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# Hamilton Rapid Transit Preliminary Design and Feasibility Study

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## **B-LINE**

### **CONSTRUCTION PHASING STRATEGY & TRAFFIC MANAGEMENT REPORT**

Version:2.0





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An agency of the Government of Ontario





## Table of Contents

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.0</b>	<b>OBJECTIVES OF THE CONSTRUCTION PHASING PLAN.....</b>	<b>1</b>
<b>3.0</b>	<b>SPECIFIC ISSUES AND CONSTRUCTION IMPACTS OF THE B-LINE .....</b>	<b>2</b>
<b>4.0</b>	<b>RECOMMENDED CONSTRUCTION METHOD.....</b>	<b>2</b>
<b>5.0</b>	<b>PROPOSED CONSTRUCTION PHASING AND CONTRACT BREAKDOWN .....</b>	<b>4</b>
<b>6.0</b>	<b>PRELIMINARY TRAFFIC MANAGEMENT PLAN DURING CONSTRUCTION .....</b>	<b>5</b>
<b>7.0</b>	<b>FURTHER WORK.....</b>	<b>5</b>
	<b>DISCLAIMER.....</b>	<b>10</b>

# 1.0 Introduction

The Hamilton LRT B-Line consists of 13.9 km of dual track, 16 on-street stops and two terminal stops. The corridor extends east-west from McMaster University to Eastgate Square. This report outlines a Construction Management Plan during construction, and is part of and should be read in conjunction with the 'Risk Assessment Report', which is under separate cover.

It is to be noted that several fundamental assumptions were made in the course of formulating this report. If, during subsequent design exercises, these assumptions are no longer valid, the Construction Phasing Strategy and Traffic Management plan should be updated to reflect these changes.

The fundamental assumptions include:

- The Project will be executed as a Design-Build contract awarded to a qualified rail transit construction and installation contractor as an Engineering, Procurement, Construction and Management (EPCM) contract;
- The entire construction duration will be 4 ½ years;
- All property acquisitions/easement agreements will be in place prior to the commencement of construction;
- All associated works along proposed detour routes and interfaces with other modes will be constructed in advance of the main B-Line project and will be available for use during construction.

# 2.0 Objectives of the Construction Phasing Plan

The objectives of the construction phasing plan for the B-Line in Hamilton include:

- To carry out the construction and installation within a 4 to 4 ½ year period;
- To strategically activate sectional contracts in parallel along the alignment to minimize the impact on the road traffic;
- To provide continuity for certain specialized works (trackwork, power distribution, signalling and communications) across the various civil works contracts ;
- To incorporate provisions for local and emergency vehicles access to all buildings along the alignment during construction;
- To allow for staging of the start-up operation on about half of the line at year 3 ½ to year 4.

### **3.0 Specific Issues and Construction Impacts of the B-Line**

Approximately half the alignment of the B-Line is located in constrained areas, which poses a challenge to the construction of the LRT guideway and its associated systems, while still striving to accommodate heavy pedestrian traffic and maintaining emergency and local access where possible during construction.

To provide space for storage of materials and equipment, sections of the cross-streets with light traffic need to be used as part of the construction site. The exact locations of these extended work zones will be identified in the negotiations with the contractors in the construction phase.

The routes to be used for the supply of materials and equipment and the hauling of debris and excavated material will have to be identified for each contract during the planning of the construction phase.

In view of the sensitivity of restricting access to businesses, an information program has to be in place during construction for each section giving the affected parties information regarding the duration of the restricted access and the alternative arrangements for supplies, parking and pedestrian access.

### **4.0 Recommended Construction Method**

Pursuing the delivery of this project under constrained circumstances in the traditional method (detailed design, quantities take off, negotiations and agreements with utility companies for relocation of their plants, preparation of bid packages, separate contracts with civil and structural contractors, supply and install bids for trackwork and power supply distribution, and communications) and management of this process will be time consuming, a strain on the City's resources and poses a high risk of extending the construction period substantially beyond the desirable timeframe.

Recent experience worldwide and specifically in Canada indicate that in a complex urban environment, similar projects are best executed under a General Contractor managing all the interfaces between utilities companies, coordinating the work of all supply, construction and installation subcontractors and most importantly, becoming responsible for the risk of overrunning the contract cost and delaying the system delivery to The City.

In discussions with Bell Canada, it was indicated that some utility companies are prepared to work within the above stated arrangement, provided their construction and installation specifications are followed and they have the opportunity for monitoring, testing, and commissioning of the works. It is to be noted at this point that to allow each utility company to carry out individual re-locations of their plant within a cohesive and intense schedule will not be possible and will inevitably extend the construction period beyond 6 years.

Based on the above, and for the purpose of formulating the preliminary construction staging, we have assumed that the Hamilton B-Line should be implemented under one Design, Build, Test and Commissioning contract with a qualified General Contractor. The proposed preliminary construction staging in this report is based on the above project implementation framework.



## 5.0 Proposed Construction Phasing and Contract Breakdown

Based on the objectives, the project specifics and the recommended implementation method, a preliminary construction phasing and contract schedule for the project is provided in Figure 5.1.

The following major contracts are proposed:

**Contract # 1:** Construction of the Maintenance and Storage Facility (MSF) and the access track to the main line: This contract will be executed over 20 months, including 3 months of testing and commissioning. The contract will include all utilities, grading and drainage works, all civil works in the yard, structural and architectural works of the workshop, the Operations and Control Centre and other auxiliary buildings. The delivery of the first set of vehicles (~ 6 vehicles) is to be made during the 16th month.

This contract is to be executed under the management of the General Contractor discussed in Part 4 of this report.

**Contract # 2:** Advanced Structural Contract to complete the structural retrofitting of the bridge over the Red Hill Valley Parkway and build the additional retaining wall in the vicinity of Reid St: This contract is expected to take 6 months and can be immediately followed by the main General Contract as described in Part 4 of this report. Some local lane restrictions will be required for both contracts.

This contract is self standing and can be executed by a bridge contractor, based on the design provided by the General Contractor.

For the following contracts, it is recommended that a contractor be used with experience working on LRT projects as the contractor will undergo the detailed design, arrange for subcontracts for executing the utilities relocations, arrange guideway construction, trackwork, PSD and communications.

**Contract # 3:** The General Construction/Installation Contract of Section 2 (between Queen St. and Sherman Ave. with a length of 3.5 km): As mentioned above, the contractor will be responsible to manage all the works involved. The contract duration is expected to be 27 months;

**Contract # 4:** Advanced Structural Contract for the bridge over Hwy 403 and the associated retaining walls:

This contract is to be preceded by a 6 month detailed design exercise performed by the General Contractor in coordination and agreed upon by the Ministry of Transportation of Ontario.

The construction will be performed by a specialized sub-contractor and is expected to take 18 months. Some detours during the construction of the piers will be required with traffic shifted to the right using the right shoulder of one of the Hwy 403 roadways.

**Contract # 5:** The General Construction/Installation contract of Section 4 (from Parkdale to Centennial Parkway with a length of 2.8 km): This contract will be executed in a similar fashion to Contract # 3. The duration will be 27 months starting in the middle of Year 1 and completed in the fall of Year 3.

**Contract # 6:** The General Construction/Installation Contract of Section 3 (from Sherman Ave to Parkdale Avenue with length of 4.2 km): The duration of this contract is expected to be 26 months starting at the end of Year 2 and finishing in the end of Year 4. Assuming the MSF is linked to the main line somewhere within the range of contracts 2, 5 or 6 (between Queen St. and Eastgate Square), a demonstration operation can start between Queen St. and Ottawa St. in the middle of Year 4, followed by a stage one commercial operation between Queen St. and Eastgate at the end of Year 4.

**Contract # 7:** The General Construction/Installation Contract of Section 1 (between McMaster University and Queen St. with a length of 3.5 km): The duration of this contract is expected to be 24 months and commence in Spring of Year 3 ending in Spring of Year 5.

The system-wide Testing and Commissioning and final acceptance will take 9 months; in the last quarter of Year 4 and the first half of Year 5.

## 6.0 Preliminary Traffic Management Plan during Construction

The B-Line Corridor is a major road traffic carrier particularly in the west direction. The corridor has two-way traffic at the west end: from McMaster University to Paradise Street South and at the east end between The Delta and Centennial Pkwy. The rest of the route has one-way westbound traffic along King and Main Streets. The LRT configuration will convert a portion of Main St. between The Delta and the Queenston Circle into westbound lanes only. Through the International Village (between Wellington Street and Walnut Street) the LRT is shared with local traffic in both directions, with a short section between Walnut Street and Mary Street) having no active traffic lanes.

The change in capacity related to permanent traffic diversions along the alignment has been modeled with the VISSIM model and is documented in the VISSIM Final Report. Figures 6.1 and 6.2 show the traffic diversion routes, as identified in this report.

During the construction period, the width of some road lanes will further be reduced to accommodate the construction of crossing utility protection, particularly at intersections where several utilities are perpendicular across the guideway. Also, the lane width will be further restricted by the relocation of curbs, the catch basin re-configuration, and the placement of working equipment.

For most of the alignment this translates to a need to redirect traffic during construction to designated detour routes which will be in place for about 18 months for each of the sections (see Figure 5.1)

The ideal construction diversion routes will be the ones designated as part of the permanent diversion, although some traffic will have to find additional alternate routes, depending on the origin and destination of each trip. Note that as part of the development of the detailed construction phase traffic management strategy at a later stage of the project, the contractor will need to develop site and sector specific traffic management proposals to suit his particular intended construction sequence (which may not be the same as the one presented in this document). Final determination of the traffic detours during phased construction shall be investigated further in relation to their impacts on the immediate network. Figure 6.3 shows the most immediate alternatives for sectional diversions during construction.

For Section 1, Contract 7, it is expected that the permanent traffic diversions should be generally sufficient to accommodate traffic rerouting during the construction (provided that intersection improvements at York Blvd/Dundurn Street and on Aberdeen Avenue are carried out ahead of construction of the LRT). Should further detailed consideration show that the existing street network cannot accommodate all the westbound traffic deviated from King St, it may be necessary to consider other measures such as the temporary conversion of part of Main Street West to two-way operation. The existing road configuration is 5 traffic lanes between Dundurn St. and Locke St. and 4 traffic lanes between Locke St. and Queen St. which could make it possible for a contractor to manage the construction of the guideway and still allow two traffic lanes to operate in each direction on Main St West, although this would be more challenging on the 4 lane section.

Within each section during construction, the crossing roads will be kept open at all times except short term night closures if required. To achieve this, all works will be staged half way across the ROW of the crossing road.

The detailed construction site plans and schedules will maintain at least one lane for limited local access and service and emergency vehicles access. Local access directions will be provided to residents and businesses showing the permitted traffic circulation between the parallel the corridor roads and the crossing roads.

A City-wide campaign to seek reduction in automobile traffic through each section under construction should be undertaken as well. Public awareness campaigns are also identified in the *Construction Safety and Security Plan*.

## 7.0 Further Work

During the construction detailed planning stage, the General Contractor and The City will prepare detailed traffic circulation plans involving the through-traffic, local access traffic and construction traffic. Opportunities to open sub-sections for traffic earlier than 18 months from start of construction should also be identified.

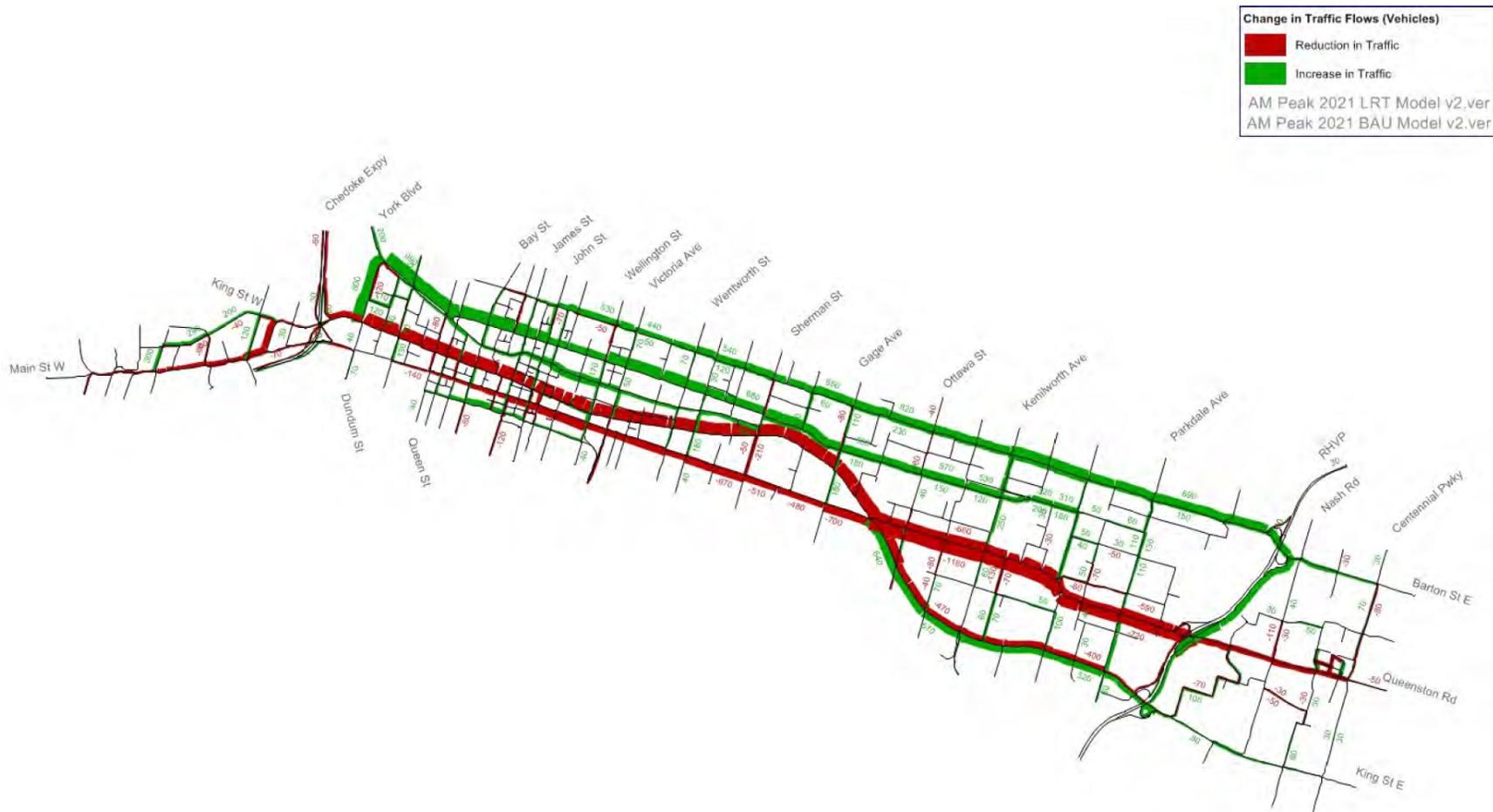
Continuous traffic monitoring during construction should be in place to identify bottlenecks and resolve localized problem intersections.

## ***Hamilton B-Line LRT***

Construction Phasing Strategy and Traffic Management Report

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**A Traffic Response Center should be put in place to address grievances of road users and advise/issue permits for specific needs.**



**Figure 6.1 Permanent Traffic Diversion as identified in VISSIM Report**  
**(Source: VISSIM Model Report, Final Report, July 2011, SDG)**



**Figure 6.2: Traffic Volumes and V/C Ratio for east-west roads affected by LRT**

(Source: VISSIM Model Report, Final Report, July 2011, SDG)

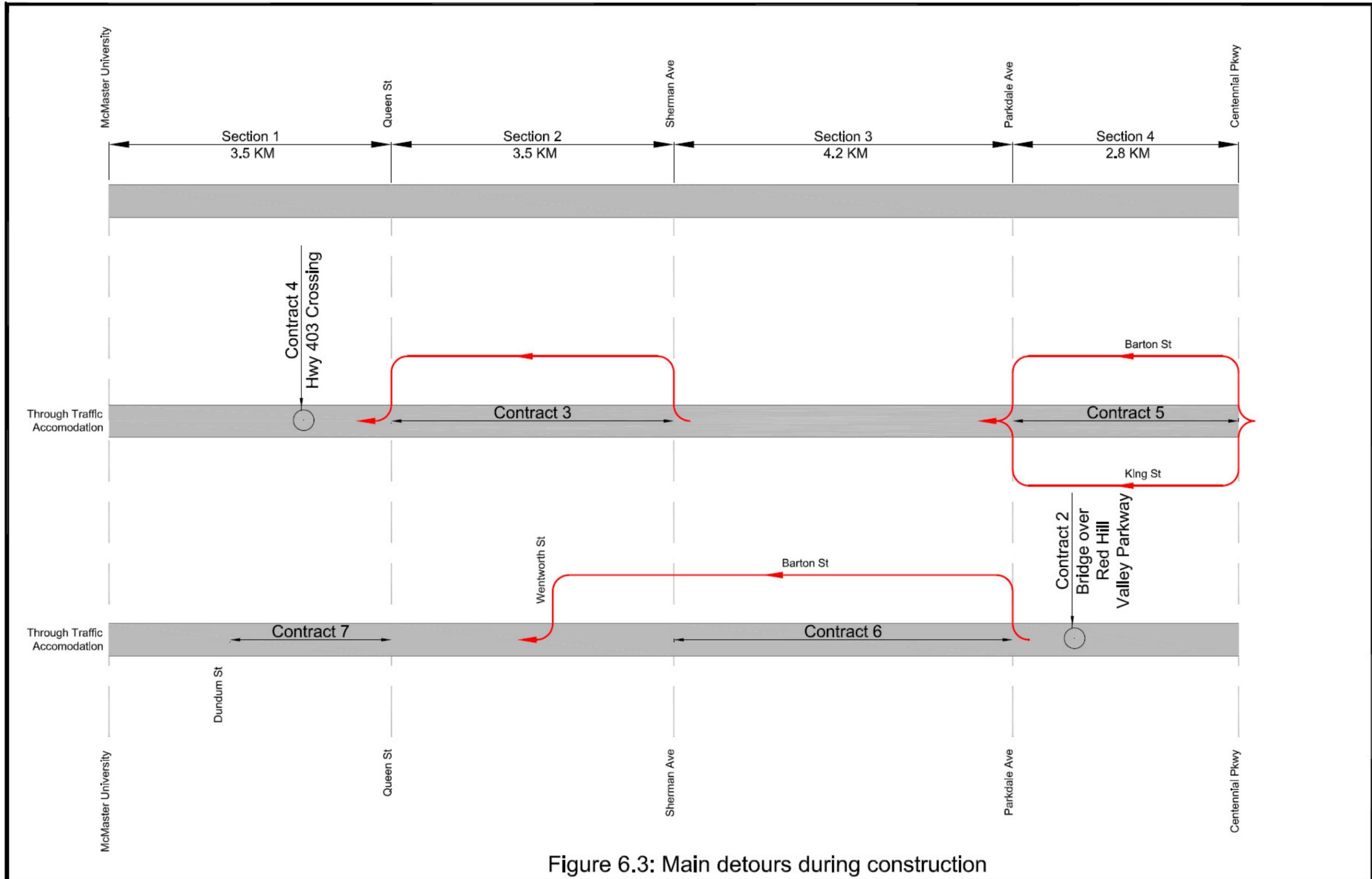


Figure 6.3: Main detours during construction

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