

2017 Canadian Consulting Engineer Award Submission

# Tunney's Pasture Station Bus Loop and Lay-up Area Design

Presented to:

**Canadian Consulting Engineer**  
80 Valleybrook Drive  
Toronto, Ontario M3B 2S9

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**MORRISON HERSHFIELD**



## EXECUTIVE SUMMARY

### 75-WORD SUMMARY

The City of Ottawa engaged Morrison Hershfield (MH) to complete the redesign of the Tunney's Pasture bus loop to be converted to a major transfer point for riders who transferring between buses and LRT.

MH was responsible for controlling and leading the process. It was through tight management of the stakeholder-input, heavy conceptual design and the multi-disciplinary preliminary and detailed design process that the project was delivered in less than 4 months.

### PROJECT OVERVIEW

The Tunney's Pasture Station was an existing station on OC Transpo's main bus rapid transit (BRT) spine corridor. As part of Ottawa's Stage 1 Light Rail Transit (LRT) implementation, the busiest portion of this corridor is being converted to an LRT line.

The former Tunney's Pasture Station was located at the west-most limit of the BRT to LRT conversion. As such, it had to be converted to a major transfer point. All LRT riders who live west of Tunney's Pasture will have to transfer between buses and trains at Tunney's Pasture every single commute.

The new facility at Tunney's Pasture has two distinct but abutting components: an LRT station and a bus loop. The design-build Stage 1 LRT project included designs for both components. While the design-builder's design for the bus loop was fully compliant with the contractual requirements, the City of Ottawa discovered that it had a fatal flaw: it was completely incompatible with the planned Stage 2 LRT extension further west.

The City of Ottawa first approached the design builder to complete a fast-tracked redesign from the ground up. The redesign had to be ready for construction start in March 2016, and the first phase of bus loop construction had to be in service before the end of June 2016. The design builder

declined as they felt the schedule was too aggressive to achieve. The City of Ottawa then approached Morrison Hershfield in November 2015 to complete the redesign of the bus loop instead. We gladly accepted, seeing the opportunity to showcase our skills in a way that is impactful to both our client and the City in which we live.

The main objective of the redesign was to render the bus loop compatible with the planned Stage 2 West LRT extension. As designed by the design builder, the bus loop would have had to have been demolished and reconstructed in its entirety to allow for the extension. There is not enough space on site to allow staged reconstruction while the loop remains in service, and there is no alternative site that is both sufficiently large and sufficiently close to the LRT station to function as a temporary transfer point. Therefore without such a redesign, there would have been no way to construct the Stage 2 West LRT extension without major service disruptions to a large portion of riders.

The planned construction timelines for the original design were already extremely aggressive, and fell on the critical path for the construction and commissioning of the entire LRT line. Therefore it was paramount that the redesign could be constructed within the same timeframes.

The redesign also included several secondary objectives, aimed at addressing less significant shortfalls in the original bus loop design:

1. The original design included accommodations for a layby area to be constructed in an adjacent site to the west. It would be more desirable to include the layby area directly inside the bus loop, as this would increase service efficiency and decrease construction costs.
2. The original design had bus platforms spread out between the loop itself and two adjacent municipal roads. It would be more desirable to have all platforms within the loop itself, as it is planned to be a fare-paid zone. As this



eliminates the need to pay fares/check transfers and passes upon boarding, which increases rider convenience and increases boarding efficiency.

3. OC Transpo had the desire to add a fare-control entry to the northwest corner, as many of the riders work to the northwest. The original design would have required riders to walk down to the southeast corner of the bus loop to enter, only to head back to the northwest to catch their bus. As the bus loop is large, this would amount to hundreds of meters of extra walking distance for each affected rider every commute.

Morrison Hershfield started the assignment with a series of regular workshops with key stakeholders, including OC Transpo and Rail Implementation Office staff. MH rapidly iterated on many conceptual design alternatives, combining input from the key stakeholders with our in-house BRT and transportation facility design expertise. Within a month, consensus was achieved between all parties on the optimal conceptual design.

Morrison Hershfield then moved on to a fast-tracked multi-disciplinary preliminary and detailed process. Within two months, the design was fully completed and detailed including transportation design, site servicing, stormwater management, lighting, security, landscaping, and several structural elements.

Morrison Hershfield successfully delivered the design for the multi-million dollar facility in February, less than four months after the project started.

Morrison Hershfield was responsible for controlling and leading the entire process. It was only through our tight management of the stakeholder-input heavy conceptual design and the multi-disciplinary preliminary and detailed design process that the tight timelines could be achieved.

## **PROJECT INNOVATIONS**

MH started the assignment with a series of regular workshops with key stakeholders, including OC Transpo and Rail Implementation Office staff. We rapidly iterated on many conceptual design alternatives, combining input from the key stakeholders with our in-house BRT and transportation facility design expertise. Within a month, consensus was achieved between all parties on the optimal conceptual design. It was only through extensive use of our key resources that MH was able to rapidly iterate over numerous concepts during the first month of the assignment.

MH then moved on to a fast-tracked multi-disciplinary preliminary and detailed process. Within two months, the design was fully completed and detailed including transportation design, site servicing, stormwater management, lighting, security, landscaping, and several structural elements.

The redesign also included several secondary objectives, aimed at addressing less significant shortfalls in the original design:

4. The original design included accommodations for a layby area to be constructed in an adjacent site to the west. It would be more desirable to include the layby area directly inside the bus loop, as this would increase service efficiency and decrease construction costs.
5. The original design had bus platforms spread out between the loop itself and two adjacent municipal roads. It would be more desirable to have all platforms within the loop itself, as it is planned to be a fare-paid zone. As this eliminates the need to pay fares/check transfers and passes upon boarding, which increases rider convenience and increases boarding efficiency.
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### LEVEL OF COMPLEXITY AND PROJECT CHALLENGES

The project was highly complex and operational requirements of the facility were very stringent. Ottawa's Stage 1 LRT implementation extends much further east of downtown than west. Since future LRT extensions will only serve to reduce the transfer demand, it's safe to say that Tunney's Pasture will be the busiest transfer point that OC Transpo has and will ever have.

The project also had a large number of stakeholders, including:

- The federal government, who owns a large complex immediately to the north
- OC Transpo security, operations and maintenance staff who must keep the facility running smoothly on a daily basis
- The Stage 1 LRT constructors, who had to implement the design in a very tight timeframe
- OC Transpo riders, who will be impacted by each and every decision made
- Residents living in the neighbourhood immediately to the south

- Numerous other businesses that operate nearby

The facility's design required input from many disciplines with interdependent requirements, complicating the coordination of the design process:

- Transportation design of the facility itself
- Site servicing to the station, bus operator's building and supervisor's building
- Stormwater (drainage)
- Lighting
- Security, including CCTV cameras and emergency phones
- Landscaping
- A large structural retaining wall
- A temporary lightweight embankment over an existing major box sewer with limited weight-bearing capacity

All of the above listed complexities added up into a very challenging project. When combined with the extremely tight schedule constraints, success could only be achieved through exceptional project management abilities.

### CONTRIBUTION TO SOCIAL AND/OR ECONOMIC BENEFITS

The successful execution of this project significant brought significant benefits to the residents of Ottawa and the environment. Had this project not succeeded, the original bus loop design would not have been constructed. In the coming decade when it comes time to construct the Stage 2 Western LRT extension, the bus loop would have had to have been taken out of service. Without an alternate viable transfer point, transit riders would have been faced with significant delays in their daily commute. Those with the financial means to do so would have likely switched to alternate means of transportation, such as passenger vehicles. Those

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without the means would have had to suffer through countless hours of additional time lost to commuting and the associated negative impact it would have to their lives. The impact on the community and the environment would have been clear and significant.

The project is a shining example of the engineer's role as an unsung hero. The vast majority of the general public is not even aware that the redesign occurred, let alone how challenging it was or what the consequences would have been had it not succeeded. This project would make an excellent story for the public demonstrating how important engineers are to both the day-to-day lives of individuals and to society in general.

### CONTRIBUTION TO ENVIRONMENTAL BENEFITS

This project, as part of the larger Ottawa Light Rail Project, will provide a great environmental benefit as it will reduce the reliance on trips made by car and replace them with transit trips resulting in a substantial reduction in greenhouse gas emissions per vehicle kilometre.

Without the bus loop to mitigate transit functionality during construction, users would be forced to resort to using personal vehicles for the duration of construction, thus creating new habits that will be harder to break.

Unintentional benefits of the BRT system include an increased level of activity for passengers, walking to/from stop locations.

All efforts made with design of the new Tunney's Pasture bus loop and the overall OLRT plan fall in to the City of Ottawa 'Plan for Sustainability and Resilience.'

### MEETING CLIENT'S NEEDS

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