

CAPITAL LINE SOUTH EXTENSION

Options and Cost Analysis for an Ellerslie Road Grade Separation

Recommendation			
That the October 22, 2024, Integrated Infrastructure Services report IIS01926, be received for information.			
Requested Action		Information only	
ConnectEdmonton's Guiding Principle		ConnectEdmonton Strategic Goals	
CONNECTED This unifies our work to achieve our strategic goals.		Urban Places	
City Plan Values	ACCESS		
City Plan Big City Move(s)	A community of communities	Relationship to Council's Strategic Priorities	Mobility Network
Corporate Business Plan	Transforming the future		
Council Policy, Program or Project Relationships	<ul style="list-style-type: none"> The City Plan 		
Related Council Discussions	<ul style="list-style-type: none"> IIS01679 Capital Line South Extension Update, City Council, May 16, 2023 IIS00553 Capital Line South Extension - Project Update and Budget Approval, City Council, June 22, 2021 CR_8337 LRT Transit Priorities Update - Strategic Options, Extension Planning and Proposed Stages of Construction, Special City Council, June 1, 2020 		

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Previous Council/Committee Action

At the May 16, 2023, City Council meeting, the following motion was passed:

That Administration provide a report outlining options including cost analysis for possible future construction of a grade-separated Ellerslie Road of the LRT crossing between 127 street and 135 street.

Executive Summary

- On May 16, 2023, City Council directed Administration to provide a report outlining options, including cost analysis, for a possible future grade separated crossing at Ellerslie Road and the Capital Line South LRT.
- A feasibility study was done in 2024 and evaluated two options: an overpass (Ellerslie Road over the LRT) and an underpass (Ellerslie Road under the LRT). Both options were analyzed for engineering feasibility, cost, environmental impact and construction risks. A high-level cost estimate was provided. Both options are feasible and viable, but come with different costs, risks and timelines.
- The Ellerslie Road overpass option is estimated at \$64 million and the underpass is estimated at \$99 million (in 2023 dollars; therefore, estimates will increase with future inflation). Based on the study conducted, the overpass option is considered more cost-effective and has lower construction risks.
- Both options would require acquiring approximately two acres of right-of-way from the Government of Alberta to facilitate utility relocations and traffic management during construction.
- No financial implications exist at this time; however, funding would be required for a grade separation should it be required as part of the future construction of the Capital Line LRT across Ellerslie Road.

REPORT

Capital Line South LRT Extension (CLSE) is a critical infrastructure project designed to extend Edmonton's LRT network from Century Park to neighbourhoods further south, thereby supporting the city's growing transportation needs. As a key component of Edmonton's Mass Transit Strategy as outlined in The City Plan, the extension is intended to provide a more sustainable travel option, reduce traffic congestion and facilitate more compact future urban development.

The south extension will be executed in two phases:

- Phase 1 will extend from Century Park to the Heritage Valley Transit Centre and Park & Ride, just north of Ellerslie Road. This phase includes an LRT underpass at 23 Avenue and bridges over Blackmud Creek and Anthony Henday Drive.
- Phase 2, which is currently unfunded with no timeline for construction, will cross Ellerslie Road and continue south to the Desrochers neighbourhood near 41 Avenue SW.

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Initially, the design for the new Heritage Valley North LRT Station (just north of Ellerslie Road) included an elevated structure, allowing the future LRT to cross over Ellerslie Road on a guideway. Based on anticipated traffic volumes and LRT frequency at the Ellerslie Road crossing, the City's LRT Crossing Assessment Framework, as part of IIS00553 Capital Line South Extension Project Update and Budget Approval on June 22, 2021, City Council approved the recommendation for this crossing to be grade separated. In May 2023, as part of IIS01679 Capital Line South Extension Update, City Council approved the recommendation for a redesign that altered the station to be at grade due to project budget constraints. The decision was made with the understanding that, while the LRT would remain at grade, Ellerslie Road could potentially be grade separated in the future to help mitigate traffic congestion.

Feasibility Study Overview

To address the motion, a feasibility study was conducted in 2024 which evaluated two options: an overpass (Ellerslie Road over the LRT) and an underpass (Ellerslie Road under the LRT). The study assessed the technical, financial and environmental impacts of both options, providing insights to guide future decisions.

Overpass (Ellerslie Road over the LRT)

The overpass option involves building a bridge to carry vehicle traffic over the LRT. This design is relatively straightforward, using standard bridge piers to support the structure. The overpass would maintain the current Ellerslie Road alignment, be approximately 420 metres long (including ramps) and roughly eight metres above grade at the highest point. Access would be incorporated with adjacent streets and properties.

The overpass avoids challenges related to groundwater and flood mitigation that are more prominent with underpasses. The grade separation requires the acquisition of approximately two acres of right-of-way from the Government of Alberta along the south portion of the Ellerslie Road corridor. This land is necessary to facilitate the relocation of existing underground utilities. The cost for land acquisition has been included in both cost estimates below. Overpass construction is estimated to take approximately three years and would cause temporary traffic disruption during the construction phase.

Underpass (Ellerslie Road under the LRT)

The underpass option involves digging a trench for Ellerslie Road to pass under the LRT. This design requires significant excavation and installation of retaining walls and advanced drainage systems to manage groundwater and stormwater. The geotechnical conditions, including groundwater from two to six metres below the surface, present challenges that would require permanent water mitigation solutions. The underpass would be approximately 380 metres long and include a 39 metre at grade bridge for the LRT. The underpass would have similar land requirements as the overpass option. Underpass construction is estimated to take four years and would cause greater traffic disruption than the overpass due to deep excavation and advanced drainage systems. The environmental impact of the underpass is notable due to the excavation, which is more intensive compared to the overpass. However, with appropriate planning and execution, the disposal of excavated materials, controlling groundwater and minimizing ground

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disturbance are manageable. Due to the additional engineering challenges, the underpass option has greater associated costs and risks.

Traffic Analysis

Ellerslie Road is currently a four lane divided arterial road, with future plans to widen it to six lanes. As part of the IIS00553 Capital Line South Extension Project Update and Budget Approval report, an initial traffic analysis conducted in 2021 using forecasted peak 2050 traffic volumes indicated that grade separation of LRT across Ellerslie Road performed better than an at grade option.

As part of the 2024 feasibility study, a subsequent traffic analysis was conducted to assess the potential impacts of Ellerslie Road going over or under the LRT, using the same forecasted peak traffic volumes in 2050. The analysis indicated that having no grade separation would increase traffic delays on Ellerslie Road, particularly for eastbound traffic. Additional traffic delays at the intersection, during peak hours, were projected to range from 20 to 30 seconds with the existing four lane configuration and from 10 to 25 seconds with the proposed six lane configuration. These delays are less than the anticipated delays at the 127 Street and 135 Street intersections with the proposed six lane Ellerslie Road configuration. The introduction of grade separation, either with an overpass or underpass, is expected to mitigate these delays by eliminating direct interactions between road traffic and the LRT.

The overpass option would facilitate smooth traffic flow over the LRT, reducing the likelihood of traffic congestion. However, it is worth noting there would be temporary traffic disruptions during overpass construction.

The underpass option would similarly eliminate traffic-LRT interactions, but construction would cause more traffic disruption than the overpass due to deep excavation and advanced drainage systems.

Cost Analysis

The feasibility study included preliminary cost estimates for the grade separation options in 2023 dollars at approximately -30/+50 per cent confidence level. These cost estimates are early stage approximations and would continue to be refined through design development.

The overpass option is estimated at \$64 million for a six lane crossing. This cost includes earthworks, utility relocation, overpass construction and traffic management. The overpass design, with its relatively straightforward engineering and reduced need for extensive groundwater management, presents a more predictable cost.

In contrast, the underpass option is estimated at \$99 million for a six lane crossing. This higher cost reflects the additional expense related to deep excavation, complex structural requirements such as retaining walls and the implementation of permanent water mitigation solutions. Greater exposure to unforeseen ground conditions contributes to increased risks associated with the underpass option.

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Both grade separation options are feasible and viable. However, the overpass is assessed to be less expensive and less complex.

Budget/Financial Implications

There are no financial implications at this time as the LRT crossing at Ellerslie Road is part of an unfunded Phase 2 future extension. The overpass option, estimated at \$64 million, is anticipated to be more cost-effective compared to the underpass option at \$99 million. The cost estimates exclude the future widening of Ellerslie Road from four to six lanes.

Community Insight

During concept planning and preliminary design of the Capital Line South LRT, extensive public and stakeholder engagement occurred, including open houses, online surveys, stakeholder meetings, Indigenous consultations and a formal Community Advisory Committee (CAC) was convened. These efforts were crucial in shaping the project's preliminary design and ensuring community input was integrated into the planning process.

Public engagement began with the Capital Line South Concept Plan (2008) and continued through preliminary design (2010). Further formal public engagement occurred between 2017 and 2019, and from 2020 to today. This has included information sessions, community town halls and public surveys. The CAC, with representatives from community leagues and the public, has provided important feedback on various aspects of the project, including early work construction impacts and community concerns. The committee serves as a communication bridge between the City and the communities impacted by the project. While the CAC is not a decision-making body, it plays an important role in ensuring community perspectives are considered as the project progresses, particularly as detailed design and construction advance.

GBA+

Capital Line South is an important part of the LRT expansion portion of the Infrastructure Planning and Development City priority and will assist the City in continuing to make transformational impacts. These transformational changes will be key to achieving the vision of the approved LRT Network Plan and providing multi-modal, universal access as the city grows to a population of two million as envisioned by The City Plan.

Environment and Climate Review

This report was reviewed for environmental and climate impacts, with key risks and opportunities identified using the City's environment and climate screening criteria.

Environmental and Climate Benefits:

- CLSE supports Edmonton's green infrastructure strategy by encouraging public transit over private vehicle use, thereby reducing the city's carbon footprint. Public transit not only facilitates efficient movement but also supports the development of compact, active neighbourhoods, which decreases environmental impacts, connects people to jobs and businesses, improves public health and fosters civic engagement.

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- While CLSE will lower vehicle emissions, construction activities may temporarily affect localized air quality due to dust and machinery emissions. Mitigation measures, such as dust control and using lower-emission equipment, will be implemented to minimize these impacts.

Natural Environment, Urban Forest or Open Space System:

- Overall, CLSE is expected to have minimal impact on existing urban green space. Necessary tree removals will adhere to the City's Public Tree Bylaw, with plans to plant climate-resilient species, once construction is completed, that enhance urban cooling, air quality and biodiversity.

Greenhouse Gas Emissions (GHG):

- CLSE is projected to significantly reduce GHG emissions by nearly 270,000 tCO₂e by 2050, supporting Edmonton's goals for sustainable urban growth and improved air quality.
- CLSE is designed with energy efficiency in mind, incorporating materials and technologies that reduce overall energy consumption and the carbon footprint, contributing to a long-term decrease in GHG emissions by promoting a shift from car travel to public transit usage.

In summary, CLSE offers substantial environmental benefits, particularly in reducing GHG emissions and supporting a more sustainable transportation option as Edmonton continues to grow.

Legal Implications

Bylaw 15101 - The City of Edmonton Transportation System Bylaw would need to be amended to include the grade separation at Ellerslie Road in Appendix "C" "Physical Description of Light Rail Transit" before construction commences in order to comply with the requirements of the *Highways Development and Protection Act, SA 2004 c H-8.5*.

Attachment

1. Ellerslie Road Grade Separation Feasibility Study Summary