# REVISION HISTORY

## ISSUANCE APPROVAL

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## REVISION HISTORY

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# SIGNATURES

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# EXECUTIVE SUMMARY

Public Service and Procurement Canada (PSPC) retained WSP Canada Inc. (WSP) to conduct a Counterweight Rehabilitation Study for the LaSalle Causeway Bascule Bridge in two stages. Stage 1 included a site investigation of the Counterweight, structural assessment and balancing analysis to determine recommended short-term and long-term rehabilitation options that provide a 25-year service life and a condition rating of 'fair', in accordance with the Bridge Inspection Manual. Since an Interim Repair was recommended, designed and implemented by WSP following the site investigation to address the short-term concerns for the Counterweight, Stage 2 of the study focused on developing the long-term recommended rehabilitation option at the Conceptual Design level. This report presents the recommended rehabilitation option for the Counterweight at the conceptual design level; Option 2a – partial removal and replacement of concrete in kind.

As part of the direction given by PSPC in the Terms of Reference for this project, the Counterweight Rehabilitation is to proceed under the assumption it is to occur in parallel with the Trunnion Rehabilitation, while maintaining access to vehicles and pedestrians at all times throughout construction. While the Counterweight Rehabilitation could be completed without impact to traffic on the LaSalle Causeway, a reduction to a single lane is required to complete the work for the Trunnion Rehabilitation. To achieve this goal, WSP recommends the use of a Crash Deck system during construction, and has provided multiple configuration options and drawings, at a preliminary design level. With the Crash Deck system in place during construction, traffic and pedestrians will have constant access during all phases of construction; removals, installations, and concrete placement.

Once the Crash Deck system is in the place, the contractor may begin removal operations. While a preliminary concrete removal sequence has been considered, it will be required during the detailed design to investigation potential load support and sequence of replacement. For the concrete to be replaced for the Counterweight, a conservative design approach has been taken to show feasibility of the proposed reinforced concrete shell in accordance with Canadian Highway Bridge Design Code (CSA S6-19) to support loading requirements. Since corrosion/deterioration of concrete and reinforcing steel has plagued the concrete Counterweight, anti corrosion measures have been considered by WSP in the conceptual design, such as: premium reinforcing steel, class of concrete used, epoxy injection of cracks, treatment of existing structural steel, and cathodic protection. While a preliminary sequence for the placement of reinforcing steel and concrete was determined in the preliminary design of the concrete shell and Crash Deck system, it will need to be further examined and developed in the detailed design phase.

At this stage in the project, a Class "D" construction cost estimate was developed, and it is estimated that Option 2a for the Counterweight rehabilitation will cost approximately $3.2M, including a 30% contingency, and excluding HST. It is intended that the Counterweight Rehabilitation project would occur during the navigational shutdown period; October to May.

# 1 INTRODUCTION

The LaSalle Causeway (LSC) is located in Kingston, Ontario and forms part of Highway #2, crossing the Cataraqui River at the entrance to the Kingston Harbour from Lake Ontario. The causeway provides a significant contribution to the socio-economic operations of the City of Kingston with 25,000 to 28,000 vehicles crossing it daily. The LSC Bascule Bridge is a Strauss Trunnion Bascule Bridge that was opened to the public in 1917 and is owned and maintained by Public Services and Procurement Canada (PSPC). This project focuses on the rehabilitation of this bridge's Counterweight.

The existing concrete Counterweight was part of the original construction in 1917. It is suspended from the counterweight truss above the roadway and weighs approximately 550 tonnes. Steel truss sections extend into the center of concrete and act as supports for the mass of concrete, while steel bars and wire mesh provide support to the external faces of the concrete. Except at the north and south faces of the Counterweight, all other faces are covered with what appears to be corrugated metal roofing panels. There are steel plates mounted on the north and south faces of the Counterweight which are secured in place by threaded steel rods. No known repairs have been conducted to the Counterweight in the past.

As part of the 2018 Comprehensive Detailed Inspection (CDI), six (6) 100 mm diameter concrete cores ranging in depth from 126 mm to 611 mm were removed from the east and west faces of the Counterweight. Due to the poor condition of the cores, it was possible to test only one of the six cores for compressive strength, and the resulting test determined a compressive strength of 11.9 MPa. Based on the Ministry of Transportation Ontario (MTO) Structure Rehabilitation Manual, structural concrete with a compressive strength under 20 MPa is of poor quality. Further investigation limited to a visual inspection of the Counterweight's visible elements was completed by Parsons as part of the 2019 CDI. The 2019 CDI indicated that the concrete was generally in poor condition, exhibiting disintegration, spalling, and efflorescence with and without stalactites and stalagmites. The results of the 2019 CDI precipitated the need for the current Counterweight Rehabilitation Study (Counterweight Study), the first stage of which has been successfully completed by WSP.

The Counterweight Study is implemented in two stages. The first stage of the Counterweight Study focused on the site investigation of the Counterweight and a subsequent structural assessment and balancing analysis. The second stage involves the development of a recommended rehabilitation option at the conceptual design level. The conceptual design option is presented in a report and includes drawings, design recommendations, temporary works, a project plan timeline and Class D construction cost estimates.

# 2 BACKGROUND

The Counterweight Study is a direct result of the yearly CDIs performed in 2018 and 2019, with an objective to further investigate in detail the present condition of the Counterweight and provide short-term and long-term rehabilitation options. The proposed conceptual repair strategies will serve as the basis for a separate project which will include a detailed design for the rehabilitation. The desired outcome of the rehabilitation is to achieve an overall service rating of “fair” in accordance with the Bridge Inspection Manual and to prolong the maintenance-free service life of the Counterweight by at least 25 years.

The Counterweight Study was implemented in two stages, the first of which has been successfully completed by WSP. The work completed in Stage 1 serves as the basis for Stage 2 which involves the development of the conceptual design option discussed in this report. The following sections summarize the results from each milestone of Stage 1 of the Counterweight Study:

- Site Investigation;
- Interim Repair; and
- Technical Memorandum.

## 2.1 SITE INVESTIGATION

The detailed site investigation of the Counterweight was conducted from October 10$^{th}$ to October 13$^{th}$, 2020 by WSP’s subcontractor Haghbin & Associates Ltd (HAL) under the direct supervision of WSP. The inspection consisted of a condition survey, concrete coring of the Counterweight, and a condition assessment of the Counterweight steel truss. The concrete underwent compressive strength testing, carbonation depth measurement, and a petrographic examination. The detailed findings of the site investigation and lab test results were presented in a site investigation report.

### *2.1.1 WORK PERFORMED ON SITE*

The following tasks were performed on site by HAL to determine the overall condition of the Counterweight:

- A large portion of the steel cladding was removed from the Counterweight to gain access to the concrete surface. **Figure 1** shows cladding removal in progress and the exposed cladding support angles;


**Figure 1: Counterweight Cladding Removal. West Face Shown.**

- A condition survey was performed on all exposed concrete using visual inspection techniques and hammer sounding to identify delamination, cracks, deterioration, etc.;
- Seven (7) 100 mm diameter concrete cores were removed from the Counterweight at locations determined using a 3D Revit model to avoid damaging the Embedded Truss members:
    - Two of the cores were greater than half the depth of the Counterweight (2.7 m and 2.6 m in length) and the other cores were partial depth ranging from 0.22 m to 0.72 m in length. **Figure 2** shows core removal in progress;

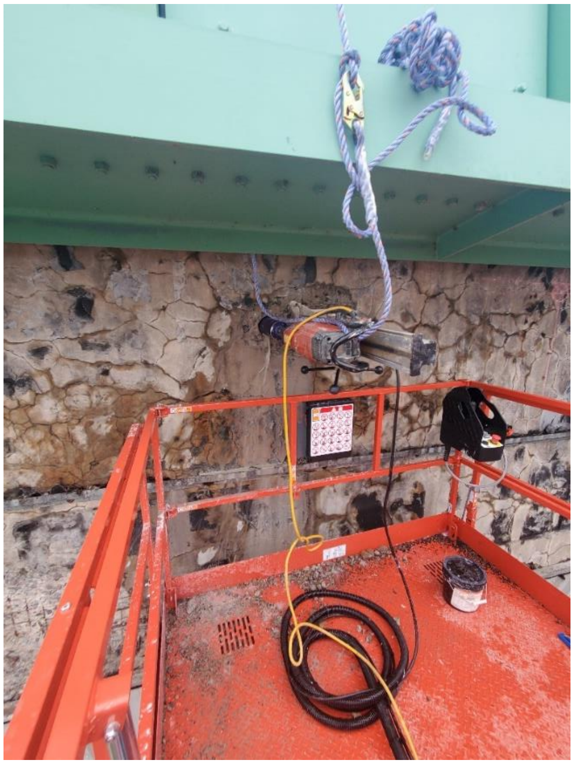

**Figure 2: Concrete Core Removal in Progress on West Face.**

  - A small sample of reinforcing steel was removed with one core and was used to determine the condition of the reinforcing steel;
  - A fibre scope was used to visually document the condition of the concrete within the core holes;
  - The cores underwent a compressive strength test, carbonation testing, and a petrographic analysis;
  - The cores were subsequently patched with Sika 45 grout.
- The Embedded Truss members were exposed on the top face of the Counterweight through the removal of two (2) carefully placed core holes; and
- The access hatches on the top face of the Counterweight were opened to assess the condition of the exposed Girder F structural steel members within.

After the inspection was complete, the steel cladding was reinstated, several structural steel angles and channels supporting the cladding were replaced due to their deteriorated condition, and all debris that was collected was weighed for the balancing analysis.

### 2.1.2 SITE OBSERVATIONS AND LAB TEST RESULTS

During the site investigation it was found that the Counterweight concrete is overall in very poor condition, showing severe signs of freeze-thaw damage and reinforcement corrosion, which has resulted in severe delamination, spalling, and cracking. Severe damage was measured to extend to a depth of 300 mm in some locations. Exposed reinforcing mesh and large cracks were observed on the west face. The top face was covered in roofing tar and could not be visually inspected, but hammer sounding and coring revealed delamination and cracking. Concrete was inspected inside the compartments on the top face and was found to exhibit excessive cracking. The steel doors on the east face were found to be in poor condition and were difficult to open and close. The bottom face was observed to be in poor condition with advanced deterioration in the bottom 600 mm of the Counterweight. The Embedded Truss was found to be in overall good shape with surface rust but no significant loss of section in the locations where it was exposed by removing concrete cores. The truss displayed severe corrosion (approximately 30%-50% section loss) only in the location where it was already exposed within the access hatches on the top face.

Seven cores were extracted from the east, west and top faces of the Counterweight. The concrete in the cores was in fair to poor condition, showing excessive cracking in the first 1300 mm, after which sound concrete was reached. Three tests were performed on site and in the lab: compressive strength testing, carbonation testing, and petrographic examination.

The compressive strength test results showed that the compressive strength of the concrete ranged from 10.4 MPa to 19.8 MPa with an average compressive strength of 14.7 MPa, which classifies the concrete as “poor” according to the MTO Structural Rehabilitation Manual.

Carbonation depth was measured on site using phenolphthalein indicator solution which was sprayed on freshly fractured concrete as well as inside the core holes. The carbonation depth was measured to be between 90 mm and 115 mm, which means that it has reached the reinforcing mesh and a layer of reinforcement at cover depths of 50 mm and 55 mm respectively. Carbonation is a concern because it initiates corrosion of the reinforcement.

Lastly, a petrographic examination was performed on select sections of cores to examine the condition of the concrete. The air content, spacing factor, and specific surface were determined to be 2.25, 0.545 mm and 12.56 $mm^2/mm^3$ respectively. In accordance with CSA A23.1 Clause 4.3.3.3, concrete requires air contents in excess of 3, spacing factors less than 0.2mm, and recommends a specific surface greater than 24 $mm^2/mm^3$. Deterioration was quantified in accordance with the Damage Rating Index (DRI). Concrete at the surface had a DRI value of 440 which indicates considerable cracking and damage, whereas concrete at depth had a DRI value of approximately 50, indicating that the interior concrete was in generally good condition.

After the site investigation was complete, a site investigation memorandum was submitted to summarize the findings until the test results became available and the detailed field investigation report could be prepared. The memo described the work that was done on site and the overall condition of the counterweight. In the memo it was recommended that an interim repair be implemented due to the extensive delamination of the concrete at the bottom of the Counterweight.

## 2.2 INTERIM REPAIR PROJECT

WSP provided Contract Drawings and Specifications for an interim repair that could support a 600 mm spall from falling to the roadway. This depth was conservatively chosen due to the uncertain nature of the concrete’s condition. The repair consisted of a 10000 lb rated heavy duty debris netting supported by 0.5” diameter galvanized wire ropes wrapped around the Counterweight. Corner protection pipes were installed at the edges of the counterweight to provide a smooth bend in the wire ropes and avoid fraying the ropes. U-bolt wire rope clips, wire rope thimbles, and turnbuckles were used to connect the ends of wire ropes together.

Construction for the interim repair commenced on May 5$^{th}$, 2021 and was completed by May 12$^{th}$, 2021, with construction occurring between the hours of 09:30 and 15:00 and partial lane closures to avoid disruption to traffic. **Figure 3** and **Figure 4** show the installation of the repair, and **Figure 5** shows the completed repair.

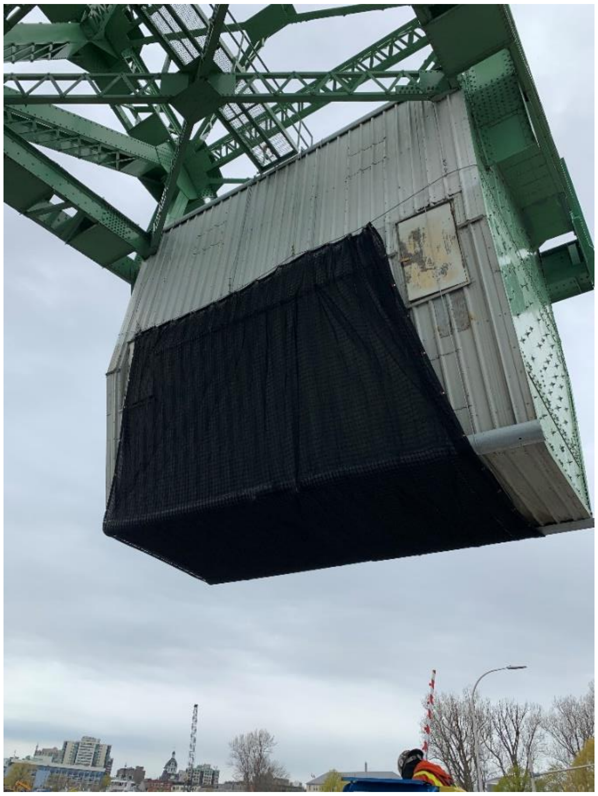

**Figure 3: Installation of Debris Netting. East Face shown.**

**Figure 4: Installation of Wire Rope. Top Face Shown.**

**Figure 5: Completed Interim Repair. West Face Shown.**

## 2.3 TECHNICAL MEMO

The purpose of the Technical Memorandum (Technical Memo) was to assess the condition of the Counterweight, determine possible rehabilitation options, and determine the feasibility of each option through a structural evaluation and balancing analysis. The following sections summarize the contents of the Technical Memo and the recommended rehabilitation option provided to PSPC.

### *2.3.1 COUNTERWEIGHT REHABILITATION OPTIONS*

To ensure public safety, WSP is recommending any potential short-term or long-term rehabilitation option includes the removal of at least 600 mm of concrete from all faces of the Counterweight. There is currently an interim repair in place with a service life of only 5 years, so the short-term or long-term rehabilitation strategy must be implemented within that timeframe.

Several rehabilitation options were examined in the Technical Memo.

- Option 1 involves the replacement of the entire counterweight. This would allow the full exposure of the Embedded Truss for complete inspection and the possibility to rehabilitate or replace any members that are in poor condition. Given that the requirement is to provide 25 additional years of service life and that a new Counterweight could outlive the 104-year-old bridge, this option may be overly aggressive. This option is also the costliest, as it would require more structural steel cleaning, more concrete removals/replacement, and more reinforcement than any of the other options.

- Option 2A involves the partial removal and replacement of the concrete. It is recommended that 600 mm of concrete is removed from all faces and replaced in kind. It was determined that this strategy may be the most efficient option as it reduces the amount of required removals.
- Option 2B uses the same repair strategy as 2A, but it introduces removal and replacement in stages, which will provide additional flexibility to mitigate traffic impacts.
- Option 3 involves the removal of deteriorated concrete and the application of shotcrete as a replacement. This solution was deemed not feasible because it would be difficult to ensure that a precisely current amount of shotcrete is applied for balancing purposes, and therefore it was not considered for structural assessment or balancing analysis.

### 2.3.2 STRUCTURAL EVALUATION

A structural evaluation using the commercially available finite element modeling software CSiBridge (v22) was conducted to assess the stability of the Through Truss, Counterweight Truss and Embedded Truss for each option. The following models were created:

- Existing conditions (22.0 kN/m$^3$ concrete density) in both the closed and open positions (0° and 64° of rotation, respectively). **Figure 6** illustrates the model for the bridge in its open position at 64° of rotation;
- Option 1 during construction with the entirety of the concrete removed from the Counterweight, as shown in **Figure 7**;

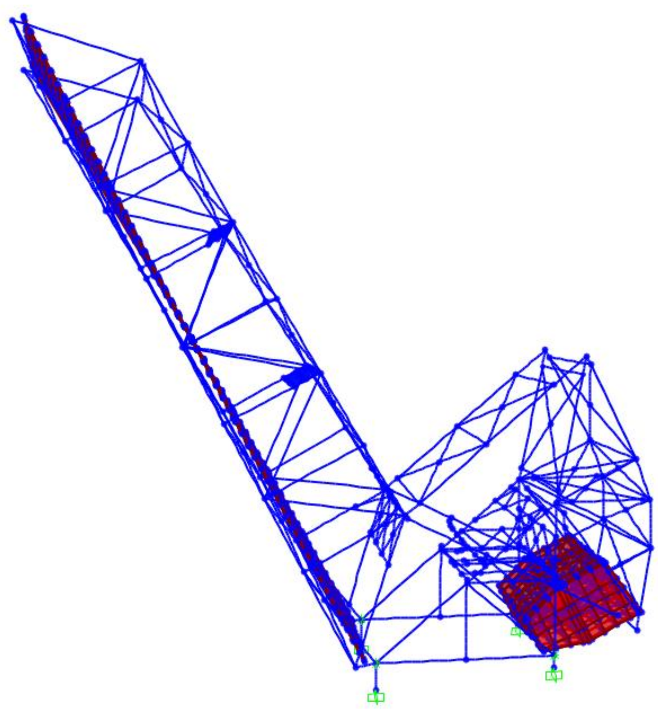

**Figure 6: Bridge Modelled in its Open Position**

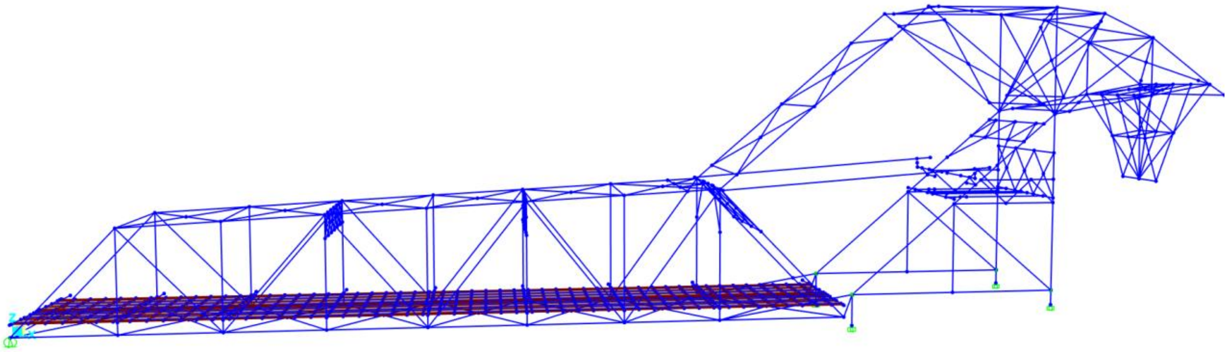

**Figure 7: Option 1 Bridge Model**

Option 2A during construction with a partial removal of 600 mm of concrete from all faces of the Counterweight;

- Option 2B during construction with half of the Counterweight concrete fully intact and the other half with partial depth removals, as shown in **Figure 8**;

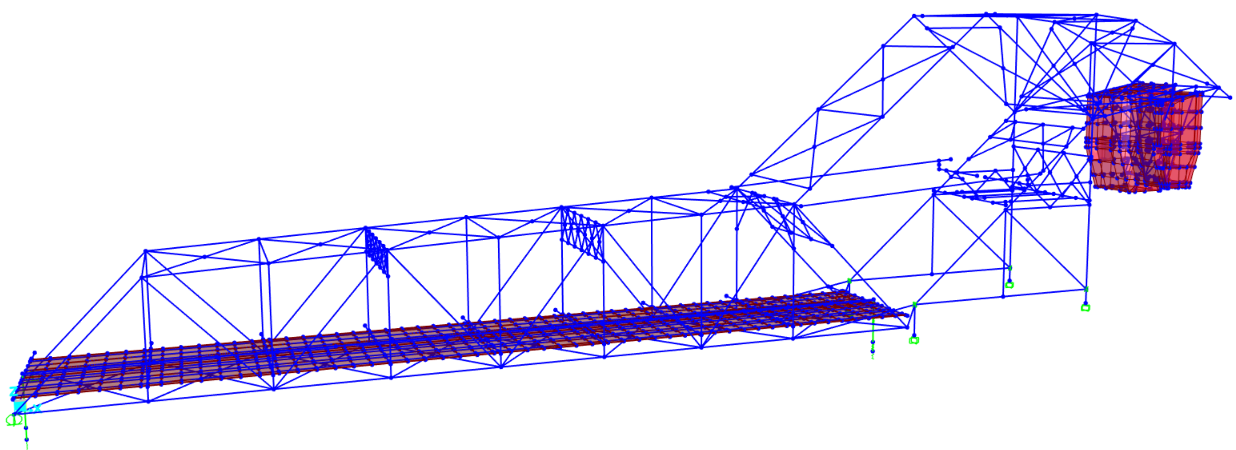

**Figure 8: Option 2B Bridge Model**

- Final condition (22.5 kN/m$^3$ and 24.0 kN/m$^3$) in both the closed and open positions (0° and 64° of rotation, respectively) for each option; and
- Single lane configurations (lane 1, lane 2, and center lane) for traffic management during construction of Option 1. Options 2A and 2B were shown to be stable with full loading.

The results of the structural evaluation were used to assess the feasibility of each rehabilitation option, including any potential requirements for strengthening or traffic restrictions during construction, such as load postings. To determine feasibility, demand/capacity (D/C) ratios for each structural steel member in the Through Truss, Counterweight Truss and Embedded Truss were calculated. Additionally, the continuity between the steel embedded truss and the Counterweight concrete was modelled using two different assumptions (translation only constraints, and translational and rotational constraints) to ensure that the assumptions do not dominate the accuracy of the results.

The results show that all the Through Truss and Counterweight Truss members have a D/C < 1 for both the open and closed positions, for both the existing and rehabilitated conditions, while various Embedded Truss members have a

D/C > 1 in tension, compression and bending. This is very dependent on the assumptions made regarding the continuity of the concrete with the Embedded Truss. If it is assumed that the concrete is well connected and or completely composite with the steel, even with low or unfavorable assumptions regarding concrete strength, stiffness and cracking, the concrete will support most of its own load. This would result in the embedded truss members having a D/C < 1. The detailed design will further look at the removal sequence to consider how the connection between the concrete and the steel is affected by the removals and manage loading considerations where members are exposed.

During construction operations, it was noted that Option 1 was feasible only when traffic was reduced to a single lane for when the concrete was removed from the Counterweight. Option 2A was shown to be feasible during construction without any traffic restriction in place. With Option 2B a loading imbalance is created due to uneven concrete removals, and therefore further development would be required during detailed design to determine feasibility.

### 2.3.3 BALANCING ANALYSIS

A balancing analysis was performed to determine if the existing bridge balance can be maintained without requiring design modifications to the existing Counterweight after concrete replacement is completed. This included analyzing the imbalance moment over the entire range of the bridge operation. All three options were analyzed for the anticipated final span balance condition based on the existing balance condition and available balance blocks and plates. Maintaining a proper balance will limit the loading on the span drive machinery during operation. If the bridge balance cannot be maintained through adding or removing balance blocks and plates, the counterweight design will require modifications.

The concrete density of the existing concrete was measured to be 22.5 $kN/m^3$, while the density of the new concrete will be 24.0 $kN/m^3$. Option 1 involves the replacement of all the Counterweight concrete, which would make the density of the Counterweight larger when compared to Options 2A and 2B. Even if all balancing blocks and plates are removed, a full depth replacement will still add about 8000 kg to the Counterweight when compared to its current weight, making the bridge Counterweight-heavy instead of toe-heavy. Thus Option 1 would require a modification to the design such as increasing the size of the pockets. Options 2A and 2B both involve only partial replacement of the concrete. The existing adjustable ballast can completely account for the added weight from the concrete replacement, and therefore no modifications to the existing Counterweight design would be required.

### 2.3.4 CONCLUSIONS

Based on the structural assessment of the Through Truss, Counterweight Truss, and Embedded Truss members, and balancing analysis results, WSP is recommending that Option 2A – Partial Removal/Replacement of concrete be further developed in Stage 2 of the Counterweight Study. The results dictate that Option 2A is the most feasible and does not require further load postings on the structure during construction or significant changes to the Counterweight design to maintain the span balance. It also serves as the most suitable option in terms of meeting the 25-year service life, as outlined in the Terms of Reference.

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# 3 CONSTRAINTS

Prior to entering the detailed design phase of the recommended Counterweight rehabilitation option, consideration needs to be given to the various constraints that are present on the LaSalle Causeway Bascule Bridge and the surrounding areas. The following sections detail at the conceptual design level, the constraints that will be present during the construction phase of the Counterweight rehabilitation.

### *3.1.1 TRUNNION REHABILITATION AND TRAFFIC/PEDESTRIAN REQUIREMENTS*

Public Service and Procurement Canada (PSPC) retained the services of Parsons Corporation (Parsons) in 2019 to conduct a rehabilitation study for the main trunnion bearings, similar to the Counterweight Rehabilitation study being conducted by WSP Canada Inc. (WSP). The Trunnion Rehabilitation concept design (Trunnion Concept Design) proposes a strengthening project to the existing steel members. Parsons notes that there are two (2) options for completing the trunnion strengthening project; in two (2) stages while maintaining a single alternating lane of traffic, or in a single stage with a centre lane of traffic. For the first option, Stage 1 would have work starting on the north side of the bridge while allowing traffic in the south lane, visa versa for Stage 2. During Stage 2, a pedestrian lane would be created as the existing sidewalk on the bridge would need to be removed to access the areas to be repaired.

In addition to the Trunnion Concept Design provided by Parsons, Dillon Consulting prepared a Strategic Transportation Analysis for the Main Trunnion Rehabilitation (Dillon Report). The Dillon Report concluded that "the Alternating Access alternative, where the causeway is reduced to one lane that provides alternating access across the bridge via signals or flaggers, provides the best overall performance", regardless of the completion of the Third Crossing. We have considered what would be best relative to the counterweight repair and then looked at accommodating the requirements for the other project and believe we have a scheme that is sufficiently flexible to allow either of the options required for the Trunnion. Therefore, either option for the trunnion rehabilitation would be in line with the recommendation from this report.

Th main requirements of the Terms of Reference (TOR) for the Counterweight Study, WSP is to ensure that traffic (vehicular and pedestrian) is maintained on the bridge at all times during construction and the Counterweight rehabilitation can take place in parallel with the Trunnion Rehabilitation. This report will detail how those two requirements are will be met and maintained throughout construction.

### *3.1.2 NAVIGATION SEASON*

The rehabilitation option recommended by WSP will render the bridge inoperable, as the Counterweight will be significantly altered during construction. Considering the bridge is located at the entrance to the Rideau Canal, which accommodates a great deal of marine traffic, the bridge must remain operational during the navigation season (approximately May to October). Therefore, the Counterweight Rehabilitation must be completed outside of the navigational season, which gives the contractor approximately 7 months to complete the Counterweight Rehabilitation work. The contractor will potentially need to consider cold weather requirements for the placement of concrete, which would be developed prior to construction.

# 4 REHABILITATION CONCEPTS AND CONSTRUCTION STAGING

The following sections will discuss the proposed Counterweight Rehabilitation concepts and construction staging/sequencing. All details presented in the following sections are at a conceptual design level and will need to be further developed during the detailed design phase.

## 4.1 TRAFFIC MANAGEMENT

As discussed in **Section 3.1.1**, a main requirement from the Counterweight Study TOR is that WSP is to ensure traffic (vehicular and pedestrian) is always maintained during construction. The Counterweight Rehabilitation could be completed with full traffic loading as the Crash Deck System (detailed in **Section 4.2**) could span the entire roadway, however, given the requirements for the Trunnion Rehabilitation, an alternating single lane closure is required. **Drawings S03 and S04** in **Appendix A** show both scenarios for traffic on the bridge; alternating single lane closure and full traffic, respectively. The structural assessment conducted by WSP in the Technical Memo (summarized in **Section 2.3**), analysed the existing structure, with concrete removed from the Counterweight (construction conditions), and determined that for Option 2a, all truss members are capable of supporting all loads likely to be applied to them with full lane loading and when reduced to a single lane. Given Parsons staging requirements for the Trunnion Rehabilitation, all three (3) single lane configurations were considered in the analysis; Lane 1, Lane2, and Centre Lane. Therefore, either rehabilitation option presented by Parsons for the Trunnion Rehabilitation can be implemented when conducting the Counterweight Rehabilitation. To maintain an alternating single lane of traffic, WSP recommends the use of temporary signals or flaggers. **Drawing TCP-1** and **TCP-2** in **Appendix A** detail the traffic management requirements for the Counterweight Rehabilitation in parallel with Stage 1 and Stage 2 of the Trunnion Rehabilitation.

WSP has also accounted for the potential staging of the Trunnion Rehabilitation with respect to pedestrian access. The Crash Deck System to be implemented for the duration of construction will allow safe access for both pedestrians and vehicles. For Stage 1 of the Trunnion Rehabilitation, the existing sidewalk on the south side of the structure will be maintained, while vehicular traffic is travelling in the south lane, as shown in **Drawing TCP-1** in **Appendix A**.

Once the work for Stage 1 is complete, the traffic lane will shift from the south to the north side of the bridge to maintain constant access. Since the walkway on the south side of the bridge will need to be removed for Stage 2, a temporary pedestrian walkway need to be provided. Since the minimum width required for pedestrians is significantly narrower when compared to vehicles, a temporary pedestrian walkway can be created using portion of the south lane of the bridge while work is being done on the south trunnion. The contractor can implement construction fencing to delineate the work area from the pedestrian walkway. For pedestrians to gain access to the south lane, a temporary ramp would be installed, in accordance with the requirements of Accessibility for Ontarians with Disabilities Act (AODA). **Drawing TCP-2** in **Appendix A** details the Stage 2 traffic management system.

## 4.2 TEMPORARY WORKS DURING CONSTRUCTION

As discussed in **Section 3.1.1**., traffic is to remain on the bridge during construction using a one-lane configuration. To ensure this constraint is met, while ensuring public safety during concrete removal operations, WSP is proposing the use of a Crash Deck system throughout construction. The Crash Deck serves multiple purposes throughout construction:

- Safe access to cross for vehicles and pedestrians;
- Debris platform during concrete removals;
- Working platform during placement of dowels, reinforcing steel, formwork, etc.; and

- Falsework to support concrete placement operations.

In addition to the Crash Deck configuration for the staged Trunnion Rehabilitation, **Drawing S04** details a Crash Deck system that could be implemented if the Counterweight Rehabilitation were to occur separately. In this scenario both lanes of traffic could be accommodated during construction. To ensure the feasibility of using a Crash Deck system, WSP conducted a preliminary design for the main structure. The following sections detail the considerations for the preliminary design.

### 4.2.1 LOADING REQUIREMENTS

Given the four purposes for the Crash Deck above, WSP determined the resulting loads from the concrete placement would govern. Loading requirements from the debris removals could be regulated and restricted based on an arbitrary build up of concrete on the platform. For example, a maximum debris accumulation of 150 mm over the entire area of the platform could be implemented to limit loading requirements and to ensure worker safety. Excessive debris accumulation on the platform would create a tripping hazard for workers, therefore, once the maximum debris accumulation is reached, or prior to, debris would be removed from the platform and removals could continue. The contractor should give consideration regarding the surface of the Crash Deck during concrete removals. An energy absorption mechanism or sacrificial surface should be considered to prevent damaged from falling debris. For example, the use of blast mats or a multi-layered wood surface is a possible solution to prevent damage to the main structure of the Crash Deck. Further details regarding specifics on removal procedures would need to be developed by the contractor prior to construction. In addition, WSP recommends that the Crash Deck system be continuously monitored during removal operations to check for any potential damage or overstressing of the Crash Deck Components (footings, tower, steel member, etc.) It is also recommended that the Crash Deck design engineer recertify all components following removals to ensure overall structural stability for concrete placement.

Furthermore, loading requirements from the working platform would be insignificant when compared to the vertical loading from concrete placement. However, consideration will need to be given by the contractor with regards to limiting of the stacking and storing of materials on the platform during construction to prevent an unbalanced platform.

Given the total overall dimensions of the Counterweight, WSP took the approach of designing for a staged concrete placement; stage 1 – lower half and stage 2 – upper half, as shown in **Figure 9** and **Figure 10** below. The approach for concrete placement is preliminary and final concrete placement sequencing will need to be determined during the detailed design phase.

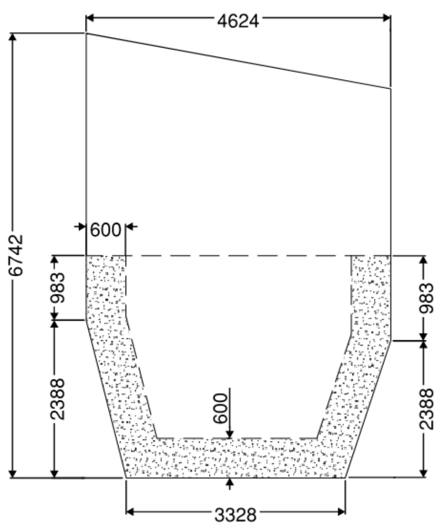



Figure 9: Stage 1 Concrete Placement (Dimension Shown are in mm)

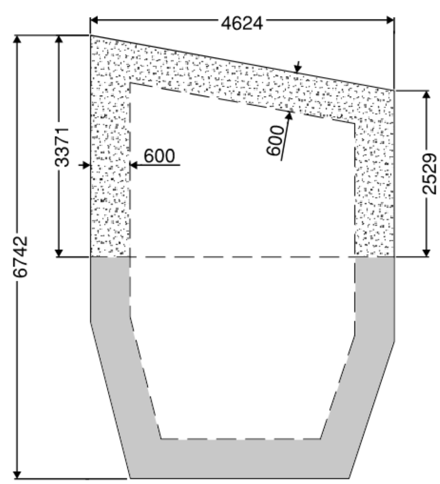



Figure 10: Stage 2 Concrete Placement (Dimensions Shown in mm)

The vertical loading requirements do vary at different locations on the Counterweight, as shown in **Figure 11** below. The concrete pressure along the perimeter of the Counterweight govern, as the depth of concrete significantly increases.

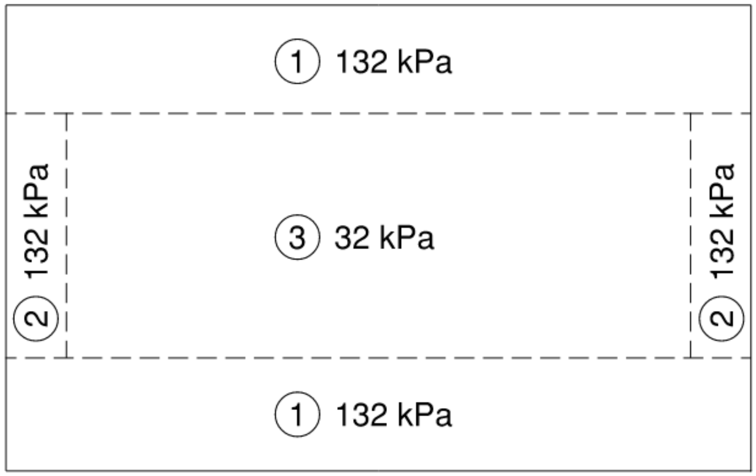



**Figure 11: Loading Requirements Shown in Plan View of Counterweight (Loading includes Dead Load, Live Load and Concrete Pressure)**

### 4.2.2 CRASH DECK DESIGN

The preliminary design of the Crash Deck was done to ensure general feasibility and member sizing. **Drawings S03 and S04** in **Appendix A** show preliminary design of the Crash Deck, including placement, dimensions, and members used. The Crash Deck design assumed the use of spread footings to support the loads from concrete placement. Further geotechnical investigation and assessment is required prior to the design of the temporary works such that maximum allowable bearing pressure is determined, which the spread footings will need to be designed to. Additionally, the contractor should also perform an investigation to determine what underground utilities, specifically very important Bell Canada cables, are present within the construction area. This may impact the required footing size and/or maximum allowable bearing capacity. Considering the design provided by WSP is preliminary, all current details and remaining details, such as hoarding, member connections, etc. will need to be designed/confirmed by the contractor prior to construction.

## 4.3 REMOVALS

Once the traffic control and temporary works are in place, the contractor may begin removal operations. As there are various components of the Counterweight, consideration needs to be given to the sequence of removals of the various components prior to the removal of concrete. The following section present a possible sequence of removals at the conceptual design level, all details will need to be confirmed by the contractor prior to construction.

### 4.3.1 INTERIM REPAIR

The Interim Repair, which was installed in May 2021, was initiated by PSPC in response to the potential safety risk to the public from delaminated concrete on the bottom face of the Counterweight. The Interim Repair consists of debris netting that is secured to the Counterweight with wire ropes. HSS pipes were also installed at the corners of the Counterweight to protect the wire ropes from fraying due to possible sharp edges. The Contract Drawings for the Interim Repair can be found in **Appendix B**.

As shown in the Contract Drawing, the contractor will need to carefully plan the removals of the Interim Repair components as there are full length HSS pipes installed at the corners of the Counterweight. The contractor will need to ensure that the HSS pipes are secured/supported prior to the removal of the wire ropes, as the HSS pipe will create a safety concern if it falls to the platform below.

The main function of the Interim Repair was to prevent any delaminated concrete from falling to the roadway below, as the netting and wire ropes were designed to support large pieces of concrete, approximately 600 mm thick. Therefore, the contractor will need to conduct a preliminary inspection of the Interim Repair and Counterweight to determine if any delaminated concrete pieces detached from the Counterweight since the implementation of the Interim Repair. If the netting and wire ropes are supporting large pieces of concrete, the contractor will need to adjust their removal procedure accordingly.

### *4.3.2 STEEL CLADDING*

Once the Interim Repair has been removed, the contractor may begin to remove the steel cladding that encases the Counterweight. Removal of the steel cladding has been an issue in past projects as it was required to be reinstalled following the inspection, however, as part of the recommended repair Option 2a, WSP does not recommend the cladding be reinstalled. Therefore, if PSPC does not require the cladding for other projects, the contractor may proceed knowing the cladding is to be disposed of.

The contractor should also be aware that concrete rubble collects on the bottom cladding panels, which would typically fall to the ground below. **Figure 12** below shows the condition of the bottom face of the Counterweight and cladding during the most recent field investigation conducted by WSP in October 2020.

**Figure 12: Typical Condition of the Counterweight Bottom Face and Cladding**

### *4.3.3 MISCELLANEOUS STEEL*

Once all the cladding has been removed from the Counterweight, all of the miscellaneous steel members can be removed, including the four (4) access hatches on the Top Face and the two (2) doors on the East Face. The miscellaneous steel members are those that the steel cladding was anchored to, which consist of various lightweight steel and structural steel members. **Figure 13** below show and example of these steel members, while **Figure 14** and **Figure 15** show the hatches on the top face and east face, respectively.

Figure 13: Cladding Support Steel – West Face Shown

Figure 14: Access Hatches on Top Face

Figure 15: Steel Doors on East Face

Replacement of the cladding support members is not required based on the recommended rehabilitation option, however, the access hatches on the top face and east face will be replaced in kind. While the east face access hatches/voids were empty at the time of the field investigation, the top face access hatches contained concrete blocks, which are used to add weight to the Counterweight and various pieces of steel. Since the balancing analysis was conducted based on the existing weight of the Counterweight, which includes: the cladding, steel support member and balance blocks located in the top face access hatches, the contractor should record the following:

- Weight of cladding removed from each face;
- Weight and location of cladding support steel removed from each face;

- Weight and location of balance blocks or any other materials within the top face access hatches; and
- Weight of east face doors and framing steel.

The above information is relevant when conducting a final balancing analysis of the Counterweight during the detailed design phase, as placement of blocks and other miscellaneous items will change the overall centre of gravity of the Counterweight.

### 4.3.4 CONCRETE REMOVALS

The main premise of recommended repair Option 2a is the partial removal and replacement of the concrete Counterweight in kind. As discussed in the Technical Memo, the outer 300 mm of concrete is severely deteriorated. At a minimum, an additional 300 mm of concrete is to be removed, beyond the initial concrete removals; for a minimum removal depth of 600 mm. This removal depth was recommended by WSP to ensure the deteriorated concrete is removed and sound concrete remains, and there would be sufficient working space for the subsequent installation of reinforcing steel. Additional removals may be required if sound concrete is not reached and will need to be tracked by the contractor to ensure final design requirements are met.

To conduct the removals, WSP recommends the use of a hydro demolition system: a high-pressure water spray used to remove concrete from the Counterweight. This removal method would saturate and clean the surface of the concrete ask work progressed. More importantly, given the presence of cracked concrete, hydro demolition would not extend existing cracks or create new cracking at the surface. Unlike a more traditional method of concrete removal like chipping, which could create micro cracking or increase cracking size of the concrete. However, there are possible drawbacks from this method, the contractor would most likely need to sub-contract this work, and they would have to ensure the debris and run-off are properly contained, as there will be constant traffic below. Cost will also be a major factor, as the hydro demolition may come with a premium.

Hydro demolition may also be extremely beneficial when exposing the Embedded Truss members, specifically those of Girder F on the Top Face. During the field investigation it was noted that the Girder F steel members exposed within the access hatches exhibited advanced deterioration, as shown in **Figure 16** below.

During the design phase, the sequence of concrete removals will need to be further developed. As discussed in the Technical Memo, the removal sequence will have to consider how the connection between the concrete and the steel are affected by the removals and where the members are exposed, the loading considerations will have to be managed. While a preliminary sequence has been considered, it will be required during the detailed design to investigation potential load support and sequence of replacement.

**Figure 16: Exposed Structural Steel within Top Face Access Hatches (Member from Girder F Shown)**

Once all concrete removals are complete, the contractor will need to conduct a survey of the remaining concrete to determine the exact extent of removals. This information will be used to conduct a final structural assessment and balancing analysis for the bridge and Counterweight.

# 4.4 STRUCTURAL STEEL

## 4.4.1 GIRDER F

Once all the concrete has been removed from the top face, it is recommended the designer assess the condition of the Girder F structural steel members. These members are exposed inside of the access hatches on the top face of the Counterweight and were noted to have severe deterioration during the field investigation. Once exposed, their actual deterioration and section loss can be measured to determine the appropriate course of action.

Potential options to consider are as follows:

- Cleaning the existing surface to remove accumulated rust;
- Blasting and coating of surface;
- Use of an appropriate type of cathodic protection system to prevent further deterioration; and
- Installation of additional steel for strengthening.

## 4.4.2 STEEL PLATES

The current arrangement of the Counterweight has steel plates anchored to the North and South faces of the Counterweight. As part of Option 2a, the concrete inside of those plates will be removed, therefore, the steel plates will need to be supported by the Crash Deck system. Once the interior of the plates is exposed, the surface of the steel should be assessed to determine if any action is required for repair or protection. These details would need to be confirmed during the construction phase.

# 4.5 REPLACEMENT OF CONCRETE

Replacement of concrete and access hatches for the rehabilitation was assumed to be done in kind to the existing Counterweight, for simplicity when conducting the structural assessment and balancing analysis. Other concrete configurations are possible, however, changing the configuration of the concrete Counterweight for a structure that is over 100 years old is not recommended. Further analysis beyond balancing would need to be considered, such the adequacy of the existing mechanical and electrical components, which is beyond the current scope of this project. The following sections maintain the assumption of a replacement in kind approach, while discussing items that will need to be taken into consideration and further developed during the detailed design phases of the project.

## 4.5.1 DESIGN CRITERIA/DESIGN LOADS/CONCEPT DESIGN

The 600 mm concrete replacement was design as a ‘shell’ using the Canadian Highway Bridge Design Code (CSA S6-19). To ensure the feasibility of the recommended rehabilitation option, the concrete shell was design to support its own self weight and approximately half of the remaining concrete core in the event that it breaks off: a conservative approach given that the existing Embedded Truss members and reinforcing steel would adequately support the concrete that remains. This assumption was applied to both the open and closed positions. **Figure 17** demonstrates the two orientations for which the shell was designed

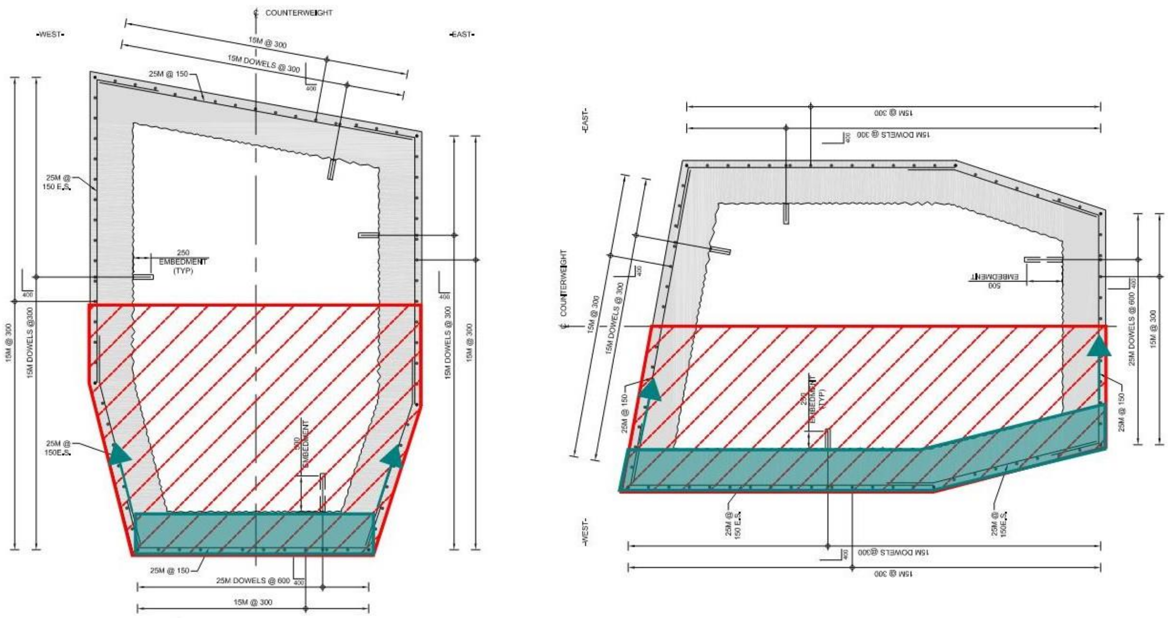


Figure 17: Concrete Shell Designed for Two Orientations

In each orientation the 600 mm thickening was designed as a simply supported beam which carries its own weight as well as the bottom half of the existing Counterweight concrete. The vertical bars which run perpendicular to the beam were designed as ties which carry the full reactions from the beam, neglecting the capacity of the dowels. The dowels were designed for pullout and shear using the Hilti manual pullout/shear resistances and spacing reduction factors. Dowels on the bottom were designed to resist pullout due to the self-weight of the 600 mm repair, while the dowels on the sides were designed to support the beam reactions, neglecting the capacity of the vertical ties.

It was determined that the only load acting on the repair is dead load, so a load factor of 1.20 was applied to all dead loads per the S6-19 load combinations B1 to B4 for movable bridges. An additional factor of 1.20 was also applied to the loads to account for the dynamic effect of all members that are in motion when operating the bridge as per Table 13.2 of CSA S6-19. Based on these loading assumptions, the 600 mm shell was designed with 25M bars spaced at 150 mm for the beam reinforcement and tension ties, 15M dowels spaced at 300 mm in both directions with an embedment depth of 250 mm, and 15M bars spaced at 300 mm for crack control and confinement of the 25M bars. The bottom dowels were specified to be 25M dowels spaced at 600 mm in both directions with an embedment depth of 500 mm.

There is a concern regarding accessibility for the installation of the bottom dowels. Worker safety and space limitations will need to be considered and coordinated between the contractor and designer prior to implementation as readjustment of the Crash Deck following removal operations may not be feasible. The bottom dowels were designed to be larger and spaced further apart to reduce the number of dowels that will need to be installed on the bottom face. Accessibility for the installation of the bottom dowels will need to be considered in the detailed design.

Lastly, the design of the concrete shell reinforcing steel and dowel size/embedment/spacing is preliminary and will need to be refined or confirmed during detailed design. A potential sequence for reinforcement installation and concrete placement was considered in the preliminary design but will need to be further examined and developed in the detailed design phase.

## 4.5.2 REINFORCED CONCRETE

The following sections present specific items that will need to be further developed during the preliminary design and detailed design phases with respect to the existing concrete and the concrete to be placed.

### 4.5.2.1 CONNECTING NEW CONCRETE TO EXISTING CONCRETE

As previously noted above, the existing concrete is over 100 years old, and since it was placed, concrete mix designs have changed significantly. When considering the interaction and connection between the two concrete mixes, the contractor will need to carefully consider the surface preparation of the existing concrete. Based on experience, WSP recommends that wet burlap is used to dampen the existing concrete for at least 24 hours prior to concrete placement. While the use of bonding agents occurs throughout concrete construction, WSP does not recommend the use of a bonding agent for this project. If not properly prepared, the bonding agent can act as a bond breaker, rather than a bonding agent.

Furthermore, a structural connection between the two surfaces is recommended, given the dynamic nature of the Counterweight. It is recommended that epoxy dowels be installed into all faces of the remaining concrete, **Section 4.5.1** above provides preliminary details for dowel embedment and spacing..

### 4.5.2.2 CLASS OF CONCRETE

As extensively noted throughout the field investigation and as shown in **Figure 18** below, the existing concrete is in very poor condition, showing severe signs of freeze-thaw damage and reinforcing corrosion, which has resulted in severe delamination, spalling, and cracking.

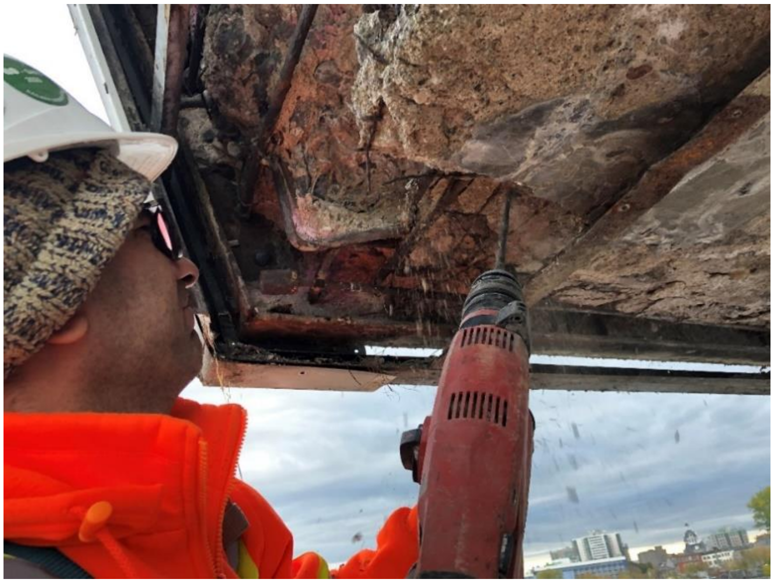


**Figure 18: Existing Concrete Counterweight Conditions (Bottom Face Shown)**

For the replacement of concrete, WSP is recommending that a CSA A23.1-19 Class C1 concrete be used, which is for use as a structurally reinforced concrete exposed to chlorides with or without freeze-thaw conditions. This will provide adequate strength and stability to protect both the remaining existing concrete and the new concrete to be placed.

### 4.5.2.3 DENSITY OF CONCRETE

The concrete cores removed from the Counterweight during the field investigation were documented and tested in a lab for compression strength and density. The concrete density results varied from approximately 20.9 kN/m$^3$ to 23.9 kN/m$^3$, with an average density of 22.5 kN/m$^3$. For the structural assessment, the analysis was conducted using a final concrete density of both 22.5 kN/m$^3$ and 24 kN/m$^3$. The former was used to match the existing average density, while the latter was used as maximum value, as modern normal density concrete is 24 kN/m$^3$. Additionally, the balancing analysis was completed using the maximum density value of 24 kN/m$^3$. At this stage in the design process, WSP is recommending consideration be given to using structural lightweight concrete to match the existing concrete density. Maintaining the original weight of the Counterweight would be an advantage, as it would keep the status quo with regards to balancing and the operation of the mechanical and electrical components. However, WSP does recognize there may be other advantages of using a normal density concrete, such as overall strength and stability.

To determine if the use of structural lightweight concrete would be the most effective approach for the replacement, further development of the structural assessment is required, as stated in the Technical Memo. Even though it was noted that the Demand/Capacity values for both conditions (final density of 22.5 kN/m$^3$ or 24 kN/m$^3$) exceeded 1.0, it was evident that with some mild reinforcement and reasonable connections to the Counterweight Truss directly from the concrete that the internal forces and loading within the Embedded Truss do not govern. If the less favourable assumptions are assumed and more demand is put on the internal steel, the members can be managed. If it is shown that D/C values exceed 1 for a concrete density of 24 kN/m$^3$, but not for a density of 22.5 kN/m$^3$, a structural lightweight concrete is preferable.

#### 4.5.2.4 *REINFORCING STEEL*

WSP recommends the use of a premium reinforcing for the rehabilitation. Despite the increased cost of using stainless steel reinforcing bars instead of regular black reinforcing, there are significant advantages to using stainless steel. The main advantage of using the premium reinforcing bars is resistance to corrosion. As noted during the field investigation, the reinforcing steel that was exposed near the surface of the Counterweight had severe deterioration and section less, as it was black reinforcing steel. Secondly, the stainless steel will provide increase strength when compared to regular reinforcing steel; approximately 25% more bending and shear strength.

#### 4.5.2.5 *INJECTION OF CRACKS*

Further analysis of the concrete cores and the core holes showed the presence of cracked concrete throughout the Counterweight, especially in the openings. WSP is recommending that an epoxy be injected into the cracks that remain after the removal of concrete, specifically on the top face and east face, where the voids are present. Additionally, all areas with excessive cracking should be injected as well. By sealing the cracks within the Counterweight, the internal structural steel will be further protected, in addition to maintaining the structural integrity of the existing concrete following removals and providing a structural bond between the cracks.

### 4.5.3 *OTHER CONSIDERATIONS*

Considering the current deterioration and corrosion of the concrete, protection of the new concrete from indirect salt spay should be considered during detailed design using a cathodic protection system. Cathodic protection is one of many techniques used to control corrosion in new and existing concrete structures. Simply speaking, cathodic protection consists of polarizing the rebar source to a cathodic potential whereby anodic dissolution is minimized. The process is achieved using a DC current source to create an electrochemical cell between the reinforcing steel (cathodic region) and a sacrificial anode (i.e. zinc) placed on or below the concrete surface. If corrosion is to initiate on the surface of the reinforcing steel, the anode will be sacrificed before the steel initiates corrosion.

The installation of cathodic protection on the Kingston Bascule Bridge would help alleviate and minimize long term corrosion, which is likely to occur due to the presence of chlorides (i.e. rock salts) and/or carbonation.

# 5 COST ESTIMATE

The Class 'D' cost estimate to carry out the work for the Counterweight Rehabilitation in this report is estimated at $3.2M. The cost estimate is based on 2021 construction prices, includes a 30% contingency allowance, and excludes HST. A detailed cost breakdown of the work items and associated costs are provided below in **Table 1.**

**Table 1: Class 'D' Cost Estimate**

| **LaSalle Causeway Bascule Bridge**<br>**Counterweight Rehabilitaion** | | | | | |
|---|---|---|---|---|---|
| **CLASS 'D' COST ESTIMATE** | | | | | |
| **Item No.** | **Description** | **Unit** | **Qty.** | **Unit Bid Price** | **Total Bid Price** |
| **PART A: GENERAL** | | | | | |
| 1 | Mobilization/Demobilization | LS | 1 | $ 50,000.00 | $ 50,000.00 |
| 2 | Traffic Control | LS | 1 | $ 200,000.00 | $ 200,000.00 |
| 3 | Work Platform (Scaffold/Crash Deck) | LS | 1 | $ 400,000.00 | $ 400,000.00 |
| 4 | Environmental Protection | LS | 1 | $ 25,000.00 | $ 25,000.00 |
| 5 | Roadway Protection | LS | 1 | $ 50,000.00 | $ 50,000.00 |
| 6 | Localized Removal of Traffic and Pedestrian Railing | LS | 1 | $ 25,000.00 | $ 25,000.00 |
| 7 | Temporary Sidewalk & Accessibility Ramps | LS | 1 | $ 20,000.00 | $ 20,000.00 |
| **Subtotal - PART A** | | | | | $ 770,000.00 |
| **PART B: STRUCTURAL** | | | | | |
| 8 | Concrete Removal | m3 | 105 | $ 3,500.00 | $ 367,500.00 |
| 9 | Concrete Placement | m3 | 105 | $ 5,000.00 | $ 525,000.00 |
| 10 | Dowels | LS | 1 | $ 150,000.00 | $ 150,000.00 |
| 11 | Stainless Steel Rebar | T | 10 | $ 15,000.00 | $ 150,000.00 |
| 12 | Structural Steel (Sandblasting and Priming) | LS | 1 | $ 125,000.00 | $ 125,000.00 |
| 13 | Hatches | EA | 6 | $ 25,000.00 | $ 150,000.00 |
| 14 | Heating and Hoarding for Cold Weather Work | LS | 1 | $ 200,000.00 | $ 200,000.00 |
| **Subtotal - PART B** | | | | | $ 1,667,500.00 |
| **Subtotal – PART A to B (excluding HST)** | | | | | $ 2,437,500.00 |
| **Contingency 30%** | | | | | $ 731,250.00 |
| **ROUNDED TOTAL** (Rounded to nearest $100k) | | | | | **$ 3,200,000.00** |

# 6 CONSTRUCTION SCHEDULE

The construction schedule below outlines a preliminary anticipated construction schedule for the Counterweight Rehabilitation. It was assumed the work would take place during the navigational shutdown period. In 2020, the navigation period closed on Thanksgiving Weekend (October 13, 2020) and was scheduled to reopen on Victoria Day Weekend (May 21, 2021). Unfortunately, due to COVID-19, the navigational opening was delayed until May 28, 2021. For the purposes of this report, it is assumed that navigational close/open dates will occur as regularly scheduled.

## Table 2: Construction Schedule

| Task | Decription | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 31 | 32 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Year | Year 1 | | | | | | | | | | | Year 2 | | | | | | | | | | | | | | | | | | | | | |
| | | Month | October | | November | | | | | December | | | | January | | | | | February | | | | March | | | | April | | | | May | | | | |
| | | Week | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | | 31 | 32 |
| | ***Mobilization*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Mobilize to site and set up construction staging and storage areas | | ■ | | | | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | Navigational Opening (Victoria Day Weekend) | | |
| 2 | Install Crash Deck system and hoarding | | | ■ | ■ | | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Install Environmental Protection Systems | | | ■ | ■ | | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Install traffic management systems for vehicles, cyclists and pedestrians | | | | ■ | | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| | ***Removals*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Removal of Interim Repair | | | | | ■ | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Removal of Steel Cladding | | | | | ■ | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Removal of Miscellaneous Steel Items | | | | | ■ | ■ | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Removal of Concrete | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| | ***Investigations*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | Investigate condition of exposed structural steel members | | | | | | | | ■ | | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 10 | Investigate condition of steel plates on East and West Faces | | | | | | | | | ■ | | | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| 11 | Determine total volume of concrete removals | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | Christmas Break | | | | | | | | | | | | | | | | | | | | | | |
| | ***Reinstatement of Concrete and Access Hatches/Doors*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | Perform potential repairs to structural steel | | | | | | | | | | | | Christmas Break | | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| 13 | Perform potential repairs to steel plates on East and West faces | | | | | | | | | | | | Christmas Break | | | ■ | ■ | | | | | | | | | | | | | | | | | | |
| 14 | Grouting of cracks | | | | | | | | | | | | Christmas Break | | | | ■ | ■ | | | | | | | | | | | | | | | | | |
| 15 | Installation of reinforcing steel and dowels for pour #1 | | | | | | | | | | | | Christmas Break | | | | | ■ | ■ | ■ | | | | | | | | | | | | | | | |
| 16 | Installation of formwork for pour #1 | | | | | | | | | | | | Christmas Break | | | | | | ■ | ■ | ■ | | | | | | | | | | | | | | |
| 17 | Placement of concrete for pour #1 | | | | | | | | | | | | Christmas Break | | | | | | | | ■ | | | | | | | | | | | | | | |
| 18 | Curing of concrete for pour #1 | | | | | | | | | | | | Christmas Break | | | | | | | | ■ | ■ | | | | | | | | | | | | | |
| 19 | Installation of reinforcing steel and dowelsfor pour #2 | | | | | | | | | | | | Christmas Break | | | | | | | | | | ■ | ■ | ■ | | | | | | | | | | |
| 20 | Installation of formwork for pour #2 | | | | | | | | | | | | Christmas Break | | | | | | | | | | | ■ | ■ | ■ | | | | | | | | | |
| 21 | Placement of concrete for pour #2 | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | ■ | | | | | | | | | |
| 22 | Curing of concrete for pour #2 | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | ■ | ■ | | | | | | | | |
| | ***Commissioning*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 23 | Removal of formwork and general site clean up | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | | ■ | | | | | | | | |
| 24 | Removal of Crash Deck System | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | | ■ | ■ | | | | | | | |
| 25 | Commissioning of bridge to ensure proper operation | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | | | |
| | ***Demobilization*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 26 | Removal of Traffic Management Systems | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | ■ | | | |
| 27 | General site demobolization | | | | | | | | | | | | Christmas Break | | | | | | | | | | | | | | | | | | | ■ | | ■ | |

# APPENDIX

# A

## CONCEPTUAL DESIGN DRAWINGS

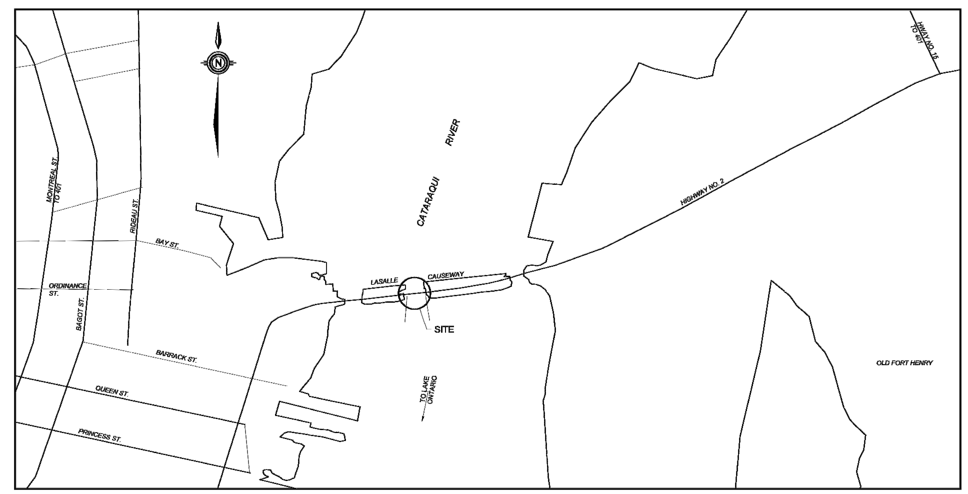
LIST OF DRAWINGS



2021

KINGSTON ONTARIO

# LASALLE CAUSEWAY BASCULE BRIDGE - CONCEPTUAL DESIGN DRAWINGS




KEY PLAN / PLAN CLÉ

Public Services and Procurement Canada

Services Publics et Approvisionnement Canada

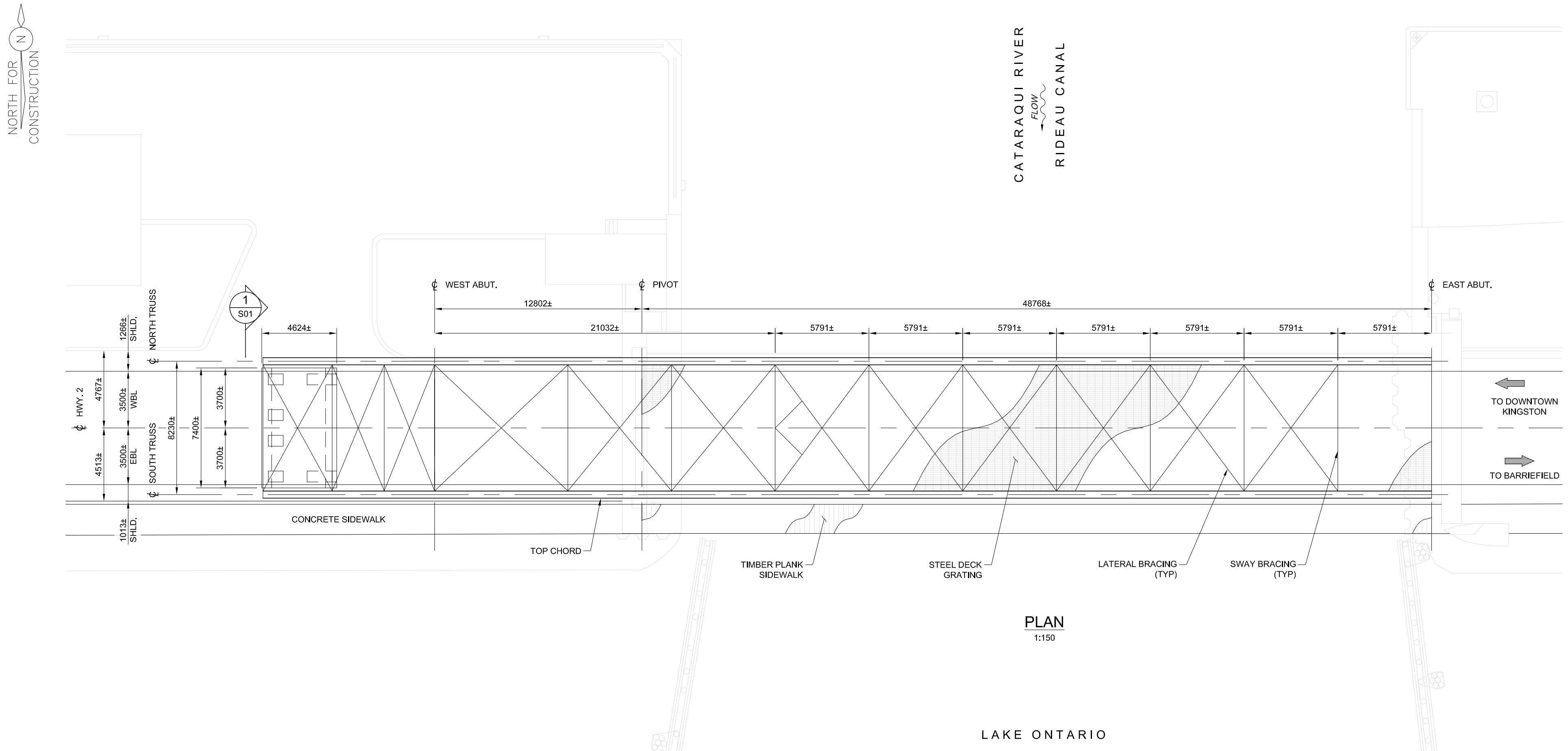
PROJECT
PROJET
R.108246.001

ISSUED FOR CONCEPTUAL REVIEW
2021/06/__

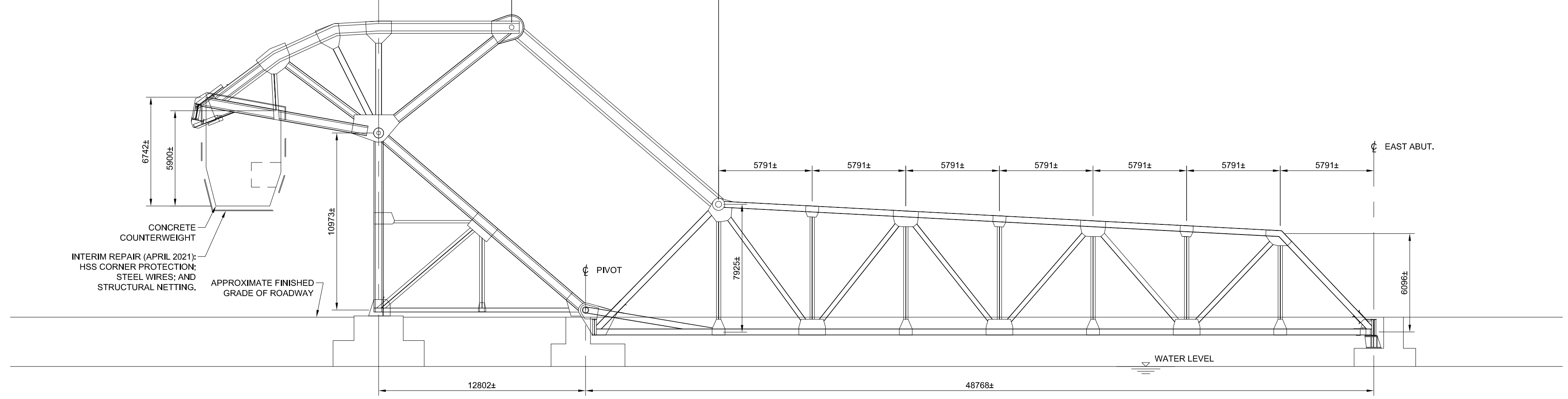
CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\003 rehabilitation\20M-01325-00-003-000_COVER.dwg
MODIFIED: 6/24/2021 6:51:07 PM BY: REESEB
DATE PLOTTED: 6/25/2021 4:15:43 PM BY: REESEB

**NOTES:**

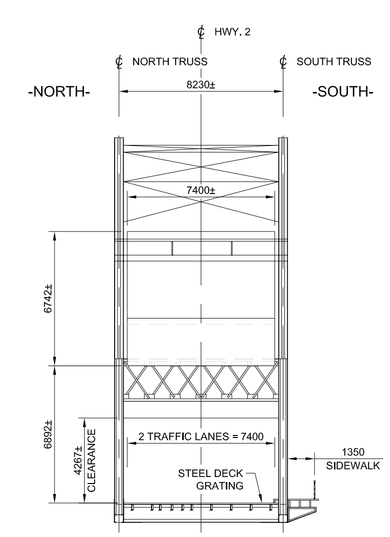
1. SEE DRAWING S02 FOR NOTES.
2. DO NOT SCALE DRAWINGS.
3. DRAWINGS ARE PRESENTED FOR CONCEPTUAL DESIGN REVIEW ONLY.




PLAN
1:150




ELEVATION
1:150




SECTION 1 / S01
1:150

Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region

Services Publics et Approvisionnement Canada
Services d'architecture et de génie
Région de l'Ontario

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Do not scale drawings.
Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

Ne pas mettre à l'echelle les plans.
Vérifier les dimensions et conditions sur le site et en aviser l'ingenieur immédiatement de tous divergence.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – CONCEPTUAL DESIGN DRAWINGS

drawing title / titre du dessin
GENERAL ARRANGEMENT

drawn by / dessine par: B.REESE

designed by / conc par: Z. BROTH

approved by / approuve par: M. MANSFIELD

tender / soumission

project manager / administrateur de projets

project date / date du projet: 2021/06/XX

project no. / no. du projet: R.108246.001

drawing no. / dessine no.: S01

CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\003 rehabilitation\20M-01325-00-003-001_GA.dwg
MODIFIED: 6/24/2021 6:51:24 PM BY: REESEB
DATE PLOTTED: 6/25/2021 4:16:10 PM BY: REESEB

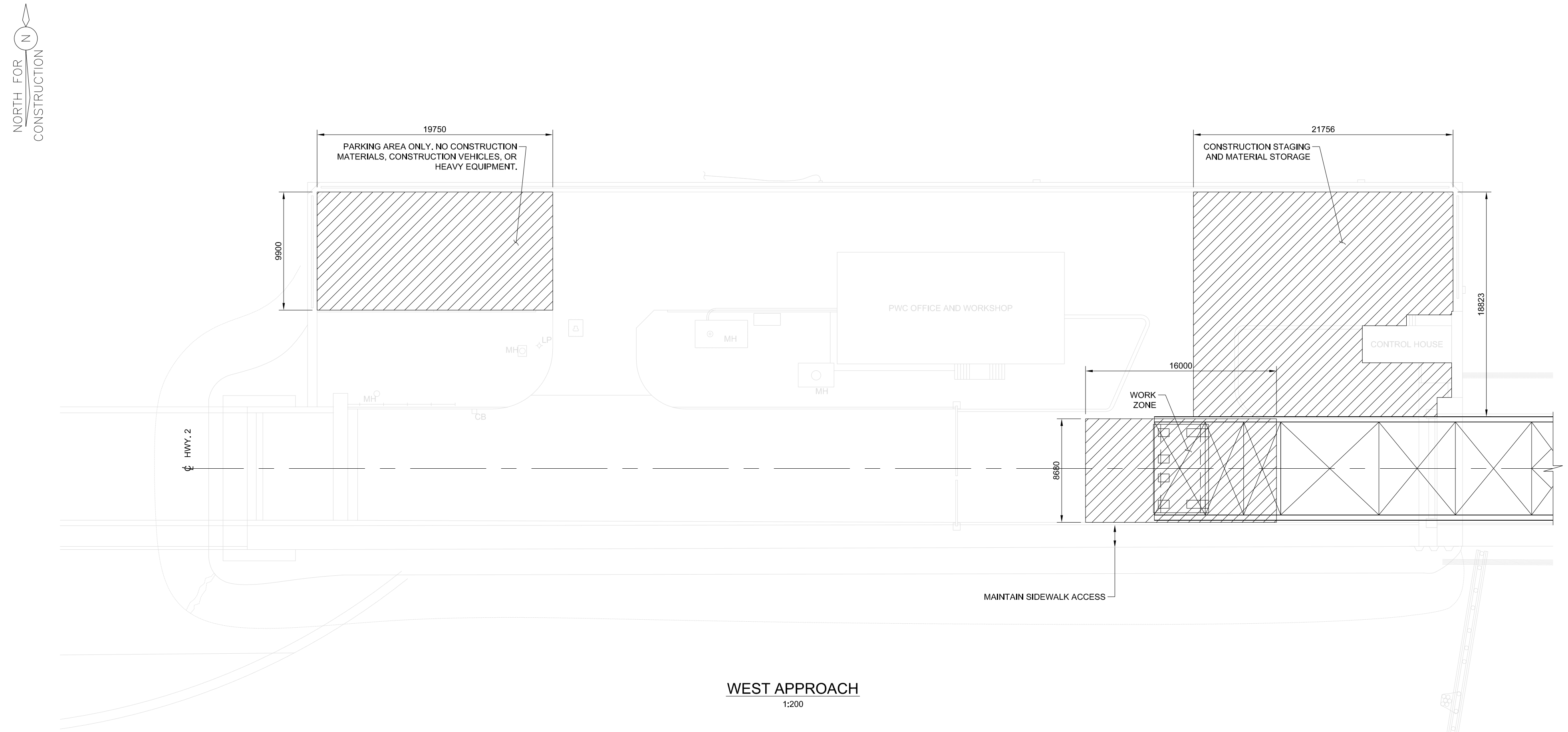
GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:

NOTES:

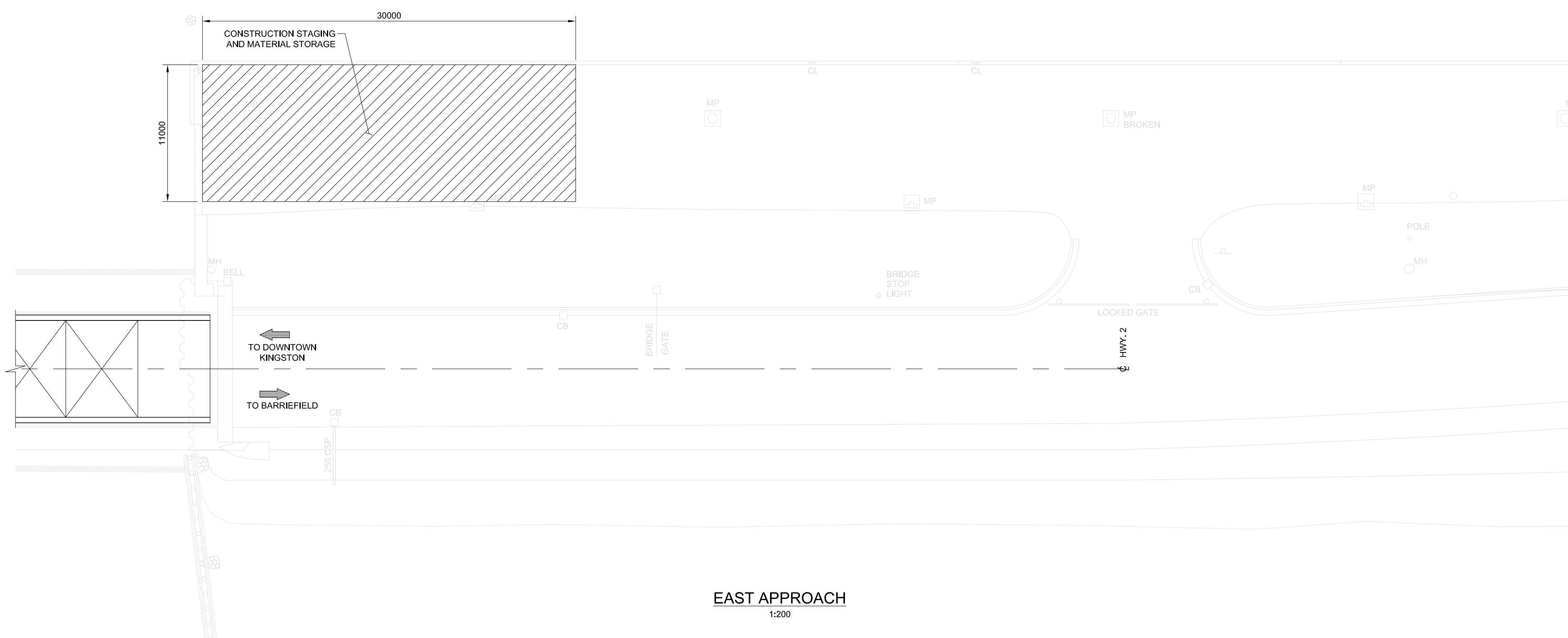
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWINGS S01 AND S02.
2. CONTRACTOR SHALL ENSURE STAGING AREA IS REINSTATED TO ORIGINAL CONDITIONS UPON PROJECT COMPLETION.

LEGEND:

WORK ZONE




WEST APPROACH
1:200




EAST APPROACH
1:200

Public Services and Procurement Canada
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B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – CONCEPTUAL DESIGN DRAWINGS

drawing title / titre du dessin
CONSTRUCTION STAGING

drawn by / dessine par: B.REESE

designed by / conc par: Z. BROTH

approved by / approuve par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/06/XX

project no. / no. du projet: R.108246.001

drawing no. / dessine no.: S02

CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\003 rehabilitation\20M-01325-00-003-002_CONSTRUCTION_STAGING.dwg
MODIFIED: 6/24/2021 6:51:44 PM BY: REESEB
DATE PLOTTED: 6/25/2021 4:16:32 PM BY: REESEB

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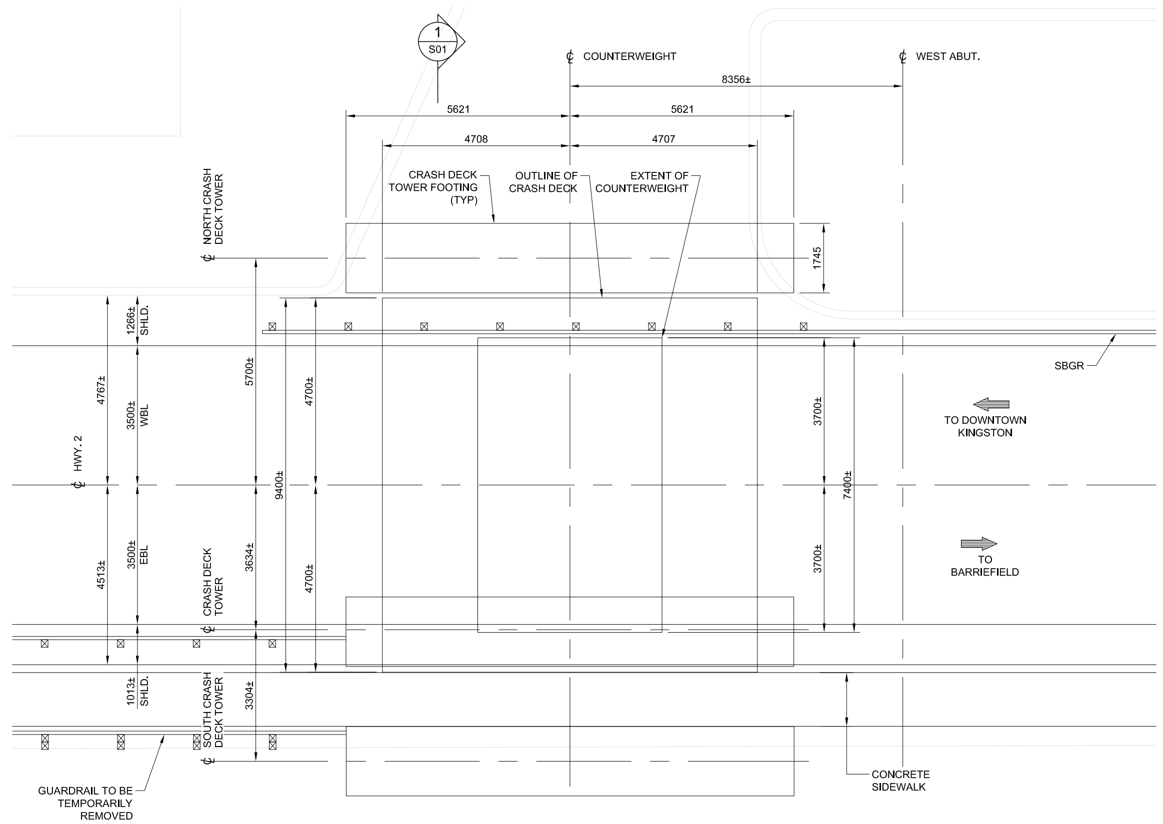
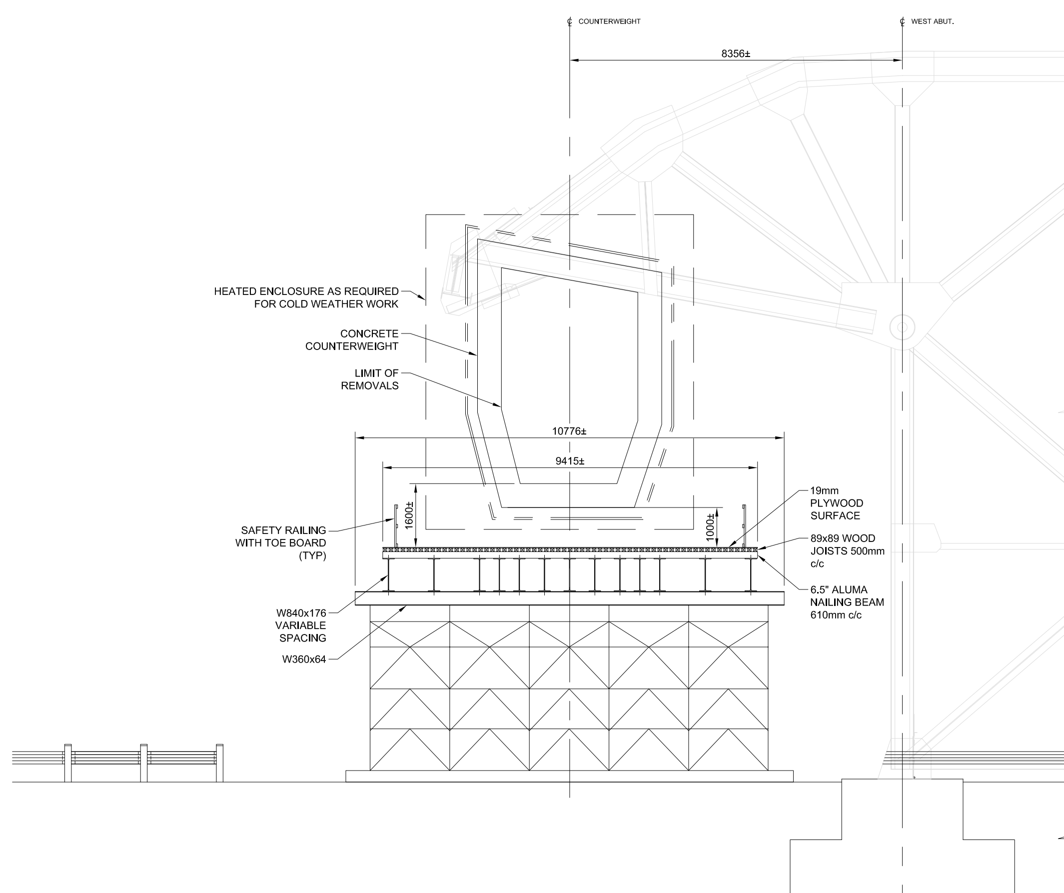
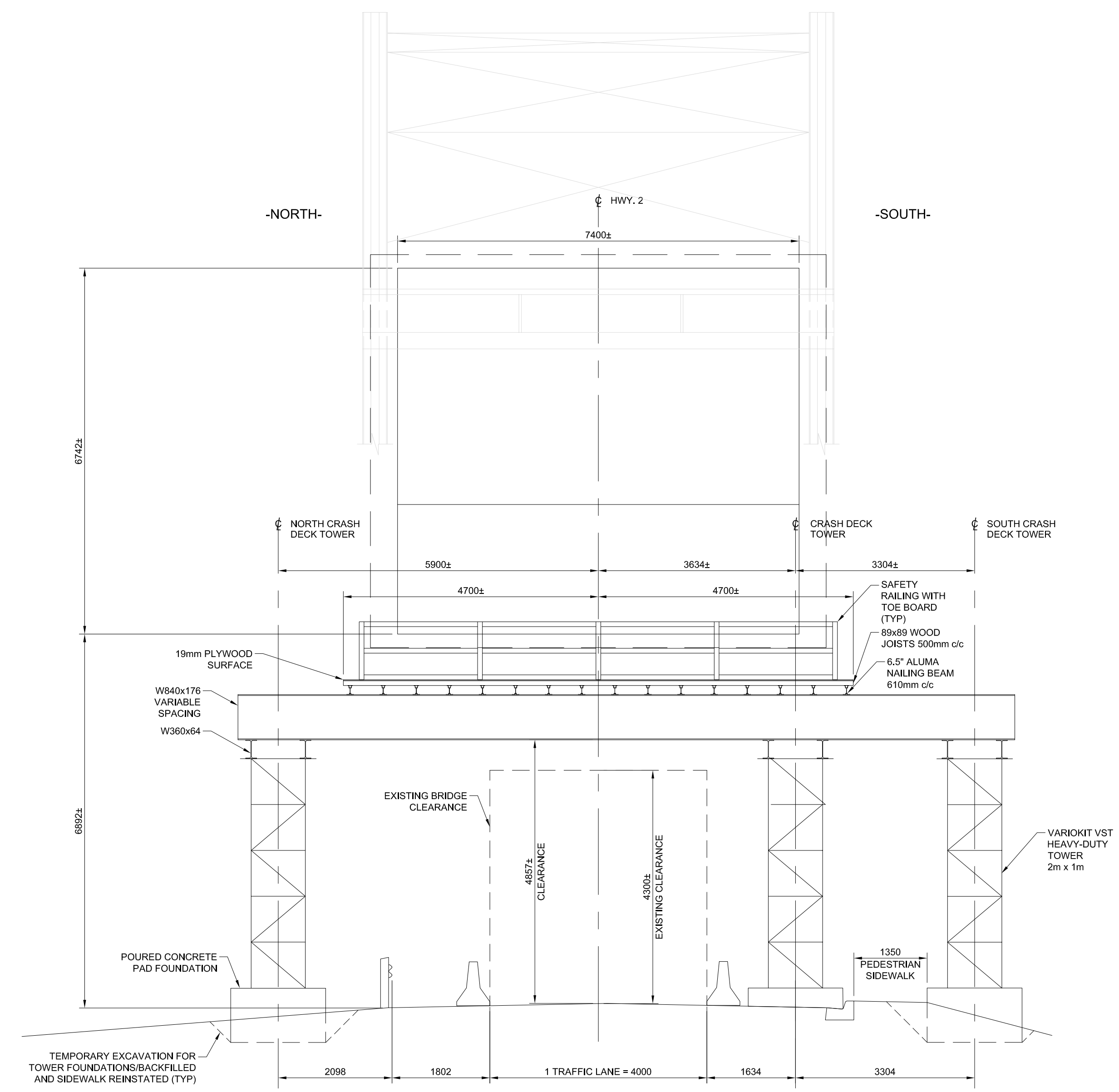



PLAN
1:75 BRIDGE TRUSS NOT SHOWN FOR CLARITY.




ELEVATION
1:75




SECTION 1/S01
1:50

Public Services and Procurement Canada
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Services Publics et Approvisionnement Canada
Services d'architecture et de génie
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A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

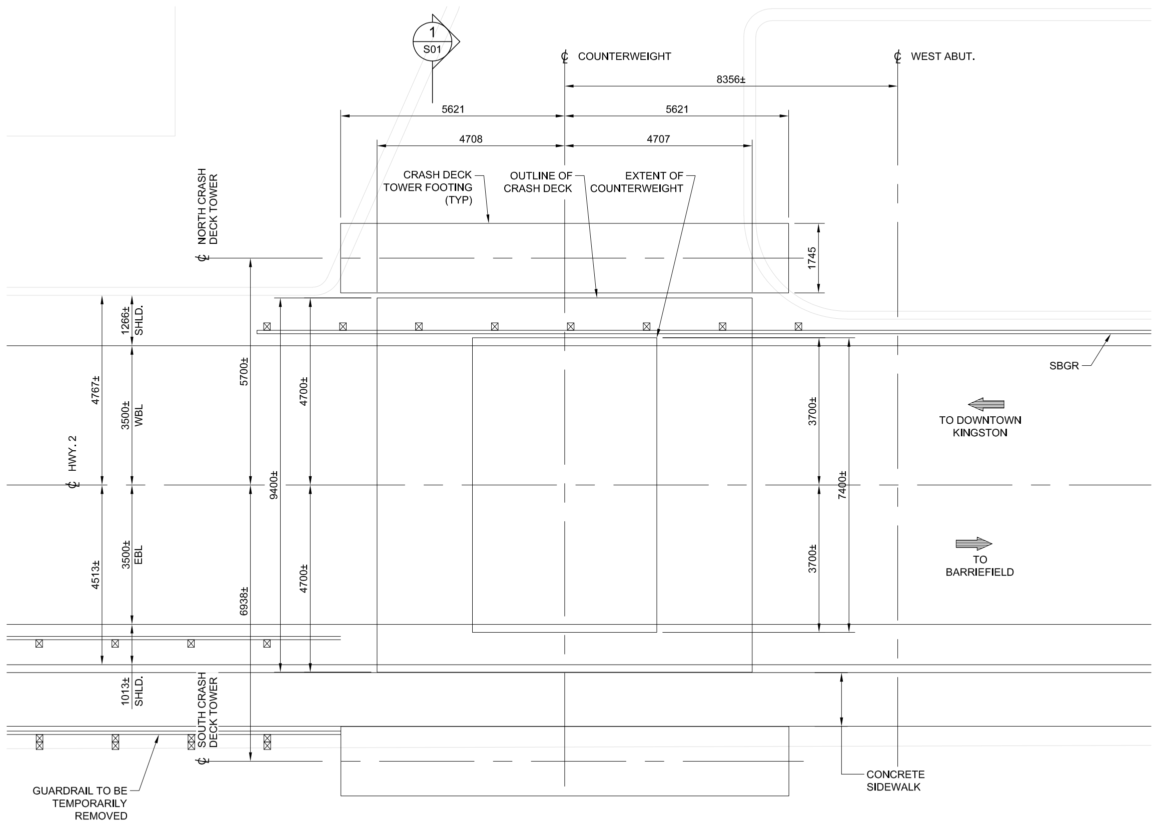
project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – CONCEPTUAL DESIGN DRAWINGS

drawing title / titre du dessin
TEMPORARY WORKS – OPTION 1

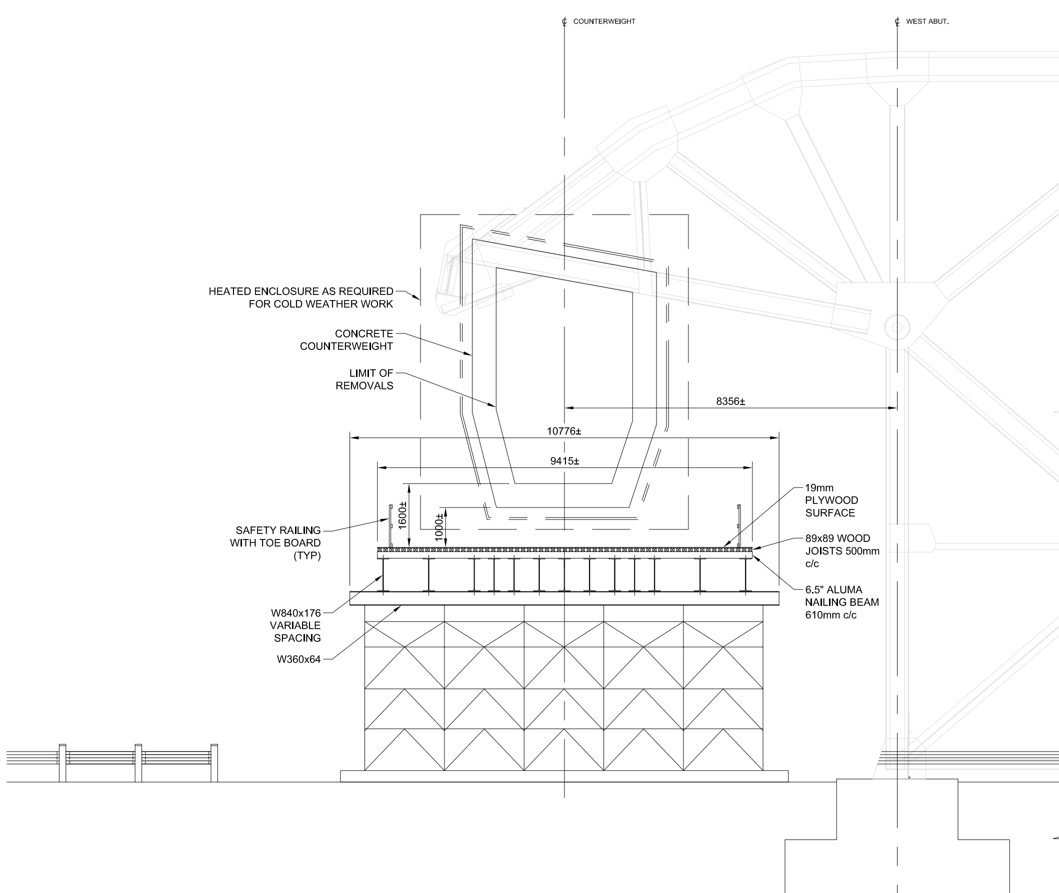
drawn by / dessiné par: B. REESE
designed by / conc par: Z. BROTH
approved by / approuvé par: M. MANSFIELD
tender / soumission
project manager / administrateur de projets
project date / date du projet: 2021/06/XX
project no. / no. du projet: R.108246.001
drawing no. / dessin no.: S03

CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\003 rehabilitation\20M-01325-00-003_TEMPORARY_WORKS_OPTION_1.dwg
MODIFIED: 6/25/2021 1:58:20 PM BY: REESEB
DATE PLOTTED: 6/25/2021 4:21:12 PM BY: REESEB

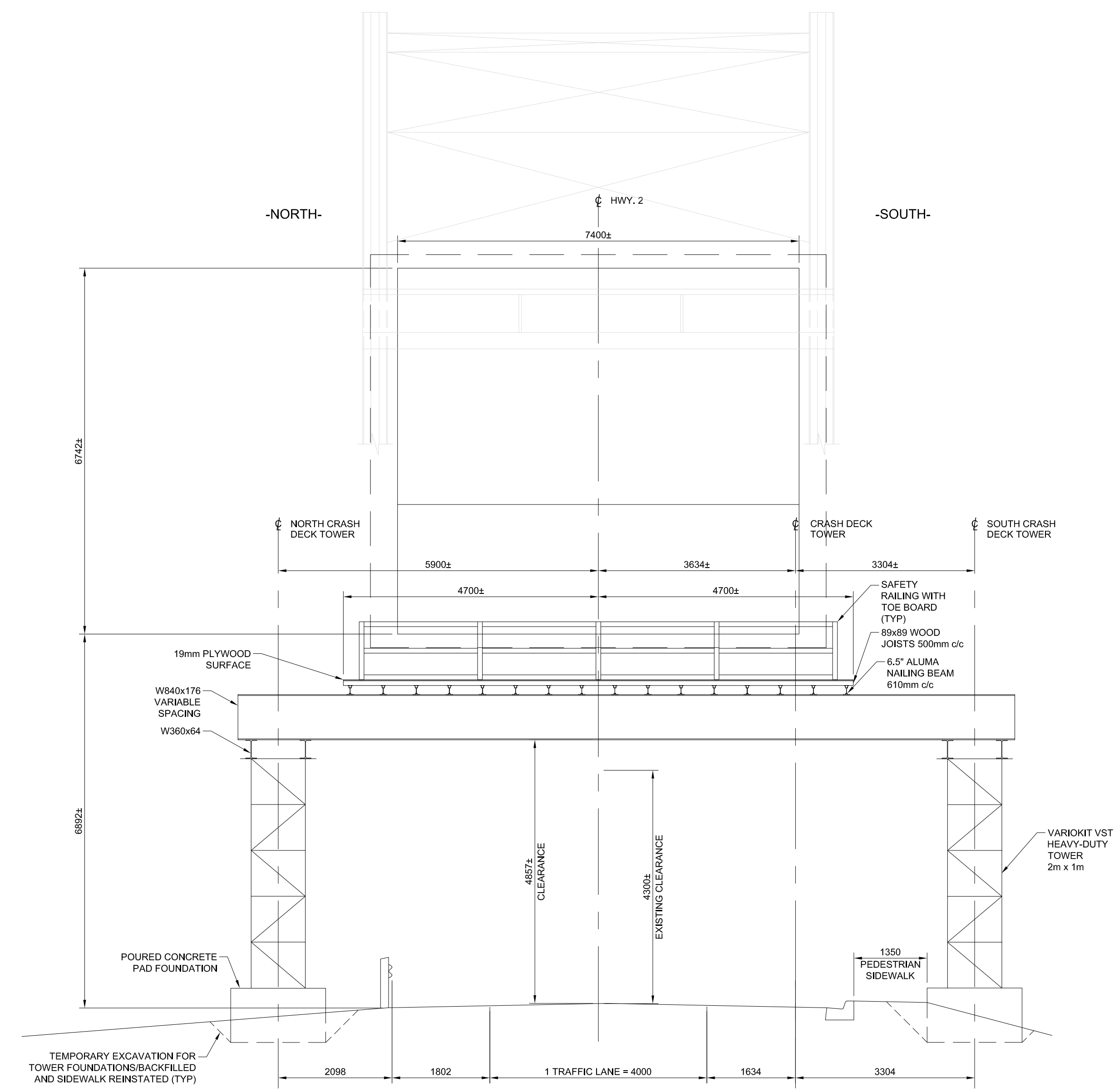
GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:




PLAN
1:75 BRIDGE TRUSS NOT SHOWN FOR CLARITY.




ELEVATION
1:75




SECTION 1 S01
1:50

Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region

Services Publics et Approvisionnement Canada
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| revision | | date |

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A Detail No. No. du détail
B drawing no. – where detail required dessin no. – où détail exigé
C drawing no. – where detailed dessin no. – où détaillé

project title / titre du projet: Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – CONCEPTUAL DESIGN DRAWINGS

drawing title / titre du dessin: TEMPORARY WORKS – OPTION 2

drawn by / dessiné par: B.REESE

designed by / conc par: Z. BROTH

approved by / approuvé par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/06/XX

project no. / no. du projet: R.108246.001

drawing no. / dessin no.: S04

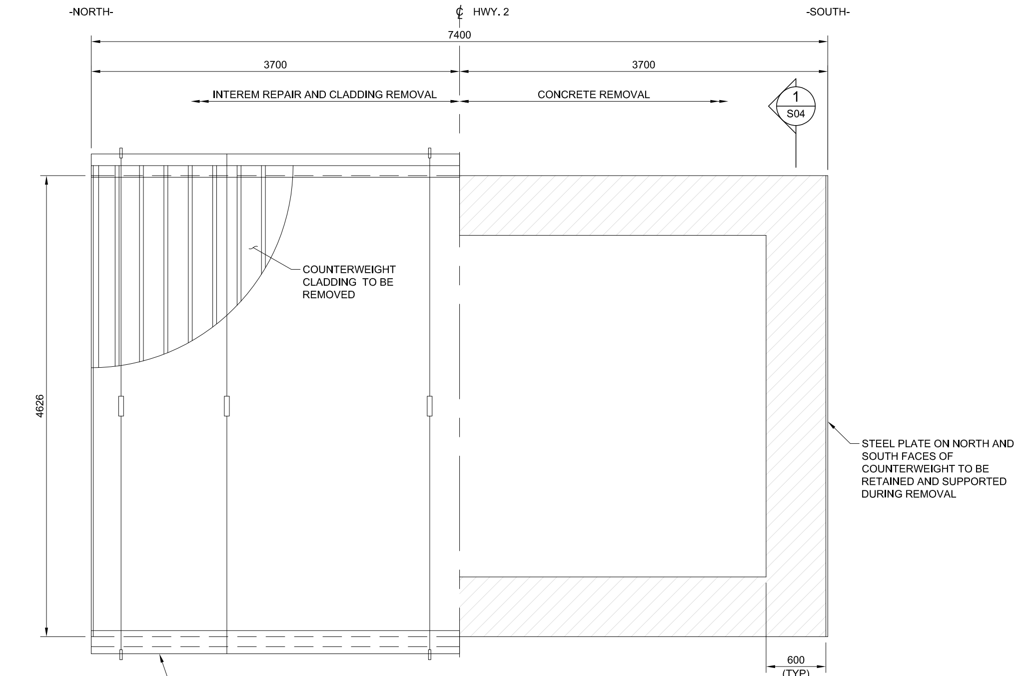
## CONCEPTUAL CONSTRUCTION STAGES AND PROCEDURES:

THE FOLLOWING SEQUENCE OF WORK IS AT A CONCEPTUAL DESIGN LEVEL AND WILL NEED TO BE DESIGNED AND CONFIRMED DURING DETAILED DESIGN.

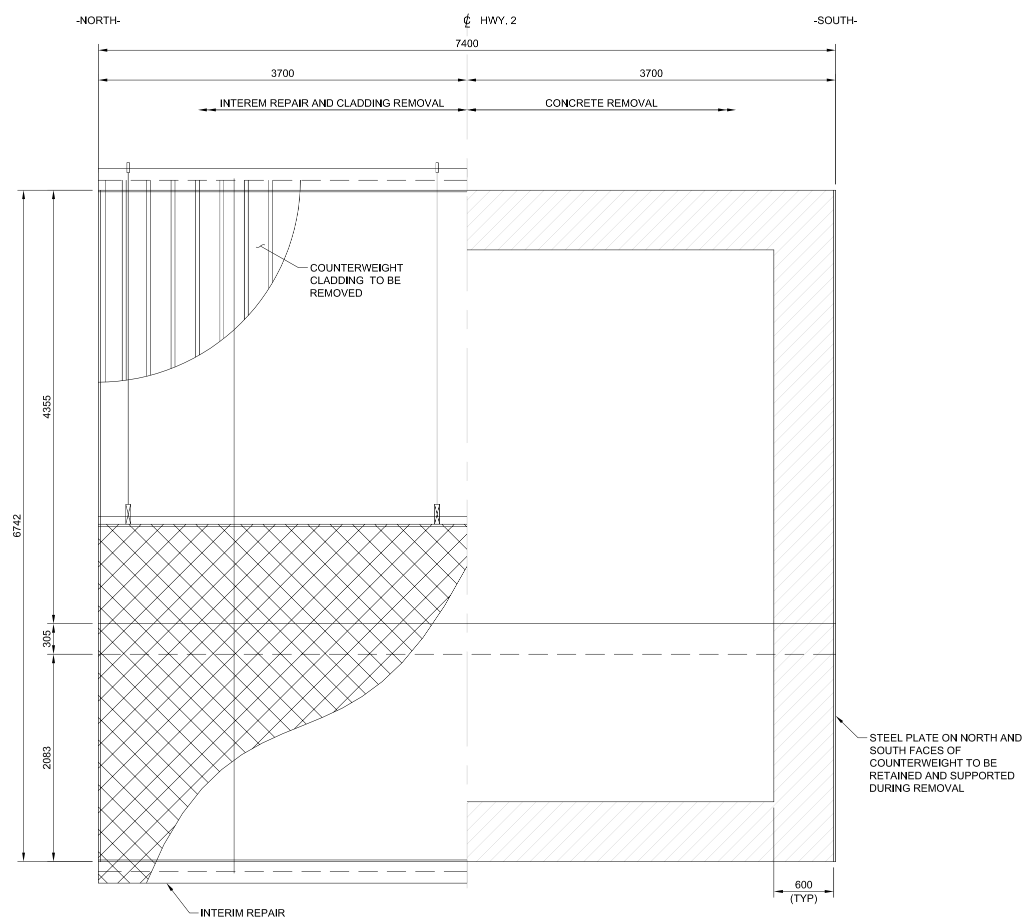
1. ERECTION OF CRASH DECK SYSTEM
2. REMOVALS:
   a. REMOVE INTERIM REPAIR;
   b. REMOVE STEEL CLADDING;
   c. REMOVE MISCELLANEOUS STEEL;
   d. CONCRETE REMOVALS.
3. INSTALLATION OF REINFORCING STEEL AND DOWELS.
4. FURTHER DEVELOPMENT FOR SEQUENCE OF CONCRETE REMOVALS IS REQUIRED DURING THE DETAILED DESIGN PHASE.

## LEGEND:

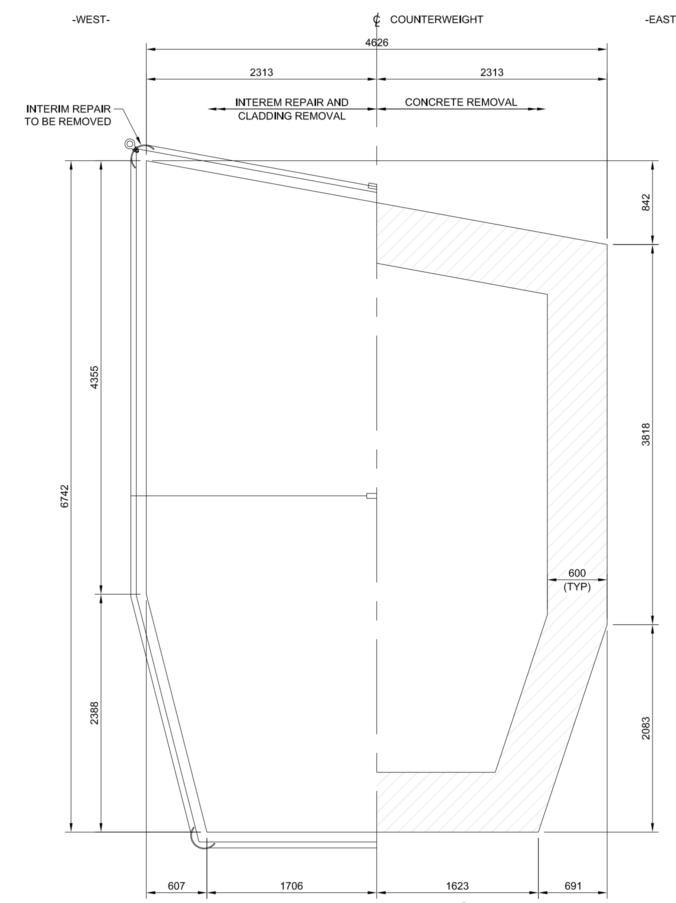
PARTIAL DEPTH REMOVALS




PLAN
1:30
COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.




ELEVATION
1:30
COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.




SECTION 1/S04
1:30
COUNTERWEIGHT POCKETS AND SECONDARY SUPPORT WIRE ROPE NOT SHOWN FOR CLARITY.

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| 00 | ISSUED FOR CONCEPTUAL REVIEW | 2021/06/__ |

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A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet: Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – CONCEPTUAL DESIGN DRAWINGS

drawing title / titre du dessin: REMOVALS

drawn by / dessine par: B.REESE
designed by / conc par: Z. BROTH
approved by / approuve par: M. MANSFIELD
tender / soumission
project manager / administrateur de projets
project date / date du projet: 2021/06/XX
project no. / no. du projet: R.108246.001
drawing no. / dessine no.: S05

CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\003 rehabilitation\20M-01325-00-003-005_REMOVALS.dwg
MODIFIED: 6/24/2021 6:50:35 PM BY: REESEB
DATE PLOTTED: 6/25/2021 4:22:37 PM BY: REESEB

GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:

04 11

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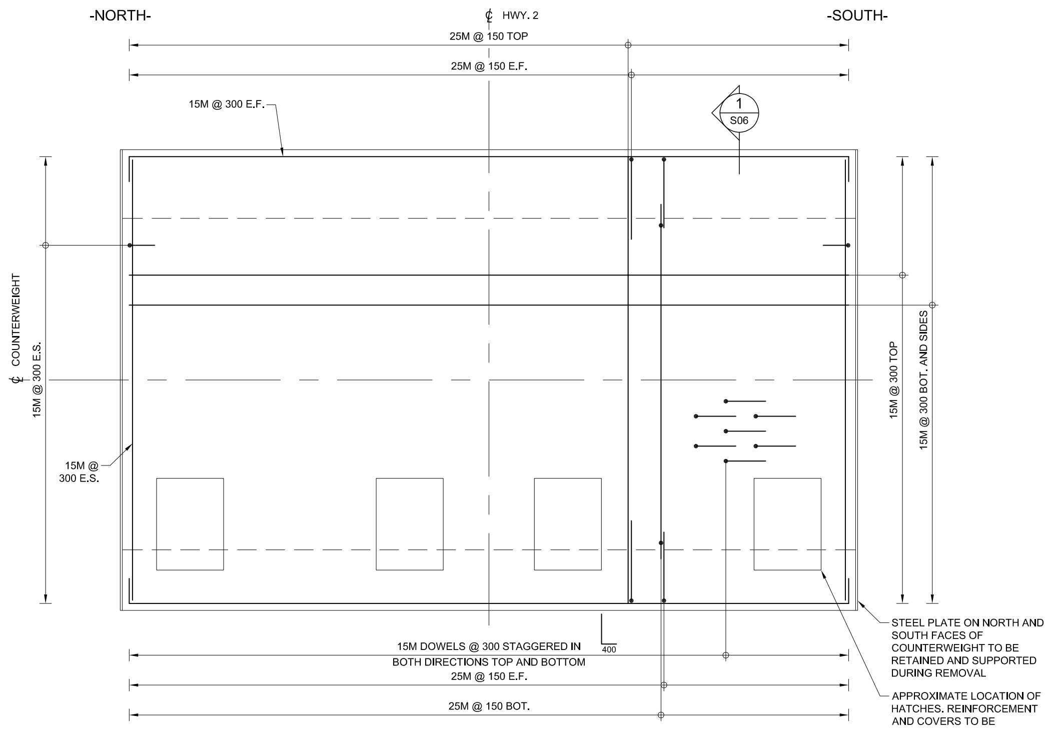
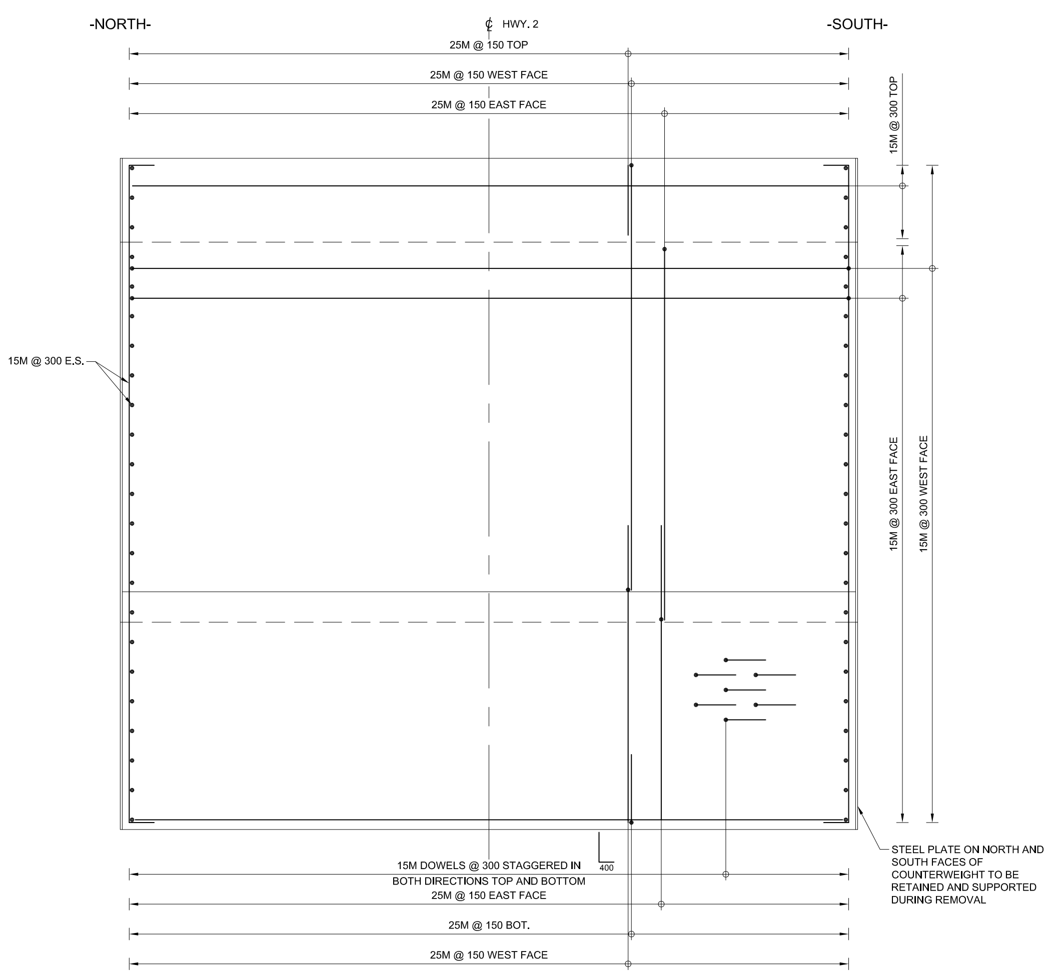
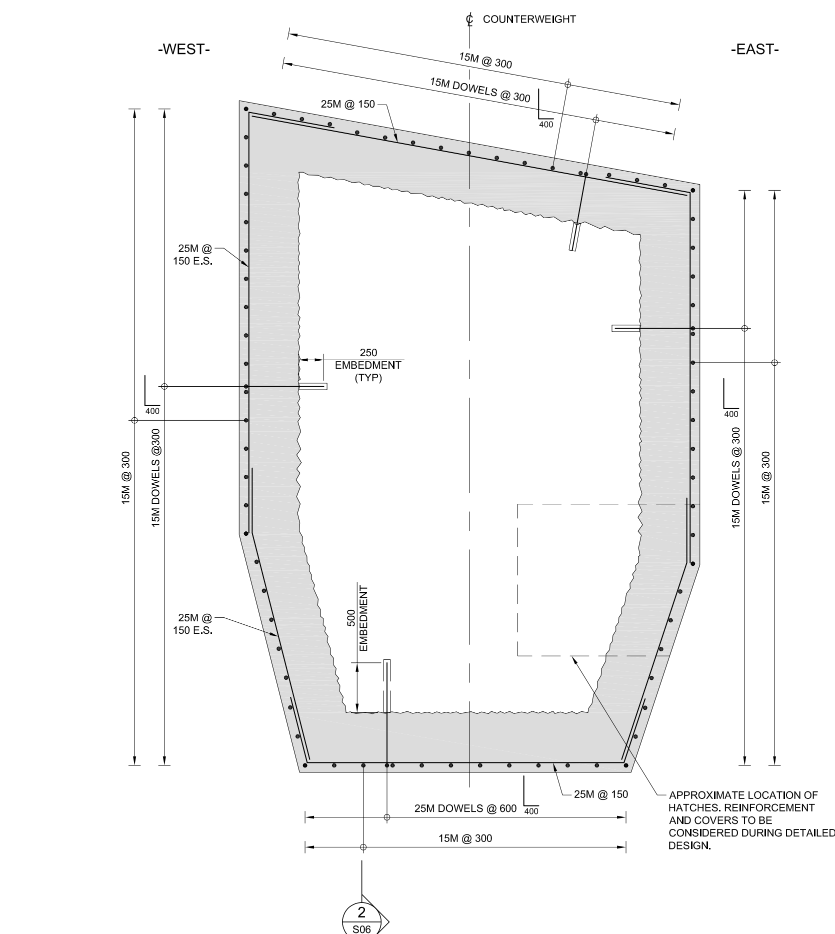


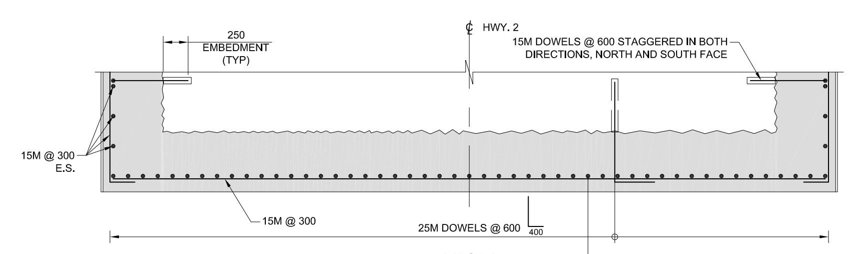

PLAN
1:30 SIDE COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.




ELEVATION
1:30 COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.




SECTION 1/S06
1:30 TOP COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.




SECTION 2/S06
1:30

NOTES:

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWINGS S01, S02 AND S05.
2. ACCESSIBILITY FOR BOTTOM DOWEL INSTALLATION TO BE CONSIDERED IN THE DETAILED DESIGN PHASE.
3. STEEL ARRANGEMENT COMPLETED FOR CONCEPTUAL DESIGN REVIEW. FURTHER DESIGN AND CONFIRMATION OF REINFORCING DETAILS REQUIRED DURING THE DETAILED DESIGN PHASE.
4. SEQUENCE OF CONCRETE PLACEMENT TO BE FURTHER DEVELOPED AND DESIGNED DURING THE DETAILED DESIGN PHASE.

LIST OF ABBREVIATIONS:

BOT. DENOTES BOTTOM
E.F. DENOTES EACH FACE
E.S. DENOTES EACH SIDE

LEGEND:

NEW CONCRETE

Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region
Services Publics et Approvisionnement Canada
Services d'architecture et de génie
Région de l'Ontario

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| 00 | ISSUED FOR CONCEPTUAL REVIEW | 2021/06/__ |

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A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet: Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – CONCEPTUAL DESIGN DRAWINGS

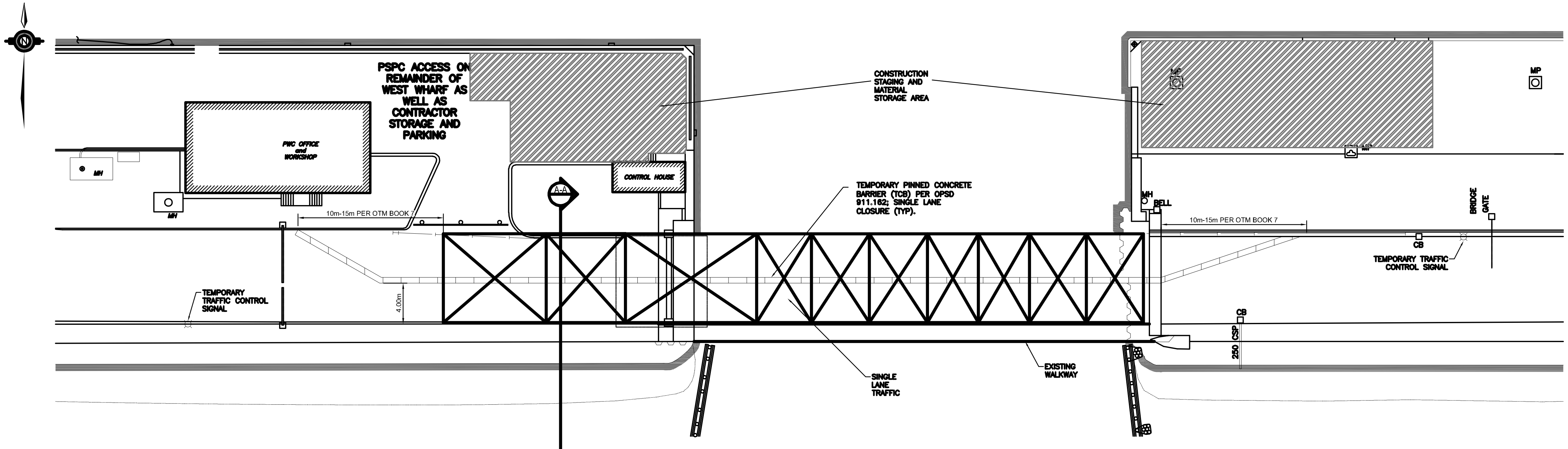
drawing title / titre du dessin: CONCRETE REPAIRS

drawn by / dessine par: B. REESE
designed by / conc par: N. SHERSHAKOVA
approved by / approuve par: M. MANSFIELD
tender / soumission — project manager / administrateur de projets
project date / date du projet: 2021/06/XX
project no. / no. du projet: R.108246.001
drawing no. / dessine no.: S06

CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\003 rehabilitation\20M-01325-00-003-006_CONCRETE-REPAIRS.dwg
MODIFIED: 6/25/2021 4:03:37 PM BY: REESEB
DATE PLOTTED: 6/25/2021 4:17:45 PM BY: REESEB

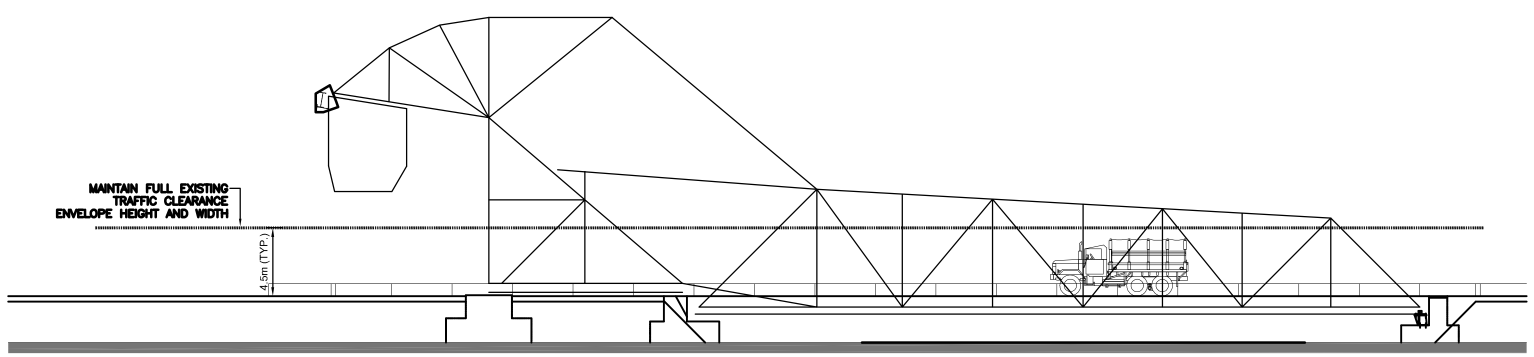
GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 millimetres



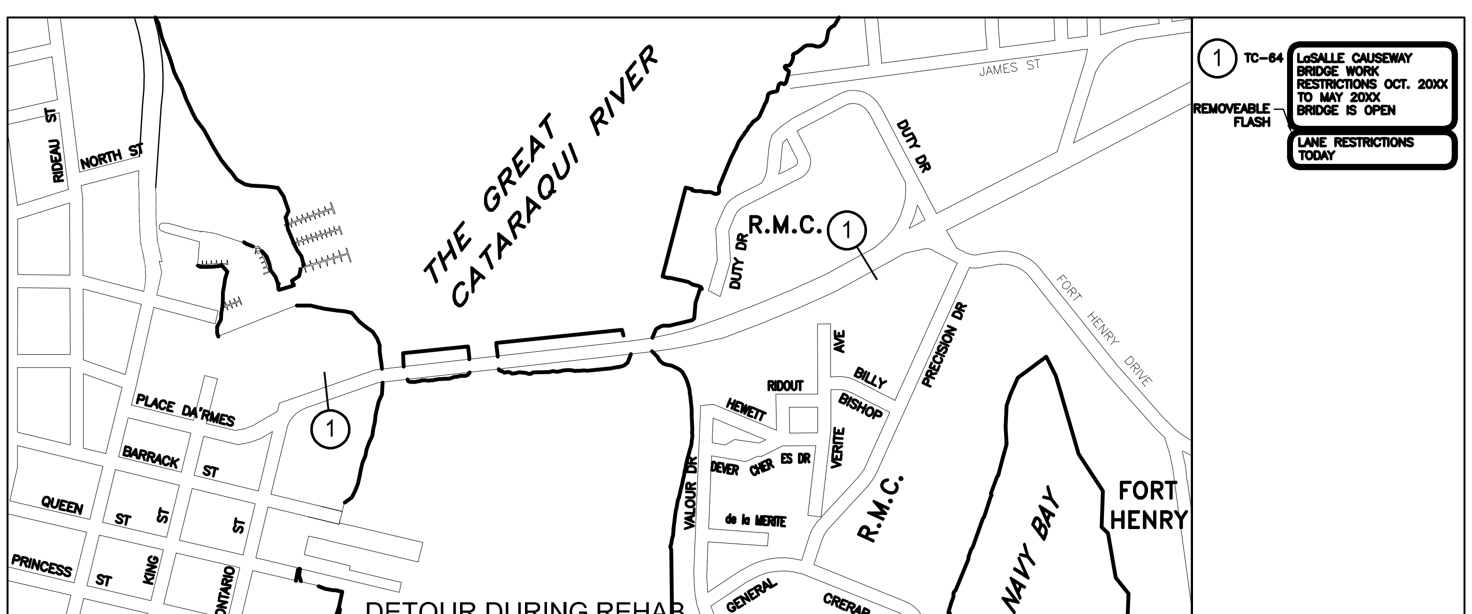

PLAN: WESTBOUND LANE CLOSURE (MINUS SIGNAGE)

1:200




SOUTH ELEVATION

1:200

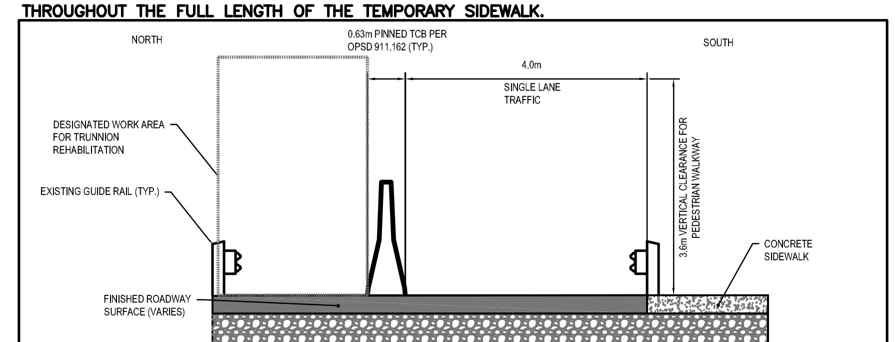



DETOUR DURING REHAB

N.T.S.

## NOTES:

1. THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE GENERAL METHOD OF TRAFFIC CONTROL DURING CONSTRUCTION. IT IS NOT A COMPREHENSIVE TRAFFIC CONTROL PLAN OR DETAILED STAGING DRAWINGS, NOR A COMPREHENSIVE LIST OF ALL THE WORKS. THE CONTRACTOR SHALL PREPARE A TRAFFIC CONTROL PLAN FOR APPROVAL IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND PSPC/CITY OF KINGSTON ROAD CLOSURE PROTOCOL.
2. CONTRACTOR SHALL SUPPLY AND INSTALL ALL SIGNAGE AND TRAFFIC CONTROL DEVICES PER OTM BOOK 7 TL-21.
3. ALL DETOUR SIGNAGE TCBs, AND TC-54 BARRELS TO BE STORED AND/OR PLACED OUT OF TRAFFIC SIGHT LINES DURING NON DETOUR HOURS. ALL DELINEATORS AND SIGNAGE/FLAGGING SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL, BOOK 7. DETOUR SIGNING, ADVISORY SPEED, AND LANE CLOSURE SIGNS (INCLUDING ADVANCE WARNING OR CLOSURE SIGNS) SHALL BE PROVIDED, INSTALLED, MAINTAINED, AND REMOVED BY THE CONTRACTOR.
4. TEMPORARY TRAFFIC CONTROL SIGNALS TO BE PLACED IN THE CAUTION MODE (FLASHING YELLOW) DURING NON DETOUR DAYLIGHT HOURS.
5. EXISTING PERMANENT SIGNALS SHALL BE BAGGED WHEN TEMPORARY SIGNALS AND THIS PLAN ARE IN OPERATION.
6. REFLECTIVE SIGNS APPROXIMATELY 1200x750mm WITH ADVANCE WARNINGS OF LANE CLOSURES TO BE APPROVED AND PLACED AS DIRECTED BY DEPARTMENTAL REPRESENTATIVE.
7. SPEED LIMIT SIGNS TO BE INSTALLED TO REDUCE SPEED TO 40KM/H.
8. CONTRACTOR SHALL FOLLOW THE ROAD CLOSURE PROTOCOL AS OUTLINED IN THE SPECIFICATIONS.
9. ACCOMMODATE AND GUIDE PEDESTRIANS DURING WORK HOURS THROUGH THE DESIGNATED DETOURS. CONTRACTOR TO MAINTAIN A VERTICAL CLEARANCE OF 3.60 METRES FOR PEDESTRIANS.
10. STRUCTURE OF ALL CONTAINMENT SYSTEMS TO BE DESIGNED BY CONTRACTOR.
11. CONTRACTOR SHALL ENSURE A MINIMUM VERTICAL CLEARANCE OF 4.5m OVER VEHICLE ROADWAYS.
12. WHERE TEMPORARY HARD SURFACE SIDEWALK IS SHOWN, OR IS REQUIRED TO PROVIDE A BARRIER FREE SIDEWALK TO MAINTAIN PEDESTRIAN ACCESS ACROSS THE SITE AS PART OF THE ACCESS ITEM, THE CONTRACTOR SHALL PROVIDE A NON-SKID HARD SURFACE SIDEWALK SUITABLE FOR ACCESS BY PEDESTRIANS AND WHEELCHAIRS AND THOSE WITH ACCESSIBILITY RESTRICTIONS. THE SIDEWALK SHALL BE A MINIMUM OF 1.2m IN WIDTH. AT MINIMUM PROTECTION WILL BE PROVIDED BETWEEN THE WORK AREA AND THE SIDEWALK AS WELL AS PINNED TCB'S BETWEEN THE ROAD AND THE SIDEWALK.THE CONTRACTOR SHALL SUBMIT CONFIGURATIONS AND SURFACES FOR REVIEW. IT IS ANTICIPATED THAT A SYSTEM OF PLYWOOD COVERED BY CONTINUOUS RUBBER MATS WITH NO TRIPPING HAZARDS WILL BE PROVIDED THROUGHOUT THE FULL LENGTH OF THE TEMPORARY SIDEWALK.




SECTION A-A TYPICAL DETOUR VIEW

1:20

Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region

Services Publics et Approvisionnement Canada
Services d'architecture et de génie
Région de l'Ontario

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A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet: Ontario
LASALLE CAUSEWAY BASCULE BRIDGE COUNTERWEIGHT CONCEPTUAL DESIGN

drawing title / titre du dessin:
**TRAFFIC AND PEDESTRIAN CONTROL PLAN WESTBOUND LANE CLOSURE**

drawn by / dessine par: J. LEGROS

designed by / conc par: S. DAVIDSON

approved by / approuve par: M. MANSFIELD

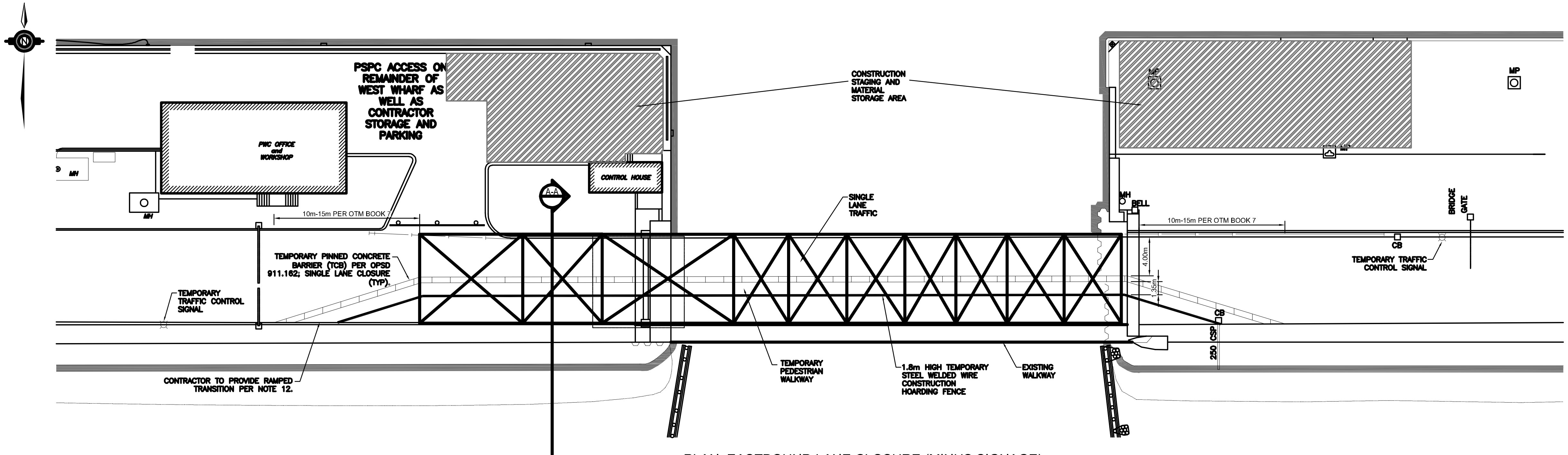
tender / soumission

project manager / administrateur de projets

project date / date du projet: 2021/06/23

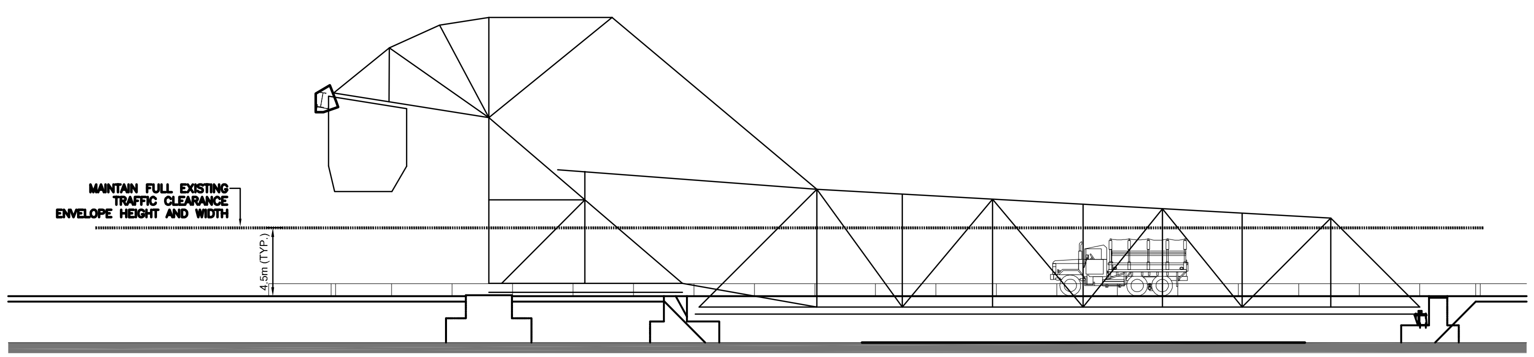
project no. / no. du projet: R.108246.001

drawing no. / dessine no.: TCP-1



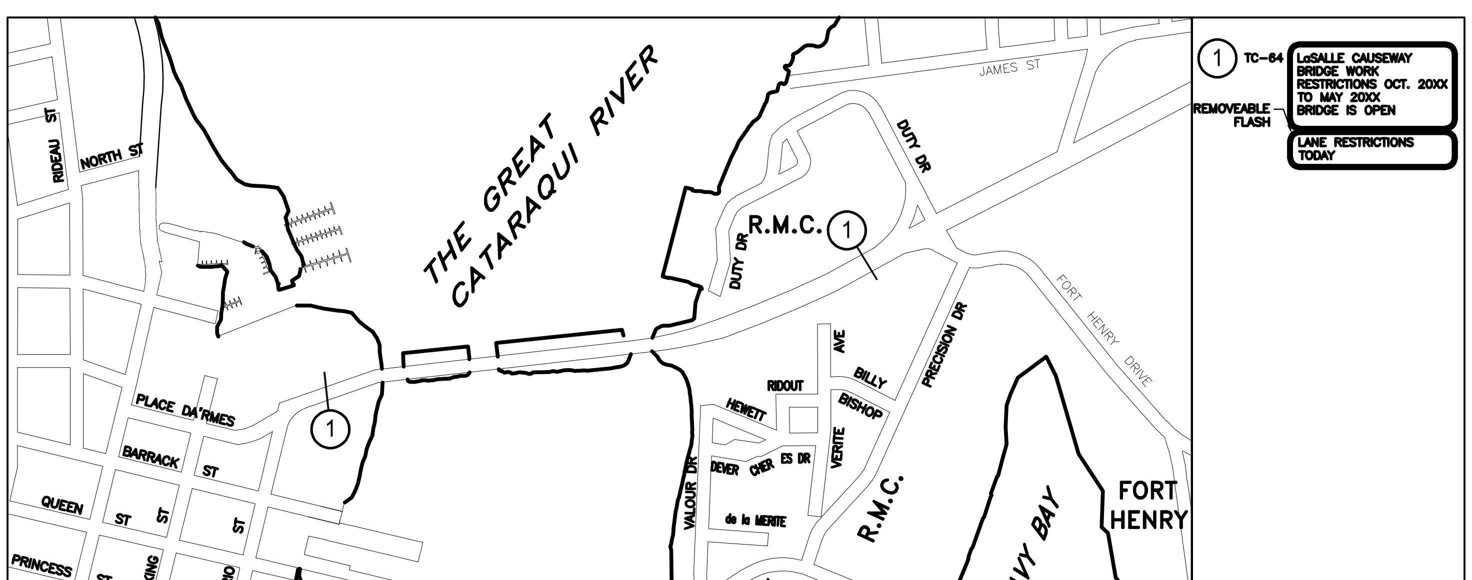

PLAN: EASTBOUND LANE CLOSURE (MINUS SIGNAGE)

1:200




SOUTH ELEVATION

1:200




DETOUR DURING REHAB

N.T.S.

## NOTES:

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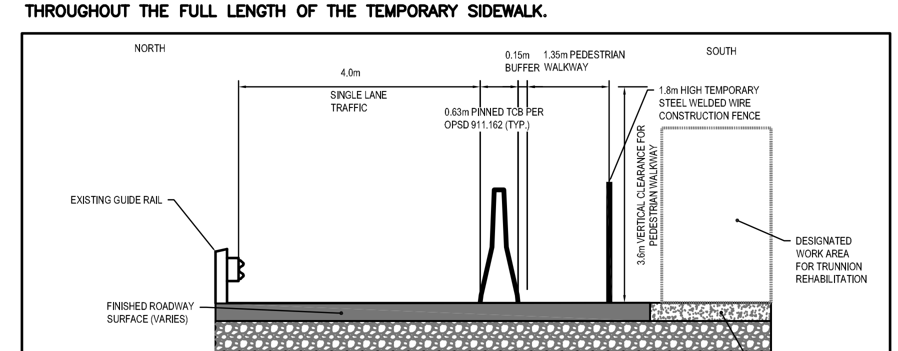
2. CONTRACTOR SHALL SUPPLY AND INSTALL ALL SIGNAGE AND TRAFFIC CONTROL DEVICES PER OTM BOOK 7 TL–21.
3. ALL DETOUR SIGNAGE TCBs, AND TC–54 BARRELS TO BE STORED AND/OR PLACED OUT OF TRAFFIC SIGHT LINES DURING NON DETOUR HOURS. ALL DELINEATORS AND SIGNAGE/FLAGGING SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL, BOOK 7. DETOUR SIGNING, ADVISORY SPEED, AND LANE CLOSURE SIGNS (INCLUDING ADVANCE WARNING OR CLOSURE SIGNS) SHALL BE PROVIDED, INSTALLED, MAINTAINED, AND REMOVED BY THE CONTRACTOR.
4. TEMPORARY TRAFFIC CONTROL SIGNALS TO BE PLACED IN THE CAUTION MODE (FLASHING YELLOW) DURING NON DETOUR DAYLIGHT HOURS.
5. EXISTING PERMANENT SIGNALS SHALL BE BAGGED WHEN TEMPORARY SIGNALS AND THIS PLAN ARE IN OPERATION.
6. REFLECTIVE SIGNS APPROXIMATELY 1200x750mm WITH ADVANCE WARNINGS OF LANE CLOSURES TO BE APPROVED AND PLACED AS DIRECTED BY DEPARTMENTAL REPRESENTATIVE.
7. SPEED LIMIT SIGNS TO BE INSTALLED TO REDUCE SPEED TO 40KM/H.
8. CONTRACTOR SHALL FOLLOW THE ROAD CLOSURE PROTOCOL AS OUTLINED IN THE SPECIFICATIONS.
9. ACCOMMODATE AND GUIDE PEDESTRIANS DURING WORK HOURS THROUGH THE DESIGNATED DETOURS. CONTRACTOR TO MAINTAIN A VERTICAL CLEARANCE OF 3.60 METRES FOR PEDESTRIANS.
10. STRUCTURE OF ALL CONTAINMENT SYSTEMS TO BE DESIGNED BY CONTRACTOR.
11. CONTRACTOR SHALL ENSURE A MINIMUM VERTICAL CLEARANCE OF 4.5m OVER VEHICLE ROADWAYS.
12. WHERE TEMPORARY HARD SURFACE SIDEWALK IS SHOWN, OR IS REQUIRED TO PROVIDE A BARRIER FREE SIDEWALK TO MAINTAIN PEDESTRIAN ACCESS ACROSS THE SITE AS PART OF THE ACCESS ITEM, THE CONTRACTOR SHALL PROVIDE A NON–SKID HARD SURFACE SIDEWALK SUITABLE FOR ACCESS BY PEDESTRIANS AND WHEELCHAIRS AND THOSE WITH ACCESSIBILITY RESTRICTIONS. THE SIDEWALK SHALL BE A MINIMUM OF 1.2m IN WIDTH. AT MINIMUM PROTECTION WILL BE PROVIDED BETWEEN THE WORK AREA AND THE SIDEWALK AS WELL AS PINNED TCB'S BETWEEN THE ROAD AND THE SIDEWALK.THE CONTRACTOR SHALL SUBMIT CONFIGURATIONS AND SURFACES FOR REVIEW. IT IS ANTICIPATED THAT A SYSTEM OF PLYWOOD COVERED BY CONTINUOUS RUBBER MATS WITH NO TRIPPING HAZARDS WILL BE PROVIDED THROUGHOUT THE FULL LENGTH OF THE TEMPORARY SIDEWALK.




SECTION A-A TYPICAL DETOUR VIEW

1:20

Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region

Services Publics et Approvisionnement Canada
Services d'architecture et de génie
Région de l'Ontario

wsp

| revision | | date |
|---|---|---|
| 00 | ISSUED FOR CONCEPTUAL REVIEW | 2021/06/23 |

Do not scale drawings.
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project title / titre du projet: Ontario
LASALLE CAUSEWAY BASCULE BRIDGE COUNTERWEIGHT CONCEPTUAL DESIGN

drawing title / titre du dessin:
**TRAFFIC AND PEDESTRIAN CONTROL PLAN EASTBOUND LANE CLOSURE**

drawn by / dessiné par: J. LEGROS

designed by / conç par: S. DAVIDSON

approved by / approuvé par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/06/23

project no. / no. du projet: R.108246.001

drawing no. / dessin no.: TCP–2

GSC–B1 DATE PLOTTED: 1/26/2021 PLOT SCALE: 1:200 CAD FILE:

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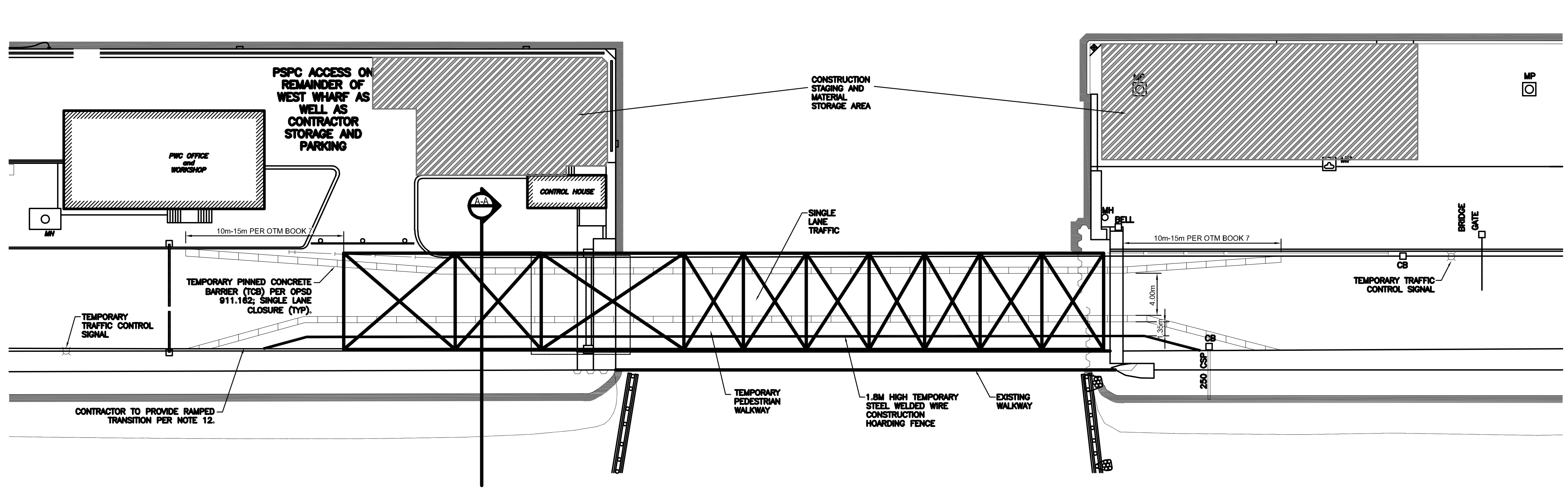
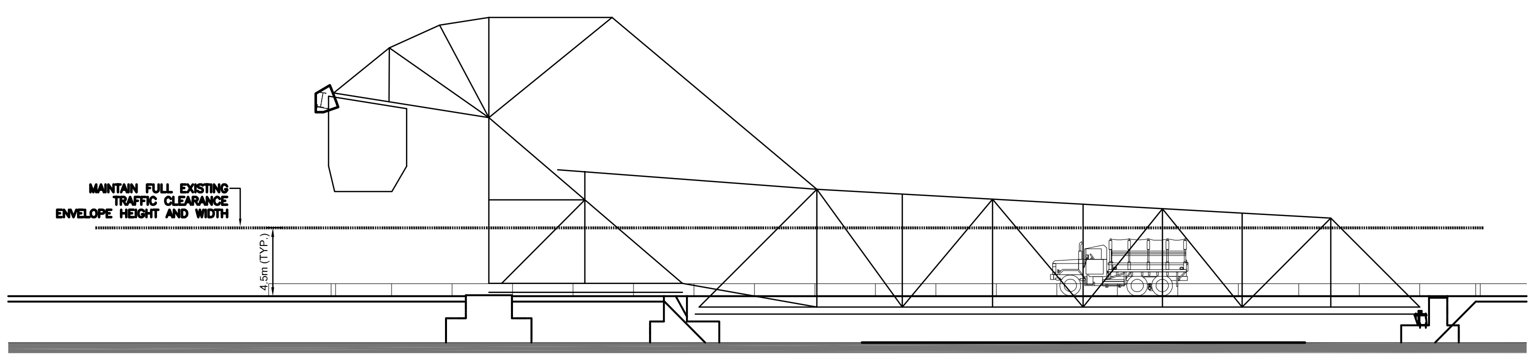



PLAN: SINGLE CENTER LANE DETOUR (MINUS SIGNAGE)

1:200

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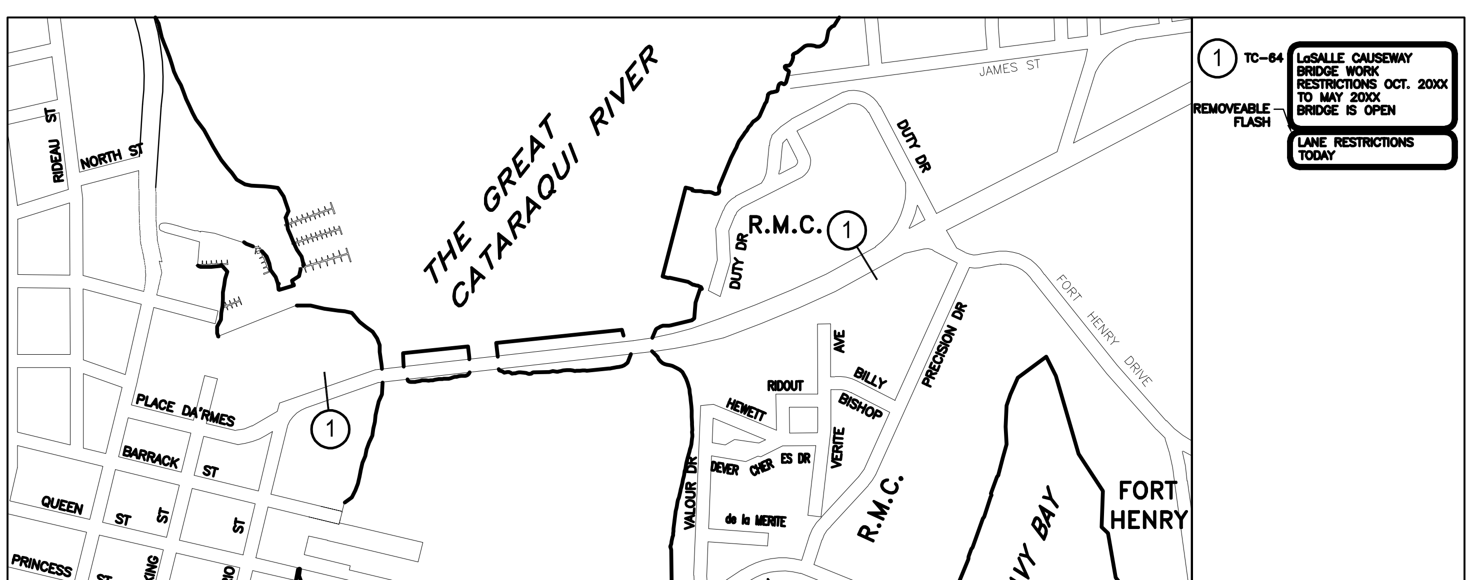
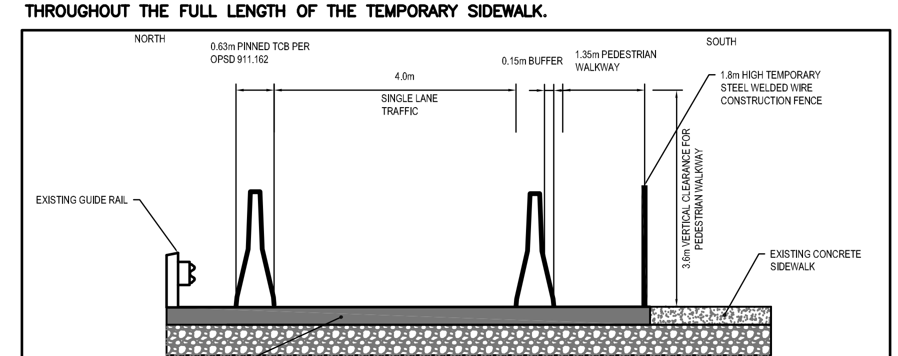



DETOUR DURING REHAB

N.T.S.




SECTION A-A TYPICAL DETOUR VIEW

1:20

Public Services and Procurement Canada
Architectural and Engineering Services
Ontario Region

Services Publics et Approvisionnement Canada
Services d'architecture et de génie
Région de l'Ontario

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project title / titre du projet: Ontario
LASALLE CAUSEWAY BASCULE BRIDGE COUNTERWEIGHT CONCEPTUAL DESIGN

drawing title / titre du dessin:
TRAFFIC AND PEDESTRIAN CONTROL PLAN CENTER LANE DETOUR

drawn by / dessiné par: J. LEGROS

designed by / conc par: S. DAVIDSON

approved by / approuvé par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/06/23

project no. / no. du projet: R.108246.001

drawing no. / dessin no.: TCP–3

# APPENDIX

# B

## INTERIM REPAIR DESIGN DRAWINGS

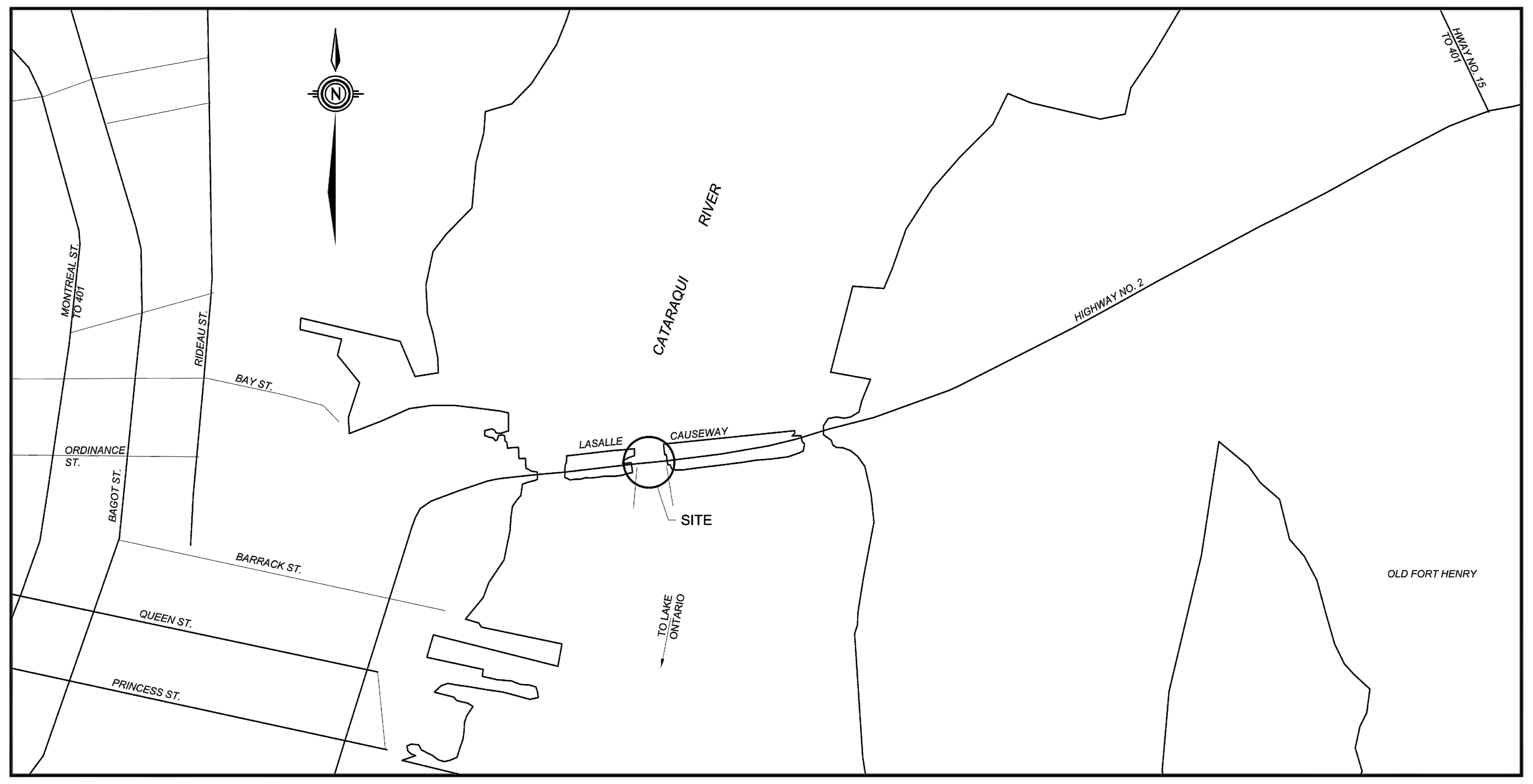
## LIST OF DRAWINGS



2021

KINGSTON ONTARIO

# LASALLE CAUSEWAY BASCULE BRIDGE - COUNTERWEIGHT INTERIM REPAIR




KEY PLAN / PLAN CLÉ

Public Services and Procurement Canada

Services Publics et Approvisionnement Canada

PROJECT
PROJET
R.108246.001

ISSUED FOR TENDER
2021/02/10


CAD FILE LOCATION AND NAME: M:\20M-01325-00 LaSalle Causeway Bridge\SHEETS\002 EMERGENCY COUNTERWEIGHT REPAIR\20M-01325-00-002-000_COVER.dwg
MODIFIED: 2/10/2021 4:14:08 PM BY: REESEB
DATE PLOTTED: 2/10/2021 4:14:25 PM BY: REESEB

04 11

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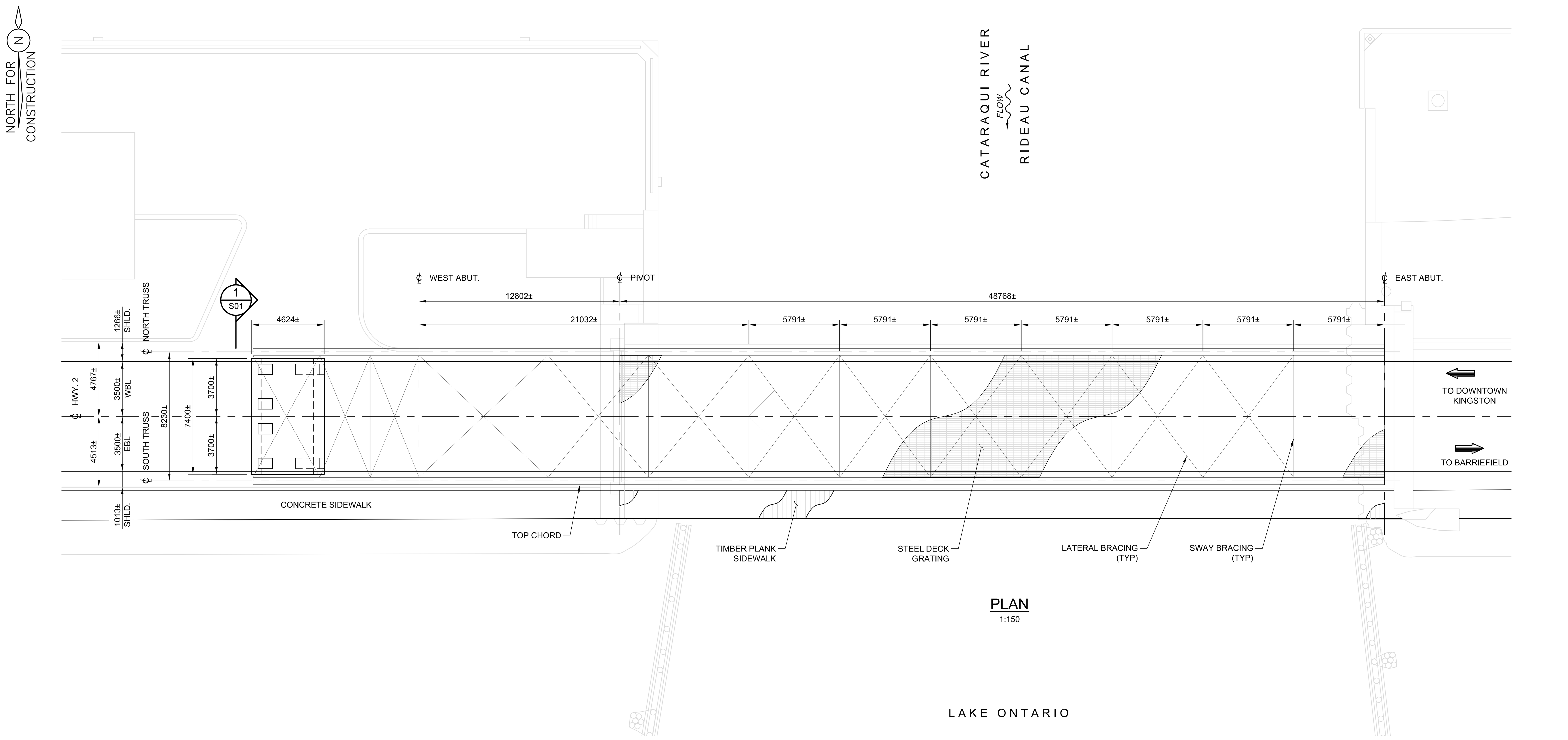
NOTES:

1. SEE DRAWING S02 FOR NOTES.




PLAN
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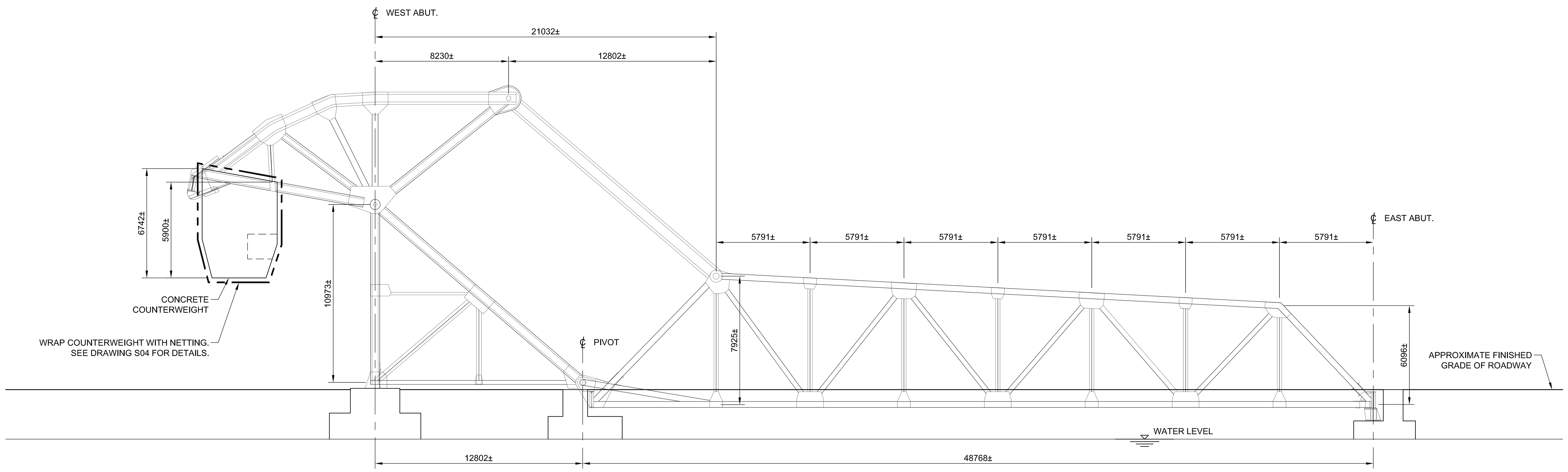
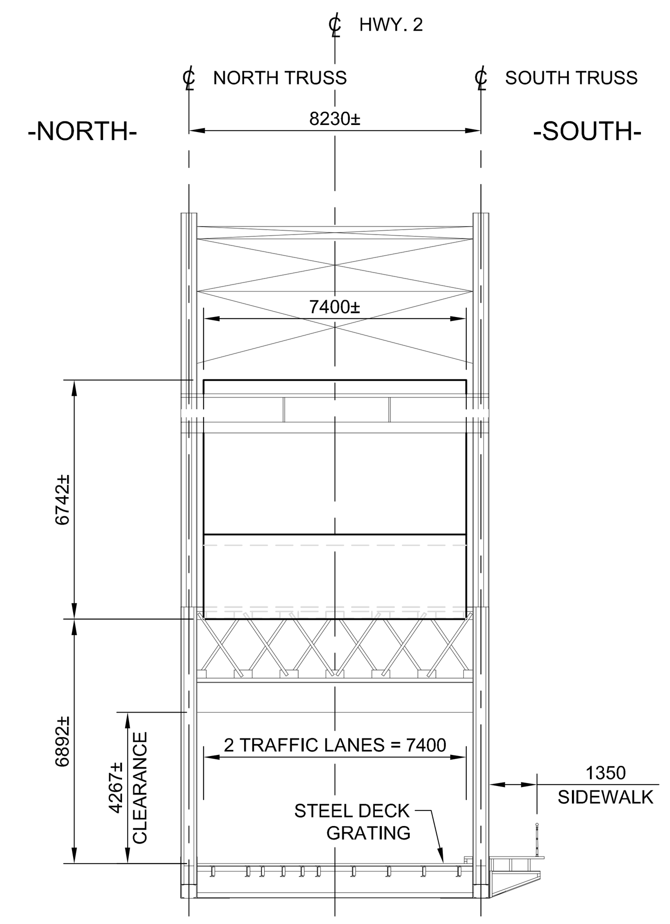



ELEVATION
1:150




SECTION 1/S01
1:150

Public Services and Procurement Canada
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Ontario Region

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Région de l'Ontario

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LICENSED PROFESSIONAL ENGINEER J.J. BERTOLA 100500440 2021/02/10 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M. MANSFIELD 100193767 10-Feb-21 PROVINCE OF ONTARIO

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project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
GENERAL ARRANGEMENT

drawn by / dessiné par: B. REESE

designed by / conc par: Z. BROTH

approved by / approuvé par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/02/10

project no. / no. du projet: R.108246.001

drawing no. / dessin no.: S01

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MODIFIED: 2/10/2021 4:14:57 PM BY: REESEB
DATE PLOTTED: 2/10/2021 4:15:10 PM BY: REESEB

GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:

## GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. WORK TO BE COMPLETED OUTSIDE OF NAVIGATION SEASON.
3. PSPC COMMUNICATIONS DEPARTMENT TO COORDINATE CONTACTING CONCERNED PARTIES.
4. THE CONTRACTOR SHALL EXAMINE THE SITE AND SATISFY HIMSELF OF THE ACTUAL CONDITIONS AND REQUIREMENTS OF THE WORK.
5. THE LATEST VERSION OF ALL REFERENCED DOCUMENTS SHALL APPLY.
6. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH THE CANADIAN HIGHWAY BRIDGE DESIGN CODE CSA S6-19.
7. DIMENSIONS RELATING TO EXISTING CONSTRUCTION MUST BE FIELD VERIFIED BY CONTRACTOR BEFORE STARTING ANY WORK OR FABRICATION.
8. STABILITY AND INTEGRITY OF STRUCTURE AND INDIVIDUAL COMPONENTS SHALL BE MAINTAINED AT ALL STAGES OF CONSTRUCTION.
9. THE CONTRACTOR IS RESPONSIBLE FOR SAFETY ON THE JOB SITE AND FOR THE DESIGN, INSTALLATION AND SUPERVISION OF ALL TEMPORARY BRACING, LOADS AND SUPPORTS.
10. ACCESS, WORK AND STORAGE AREAS SHALL BE LIMITED TO THOSE AREAS DELINEATED ON THE DRAWINGS.
11. ALL DISPOSALS SHALL BE IN ACCORDANCE WITH THE RELEVANT SECTION OF THE SPECIFICATIONS.
12. REINSTATE AND MAKE GOOD ALL DISRUPTED AREAS TO THE SATISFACTION OF THE DEPARTMENTAL REPRESENTATIVE AFTER COMPLETION OF THE WORK.
13. WORK CONSIDERED TO BE COMPLETE AFTER THE BRIDGE HAS BEEN SUCCESSFULLY COMMISSIONED IN ACCORDANCE WITH SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS AND IS FULLY OPERATIONAL.

## DESIGN LOADS:

1. THE SIZE OF CONCRETE SPALL IS NOT DIRECTLY PREDICTABLE. THE INTERIM REPAIR HAS BEEN DESIGNED BASED ON A THEORETICAL DEPTH OF CONCRETE LOSS FROM THE BOTTOM OF THE COUNTERWEIGHT IN ITS VERTICAL SUSPENDED POSITION.
2. FOR AN ASSUMED DEPTH OF 600:
   - APPROXIMATE VOLUME OF SPALL: 15.5 $m^3$
   - ACTUAL LOAD: 373 kN
   - FACTOR OF SAFETY: 3
   - TOTAL DESIGN LOAD: 1120 kN
3. FOR AN ASSUMED DEPTH OF 300:
   - APPROXIMATE VOLUME OF SPALL: 7.6 $m^3$
   - ACTUAL LOAD: 182 kN
   - FACTOR OF SAFETY: 5
   - TOTAL DESIGN LOAD: 912 kN

## DURING OPERATION:

1. DURING OPERATION OF THE BRIDGE (OPENING AND CLOSING) THE AREA UNDER THE BRIDGE AND IMMEDIATELY ADJACENT TO THE BRIDGE SHOULD NOT HAVE ANY HUMAN OCCUPANCY.

## STRUCTURAL STEEL:

1. ALL NEW STRUCTURAL STEEL SHALL CONFORM TO CSA G40.20 AND CSA G40.21 GRADE 350W FOR ROLLED SHAPES.
2. GALVANIZING SHALL BE IN ACCORDANCE WITH ASTM A123/A123M-17. MINIMUM WEIGHT OF ZINC COATING SHALL BE 600g/$m^2$.
3. STEEL IS DESIGNED AND SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH CSA S6-19.
4. FOR EACH REPAIR DETAIL SHOWN, DETAILS MAY DEPICT ONE LOCATION AND ARE INCLUDED TO INDICATE DESIGN INTENT AT SIMILAR LOCATIONS. THE DIMENSIONS CAN VARY FROM ONE LOCATION TO ANOTHER. DIMENSIONS SHOWN ARE APPROXIMATE AND MAY VARY DEPENDING ON CONTRACTOR'S MEANS AND METHODS.
5. ALL CUTTING OF STEEL IN THE FIELD SHALL BE BY MECHANICAL CUTTING WHEEL UNLESS OTHERWISE DIRECTED. THE CUT SURFACES MUST BE GROUND SMOOTH.
6. NO FIELD WELDING IS PERMITTED, UNLESS NOTED OTHERWISE.
7. THE SHOP FABRICATOR SHALL BE CERTIFIED TO THE REQUIREMENTS OF CSA STANDARD W47.1 (DIVISION 1 OR 2.1).
8. SHOP DRAWINGS SHALL BE SUBMITTED TO DEPARTMENTAL REPRESENTATIVE FOR THE APPROVAL FOR ALL ITEMS.
9. ALL WELDING SHALL BE IN ACCORDANCE WITH CSA STANDARD W59.
10. UNLESS OTHERWISE NOTED, THE MINIMUM FILLET WELD SHALL BE AS FOLLOWS:

| MATERIAL THICKNESS OF THICKER PART JOINED (mm) | MINIMUM SIZE OF SINGLE PASS FILLET WELD (mm) |
|---|---|
| TO 12 INCLUSIVE | 5 |
| OVER 12 TO 20 | 6 |
| OVER 20 TO 40 | 8 |
| OVER 40 TO 60 | 10 |

## MATERIALS:

1. MATERIALS FOR INTERIM REPAIR SHALL BE AS LISTED BELOW OR AN EQUIVALENT APPROVED BY THE DEPARTMENTAL REPRESENTATIVE.
2. ALL MATERIALS SHALL BE NEW AND FREE OF DEFECTS.
3. WIRE ROPE: 1/2" DIAMETER 6x19, GALVANIZED, RIGHT REGULAR LAY, EXTRA IMPROVED PLOWED STEEL (EIPS), INDEPENDENT WIRE ROPE CORE (IWRC).
4. THIMBLE END TREATMENT: 1/2" DIAMETER, HOT DIP GALVANIZED, CROSBY® G-411 STANDARD WIRE ROPE THIMBLES.
5. TURNBUCKLES: 7/8" DIAMETER x 18" TAKE-UP LENGTH, HOT DIP GALVANIZED, CROSBY® HG-226 EYE & EYE TURNBUCKLE.
6. U-BOLTS: 1/2" DIAMETER, GALVANIZED, CROSBY® G-450 "RED-U-BOLT" WIRE ROPE CLIPS.
7. CONSTRUCTION DEBRIS NETTING: 10,000 POUND WEIGHT RATED ALCO CONSTRUCTION COVERS (RB-10000).
8. MISCELLANEOUS MATERIALS (INCLUDING HSS, EYE BOLTS AND ALL ASSOCIATED HARDWARE): TO CSA G40.20/G40.21 (WHERE APPLICABLE), HOT DIP GALVANIZED, AND AS NOTED ON CONTRACT DRAWINGS.
9. THE CONTRACTOR SHALL FOLLOW ALL RECOMMENDED PROCEDURES FOR THE USE OR INSTALLATION OF THE REPAIR MATERIALS. SPECIFICATIONS FROM THE MANUFACTURER, AS WELL AS DESIGN MANUALS AND STANDARDS, SHALL BE CONSULTED WHEREVER APPLICABLE.

## GENERAL CONSTRUCTION AND PROCEDURES:

1. THE CONTRACTOR SHALL PLAN AND CONTROL THE PROCESS/PROCEDURES TO THE EXTENT NECESSARY TO ENSURE THAT TOLERANCES IN THE CONTRACT DOCUMENTS ARE COMPLIED WITH. THE DEPARTMENTAL REPRESENTATIVE SHALL BE ENTITLED TO DEMAND THAT ANY SPECIFIC WORKING/INSPECTION PROCEDURE BE ADJUSTED IF SUCH PROCEDURE APPEARS NOT TO PROVIDE ADEQUATE SECURITY AGAINST EXCEEDING OF TOLERANCES.
2. ACTUAL FIELD CONDITIONS MAY REQUIRE MODIFICATION TO CONSTRUCTION DETAILS AND WORK QUANTITIES. THE CONTRACTOR SHALL PERFORM THE WORK IN ACCORDANCE WITH FIELD CONDITIONS FOLLOWING WRITTEN APPROVAL FROM DEPARTMENTAL REPRESENTATIVE.
3. IF THE CONTRACTOR DAMAGES ANY MATERIALS WHICH ARE TO REMAIN IN PLACE, OR WHICH ARE TO REMAIN ON THE STRUCTURE, THE DAMAGED MATERIALS SHALL BE REPAIRED OR REPLACED IN A MANNER SATISFACTORY TO THE DEPARTMENTAL REPRESENTATIVE AT THE EXPENSE OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL TAKE PRECAUTIONS SO AS NOT TO LEAVE DEBRIS, MATERIALS, TOOLS, ETC. ON THE BRIDGE SURFACE WHEN LEAVING THE WORK AREA ON A DAILY BASIS.
5. HORIZONTAL, VERTICAL AND DETAIL DIMENSIONS AND ELEVATIONS SHOWN ON THESE PLANS HAVE BEEN OBTAINED FROM THE ORIGINAL DESIGN DRAWINGS, SHOP DRAWINGS, AND SUBSEQUENT MODIFICATION DRAWINGS OF THE EXISTING STRUCTURES. THE CONTRACTOR SHALL PERFORM FIELD MEASUREMENTS TO ESTABLISH CONTROL POINTS AND TO VERIFY ALL EXISTING DIMENSIONS AFFECTING FABRICATION AND CONSTRUCTION. SHOP AND CONSTRUCTION DRAWINGS SHALL SHOW DESIGN DIMENSIONS AND FIELD DIMENSIONS WHENEVER THEY DIFFER.
6. THE CONTRACTOR SHALL PRODUCE SHOP DRAWINGS USING COMPUTER AIDED DRAFTING & DESIGN (CADD). THE SUBMISSIONS SHALL MEET PSPC CADD STANDARDS FOR ONTARIO AND WILL BE SUBJECT TO THE REVIEW AND APPROVAL OF THE DEPARTMENTAL REPRESENTATIVE.
7. RECORD DRAWINGS OF THE EXISTING STRUCTURE ARE ON FILE AT THE OFFICES OF PSPC. RECORD DRAWINGS OF THE EXISTING STRUCTURE WILL BE MADE AVAILABLE TO THE SUCCESSFUL BIDDER FOR REFERENCE, BUT MAY NOT BE REMOVED.
8. THE CONTRACTOR SHALL SUBMIT CONSTRUCTION SEQUENCING WITH A DETAILED WRITTEN PLAN OF OPERATIONS COINCIDENT WITH THE PROJECT SCHEDULE AND EACH SUBSEQUENT SCHEDULE UPDATE TO THE DEPARTMENTAL REPRESENTATIVE FOR REVIEW PRIOR TO IMPLEMENTATION, AS DEFINED WITHIN THE CONTRACT SPECIFICATIONS. FOR WORK RESTRICTIONS AND OPERATIONAL CONSTRAINTS REFER TO SPECIFICATION SECTIONS 01 14 00 - WORK RESTRICTIONS AND 05 12 33 - STRUCTURAL STEEL FOR BRIDGES.
9. THE CONTRACTOR SHALL PERFORM ALL WORK IN ACCORDANCE WITH THE PERMITTED LANE CLOSURES AS DEFINED IN THE CONTRACT SPECIFICATIONS. WORK THAT DOES NOT AFFECT THE TRAFFIC OR PEDESTRIANS MAY BE PERFORMED OUTSIDE THE TIMES OF THE RESTRICTIVE LANE CLOSURES BUT MUST REMAIN IN CONFORMANCE WITH THE ACCEPTED WRITTEN PLAN OF OPERATIONS AND DEPARTMENTAL REPRESENTATIVE'S APPROVALS.
10. DURING REMOVAL AND CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL NOT BE PERMITTED TO DROP MATERIAL OR DEBRIS FROM THE BRIDGE NOR SHALL ANY WATER WHICH IS USED FOR WASHING PURPOSES OR OTHER SIMILAR OPERATIONS WHICH CAUSES IT TO BECOME POLLUTED WITH SAND, SILT, CEMENT, OIL OR OTHER IMPURITIES BE DEPOSITED INTO THE CATARAQUI RIVER.
11. PROTECTIVE SHIELDS SHALL BE USED TO CATCH POTENTIAL FALLING MATERIAL AND SHIELD THE AREA BELOW THE WORK. THE LOAD CARRYING CAPACITY OF THE PROTECTIVE SHIELDS SHALL BE CONSISTENT WITH THE NATURE OF THE WORK BEING PERFORMED IN ANY PARTICULAR LOCATION. IF THE DEPARTMENTAL REPRESENTATIVE DETERMINES THAT ADEQUATE PROTECTIVE SHIELDS ARE NOT BEING PROVIDED, THE WORK SHALL BE SUSPENDED UNTIL ADEQUATE WORK SHIELD ARE EMPLOYED.
12. THE CONTRACTOR SHALL SUBMIT TO THE DEPARTMENTAL REPRESENTATIVE FINAL DESIGN DRAWINGS OF ALL TEMPORARY ACCESS AND CONSTRUCTION PLATFORMS AND PROTECTIVE SHIELDS. THESE DRAWINGS SHALL BE FULLY DIMENSIONED AND SHALL SHOW ALL ATTACHMENTS TO THE EXISTING BRIDGE MEMBERS. DRAWINGS SHALL BEAR THE SIGNATURE AND SEAL OF THE DESIGNER WHO SHALL BE A LICENSED PROFESSIONAL ENGINEER IN ONTARIO. ATTACHMENTS TO THE EXISTING STRUCTURE, THAT IN THE OPINION OF DEPARTMENTAL REPRESENTATIVE, COULD BE DAMAGING TO ANY COMPONENT OF THE BRIDGE STRUCTURE SHALL NOT BE USED.
13. THE CONTRACTOR SHALL OBTAIN HIS OWN ELECTRICAL POWER SOURCE FOR ALL CONSTRUCTION OPERATIONS AND SHALL NOT BE PERMITTED TO USE ANY EXISTING UTILITIES ON THE BRIDGE AS A SOURCE OF POWER.
14. EXCEPT WHILE INCLUDED WITHIN A PARTICULAR PHASE OF CONSTRUCTION, THE BRIDGE MAINTENANCE WALKS, THE ROADWAY, AND ANY BRIDGE EASEMENT SHALL NOT BE USED FOR STORAGE OF MATERIALS OR EQUIPMENT AND SHALL NOT BE COVERED OR BLOCKED IN ANY WAY WITHOUT WRITTEN AUTHORIZATION BY DEPARTMENTAL REPRESENTATIVE.
15. THE CONTRACTOR SHALL SUBMIT FOR APPROVAL A PROJECT PLAN INCLUDING A DETAILED SCHEDULE IN GANTT CHART FORMAT OUTLINING THE PATH AND STEPS TO COMPLETE THE INTERIM COUNTERWEIGHT REPAIRS. THIS PLAN MUST BE SUBMITTED TO THE DEPARTMENTAL REPRESENTATIVE AT LEAST 14 DAYS PRIOR TO THE COMMENCEMENT OF WORK.
16. CONTRACTOR TO SUBMIT SITE-SPECIFIC HEALTH AND SAFETY PLAN PER SPECIFICATION REQUIREMENTS.
17. THE CONTRACTOR IS RESPONSIBLE FOR THE PROVISION OF ALL TEMPORARY SUPPORT AND PROTECTION REQUIRED TO SAFELY COMPLETE THE INSTALLATION OF THE COUNTERWEIGHT INTERIM REPAIR.

## TRAFFIC CONTROL:

1. THE CONTRACTOR SHALL PROVIDE SCHEDULE OF LANE CLOSURES FOR APPROVAL AT LEAST 14 DAYS PRIOR TO WORK COMMENCEMENT.
2. THE CONTRACTOR SHALL CONFIRM WORK OR CANCELLATION OF LANE CLOSURES PRIOR TO WORK COMMENCEMENT.
3. THE CONTRACTOR SHALL FOLLOW THE ROAD CLOSURE PROTOCOL AS OUTLINED IN THE SPECIFICATIONS.
4. ALL NIGHTLY DETOUR SIGNAGE AND TEMPORARY BARRIERS TO BE STORED AND/OR PLACED OUT OF TRAFFIC SIGHT LINES BETWEEN CLOSURE PERIODS.
5. REFLECTIVE SIGNS APPROXIMATELY 1200x7500mm WITH ADVANCE WARNING OF LANE CLOSURE PERIODS TO BE APPROVED AND PLACED AS DIRECTED BY THE DEPARTMENTAL REPRESENTATIVE.
6. ADVANCE WARNING SIGNS SHALL BE PLACED AT HIGHWAY 15 AND HIGHWAY 401.
7. TRAFFIC CONTROL PLAN FOR TEMPORARY CONDITIONS (LANE CLOSURES) SHALL BE PROVIDED BY CONTRACTOR AND BE IN ACCORDANCE WITH OTM-BOOK 7. THE TRAFFIC CONTROL PLAN SHALL BE SUBMITTED FOR REVIEW AND APPROVAL BY THE DEPARTMENTAL REPRESENTATIVE.
8. THE CONTRACTOR SHALL MAINTAIN SIDEWALK OR PROVIDE A SAFE TEMPORARY WALKWAY 1500mm WIDE MINIMUM THROUGH THE WORK ZONE. THE TEMPORARY WALKWAY SHALL BE PROTECTED FROM ADJACENT TRAFFIC AND WORK ACTIVITIES. AN ACCESSIBLE SURFACE SHALL BE PROVIDED, AND THE TRANSITION TO THE SIDEWALK ON EITHER END SHALL BE ACCESSIBLE.
9. PEDESTRIANS AND CYCLISTS SHALL BE PROVIDED SAFE ACCESS TO SIDEWALK DURING CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE TO MANAGE SIDEWALK TRAFFIC. AT A MINIMUM, FLAGGING OPERATIONS SHALL BE CARRIED OUT DURING CONSTRUCTION TO ALLOW PEDESTRIANS AND CYCLISTS TO CROSS, WHEN SAFE TO DO SO.
10. THE CONTRACTOR SHALL ENSURE THAT EMERGENCY VEHICLES ARE PERMITTED TO SAFELY CROSS THE BRIDGE AT ALL TIMES DURING CONSTRUCTION.

## LIST OF ABBREVIATIONS:

| | |
|---|---|
| ABUT. | DENOTES ABUTMENT |
| DIA. | DENOTES DIAMETER |
| EBL | DENOTES EAST BOUND LANE |
| SHLD. | DENOTES SHOULDER |
| TYP | DENOTES TYPICAL |
| WBL | DENOTES WEST BOUND LANE |

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Ontario Region

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LICENSED PROFESSIONAL ENGINEER
J.J. BERTOLA
100500440
2021/02/10
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
M. MANSFIELD
100193767
10-Feb-21
PROVINCE OF ONTARIO

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project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
NOTES

drawn by / dessine par: B. REESE
designed by / conc par: Z. BROTH
approved by / approuve par: M. MANSFIELD
tender / soumission
project manager / administrateur de projets
project date / date du projet: 2021/02/10
project no. / no. du projet: R.108246.001
drawing no. / dessine no.: S02

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MODIFIED: 2/10/2021 4:16:54 PM BY: REESEB
DATE PLOTTED: 2/10/2021 4:17:05 PM BY: REESEB

GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:

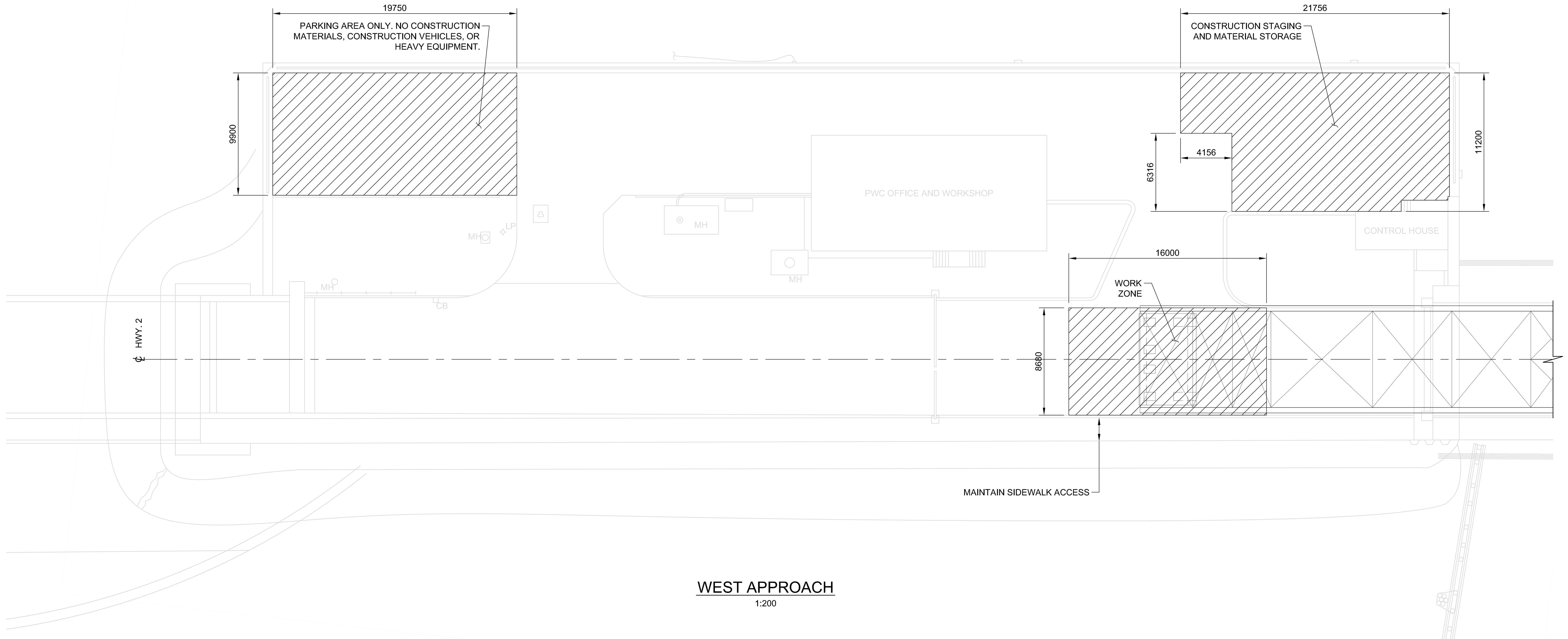
NORTH FOR CONSTRUCTION

## NOTES:

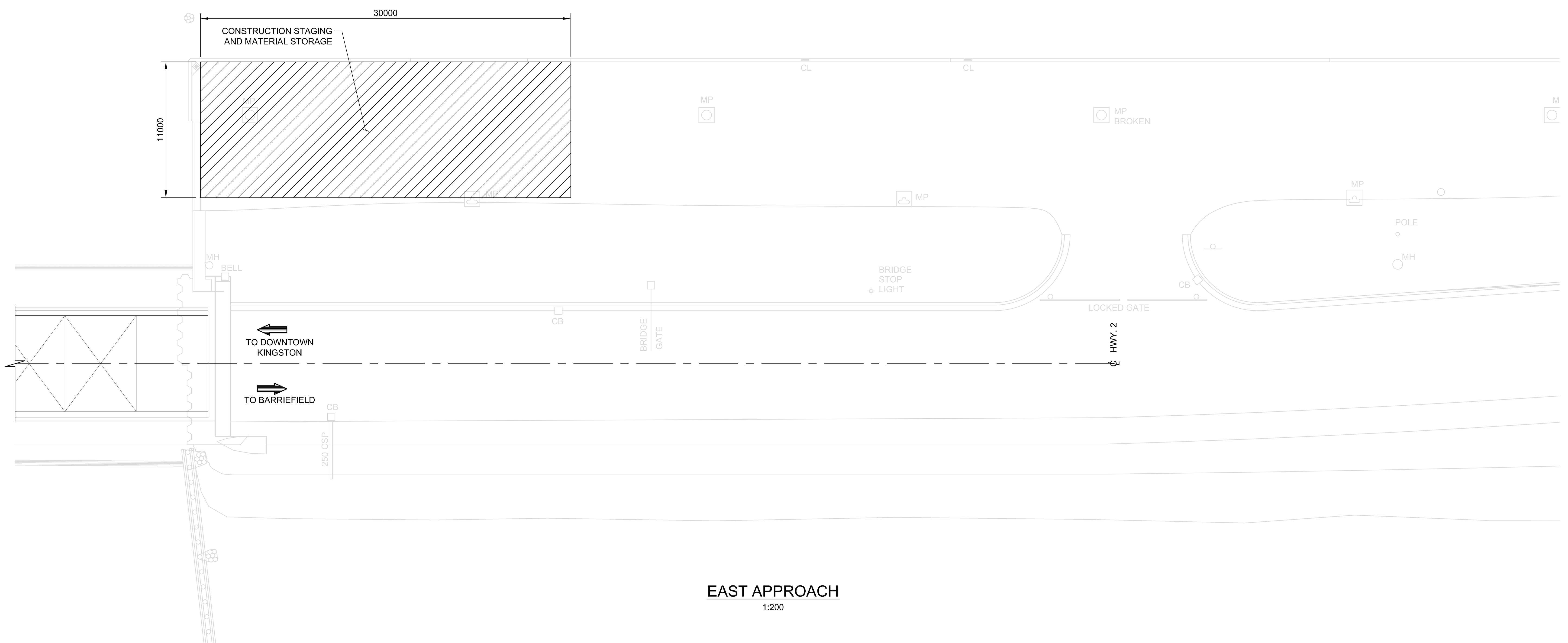
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWINGS S01 AND S02.
2. CONTRACTOR SHALL ENSURE STAGING AREA IS REINSTATED TO ORIGINAL CONDITIONS UPON PROJECT COMPLETION.

## LEGEND:

WORK ZONE




WEST APPROACH
1:200




EAST APPROACH
1:200

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project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
CONSTRUCTION STAGING

drawn by / dessine par: B. REESE
designed by / conc par: Z. BROTH
approved by / approuve par: M. MANSFIELD
tender / soumission
project manager / administrateur de projets
project date / date du projet: 2021/02/10
project no. / no. du projet: R.108246.001
drawing no. / dessine no.: S03

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GSC-B1 DATE PLOTTED: PLOT SCALE: CAD FILE:

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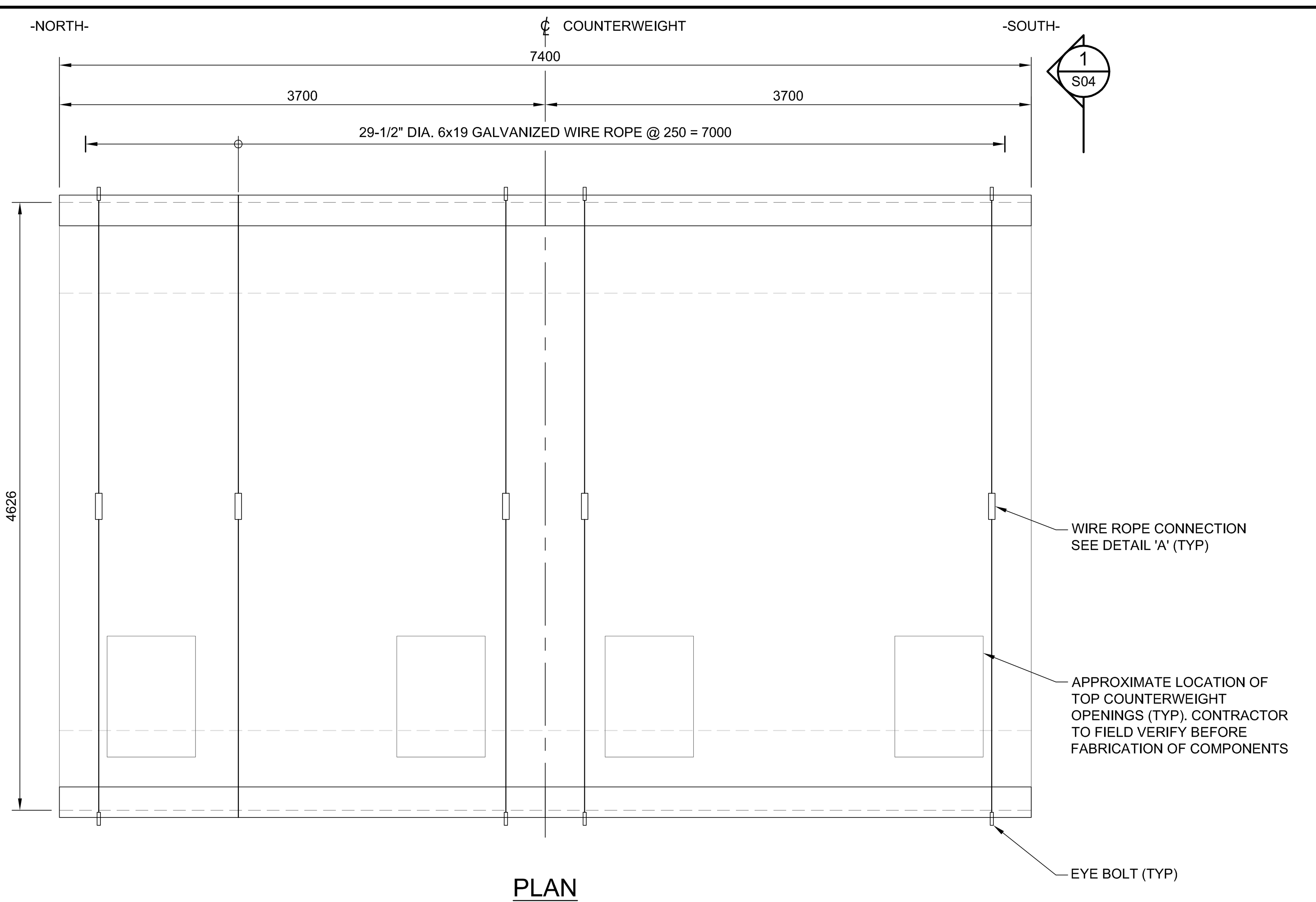


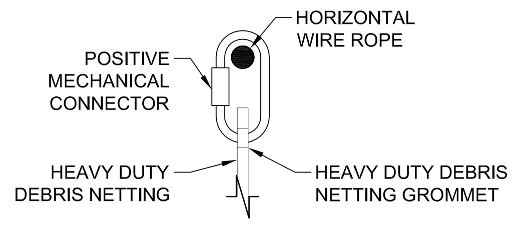

PLAN
1:30 SIDE COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.

NOTES:

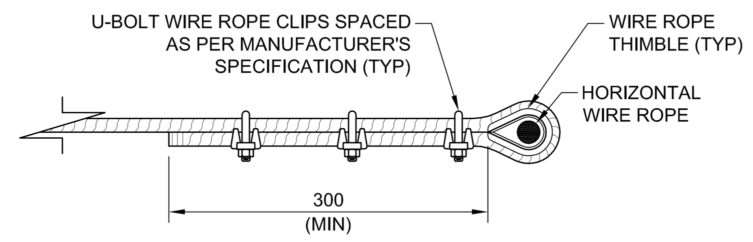
1. THIS DRAWING TO BE READ IN CONJUNCTION WITH DRAWINGS S01 AND S02.

LEGEND:

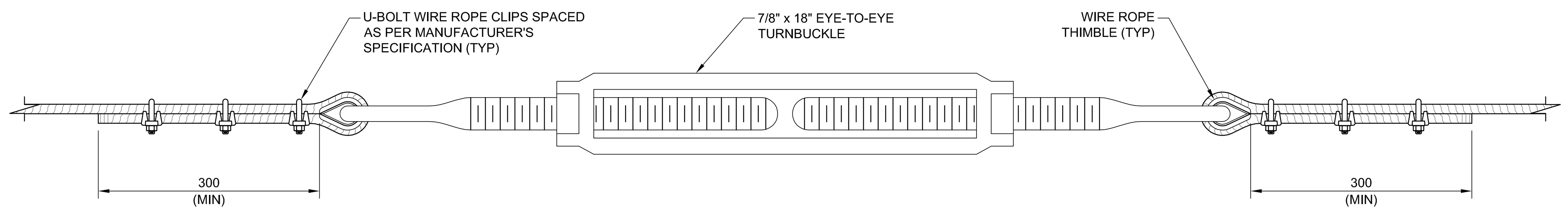
- WIRE ROPE CONNECTION
- WIRE ROPE END CONNECTION
- POSITIVE MECHANICAL CONNECTION




POSITIVE MECHANICAL CONNECTOR CONNECTION

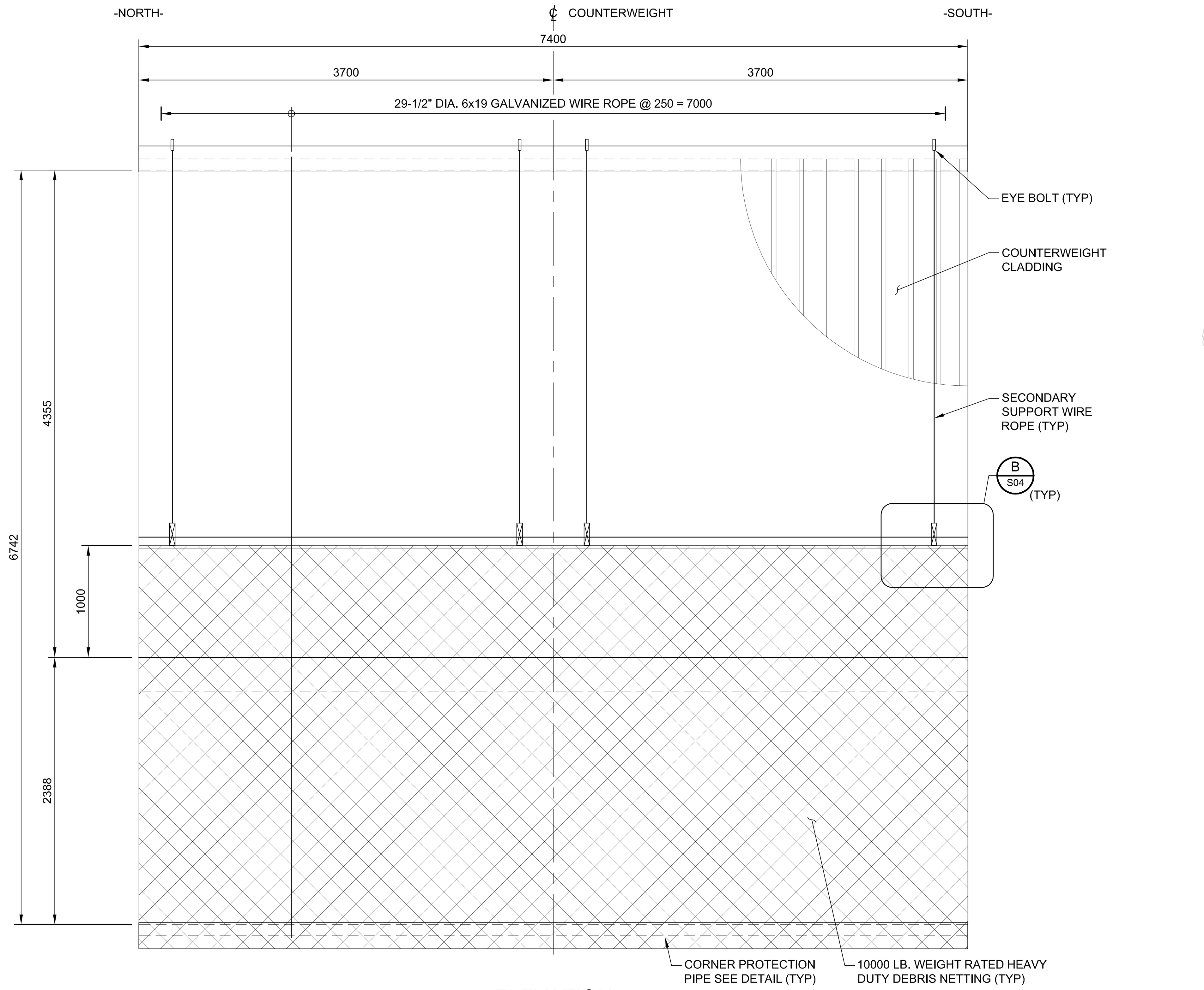



WIRE ROPE END TREATMENT

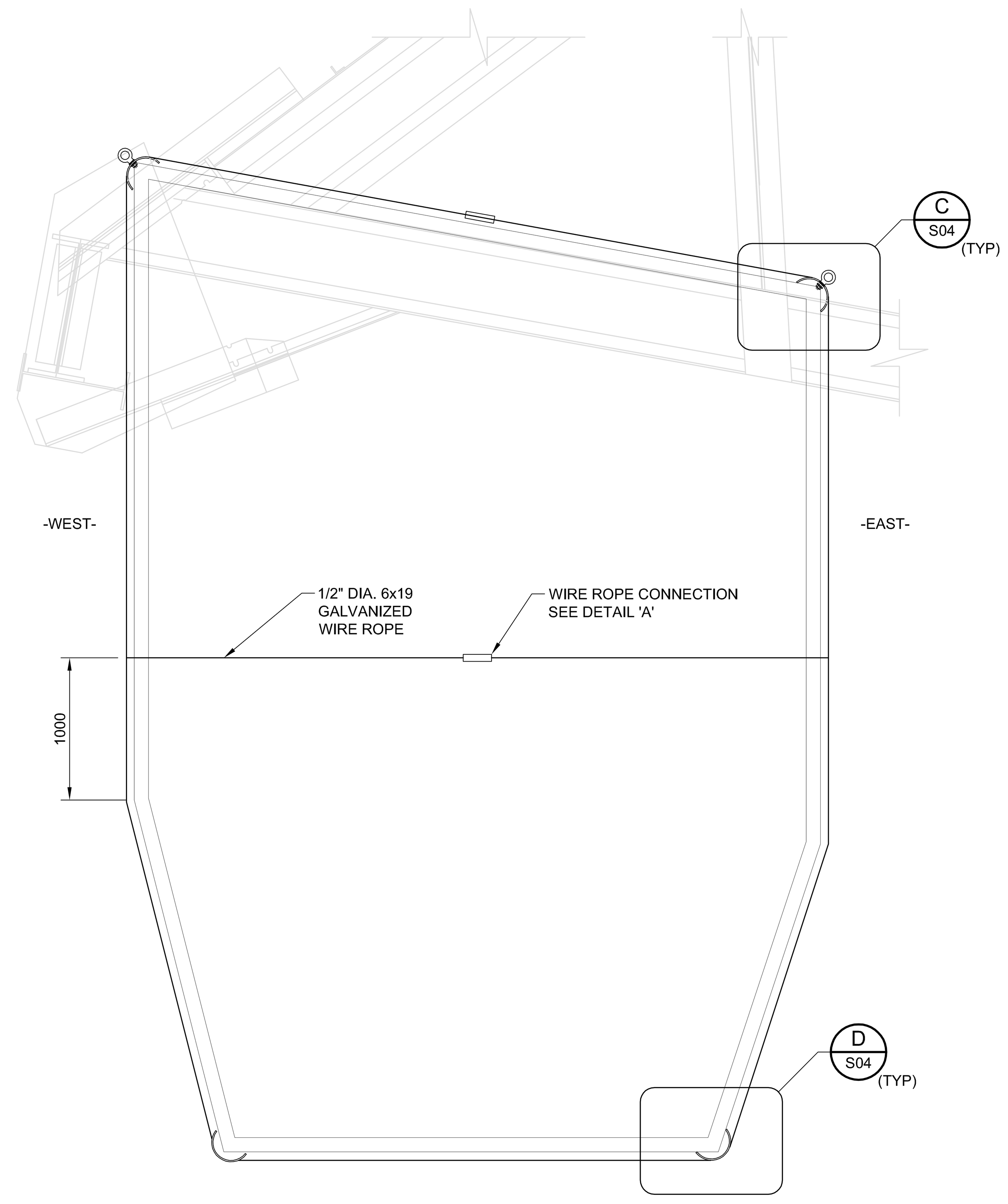



WIRE ROPE CONNECTION

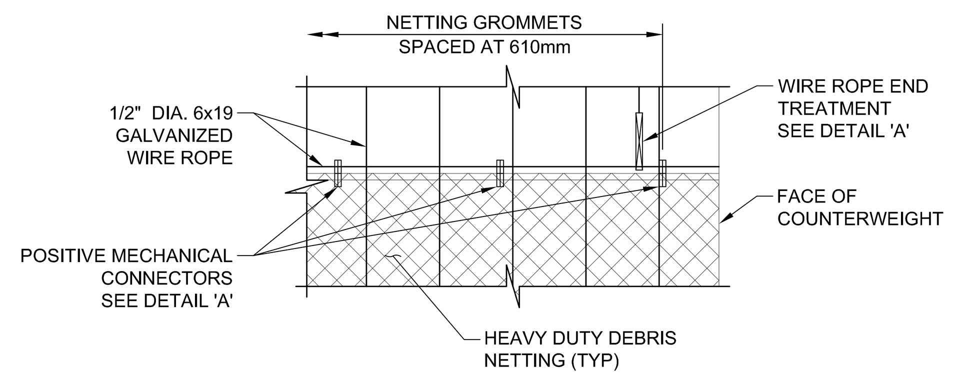
CONNECTION DETAILS (A / S04)
N.T.S.



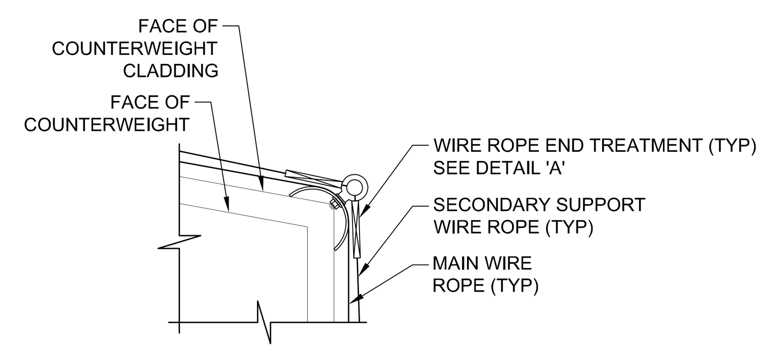

ELEVATION
1:30 TOP AND SIDE COUNTERWEIGHT POCKETS NOT SHOWN FOR CLARITY.



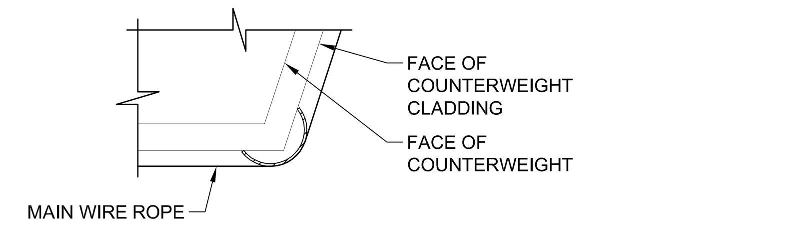

SECTION (1 / S04)
1:30 COUNTERWEIGHT POCKETS AND SECONDARY SUPPORT WIRE ROPE NOT SHOWN FOR CLARITY.



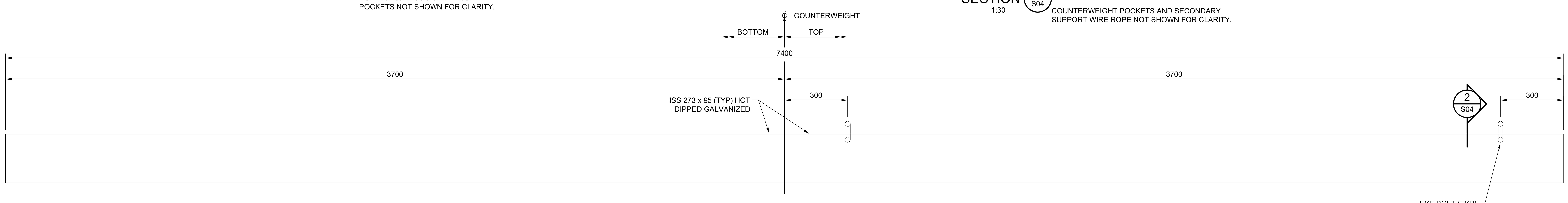

NETTING CONNECTION DETAIL (B / S04)
1:20



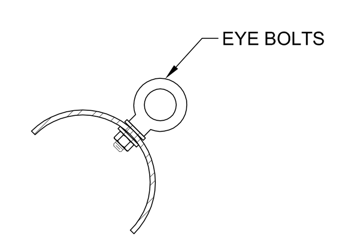

TOP CORNER PROTECTION DETAIL (C / S04)
1:20




BOTTOM CORNER PROTECTION DETAIL (D / S04)
1:20




CORNER PROTECTION PIPE
1:10




SECTION (2 / S04)
1:10

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LICENSED PROFESSIONAL ENGINEER J.J. BERTOLA 100500440 2021/02/10 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER M. MANSFIELD 100193767 10-Feb-21 PROVINCE OF ONTARIO

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project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE – COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
COUNTERWEIGHT REPAIR DETAILS

drawn by / dessine par: B. REESE

designed by / conc par: Z. BROTH

approved by / approuve par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/02/10

project no. / no. du projet: R.108246.001

drawing no. / dessine no.: S04

CAD FILE LOCATION AND NAME: M:\20m-01325-00 lasalle causeway bridge\SHEETS\002 EMERGENCY COUNTERWEIGHT REPAIR\20M-01325-00-002-004_COUNTERWEIGHT_REPAIR_DETAILS.dwg
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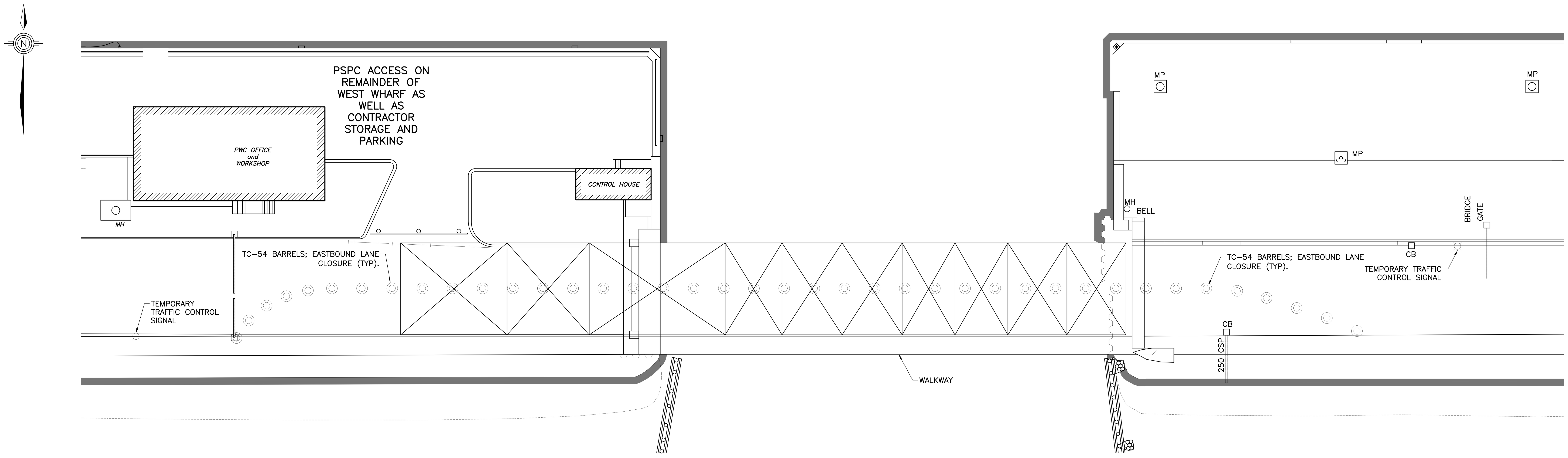
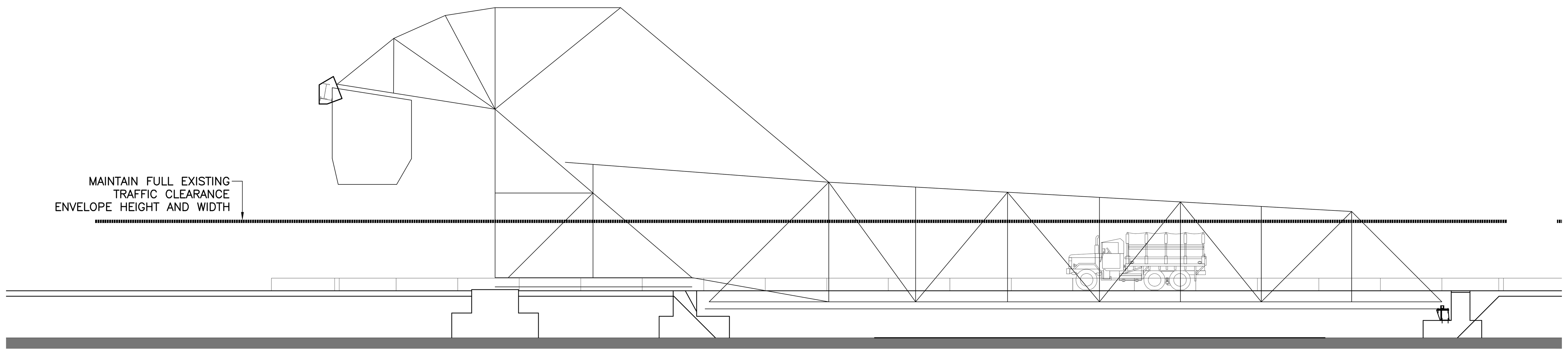


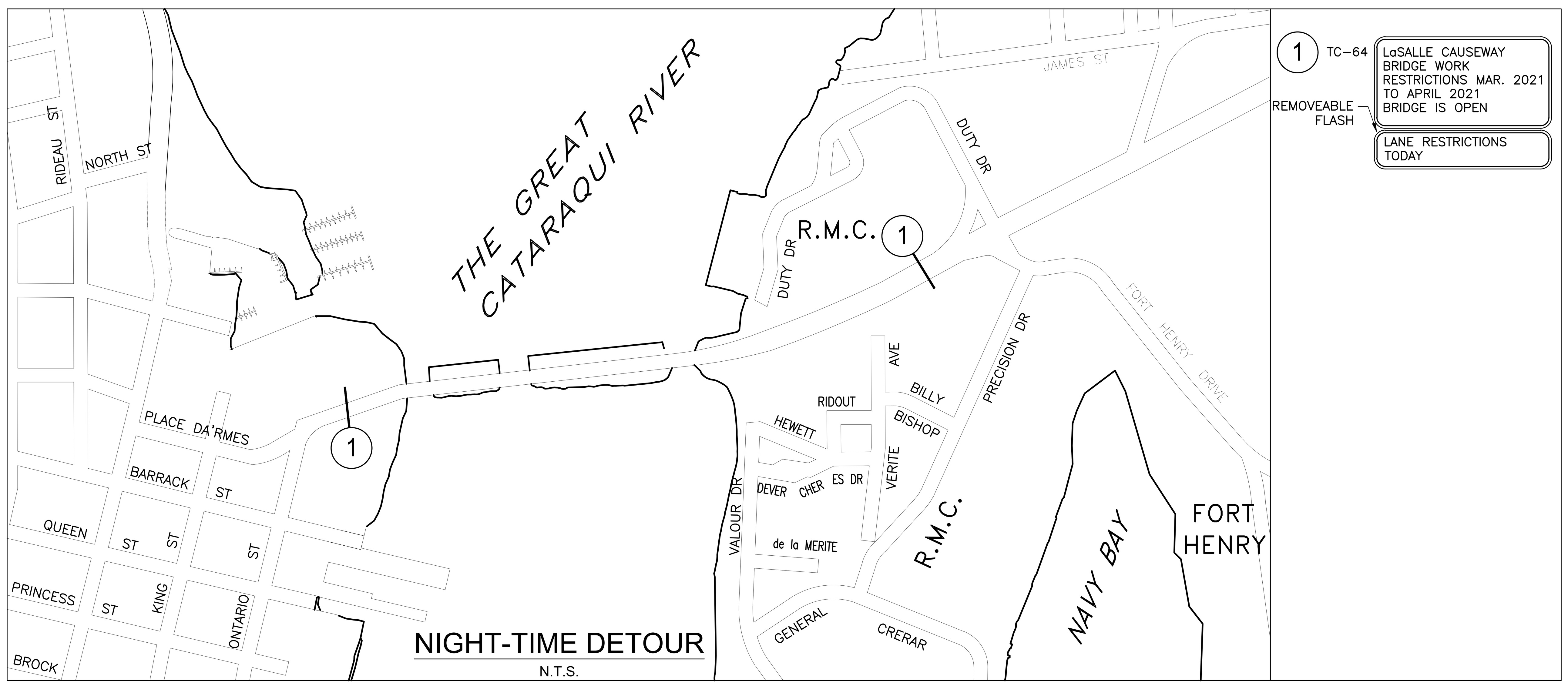

PLAN: EASTBOUND SINGLE LANE CLOSURE (MINUS SIGNAGE)

1:200




SOUTH ELEVATION

1:200




NIGHT-TIME DETOUR

N.T.S.

## NOTES:

1. THE PURPOSE OF THIS DRAWING IS TO ILLUSTRATE THE GENERAL METHOD OF TRAFFIC CONTROL DURING CONSTRUCTION. IT IS NOT A COMPREHENSIVE TRAFFIC CONTROL PLAN OR DETAILED STAGING DRAWINGS, NOR A COMPREHENSIVE LIST OF ALL THE WORKS. THE CONTRACTOR SHALL PREPARE A TRAFFIC CONTROL PLAN FOR APPROVAL AT LEAST TWO WEEKS PRIOR TO THE CLOSURE AS PER THE CONTRACT DOCUMENTS.
2. CONTRACTOR SHALL SUPPLY AND INSTALL ALL SIGNAGE AND TRAFFIC CONTROL DEVICES PER OTM BOOK 7 TL-21.
3. ALL DETOUR SIGNAGE AND TC-54 BARRELS TO BE STORED AND/OR PLACED OUT OF TRAFFIC SIGHT LINES DURING NON DETOUR HOURS. ALL DELINEATORS AND SIGNAGE/FLAGGING SHALL BE PROVIDED BY THE CONTRACTOR IN ACCORDANCE WITH THE ONTARIO TRAFFIC MANUAL, BOOK 7. DETOUR SIGNING, ADVISORY SPEED, AND LANE CLOSURE SIGNS (INCLUDING ADVANCE WARNING OR CLOSURE SIGNS) SHALL BE PROVIDED, INSTALLED, MAINTAINED, AND REMOVED BY THE CONTRACTOR.
4. TEMPORARY TRAFFIC CONTROL SIGNALS TO BE PLACED IN THE CAUTION MODE (FLASHING YELLOW) DURING NON DETOUR DAYLIGHT HOURS.
5. EXISTING PERMANENT SIGNALS SHALL BE BAGGED WHEN TEMPORARY SIGNALS AND THIS PLAN ARE IN OPERATION.
6. REFLECTIVE SIGNS APPROXIMATELY 1200x750mm WITH ADVANCE WARNINGS OF LANE CLOSURES TO BE APPROVED AND PLACED AS DIRECTED BY DEPARTMENTAL REPRESENTATIVE.
7. SPEED LIMIT SIGNS TO BE INSTALLED TO REDUCE SPEED TO 40KM/H.
8. CONTRACTOR SHALL FOLLOW THE ROAD CLOSURE PROTOCOL AS OUTLINED IN THE SPECIFICATIONS.
9. ACCOMMODATE AND GUIDE PEDESTRIANS THROUGH SITE DURING DETOURS.
10. STRUCTURE OF ALL CONTAINMENT SYSTEMS TO BE DESIGNED BY CONTRACTOR.

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100133944
2021/02/10
PROVINCE OF ONTARIO

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project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE– COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
TRAFFIC AND PEDESTRIAN CONTROL PLAN – EASTBOUND LANE CLOSURE

drawn by / dessine par: C. ZANDER

designed by / conc par: S. DAVIDSON

approved by / approuve par: M. MANSFIELD

tender / soumission

project manager / administrateur de projets

project date / date du projet: 2021/02/10

project no. / no. du projet: R.108246.001

drawing no. / dessine no.: TCP-1

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MODIFIED: 2/5/2021 11:48:25 AM BY: CAZ074035
DATE PLOTTED: 2/10/2021 4:14:48 PM BY: CAZ074035

GSC-B1 DATE PLOTTED: 1/26/2021 PLOT SCALE: 1:200 CAD FILE:

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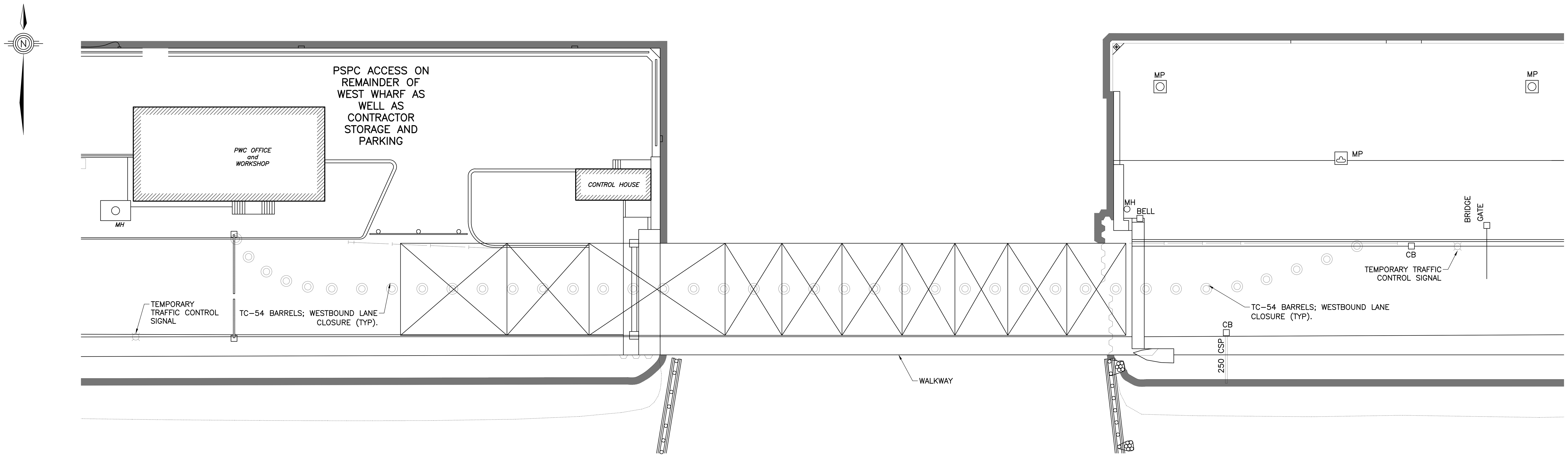
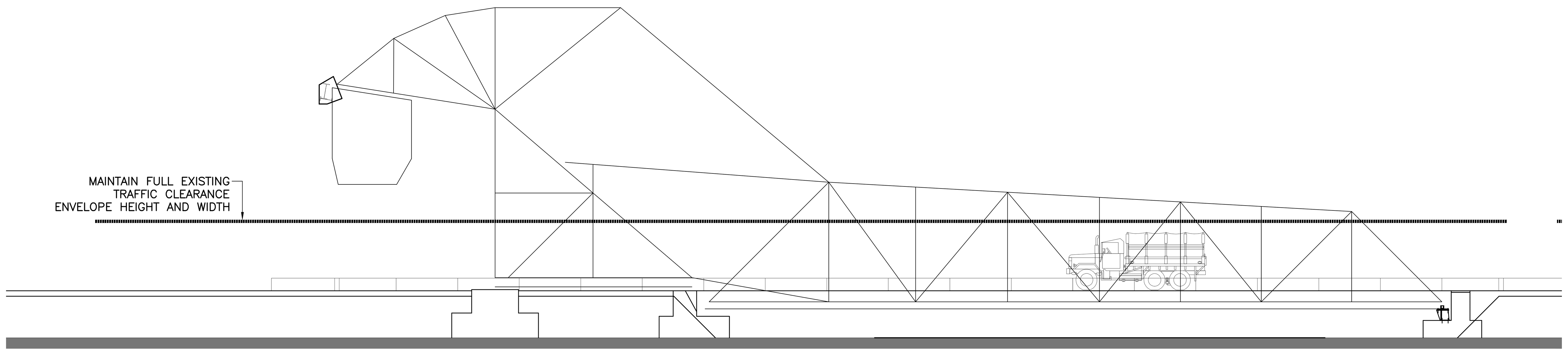


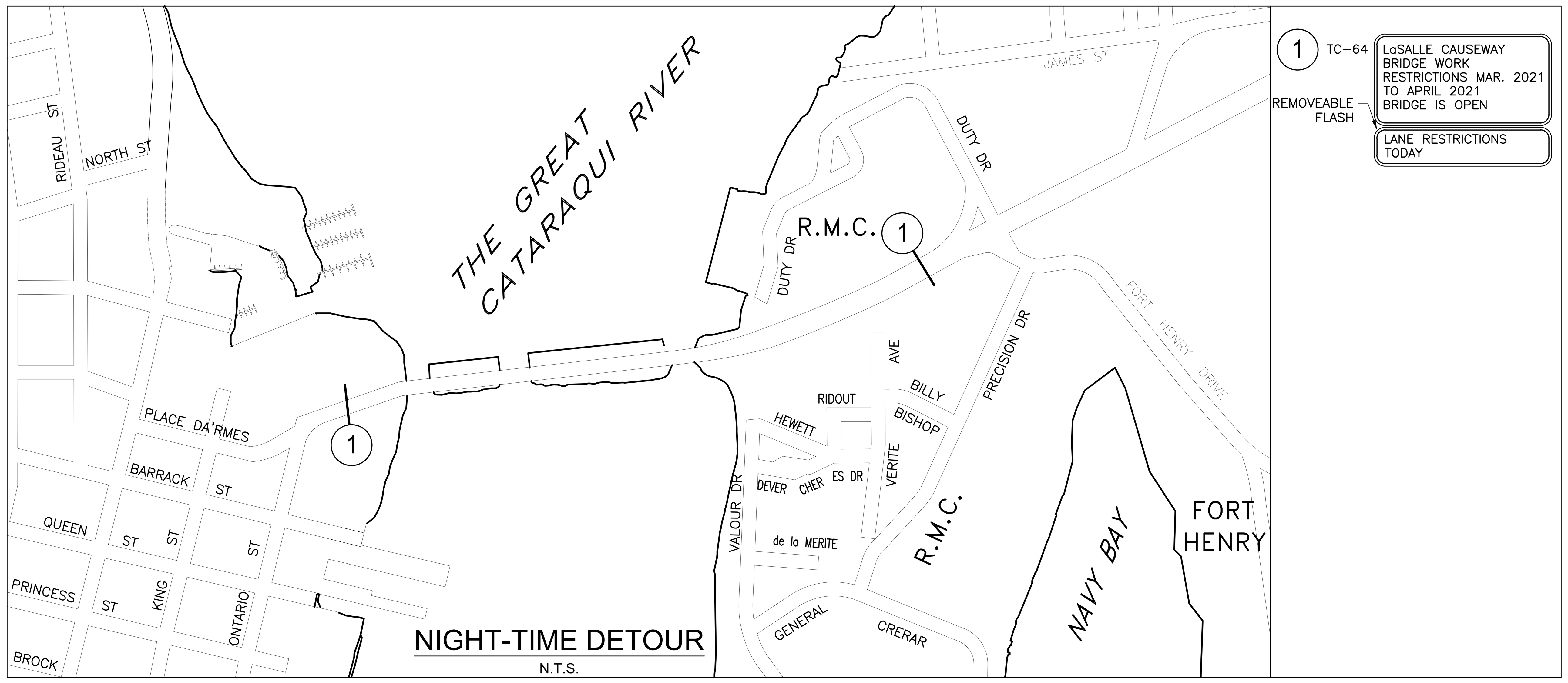

PLAN: WESTBOUND SINGLE LANE CLOSURE (MINUS SIGNAGE)

1:200




SOUTH ELEVATION

1:200




NIGHT-TIME DETOUR

N.T.S.

## NOTES:

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8. CONTRACTOR SHALL FOLLOW THE ROAD CLOSURE PROTOCOL AS OUTLINED IN THE SPECIFICATIONS.
9. ACCOMMODATE AND GUIDE PEDESTRIANS THROUGH SITE DURING DETOURS.
10. STRUCTURE OF ALL CONTAINMENT SYSTEMS TO BE DESIGNED BY CONTRACTOR.

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100133944
2021/02/10
PROVINCE OF ONTARIO

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C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE—COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
TRAFFIC AND PEDESTRIAN CONTROL PLAN — WESTBOUND LANE CLOSURE

drawn by / dessine par: C. ZANDER

designed by / conc par: S. DAVIDSON

approved by / approuve par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/02/10

project no. / no. du projet: R.108246.001

drawing no. / dessine no.: TCP-2

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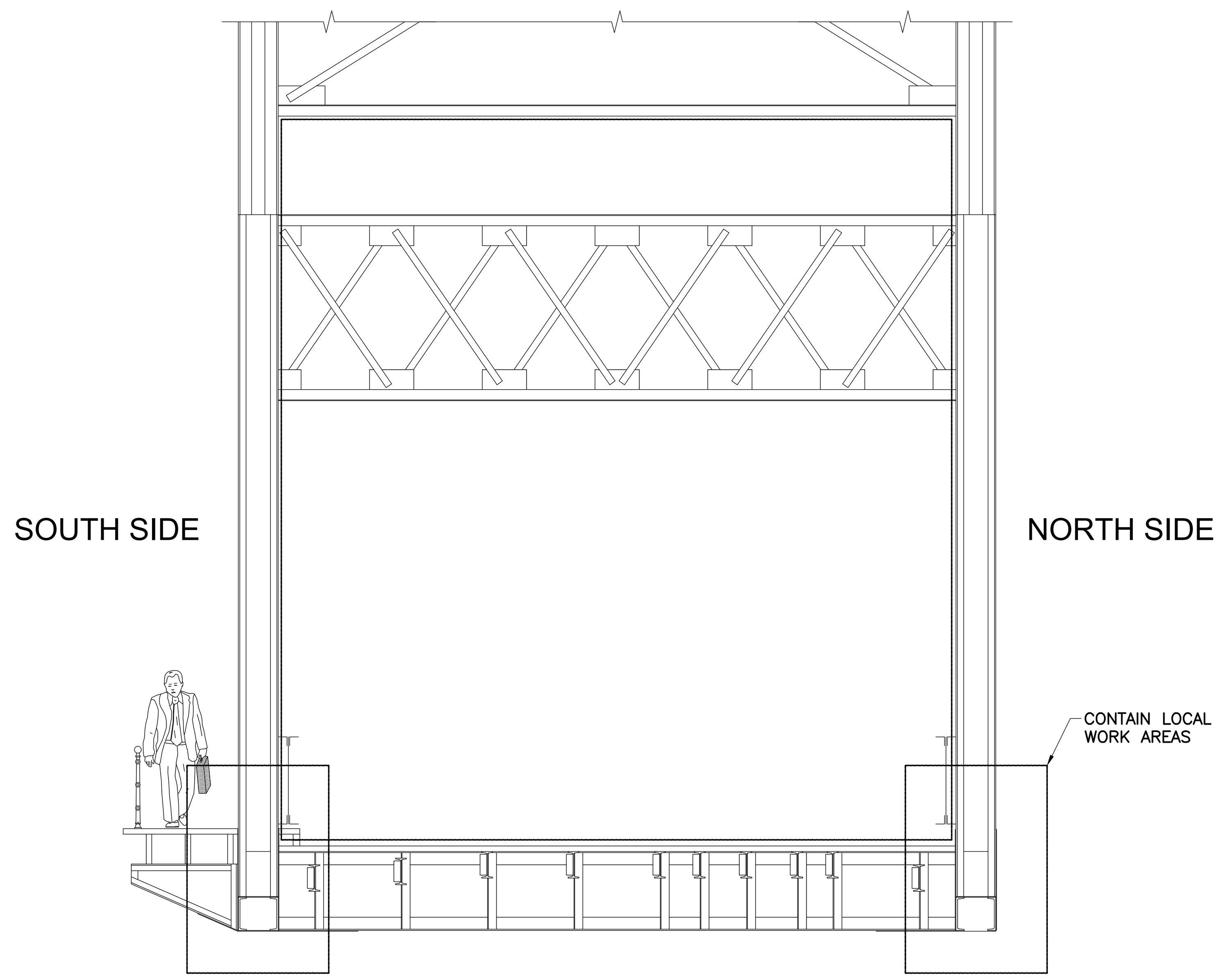
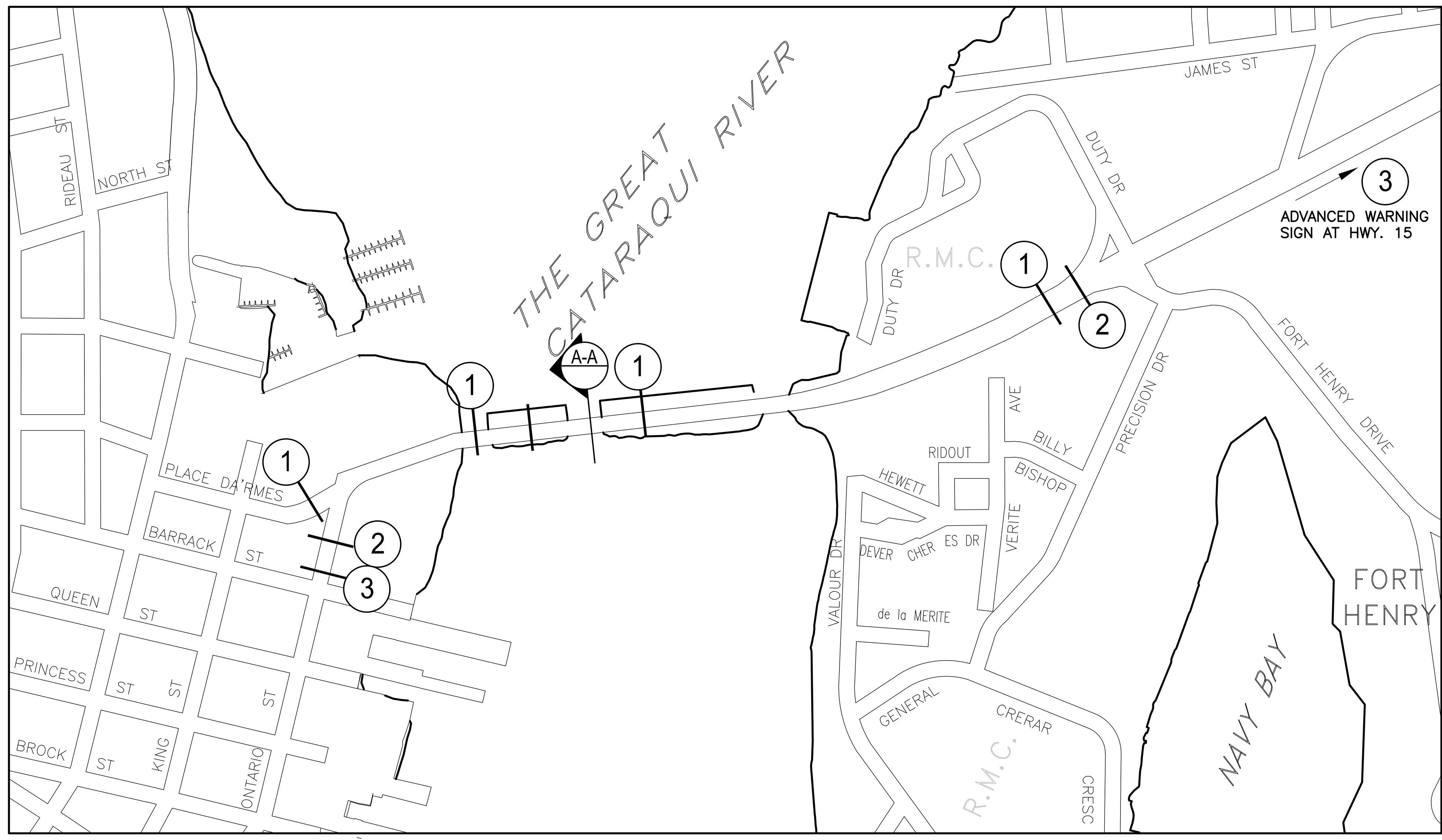



NOTE:
GUIDE PEDESTRIANS THROUGH WORK SITE

SECTION A-A
1:50


## NOTES:

1. STRUCTURE OF ALL CONTAINMENT SYSTEMS TO BE DESIGNED BY CONTRACTOR.
2. CONTRACTOR SHALL PROVIDE FLAGGERS ON EITHER SIDE OF THE BRIDGE IN ORDER TO DIRECT EMERGENCY VEHICLES AND PEDESTRIANS ACROSS THE BRIDGE DURING INVESTIGATION WORK.
3. THE CONTRACTOR SHALL NOT RESTRICT ACCESS TO BOAT TRAFFIC; HOWEVER, BOATERS WILL ONLY BE ABLE TO CROSS BY APPOINTMENT ONLY. BOATERS ARE REQUIRED TO CONTACT THE BRIDGE OPERATOR TOM VILNEFF TO MAKE AN APPOINTMENT:
TOM.VILNEFF@PWGSC-TPSGC.GC.CA
OFFICE 613-545-8359
CELL 343-551-5145
4. FULL CLOSURE SHALL BE LIMITED TO NIGHTLY OPERATIONS BETWEEN THE HOURS OF 0:00 AND 06:00. FULL CLOSURES OUTSIDE OF THIS TIME WILL REQUIRE WRITTEN APPROVAL FROM THE CITY OF KINGSTON




NOTE:
A FULL CLOSURE OF THE BRIDGE WILL BE REQUIRED FOR THE DESIGNATED OPERATIONS. THE BRIDGE WILL BE OPEN TO PEDESTRIANS AND EMERGENCY VEHICLES ONLY.

(1) TC-54

NOTE:
PROVIDE ENOUGH TC-54 TO BLOCK ROAD. MAXIMUM SPACING 600mm.

(2) TC-7 BLINKING LIGHT

TC-7tA ROAD CLOSED

TC-7tB LOCAL TRAFFIC ONLY

NOTE:
BESIDE ROAD CLOSURE SIGNS (2) PROVIDE BARRIERS and/or TC-54 BARREL CHICANE TO RESIST AND DISCOURAGE TRAFFIC.

(3) TC-64 LaSALLE CAUSEWAY BRIDGE WORK CLOSURE 00:00 OCTOBER 10TH TO 06:00 OCTOBER 13TH

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S. P. DAVIDSON
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Verify all dimensions and conditions on site and immediately notify the engineer of all discrepancies.

Ne pas mettre à l'echelle les plans.
Vérifier les dimensions et conditions sur le site et en aviser l'ingenieur immédiatement de tous divergence.

A Detail No. / No. du détail
B drawing no. – where detail required / dessin no. – où détail exigé
C drawing no. – where detailed / dessin no. – où détaillé

project title / titre du projet
Ontario
LASALLE CAUSEWAY BASCULE BRIDGE– COUNTERWEIGHT INTERIM REPAIR

drawing title / titre du dessin
TRAFFIC AND PEDESTRIAN CONTROL PLAN – FULL CLOSURE

drawn by / dessiné par: J. LEGROS

designed by / conç par: S. DAVIDSON

approved by / approuvé par: M. MANSFIELD

tender / soumission — project manager / administrateur de projets

project date / date du projet: 2021/02/10

project no. / no. du projet: R.108246.001

drawing no. / dessine no.: TCP-3

GSC–B1 DATE PLOTTED: 2/10/2021 PLOT SCALE: 1:50 CAD FILE:

CAD FILE LOCATION AND NAME: M:\2020\20M-01325-00 – Lasalle Causeway Counterweight Rehab\6.0 Dwg\20M-01325-00-Traffic Control Plan – New title block.dwg
MODIFIED: 2/10/2021 1:39:21 PM BY: CAZ074035
DATE PLOTTED: 2/10/2021 4:19:43 PM BY: CAZ074035