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# Hamilton Rapid Transit Preliminary Design and Feasibility Study

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## B-LINE

### SAFETY AND SECURITY PLAN

Version: 1.0



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November 2011

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## 1.0 Introduction

This brief discusses indicative elements that should be considered for the detailed Safety and Security Plan which must be developed before the commencement of construction activities, as well as highlights safety measures to address passenger safety during operation of the B-Line LRT.

The hereby presented Safety and Security Plan during and after construction outlines key indicated actions for effective safety and security management of the B-Line LRT during the construction stage and immediately prior to commissioning. The Plan hereby presented is developed in agreement with the Ontario Ministry of Labour Occupational Health and Safety Act, Workplace Safety and Insurance Act and Regulations, and any other applicable laws and codes.

In addition, the Plan, once reviewed in the next design phase, should include all site-specific safety requirements stipulated by the City and any concerned stakeholders.

Safety and security measures for passenger safety are generally covered in Section 10.5 of the Project Design Criteria entitled 'Passenger Emergency Communication', under separate cover. Key elements of passenger safety are covered in Section 3 of this brief.

## 2.0 Safety and Security Plan During and After Construction

The City shall prepare a set of criteria for Safety and Security during and after construction of the LRT system. These criteria should define the provisions The Contractor(s) should maintain at all times during construction, installation, testing and commissioning. The main criteria should include:

- Minimum travel time for emergency services through the construction zones from pre-determined approach/exit points;
- Adequate and safe provisions for pedestrian walkways;
- Acceptable road surface requirements for emergency routes for speed and safety;
- Proper visibility of all traffic and pedestrian lights;
- Provision of and access to fire hydrants at all times;
- Maintenance of acceptable illumination levels during construction and installation;
- Definition of material and equipment hauling routes;
- Provisions for emergency communications during and after construction.

These criteria should be used by The Contractor(s) to prepare a Safety and Security Plan for the various segments and stages of the construction.

The plan should identify areas along the corridor where construction will take place and be cognizant of risks in each location. It should address events which may necessitate the closure and/or evacuation of an area. The project team will review emergency procedures relating to these potential events to ensure measures are incorporated into the emergency response plans to activate the project emergency response protocols should an external event occur.

### 2.1 Safety Management System (SMS)

A good Safety Management System [SMS] shall be designed in accordance with OHSAS 18001 standards. The SMS shall provide instructions, procedures and processes to ensure health and safety are effectively managed. The SMS shall be used extensively on the project by both the Contractor and all subcontractors.

The key elements of a Safety Management System include defining roles and responsibilities, identifying hazards and mitigating risks, defining a safe work program, providing adequate training and defining inspection and monitoring protocol.



#### Roles and Responsibilities

The SMS shall contain specific details which identify how the contractor will fulfill its obligations. A qualified and competent Project Safety Manager shall be assigned to lead the implementation of the SMS and the Safety and Security Plan. The Project Safety Manager shall ensure proper coordination amongst all concerned parties.

Subcontractors should be informed of their project safety and security requirements and should nominate key individuals who will be responsible for enforcing and maintaining these requirements. Subcontractors should present to The General Contractor and The City their own SMS as applicable to their type of works. Subcontractors will be informed of their responsibility to communicate project safety and security requirements to any of their subcontractors.

#### Hazard Identification and Risk Management

The Contractor should conduct a Hazard Identification and Risk Management workshop prior to opening any sector for the construction of the B-Line. Identification of project hazards must be the first step towards understanding and managing risks, and for developing safe work procedures.

The Contractor should propose a process to register risks and formulate risk management strategies. The risk registry will include all activities along the corridor and an evaluation of all hazards associated to it. This registry will serve as an input into the determination of proposed controls, safeguards, training, etc. The risk registry will be revised periodically and all concerned parties will contribute to its development. In particular, an examination of external risks related to public and motorist safety will be evaluated to ensure the proper controls are in place to protect these groups from project health and safety risks.

The Contractor should carry out a task safety analysis (TSA) of all activities associated with the construction work. The TSA will address operational constraints related to the work areas, schedules for performing the works, and permits and approvals. The TSA will ensure that all tasks are carried out with minimum risk, in conjunction with the risk registry.

Furthermore, the TSA process at the supervisory level will include an examination of the work components and sequencing, the equipment and materials involved in the task, the work methodology to execute the task and the task safe work procedure requirements. All tasks will be evaluated in relation to the expected vehicular and pedestrian movements as well as requirements from Emergency Services vehicles.

#### Safe Work Programs

After carrying out all the above stated analysis, a comprehensive safe work program shall be developed addressing all aspects of construction. For example, Traffic Safety procedures shall be used extensively in areas where motorists are in close proximity to work areas, and Public Safety and Security programs should protect the public by identifying, controlling and securing areas to ensure the integrity of the construction.

#### Training

Every resource assigned to a working task must undergo required training to deal with potential risk situations of their environment. All construction personnel will be regularly trained on safety policies and procedures. The Contractor will keep a log of all orientation provided to all contractors, workers, consultants, inspectors and visitors entering the project areas.

The subcontractors shall also be required to demonstrate proper training of their employees prior to commencing work. Subcontractor training records and certificates may be sought to verify previous training. In some cases additional training may be stipulated to the subcontractors, particularly for unique tasks or project specific activities for which the subcontractor may not have had previous experience or training.

All authorized visitors to the site such as City officials, materials and equipment suppliers and maintenance personnel, should be briefed on the safety procedures and requirements to be followed while on the site.

#### Inspections and Monitoring

Inspections and monitoring will validate compliance to the Safety and Security Plan, SMS and OH&S legislation. The City or its representatives may use a variety of different processes to ensure that hazards and

risks are not occurring during construction. Monitoring will be part of the daily processes for all supervision and safety personnel, and will be supported by inspection reports. All inspections will be reviewed by the City or its representative and any corrective actions arising from the inspection reports will be tracked through to resolution.

In general terms the following monitoring and inspections will be performed:

- Personal protective equipment;
- General site conditions, tools, materials and processes;
- Equipment inspections [and certifications as required];
- Preventative maintenance program inspections;
- Specialized inspections, ie; fire safety, project security, public safety etc;
- Joint Occupational Health and Safety Committees.

The format and frequency of the inspection processes will be contingent on the type(s) of inspections being performed; however as a general rule the following will apply:

- Equipment, tools, materials and personal protective equipment will be inspected daily. Most will require a written inspection form to validate proper inspection;
- General inspections of work areas and activities will be performed daily. These inspections, if performed by one person will be considered informal and if performed by more than one person will be considered formal. Formal inspections will be documented;
- Project safety personnel will document inspections of all areas of responsibility with no less than one documented inspection of each area per week;
- Weekly Inspections shall be performed by more than one person and documented;
- Records of all inspections will be maintained by the City and its representative on the project and summarized each month for record keeping.

#### Emergency Response

The Project Emergency Response Program will ensure an effective line of communication for proper interaction between the project and emergency response agencies. Key project personnel will receive Incident Command System training to ensure effective interaction with provincial emergency response services personnel. All contractor personnel on site should have quick access to emergency communications set up by the Safety and Security Plan.

The Emergency Response Program will encompass the following key elements:

##### *Incident Reporting*

All Project personnel, City Representatives and Management of Emergency Services will be informed of all incidents or near misses, regardless of severity immediately.

##### *Incident Notification*

Incident Notification flowcharts will be developed and provided to the City and its Emergency Services, key project contacts, City representatives, property owners, emergency response agencies, utility owners and other key individuals or agencies listed. Incident notification flowcharts will be updated throughout the course of the Project to ensure accuracy of personnel, conditions and project areas.



### *Emergency Response Plans*

Emergency response plans will be developed as needed to identify the intended primary and secondary command and control areas and the methods for initiating the emergency response. These specific emergency response plans will also identify evacuation muster stations, hazardous materials storage areas, fire fighting water supplies, site first aid facilities as well as project equipment and other resources which are available for use during emergencies.

### *Public Information*

Safety is everyone's responsibility; therefore it is important to conduct public awareness campaigns to raise the level of public conscience in relation to the Project. The General Public should be continuously updated on safety and security situations, events and risks and an open information line should be provided to respond to concerns of the public. Reporting accidents should be streamlined through designated spokespersons on behalf The Contractor, The City and the Emergency Services Management.

## **3.0 Safety and Security Measures for Passenger Safety during operations**

Passenger safety is a vital aspect of the design of the LRT stop configurations as well as a part of the communication system.

### Stop configuration

The following elements have been included in the design of the stops to allow for greater safety and security of passengers:

- The stop design should make extensive use of glass at platform level to strengthen visual connectivity.
- The platforms should be illuminated by lights mounted on the catenary poles, pole mounted light fixtures, and by the lights at the shelters.
- The street fire hydrants should have the capacity to cover the stop platforms.
- A detectable warning surface is used along the edge of the stop platforms and will be used at the intersection of the ramp and cross walk in accordance with the City of Hamilton's Urban Braille requirement.
- Stop Emergency Cabinets - Located on each platform are Stop Emergency Cabinets. These shall contain an Emergency Services Telephone, a standard PABX telephone, a fire extinguisher, and a keyed reset switch for the integrated alarm system IADS. The Emergency Services Telephone should be accessible by the passengers upon breaking through a protective cover. The CCTV cameras should cover the Stop Emergency Cabinets to facilitate investigation and protection from unwarranted use.

### Passenger Emergency Communications

#### *Types of Emergency Communications*

Each vehicle will be provided with the following:

- Discrete Passenger Alarm Strips,
- Passenger Alarm Call Buttons,
- Passenger Intercoms,
- Vehicle Health Monitoring.

Activation of any of the above alarm systems will result in an alarm being raised in the Operations Control Centre and with the Driver. The driver will be responsible for answering the call, but under certain situations the Operations Control Centre operator will handle the call. The system can also be configured for direct communication with emergency response services.

#### *Passenger Emergency Intercom*

This radio system allows a passenger to make contact with either the driver or with central control from one or more intercoms built into the walls of each vehicle. Passenger intercoms are now regarded as essential security features in LRT systems. To reduce costs it is recommended the intercom be limited to connection to the driver who can then relay any information to the central control.

#### *Closed Circuit Televisions (CCTV)*

CCTV cameras will be used for both security and operational purposes. The latter requires cameras that monitor the stop platform showing levels of crowding and LRV door status. Each platform requires two cameras with cross vision, electronically combined onto one split screen to give a composite picture of the entire platform. The terminal stops will require 4 cameras each. The City of Hamilton may connect these cameras to their police surveillance stop as well.

Recording of video images shall be provided to assist in the investigation of incidents and court proceedings. These images could be retained for a period of time before being erased. Images may also be copied from the system and archived. Recordings will be stamped with date, time and camera location to assist in recovery of data.

#### Uninterruptible Power Supply

All communication systems require an Uninterruptible Power Supply to ensure safety and security during power outages. Such UPS systems are provided in vehicles, stops (in the communications cabinet) at TPSS, the OCC and at the workshop building.

These systems should be used to supply the various communication requirements. The UPS systems should be battery supplied and have a capacity specified by code, typically 30 minutes for emergency lighting and two hours for communications and controls. At the OCC and workshop building the large UPS will be backed up by a diesel stand-by generator giving central communication facilities an extended availability for at least 24 hours.



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