



Appendix B.14

Utility Relocation Strategy Guidelines



HURONTARIO-MAIN LRT PROJECT

Preliminary Design/TPAP

Utility Relocation Strategy Guidelines
June 2014
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CLIENT: **City of Mississauga and City of Brampton**

PROJECT: **Hurontario-Main LRT
Preliminary Design/TPAP**

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1.0 Introduction

The Hurontario / Main LRT project is the provision of light rail transit (LRT) between Lakeshore Road East and Nelson Street East along Hurontario Street / Main Street corridor.

A review of the conflicts of the LRT system with the utilities and services along the Hurontario / Main corridor will be carried out and a relocation strategy has been developed to identify conflicts with municipal services and private utilities at the preliminary engineering level.

This work will be performed as an iterative process. Once the major conflicts are identified and a new location is proposed, the configuration will be analyzed for new conflicts at the new location. This will be done until all utilities and services in the corridor are indicatively accommodated. During this process, the City of Mississauga, the City of Brampton and the Region of Peel will be consulted, any concerns about the relocations will be addressed and appropriate changes to the strategy will be made.

The conflict identification is based on the present location of the utilities and services as shown on the base survey map provided by the City. Fire hydrant leads and catch basin leads are not shown on the City base information, however they are assumed to be connected to the closest watermain or storm sewer, and any changes in length or need for protection will be quantified.

As this is a preliminary strategy, the main goal is to identify the conflicts and needs for relocation. In the future, such strategy should be evaluated and updated based on further input from the City and all utility and service companies involved.

This report outlines the criteria to be used for identification of conflicts and guidelines for the relocation strategy.

All the utilities considered in the relocation strategy are based on the existing network without consideration for improvements. The guidelines are intended to show what utility relocations along the corridor directly result from the LRT project, and thus have their relocation costs attributable to the project. As the procurement strategy for the project is yet to be determined, it is unclear how the utility relocation will be undertaken. Nevertheless, it is assumed that in all cases, the LRT-caused relocation costs will be paid for out of the overall project budget, and that the design of relocated utilities will conform to the standards of the authority having jurisdiction.

Various jurisdictions may use the construction of the line as an opportunity to undertake future utility upgrades; however these are not considered to be within the scope and budget of the LRT.

2.0 Conflict Identification

2.1 Utility Restriction Area Definition

Subsurface infrastructure along the corridor is comprised of watermains, sewers, gas lines, electrical utilities and communication infrastructure.

The introduction of an LRT system into a corridor with existing subsurface infrastructure creates conflicts, particularly since when subsurface infrastructure parallel to the tracks requires servicing, LRT service must be interrupted. Therefore, to minimize service interruptions and to ensure safety of workers, direct physical obstructions, such as maintenance holes in the right-of-way of the LRT should be eliminated. Infrastructure under the track, if not removed, will be exposed to the LRT vehicle's load and vibration forces as well as the potential of corrosion from stray currents along the track. To minimize these impacts, the subsurface infrastructure must be moved out of the Utility Restriction Area.

For the purpose of this review, the Utility Restriction Area is identified as 1 m to either side of the guideway and 1.8 m below the top of rail (see Figure 2.1). Infrastructure which crosses perpendicular to the track is to be maintained, but must be protected from surface loads and stray current.

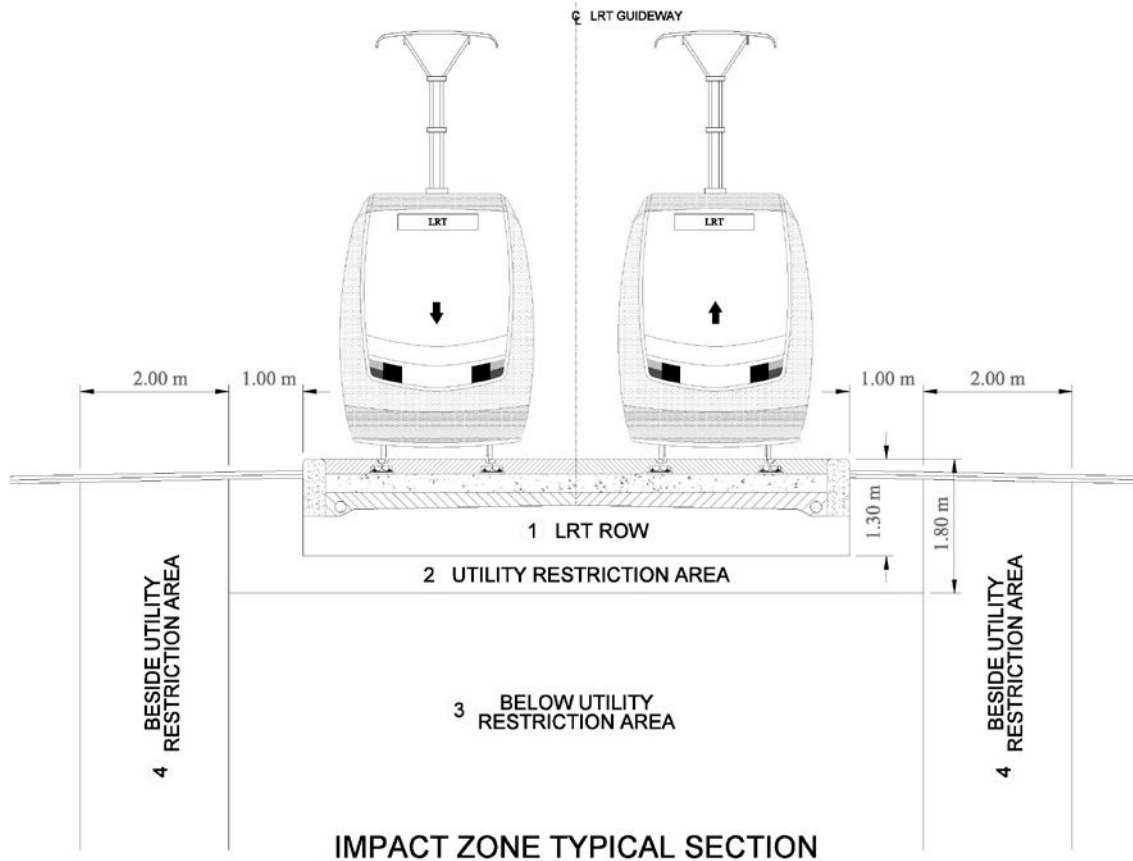


Figure 2.1 - Utility Restriction Area

2.2 Conflict Criteria

2.2.1 Watermains and Sewers

Watermains and sewers (sanitary and storm) running parallel within the Utility Restriction Area are identified as in conflict and requiring relocation (see Table 2.1). Watermains and sewers, including fire hydrant leads and catch basin leads, crossing the Utility Restriction Area perpendicularly, which need to be maintained in their location, are identified as requiring protection for the length in which they were within the LRT impact zone.

2.2.2 Gas lines, Hydro and Communication Ducts

It is assumed that gas lines, hydro and communication ducts generally have sufficient cover under the track bed are assumed. As such, these utilities will be identified as in conflict according to Table 2.1. However, when existing access to these utilities (i.e. a maintenance hole) is located within the new guideway, this access will be identified as in conflict. As a result, the utilities leading to the access are also in conflict and required relocation.

2.3 Conflict Criteria Summary

All the criteria under which utilities and services are identified as needing relocation are summarized in Table 2.1.

Table 2.1: Conflict Criteria

Type of Utilities	Zone 1 Utility Free Area (Top of Rail to 1.3m Below Top of Rail)	Zone 2 Utility Restriction Area (1.3 to 1.8m Below Top of Rail)	Zone 3 Below Utility Restriction Area (1.8m from Top of Rail to Centre of Earth)	Zone 4 Beside Utility Restriction Area (2.0m Width to Centre of Earth)
Existing Longitudinal				
Watermains	Relocate	Relocate	Relocate	Up to 300mm dia-relocate Over 300mm dia-may remain
Sanitary Sewer	Relocate	Local – Relocate Large trunk or sub-trunks – may remain if access can be secured through Zone 1 or by offset access chambers (subject to approval of the Region of Peel Water & Wastewater Division with the Public Works, and also depending on the age & condition of the pipe)	Local – Relocate Large trunk or sub-trunks – may remain if access can be secured through Zone 1 or by offset access chambers (subject to approval of the Region of Peel Water & Wastewater Division with the Public Works, and also depending on the age & condition of the pipe)	May remain
Storm Sewer	Relocate	May remain if access can be secured through Zone 1 or by offset access chambers (subject to approval of the Municipality’s Water Department, and also depending on the age & condition of the pipe)	May remain if access can be secured through Zone 1 or by offset access chambers (subject to approval of the Municipality’s Water Department, and also depending on the age & condition of the pipe)	May remain
Hydro, Tele-Comm Cables, Traffic Signals	Relocate	Relocate	Relocate	May Remain
Gas	Relocate	Relocate	Relocate	Uncased gas pipelines must be relocated

Type of Utilities	Zone 1 Utility Free Area (Top of Rail to 1.3m Below Top of Rail)	Zone 2 Utility Restriction Area (1.3 to 1.8m Below Top of Rail)	Zone 3 Below Utility Restriction Area (1.8m from Top of Rail to Centre of Earth)	Zone 4 Beside Utility Restriction Area (2.0m Width to Centre of Earth)
Existing Crossings				
Watermains	Relocate	May be replaced with line in steel casing Access chambers shall be relocated	May be replaced with line in steel casing Access chambers shall be relocated	May Remain
Water Service Connections	Relocate	Relocate to below URA	May remain	May Remain
Sanitary Sewer	Relocate	May Remain Access chambers shall be relocated	May Remain Access chambers shall be relocated	May Remain
Sanitary Sewer Connections	Not Permitted	Relocate to be below URA if grade permits otherwise replace service in URA zone	May remain	May Remain
Storm Sewer & Service Connections	Not Permitted	May remain Access chambers may protrude through Zone 1 or shall be relocated	May remain Access chambers may protrude through Zone 1 or shall be relocated	May Remain
Hydro, Tele-Comm Cables, Traffic Signals Including Local Connections	Relocate	In duct & encased – may remain In duct only – may remain if encased No duct – include duct & encase or relocate	In duct & encased – may remain In duct only – may remain if encased No duct – include duct & encase or enclose or relocate	May Remain
Gas & Gas Services	Relocate	May remain if enclosed in steel casing	May remain if enclosed in steel casing	May Remain if enclosed in steel casing

In addition, the following utilities are considered in conflict:

Utilities/Services	Relocation required if:
Cable Pedestals	<ul style="list-style-type: none"> • In conflict with: <ul style="list-style-type: none"> ○ Guideway ○ New Curb ○ New Sidewalk
Catch Basins	<ul style="list-style-type: none"> • Not in line with the new curb
Catch Basin Leads	<ul style="list-style-type: none"> • Catch Basin relocated
Fire Hydrants	<ul style="list-style-type: none"> • Less than 600 mm from edge of curb • In conflict with the new sidewalk • In conflict with new stop structure • New Fire Hydrant Lead less than 1m in length
Fire Hydrant Leads	<ul style="list-style-type: none"> • Fire Hydrant relocated
Concrete/Wooden Hydro Poles	<ul style="list-style-type: none"> • Less than 600 mm from edge of curb • In conflict with the new sidewalk • In location of new Sewer or Watermain
Utility Light Standard	<ul style="list-style-type: none"> • Less than 600 mm from edge of curb • In conflict with the new sidewalk • In location of new Sewer or Watermain • Utility Light Standard not relocated in new platform locations
Traffic Utilities Include: Traffic Light Posts, Controllers, Junction Boxes, Vehicles and Pedestrian Signal Heads, and Road Signs	<ul style="list-style-type: none"> • In conflict with: <ul style="list-style-type: none"> ○ Guideway ○ New Roadway ○ New Curb ○ New Utility location (i.e. Watermain)

3.0 Relocation Strategy

3.1 Utility Clearance Guidelines

A relocation strategy will be developed for the utilities and services found to be in conflict.

Clearance guidelines were compiled using guidelines from the Region of Peel, supplemented by standards from the Ministry of Environment. Generally the Region's standards are more stringent, and therefore will take precedence. The required spacing between services is summarized in Table 3.1.

Table 3.1: Minimum Spacing between Services

	Property Line	Storm/ Sanitary Sewer (outer edge)	Watermain (outer edge)
Storm/ Sanitary Sewer (outer edge)	3 m	0.5 m minimum	2.5 m minimum; if less, must have 0.5 m vertical clearance
Watermain (outer edge)	3 m	2.5 m minimum; if less, must have 0.5 m vertical clearance	–
Hydro Ducts	1.75 m	–	–
Gas Main	0.75 m	–	–
Bell Ducts	1.75 m	–	–

In the information provided by the city, profile view was not provided for all utilities. Watermain profiles will be obtained from the Region of Peel, and this will be used to assess the criteria of 0.5 m vertical clearance from sewers.

These guidelines will be applied wherever possible; with the exception of some locations along the corridor, where the right-of-way is too narrow to accommodate the requirements. These situations will be examined in more detail, taking into account the length of conflict and risk of a lower clearance in each individual case. Upon examination, minimum spacing will be lowered in situations where it is appropriate.

The design of the relocated utilities shall also account for the long-term vision for the corridor, inclusive of future space allocations for widened sidewalks, bike lanes and landscaping. As such, designs must not relocate utilities into locations where they will be subject to conflict with future infrastructure (e.g. tree roots).

3.2 Watermain Clearance

Clearance between parallel watermains is based on the space required for installation and compaction of backfill. This is assumed to be 0.3 m.

3.3 Crossing Utilities

Watermains and sewers, including fire hydrant leads and catch basin leads, crossing the Utility Restriction Area perpendicularly that has to be maintained in the current location will be identified as requiring protection from the surface loading and stray current. This protection is assumed to be installed for the length of the utility within the utility restriction area.

3.4 Traffic Utilities

Traffic utilities, including traffic light posts, controllers, junction boxes, vehicle and pedestrian signal heads, and road signs, will be identified as in conflict. Relocation strategy is not defined at this stage.

3.5 Gas lines, Hydro and Communication Ducts

Gas lines, hydro and communication ducts will be identified as needing relocation when there is change to the depth of cover. This occurs when the original utility is under the existing sidewalk but is to be located under the new roadway in the new design. As depth of cover is compromised, relocation of utility is required to move under the new sidewalk. Ducts that remain or are relocated to beneath the LRT guideway are considered to have sufficient depth of cover (see Figure 2.1), and do not pose a structural risk to the structure of the guideway. In fact, the system itself has a system-wide duct bank under the guideway for exclusive system use. When new Hydro Poles are installed, Clear Zone requirements will be maintained.

3.6 Relocation Criteria Summary

New location of utilities and services will be determined by the criteria summarized in Table 3.2.

Table 3.2: Relocation Criteria

Utility/Service	New Location Criteria
Bell Ducts	<ul style="list-style-type: none"> • Maintaining minimum clearance • Not on top of alignment of new Sewers or Watermain • Connecting to relocated or existing Bell Maintenance Holes
Coaxial Cables	<ul style="list-style-type: none"> • Maintaining minimum clearance • Not on top of alignment of new Sewers or Watermain • Connecting to relocated or existing Cable Pedestals
Gasmains	<ul style="list-style-type: none"> • Maintaining minimum clearance • Not on top of alignment of new Sewers or Watermain

Utility/Service	New Location Criteria
Hydro Ducts	<ul style="list-style-type: none"> • Maintaining minimum clearance • Not on top of alignment of new Sewers or Watermain • Connecting to relocated or existing Hydro Maintenance Holes • Cased for protection when crossing the Utility Restriction Area
Sewers (Sanitary, Storm)	<ul style="list-style-type: none"> • Maintaining minimum clearance • Cased for protection when crossing the Utility Restriction Area
Sewer Maintenance Holes	<ul style="list-style-type: none"> • Relocated, keeping the same spacing • Not relocated in sections where Sewers are in Utility Tunnel • Some new added for new connections
Watermains	<ul style="list-style-type: none"> • Maintaining minimum clearance • Sleeved for protection when crossing the Utility Restriction Area sleeved • Valve Chambers, Valve Boxes and Tee Connections replaced, keeping the spacing • Valve Chambers and Boxes Not relocated in sections where Watermains are in Utility Tunnel
Catch Basins	<ul style="list-style-type: none"> • Relocated to new edge of curb • Spacing between Catch Basins generally not modified, except at stop platform locations
Catch Basin Leads	<ul style="list-style-type: none"> • Cased when crossing Utility Restriction Area • Extended or reduced to new location
Fire Hydrants	<ul style="list-style-type: none"> • Min 600 mm from edge of curb • Relocated to opposite side of street when in conflict with new stop structure
Fire Hydrant Leads	<ul style="list-style-type: none"> • Assumed 150 mm pipe • Sleeved when crossing Utility Restriction Area • Minimum length of 1 m
Concrete/Wooden Hydro Poles	<ul style="list-style-type: none"> • Min 600 mm from edge of curb. Maintain Clear Zone requirements; install Break away poles in locations where Clear Zone is not possible to maintain
Utility Light Standards	<ul style="list-style-type: none"> • Min 600 mm from edge of curb. Maintain Clear Zone requirements; install Break away poles in locations where Clear Zone is not possible to maintain ULS not relocated in new platform locations
Traffic Utilities	<ul style="list-style-type: none"> • Conflicts identified; no new location shown on drawings

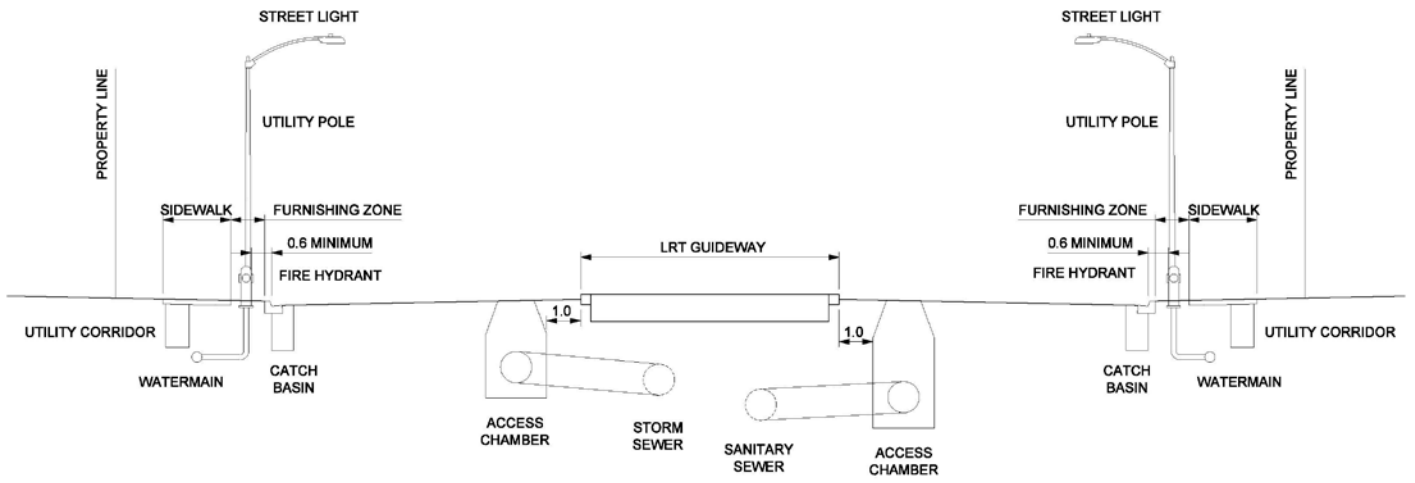


Figure 3.6 – Utility Relocation Diagram

Disclaimer

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