

GREEN LINE LRT: BUILDING THE CORE

EXECUTIVE SUMMARY

This report presents the recommended first stage of construction for the Green Line Light Rail Transit (LRT): 16 Avenue N (Crescent Heights) to 126 Avenue SE (Shepard) laying the foundation for Calgary's next LRT line. This core project will improve mobility choices, support community development, provide greater transportation choices to access Calgary's community amenities and resources, and is essential to support Calgary's growth. The Green Line LRT is a momentous investment in Calgary's future and marks our city's most extensive transit expansion serving our city for many generations to come. Defining the first (core) stage of construction over the coming decade is necessary to provide clear direction to the other orders of government on the project scope and in order to secure project funding so that detailed design and construction can proceed.

Administration is presenting our assessment of where to commence the construction of Green Line. Supported by a detailed evaluation to compare and contrast the numerous staging options, the core project will establish a strong foundation of LRT service and supporting facilities (such as the maintenance and storage facility) required to operate the new line. The core project will complete the most technically complex and capital intensive aspects of the long-term vision. The core project has the highest readiness; Administration is confident that The City can move quickly into construction while minimizing risks to The City. This foundational core project will best facilitate future extensions and demonstrates The City's commitment to implementing the long-term vision for the Green Line LRT.

The core project delivers numerous benefits for the projected 60,000 to 65,000 Calgarians who will ride the train on opening day. Benefits include improved access for Calgary's low income population, the creation of short term construction and long term operating jobs, greenhouse gas reductions, and service to the most viable near term development sites.

Capital construction cost for the core project from 16 Avenue N to 126 Avenue SE is estimated to be no more than \$4.65 Billion. The project financing costs have been estimated and will be updated once the terms of the Federal and Provincial funding are known. Operating costs that would commence on opening day; targeted for 2026, have also been estimated and are included in this report.

ADMINISTRATION RECOMMENDATION(S):

That the Strategic Meeting of Council:

1. Receive this report and attachments 1 and 2 for information;
2. Direct that attachment 2 and any In Camera discussion heard in-camera pursuant to subsection 23(1)(b) of the *Freedom of Information and Protection of Privacy Act*, and remain confidential under 24(1)(a), 24(1)(b) and 25(1)(b) of the *Freedom of Information and Protection of Privacy Act*, until the Green Line construction has been completed.

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PREVIOUS COUNCIL DIRECTION/POLICY

As per Administrative Leadership Team direction, Administration was requested to report to the 2017 May 15 Strategic Meeting of Council to recommend the first construction project for the Green Line LRT.

At the 2015 December 14 Regular Meeting of Council, Notice of Motion NM2015-33 was approved as follows:

“MOTION ARISING, Moved by Councillor Farrell, Seconded by Councillor Chabot, that Council direct Administration to prepare a report on the impact of the 30-year commitment to the Green Line on the city's overall debt and debt servicing capacity, returning to the Priorities and Finance Committee, no later than Q2 2017.”

BACKGROUND

The long-term vision for the Green Line LRT is Calgary's third light rail line linking north central Calgary through the downtown core to the deep southeast. At full build out the Green Line LRT will include 46 km of low floor transit connecting approximately 26 stations between 160 Avenue North to Seton in the Southeast. It will introduce fast, frequent and reliable LRT service to tens of thousands of Calgarians, seamlessly integrating with the Red and Blue lines at a 7 Avenue SW Station, expanding customer access to all of Calgary.

Since 1978, Calgary has been continuously building and expanding its Light Rail Transit (LRT) system and has created one of the largest and most well used public transit systems in North America. Calgary's CTrain system started in the downtown and was radially built out. The 12.9 km core of the Red Line was constructed from 7 Avenue SW to the maintenance and storage facility at Anderson Station (1981). The next LRT project launched the core 9.8 km of the Blue Line from 7 Avenue SW to Whitehorn Station (1985). In 1987 the core of the Red Line was extended by 5.8 km, to serve the northwest, from 7 Avenue SW to the University, in time for the Winter Olympics. With the core segments in place the City of Calgary has seen 9 further LRT expansions over 30 years, as funding became available.

Building on this successful LRT system The City of Calgary is now moving forward with the Green Line LRT. We are starting this new LRT line by building the core segment for the north and southeast. This first stage of investment combined with a long-term staging plan will provide the basis for future investments in extensions that can occur when the time is right.

Since 2012 December, Administration has been thoughtfully advancing design, transit oriented development planning, and land acquisition to set the long-term vision and to determine the steps required for implementation. In 2015 December, Administration presented a report to Council (TT2015-0881) which evaluated the long-term vision for the Green Line LRT. This vision was evaluated against the expected capital funding plan over the next ten years to assess to what extent the Green Line LRT could be constructed within the \$4.65 Billion expected capital funding plan.

Funding for the first stage of Green Line LRT will be a three party partnership between The Government of Canada, The Province of Alberta and The City of Calgary. The target for the

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initial stage of the Green Line LRT was shaped by commitments made in 2015 July when the Government of Canada announced that it will invest \$1.53 Billion towards the Green Line LRT, predicated on an approved formal application by The City to the Government of Canada. A complete funding commitment has not been made by The Province of Alberta, however, positive discussions are continuing and The Province is waiting to understand the benefits and details of the recommended core project and Council's decision on the recommendation.

Initial funding contributions towards the Green Line LRT have been received from both The Federal and Provincial Governments, demonstrating support for the project. To date the Federal Government has contributed \$111 Million through the Public Transit Infrastructure Fund (PTIF) Phase 1 and The Province has committed \$147.9 Million, announced in 2016 November, through GreenTrip. These funds are currently being utilized for land acquisition, utility relocations, and transit improvements along the corridor.

At the 2016 November 14 Strategic Meeting of Council, Administration presented funding, financing, and staging considerations for the Green Line LRT. The report presented a number of funding scenarios and the impacts of financing costs that would reduce capital availability for construction. Project pre-requisites were also presented to support operations of a new LRT line including:

- a maintenance and storage facility;
- a new fleet of low floor light rail vehicles;
- assembly of necessary land; and
- network connections, such as the Centre City, that provide ridership to ensure sustainability.

The report to Council also highlighted that a recommended first stage for construction should be evaluated based on the benefits provided to Calgarians.

INVESTIGATION: ALTERNATIVES AND ANALYSIS

Since the 2016 November 14 Strategic Meeting of Council numerous staging options for initial construction were identified by Administration. Extensive analysis of the staging options was undertaken with only those alternatives that fit within the funding envelope advancing as a viable option. Similar to what was presented at the 2016 November Strategic Meeting of Council, the following criteria were used to narrow the options to the recommended core project within this report.

Project Pre-requisites:

Common to all options are three key pre-requisites that are required when starting any new LRT line; strategic network connections, a Maintenance and Storage Facility, and the ability to expand the Green Line LRT in the future. These requirements helped to define the core project.

- **Network Connections** – To support opening day and projected ridership growth, the core project must connect to the Centre City and provide seamless connectivity with the existing Red and Blue lines. Network connectivity is further enhanced by providing integrated connections to the crosstown bus rapid transit routes currently under construction.

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- **Maintenance and Storage Facility** – Provision of a light rail vehicle facility to clean, repair and protect from the environment when parked.
- **Expandability** - The ability to implement the long-term vision in stages when further investments are made. This positions The City to deliver future affordable and achievable expansions.

Benefits:

Another key consideration of a recommended project are the benefits to Calgarians, the following criteria were evaluated:

Transit Sustainability: LRT Ridership and Operating Costs

Critical to the success of the first project is delivering a sustainable transit system. In the 2016 November Strategic Report to Council (C2016-0880) Administration presented a number of factors that contribute to a sustainable system; maximizing new ridership, minimizing operating costs, maximizing ride (travel) time savings, and improving capacity.

Community Benefits

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, serves as a catalyst for transit oriented development, and connects Calgarians to a city-wide network of community services. 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 the low income population 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:

The last key consideration in determining the recommended project is the projects readiness. In order to minimize implementation risks, the recommended project must be sufficiently advanced to ensure it can be delivered successfully. Criteria of a project's readiness include:

- **Stakeholder Preparedness** - Level of stakeholder acceptance and alignment on project goals and objectives. This criteria is intended to ensure that proper efforts have been made to communicate and accommodate community and business disruptions during construction or as a result of the project.

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- **Design and Approvals** – Status of functional and preliminary design is sufficiently resolved to increase cost estimate certainty and to inform land acquisition requirements in order to acquire the necessary land prior to the award of a construction contract by Q2 2020.
- **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. Lessons learned from transit agencies that have implemented transit expansions of a similar magnitude to the Green Line LRT are: all necessary land should be acquired prior to award of a construction contract to mitigate the risk of contractor delay claims.
- **Program Delivery, Resources and Contracting Strategy**- Ensure the options considered for construction can be equally delivered given current market conditions, delivery methods are available, and that the contracting strategy and procurement plan is in line with the projects objectives. This criteria is testing the market's ability to deliver a core project of the magnitude and complexity as is being recommended. Currently there are 10 known projects across Canada that are similar in size and scope, therefore creating competition for resources to deliver these projects.

It is possible to improve the readiness of any given core project option by managing the risks, adjusting the scope, timeline, contracting strategy, or enabling the factors with additional resources or mitigating strategies. For example, to improve readiness of the north segment of the alignment, Administration would recommend 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.

First Stage Project Recommendation:

Today, the southeast is the fastest growing area of the city, with the residential population expected to double in the next 25 years. Northwards, Calgary is a well-established and densely populated area, and will continue to grow with over 50,000 new residents anticipated over the next 20 years. By opening day, the population of both the north and southeast catchment areas is expected to be similar. For these Calgarians, the recommended core project from 16 Avenue N (Crescent Heights) to 126 Avenue SE (Shepard) will provide high quality transit to residents, businesses, and commuters along the route.

Project Pre-requisites

The core project delivers on system integration by strategically connecting to the City's Primary Transit Network; Red and Blue Lines in the Centre City and Bus Rapid Transit (BRT) routes that are currently under construction and scheduled to open over the next three years. Key BRT connections include the North Crosstown BRT at 16 Avenue N, South Crosstown BRT at Douglas Glen SE, 17 Avenue SE BRT Transitway at Inglewood/Ramsay and Centre City and Southwest BRT Transitway at Centre City. Connections are further enhanced with the provision for 11 transit hubs that will connect transit customers to local and city-wide destinations including direct connections to seven of the Municipal Development Plans activity centres. Other key connections that will be improved are the future primary transit network connections and future regional transit connections.

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Anchored by key network connections the core project is strengthened by the population and jobs it serves. The north limit of the core project at 16 Avenue N, adjacent to Crescent Heights, Balmoral and Tuxedo communities, has the highest population within walking distance of the station (outside of downtown), has the highest job population on opening day of all northern stations (outside of downtown) and is expected to see the second highest LRT boardings (outside of the downtown) on opening day. This station site is also one of the highest ranked transit oriented development sites along the line.

The 16 Avenue N station marks the north end of the downtown tunnel, which positions The City for future more easily achievable expansions. The downtown tunnel segment in the Centre City represents a significant portion of the investment. Funding programs of the magnitude required to construct the downtown tunnel may not be available for some time. Therefore, constructing the Centre City segment as part of the first stage project establishes the ability to expand in the future with smaller amounts of capital funding.

The core project is also supported by the primary bus terminal and Maintenance and Storage Facility located north of Shepard Station at 126 Avenue SE, where the lands required have either been acquired or are currently under contract.

Attachment 1 outlines the route of the first stage project and includes the following infrastructure features:

- 20 km of LRT track;
- 14 stations;
- 8 bridges (Elbow River, Blackfoot Trail, Highfield Blvd, 46 Avenue SE, Deerfoot Trail, Bow River, 78 Avenue SE and 90 Avenue SE);
- 1 km of elevated guideway between Inglewood/Ramsay to 26 Avenue stations;
- 3 park and ride facilities with a total of 1800 - 1900 stalls (Lynnwood/Millican, Douglas Glen, and Shepard);
- 3 tunnels (CN/Highfield; Ogden Road SE and Barlow Trail/114 Avenue SE);
- 4 km Centre City tunnel from 20 Avenue N to Macleod Trail;
- 1 light rail vehicle (LRV) Maintenance and Storage Facility north of 126 Avenue SE (Shepard); and
- Approximately 70 low floor vehicles.

Benefits

Trends indicate that as the population grows and development occurs around stations, more people will choose to live more transit oriented lifestyles. An additional six transit oriented development (TOD) sites along the core project will allow people to live, work, and play close to transit, helping to manage urban sprawl in the city and to support ridership for the system.

On opening day the recommended core project from 16 Avenue N (Crescent Heights) to 126 Avenue SE (Shepard) will carry 60,000 to 65,000 Calgarians. Calgarians will have improved access to destinations of their choice with the 20 km's added to the existing 59 km LRT system. Connections to Calgary's several major activity centres such as Quarry Park, The National Music Centre, The Stampede, and The New Public Library are some of the many amenities that become more accessible. This core project will help Calgarians to continue to live affordable

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lives in communities that already have over 2,300 existing affordable housing units providing homes for over 7,000 Calgarians, and further opening the door with access to over 60 existing community services such as recreation centres, parks, and libraries.

Investing now in this first stage of Green Line supports businesses and employee travel choice for 191,000 existing employment in planned station areas; with long-term employment growth projections to over 225,000 located within the core projects station areas. Over the proposed 10 years of construction the first stage project is estimated to create over 12,000 direct construction jobs and over 8,000 supporting jobs. This creation of jobs is in addition to the operating jobs for opening day of service. Contributions to our environmental sustainability initiatives are also seen with a reduction of 30,000 tonnes of greenhouse gases, the equivalent of 6,000 vehicles being taken off the road on opening day. To support Calgary's growth and to be well positioned to continue to welcome this growth the foundational piece of the Green Line LRT from 16 Avenue N (Crescent Heights) to 126 Avenue SE (Shepard) is critical to be built.

Project Readiness

The recommended first stage project demonstrates the highest degree of project readiness. Specifically, land acquisition for the southeast portion of the alignment has been underway since early 2016 and nearly 50% of the total land area required within this segment (Inglewood/Ramsay to 126 Avenue SE) has been acquired or is under contract. This includes the acquisition of over 70 acres of land which is required to construct the Maintenance and Storage Facility. Negotiations are ongoing with both Canadian Pacific and Canadian National Railway and once complete nearly 85% of the total land area required for construction between Inglewood/Ramsay to 126 Avenue SE will be acquired. It also represents the highest level of stakeholder preparedness with largely supportive communities. The design is the furthest along with the alignment and station locations in the segment between Inglewood/Ramsay and Seton approved in 2015. The recommended scope for the core project has also been determined to be a marketable project size based on recent market sounding.

Stakeholder Engagement, Research and Communication

Administration will continue to engage with Calgarians to set the long-term vision for the full Green Line LRT and its associated city building framework.

The details of the recommended first stage project will be presented in a series of community meetings following the 2017 May 15 Strategic Meeting of Council.

Engagement on the southeast alignment was completed and recommendations were approved by Council in 2015. This segment of the line is currently the most advanced in terms of design and land acquisition.

Strategic Alignment

The recommended core project meets the needs of a growing and changing population, and is in accordance with Council's priorities and is aligned with the Government of Alberta's and Government of Canada's strategic objectives. This core project supports sustainable growth and contributes to vibrant, safe, and healthy communities.

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Social, Environmental, Economic (External)

The first stage project aligns with social, environmental and economic priorities of The City, the Provincial and the Federal Governments. It is designed to improve quality of life by providing people with options on how to move, work, live, and play, and allows more affordable access to essential community services. Specifically the core project will contribute to:

- affordable lifestyles: nearly 35% of lower-income citizens use public transit to get to their everyday destinations, compared to 17% of moderate income respondents;
- directly reduces greenhouse gas (GHG) emissions, achieves efficiency gains with as few as 18 LRT passengers/train, which is the “break even” point for LRT energy savings when compared to 18 single occupant automobiles; and
- connects industrial, employment and commercial centres, providing high quality transit to these areas including Quarry Park, with 2 million square feet of development completed, and a total expected 4 million square foot buildout. Quarry Park is now home to major corporate head offices, such as Imperial Oil, and the surrounding area currently employs over 11,500 employees, and will see a 25,000 job increase by 2076.

Financial Capacity

The first stage capital construction cost is estimated at \$4.65 Billion including infrastructure, land, maintenance and storage facility, vehicles, and escalation. The construction cost estimate is based on a functional level of design and a Class 3 estimate (-30% to +50%). Cost estimates include a provision for inflationary escalation assuming a construction period from 2020 to 2026. Estimated costs have been validated using Monte Carlo statistical analyses, whereby a value is placed on the identified risks and the probabilities of occurrence are determined. The cost validation exercise provides additional confidence in the probable project cost. Further, a team of external experts from across North America recently reviewed the project and the cost estimates and believe that the estimates are reasonable and in line with standard industry practice and experience.

It should be noted that the infrastructure at the time of writing this report assumes the option for the Beltline to Inglewood/Ramsay segment that extends underground on 12 Avenue SE and heads north around the Victoria Park Transit Centre at surface (Option 1 from TT2016-0972).

Current and Future Operating Budget:

Taking into account the additional revenue generated, a net additional operating budget of approximately \$40 million per year, calculated in 2016 dollars, will be required on opening day in 2026. The estimate is dependent on a number of factors, including actual ridership and vehicle characteristics, etc.

Current and Future Capital Budget:

Financing costs are excluded because of the uncertainty of the terms of the funding from The Province of Alberta and The Government of Canada.

The financial plan is based on each of the three levels of government funding one-third of the capital cost of \$4.65 Billion towards the first stage Green Line LRT project;

- (i) The City's portion represents a 30 year cash flow of \$52 Million per year.

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- (ii) The Federal government has reaffirmed its funding commitment of one-third, most recently confirmed with a specific Green Line LRT mention in its March 2017-2018 budget. Funding will be from PTIF Phase 2 program.
- (iii) The Provincial government has indicated support for the project with initial commitments provided through GreenTrip and PTIF Phase 1, but has not yet provided a firm commitment on the full amount. Commitments are pending The City's confirmation of the recommended first stage for construction.

Any debt service impact from one or more of the three funding streams would be in addition to the \$4.65 Billion required for the recommended core project construction.

Attachment 2 responds to Council's direction (NM2015-33) to report the impact of the Green Line LRT on The City's overall debt and debt servicing capacity.

Risk Assessment

Land acquisition represents one of the highest risks to the project readiness. The full Green Line LRT from 160 Avenue N to Seton SE impacts 438 privately owned properties, 286 of which are located between 25 Avenue N to Beddington Trail N. The core project represents less than one-quarter of the total number of property acquisitions that are required for the full Green Line LRT, with approximately 99 property acquisitions required. There are high risk property acquisitions located within the southeast segment of the alignment, however, Administration is in active discussions with these stakeholders and are working towards obtaining negotiated agreements prior to 2017 year-end.

Mitigating the land acquisition risks for the full buildout of the Green Line LRT will require both significant effort and time to complete. The design details for the portions of the alignment located north of Inglewood/Ramsay have not advanced far enough to allow for land acquisition to move forward, and as such, pursuing a north alignment within current timelines would place increased risk on the project. In an effort to mitigate risks for future stages of the project, Administration recommends continuing with land purchases on an opportunity basis for those properties located outside of the recommended first stage project as they become available.

The Province and The Government of Canada remain engaged and supportive of the Green Line LRT, however it has been clearly communicated that a first stage project needs to be established, the scope needs to be set, and the associated benefits defined in order to secure a funding commitment from all levels of government.

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REASONS FOR RECOMMENDATIONS:

Building the first stage project from 16 Avenue N (Crescent Heights) to 126 Avenue SE (Shepard) delivers the core critical infrastructure, completes the most challenging sections of the line, strengthens transit service for Calgarians, is ready for immediate delivery, provides public benefits and sets the foundation for future extensions in north and southeast Calgary.

ATTACHMENTS

1. Green Line LRT: Building the Core (16 Avenue N to 126 Avenue SE)
2. Funding and Financing Scenarios (Confidential)