
Sir Isaac
Brock
Bridge

Content

I. Introduction

The Sir Isaac Brock Bridge is Located on Bathurst Street, between the intersection of Front Street West and Fort York Boulevard. Today it is a multipurpose bridge intended for cars, street cars in the middle and pedestrians on the sides. Originally intended for the great Western railway.[i] Its robust steel Warren truss construction allows it to withstand the weight over a long distance, permitting the passage of 10 railways under it.

II. Structural hierarchy

Figure 2 Illustration of structural hierarchy | Image: Léo Trédille 2025. CC BY-NC

On this steel Warren truss, the live load (pedestrians, cars, wind, etc.) and the dead load (the self-weight of the bridge) first go onto the secondary structural units: the deck, which transfers the load to the stringers (small beams parallel to the traffic), which then transfer it to the secondary beams. After that, the load goes onto a primary structural unit—the truss, which is connected with fixed joints to the bearing. Then, the load goes from the truss to the primary beams, then to the truss bearing, which transfers it to the columns, and finally to the foundation, which disperses the force into the ground.

III. Structural elements

Figure 3 Illustration of structural elements | Image: Léo Trédille 2025. CC BY-NC

IV. Rigidity and functionality

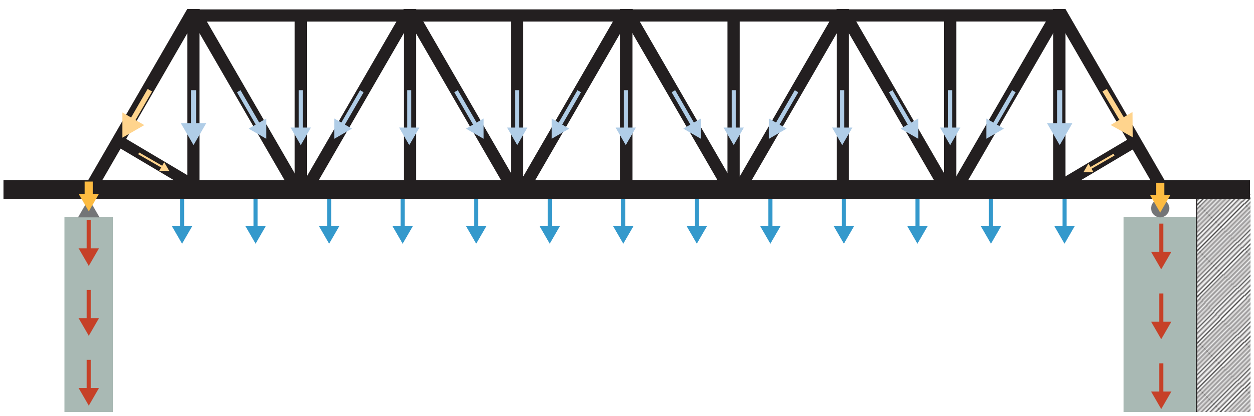

Figure 4 Load path diagram

Figure 5 Joint between truss and beams | Image: Léo Trédille 2025. CC BY-NC

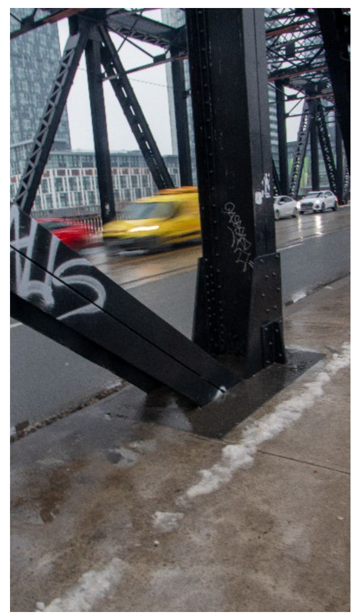

Figure 6 Joint between end post, counter bracing and beams | Image: Léo Trédille 2025. CC BY-NC

As we can see in the title image (Figure 1), the truss and structural system are made from thick steel riveted together, creating a solid and rigid structure. Furthermore, the connections between the truss and the beams are fixed connections (Figures 5 and 6), reinforcing the rigidity of the bridge. In addition, the relatively short structural spans reduce flexibility by limiting bending. Finally, the triangulated truss adds another layer of rigidity. To conclude this assemblage allows a rigid and strong structure that will resist all the live load applied and evenly distribute it through the entire structure.

V. Aesthetic improvements

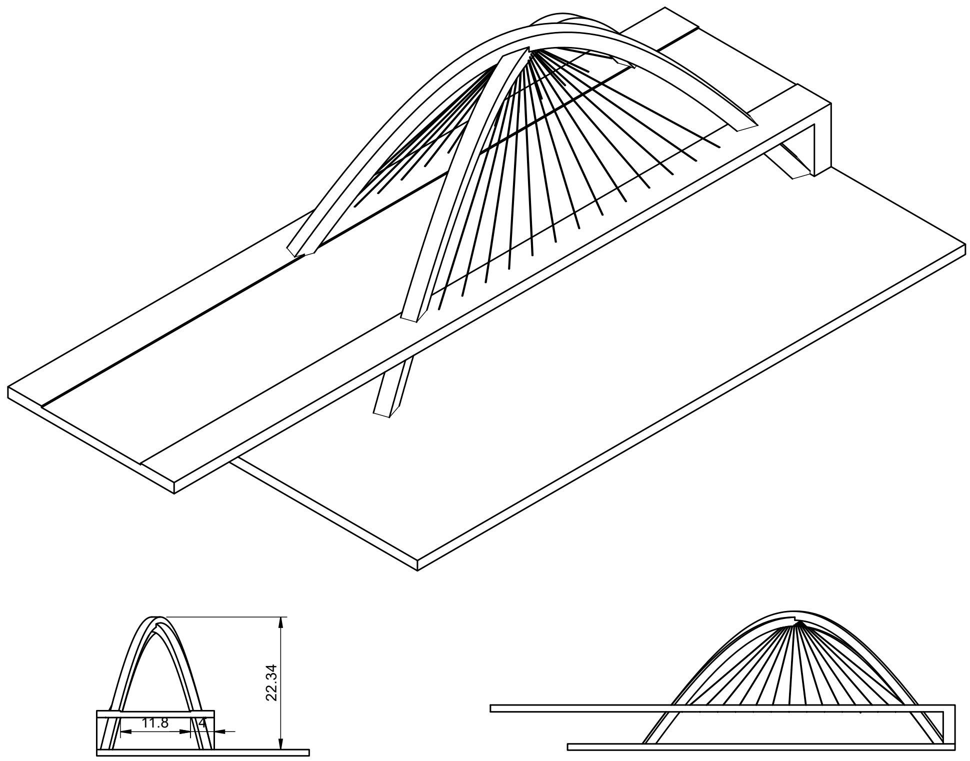

Figure 7 Sketch of the improved bridge (unit in m)

This proposed structural improvement still allows heavy traffic on top and a long span for train traffic underneath. However, this improvement uses more recent methods, with a lighter structure incorporating cables, which will blend better with the modern local site, creating a pleasant walkway and reducing the industrial appearance. The load, as in the current bridge, will first go onto the deck, then the stringers and secondary beams. However, instead of being transferred through the truss diagonals and vertical posts, the weight will be carried by cables directly connected to the main arches, which support the overall load. The dead load of the bridge will put the cables in tension, creating overall rigidity. This proposed bridge will be less rigid but will have a more evenly distributed weight, reducing the dead load at the center.

VI. References

[i] *Filey, Mike (1996). The TTC Story: The First Seventy-five Years. Toronto, Ontario: Dundurn Press. p. 39.*