the previous master plan update in 2009. The objective of the work undertaken as part of the Development Charges By-Law update was to confirm on-going development charges funding as an important component of the financial plan’s long-term strategy for the implementation of the Third Crossing project.

Phase 1 work also provided direction on the final bridge design parameters. Although provisions were made for up to a 4-lane cross-section in the Third Crossing EA, the decision of travel lane capacity was deferred until updated growth, population, and traffic studies were completed. Some debate has continued with respect to whether the proposed Third Crossing should be built as a 2, 3 or 4-lane bridge structure. A 3-lane bridge has merit when there is a predominant travel direction in the morning and afternoon peak travel periods. This allows for the ‘third’ travel lane to be used to accommodate for the additional traffic volume in one direction during the morning commute and then reversed in order to accommodate for the additional traffic volume in the opposite direction during the afternoon commute. This option has been discounted based on existing and forecasted traffic volumes that reveal a relatively equal split in traffic volumes in each direction during the peak travel periods. The 2-lane option for
the proposed bridge crossing was recommended to City Council as part of the Third Crossing Action Plan approved in September 2015. This recommendation was based upon a number of factors including (i) population growth, (ii) expected improvements and shifts to other modes of transportation, including walking and cycling and transit, (iii) changes in transportation technologies and use of autonomous vehicles, (iv) promotion of transportation demand management strategies, (v) changes in population demographics, and (vi) magnitude of infrastructure project capital costs, were all factors that influenced the recommendation and decision to advance the preliminary design for a 2-lane bridge deck configuration for the Third Crossing.

Phase 2

This work entails the completion of the preliminary design and associated cost estimate for the Third Crossing project. The objectives of this work includes the completion of preliminary 2-lane bridge design and drawings; completion of various detailed field investigations; shore land road and intersection improvement design; confirmation of property acquisition requirements for road and bridge infrastructure including construction staging areas; confirmation of various environmental permits required; update opinion of probable construction cost estimates; preparation of preliminary Cultural/Natural Environment Protection Plan and Risk Management Plan; and on-going public engagement and consultations with stakeholders including Parks Canada and First Nations.

Phase 3

This work entails the completion of a business plan to support decision making with respect to the implementation of the Third Crossing project. The objective of this work includes an analysis and summary of considerations related to both the technical and economic feasibility of the Third Crossing project. The economic considerations are further supported by the cost-benefit analysis; an economic impact analysis; a procurement options analysis; and a financial plan. The financial plan for the Third Crossing uses capital and maintenance cost information from the Phase 2 work that was carried out in parallel. Also, an examination of all available sources of project funding (e.g. tax, development charges, grants, user fees) was undertaken.

Phase 4

This work entails the completion of final detailed design and associated cost estimates for the Third Crossing project. The objectives of this work would include final design drawings and specifications for construction; contract documents; detailed construction phasing and scheduling; all permits and approvals required for construction; the Cultural/Natural Environment Protection Plan and Risk Management Plan; final construction cost estimates; land lease and/or construction Agreements with Parks Canada; land acquisitions required for the project; and on-going public engagement and stakeholder consultations. Beyond the goal of having the Third Crossing project ready for construction, one of the desired outcomes of the work associated with the Third Crossing Action Plan is to ensure that Kingston City Council is provided with key information, analyses, results, and public input and feedback related to the project, in
order to help inform the decision-making process. Also, it has been the past experience of City staff that grant-funding opportunities are typically setup with relatively short time periods for submission of projects for grant funding consideration and generally geared towards projects that are ready to proceed to construction.

D. Project Background

The Third Crossing has a lengthy history that dates back over 50 years. First discussions and early studies for a new bridge crossing on the Cataraqui River between Highway 401 and the LaSalle Causeway date back to the early 1960s. A transportation study completed by the former City of Kingston in 1980 made recommendation for a new transportation link across the river that would join Elliott Avenue and Gore Road. As a result, a proposed crossing was incorporated in the Official Plans for both the City of Kingston and Pittsburgh Township. In 1989, the Kingston Transportation Study considered the need and proposed route for a new bridge crossing of the Cataraqui River. The final study, which was completed in 1992, was undertaken as a transportation route and functional design study. The study reconfirmed the need for additional transportation capacity across the Cataraqui River and also reconfirmed the preferred solution to build a new bridge structure that would link Elliott Avenue and Gore Road. It was further recommended that the study findings be incorporated into a future environmental study report that would utilize the municipal class EA process.

In January 2009, the City of Kingston commenced the municipal class EA for the Third Crossing project. The EA was divided into two stages. Stage 1 focused on an analysis of the need and justification for additional transportation capacity across the Cataraqui River and the preferred form and location for a new crossing. This work reconfirmed the need and justification for the project and continued to show the preferred location for a new bridge crossing that would link John Counter Boulevard and Gore Road. Stage 2 of the EA focused on the conceptual design for the new bridge crossing including the road approaches and other shore land improvements. Stage 2 also considered various environmental impacts and recommended measures to mitigate negative impacts. The EA was concluded in 2012 with the preparation of the Environmental Study Report, and received final approval from the Ontario Minister of Environment in 2013.

1. Third Crossing Action Plan

The Third Crossing Action Plan outlines the steps that were required to move the Third Crossing project to be “shovel-ready”. The current status of the four phases of the Action Plan is as follows:

Phase 1 – Completed: Updates to the Kingston Transportation Master Plan and Development Charges By-Law;

Phase 2 – Completed June 1, 2017: Preliminary Design and Cost Estimates;

Phase 3 – Completed June 2, 2017: Business Plan;

Phase 4 – Pending Council Direction.
The Third Crossing Action Plan has been updated on a periodic basis as a means to provide City Council with information related to completed, current, and future activities, including time and capital budget requirements, in order to position the Third Crossing to be ready for construction. The Action Plan is continually being updated as project elements progress mainly due to Council direction:


2. City Council Decisions and Direction

Each major element of the progression of the Third Crossing project was in response to direction provided by Kingston City Council. A chronology of decision points and direction provided by City Council is provided as follows:

2007/2008 – Capital budget allocation approved by Council to undertake the EA. Council approves capital budget requirements.

January 2009 – Report to Council (RTC 09-037) recommends contract with J.L. Richards to commence Stage 1 of the EA. Council approves recommendation.

May 2010 – Report to Council (RTC 10-135) provides Stage 1 findings and recommends that the project team proceed with Stage 2 of the EA. Council approves recommendation.

May 2012 – Report to Council (RTC 12-155) provides the final Environmental Study Report and recommends that the project team issue the final Study Notice of Completion in accordance of the EA requirements. Council approves recommendation.

June 2012 – Council resolution directs the project team to report on comments received from the public and review agencies after completion of the 30-day period following issuance of the Study Notice of Completion.

July 2012 – Report to Committee (EITP 12-016) provides summary of Part II orders received following the Study Notice of Completion. Report is provided for information purposes only.

January 2013 – Council resolution directs the project team to provide briefing and work requirements to make the Third Crossing project ready for construction.

July 2013 – Report to Committee (EITP 13-013) provides summary of Part II orders received and addressed by the project team. The report also provides Council with notification that the environment assessment has been approved by the Ontario Minister of Environment. Report is provided for information purposes only.

February 2013 – Report to Council (RTC 13-097) introduces Third Crossing Action Plan and required phases of work to bring the project to a construction ready status. Report is provided for information purposes only.
September 2015 – Report to Council (RTC 15-268) provides updated Third Crossing Action Plan and recommendation to approve capital budget to undertake Phase 2 (Preliminary Design for 2 lane bridge crossing) and Phase 3 (Business Plan). Council approves recommendation.

December 2015 – Report to Council (RTC 16-010) recommends contract with J.L. Richards to undertake Phase 2 Preliminary Design for the Third Crossing project. Council defers approval pending further information provided in (RTC 16-050) to justify recommendation to award contract to J.L. Richards. Council approves recommendation.

March 2017 – Report to Council (RTC 17-049) provides information on the communications and public engagement to date on phases 2 (preliminary design) and 3 (business plan) for the Third Crossing. The report also provides some historical context with a summary of the previous public engagement work during the period from 2009 to 2013 that supported the completion of the environmental assessment for the Third Crossing. Report is provided for information purposes only.


May 2017 – Report to Council (RTC 17-158) provides information on access to draft reports prepared as part of the Third Crossing Action Plan Phase 2 (Preliminary Design) and Phase 3 (Business Plan). Report is provided for information purposes only.

June 2017 – Staff will prepare a Report to Council for the final Third Crossing Preliminary Design Summary Report and final Third Crossing Business Plan Report for council’s consideration.

E. Communications, Public Engagement, and Feedback

The Third Crossing has been a topic of discussion, debate and examination within the Kingston community dating back to the 1960s. Communication and engagement with the public and other stakeholders has been and will continue to be an important component of the Third Crossing Action Plan. A detailed Public Engagement Feedback Report was prepared to provide Council and the community with a comprehensive look at how the community was engaged, what was heard, and how this input was considered and reflected in phases 2 and 3 of the Third Crossing Action Plan.

The Public Engagement Feedback Report is a compilation of the communication and public engagement conducted by the city on phases 2 and 3 of the Third Crossing Action Plan. It outlines the public process goals and objectives which guided the public engagement and describes the methods and activities used to inform and engage the public and community stakeholders. It includes summaries of the key themes and
messages heard from the public engagement activities including public open houses held in September 2016 and April 2017, Third Crossing survey (summer 2016), First Nations consultation, presentations to business and community organizations, communication with Third Crossing interest groups, external and internal stakeholder meetings and input received through the web-site.

Integral to the Public Engagement Feedback Report is the input from communication and public engagement in April and May 2017 which will provide Council with public opinions on the results of the preliminary design and business plan from:

- Public Open Houses held on April 26 and April 27, 2017. These were attended by over 330 community members who had comments on the evolution of the preliminary design, updated field work, landscape plans and road layout, cost-benefit results, economic impacts, project financing and project delivery methods.

- Door-to-door outreach with near neighbours which occurred in May 2017.

- Presentations to business and community organizations and external and internal stakeholder meetings.

- Public feedback on the draft business plan and draft Preliminary Design Summary Report posted on the City website.

1. Communications and Public Engagement Overview

The communication and public engagement on phases 2 and 3 of the Third Crossing Action Plan was focused on providing and receiving input to help inform Council on a number of important issues such as:

- Would the Third Crossing design balance sustainability, aesthetics and affordability?

- Would the Third Crossing be a good use of tax dollars?

- What would be the economic benefits of building the Third Crossing?

- How would the City administer the design and construction of the Third Crossing?

- How would the City pay for the Third Crossing?

As a result, specific public input was sought on a range of things including bridge design, landscaping and user-experience elements; public considerations regarding the costs and benefits of the Third Crossing; and input related to various options for construction procurement and project delivery models.
The goal of the public engagement process was to facilitate a good understanding of the preliminary design and business plan elements in order to receive and consider comments in the finalization of these plans, and to inform City Council on what was heard and how it was considered. The scope of this work included the development of a communication and public engagement strategy to inform and consult the public on the preliminary design and business plan. With the profile and public interest in the Third Crossing, coupled with the unique aspects of designing and constructing a 1.2km bridge, key objectives for the public engagement were:

- To provide purposeful and meaningful information across the community to share information and promote discussion on the preliminary design, updated financial cost information, cost-benefit analysis, economic impacts, and construction procurement options.

- To provide easy to understand and accessible information (plain language, concise text, useful visuals and maps, in accessible formats).

- To ask meaningful questions appropriate to receive public feedback.

- To strive for an exchange of view and perspectives and ensure opportunities to voice concerns, questions and comments in a variety of methods.

- To be responsive to the feedback received to the best extent possible by providing responses to questions and providing further information aimed at clarifying and addressing comments.

The full list of public process objectives is included in the Public Engagement Feedback Report located on the Third Crossing webpage.

Ongoing communications work has been vital to build knowledge and awareness of the project and to keep the public and various stakeholders well-informed as work progressed from conceptual to a more detailed level, with the current work associated with the preliminary design and business plan. Engagement activities have been equally important to seek and receive specific public and stakeholder input on the evolution of the project design and business plan elements.

Public engagement efforts have been focused on creating a good awareness of the Third Crossing project across the entirety of the Kingston community and have included the following audiences:

- General public - residents throughout the City of Kingston
- First Nations communities
- Near neighbours – west and east approaches
- Third Crossing interest groups
• Business organizations, associations and employers
• Community organizations and associations
• Community stakeholders
• Tourism organizations
• Emergency service providers
• Kingston Transit
• Municipal Accessibility Advisory Committee
• Active transportation/cycling organizations
• CFB Kingston
• Post-secondary institutions
• Senior levels of government
• Parks Canada

A number of different on-line and in-person engagement methods and communication tools have been utilized by the project team, efforts that included:

**Public survey** – In the Summer of 2016 a city-wide survey was posted on the City website to seek input on residents’ priorities on how the city should prioritize sustainability, bridge aesthetics, engineering and innovation, and considerations about project delivery.

**Public open houses** – Three public open houses were held so that residents could receive updates on the preliminary design and business plan development and the results of this work. Participants were able to discuss the project directly with the Third Crossing project team.

**Third Crossing website** – The project team developed a website for the Third Crossing project that provides background information, details on the work phases associated with the Third Crossing Action Plan, public consultation, and a “Bridge Buzz” section. This section has provided opportunities for the project team to post updates on various components of work related to both the preliminary design and the business plan development.

**Two-way website forum** – The project team created a two-way contact forum on the Third Crossing website. This offered the opportunity for the public to post comments, pose questions, and participate in online discussions with other commenters.

**Dedicated Third Crossing email for feedback** – A dedicated email address was established for the Third Crossing project. The email account was created for the public to provide comments and questions and receive responses for project related information from the project team.

**Presentations to business and community organizations** – Additional outreach was undertaken with business and community organizations and staff gave presentations and answered questions at meetings with different organizations.
Communication with Third Crossing interest groups – Staff met with representatives of supporter and non-supporter groups in order to provide project related information and to discuss concerns and address questions.

Media releases/social media/print and digital advertising – The project team provided media releases and social media posts on the City of Kingston Facebook and Twitter accounts in order to increase awareness of the Third Crossing preliminary design and business case development. Social media has been used to inform the community on the posting of information and to encourage participation at the Public Open House.

Updates for City Council – Members of City Council were provided with an opportunity to meet with staff to review work progress on the preliminary design and business plan development. Two information reports were provided to Council to provide information on public engagement (March 21, 2017) and the process for posting and receiving input on the draft business plan and draft Preliminary Design Report (May 16, 2017).

Below is a high level overview of the number of contacts through the various communication tools and engagement activities up to May 31, 2017:

- 13,678 visitors to the Third Crossing project website.
- 5,748 views of Third Crossing project videos.
- 1,144 respondents to the Third Crossing survey held summer 2016.
- 538 participants at the three Public Open Houses.
- 213 participants to the first Public Open House held on September 29, 2016.
- 95 participants to the second Public Open House held on April 26, 2017.
- 230 participants to the third Public Open House held on April 27, 2017.
- 147 comments received from residents at the first Public Open House.
- 21 comments received from residents at the second Public Open House.
- 71 comments received from residents at the third Public Open House.
- 350 emails to the Third Crossing email address.
- 60 comments on the two-way website forum.
- 15 community presentations to over 400 residents.
- Feedback from 3 residents and 3 stakeholders on the draft business plan and draft preliminary design summary report.

2. Public Engagement Reflected In Preliminary Design and Business Plan

The project team received public input related to a wide range of interests in the Third Crossing project. The survey (summer 2016) provided views on what were important considerations for sustainability, bridge design aesthetics, user experience, project delivery methods and cost.

The first Public Open House held in September 2016 provided views on the need for the
bridge, the look of the bridge, the user experience including active transportation and transit, transportation connectivity and emergency services across the Cataraqui River together with comments on bridge funding. Views on the sustainability of the LaSalle Causeway and concerns about the reliance on Highway 401 for city trips were also noted. The project team received further public input on various aspects that relate to the preparation of the business plan for the Third Crossing.

The second and third Public Open Houses held in April 2017 provided views on the evolution of the bridge design, active transportation facilities, user experience, east and west shore landscape plans and pathways, road layout and connections on the west and east shores. Concerns about access across the Cataraqui River and emergency service were noted. Opinions were offered on the cost benefit analysis and user and non-user benefits, project financing including clarification on development charges and tax implications and project delivery methods.

Business and community presentations provided views on economic benefits across the city, connecting the city, user and non-user benefits, bridge design aesthetics, user experience, active transportation opportunities, transit connections, economic analyses, cost benefit analyses and travel time savings. Several of the meetings involved discussion on the need for the project and concerns about project affordability with questions and comments relating to amount of and use of development charges and the City’s portion of funding and tax implications.

Discussion with near neighbours provided views on access and egress to their neighbourhoods, landscape plans, views and noise, need for the project, construction impact and road layout considerations. Meetings with stakeholders provided information on transit service, travel through the downtown, and impacts to major employers, emergency services and natural heritage.

The Public Engagement Feedback Report describes the consultation undertaken and input received including feedback from the Public Open Houses held on April 26 and April 27, near neighbour outreach, business and community presentations, stakeholder meetings and comments received on the draft business plan and preliminary design.

The following Table 1 is a “summary” of how public input was considered and reflected in the evolution of the bridge design and business planning. This should be read in conjunction with the full Public Engagement Feedback Report for phases 2 and 3 of the Third Crossing Action Plan located on the Third Crossing webpage.
Table 1: Summary of Public Input Considerations

<table>
<thead>
<tr>
<th>Key theme</th>
<th>What was heard (high level)</th>
<th>How this input is reflected in the design evolution and business planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge design that is aesthetically appealing and affordable</td>
<td>• The v-pier with the central arch was the preferred design option prepared as part of the conceptual design phase during the environmental assessment.</td>
<td>• Design alternatives have been considered to reduce overall project costs.</td>
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<tr>
<td></td>
<td>• The public expressed their desire to have a bridge design that would be aesthetically pleasing, however this was qualified with a clear message that the bridge needed to be practical with the expectation that the costs of the Third Crossing be managed with practicality in mind.</td>
<td>• The updated design (current design) has been optimized to maintain the central arch section spanning the navigable channel as the main focus point of the bridge, but to replace the v-piers with inverted u-piers to reduce the cost and to further protect the natural/aquatic environment.</td>
</tr>
<tr>
<td></td>
<td>• Residents expressed that the updated design: u-pier with Arch as the focal point and look out area is a better design, is more economical and better takes into consideration the natural environment.</td>
<td>• The gradual s-curve of the bridge is maintained with a low silhouette.</td>
</tr>
<tr>
<td></td>
<td>• Many residents like the updated design noting that it looks beautiful, is more user-friendly with strong support for the multi-purpose path, look out area and rest stops on the bridge.</td>
<td>• Specific design elements have been incorporated for lighting, noise barriers, lookouts and benches, and landscaping.</td>
</tr>
</tbody>
</table>
|                                                | • Strong support for the pathways, connections to the City of Kingston 32
<table>
<thead>
<tr>
<th>Key theme</th>
<th>What was heard (high level)</th>
<th>How this input is reflected in the design evolution and business planning</th>
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</thead>
</table>
| **Bridge design that is aesthetically appealing and affordable** | waterfront trail, observation areas and active transportation on the west and east approaches. | - Landscaping, lighting, noise barriers, lookouts, benches were considered to be important elements in the design.  
  - The number of lanes was further discussed with differing opinions on two, three or four lanes. |
| **Protection of the Natural Environment** | Strong support for protecting the environment and minimizing impacts.                        | - The bridge construction methods have been further reviewed and a dredged channel is no longer being considered.  
  - The use of a temporary work bridge is recommended to minimize the impacts of the bridge structure on the Greater Cataract Marsh Provincially Significant Wetland.  
  - The surrounding lands and shorelines will be extensively restored and enhanced using native plant species to create both a natural and parkway setting.  
  - Restrictions will be put in place to prevent or limit |
<table>
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<tr>
<th>Key theme</th>
<th>What was heard (high level)</th>
<th>How this input is reflected in the design evolution and business planning</th>
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</table>
| Sustainability | • It is important to minimize carbon emissions related to the bridge construction.  
• There is a desire to explore sustainability options that would implement renewable energy possibilities and/or other options to reduce the carbon footprint associated with the bridge construction.  
• There is also a strong desire to have this balanced to see the Third Crossing implemented in the most economical and practical manner possible. | • The project team has considered this input in the preliminary design as described in detail in the Preliminary Design Summary Report. Recommended emission reduction strategies include:  
  • Use of recycled materials in asphalt and concrete materials.  
  • Low emission fuels in materials manufacturing, materials transportation, and construction vehicle/equipment operation.  
  • Shorter material transport distance.  
  • Use of in-place roadway recycling techniques and warm mix asphalt. |
| User experience and active transportation | • Strong public support for the inclusion of active transportation facilities within the bridge and shore land road design.  
• Bridge is seen as an important connection to active transportation on the east and west side of the river and a | • 4.0 metre- wide multi-use pathway to be built on the south side of the bridge.  
• The multi-use pathway would incorporate rest areas/benches stationed periodically along the entire length of the bridge crossing. |
<table>
<thead>
<tr>
<th>Key theme</th>
<th>What was heard (high level)</th>
<th>How this input is reflected in the design evolution and business planning</th>
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</table>
| User experience and active transportation | key route for active transportation across the city.  
- The inclusion of a multi-use pathway across the bridge for walking, cycling and rolling is important.  
- Increased transit connections are seen as important.  
- The bridge could be a draw for tourism.  
- More detail is desired for active transportation facilities on the west shore and how these would connect along John Counter Blvd west and downtown along Montreal Street.  
- Strong support for paths at both ends of the bridge to connect the community.  
- More consideration of the design of 2.0 metre-wide commuter cycling facility.  
- Consideration of weather protection on the bridge for cyclists and pedestrians at rest areas. Some residents noted concerns about the potential for windy conditions on the bridge.  
- Residents expressed interest in pathways around the library. | - Widening of multi-use path to 9.5 metres for lookout/rest areas/interpretive provide a look-out / interpretive area over the navigation channel and adjacent rowing lanes.  
- The multi-use pathway is designed to connect to sidewalks and designated cycling facilities on the road approaches on either side of Cataraqui River and also to connect with future sections of the waterfront trails that are planned to extend along both the west and east shore of the Cataraqui River as envisaged in the Kingston Waterfront Master Plan.  
- 2.0 metre-wide shoulder in both directions for use by commuter cyclists.  
- 3.0 metre-wide multi-purpose path extending from east and west approaches. |
<table>
<thead>
<tr>
<th>Key theme</th>
<th>What was heard (high level)</th>
<th>How this input is reflected in the design evolution and business planning</th>
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</thead>
<tbody>
<tr>
<td>User experience and active transportation</td>
<td>on the east shore. There are suggestions for more parking at the library to accommodate residents who come to walk/cycle the bridge.</td>
<td></td>
</tr>
<tr>
<td>Cost</td>
<td>• The public input received also reflected a strong desire to minimize the cost of building, operating and maintaining the Third Crossing.</td>
<td>• The refinement of the pier design from the v-Pier to the inverted u-Pier results in reduced construction costs.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The inverted u-pier design of the bridge can be built using common construction techniques which is critical for long term savings to be realized for when repairs are need in the future.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Other bridge service life considerations can extend the overall life cycle of the bridge such as the bridge deck’s drainage design to help limit long-term operational costs through the reduction of bridge de-icing agents and/or the use of manual efforts to reduce and/or eliminate possible ice buildup.</td>
</tr>
<tr>
<td>Cost-benefit analysis</td>
<td>• Long-term sustainability and reliability on the LaSalle Causeway are issues of concern to community members.</td>
<td>• Further information on the cost-benefit analysis is provided in Chapter G which addresses the public input noted.</td>
</tr>
<tr>
<td></td>
<td>• The use of the 401 was further noted by many to not</td>
<td>• Impacts with respect to the planned and/or unplanned</td>
</tr>
<tr>
<td>Key theme</td>
<td>What was heard (high level)</td>
<td>How this input is reflected in the design evolution and business planning</td>
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<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cost-benefit</td>
<td>be an acceptable travel route for connecting the city even with the future six-lane widening. Public input suggested the consideration of additional benefits provided by the Third Crossing in the event of closures of Highway 401 and the LaSalle Causeway.</td>
<td>closures of Highway 401 and the LaSalle Causeway and the potential benefits of the Third Crossing to manage diverted traffic have been considered and quantified in the cost-benefit analysis.</td>
</tr>
<tr>
<td></td>
<td>• Questions were noted about what the cost-benefits for users vs. non-users would be.</td>
<td>• User and non-user benefits have been considered and quantified.</td>
</tr>
<tr>
<td></td>
<td>• Public input also suggested the consideration of additional costs of the Third Crossing that would be related to the promotion of urban sprawl; the costs related to impacts on the natural environment; and costs related to near neighbor residents with increased traffic and noise.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Residents commented that there are many new homes in Kingston East with more approved and that the city is benefiting from the taxes paid from these new growth areas. Concerns were expressed that the transportation infrastructure in Kingston East is not keeping up with the development that has been occurring.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Analysis should take into</td>
<td></td>
</tr>
<tr>
<td>Key theme</td>
<td>What was heard (high level)</td>
<td>How this input is reflected in the design evolution and business planning</td>
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<td>----------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Cost-benefit analysis</td>
<td>account what the cost of not building the bridge now and what the increased costs would be in the future if the decision is put off. The longer we wait, the more it will cost.</td>
<td>• Analysis should consider the loss to the city of taxes if the industrial, commercial and residential development is Kingston East doesn’t happen?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Would like to see more emphasis of overall economic benefits of the bridge. The benefits are far greater than just the savings on the daily commute.</td>
</tr>
<tr>
<td>Bridge funding and project financing</td>
<td>• The public input received provided a focused set of inquires mainly on how much will the bridge cost and how would the city tax payer be impacted for both initial and long-term operation and maintenance costs.</td>
<td>• Further information is provided in Chapter G which addresses the public input received.</td>
</tr>
<tr>
<td></td>
<td>• Questions arose about how the city’s portion would be funded including the use of Development Charges and tax implications.</td>
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<tr>
<td></td>
<td>• The suggestion of considering tolls on the bridge was made by a few residents. Other residents do not support tolls.</td>
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<tr>
<td>Key theme</td>
<td>What was heard (high level)</td>
<td>How this input is reflected in the design evolution and business planning</td>
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<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Bridge funding and project financing</strong></td>
<td>expressing the opinion that tolls would unfairly be used for the bridge when they have not been used for any other infrastructure projects built in the city which has been funded by the city without user pay. This is seen as setting up an imbalance between new roads constructed in other parts of the city and in Kingston East.</td>
<td></td>
</tr>
<tr>
<td><strong>Economic impact analysis</strong></td>
<td>• Economic development and tourism growth were noted to be potential benefits by creating better transportation connectivity across the city.</td>
<td>• Further information on the cost-benefit analysis is provided in Chapter G which addresses the public input noted.</td>
</tr>
<tr>
<td></td>
<td>• Additionally benefits were identified for the facilitation of business deliveries and improved access for employees and customers who live in all parts of the city.</td>
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<td></td>
<td>• Improved access to employment destinations was also noted particularly CFB Kingston.</td>
<td></td>
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<tr>
<td></td>
<td>• Improved access across John Counter to Kingston East for jobs in the Business Park and west to Kings Crossing is important.</td>
<td></td>
</tr>
<tr>
<td>Key theme</td>
<td>What was heard (high level)</td>
<td>How this input is reflected in the design evolution and business planning</td>
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<td>---------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| **Procurement options analysis & Project Delivery Methods** | • The public input with respect to the various procurement options for the Third Crossing reflected a desire to use a project delivery model that provided the most economical means to build, operate, and maintain the bridge crossing.  
• There was no clear preference with respect to whether these efforts were undertaken by either the public or private sector, however, the clear desire was to see the project completed both on-time and on-budget. There was also public support to see the contractor provide further innovation as part of the final design and construction of the bridge crossing.  
• Concerns were expressed about the use of a P3 model. | • These findings were important in considering the qualitative factors in that has been part of the procurement options analysis which is addressed in Chapter G.  
• The Design Bid Build is no longer being considered and is not preferred. Models that continue to be considered include the Design Bid Finance (DBF) and the Integrated Project Delivery (IPD).  
• Both the DBF and IPD provide for the following:  
  – Increased cost containment, schedule adherence and risk allocation to appropriate parties.  
  – Maximum amount of flexibility for the city and contractor to modify the project as needed.  
  – Maximize innovation through a coordinated design and construction approach. |
F. Technical Feasibility

The technical feasibility of the Third Crossing project is supported in large part through the previous work completed as part of the EA. The preliminary design work as part of Phase 2 of the Third Crossing Action Plan is used to further support the technical feasibility with the addition of supplemental field investigations; on-going stakeholder consultations; refinement of design; and updated cost estimates related to construction and on-going operations and maintenance.

The following chapter provides the reader with summary information related the transportation modeling that supports the needs and justification for the Third Crossing. For the purposes of Phase 2 (Preliminary Design) and Phase 3 (Business Plan) of the Third Crossing Action Plan, this information is required for further refinements to the road and intersection design, and the development of the cost-benefit and economic impact analysis. This chapter also provides summary information related to (a) the environmental study report completed as part of the EA, and (b) the Preliminary Design Summary Report. Information is also provided on the updated capital, maintenance, and operating costs for the Third Crossing which will be used in the assessment of the economic feasibility for the project.

1. Environmental Study Report

The Environmental Study Report (ESR) for the Third Crossing commenced in 2009 and was separated into two stages to provide Council with a mid-point review of the work completed for Stage One including the preferred location for a Third Crossing of the Cataraqui River and a preliminary cost estimate for the preferred solution. It also provided City Council with information to make an informed decision as to whether or not to proceed with Stage Two of the EA process. The Stage One report was completed and provided to Council in May 2010 with an approved recommendation to complete Stage Two of the EA, which was a more detailed evaluation of the preferred crossing location. The ESR provides a summary of the 3 year effort by the project team to collect, assemble, and evaluate data and information pertaining to the project. The ESR provides a narrative of the information collected and analyzed and public comments received during both Stage One and Stage Two of the Third Crossing EA, and the conclusions and recommendations that were developed through the EA process.

The ESR, which was completed in 2012, provided a number of conclusions that were important to address the technical feasibility of the project. First, the need for and the feasibility of providing additional transportation capacity across the Cataraqui River were explored through a number of alternative solutions examined through the EA process. The ESR concluded that additional transportation capacity was required across the Cataraqui River to meet current and future travel demands. Second, an understanding of the physical, social, cultural and economic environment was developed in order to assess and evaluate several options for providing the additional transportation capacity. The ESR concluded that the preferred location for a new bridge crossing would connect John Counter Boulevard on the west side of the Cataraqui River with Gore Road on the east side of the River and measures were identified to minimize negative environmental impacts. Finally, various bridge design concepts were
considered and options for how the construction of the proposed bridge crossing would be undertaken were examined. The ESR concluded that the bridge should be developed based on a preferred concept for a structure with v-piers and central arch spanning the navigable channel. In addition, the bridge should be constructed using land machinery and marine barges facilitated by the creation of a dredged channel along the bottom of the riverbed parallel to the bridge alignment. These EA conclusions were endorsed by Kingston Council in 2012 which initiated the process of seeking the review, scrutiny, and ultimate approval of the EA by the Province of Ontario. The Ministry of the Environment reviewed all of the EA’s content and responded to all questions submitted by stakeholders including questioning the need of the project. The Province declared that the EA’s methodology was correct and led to the EA’s recommendations and conclusions being ultimately approved by the Province. This signaled the end of the debate of whether the Third Crossing is needed.

2. Transportation

The City of Kingston maintains a city-wide traffic model that uses traffic information from the present day to forecast and simulate traffic patterns 20 years into the future. Traffic model updates are carried out using industry standard approaches and instruction from master planning documents such as the Official Plan and the Transportation Master Plan. This section provides a high level overview of the transportation master plan and associated traffic model assumptions that have been used in the preliminary design and business plan assignments.


An update to the Kingston Transportation Master Plan (KTMP) was identified as part of Phase 1 of the Third Crossing Action Plan. The update to the KTMP commenced in 2013 with the final report and recommendation being received by City Council in 2015. A significant component of the KTMP is the development of a transportation model that can be used to forecast travel demand; assess capacity constraints with the transportation network; and consider options for improvements to the transportation network in order to facilitate the efficient movement of people, goods and services within the Kingston community. TransCAD was the transportation modeling software used as part of the KTMP. The TransCAD model established a base year of 2014 and a forecast horizon year of 2034 in order to assess the travel demand and impacts on the transportation network over a 20 year planning period.

The KTMP was developed in a manner that would continue to focus on sustainable modes of transportation and support new additional investments in transit and active transportation infrastructure. In addition, the KTMP made recommendation to accept an increase in roadway congestion and traffic delay during the peak travel period and to promote transportation demand management measures in order to allow for the deferral of road expansion projects. These measures were viewed as progressive steps that would help achieve the vision of a sustainable transportation system for the City of Kingston.
As a result, the recommended transportation strategy developed as part of the 2015 KTMP established various targets as outlined in Table 2 which were used to assess the performance on the transportation network and identify transportation capacity deficiencies at both a roadway and screenline level.

Table 2: Transportation Targets

<table>
<thead>
<tr>
<th>System Component</th>
<th>Measure</th>
<th>Existing Target</th>
<th>2015 KTMP Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Transportation</td>
<td>Walking + Cycling Mode Share</td>
<td>14%</td>
<td>17% (14% walking and 3% cycling)</td>
</tr>
<tr>
<td>Public Transit</td>
<td>Transit Mode Share</td>
<td>11%</td>
<td>9% City-wide trips by transit</td>
</tr>
<tr>
<td>Transportation Demand Management</td>
<td>Reduction in vehicle trips</td>
<td>Not specified</td>
<td>5% fewer trips</td>
</tr>
<tr>
<td></td>
<td>Auto Occupancy Rate</td>
<td>Not specified</td>
<td>1.20 average number of people in each car</td>
</tr>
<tr>
<td>Transportation Systems Management</td>
<td>Roadway Capacity Optimization</td>
<td>Not specified</td>
<td>5% improvement for TSM and transit priority measures</td>
</tr>
<tr>
<td>Road Network</td>
<td>Volume to Capacity Threshold for Road Improvements</td>
<td>0.9 (LOS D)</td>
<td>1.0 (LOS E) increased congestion</td>
</tr>
</tbody>
</table>

b. Lasalle Causeway

The LaSalle Causeway is a 2-lane crossing, owned by the Federal Government of Canada, which links Ontario Street on the west side of the Cataraqui River with Highway 2 on the east side. Forecasts for travel demand across the LaSalle Causeway that have been modeled as part of the City transportation model in 2004, 2009 and 2014 have consistently shown that the travel demand exceeds the capacity for trips crossing at the LaSalle Causeway during the peak travel periods. In 2011 the City undertook additional work to examine whether other operational improvements could be made to the LaSalle Causeway corridor to improve travel capacity. The results indicated that implementation of all of the recommended improvements, which included intersection improvements, adjustments to traffic signal timings, and various transportation demand management initiatives provided some travel operation benefits, but not enough to address the need for additional capacity across the Cataraqui River. Many of the recommended improvements have been completed and the City continues to measure traffic volumes on LaSalle Causeway three times per year. This data has
shown a steady increase from 23,000 vehicles a day in 2010 to between 24,000 to over 28,000 vehicles a day in 2017.

c. Highway 401

Highway 401 is a primary major intra and inter-provincial transportation link that is owned by the Province of Ontario. The Ontario Ministry of Transportation has been undertaking on-going work to widen Highway 401 from four to six lanes between County Road 38 and Highway 15. The need and justification for widening Highway 401 was based on a number of factors including: traffic safety deficiencies, existing and future traffic operations/capacity, pavement condition, bridge and structural culvert conditions, existing freeway geometrics, existing interchange layouts, and drainage deficiencies. The EA completed by the Ontario Ministry of Transportation in 2001 addressed traffic capacity considerations and identified that highway widening would address decreasing level of service as a result of projected increases in traffic volumes, which were due in part to increased commuter trips utilizing Highway 401 within the City of Kingston. In 1999, the Ontario Ministry of Transportation also examined the relationship between the proposed Third Crossing and the widening of Highway 401 between Montreal Street and Highway 15 and concluded that the implementation of the Third Crossing would not defer the widening of Highway 401. However, the on-going debate in Kingston continues to focus on whether the widening of Highway 401 defers the need for the Third Crossing. The City of Kingston transportation model includes Highway 401 as a 6-lane transportation link and the model results demonstrate that Highway 401 has reserve capacity to handle current and future project traffic volumes across the Cataraqui River. The model also reveals the strong demand for trips crossing the Cataraqui River via the LaSalle Causeway since, in the absence of a Third Crossing, there is no other crossing south of Highway 401. As a result, the capacity improvements provided by the widening of Highway 401 do not defer the need for the Third Crossing. Instead, the absence of the Third Crossing will contribute to continued increase in traffic congestion and travel delay on the LaSalle Causeway and additional trips utilizing Highway 401 with further out-of-the-way travel and additional travel delays.

d. Cataraqui River Screenline

The capacity and usage of the two primary transportation links across the Cataraqui River, including the LaSalle Causeway and Highway 401, has continued to be a point of some debate within the Kingston community. This debate centers on the need for a Third Crossing when considering the capacity of the existing Cataraqui River crossings. Several examinations on the Cataraqui River screenline have been performed to assess the travel demand for trips linking origins and destinations on either side of the Cataraqui River. The results of these previous studies confirmed that the combined capacity of the three existing crossings (Kingston Mills, Highway 401, and the Lasalle Causeway) provides a sufficient capacity across the Cataraqui River screenline for both existing and forecasted volumes of traffic crossing the Cataraqui River. This is due most in part to the capacity provided by Highway 401 and its expansion to six lanes. When viewed on an urban-context basis, the next nearest crossing is the Lasalle Causeway which is nearly 6 kilometers to the south towards downtown. The distance
between Highway 401 and the Lasalle Causeway is the largest distance between roads along a common screenline by a fair margin in Kingston’s urban area. Due to this distance, the LaSalle Causeway continues to attract volumes that are above its designed capacity and operational limit.

The proposed Third Crossing, as identified in the KTMP, is expected to increase operational and capacity improvements over the Cataraqui River screenline. The Third Crossing’s additional transportation capacity is strategically located at the mid-way point between Highway 401 and Lasalle Causeway thus attracting traffic from both Highway 401 and the Lasalle Causeway. In turn, the LaSalle Causeway experiences an improvement as a result of a portion of trips using the Third Crossing to more efficiently match travel origin and destination by use of the Third Crossing.

e. **Kingston Transportation Model Update (2016)**

As part of the ongoing management of the City’s transportation model, the City’s Traffic Division performed a model migration from the former TransCAD modeling software into a new, state-of-the-art traffic modeling software called VISUM in 2016. The project team has been utilizing the additional tools and features that VISUM provides as part of the Third Crossing work. First off, the City of Kingston needed to perform a transportation model calibration that utilized recent traffic counts in the vicinity of the Cataraqui River in order to provide more up-to-date information for the Third Crossing project. Once calibration was completed, VISUM model simulations were carried out to serve three main purposes:

1. Update the transportation model to incorporate more aggressive transportation mode share targets established by City Council following the receipt of the 2015 KTMP. More specifically, increased targets were established for transit shifting from 9% to 15%, and increased targets were established for active transportation shifting from 17% to 20% of the overall mode share. This in turn, decreases the volume of cars in the network and increases the amount of active transportation and transit trips accordingly.

2. Provide additional traffic simulation to assist with the development of the preliminary design for the Third Crossing. More specifically, this included traffic analysis at future intersections on the west and east shore to aid in the intersection design work and resulting lane configurations.

3. Provide additional traffic simulation to assist with the development of the cost-benefit analysis as part of the Third Crossing business plan.

It is important to note that the recent VISUM simulations also provided another opportunity to re-confirm the need for the Third Crossing which also verified that previous transportation study outcomes from the Third Crossing EA and the 2015 KTMP model remain valid. The reader is invited to review Dillon’s “Third Crossing Transportation Forecasting and Analysis” traffic report which contains updated traffic information as provided as Appendix A.
The new mode share targets for various components of the transportation system have been incorporated into the VISUM model in order to forecast future traffic volumes during the peak hour travel period in 2034 (see Table 3).

Table 3: Transportation Model Results

<table>
<thead>
<tr>
<th>Road</th>
<th>Traffic Volume (peak hour)</th>
<th>2034 Volumes (not included)</th>
<th>2034 Volumes (included)</th>
<th>Change (Volume)</th>
<th>Change (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kingston Mills</td>
<td></td>
<td>878</td>
<td>388</td>
<td>490</td>
<td>56%</td>
</tr>
<tr>
<td>Highway 401</td>
<td></td>
<td>6055</td>
<td>4783</td>
<td>1272</td>
<td>21%</td>
</tr>
<tr>
<td>Third Crossing</td>
<td>N/A</td>
<td>3051</td>
<td>2386</td>
<td>+2386</td>
<td>N/A</td>
</tr>
<tr>
<td>LaSalle Causeway</td>
<td></td>
<td>3051</td>
<td>2444</td>
<td>-607</td>
<td>20%</td>
</tr>
</tbody>
</table>

VISUM model results that include the proposed Third Crossing and other road network improvements identified in the KTMP show the LaSalle Causeway experiencing some relief by attracting a portion of these trips to use the Third Crossing instead. The Third Crossing also attracts a significant number of trips that use the Highway 401 by providing a preferred route that matches trip origins and destinations for city-wide travel. In other words, the Third Crossing provides a more direct route for many trips across the Cataraqui River by providing both travel distance and travel time savings for the majority of those road network users. VISUM model results indicate that travelers using the Third Crossing will spend 40% less time on the road and travel 35% less distance than previous routes used without the Third Crossing. The Dillon traffic report shows the routes used for vehicles that cross the Cataraqui River in both the westbound and eastbound directions from their origin to destination with and without the Third Crossing in place.

VISUM model results indicate that travel patterns without the Third Crossing in place show that traffic with origins and destinations that connect between the north-west and north-central parts of the City and the east side of the City use Highway 401 to cross the Cataraqui River. Traffic with origins and destinations that connect between the west, south-west, and south-central parts of the City and the east side of the City use routes including Princess Street, Bath Road, King Street, and the LaSalle Causeway to cross the river. Overall, there are not significant differences in the travel routes being used in either the westbound or eastbound directions.
Table 3 indicates that with the Third Crossing in place show:

- 21% or 1272 vehicles (total west and east bound traffic) with origins and destinations that connect between the north-west and north-central parts of the City and the east side of the City shift from using HWY 401 to use the Third Crossing instead to cross the Cataraqui River.

- 20% or 607 vehicles (total west and east bound traffic) with origins and destinations that connect between the west, south-west, and south-central parts of the City and the east side of City shift from using the LaSalle Causeway to use the Third Crossing in order to cross the river.

As a result, the Third Crossing is a well utilized transportation link drawing approximately 21% of its use from traffic that would have otherwise used Kingston Mills Road, 54% of its use from Highway 401, and the remaining 26% of its use from traffic that would have otherwise used the Lasalle Causeway. The Lasalle Causeway users benefit as a result of the shift in travel volume during the peak commuting period. The shift of approximately 26% of the traffic volumes from the Lasalle Causeway to use the Third Crossing reduces the level of congestion and delay on the LaSalle Causeway. Model results indicate that travelers using the LaSalle Causeway will spend approximately 36% less time on the road with the Third Crossing in place.

3. Preliminary Design Elements

The development of the preliminary design is part of Phase 2 of the Third Crossing Action Plan and builds upon the conceptual level design that was completed during the EA phase of the project. This section of the business plan is intended to provide the reader with a high-level summary of various elements of the preliminary design work and the development of updated cost estimates associated with the Third Crossing. The reader is invited to review the full “Preliminary Design Summary Report” for additional details.

a. Field Investigations

The completion of various detailed field investigations was an important undertaking in the development of the preliminary design for the Third Crossing. Although all the field studies conducted are important and provide key information on various components of the project, the overall cost estimate discussion in the business plan is heavily influenced by the constructability of the bridge which was dependent on the collection of additional geotechnical and geo-environmental data. The assessment of the data collected was in turn used to help inform the preliminary design for the structural elements of the bridge including foundation and pier designs, storm water conveyance and treatment, and constructability options, and ultimately the updated construction cost estimate.

The results of this work confirmed earlier investigations with respect to the depth to bedrock along the proposed bridge crossing corridor and the extent of overburden
material underlying the water surface in the Cataraqui River. The geotechnical investigations also confirmed the presence of two fault lines in the river valley which has been taken into consideration as part of the preliminary design work. The geo-environmental work also provided a better understanding of the physical and chemical properties of the soils (overburden material) underlying the water surface. The analyses of these materials revealed additional complexity that would be involved in the extent of dredging that would be required to support the construction of the bridge. The physical properties of the sediment, which were predominantly fine silt and clay with high water content, present challenges in establishing a containment area within the river during the dredging operations to support the bridge construction. In addition, the chemical properties indicated levels of contaminants that would require special provisions and additional costs for removal and disposal.

b. Preliminary Design

In response to direction received by Council, the preliminary design advanced the design work for a 2-lane bridge crossing of the Cataraqui River with new road connections to Montreal Street and Highway 15 on either shore of the river. The preliminary design incorporates a multi-use pathway on the south side of the bridge to accommodate active forms of transportation and the opportunity to connect to future waterfront trails on both sides of the river. The evolution and refinement of the design from conceptual to preliminary level has focused on a number of key components.

**Bridge and Approach Roadway Components** - A depiction of the bridge deck is shown in Figure 3. The proposed width of the bridge deck is 16.5 m consisting of:

1. Two lanes for vehicular traffic in response to the recommendation in the recent Kingston Transportation Master Plan update. Based on the current design speed (70 km/hr) and future posted speed (60 km/hr) on the bridge, the width of each lane will be 3.5 m. There will also be a 2 m wide shoulder adjacent to each vehicular traffic lane to assist with snow clearing and other maintenance activities and accommodate commuter cyclists.

2. A 4 m wide multi-use pathway on the south side of the bridge deck to provide for active transportation and look-out / interpretive areas. At the arch, the width of the multi-use pathway will increase to 9.5 m to provide a look-out / interpretive area over the navigation channel and adjacent rowing lanes.

3. Three 0.5 m wide barriers for public safety, on the north side of the bridge; separating the roadway and the multi-use pathway; and on the south side of the bridge.

There will be two storm sewer pipes under the bridge deck, one along the north barrier and one along the barrier separating the roadway and the multi-use pathway. These storm sewer pipes, which will run from each side of the arch, drain storm water off the bridge into storm water management facilities on either shore, adjacent to the approach roadways.
The proposed horizontal alignment of the bridge maintains the s-curve which has been modified to consist of two large radii horizontal curves, which will preclude the need for costly super-elevation (banking) on the bridge.

The proposed vertical profile of the bridge was also refined compared to the conceptual design. The crest of the bridge has been centered on the arch span with the low points located off the bridge. This will make the arch the focal point of the bridge and it will also better facilitate storm water management and optimize the number of deck drains needed on the bridge. In addition, the vertical profile will be lowered by 2.8 m at the crest, which will reduce capital costs by requiring lower pier heights and reduced embankment fill requirements on the approaches.

The initial preferred pier design consisted of two separate concrete v-piers with two tie beams. The v-piers would be supported by a large pier cap at the base of the pier, from which several large diameter caissons would be drilled into bedrock. As noted later, the pier design was revisited in response to bridge constructability, capital cost and environmental mitigation considerations.

The proposed arch will be a pair of outward tilting tied arches. Each arch will have 18 multi-strand cables connected to the transverse floor beams, which will support the bridge deck. The proposed arch top chord is shaped elegantly with shaped parallel cross struts between the arch chords and parallel hangers (see Figure 4).
The design of the approach roadways has not changed significantly from the conceptual design stage. However, the John Counter Boulevard-Ascot Lane intersection has been designed to accommodate future signalization, should it be required based on traffic monitoring by the City. As well, the intersection of Point St Mark Drive at Gore Road will include traffic calming measures to prevent short-cutting through the Point St. Mark neighbourhood. In addition, the roadway lighting will be simple, contemporary and elegant in appearance with accent lighting that highlights key bridge corridor components in a subtle, yet aesthetically pleasing effect at night.

**Figure 4: Artist’s Sketch of Arch and Cables**

Best management practices will be used to protect, restore, and enhance the cultural and natural heritage landscape within the bridge corridor both during and after construction. Focusing on post-construction design measures and consistent with the approved EA:

- The on-shore look-out / interpretive areas and active travel / commuter cycling provisions will be carried forward.

- The surrounding lands and shorelines will be extensively restored and enhanced using native plant materials to create both a natural and parkway setting.

- On-land wildlife micro-habitats such as bat and duck boxes, turtle nesting areas and snake hibernacula will be provided.

- In recognition of the impact area from the permanent bridge on the structure and function of the Greater Cataraqui Marsh Provincially Significant Wetland (PSW), there will be provisions for wetland rehabilitation of the near-shore area on the west side of the bridge corridor. These provisions include the installation of habitat enhancements (e.g. reptile basking structures, submerged and emergent logs) and in-water re-vegetation using dominant wetland species.
Environmental Impact Considerations - The original recommendation from the EA that selected dredging as the preferred in-water bridge construction option has also evolved, as highlighted below:

- Based on more in-depth fieldwork activities, it has been determined the composition of the dredged material could lead to severe suspension and sloughing of in-river sediment and potential mobilization of contaminants during construction; and changes in sediment dynamics and increased turbidity in the water column after construction.

- Specific consultations with Parks Canada during the preliminary design work provided more clarity on the sensitivity of the Greater Cataraqui Marsh PSW ecosystem, particularly its role as a coastal wetland, and its status as one of Parks Canada’s larger protected heritage areas. The 4.3 ha impact area from the dredging option is significantly larger than the new proposed 0.6 ha impact area resulting from the use of a temporary work bridge. This option also lowers the risk concerning the potential long-term effects from a temporary work bridge on the Cataraqui River sediments, vegetation, habitat, and water quality.

Bridge Constructability - Based on the above considerations as well as extensive bridge constructability assessments by the project team in consultation with City staff, the current project is recommending the temporary work bridge as the preferred in-water bridge construction option. Utilities Kingston has an alternative route for the proposed water main that was originally intended to be located within the dredged channel. Secondly, The 4.3 ha impact area from the dredging option is significantly larger than the new proposed 0.6 ha impact area resulting from the use of a temporary work bridge.

This option also lowers the risk concerning the potential long-term effects from a temporary work bridge on the Cataraqui River sediments, vegetation, habitat, and water quality. The temporary work bridge will be approximately 11 m wide, and supported on piles every 10 to 12 m. It will be advanced incrementally in conjunction with the construction of the permanent bridge from shore to the navigation channel on both sides. Targeted dredging will still be required at each pier location, but the overall impact footprint will still be significantly minimized. Removal of the temporary work bridge would follow after construction of the permanent bridge is completed. The temporary piles could either be removed completely or cut below the top of the riverbed and left in place.

Pier Design Innovation - The estimated cost of building the Third Crossing based on the conceptual design prepared as part of the Class EA, and the use of a temporary work bridge to support construction, would have been significantly higher than the estimate prepared in 2011. In response, the project team considered pier design alternatives that would help to reduce the overall project cost and still maintain the bridge aesthetics. Figure 5 provides a depiction of the alternative pier design.
Discussions between Parks Canada and the project team considered an innovative alternative pier design that changes the v-pier design that was endorsed as part of the EA. While the v-piers would remain to frame the arch span as the focal point of the bridge, each of the remaining piers would consist of 2 circular hammerhead piers. Although the span arrangement would increase from 14-to-19-spans, the overall environmental footprint from the hammerhead piers would still be lower compared to the initial v-pier design. This alternative pier design yields a significant cost savings in comparison to the original v-pier design. Since the temporary work bridge is the preferred construction method instead of the dredged channel from an environmental impact perspective, the reduction in cost associated with the alternative pier design helps to offset the cost increase associated with the use of the temporary work bridge. From an aesthetic perspective, the alternative pier design would still provide a cohesive overall rhythm towards the arch span as the focal point of the bridge.

As a result, the alternative pier design has been advanced as the preferred structural arrangement for the current project. The bridge will be supported on 92 conventional pot bearings, 88 for the plate girder approach spans up to the arch and 4 for the arch itself. To minimize maintenance and operation costs and increase durability, the bridge will have only four expansion joints. To the east of the arch, the expansion joints will be strip seal joints; to the west of the arch, the expansion joints will be multi-cell modular joints.

The U-frame piers will consist of two 1800 mm diameter caissons rock socketed into the bedrock with a steel liner. The v-piers at the arch will be supported on eight 2100 mm caissons with a footing. With the high ice loading that can develop on the arch pier footing, a pier nosing will be installed on the ends of the footings to break-up the ice.
Supplemental Innovation Considerations - Some additional innovative features have also been incorporated into the design of the Third Crossing. Flexibility in the design of the bridge will allow different methods for assembly of the arch and the approach spans, depending on the means and methods of construction selected by the bridge contractor.

In addition, bridge service life considerations, which focus on the overall life cycle of the bridge and optimization of performance and related operations / maintenance / rehabilitation costs, include:

- Designing the arch components from completely sealed components to enhance the long term life and durability of the structure.

- Structural health monitoring system (SHMS) provisions, such as but not limited to a weather station; permanent displacement survey prisms; displacement sensors; GPS sensors; accelerometers; and leak detection systems.

- A hanger system comprised of multi-strand cables and anchorages with adjustment nuts, which would enable quick and easy adjustment (and replacement) of the cable forces throughout the life of the bridge.

- The use for alternative reinforcing steel such as stainless, glass fiber reinforced polymer, or galvanized steel rather than carbon steel in areas prone to high corrosion.

- Employing a four coat system and the potential metalizing of the arch components.

- The use of LED light fixtures to reduce energy consumption, and optimize associated maintenance and replacement costs.

- The use of sustainable de-icing and anti-icing systems.

c. Property Impacts

Property considerations and impacts were identified in the Class EA in three locations with respect to the bridge and approach roadways: the east approach (on land); the bridge span (over water); and the west approach (on land).

The east side of the bridge corridor utilizes an unopened road allowance at the west end of Gore Road (north of the Point St. Mark neighbourhood) and the City-owned Gore Road library property at the northwest corner of Highway 15 and Gore Road. All east side lands required for the construction and operation of the approach roadway, active transportation provisions and landscape works, embankment leading to the bridge abutment, bridge footprint and storm water management areas will be contained within existing City-owned property.

The Cataraqui River riverbed is owned by the federal government and managed by Parks Canada. It will be necessary to recognize the footprint of the bridge both within
and over the river as well as the construction and operation of the bridge through agreement(s) with Parks Canada.

The west side of the bridge corridor predominantly uses an existing road allowance at the west end of John Counter Boulevard. The City owns the former Music Marina property on the north side of the road allowance near-shore, up to the River Park Subdivision. This property will partially accommodate construction staging and laydown area requirements as well as future storm water management provisions. Additional lands will also be required:

- On the south side of the road allowance to accommodate construction staging and laydown areas, the re-located John Counter-Boulevard-Ascot Lane intersection as well as active transportation and landscape works.

- At the John Counter Boulevard-Montreal Street intersection for widening John Counter Boulevard to accommodate eastbound turning and through lanes.

d. Permitting

Parks Canada is responsible on behalf of the Federal government for managing and protecting the Canal as a National Historic Site and Canadian Heritage River. Parks Canada is also responsible on behalf of the UNESCO World Heritage Committee for protecting the Canal as a UNESCO World Heritage Site.

Following the acceptance of the ESR by the Province in 2013, the Parks Canada ‘Directive on Impact Assessment’ was prepared in 2015. It 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 Canal. In keeping with its mandated priorities, Parks Canada’s Environmental Impact Assessment (EIA) process examines how a project may lead to adverse effects on natural and cultural resources.

In addition, the Parks Canada 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.

- Adverse effects to health and socio-economic conditions of First Nations and non-First Nations communities.

- Adverse effects to First Nations communities’ current use of lands and resources for traditional purposes.

The continuation of the Federal EIA process is part of the scope of this project. Given the nature of the bridge project and the sensitivity of the project area, Parks Canada has determined that the Detailed Impact Analysis (DIA) framework is to be used for the Federal 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. The City and project team are currently working with Parks Canada on achieving an agreement-in-principle regarding the DIA as part of the project.

Following the formal approval of the DIA during the future final design phase, the City will be required to enter into agreements with the Government of Canada (represented by Parks Canada) to ultimately proceed to construct and subsequently operate the bridge for the duration of its life cycle, pursuant to the Federal Real Property and Federal Immovables Act.

In addition, there are also a number of permits and approvals required from various regulatory authorities in support of the design work as it proceeds from the pre-design stage to the final design stage. Approvals are related to various non-passive fieldwork activities in support of the design work, which could also include authorizations pursuant to:


2. The Permit To Take Water requirements under the Ontario Water Resources Act.

3. Ontario Regulation 148/06, Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (Administered through the Cataraqui Region Conservation Authority).

4. Construction Cost

The work associated with the preliminary design for the Third Crossing also included the preparation of an updated cost estimate for the project. The scope of work required the provision of a Class ‘B’ construction cost estimate that would improve upon the Class ‘D’ estimate for the conceptual level design completed as part of the EA.

Construction cost estimates are typically developed for infrastructure projects as they progress from the conceptual level to the final detailed design stage to assist in developing a project budget prior to tendering for construction. As additional project information is gathered and analyzed, the design work progresses with increased accuracy for the quantification of factors that will affect the cost of construction (e.g. the quantity and unit cost of various construction materials). The construction cost estimate at the Class ‘D’ level is generally associated with conceptual level design work with a wide range of anticipated costs. Class ‘A’ estimates associated with final detailed design work that would be ready for tender provide increased certainty and a narrower range of the anticipated construction cost. The preliminary design for the Third Crossing is commensurate with a Class ‘B’ cost estimate based upon an approximate 60% design level completion.

The Class ‘D’ construction cost estimate prepared as part of the EA is provided in Table 4 below. This cost estimate is based upon the conceptual level design and reflects construction costs based on 2011 dollars. The estimate of $120 M did not include costs that related to land acquisition requirements to support the project, and the non-refundable portion of the HST tax. Engineering and contract administration was estimated at 15% of the construction cost, which is typical for large infrastructure projects of this nature. The contingency was estimated at 20% which is also typical for projects at a conceptual level design.

**Table 4: Third Crossing Cost Estimate (2011 dollars)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Total for Structure Construction</td>
<td>$75,500,000</td>
</tr>
<tr>
<td>Sub-Total for Construction of Bridge Approaches</td>
<td>$8,900,000</td>
</tr>
<tr>
<td>Sub-Total for Landscaping</td>
<td>$1,000,000</td>
</tr>
<tr>
<td><strong>Sub-Total for Construction</strong></td>
<td><strong>$85,400,000</strong></td>
</tr>
<tr>
<td>Mobilization (3%)</td>
<td>$2,600,000</td>
</tr>
<tr>
<td>Engineering and Contract Administration (15%)</td>
<td>$12,800,000</td>
</tr>
<tr>
<td>Quality Management (3%)</td>
<td>$2,600,000</td>
</tr>
<tr>
<td>Contingency (20%)</td>
<td>$17,100,000</td>
</tr>
<tr>
<td><strong>Total Estimated Construction Cost</strong></td>
<td><strong>$120,500,000</strong></td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>Not included</td>
</tr>
<tr>
<td>Taxation (non-refundable HST 1.76%)</td>
<td>Not included</td>
</tr>
</tbody>
</table>


The Class ‘B’ Cost Estimate for the Third Crossing is based on the preferred design concept for the Third Crossing as described elsewhere in the business plan or better described in the Preliminary Design Summary Report. The updated Class ‘B’ estimate is a unit-price type estimate with unit price values derived from HiCo, MTO’s infrastructure costing system as well as recent historical records of bid prices from the consultant’s databases and budgetary estimates from contractors and suppliers. The quantities for the unit prices were based on the preliminary design which focused on principal structure member sizes which were subjected to a limited number of loadings which were judged to be the governing load cases. The cost estimate is in 2017 dollars and includes the following indirect costs: 15% contingency allowance, 12.5% allowance for engineering services during construction and contract administration services, 2.5% allowance for quality management and a 3% allowance for mobilization.

The contingency allowance accounts for any unforeseen conditions that may arise during the detailed design investigations and during construction, accounts for market
fluctuations including carbon pricing on materials and contractors use of equipment which, at the design approval stage, is generally 15%.

The engineering contingency of 12.5% covers the engineering services during construction as well as the contract administration which consists of a variety of activities ranging from the review of all contractor submittals (shop drawings, plans and procedures, etc.) to inspection of all the construction activities, and processing of contractor payments.

Quality management of 2.5% covers the costs of the inspections and testing required to ensure that the material provided are in accordance with the contract documents. The inspections and testing include testing of concrete, steel and asphalt to ensure that the properties meet the contract documents; testing of the compaction of the granular and asphalt; performing coating and welding inspections of the structural steel; and other material testing.

Mobilization of 3% covers the indirect costs that are subjected to the Contractor at the onset of the project which are not paid for under a specific tender item and include pre-construction survey of the construction site; all environmental permits and approvals; and bonding and insurance.

The construction cost estimate based on the preliminary design is shown in Table 5 below. The construction cost estimate is provided in 2017 dollars and is approximately $161 M. With the inclusion of estimates for land acquisition required to support the project and the non-refundable portion of the HST tax, the total project cost estimate is $167 M.

Table 5: Third Crossing Cost Estimate (2017 dollars)

<table>
<thead>
<tr>
<th>Description</th>
<th>Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-Total for Structure Construction</td>
<td>$106,500,000</td>
</tr>
<tr>
<td>Sub-Total for Construction of Bridge Approaches</td>
<td>$11,500,000</td>
</tr>
<tr>
<td>Sub-Total for Landscaping</td>
<td>$3,400,000</td>
</tr>
<tr>
<td><strong>Sub-Total for Construction</strong></td>
<td><strong>$121,400,000</strong></td>
</tr>
<tr>
<td>Mobilization (3%)</td>
<td>$3,600,000</td>
</tr>
<tr>
<td>Engineering and Contract Administration (12.5%)</td>
<td>$15,200,000</td>
</tr>
<tr>
<td>Quality Management (3%; 2.5% structural)</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Contingency (15%; 10% landscaping)</td>
<td>$18,000,000</td>
</tr>
<tr>
<td><strong>Total Estimated Construction Cost</strong></td>
<td><strong>$161,200,000</strong></td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>$3,000,000</td>
</tr>
<tr>
<td>Taxation (non-refundable HST 1.76%)</td>
<td>$2,800,000</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT COST</strong></td>
<td><strong>$167,000,000</strong></td>
</tr>
</tbody>
</table>
It is important to note that the total project cost estimate is provided in 2017 dollars. If the project proceeds to construction, a budget will be established for the implementation phase of the Third Crossing. The budget will include the increase in overall project cost due to construction price inflation between 2017 and the actual date of construction commencement. Based on historical data over the past decade, the construction price inflation may range between 2 to 5% per year.

c. **Carbon Cost Estimate**

An evaluation of carbon emissions was identified as one of the main priorities when examining the sustainability of the Third Crossing which has been documented in the Preliminary Design Summary Report. Detailed design documents and construction means and methods information are not available at this stage of the Third Crossing project. As such, the U.S. Federal Highway Administration (FHWA) Infrastructure Carbon Estimator (ICE) tool was selected for the analysis because it provides approximate energy use and emissions outputs for projects that have not progressed to more detailed levels of design and construction planning but is appropriate for planning level of detail from the preliminary design. The carbon assessment undertaken for the Third Crossing estimates carbon emissions caused by materials extraction and processing, and the transportation of materials and its implementation to be used during construction phase operations. In other words, the carbon assessment includes emissions involved in the construction of the Third Crossing from the mine/quarry extractions through to the bridge’s opening ribbon-cutting day. The emissions associated with the operation phase of the bridge with respect to snowplowing, street sweeping, repairs, etc., that occur after opening day have not been determined at this stage of the project. Table 6 shows the amount of carbon dioxide emissions for the Third Crossing during the construction phase. The results indicate that approximately 2,318 metric tonnes of carbon dioxide are produced without any mitigation measures being employed during construction. The cost attributed to carbon varies considerably based on various jurisdictions in North America. The Province of Ontario has recently established a market price for carbon as part of the provincial cap and trade program with a value of approximately $18/tonne. On-going debate continues with regard to the appropriate pricing of carbon with the federal government pricing carbon at $50/tonne in 2022. Assuming the cost of carbon at $50/tonne, the total cost estimate for carbon associated with the construction phase of the Third Crossing is approximately $116,000.

The carbon assessment also considered possible mitigation measures that included the use of alternative fuels for equipment and machinery, warm mix asphalt for paving road surfaces, and the use of recycled or reclaimed materials. The combined use of various mitigation measures was able to reduce the carbon emissions by approximately 16% to 1955 metric tonnes. With the mitigation measures in place, the total cost estimate for carbon associated with the construction phase is lowered to approximately $98,000. Although measured, the monetized value of the carbon price is less than 0.1% of the overall construction cost estimate of $161 M dollars. Applying a more conservative approach, if the carbon tonnage was doubled to approximately 4600 metric tonnes and if the price increased to $100/tonne, the carbon cost would be less than 0.3% of the construction cost. The magnitudes of these values are small and, for the purposes of
simplicity, has been absorbed into the preliminary design construction cost estimate described above.

Table 6: Unmitigated Construction Phase Greenhouse Gas Emissions

<table>
<thead>
<tr>
<th>Emissions Metric Tonnes CO2E</th>
<th>New Road Construction</th>
<th>Roadway Rehab</th>
<th>Bridges</th>
<th>Bus, Bike, Pedestrian</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upstream: Materials</td>
<td>96</td>
<td>97</td>
<td>1,405</td>
<td>201</td>
<td>1,799</td>
</tr>
<tr>
<td>Direct: Construction</td>
<td>45</td>
<td>30</td>
<td>401</td>
<td>43</td>
<td>519</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>141</td>
<td>127</td>
<td>1,806</td>
<td>244</td>
<td>2,318</td>
</tr>
<tr>
<td>% Construction</td>
<td>6.1%</td>
<td>5.5%</td>
<td>77.9%</td>
<td>10.5%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Please see the Preliminary Design Summary Report for more detailed information on the carbon assessment. In addition, the emissions of vehicles using the road for daily travel has been more closely analyzed in the cost benefit analysis undertaken for the project and described in Chapter G of the business plan.

d. Sunk Costs

A sunk cost is a cost that has already been incurred and is not recoverable. In general, a sunk cost has no relevance for a decision concerning present or future project activities. To date, a number of costs have been incurred with respect to the planning, design, and land acquisition associated with the Third Crossing project. These costs include the following:

- Environmental Assessment (Phase 1) = $2.03 M (2009 dollars)
- Preliminary Design & Business Plan (Phase 2 & 3) = $2.95 M (2015 dollars)
- Land Purchase (Music Marina) = $1.50 M (2013 dollars)

These costs represent a total capital budget expenditure of $6.48 M to date.

5. Operation, Maintenance, and Capital Repair

A life cycle analysis was undertaken as part of the preliminary design for the Third Crossing in order to determine the future operation and maintenance requirements for the bridge through the course of the 100 year service life. With regular maintenance, it is expected that the bridge can last more than 100 years. The life cycle analysis includes both the annual operation and maintenance and also the bridge repairs over the design life of the bridge which would be required to achieve the overall 100 year design life.
a. **Operations and Maintenance**

The life cycle analysis considers the annual maintenance and operation costs for both the bridge structure and the roadway elements on both side of the Cataraqui River.

The on-going operating and maintenance costs for the bridge and roadway, which includes snowplowing, street sweeping, line painting, and landscaping to name a few, is $138,000 dollars ($45,000 and $93,000, respectively) per year in 2017 dollars.

b. **Capital Repair**

Various elements of the Third Crossing will require replacement over the course of the service life. Bridge elements that will require repair and replacement over the design life include:

- Mill and re-paving asphalt
- Bridge deck waterproof replacement
- Expansion joint seals replacement
- Expansion joints modular replacement
- Expansion joints strip seal replacement
- Bridge bearings replacement
- Structural steel re-coating
- Noise barriers replacement
- Traffic railing replacement
- Drainage system replacement
- Concrete repairs
- LED luminaires replacement
- Light standards and brackets replacement

Roadway elements that connect the bridge crossing to Montreal Street on the west shore and Highway 15 on the east shore of the Cataraqui River will also require repair and replacement over the design life. These roadway elements will include:

- Surface and base course asphalt re-paving
- Major road reconstruction
- Granular pathway replacement
- Landscaping renewal
- Stormwater management pond rehabilitation
- Traffic signals and controllers replacement
- Noise barriers and fencing replacement
- LED luminaires replacement
- Light standards and brackets replacement
G. Economic Feasibility

The economic feasibility of the Third Crossing project considers the financial aspects of the project and how it fits into the City’s long-term financial planning models. The economic feasibility is further supported through the cost-benefit analysis, economic impact analysis, and procurement options analysis, all of which provide critical information in the development of the business plan for the Third Crossing. This information will support Kingston City Council to make sound decisions regarding the next phase of the Third Crossing Action Plan and also serve as useful information to communicate with funding partners including the federal and provincial governments in the pursuit of grant funding for the project.

1. Finance Plan

Investments in infrastructure continue to be a key priority for the sustainability and development of Kingston. Comprehensive strategic planning and infrastructure priority setting processes ensure that the City is living within its means and municipal assets are being managed in a fiscally responsible manner while maintaining appropriate level of service for the community.

This section addresses the financial elements of the Third Crossing project including a summary of project cost estimates, operating and maintenance costs, capital repair costs and funding strategies for construction and ongoing operating and capital investment requirements. It also illustrates how the Third Crossing project costs and funding models are incorporated into existing asset management funding models being maintained for the City’s broader transportation network. Also, an examination of project funding sources such as taxes, development charges, grants, and user fees was undertaken.

The earliest year that construction could take place would be 2019 if approval to proceed with Phase 4 was received by mid-2017 and grant funding was secured prior to construction. For the purposes of the business plan and generation of the project cost estimate, we have assumed the anticipated year of construction is 2019. The suffix ‘M’ is substituted for the word ‘million’ throughout the financial section for simplicity reasons.

a. Cost Estimates

Capital Project Costs - The projected capital cost estimate of $167 M reflects a Class ‘B’ construction estimate in 2017 dollars including land costs and HST. An inflationary component has been added to the 2017 cost estimate in order to escalate these costs to a projected construction year of 2019.

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class ‘B’ Estimate, including HST</td>
<td>$167M</td>
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<tr>
<td>Construction Price Inflation to 2019</td>
<td>13M</td>
</tr>
<tr>
<td>Total Project Cost</td>
<td>$180M</td>
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</tbody>
</table>
Should project construction begin after 2019, the total project cost estimate of $180 M is projected to increase by approximately 2% - 5% annually in recognition of inflationary factors.

**Operating Cost Requirements** - Operating cost projections were provided as part of the Class 'B' estimates. In 2017 dollars, these annual costs are projected to be approximately $138,000 based on the addition of 4.0 lane kilometers of road and bridge surfaces to the City’s overall roads network. This would include annual maintenance costs with respect to the bridge and the approach roads including snowplowing, street sweeping, line painting and landscaping.

**Capital Repair Requirements** - A life cycle cost analysis was undertaken to determine the future capital repair costs for the bridge throughout its estimated service life of 100 years. The analysis included capital costs associated with the repair and replacement of road and bridge elements to achieve the overall minimum 100 year design life. The capital investment plan incorporates minor rehabilitations every 15 years and major rehabilitations every 25 to 30 years. Cost estimates are considered conservative and do not reflect that the life cycle costs could be reduced as a result of extension of service life due to technological and building material improvements over the course of the next 100 years that may help to minimize these costs.

Life cycle costs for the Third Crossing are considered as part of the City’s integrated asset management plan for the overall transportation infrastructure asset class. As a component of the city’s transportation network, these costs are factored into the City’s existing long term capital asset and financing plans and are considered within the overall estimate identified for this project of approximately $20 annually per average residential household.

**b. Funding Sources**

**Capital Project Funding** - The capital project funding for the bridge is based on an equal contribution from the federal, provincial and municipal governments. The illustration below (Figure 6) breaks down projected funding with the Government of Canada and the Province of Ontario each contributing $60 M for a total of $120 M in grant funding which is aligned with senior level government priorities for shovel-ready infrastructure. The City would also contribute $60 M, of which $30 M will be funded from development charges, representing the proportion of road and bridge network that relates to new growth development as per the 2014 Development Charge Background Study, and $30 M from municipal taxes.
Senior Level Government Grants $120 M (66%) - Council and staff continue to petition senior levels of governments for support of the Third Crossing. The project has been built into the financial models under the assumption that grant support from the province and federal governments will be received. Without this support, the project would not be viable.

Development Charges $30 M (17%) - The Third Crossing project has been included in the development charge background studies since 1999 and over that period a portion of the anticipated construction requirement has been collected. Development charges are derived and collected at the asset category level (total roads and bridges) and not at the specific project level. However, applying a proportionate calculation to the Third Crossing project, it is projected that, to the end of 2016 total funds collected were approximately $11 M. Based on an assumed project start date of 2019, it is estimated that funds collected by project completion in 2022/2023 would be approximately $20 M. The project will continue to be a component of the development charge collections throughout the period of construction with the post-period balance of $10 M to be collected from growth beyond that time frame.

Municipal Revenues $30 M (17%) - The remaining 16% of project costs will be funded from the Municipal Capital Reserve Fund. The Municipal Capital Reserve Fund model has previously earmarked amounts projected for this project, using a combination of cash and debt issuance that ensures capital reserve fund balances remain at fiscally responsible levels and the issuance of debt aligns with debt management strategies for keeping within pre-determined debt capacity thresholds. Funding models currently
anticipate that the City will pay its share of the $30 M through a combination of 50% cash and 50% debt issuance.

**Funding of Operating Cost Requirements** – Development that occurs throughout the City adds approximately 5 km annually to the roads network. Financial models consider an additional investment of resources approximately every five years to maintain current levels of service for snowplowing, street sweeping, garbage collection, etc. The projected operating costs related to adding four new lane kilometers from the Third Crossing represent less than 1% of the total costs to maintain the City’s entire road and bridge network. This 1% cost will be incorporated into future operating budgets as part of routine roads network expansion which is comparable for how the City incorporates operating costs for when new subdivisions are developed over time and added to the network. Annual assessment growth, a primary driver for expansion of the overall transportation network, also provides a source of funding for growth related operating costs minimizing pressure on property taxes.

**Funding of Capital Repair Requirements** - Ongoing capital repair requirements will be funded from the Municipal Capital Reserve Fund out of the annual asset management funding envelope for roads and bridges.

The 15 year capital forecast and funding models presented to Council as part of the annual budget presentation currently provide for progressive increases to this annual funding envelope for capital repair requirements. Capital repair costs are budgeted based on the total overall transportation network requirements in support of more detailed asset management plans for individual assets as managed by the engineering department. Cost projections included in the 15 year financial models also reflect inflationary impacts as well as expected growth in the City’s overall transportation network over time.

The 2017 budget presentation indicated that the annual requirement for the engineering capital program, currently budgeted at approximately $20 M annually, is projected to grow to $42 M by 2031 based on a detailed analysis of replacement values, condition assessments, average useful lives, and projected growth. Annual capital repair requirements for the Third Crossing have been considered as part of the 15-year capital forecasts and will be incorporated into the annual capital envelope approved for the City’s overall roads and bridges replacement and renewal program. Annual capital repair requirements for the Third Crossing represent approximately 3% - 5% of the total annual capital envelope.

**Municipal Capital Reserve Fund Balances** - As indicated above, the City’s capital funding models provide for capital expenditures that are financed through the City’s capital reserve funds, by a cash method whereby funds are withdrawn from the reserve funds to pay for the capital costs or through the issuance of debt whereby funds are borrowed to pay for the capital costs and the capital reserve funds are utilized to pay future debt principal and interest charges. Annual operating budgets incorporate a capital levy, allocated to the capital reserve funds to be used for capital infrastructure investment and asset management requirements.
Council has endorsed a 1% incremental tax increase to this levy each year in order to reach and maintain a sustainable level of capital investment that will allow us to fund capital infrastructure with an increased proportion of cash funding and maintain debt balances within or below capacity thresholds. By the end of the 2016 fiscal year, this dedicated capital levy has accumulated to a total annual capital investment of approximately $30 M and continues to increase at a rate of $2 M annually as a result of the 1% incremental tax increase. Financial plans currently reflect the continuation of the 1% policy until 2024.

This capital levy represents the primary source of municipal funding for the Third Crossing, for both the capital project cost and ongoing capital repair requirements. Funds have previously been earmarked within the Municipal Capital Reserve Fund for this project as well as the funding required on an ongoing annual basis to address capital repair requirements.

*Projected Debt Balances* - The graph below (Figure 7), as regularly reported to council, illustrates the results of debt management strategies used in funding capital projects.

**Figure 7: Project Debt Balances for the City of Kingston**

The model projects timing of debt issuance for both approved and future planned issuances (including an anticipated $15 M of debt issuance for the Third Crossing), estimated annual principal repayments and debt balances by year over a 15 projection
period. As previously reported, debt levels are projected to remain substantially below provincial limits. Council has also endorsed self-imposed debt capacity ceiling well below the provincial ceiling. The graph illustrates that the level of debt could marginally exceed Council recommended parameters between 2019 and 2021 as a result of some significant utility capital projects happening within that period; however, it is projected that debt levels would fall back below desired levels as early as 2022, prior to the debt issuance requirements for the Third Crossing, and thereafter be below the parameter ceiling. The projected debt balances reflect ongoing debt management strategies that include coordination of the timing of debt issuance and principal repayments in order to stay within desired parameters. Standard and Poor’s recently reviewed our capital funding and debt models, as part of their credit rating process. They noted that the City adheres to prudent debt and related policies, including the self-imposed debt limit, and confirmed their concurrence with our debt management strategies.

**User Fees** - User fees were identified as one of the possible funding options as part of the Third Crossing EA. User fees are commonly referred to as tolls for transportation infrastructure and are typically developed based upon a price per distance of travel or a fixed price for a one-way or return trip. There is a wide range of public opinion that has been received throughout the past year with respect to the use of tolls to help fund infrastructure construction and/or operation and maintenance. Public acceptance for tolls, which are usually applied only to licensed motor vehicles, is generally more favourable when there is a clear and demonstrated benefit solely attributed to the user group for which the toll is applied such as the Highway 407 toll route north of Toronto. In the context of the Third Crossing project, the use of tolls as a possible funding option has been reviewed with consideration for the following:

1. The results of the transportation modelling indicate that the Third Crossing provides benefits to both users and non-users of the proposed new bridge crossing almost equally as described in the cost-benefit analysis section below. User benefits include reduced travel distance and travel time for travelers that utilize the Third Crossing for their trips. Non-users also derive benefits from reduced congestion and associated reduction in travel times for travelers that do not use the Third Crossing for their trips. As a result, the benefits are shared for road network users and is not a sole benefit attributed to just the users of the Third Crossing.

2. The Third Crossing is a strategic element of the City’s transportation network intended to provide transportation capacity to service the entire Kingston community. Beyond improvements to motorist operating within the transportation network, the Third Crossing also provides benefits for active transportation users and Kingston Transit users for who tolls would not be collected.

3. The City of Kingston’s Transportation Master Plan has not identified tolling or congestion pricing as a policy measure for the City’s transportation network. Congestion pricing is being used in other jurisdictions to help reduce the amount of motorists in congested areas. In these instances the application of tolls or congestion pricing would not be limited to one roadway but rather on several
roads that lead into a congested area. As a result, the use of tolls to fund the Third Crossing in isolation of consideration of user fees for all other elements of the City’s transportation system would create a real and/or perceived inequality for various users of the City’s transportation network.

4. The operational expenses of implementing a tolling system have not been estimated. As a result, the use of tolls may be economically infeasible as the costs of system implementation and toll collection may be significant.

The project team has completed a qualitative review of user fees as described in the reasons above. Based on this preliminary level of analysis, the use of tolls on the Third Crossing has been discounted. Needless to say, municipalities are continuing to review the complex discussion of tolls and congestion pricing analysis as part of their ongoing traffic program.

c. Impact to City Taxpayer

There is no requirement for a dedicated tax increase for the Third Crossing. Capital project costs as well as ongoing life-cycle costs are already factored into the City’s long-term capital asset and financing plans as part of the City’s overall transportation network. If the Third Crossing is considered exclusively for comparative purposes, the average homeowner’s share of the life cycle costs associated with the capital repair and replacement of the Third Crossing, including debt charges and annual operating and maintenance expenses, would equate to approximately $20 annually over the asset life or approximately a $1.65 per month for an average residential household with a property assessment of approximately $300,000.

The Economic Impact Analysis, discussed later in this section, discusses the potential for the Third Crossing to be a catalyst to facilitate and accelerate employment and residential land development in surrounding areas. Accelerated build-out will also contribute to assessment growth projections, thereby increasing the tax base and reducing pressure on future property taxes to fund costs related to this and other operating and capital investments.

2. Cost Benefit Analysis

A cost-benefit analysis (CBA) is used to help to determine whether an investment is a good use of resources. In the case of the Third Crossing, the CBA examined whether or not the financial costs of building, operating and maintaining the bridge would measure against the benefits that the project generates. In general, infrastructure projects that provide benefits that are greater than its implementation cost should be pursued because it provides an overall net benefit for society as a whole.

The CBA identifies, calculates and compares the social and economic impacts of the project (both costs and benefits) and places a dollar value on these impacts (monetize) to enable an “apples-to-apples” comparison, in monetary terms. The industry standard to developing a cost-benefit analysis for major transportation infrastructure projects typically uses a 30 year period. All of these socioeconomic impacts that are accrued to

City of Kingston
the project over the 30 years are then discounted (i.e. brought forward) to a common year to enable a comparison of the total cost versus the total benefit that is calculated in 2017 dollars. The result of this comparison is called a cost-benefit ratio which is discussed later in the business plan.

Collins Barrow, who is a financial service consultant, was retained by the City to provide an independent and objective cost-benefit analysis for the Third Crossing. The reader is invited to review the more detailed information in the Third Crossing Cost-Benefit and Economic Impact Analysis Report that is provided as Appendix B.

a. Objectives

The CBA considers various transportation-related costs and benefits associated with the project both in quantitative and qualitative terms. The CBA helps assess the overall monetary and social value that the project can provide the City of Kingston and society in general if it were implemented through these main objectives:

- Developing a cost benefit model that estimates a cost-benefit ratio, internal rate of return and net benefits or costs to the City of developing the Third Crossing;
- Conducting sensitivity, scenario, and Monte Carlo analysis of key variables;
- Comparing the Third Crossing Cost-Benefit Ratio to other similar projects;
- Summarizing the findings in a CBA report to supplement the overall business plan.

b. Methodology and Model Development

The monetization of socioeconomic impacts required credible data and information sources that were available at the time of the CBA’s preparation. Monetary values are typically obtained from government sources, academic literature and other third-party sources that provide methodologies on how values were reached along with any associated assumptions and limitations.

Although the CBA exercise converted non-monetary factors such as kilometers and gas emissions into a monetary dollar value, it was not possible to monetize all costs or benefits that the Third Crossing project may generate. Even though some of the cost or benefits have not been quantified in the CBA due to a lack of data availability/credibility, this does not mean that it is not important in the decision-making process. The full CBA report provided in Appendix B reviews the methodology used to consider the qualitative benefits and costs through stakeholder interviews, literature review and outreach with the community.

An industry standard approach has been utilized in the development of the cost-benefit model for the Third Crossing project. The socioeconomic impacts of the Third Crossing that have been monetized and included in the CBA are described in Table 7.
Model Input Information

Two main sources of information that have been used in the CBA model calculations have come from the City’s transportation model as described in Dillon’s Traffic Report in Appendix A, and the cost estimates generated by the preliminary design consultant.

Third Crossing Costs

The Third Crossing capital, operating, and repair costs were obtained from the Class ‘B’ cost estimate that was prepared as part of the Phase 2 preliminary design assignment and the Phase 3 financial plan and budgeting assignment. The project cost estimate of $167 M dollars (in 2017 dollars) was used as part of the CBA model work. The project cost estimate accounts for the most significant cost that is attributable to the cost component of the CBA model. The initial construction cost occurs at the beginning of the CBA’s 30 year horizon and is less impacted by discounting the costs to a present value in 2017 dollars. The other significant cost component of the CBA model is the ongoing maintenance and repair costs that occur within the CBA’s 30 year horizon. These costs occur over the 30 year horizon and are affected by discounting by a much larger degree when compared to the initial construction costs.

Table 7: Description of Socioeconomic Impacts for the Third Crossing

<table>
<thead>
<tr>
<th>Socioeconomic Impact</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital and Operating Costs</td>
<td>The costs to plan, design, construct, operate, and maintain the Third Crossing over the analysis period (30 years).</td>
</tr>
<tr>
<td>User and non-user travel time savings</td>
<td>The change in the amount of time for road network users travelling in the City of Kingston.</td>
</tr>
<tr>
<td>Vehicle operating costs</td>
<td>Changes to travel time and distances affect vehicle operating costs including vehicle maintenance, depreciation, and fuel consumption.</td>
</tr>
<tr>
<td>Traffic accidents</td>
<td>Changes to travel distance affect the probability of traffic accidents occurring and resulting fatalities, injuries, and property damage.</td>
</tr>
<tr>
<td>Vehicle emissions</td>
<td>Changes to vehicle emission outputs for road network users across the City of Kingston.</td>
</tr>
<tr>
<td>Emissions from construction</td>
<td>The emission output from the construction of the Third Crossing.</td>
</tr>
<tr>
<td>Emergency response time</td>
<td>Changes to travel distance affects emergency response times in the road user network for fire, paramedic services, and police.</td>
</tr>
</tbody>
</table>

In addition, the CBA model also referenced the carbon assessment report that was prepared by the preliminary design consultant in order to help quantify the cost of carbon due to the Third Crossing’s construction. Also, the CBA model included the
potential for traffic-related induced demand and applied it as a penalty against the project benefits as described in the results section below.

**Third Crossing Benefits**

Many of the socioeconomic impacts in Table 7 above are dependent on the distance and time values that are part of the City’s transportation model. The CBA model used information from the City’s transportation model to calculate the travel and distance changes that would occur if a Third Crossing was built. The transportation model has determined that a travel time and distance savings can be realized if a Third Crossing was built and the CBA model defines this as a benefit of the project. Typically, transportation model information is presented by an average annual daily traffic (AADT) value which represents the traffic volumes over the course of a day. The CBA model has used this traffic data which converted the AADT into a yearly value, a process which is called annualization. An annualization factor has been generated from the traffic model information and has been used in the CBA model to help calculate and monetize the travel benefits over the CBA 30 year horizon.

The benefits have been further categorized into two main groups: the ‘user’ and the ‘non-user’. Users are defined as people using the bridge for trips within the City’s transportation network. Benefits users of the bridge receive include shorter travel time and travel distance while providing options of using active transportation and transit for their trips throughout Kingston.

Non-users are defined as people making trips within Kingston’s transportation network but are not using the crossing for their trips. Non-users also benefit since the crossing provides a more direct route for users and therefore non-users benefit from shorter travel times and decreased congestion on their routes throughout Kingston. The CBA used information from the City’s transportation model to help compare the benefits of users and non-users. There are other socioeconomic impacts that have been monetized in the CBA which can be found in the CBA report in Appendix B.

**Transportation Model Information**

Transportation model information is provided in Table 8 below but will be more generally described in the narrative that follows. Without a Third Crossing, the remaining travel route options for all trips across the Cataraqui River is 900 hours during the afternoon peak travel hour with a cumulative travel distance of 33,500 kilometers. With the Third Crossing in place, the total travel time for all trips drops to 550 hours and the total travel distance is lowered to 21,500 kilometers. This represents an overall travel time savings for users of 350 hours and 12,000 fewer kilometers travelled every day. For the average person using the Third Crossing, their trip would be about 5 kilometers shorter and save them 8 minutes in travel time. For all other trips in the transportation network during the afternoon peak travel hour, the total travel time is 12,000 hours with a cumulative travel distance of 695,000 kilometers without the Third Crossing.

This compares with 11,500 hours and 690,000 kilometers with the Third Crossing in place. As a result, non-users of the Third Crossing will benefit from reduced congestion.
in the transportation network with total overall travel time savings of 500 hours for the non-users and 5,000 fewer kilometers travelled every day.

**Table 8: Transportation Model Values – Peak Travel Hour**

<table>
<thead>
<tr>
<th>Description</th>
<th>Daily Change in Time (Hours)</th>
<th>Daily Change in Distance (Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Third Crossing Users</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without Third Crossing</td>
<td>899</td>
<td>33,612</td>
</tr>
<tr>
<td>With Third Crossing</td>
<td>537</td>
<td>21,550</td>
</tr>
<tr>
<td><strong>Overall Savings</strong></td>
<td><strong>362</strong></td>
<td><strong>12,062</strong></td>
</tr>
<tr>
<td><strong>Third Crossing non-users</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without Third Crossing</td>
<td>12,010</td>
<td>694,600</td>
</tr>
<tr>
<td>With Third Crossing</td>
<td>11,451</td>
<td>689,911</td>
</tr>
<tr>
<td><strong>Overall Savings</strong></td>
<td><strong>559</strong></td>
<td><strong>4,689</strong></td>
</tr>
</tbody>
</table>

When these values are considered as shown in Table 9, the benefits for both the users and non-users are a combined estimate of over 63 million fewer kilometers travelled with an overall time savings of over 3.4 million hours on an annual basis could be realized if a Third Crossing was built. These traffic values have been incorporated into the CBA model exercise.

**Table 9: Transportation Model Values – Total Annual Savings**

<table>
<thead>
<tr>
<th>Time Savings</th>
<th>Time (Millions of Hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users</td>
<td>1.36 M</td>
</tr>
<tr>
<td>Non-Users</td>
<td>2.11 M</td>
</tr>
<tr>
<td><strong>Overall Time Savings</strong></td>
<td><strong>3.47 M</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Distance Savings</th>
<th>Distance (Millions of Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users</td>
<td>45.5 M</td>
</tr>
<tr>
<td>Non-Users</td>
<td>17.7 M</td>
</tr>
<tr>
<td><strong>Overall Distance Savings</strong></td>
<td><strong>63.2 M</strong></td>
</tr>
</tbody>
</table>
c. Results

The main objective of the CBA study was to assess whether the benefits of the Third Crossing outweigh the 2019 project cost estimate of $180 M dollars. This cost-versus-benefit comparison is more simply demonstrated through an exercise called a cost-benefit ratio.

A cost-benefit ratio (CBR) is a key comparison indicator that is used to assess whether the project is a good use of resources. A CBR with a value greater than 1.0 means the benefits outweigh the costs of the project over the 30 year horizon. However, since dollar values are affected by time, the application of a discount rate is used to represent the present value of future costs and benefits to provide an “apples-to-apples” comparison into year 2017.

When applying a discount rate of 5%, the present value of the cumulative costs for the Third Crossing over the 30 year period is estimated to be approximately $178 M dollars and includes the initial cost of construction and operation and maintenance over the 30 year period. The present value of the cumulative benefits over the same period for both the users and non-users of the Third Crossing is estimated to be approximately $1,284 M dollars. When isolating just the user benefits the present value of the total benefits for this group alone is approximately $548 M dollars. These benefits are primarily provided through decreased travel time and reduced vehicle operating expenses. The CBA model also included the sunk costs spent-to-date on the project which is not typical for CBA model, nevertheless, they have been included in the CBA model for conservative purposes.

The resulting Third Crossing CBR, as shown in Table 10, indicates a range of 5.83 to 7.23 when considering both the user and non-user benefits combined, and a range of discount rates from 7% to 5% used for the CBA, respectively. When isolating the user benefits, the Third Crossing CBR shows a range between 2.82 to 3.49. These CBR values provide a strong indicator that the project is a good use of resources since the decreased vehicle operating costs, which includes vehicle maintenance, fuel, and vehicle depreciation costs, due to the decrease in distance travelled provide benefits that flow back to the users of the Third Crossing.

### Table 10: Discount Rates and Cost Benefit Ratio (CBR)

<table>
<thead>
<tr>
<th>Description</th>
<th>Nominal Discount Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3%</td>
</tr>
<tr>
<td>User CBR</td>
<td>4.31</td>
</tr>
<tr>
<td>Non-user CBR</td>
<td>4.63</td>
</tr>
<tr>
<td>Combined User and non-user CBR</td>
<td>8.95</td>
</tr>
</tbody>
</table>
Approximately 48% of the total benefits of the Third Crossing accrue to the users and 52% flow to non-users. This result demonstrates that the benefits of the Third Crossing are dispersed widely across the City of Kingston and that users and non-users benefit almost equally.

Sensitivity Analysis

It is important to account for unknown future conditions for significant projects such as a Third Crossing through what is called a sensitivity analysis. Collins Barrow performed a Monte Carlo simulation to better understand which of the socioeconomic assumptions and data has greater influence on the CBR results. The Monte Carlo simulation allows a wider set of factors to vary within the CBA model. The goal of Monte Carlo simulation is to account for unknown future conditions in the CBA model and the subsequent CBR results. This sensitivity analysis adjusted key socioeconomic impacts to provide an upper and lower range of potential CBA model results.

Figure 8: Factors Influencing Cost-Benefit Analysis

![Figure 8: Factors Influencing Cost-Benefit Analysis](image)

Figure 8 provides an indication of the relative importance of factors that have an impact on the cost-benefit model and the resultant CBR values. This information shows that the valuation of a person’s time is the most important factor that affects the benefits calculation, and construction price increase and the penalty applied to account for the possibility of induced travel demand have the most influence on the costs calculations. This provides another level of scrutiny to all CBA model inputs that were obtained from other information sources as described earlier in this business plan. Some of the CBA model inputs that generate the CBR are more sensitive to certain assumptions than others including the discount rate, the inclusion of user and non-user benefits and travel demand values.
Combining the user and non-user group, the Monte Carlo results indicates that there is a 5% chance of obtaining a CBR that is greater than 8.34; a 5% chance of obtaining a CBR that is less than 6.19; and a 99% chance of obtaining a CBR greater than 5.82. Isolating the user group only, the Monte Carlo results indicate 1% chance of obtaining a CBR that is lower than 2.81. Even under some particularly conservative assumptions, the quantified and monetized socioeconomic benefits of the Third Crossing outweigh the costs. Please see Figure 9 for more information.

Figure 9: User and Non-User CBR values (5% Discount Rate)

Even though the construction cost estimate has already accounted for a 15% contingency as part of the Class B cost estimate, any changes to the project cost estimate, such as construction price inflations, is one such variable that greatly influences the CBR. Another element that could influence the CBR is the potential for traffic-related induced demand. The traffic model outputs that were used were appropriately monetized in the CBA model. However, taking a more conservative approach to account for traffic-related induced demand, Collins Barrow applied a 15% penalty against the socioeconomic benefits that were generated in the CBA model. Although this is considered a significant penalty, the benefits still outweigh the costs of the project.

Comparator Projects

A general assessment and comparison of the crossing with other major transportation projects in Canada and the United States was also done to gauge the strength of the CBR against other projects. The Third Crossing CBA used similar discount rates as the
other projects and although a wider range of discount periods was used by the other projects, the Third Crossing CBA’s 30 year period is an appropriate horizon since population, employment, and traffic information is less reliable beyond 30 years. Figure 10 shows the Third Crossing compares favourably to other transportation projects across North America and can be considered a good use of resources. The results of the CBA indicate that the Third Crossing has a “payback” period within 10 years at which point the cumulative benefits exceed the costs of the project and subsequent years thereafter.

**Figure 10: Cost Benefit Ratio Comparison Projects**

![Cost Benefit Ratio Comparison Projects](image)

### d. Other Considerations

The CBA uses an industry standard approach to consider the relative costs versus benefits of the Third Crossing project. The possibilities of key transportation route closures are other factors that have been analyzed and would increase the socio-economic benefits however these closure scenarios were not included in the current cost-benefit results for conservative purposes.

Closures of Highway 401 between Montreal Street and Highway 15, which is the segment of Highway 401 that crosses the Cataraqui River, require traffic to use the Ministry of Transportation’s designated emergency detour route (EDR) which provides for a crossing of the Cataraqui River at Sunbury Road. This out-of-the-way route results in a longer travel distance and time that impacts both local traffic utilizing Highway 401 as well as inter-city traffic using Highway 401 to commute between other urban centers such as Toronto and Montreal. During the period from 2010 to 2016 there have been 14 recorded instances where Highway 401 between Montreal Street and Highway 15
has had all lanes closed either in the westbound or eastbound direction with a total closure time of approximately 50 hours.

Closures of the LaSalle Causeway are also an important consideration from a cost-benefit perspective. Planned (and unplanned) closures of the LaSalle Causeway to accommodate maintenance and repair work can result in extra travel distance and time as travelers need to divert to Highway 401 or Kingston Mills Road to cross the Cataraqui River.

Beyond the costs to travelers impacted as a result of closures of either Highway 401 or the LaSalle Causeway, there are also the costs associated with impacts to emergency services. As discussed earlier in the business plan, it is understood that having a reliable transportation network is critical for minimizing travel time emergency response. The cost associated with additional resources for Kingston Fire & Rescue Services to meet service requirements in the absence of a Third Crossing is estimated to be an additional expense to the city operating budget for fire services of approximately $3 M per year. These annual costs are primarily related to additional services that would be required for the Gore Road fire station. The additional costs to provide supplemental services for the emergency service groups have not been evaluated as part of the cost benefit analysis due to closures of these transportation routes crossing the Cataraqui River.

3. Economic Impact Analysis

An economic impact analysis (EIA) was undertaken for the Third Crossing project. The EIA is a common tool used to evaluate the economic impacts of infrastructure projects at a local and regional level. In other words, if there is a decision to proceed with the implementation of the Third Crossing, what would be the economic impacts or benefits that would be derived for both the local Kingston economy and the broader provincial economy? The reader is invited to review the full Collins Barrow report provided in Appendix B.

a. Objectives

The objective of the EIA was to assess the economic impact of the Third Crossing on the City of Kingston and the broader region using standard measures of economic activity. An EIA is a widely accepted, rules-based and standard approach to measure how spending tracks through and impacts an economy – in this case, the economy of the City of Kingston and the surrounding area as defined by the Kingston Census Metropolitan Area (Kingston CMA). For infrastructure projects such as the Third Crossing, there are two broad types of economic impacts:

- **One-time impacts** from the construction of the Third Crossing that is significant in the short term while the project is being developed, but ultimately dissipates after project completion.
• **On-going impacts** that are generated from economic activity that the Third Crossing stimulates such as the development of employment or residential lands.

b. **Methodology and Model Development**

Economic impacts are generally estimated for the following standard measures of economic activity:

- **Gross output** is the gross value of all business revenue. This is the broadest measure of economic activity and indicates the total sales and transactions triggered by operations.

- **Value-added or Gross Domestic Product (“GDP”)** is the value added to the economy or the unduplicated total value of goods and services. GDP includes only final goods to avoid double counting of products sold during an accounting period. So, for instance, if a producer of widgets sells each widget for $100 and purchased $40 of goods from suppliers to produce the widget then the value-added or GDP impact would be $60 for each widget sold.

- **Wages and salaries** equal the total value of wages and salaries associated with employment impacts occurring from the project. Labour income is an even narrower measure of economic activity and comprises an important part of GDP.

- **Employment** refers to the number of jobs created or supported due to the project and is expressed as the total number of part-time and full-time jobs.

- **Government tax revenues** are the amount of total tax revenues generated (Federal, Provincial and Municipal) from the project occurring.

Economic impacts are typically estimated at the direct, indirect and induced levels for both one-time and ongoing impacts:

- **Direct impacts** are changes that occur in “front-end” businesses such as the bridge construction company that initially receive expenditures and operating revenue as a direct consequence of operations and activities conducted.

- **Indirect impacts** arise from changes in activity for suppliers of the front-end business commonly known as the supply chain process. For example, the bridge contractor requires the purchase of rebar from a steel product manufacturer which requires purchase of refined steel from a steelmaker.

- **Induced impacts** occur when employees, from businesses and jobs stimulated by direct and indirect expenditures, spend their personal income on consumer goods and services.
c. Results

The total economic impact equals the sum of the direct, indirect and induced economic impacts. Table 11 provides the results of the EIA when considering the one-time impacts of the Third Crossing construction on the Kingston CMA. These results show that the one-time impacts during construction are estimated to generate roughly $10.0 M in GDP and 89 jobs on an average annual basis in Kingston.

Table 11: Average annual one-time economic impacts to Kingston CMA

<table>
<thead>
<tr>
<th></th>
<th>Output (millions)</th>
<th>GDP (millions)</th>
<th>Wages and salaries (millions)</th>
<th>Employment (number of jobs)</th>
<th>Taxes (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$18.7</td>
<td>$8.2</td>
<td>$5.1</td>
<td>74</td>
<td>$1.7</td>
</tr>
<tr>
<td>Indirect</td>
<td>$1.0</td>
<td>$0.5</td>
<td>$0.3</td>
<td>4</td>
<td>$0.1</td>
</tr>
<tr>
<td>Induced</td>
<td>$2.2</td>
<td>$1.3</td>
<td>$0.6</td>
<td>11</td>
<td>$0.3</td>
</tr>
<tr>
<td>Total</td>
<td>$21.9</td>
<td>$10.0</td>
<td>$6.0</td>
<td>89</td>
<td>$2.1</td>
</tr>
</tbody>
</table>

Table 12 provides the results of the EIA when considering the on-going impacts that are simulated as a result of the construction of the Third Crossing. Interviews with various business organizations and leaders within the community suggested that the development of the Third Crossing would be a catalyst to facilitate and accelerate the development of the east end of the City of Kingston and in particular the St. Lawrence Business Park, where employment land development was viewed as limited as a result of lack of easy access to the rest of the City. The EIA considered the full build-out and development of the St. Lawrence Business Park, which would result in on-going economic impacts including the creation of 276 jobs and approximately $29 M in GDP on an annual basis.

Table 12: Average annual on-going economic impacts to Kingston CMA

<table>
<thead>
<tr>
<th></th>
<th>Output (millions)</th>
<th>GDP (millions)</th>
<th>Wages and salaries (millions)</th>
<th>Employment (number of jobs)</th>
<th>Taxes (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>$37.3</td>
<td>$24.5</td>
<td>$18.7</td>
<td>228</td>
<td>$5.1</td>
</tr>
<tr>
<td>Indirect</td>
<td>$1.4</td>
<td>$0.7</td>
<td>$0.5</td>
<td>11</td>
<td>$0.2</td>
</tr>
<tr>
<td>Induced</td>
<td>$6.7</td>
<td>$4.0</td>
<td>$1.9</td>
<td>37</td>
<td>$0.8</td>
</tr>
<tr>
<td>Total</td>
<td>$45.4</td>
<td>$29.2</td>
<td>$21.1</td>
<td>276</td>
<td>$6.1</td>
</tr>
</tbody>
</table>

Similar recommendations were presented as part of the Employment Land Strategy Review completed in 2015 and formed the basis of several policy changes in the Five Year Update to the City’s Official Plan. The Employment Land Strategy indicated that given the somewhat isolated location of the St. Lawrence Business Park in the east end of the City, the construction of an additional bridge crossing the Cataraqui River would
largely enhance the marketability of those employment lands while also providing critical
direct access to those lands for the surrounding labour force. The same would also be
ture related to the enhanced marketability of undeveloped commercial and residentially
designated lands in the east side of the City. The Third Crossing was also viewed to
have the potential for synergistic effects on both the east end and Old Industrial areas of
the City by creating a more dynamic, inter-connected urban environment serviced by
active transportation linkages and express transit.

4. Procurement Options Analysis

The EA for the Third Crossing provided a preliminary review of various procurement
options for the project implementation and made a recommendation for a more detailed
evaluation as part of the business plan development for the project. The procurement
options analysis and evaluation considered, analyzed and evaluated various project
delivery models for project implementation as part of this business plan.

a. Project Delivery Models

Design-Bid-Build - This model is the most common and well understood project
delivery model by public sector owners (Owner). It involves the Owner directing the
engineering design of a project through to completion. Once the tender package is
ready, the Owner can tender the project out in an open public forum. Potential
contractors bid on the project and the award is typically made to the contractor who
submits the lowest price. The Owner has separate contracts with the designer and the
contractor. There are no direct contractual links between the designer and contractor.
The contractor is responsible to build the project to the construction specifications that
have been provided in the construction contract. This type of Design-Bid-Build project
delivery model is used for the majority of capital projects constructed by the City of
Kingston.

Design-Build - This model has also been widely used throughout the world on a variety
of infrastructure projects, including major road and bridge projects. It usually involves a
team comprised of one or more engineering companies and a lead contractor that is
capable of designing and building the infrastructure for a guaranteed price. This
approach creates a single point of responsibility for project delivery. The financing of a
Design-Build project is normally provided by the Owner, which could involve a payment
schedule that is tied to specific project deliverables.

The basic Design-Build process involves two main steps. The first step is pre-
qualification, which is typically an open public forum wherein submissions are made by
the lead contractor teams in response to project-related criteria from the Owner. The
top three to four submissions are usually selected (short-listed) and those teams are
invited to participate in the second step. This step involves the development of an early
bid. The early bid is based on a preliminary design produced by the engineer in each
lead contractor team to meet the project criteria specified by the Owner. The preferred
team is then selected by the Owner, normally on the basis of price. More subjective
evaluation criteria can also be used, provided their context and roles in the selection
process are clearly defined beforehand by the Owner. The City has used this type of
Design-Build project delivery model on some large projects such as the K-Rock Center and the Invista Center.

**Public-Private-Partnership (P3)** – This model is a cooperative venture between the public and private sectors. It is built on the expertise of each partner that best meets clearly defined public needs through the appropriate allocation of resources, risks and rewards. This essentially involves an analysis of what it would cost the public sector to design, build, finance and maintain the infrastructure for the life of the project, compared to engaging the P3 model, which is a form of procurement for providing capital assets and associated long term operations that includes a component of private finance.

The P3 model can be appropriate for major and complex capital projects that are usually in excess of $100 M and have significant ongoing maintenance requirements. A P3 can ensure that the contractor is bound to provide project management, design, and risk management expertise to the Owner and to enter into long term operational contracts for the project after it is built. As such, a P3 carries the responsibility for the quality of the contractor’s work over the implementation and operation phases of the project. Typically, at the end of the P3 contract, the infrastructure is turned over to the Owner under clearly defined conditions.

The initial P3 selection process is similar to the Design-Build process. The first step involves submissions by the lead contractor teams to the Owner during the pre-qualification stage. The top three to four submissions are normally selected by the Owner and those teams are invited to develop designs of suitable detail that can be assessed by the Owner as well as used by the teams to establish their bids. Once the preferred team is selected, the Owner executes the contract agreements for the design, build, finance, operation, maintenance and transfer of the infrastructure at the end of the contract term. This is the main difference between the Design-Build and P3 models, in that the P3 model includes a process for financing and payment over a long period (usually 25 years or more). This type of P3 project delivery model has not been used on any City projects and, if selected for the Third Crossing, would be the first instance of its use on a City project.

b. **Project Delivery Model Analysis**

A review of various procurement options has been carried out as part of the business plan for the Third Crossing. This review was intended to assist in determining the preferred design and construction administration to be used by the City. The review considered both traditional models including design-bid-build (DBB) and design-build (DB), and non-traditional models including various forms of public private partnerships (P3). The examination of procurement options typically relies on the combined findings of a quantitative and qualitative analysis with the objective of selecting the procurement option that maximizes both value and efficiency while protecting the City from risk.

The first analysis involved a comparison of a traditional DBB model against a non-traditional private public partnership model. The City has extensive experience with using DBB models on many capital projects such as road reconstruction and bridge infrastructure projects. The next step was to determine the appropriate (P3) model...
ranging from a design-build-finance (DBF) model up to and including options for operation and maintenance functions (DBFOM). The operations and maintenance functions associated with the Third Crossing are not significant enough to attract private sector interest without significant cost increase and little benefit being offered to the City. As a result, both the operations and maintenance functions were not considered to be viable components for a possible P3 model for the Third Crossing. Therefore, the DBF model was the preferred P3 model measured against a DBB in a value-for-money analysis. A value-for-money (VfM) analysis is an approach commonly used to undertake a quantitative assessment that identifies, evaluates, and monetizes all of the potential risks associated with the project for a DBB versus a DBF. The VfM analysis also helps identify whether the project risks are retained by the City, transferred to the constructor, or shared between them. The results of the VfM’s quantitative analysis indicated the DBB provided more risk to the City when compared to the DBF model and therefore the DBB was eliminated from further consideration.

It is important to note the VfM analysis is one of many tools used to inform the decision-making process as to whether a project should proceed with a DBF. The project team has widened its consideration to also include alternative models for large construction procurements that have been developed to complete projects with both cost containment and risk mitigation. Integrated Project Delivery (IPD) is a model for construction which has been developed over the last decade and is suited for large scale construction projects. A Design-Build IPD is an approach to projects that integrates project participants in a collaborative manner but does not represent an “outsourcing” of the contract. Through a multi-party agreement that ensures fiscal transparency and shared financial risk and reward, collaboration is encouraged through payment for team participation and liability waivers to mitigate litigation fears. The Design-Build IPD model increases cost predictability, schedule predictability, and risk allocation in a way which has been shown to complete complex projects both ahead of schedule and under budget.

The City is well-positioned to undertake a successful Design-Build IPD model since the City has:

- Dedicated and knowledgeable in-house staff expertise who have managed complex Design-Build projects and their associated risk elements;
- A long-standing and stable financial position with a variety of lenders;
- Access to acquire additional resources to acquire industry expertise to support a future Design-Build IPD team.

c. **Recommended Project Delivery Model**

The project team has completed its analysis and has identified Integrated Project Delivery as the preferred project delivery model for the Third Crossing. In coming to this conclusion, the project team considered all the public input that was received from the project’s engagement activities to help determine the public’s project delivery model preferences particularly in relation to cost control and risk management.
The project team’s review of project delivery models, along with the consideration of public feedback, has been summarized in the following list which compares the benefits of a DBF (P3) to a Design-Build IPD project delivery model.

1. **The DBF P3 model is appropriate where construction project owners require or prefer a funding model that defers cash-flow requirements.**

   The City will have its one-third share of the project costs in place as described in the long-term financial plan for the Third Crossing through various tools such as development charges, municipal taxes, and preferred lending rates for debt repayments. The project will only move forward on confirmation of upper level funding of the balance of project costs. This key benefit of the DBF model, as a result, will not apply to this project.

2. **Private sector financing through a DBF provides incentives for contractors to finish projects early.**

   There are many examples where DBF’s using financing as a leveraging tool does provide incentive for the contractor to complete projects on time/early. This is due to contractors trying to minimize their interest payments back to private lenders in order to maximize contractor profit which creates a public perception of ‘profits-before-project’ mentality.

   In contrast, the Design-Build IPD model provides price certainty during the early stages of the procurement process. The collaborative team approach produces an appropriate design and construction product that adheres to a predetermined fixed price and overall project budget. In conjunction with a fixed price, the Design-Build IPD offers earlier risk identification which provides additional change order controls during later project phases. The team approach offers contractors a level of comfort that they are in control of their profit margins and can still build a quality product. Furthermore, incentives can be built into the Design-Build IPD model through a shared cost savings formula encouraging the project team to bring the project in under budget.

3. **The DBF provides a reduced level of risk for the city since the risk could be transferred to the private sector.**

   The DBF P3 model is based upon considerable outsourcing of responsibility. The City does not have a track record of P3 projects hence the City would be dependent upon the outsourced DBF team to manage the project’s risk on behalf of the City. The transfer of risk to the private sector is beneficial for owners who are risk averse and are generously funded but do not have an established level of comfort with risk elements that are associated with significant projects in general.

   The management of risk in the Third Crossing project will be founded upon in-house experience using appropriate tools and resources further supported by a team of specialist professionals. The City’s existing allocation of dedicated project team staff, development of an oversight Project Management Committee (PMC), and the hiring of
specific expertise for peer reviews and additional investigations will form the core and leadership of the IPD team.

Having these appropriate tools and resources in place allows the project team to work through the risk together collaboratively and embrace project risk rather than transferring it to the private sector away from the City’s control. Rather than paying a risk premium to transfer the risk to the contractor, the Design-Build IPD model creates a shared risk reward environment while controlling risk by ensuring that the integrated design team has collaboratively approved a design within budget prior to the commencing of the building stage.

4. **The real value in a DBF is transferring risk to the private sector which offers a level of risk and cost containment for the City.**

The Value for Money (VfM) analysis results indicated that the DBF model would be more expensive at the beginning of the project when compared to a traditional DBB. However, this analysis also indicated that the risk transfer to the private sector through a DBF will yield an overall project cost savings when compared to a DBB. There is an acknowledged if modest correlation between construction risk and the financing element of the DBF model.

It is important to note that transferring risk does not absolve the City from costs associated with project risks. The risk that will be transferred from the City is essentially sold to the contractor who would then charge a price premium to account for the management and ownership of project risks. Under a DBF, a lender works with the contractor to price the job with the risk premium included. Therefore, the project cost could be considered more expensive due to this loan component.

The City’s financial position avoids the need for the outsourced financing of a DBF project which eliminates this aspect of the overall costs.

5. **A DBF offers the opportunity for design innovations as the project progresses.**

It is acknowledged that the Design-Build portion of a DBF offers a superior product with a reduced amount of change orders and an overall more holistic design when compared to a traditional DBB. It provides, however, less verification control for the Owner of the project due to the fundamental outsourcing of roles.

By comparison, the Design-Build IPD model also allows for innovations that could be realized which are similar to the DBF. By ensuring that the design stage is complete before the building stage begins, the IPD model better ensures cost certainty and design certainty and enhances innovation incentives by making the design innovation parts of the initial contract award during the procurement phase. The focus on cost certainty is also key during the design verification stage that precedes construction.

6. **The Value for Money (VfM) analysis offers an approximation of the risk that can be transferred to the private sector when compared to a DBB.**
The DBF offers a positive VfM when compared to a traditional DBB for the Third Crossing which offered a savings to the City through the transfer of risk from the public to the private sector. The information used in the VfM analysis was obtained through the review of the preliminary design information and through the shared expertise of the project team to develop the risk quantification values that were used in the VfM process.

As a result, it is still only a forecast of what the project will encounter. This process contains an element of subjectivity and would not be able to objectively verify the true VfM until much later on in the P3 process. It is expected that the Design-Build IPD model will integrate an ongoing cost and design analysis iterative process throughout the pre-construction phases.

It is noted that the VfM analysis between a DBB and a P3 follows industry best practices. However, the project team could not conduct a VfM analysis between a DBF P3 to the Design-Build IPD model since this comparison process did not exist at the time of the Third Crossing’s business plan development.

7. The City could benefit from experienced P3 project managers who can manage the DBF project on behalf of the City.

Regardless of procurement model, P3 project managers hire from the same pool of industry resources that owners would also be procuring for a Design-Build IPD. The project management governance of a DBF is complex and to a degree adversarial. It requires an increased level of oversight to manage the actual P3 management process which would be kept at an arm’s length away from the City.

The DBF’s project management structure is beneficial for owners who are risk averse or who do not have the in-house capacity to provide dedicated project management. In contrast, the owner of a Design-Build IPD would be more directly involved in the decision-making processes of the project. The owner’s project managers would require appropriate resources and tools to diligently manage the project to maintain cost containment, risk mitigation, and schedule adherence. In the opinion of the project team, the Design-Build IPD model will better serve the City’s interests.

Public feedback

The public were asked a series of project delivery model questions as part of the public survey in 2016. The City received over 1100 responses to the survey in which the survey results were shared with the residents at the September 2016 Public Open House. A key piece of feedback received from the public indicated that the project should be managed by the most appropriate party as long as the project was finished on time and on budget. Since the fall of 2016, the project team has continued receiving feedback through its public engagement process in regards to project delivery models.

The public feedback has expressed concerns of how a P3 model:
• could pose a risk to outsourcing local public sector jobs;
• could lead to tolls and users fees being placed on the Third Crossing and other locations throughout Kingston;
• would not be in the best interest of the City due to a ‘profits-before-project’ mentality which would be at the expense of Kingston taxpayers;
• would lead to paying a premium for private sector financing and a higher project cost;
• could lead to cost overruns since it is a P3 by nature;
• places a prominent project into the hands of the private sector rather than keeping it with the public sector.

Conclusion

• The value for the financial element of a DBF could not be validated in regards to schedule acceleration, transfer of risk for the project, or deferral of cash flows;
• The City of Kingston’s strengths are better aligned with the Design-Build IPD model which provides an appropriate framework and resources to best manage construction risks and challenges effectively;
• Design innovations can be maintained through a Design-Build IPD;
• A quantitative Value for Money analysis could not be conducted between a DBF and a Design-Build IPD;
• The City has experienced project managers with access to appropriate resources and expertise;
• The public has a low level of comfort for a P3.

Based on the above information, the project team has determined that the Design-Build IPD model is the appropriate project delivery model for the Third Crossing.

H. Next Steps

Phase 1, 2, and 3 of the Third Crossing Action Plan has determined that the project is both technically and economically feasible and would benefit the City of Kingston if implemented.

The information provided in the Final Preliminary Design Summary Report and the Final Business Plan will support a summary staff report to Kingston City Council on June 13, 2017. The staff report will also provide City Council with recommendations in relation to the next steps associated with the implementation of the Third Crossing project.

I. Appendices

Appendix A – Third Crossing Transportation Forecasting and Analysis Traffic Report
Appendix B – Third Crossing Cost-Benefit and Economic Impact Analysis Report