

Executive Summary

In 2017 May, Administration presented the recommended stage 1 project (C2017-0467) for the Green Line LRT from Crescent Heights in the north to Shepard in the southeast laying the foundation for Calgary's next LRT line. The stage 1 project will complete the most technically complex and capital-intensive aspects of the long-term vision. The stage 1 Green Line project will connect 60 community services with fast, frequent, and reliable transit service, and will reduce greenhouse gas emissions by 30,000 tonnes each year. Completing the stage 1 Green Line project facilitates future extensions and demonstrates The City's commitment to implementing the long-term vision for the Green Line LRT.

This report evaluates the benefits of various potential stage 2 candidate projects. The projects are presented in groupings, established to represent a potential increasing magnitude of capital funding. The groupings were developed based on the announced dedicated funding of approximately \$200 million per year for transit projects outlined in the Province's approved City Charters Fiscal Framework Act. This report does not provide a recommendation on the next stage for the Green Line LRT. The recommended next step is to advance the planning for all the candidate projects to validate the constructability and capital cost of the projects.

Background

In 2017 May, Administration presented "Green Line LRT: Building the Core" (C2017-0467), a recommendation on Green Line stage 1, and outlining the history of Calgary's LRT network expansion. Calgary's current LRT network was successfully expanded over the past four decades, balancing capital construction costs, capital lifecycle maintenance costs, construction of supporting infrastructure (maintenance and storage facilities) and ongoing operating costs, combined with efficient delivery of services and ongoing optimization. This balanced approach has led to Calgary operating one of the highest ridership LRT systems in North America. Constructing and expanding the Green Line LRT is proposed to use this same approach to deliver major infrastructure projects, providing benefits to Calgarians while balancing construction and operating costs.

This report presents the benefits for future candidate projects. Stage 1 construction will bring significant changes and benefits to many Calgarians. Future extensions to the Green Line will leverage the Stage 1 investment and improve mobility options for Calgarians. To fully realize the benefits of the long-term vision the Green Line LRT will be built-out between Keystone in the north and Seton in the southeast. Investments in LRT have proven benefits in the communities they serve, such as:

- Increased mobility options and access to destinations for all Calgarians
- Connecting Calgarians with the services they use every day
- Reduction in household transportation costs (time and money) for commuters
- Increases in property values for properties served by rapid transit providing growth in municipal and Provincial tax revenues due to redevelopment and growth in income
- Reduced greenhouse gas (GHG) emissions
- Short-term creation of jobs during construction and long-term creation of jobs during operation of the LRT
- Economic diversification and increased attractiveness to employers that value accessible communities

Green Line future candidate projects will be included in the RouteAhead project prioritization to be evaluated against other rapid transit expansion projects. A similar evaluation framework of benefits, costs, and constraints will be used to assess overall rapid transit priorities across the city in a consistent manner. This evidence-based analysis has been successful in securing funding from our partners for previous RouteAhead projects, including:

- Green Line stage 1
- MAX Orange (North Crosstown)
- MAX Teal (South Crosstown)
- MAX Purple (17 Avenue SE)
- MAX Southwest BRT

Analysis/Investigation

The following candidate projects are presented in this report, based on three possible funding envelopes [**See attached**]:

- Small (\$250-\$400 million)
 - Shepard station to McKenzie Towne station (two station extension)
- Medium (\$400-\$700 million)
 - 16 Ave N station to 40 Ave N station (two station extension)
 - Shepard station to Auburn Bay/Mahogany station (three station extension)
- Large (\$700 million - \$1 billion)
 - 16 Ave N station to 64 Ave N station (four station extension)
 - Shepard station to Seton station (five station extension)
 - 16 Ave N station to 40 Ave N and Shepard station to Auburn Bay/Mahogany station (five station extension)

Candidate projects presented in this report are based on expected future funding levels for LRT investment. The candidate project from 16 Avenue N to 40 Avenue N can be constructed, however there are a few current challenges with an interim terminal station at 40 Avenue N, such as:

- 40 Avenue N Station is not designed for terminal operations in terms of train turnaround or passenger transfers between bus and LRT
- Buses running along Centre Street N are likely to continue to go downtown, duplicating LRT and bus service and increasing transit operating costs
- Centre Street N would transition from four lanes to two lanes at 40 Ave N

Once the Green Line is constructed to 64 Avenue N there will be a reduction in bus operating costs and duplication of service because bus routes will start/end at 64 Avenue N station. However, due to the increase in LRT length and LRT operating costs, there will be an increase in transit operating costs with this extension. In the southeast, an extension to McKenzie Towne will reduce bus operating costs. Construction of longer candidate projects is desirable to realize operating savings, reduce community construction impacts and realize efficiencies of scale.

Project Benefits

The next step in evaluation of the candidate projects are the benefits to Calgarians. The intent of planning the Green Line LRT under the four-layer approach has been to envision a customer focused transit system that integrates into the community, connects Calgarians to a city-wide

network of community services, and serves as a catalyst for transit oriented development. These benefits are further defined as follows:

- **Social** – the number of community services (parks, recreation centres, libraries, health centres, schools, grocery stores etc.) connected by the Green Line LRT, the number of affordable housing units within walking distance of the stations, and people with low income served within walking distance of the stations.
- **Economic** - property value uplift within walking distance of the stations over 30 years, the number of opening day jobs served within walking distance of the transit stations, and the number of future jobs served within walking distance of the transit stations over 30 years.
- **Environmental** – reduction of greenhouse gas emissions, proximity to Municipal Development Plan (MDP) Activity Centres and Corridors, and the number of properties that offer a brownfield remediation opportunity.
- **Transit Oriented Development (TOD)** - development potential surrounding the station area, the opportunity for land use diversity depending on the TOD type that is most suitable for a station area, and market readiness based on the insight into the potential and desirability for development from a market perspective.

Project Readiness

Candidate projects will all need to be advanced to a state of readiness prior to implementation. To minimize implementation risks, the candidate projects should be sufficiently advanced to ensure they can be delivered successfully. Criteria of a projects readiness include:

- Stakeholder Preparedness: level of stakeholder acceptance and alignment on project goals and objectives. This is intended to ensure that proper efforts have been made to communicate and accommodate community and business disruptions during construction or because of the project.
- Design and Approvals: status of functional and preliminary design is sufficiently resolved to increase cost estimate certainty and to inform land acquisition requirements to acquire the necessary land prior to the award of a construction contract.
- Land Acquisition: number of acquisitions required and progressed, complexity of acquisition, and the impact on overall negotiation effectiveness due to the level of design or timeline. Administration recommends allotting a minimum of three years following completion of preliminary design prior to procurement to allow for a higher number of negotiated acquisitions to be completed and to address any land use amendments that may be required.
- Program Delivery, Resources and Contracting Strategy: ensure the options considered for construction can be delivered given current market conditions, delivery methods are available, and that the contracting strategy and procurement plan is in line with the project objectives.

Conclusion

This report evaluates the benefits of various potential stage 2 candidate projects. The projects are presented in groupings, established to represent a potential increasing magnitude of capital funding. The groupings were developed based on the announced dedicated funding of approximately \$200 million per year for transit projects outlined in the Province's approved City Charters Fiscal Framework Act. This report does not provide a recommendation on the next stage for the Green Line LRT. The next step is to advance the planning and design for all of the candidate projects to validate the constructability and capital cost of the projects.

"Future Staging Analysis"

Green Line LRT Extensions

		Small (\$250-400M)	Medium (\$400-700M)		Large (\$700M-\$1B)			Mega (\$1B-\$2B+)		
Criteria		Shepard-McKenzie Towne	16 Ave N-40 Ave N	Shepard-Auburn Bay/Mahogany	16 Ave N-64 Ave N	Shepard-Seton	16-40 Ave N and Shepard-Auburn Bay/Mahogany	16 Ave N - Beddington	16 Ave N - 96 Ave N	16 Ave N - North Pointe
Net Operating Cost		-\$3M	\$7M	-\$3M	\$8M	-\$1M	\$5M	\$6M	\$5M	\$6M
LRT Ridership		Passenger's per avg. weekday	4,200	7,900	7,300	26,900	12,600	15,200	30,800	36,300
Community Services		# of Services in 1,000m radius	10	38	16	65	23	54	92	109
Social	Affordable Housing Units	# of Affordable Housing Units in 1,000m radius	2,500	5,000	4,600	7,800	9,400	9,600	9,500	11,100
	People with Low Income Served	Total # of Low Income Pop in 600m radius	1,300	800	1,700	2,100	1,950	2,500	2,850	3,350
Economic	Property Value Uplift	\$Million	550	850	750	1,050	950	1,600	1,250	1,500
	Jobs Opening Day	# Jobs in 800m radius	5,200	5,900	5,600	9,600	6,200	11,500	11,300	12,900
	Jobs Future	# Jobs in 800m radius	11,900	9,600	13,200	14,300	21,300	22,800	16,700	21,200
Environmental	GHG Emissions Reductions	Tonne CO2/Year	1,800	3,300	3,100	6,900	5,300	6,400	12,900	15,200
	Proximity to MDP Activity Centres and Corridors (and PTN)	Connects to # of activity centres/corridors	0	2	1	3	3	3	5	7
Development	Brownfield Remediation	Area (m2) requiring remediation	790,000	40,000	805,000	120,000	825,000	845,000	300,000	306,000
	Transit Oriented Development	Development potential adjacent to stops/stations and market readiness	80	84	115	146	190	199	177	206
		233								