

To: Mark Baker (Parsons)
From: Adam Lanigan (Dillon)
CC: Peter Harvey (Parsons), Eric Stewart (Dillon)
Date: February 23, 2021
Subject: LaSalle Causeway Bascule Bridge Main Trunnion Rehabilitation – Transportation Impacts

This memorandum discusses the potential transportation impacts related to rehabilitation work on the Bascule bridge portion of the LaSalle Causeway in Kingston, ON.

Background

The LaSalle Causeway separates Kingston's inner and outer harbours, while connecting the east side of the Cataraqui River to downtown Kingston via Highway 2. As one of two major River crossings (paired with Highway 401 to the north), the Causeway is a critical travel link for residents of the City of Kingston and carries approximately 24,000 trips on an average day (2019) with daily congestion during peak travel times.

The LaSalle Causeway includes three bridges, the middle of which is a Strauss trunnion bascule bridge, which permits intermittent seasonal access to the inner harbour at specific times of day.

Public Services and Procurement Canada (PSPC) has identified the need to rehabilitate the main trunnions and the deck of the Bascule Bridge which will require that operations on the bridge be limited for a four- to six-month period. The limitations will require partial or potential full closure of Highway 2 lanes during this period. Understanding the critical role of the Causeway during the peak summer season in facilitating and managing both roadway and River traffic, it is intended that the rehabilitation work occur during the off-peak season, which will likely take place from November of 2021 to approximately March or April of 2022.

The work will be executed in two stages:

- Trunnion Rehabilitation – During this stage of the project, one lane can safely be maintained across the bridge. This would permit alternating access across the Cataraqui River for vehicles in both directions throughout the day.
- Deck Rehabilitation – The rehabilitation of the bridge deck requires replacement of the full width of the bridge. This stage will require phasing of work to maintain access and may require full closure of the bridge to complete some elements of the work.

Crossing Options

Residents of Kingston will have two options to cross the Cataraqui River during the four to six months where the crossing will be under construction. Depending on the time of day and the period of construction one or both of these options will be available:

- **Cross the single-lane LaSalle Causeway** – For construction stages where a single lane can be safely maintained across the Causeway, it will be possible to offer alternating access for eastbound and westbound vehicles.
- **Detour via Highway 401** – For stages of the rehabilitation where the bridge is fully closed or during periods of congestion across the Causeway, drivers could cross the River by travelling north to Highway 401 and then proceeding south via Montreal Street or Highway 15, dependent on direction of travel.

Both crossing options will result in significant increases in travel time and/or distance for residents of Kingston who need to cross the River. There will also be knock-on effects to other drivers on either side of the River due to increases in congestion and queuing as the capacity across the River is reduced and drivers take longer routes along roadways that already experience recurring congestion during peak travel hours.

Crossing the Single-Lane LaSalle Causeway

As discussed in detail in Dillon’s previous technical report (“LaSalle Causeway Bascule Bridge Main Trunnion Rehabilitation – Strategic Transportation Analysis”, April 2020), the LaSalle Causeway currently operates with an approximate capacity of 1200 vehicles per direction during peak travel hours. Temporary reduction of the crossing to a single lane will result in a likely functional capacity of 500 vehicles per hour per direction – given a 50% reduction in capacity and some operational inefficiencies to allow the Causeway to be safely cleared between changes in direction.

The graph below in **Figure 1** shows the profile of traffic volume crossing the Causeway on a typical day (October 2017). As shown in the figure, the ***demand for crossing the Causeway is likely to exceed the available capacity 12 to 13 hours of every weekday***. This will result in significant congestion on both sides of the Causeway for all construction stages likely every day. As the Causeway already typically operates with periods of congestion during peak travel times, this may be significantly exacerbated for an extended period.

Residents of Kingston who must cross the River every day will therefore most likely experience increased congestion throughout the project as they attempt to cross a single-lane LaSalle Causeway. Significant queuing and congestion will be present on either side of the Causeway during the daytime for the duration of the project.

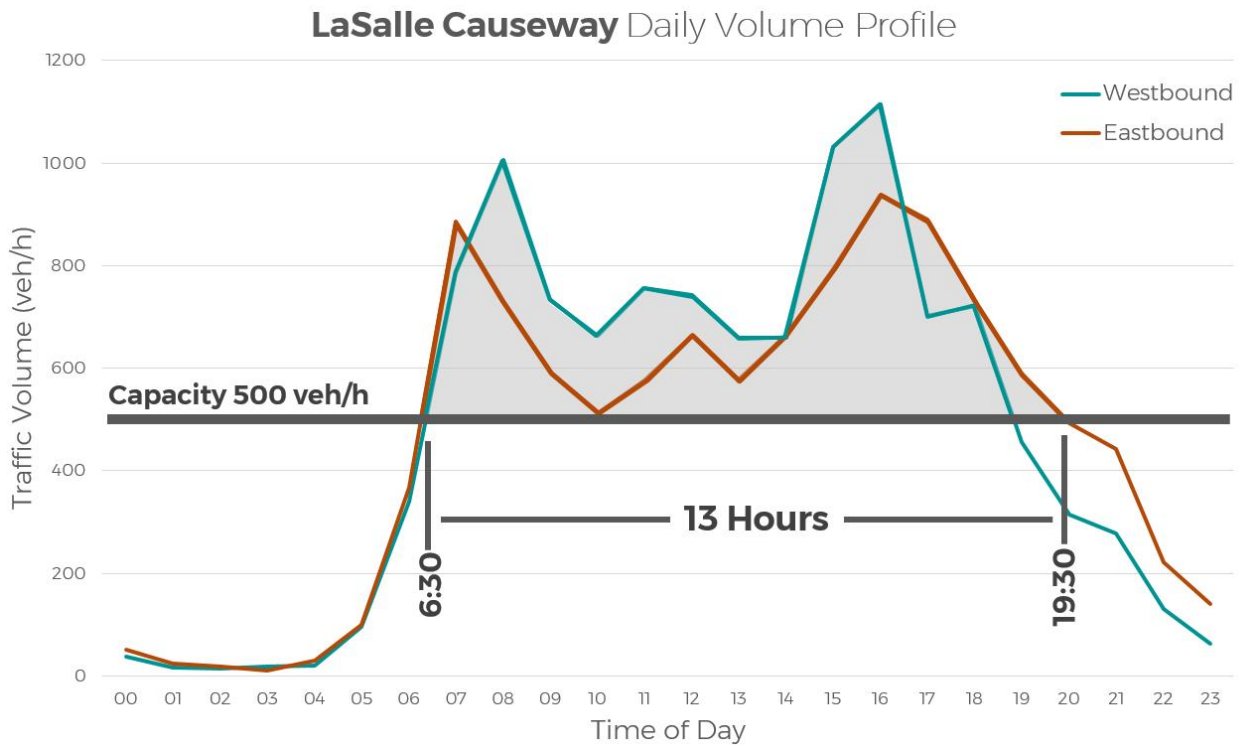


Figure 1 – LaSalle Causeway – Daily Volume Profile

Detouring via Highway 401

Alternately, residents crossing the Cataraqui River could make use of a detour across the River via Highway 401, which lies approximately 5 kilometres to the north of the LaSalle Causeway, as shown in **Figure 2**.



Figure 2 – LaSalle Causeway Detour Route

As shown in the figure, the detour across the River to avoid the LaSalle Causeway will add up to approximately 16 kilometres to every driver’s trip dependent on their origin and destination on either side of the River. Given an existing demand across the River of approximately 24,000 trips every day, the additional vehicle kilometres of travel will be significant.

During current peak travel hours, this detour will add 20 to 30 minutes to the trip for a typical traveller. This condition, however, will degrade further as additional vehicles travel along Montreal Street, Highway 401, and Highway 15. With a total demand across the Causeway of approximately 2,400 vehicles during the PM peak hour and a capacity during the single-lane stages of 1000 total vehicles, there could be an increase of up to 1,400 vehicles travelling these already congested routes over a distance of up to 16 kilometres. There is significant potential for further travel time increases in excess of the 30 minutes experienced currently for a large number of travellers, which includes those

specifically making the detour across the River and those simply travelling along the main routes as part of their daily travels.

A further knock-on effect of the increased congestion along the most direct detour route will be an increase in volume and travel time along any comparable parallel routes and infiltration into residential areas, as drivers seek to avoid worsening congestion. On the western side of the River, increases in volume and congestion along Rideau Street and Division Street are likely, as well as smaller parallel local roads. On the eastern side of the River, there are no convenient parallel north-south routes that could serve as an alternate to Highway 15, so congestion along this route will likely be significant.

The significant increases in travel distance, travel time, and exacerbated congestion will also create significant increases in related greenhouse gas (GHG) emissions over the length of the project, as drivers travel further and experience longer periods of congestion over a large portion of the city.

For the bridge deck rehabilitation portion of the project, there may be stages of the construction where full closure of the Causeway will be required. For these stages, it will be critical that work be done during overnight periods between likely midnight and 6am to avoid major congestion issues. If full closure of the Causeway were to occur during the busier 6am to 6pm period, congestion would be extreme. Detailed study of the construction staging and road network performance should be undertaken by the selected contractor to minimize the number and duration of these closures and establish appropriate periods for overnight work.

As discussed in Dillon's previous report, the City of Kingston is currently constructing a new bridge across the Cataraqui River, known currently as the Third Crossing. This crossing will sit at essentially the mid-point between the LaSalle Causeway and Highway 401. Current estimates place the completion of the Third Crossing in the year 2023. The Third Crossing will provide one lane per direction for vehicle trips, plus sidewalks and cycling infrastructure for walking and cycling across the River.

As shown in **Figure 3**, the availability of the Third Crossing provides a significant reduction in detour distance for drivers crossing the River while capacity is constrained on the Causeway, reducing the detour from a maximum of approximately 16 kilometres to approximately 7 kilometres – a 56% reduction.

The additional capacity provided by the Third Crossing will also be of significant benefit to residents during the construction period, as this provides new capacity across the River that is equivalent to the existing Causeway. This will aid in reducing capacity issues for residents wishing to cross the River both during and outside of the construction period.

The combination of the midpoint location and additional capacity provided by the Third Crossing will provide significant benefits to residents of Kingston throughout the duration of the project, significantly reducing congestion and detour issues throughout the duration of the rehabilitation of the Causeway. The reduction in delays, congestion, and GHG emissions of performing the work following the opening of the Third Crossing will be significant.

Note, however, that the City of Kingston has indicated that follow-on construction activities at major intersections near the Third Crossing will be required once the facility is opened, so there may be other construction-related capacity issues along the detour route.



Figure 3 – LaSalle Causeway Detour Route – With Third Crossing

Conclusion

As one of two major crossings of the Cataraqui River, the LaSalle Causeway is a critical link for residents of Kingston as they travel every day between their homes, jobs, and other activities on either side of the River.

The rehabilitation of the trunnions and deck on the Bascule Bridge portion of the Causeway will cause significant congestion over a large portion of the city along routes that are already congested. With only two feasible crossings of the River, there are limited options for crossing:

- Capacity across the Causeway itself will be reduced to less than half of existing – this will cause significant daily congestion on both sides of the River.
- Detouring drivers across the River via the combination of Montreal Street, Highway 401, and Highway 15 will exacerbate these already congested routes. This will also likely increase volume and congestion on comparable parallel routes, including infiltration into residential neighbourhoods. The increase in travel time and distance will be significant for a large number of residents every day throughout the project.

These significant increases in congestion will occur every day throughout the project likely for periods of 10 to 12 hours per day. Care should be taken to avoid full closure of the Causeway during the project if possible and any required closures should be performed via overnight work to minimize impacts.

The completion of the Third Crossing of the Cataraqui River has the potential to significantly reduce congestion and delay issues for residents needing to cross. The additional capacity and useful midpoint placement between the Causeway and Highway 401 could significantly reduce congestion, detour distance, and the resultant GHG emissions.