Bonnie Doon Grade Separation

Recommendation:
That the April 18, 2017, Integrated Infrastructure Services report CR_4461, be received for information.

Report Summary

This report provides information regarding the option of changing a portion of the Valley Line at-grade trackway to an elevated guideway and station.

Report

Background

The Valley Line - Stage 1 project represents the biggest single infrastructure investment in Edmonton's history. The Valley Line will help shape the City through its vision of an urban LRT system by promoting mixed use development along the corridor and encouraging transit ridership, while minimizing negative community impacts. The low-floor system specified for Valley Line is designed to integrate into city streets and neighbourhoods with a reduced infrastructure footprint.

This vision of an urban LRT system was developed over a number of years and included considerable public discussion and engagement. It has been incorporated into City policy through the Transportation Master Plan - *The Way We Move*. As a result, grade separations, overpasses, and separated right-of-ways along the Valley Line have been minimized wherever possible to reduce property acquisition, infrastructure costs, and negative impacts to local neighbourhoods.

The planning process for the Valley Line utilized Council-approved LRT Route Planning and Route Evaluation criteria reflecting the City's strategic goals. Planning was further guided by principles to reflect a balanced consideration of integration with the existing system, as well as a shift to a more contemporary philosophy that emphasizes urban integration. The principles were:

- maximize cost-effectiveness
- maximize the use of existing transportation corridors
- provide opportunities for future system expansion
- increasing transit system effectiveness
- respect neighbourhoods
- respect parkland, the river valley, and ravines
- promote economic development and redevelopment

Through recent discussions with Council the principle of maximizing cost-effectiveness

is still important; however, LRT expansion should balance maximizing cost-effectiveness with considerations of the broader transportation network performance, specifically the consideration of separating the LRT from key transportation corridors. To support this evaluation a more fulsome and rigorous process to assess grade separation along LRT corridors will be developed, similar to the LRT Route Planning and Route Evaluation criteria that was approved by Council in December 2008. These criteria can then be applied to the current and future planned corridors.

Following the award of the P3 contract to TransEd Partners ("TransEd") in February 2016, and using the principles above, TransEd and Administration initiated an informal review to examine the potential benefits and implications of an elevated guideway through the Holyrood/Bonnie Doon area of the corridor. TransEd and Administration have examined impacts related to urban LRT design, land and project coordination, project schedule, P3 agreement, and traffic.

The limits of a potential elevated guideway are from north of 90 Avenue to south of 82 Avenue, with an elevated station at Bonnie Doon, and eliminates LRT-vehicle interaction at five signalized intersections:

- 85 Street/83 Street/90 Avenue/Connors Road
- 83 Street/Future Dermott District Park
- 83 Street/86 Avenue
- 83 Street/84 Avenue
- 83 Street/82 Avenue

Urban LRT Design Impacts

The elevated guideway option would utilize the same design and construction requirements of the elevated guideway to be constructed at the Davies Station, which is located in an industrial area (75 Street and Wagner Road). Renderings of a proposed design for the Holyrood and Bonnie Doon elevated guideway are presented in Attachment 1.

An elevated guideway would have significant aesthetic and urban design impacts. An elevated station, fences, gates, crossing arms, and other associated infrastructure would hinder integration of the Valley Line into the fabric of the neighbourhood. The value of adjacent properties may drop compared to the value with an at-grade design, and demand for redevelopment adjacent to grade-separated LRT may slow due to the additional architectural costs and complexity (e.g. bridge structures to tie in with elevated stations).

A change of this nature would trigger a need for renewed stakeholder engagement. To date, Administration has not completed any engagement on this alternative design.

Land and Project Coordination Impacts

The elevated guideway option would require additional land from Dermott District Park, Bonnie Doon Mall, and six residential properties south of 82 Avenue. The cost estimate includes land acquisition based on market value.

Adjacent landowners and developers have started planning for redevelopment along the Valley Line corridor based on the vision for at-grade, urban style, integrated LRT. Land use planning due to a change to elevated guideway from urban at-grade LRT may require additional engagement sessions with adjacent property owners and developers and subsequent revisions to their development plans.

Neighbourhood renewal has work planned in Strathearn with the area north of 95 Avenue scheduled for 2017 and the area south of 95 Avenue scheduled for 2018, and in Bonnie Doon, which is scheduled for completion in 2017. These projects have been coordinated on the basis of the current at-grade LRT design. If the LRT was to be grade separated this may require rework in the adjacent areas depending on the final design of the elevated guideway.

Project Schedule Impacts

The elevated guideway option anticipates a delay to Service Commencement of at minimum six months. It is likely that this delay could be exceeded due to a number of risks including delayed approvals from funding partners or TransEd's lenders, land acquisition delays, additional utility relocation work, additional public engagement requirements, or other unforeseen technical issues.

Traffic Impacts

Traffic engineering has been an integral part of the design of the Valley Line, linking the integration of traffic, trains, and pedestrians along the urban roadways. To understand the impact of LRT before and after construction, an integrated traffic and LRT model was developed during planning and design of Valley Line for peak hours to represent existing conditions and the opening year.

TransEd completed a preliminary traffic assessment comparing LRT at-grade with the elevated guideway option for peak hours representing the opening year and final year of the TransEd operation and maintenance period. This assessment concluded that there are incremental potential benefits to average vehicle delay at intersections in both AM and PM peak periods. The benefits to vehicle travel time predicted by TransEd may be optimistic given the following factors:

- TransEd traffic analysis considered intersection geometry only and did not consider effects/impacts of the surrounding transportation network.
- TransEd traffic analysis was based on the same traffic demand for both the LRT at-grade and elevated guideway scenarios, but traffic demand would likely

increase if the corridor was less constrained due to LRT being elevated.

The results of TransEd's traffic assessment comparison are summarized below:

82 Avenue and 83 Street Intersection			
Year and Peak	Vehicle Delay LRT At-Grade (seconds)	Vehicle Delay LRT Elevated (seconds)	Avg Vehicle Time Saving for Elevated (seconds)
2020 AM Peak	30 - 60	20 - 50	20 - 30
2050 AM Peak	40 - 100	20 - 50	30 - 40
2020 PM Peak	30 - 60	20 - 50	10 - 20
2050 PM Peak	30 - 60	30 - 50	10 - 20

90 Avenue, Connors Road and 85 Street Intersection			
Year and Peak	Vehicle Delay LRT At-Grade[1] (seconds)	Vehicle Delay LRT Elevated[2] (seconds)	Avg Vehicle Time Saving for Elevated (seconds)
2020 AM Peak	30 - 40	0 - 10	30 - 40
2050 AM Peak	30 - 40	0 - 10	30 - 40
2020 PM Peak	30 - 40	0 - 10	30 - 40
2050 PM Peak	30 - 40	0 - 10	30 - 40

[1] 4-legged signalized intersection as per Valley Line design
[2] Intersection maintained as 5-legged traffic circle

TransEd's report also notes general benefits in traffic safety, LRT reliability, and LRT travel times due to reduction of conflicts with vehicular and pedestrian traffic. TransEd has predicted a reduction in end-to-end LRT travel times (Mill Woods Stop to 102 Street Stop) from 27-30 minutes to 26-29 minutes, which represents a time savings of 1-2 minutes for LRT passengers.

Conclusion and Next Steps

The option of an elevated LRT guideway in the Holyrood and Bonnie Doon neighbourhoods has the following advantages and disadvantages:

Advantages	Disadvantages
● Improves **AM** vehicle travel time at 83 Street & 82 Avenue intersection by ○ 20-30 seconds on average in 2020 and ○ 30-40 seconds on average in 2050 ● Improves all directional vehicle travel time at existing Bonnie Doon traffic circle by ○ 30-40 seconds on average in both 2020 and 2050 ● Reduces end-to-end LRT travel time by 1-2 minutes	● Order of magnitude cost estimate of $125-220 million ● Delays LRT opening by at least six months ● Negative aesthetic and urban design impact ● Acts as a physical barrier in the community ● Impacts the potential for adjacent Transit Oriented Development ● Not consistent with the overall vision for an urban-style LRT ● May require additional funding approval from the P3 partner ● Requires additional public engagement

At the time that the corridor and concept plan were developed in 2010 and 2011, traffic impacts were understood as being unavoidable due to the placement of the Valley Line within the existing road corridor at-grade. The approved concept plan includes a reduction in vehicle travel lanes on these corridors, and at-grade LRT crossings. While this represents a short-term and localized impact on travel patterns, in the longer term the Valley Line, coupled with improvements to the broader transportation network, is anticipated to accommodate growth while maintaining goods and people movement along appropriate corridors utilizing a range of travel modes.

Long term planning has identified network improvements, including upgrades to adjacent arterial road corridors such as 75 Street, are required to support traffic flow through the LRT corridor area. Administration continues to assess potential improvements which will be considered as a part of the capital project planning process.

Policy

Transportation Master Plan "*The Way We Move*"

Corporate Outcomes

- This report supports the corporate outcome that *Edmonton is attractive and compact* by considering, as a part of Administration's recommendation, how grade separation at Bonnie Doon impacts the physical landscape in that area.
- This report supports the corporate outcome that *the City of Edmonton has sustainable and accessible infrastructure* by providing a recommendation in

consideration of how grade separation at Bonnie Doon might impact the surrounding community

Risk Assessment

Risk Element	Risk Description	Likeli-hood	Impact	Risk Score	Current Mitigations	Potential Future Mitigations
Public Engagement	Stakeholders do not support the change; public engagement requires extra time, Service Commencement date affected	4 - Likely	3 - Major	12 - Medium	Not yet started	Establish a public engagement plan.
Approvals	TransEd Lenders or other Funding Partners do not support or approve the scope change	2 - Unlikely	3 - Major	6 - Low	Early involvement of TransEd	Engage with Funding Partners and TransEd Lenders
Land	If expropriation is required it could be challenged because we have a feasible alternative; extended land acquisition could impact P3 schedule	2 - Unlikely	3 - Major	6 - Low	Review and refine land requirements	Engage additional land acquisition and legal resources

Adjacent Development	Adjacent developers are not supportive of change	3 - Possible	2 - Moderate	6 - Low	Evaluate technical aspects and impacts	Work closely with developers to facilitate their plans
Traffic Impacts	Traffic analysis may not be reliable due to the methodology or data used.	2 - Unlikely	2 - Moderate	4 - Low	Utilize TransEd resources for traffic assessment	Work with Sustainable Development/Transportation Operations on model development.
Technical Challenges	Additional land or construction scope required to implement the solution	1 - Rare	2 - Moderate	2 - Low	Early decision on scope change	Work closely with TransEd to confirm technical requirements

Public Engagement

The nature of the proposed change is not consistent with the vision and concept for urban LRT along the Valley Line corridor that was shown to the public previously through open houses and public consultation throughout the concept and planning phases.

A proposed change of this nature would require an amendment to the approved Concept Plan for the Valley Line. This would trigger new public consultation and engagement, especially for the Holyrood and Bonnie Doon neighbourhoods, and could re-open many of the issues that had been resolved through the Concept Planning process.

Budget/Financial Implications

The order of magnitude cost estimate for the elevated guideway option is $125 to $220 million and was not considered in the original project budget.

Since the project is being delivered as a P3, TransEd is providing some of the funding for construction, which will be paid back over the 30-year operating term through monthly payments. If grade separation is desired, the City has the option to request

that TransEd finance the scope change and likewise increase the monthly payments over the 30-year operating period. If the City does not request TransEd to finance the scope change, or if TransEd is not able to obtain financing, the City will be required to finance the additional costs for the scope change.

Legal Implications

The addition of further grade separations to the Valley Line will require an amendment to Bylaw 15101 - The City of Edmonton Transportation System Bylaw. Amendments to Bylaw 15101 require statutory public hearings and Ministerial approval.

The P3 agreement provides the City with the right to request changes to the project but those changes result in cost and schedule impacts which are to be negotiated with TransEd.

Metrics, Targets and Outcomes

Metrics	Targets	Outcomes
Valley Line Cost Performance	Cost Performance is measured by the Cost Performance Index (CPI) based on a calculation of the earned value (budgeted cost of work performed) divided by actual cost. The Target CPI is 0.85-1.	Projects are delivered on budget
Valley Line Schedule Performance	Schedule Performance is measured by the Schedule Performance Index (SPI) based on a calculation of the earned schedule divided by actual time. The Target SPI is 0.85-1.	Projects are delivered on schedule
Valley Line Scope Performance	Scope Performance is a measure of undesirable scope creep. Scope Performance Index (ScPI) is based on a calculation of the total undesirable scope changes divided by total budget at completion. The Target ScPI is less	Project scope is well defined and managed.

	than or equal to 1.05.	
Transit Ridership and improved Modal Split	Transit ridership is expected to to grow from opening day (2020) ridership of 28,000 riders per day to long-term (2050) ridership of 49,000 riders per day	Edmontonians use public transit and active modes of transportation
Traffic Intersection Performance	82 Ave & 83 St intersection is expected to operate at an “E” level of service in the AM peak and at an “F” level of service in the PM peak	Providing LRT Service to supplement existing roadway operations will result in a significant increase in the carrying capacity and overall multi-modal level of service between Mill Woods and Downtown.

Attachment

1. Bonnie Doon Grade Separation Sample Renderings

Others Reviewing this Report

- T. Burge, Chief Financial Officer and Deputy City Manager, Financial and Corporate Services
- R. G. Klassen, Deputy City Manager, Sustainable Development
- C. Campbell, Deputy City Manager, Communications and Engagement
- D. Jones, Deputy City Manager, City Operations