Crossing Assessment Framework

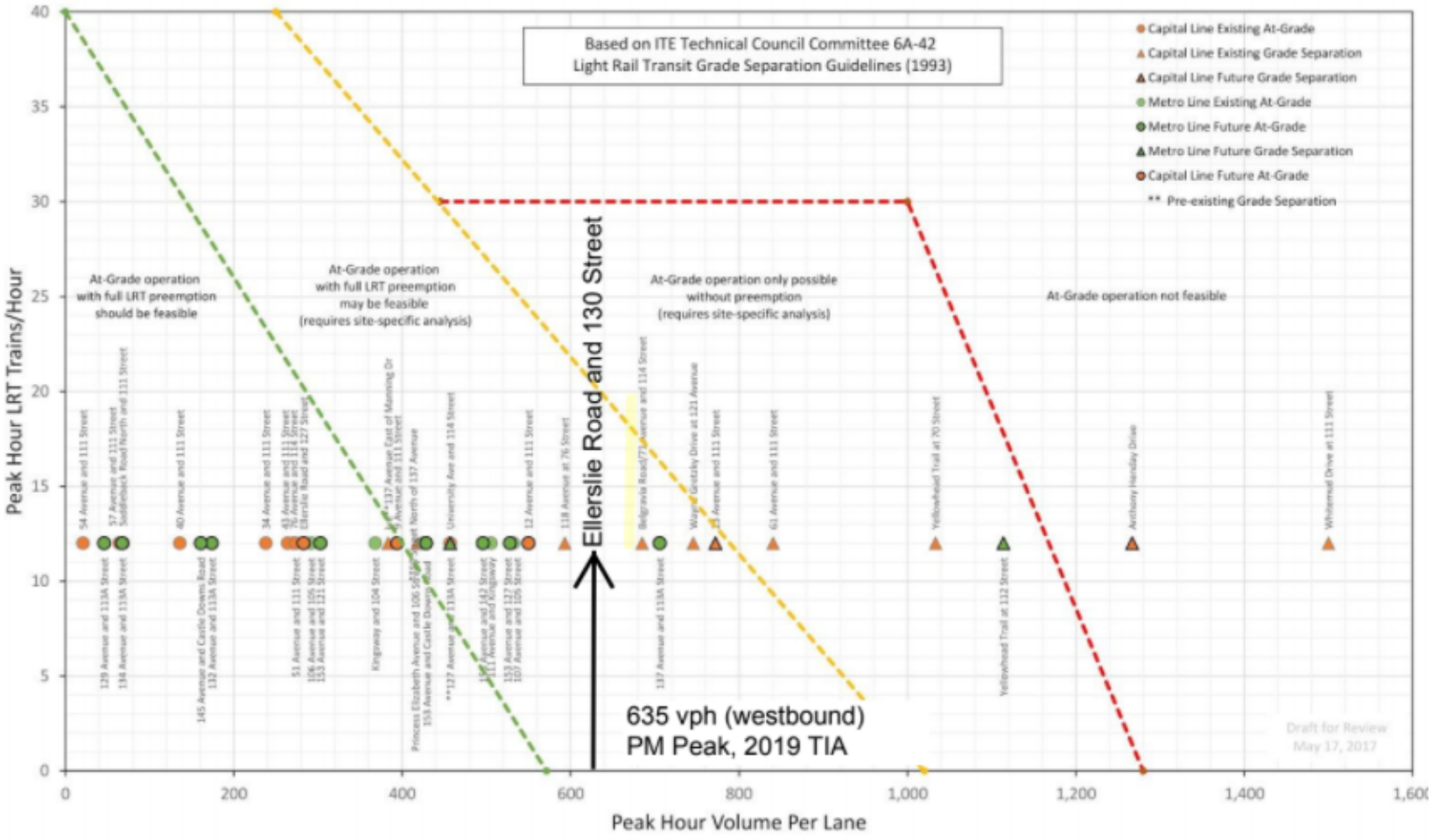
On June 13, 2017, Council approved Integrated Infrastructure Services Report CR_4512 LRT Crossing Assessment Framework, which established the weighted criteria and process to guide objective decision-making on grade separations of current and future LRT projects.

Grade separation has the potential to offer reduced traffic congestion and shorter vehicle travel times in the short term. However, this must be balanced with the long term implications on the broader transportation network and other Council-approved policies, strategies and initiatives related to land-use and compact urban form.

The Institute of Transportation Engineers (ITE) developed a methodology to assess when LRT crossings should remain at-grade, grade-separated, or require additional analysis. The ITE graph suggests that a comparison of LRT crossing frequency to the worst case per-lane traffic volumes be used as a starting point.

The LRT Crossing Assessment Framework Initial Screening Graph for the Capital Line shown in Figure 1 contains the ITE graph overlaid with the City's existing and planned LRT crossings along the Metro and Capital Lines. Once intersections are plotted, any crossings that fall:

- to the left of the green line should remain at-grade;
- to the right of the yellow and red lines be grade-separated; and
- on or between the green and yellow lines require site-specific assessment



High Floor Network Overlay (Capital Line and Metro Line)

Figure 1 LRT Crossing Assessment Framework - Initial Screening Graph (High Floor Network Overlay)

If a crossing location is selected for further assessment, options are developed for evaluation. Comparative analysis of the options is completed using the following weighted criteria.

Table 1 - LRT Crossing Assessment Weighted Criteria

Criteria Category	Weighting
Accessibility *How the various transportation modes link between one another and with adjacent developments*	4
Network Operations *How the surrounding and broader transportation network is impacted.*	4
Urban Design & Social Environment *How the surrounding communities and stakeholders are impacted.*	4
Feasibility & Construction *Feasibility, cost and risk assessments.*	2

Ellerslie Road Crossing Assessment

The 2010 Capital Line South LRT Extension Concept Plan (Concept Plan) included an at-grade LRT crossing of Ellerslie Road to the west of 127 Street, however this previous assessment is no longer valid with updated land use and traffic impact assessments within the Heritage Valley Area.

Figure 2 - Capital Line Crossing Location at Ellerslie Road

As part of the current preliminary design review, this crossing was re-assessed per the City's LRT Crossing Assessment Framework.

The Tier I screening shows that this intersection falls between the green and yellow lines of the Crossing Assessment Framework graph, and therefore a Tier II assessment is required. Three options were considered as part of the Tier II assessment:

1. At-grade crossing of Ellerslie Road (originally approved); and
2. Elevated LRT guideway crossing over Ellerslie Road;

A preliminary assessment was also undertaken on an LRT underpass beneath Ellerslie Road, but this option was not deemed feasible based on a number of major utilities in the area including the crossing of a pipeline corridor south of Ellerslie Road.

Option 2 is shown in Figure 3:

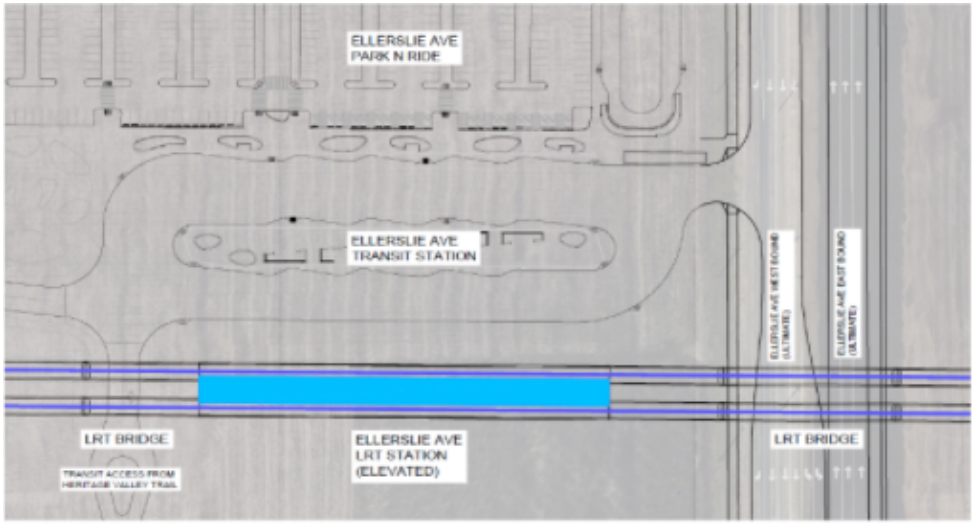


Figure 3 - Grade Separation over Ellerslie Road

The following table summarizes performance of the two options in response to the crossing assessment criteria.

Table 2 - Ellerslie Road Crossing Assessment

	At-Grade	Elevated Grade Separation
Accessibility	✓✓	✓✓
Considerations	• An at-grade LRT crossing and at-grade station would not require stairs, elevators or escalators, which can reduce pedestrian travel time and assist those with mobility challenges. • An at-grade solution would either require a mid-block pedestrian crossing, or for users to be routed to 127 Street or 135 Street to cross Ellerslie Road. • The elevated option provides direct pedestrian access to the Park and Ride Station from the lands south of Ellerslie Road through a Shared Use overpass. Also provides a direct link across Ellerslie Road for non-LRT pedestrians and active mode users.	
Network Operations	✓	✓✓✓
Considerations	• An Elevated crossing would mitigate impacts to the vehicular network travelling East-West on Ellerslie Road, including those using the Park and Ride. • An elevated crossing would mitigate impacts to buses entering and exiting the transit centre. • An elevated crossing would mitigate impacts to ambulances and other emergency service vehicles that will require access to the future provincial hospital site.	
Urban Design and Social Environment	✓✓✓	✓✓
Considerations	• At-grade option aligns best with Urban LRT characteristics. • An elevated structure would create opportunity for landscaping or public spaces, as green space may be able to be maintained below the elevated guideway. • Noise impacts with at-grade noise are more localized, while an elevated track has a higher noise impact (acceleration and braking of trains). • Elevated guideway is more visually and physically intrusive to the surrounding community.	

	• An elevated guideway may help promote future development by reducing vehicular + pedestrian/LRT conflicts, as well as providing the potential for a direct connection to future development through elevated connections.	
Feasibility and Construction	✓✓✓	✓✓
Considerations	• An elevated crossing would require several hundred metres of elevated guideway, as well as the construction of an elevated station. • There is a major pipeline corridor south of Ellerslie Road. The elevated guideway would allow the LRT to travel over the pipeline corridor without requiring relocations of these pipelines. An at-grade crossing would require relocation of these pipelines at an estimated cost of $15-$20M. • An elevated crossing would avoid potential utility conflicts in Ellerslie Road, including major drainage and water transmission lines.	
Order of Magnitude Cost Differential (+/- 30%)	-	Additional $50 million (includes cost avoidance of pipeline mitigation)
Overall Performance	✓✓	✓✓✓

Summary & Recommendation - The elevated option did receive public support through the Public Engagement done as part of the NASP14 engagement process. This includes a letter of support from the Government of Alberta, as it would reduce potential conflicts with emergency vehicles, and fit well with the proposed institutional land use for the provincial hospital development. The elevated option also mitigates impacts to traffic, LRT and bus operations including those using the transit centre and park and ride. The elevated option would also provide a direct connection for active mode users and those accessing the station, from south of Ellerslie Road. The at-grade option does fit better with the Urban LRT design philosophy, but given the suburban and institutional surrounding land uses, an elevated guideway is a reasonable fit in this location. As a result, an elevated guideway of Ellerslie road is recommended.