

Valley Line LRT Phase 1

Intersection Performance Estimates

Recommendation:

That the April 13, 2016, Integrated Infrastructure Services report CR_3340, be received for information.

Report Summary

This report outlines the work completed to plan, design and operate the south leg of the Valley Line LRT to minimize expected traffic delays, as well as options to mitigate these delays in the future.

Previous Council/Committee Action

At the September 9, 2015, City Council meeting, the following motion was passed:

That Administration provide a report on Phase 1 of the Valley Line LRT outlining the:

1. Estimated travel time and performance of the major intersections along the Valley Line route, including the travel time impacts at these intersections.
2. Possible costs and implications of traffic impact mitigation.

Report

LRT expansion is a cornerstone of Edmonton's Transportation Master Plan - *The Way We Move* creating an integrated transit system allowing more people to travel within existing corridors, making more efficient use of the City's rights-of-way. LRT, combined with redevelopment and densification through Transit Oriented Development, allows for a more compact urban form and more effective use of city infrastructure. As the City grows it is important to strike a balance between encouraging LRT/Transit use and traffic congestion. Finding this balance depends on circumstances for specific locations and the options available.

Through Valley Line concept planning the effects on traffic operations have been considered and options to mitigate these delays have been developed, including localized intersection geometry changes and off-corridor improvements. The Valley Line concept plan considered the benefits of grade separations, roadway widening and other mitigation measures, to determine the most cost-effective means of expanding the LRT network and meeting the City's vision for a more compact, sustainable Edmonton supporting alternative modes of transportation.

As the project has evolved into a P3 the successful contractor is responsible to design,

construct and operate the system to meet performance expectations. Overall, the P3 contract requires that a travel time of 29 minutes be maintained between the Churchill and Mill Woods stops with up to an additional 2.5 minutes in flexibility. In order to meet these travel time requirements, certain conditions were applied to the operation of the LRT corridor intersections. Except as noted below, the intersections along the corridor will operate with “full-priority” for the LRT.

Full-priority is similar to the operation of the current high floor system on the Capital Line whereby the traffic signals and crossing controls stop vehicle traffic so that the LRT can proceed unimpeded. Full-priority has been applied to those intersections where train delays were of concern, and where traffic congestion could be accommodated effectively.

Some key intersections on the corridor will be operated with “partial-priority.”

Partial-priority operates the traffic signal and LRT controls differently by identifying windows of time in the network operation that minimize the impact on traffic operations. LRT vehicles may be held at upstream stops and advanced to meet these windows so that traffic impacts are minimized.

Intersections where partial-priority control are planned include the following locations outside the Downtown core:

- 90 Avenue/85 Street/83 Street
- 82 Avenue/Whyte Avenue/83 Street
- Roper Road/75 Street
- Whitemud Road WB Ramps/75 Street
- Whitemud Road EB Ramps/75 Street

These intersections are busier intersections from a traffic perspective, and significant congestion at these locations is problematic due to the greater impact on traffic mobility in the southeast sector of the City. Even though the LRT system is planned to help manage growing traffic demand, the intersections in the corridor will have more congestion than exists today.

The P3 contractor is also required to meet specific criteria at each intersection within the corridor. Four Measures of Effectiveness were identified as follows:

- Level of service
- Average vehicle delay (in seconds)
- Average queue length (in metres)
- Maximum queue length (in metres)

Level of service for intersections is a qualitative performance measure that denotes an operating condition that occurs on a roadway when it is accommodating specific traffic volumes. The level of service calculation is based on a ratio of the volume utilizing the

transportation facility in comparison to the available capacity within the facility (volume to capacity ratio). Level of service can be determined for all movements in the intersection or the intersection as a whole. For signalized intersections, level of service is typically presented in a range from A to F with A representing very low delay, E operating at or near capacity, and F where the intersection or movements are at capacity. For example, a volume to capacity ratio of 0.75 means that the intersection is operating at 75 percent of its capacity which represents a level of service of D.

Major intersections along the LRT routes are approaching or experiencing a level of service of F today for portions of the peak-hours. As the city grows, the duration that these intersections experience a level of service F will increase.

As urban centres grow, increased transportation demand can be met in a number of ways. One of the most cost effective ways is through more effective use of transportation corridors and rights of way through investment in public transit. Travelers may also have other choices such as altering their travel route, traveling outside the peak-hour, carpooling, or possibly working from home. *The Way We Move* encourages increased use of these strategies for moving people in Edmonton.

Attachment 1 indicates the anticipated operation of the corridor intersections for opening day and for 2044, showing intersections that were congested during peak periods. The results were generated based upon the best available information at the time and reflect that congestion within the LRT corridor can be expected. The P3 contractor is responsible for developing timing plans which will facilitate both LRT travel time and intersection measures of effectiveness. As such, the P3 contractor will provide a design that will best optimize the traffic flow while meeting the defined LRT schedule.

Options for the Transportation Network

As the city continues to grow, traffic congestion will grow and it is important to consider the overall transportation network to support the traffic demands within the southeast sector. Parallel arterial roadways such as 34 Street, 50 Street, 91 Street, 99 Street, and Calgary Trail/Gateway Boulevard are key corridors to support traffic. In addition, the east-west arterials connecting to these roadways also have capacity to accommodate traffic.

The City's traffic models are regularly updated in order to better plan for changes to the transportation network as a result of the Valley Line. As the modelling information is refined and the P3 contractors designs are the completed there is a better understanding of the network wide traffic impacts and estimated traffic diversion to alternate routes. This helps refine traffic signal timing within the corridor and identify the potential for off-corridor improvements. Results of the modelling and LRT corridor design are anticipated to be available by the end of 2016. Once completed, the following options can be explored to determine how to best balance the operations for vehicles and transit/LRT users.

For the Valley Line corridor:

- Alter the operations at specific locations of the LRT/roadway crossings to partial-priority. This will reduce the amount of time needed to clear traffic and pedestrians from the crossing before the LRT arrives. Changing this operation may require holding the train at a stop more often, which may have some impact on the P3 contract and the performance measures included in it.
- Change the geometry of the intersection to incrementally improve traffic operations while minimizing impacts on LRT operations.
- Consider grade-separation of critical crossings.

Off-corridor Improvements

- Provide selective roadway improvements at critical off-corridor locations to provide attractive alternatives to the LRT corridor for traffic.
- Off corridor improvements previously identified include:
 - 50 Street railway grade separation
 - 75 Street railway grade separation
 - Widening 50 Street to 6 lanes from Whitemud Drive to 101 Avenue

Costs of potential LRT corridor improvements, as well as potential increases to transit operating costs, will be determined once the scope has been confirmed. Conceptual costs for the previously identified off-corridor improvements identified above are estimated at \$207 million combined. The 50 Street and 75 Street railway grade separation projects have been identified by City Council as two City priorities under the Provincial-Territorial Infrastructure Component of the New Building Canada Fund. Administration has prepared and submitted an application for the grade separations funding under the New Building Canada Fund. The widening of 50 Street from Whitemud Drive to 101 Avenue would be considered as part of the 2019-2022 Capital Program.

Policy

The Way We Move, Edmonton's Transportation Master Plan:

- Strategic Action 4.1(b): Encouraging land uses that are compatible and complementary to the surrounding transportation network.
- Strategic Action 4.1(c): Designing the transportation network to ensure it is compatible and complementary to the surrounding land uses.
- Strategic Action 5.1(a): Developing the LRT in consideration of balancing objectives such as service, cost and redevelopment opportunities.
- Strategic Action 5.1(c): Pursuing an urban style system for the existing LRT and new LRT lines.

The Way We Grow, the City's Municipal Development Plan

- Strategic Objective 3.3: Edmonton's transit system becomes the primary framework for urban form.

The Way We Live, Edmonton's People Plan:

- Objective 1.3: The City of Edmonton integrates public transit with economic, social, residential and recreational hubs.

Public Consultation

Public engagement formed part of concept and preliminary design for this line. Further engagement in direct response to this report did not occur.

Budget/Financial Implications

There is a Public-Private-Partnership contract in place for the south leg of the Valley Line, with funding for the contract approved by City Council. The addition of grade separations or other changes would be an additional expense requiring separate funding approval. The improvements may also impact the Public-Private-Partnership contract.

The estimated cost for the completion of off-corridor improvements to 50 Street and 75 Street totals \$207 million. This cost includes the following unfunded capital profiles:

- 50 Street CPR Underpass, Profile 15-66-2190 (\$85.074 million unfunded)
- 75 Street CPR Underpass, Profile 18-66-2191 (\$66.923 million unfunded)
- 50 Street (Whitemud Drive to Roper Road) 6 Lane Widening, Profile 17-66-2124 (\$8.925 million unfunded)
- 50 Street (Roper Road to Sherwood Park Fwy) 6 Lane Widening, Profile 17-66-2125 (\$21.2 million unfunded)
- Bridge Rehab - 50 Street Over Sherwood Park Freeway, Profile 15-66-2414 (\$3 million funded, \$22.086 million unfunded)

Attachments

1. Corridor Intersection Operations

Others Reviewing this Report

- T. Burge, Chief Financial Officer and Treasurer, and General Manager, Financial and Corporate Services
- D. Wandzura, General Manager, City Operations