RouteAhead: Prioritzation of Future Capital Projects

RECOMMENDATION(S):

That the Standing Policy Committee on Transportation & Transit recommend that Council:

1. Use the results of the prioritization analysis to advance projects to the corporate prioritization processes to align with all City priorities and make the best match with available funding.

2. Conduct ongoing advocacy with the federal and provincial government for capital funding for rapid transit expansion projects, fleet purchase/maintenance, and state of good repair.

3. Return to Committee by Q4 2022 with an updated prioritization list as part of the 10-year review of RouteAhead.

4. Direct Administration to use the analysis in this Report to create Appendix 1 of RouteAhead that will identify priority transit projects to be used for infrastructure prioritization.

RECOMMENDATION OF THE STANDING POLICY COMMITTEE ON TRANSPORTATION AND TRANSIT, 2020 NOVEMBER 17:

That Council adopt the Recommendations contained in Report TT2020-1289.

Opposition to Recommendations:

Against: Councillor Farkas

HIGHLIGHTS

- This report provides an updated list of prioritized future rapid transit network growth projects as identified in Calgary Transit's 30-year strategic plan using a prioritization analysis.
- What does this mean for Calgarians? The report will indicate "what's next" for rapid transit expansion projects with the completion of MAX Purple, Teal, Orange and Yellow.
- Why does it matter? Without long-term plans, integration with municipal growth decisions may be misaligned as well as inconsistent messaging around growth priorities for the transit system.
- Attachment 2 provides the prioritization results for projects by first analyzing project benefits, independent of readiness, capital and operating investments. Then secondly, by analysing the benefits with capital and operating investments and readiness to examine the value.
- Additional considerations such as High Ridership Corridors, Transit Oriented Development and coordination with other City Departments and key City strategies are incorporated from a qualitative perspective to account for project readiness and corporate coordination.
- The top five projects ranked according to benefits and readiness are: 52 Street East BRT, MAX 301 North, Route 305 West, Blue Line NE, and MAX 302 South.

- Unapproved segments of the Green Line are not included in the RouteAhead Prioritization of Future Capital Projects as Administration will be updating the future planning recommendations.
- We are advancing the RouteAhead report with an understanding that as Canada recovers there may be more opportunity to advocate for additional transit funding outside of the Green Line.
- Pending Council approval, the projects are then advanced to departmental and corporate infrastructure prioritization processes to align with other needs and make the best match with available funding.
- The prioritization analysis was conducted the same criteria and methodology developed for Green Line Stage 1 which was based on the original RouteAhead analysis. It was adapted to incorporate a qualitative benefits framework using a standardized weighting and ranking process.
- It is also important to note that adequate funding must be considered for fleet (bus and LRVs) and to maintain infrastructure in a state of good repair to ensure Calgary Transit can maintain and operate the current system.
- At the 2019 July 7 Standing Policy Committee on Transportation and Transit report TT2019-0637, was approved the Council adopted Administration's recommendations contained in report TT2019-0637 and directed Administration "to use the framework and list of major transit growth projects in Attachment 1 for prioritizing the future stages of growth of the rapid transit network, and provide an update through the SPC on Transportation & Transit by Q4 2019."
- Strategic Alignment to Council's Citizen Priorities: A city that moves
- Background and Previous Council Direction is included as Attachment 1.

DISCUSSION

Since 2013, Calgary Transit has made strong progress on the planning and construction of RouteAhead network objectives. Major construction has been completed on many Bus Rapid Transit (BRT) Network projects, with service commencing on the MAX Orange, Purple, Teal and Yellow lines. These projects account for 158 kilometers of the 342 kilometers of rapid transit projects planned which equals 46 percent.

Prioritization of the projects will not change the current approved capital projects in One Calgary 2019-2022 as the projects are outside of the four-year anticipated capital funding envelope.

Prioritization Approach

A two-dimensional prioritization approach was used to evaluate rapid transit projects by first analyzing project benefits, independent of capital and operating cost constraints. This allowed projects to be analyzed using the criteria and values approved by Council that capture social equity, employment connections and environmental benefits. The second dimension used the results of the benefit analysis and compared the projects against the estimated net operating costs for 30 years and capital investments using Net Present Value (NPV), to evaluate the relative benefits, value and financial impacts. Additional considerations such as High Ridership Corridors, Transit Oriented Development and Coordination with other City Departments and key City strategies are incorporated from a qualitative perspective to account for project readiness and corporate coordination.

Project List

RouteAhead: Prioritzation of Future Capital Projects

The evaluated rapid transit projects have been identified in RouteAhead (2012) as well as additional projects approved by Council after RouteAhead (Westbrook to MRU Transit Connection, in-street MAX improvements to Routes 301 and 302). Some projects (e.g. 162 Ave SW Transitway, Shaganappi HOV and North Regional Context Study BRT) were previously identified as beyond the RouteAhead timeframe but are now being included because of advances in approved development adjacent to the project area.

The Green Line North and South segments were not included as Administration will be updating future planning recommendations in 2021. In the case of Blue Line NE and MAX Purple extensions, programs have been defined into discrete projects to allow for incremental expansion based on operational and customer requirements, development and consistent with the traditional, successful expansion model of the LRT network. This does not preclude multiple projects from being constructed together if funding is available at the time.

Prioritizing State of Good Repair

It is important to note that while funding new projects is important to the growth of the transit system, there remains critical asset replacement and renewal needs to sustain existing service and keep up with current ridership demand. Capital programs that improve the state of good repair (SOGR) of public transit and that support system optimization and efficiency will be essential to fund. This funding ensures that Calgary Transit is able to continue providing reliable, efficient and safe service. Assets in this category include fleet vehicles, buildings, tracks and related equipment, electrical systems, fare systems, and other technology systems. Recent significant reductions in capital funding for lifecycle maintenance have increased the risk of service disruptions and failures of these assets, which will negatively impact the ability to sustain reliable operations. As significant portions of the Red and Blue Lines are greater than 30 years old, reduced capital funding for regular maintenance and lifecycle replacement will increase the likelihood of significant failures and extended unplanned reactive maintenance. Industry best practices recommend budgeting approximately 10 percent of replacement capital asset value to maintain a SOGR. Appropriate funding is needed for ongoing maintenance of these critical assets to remain in a SOGR and support safe and reliable transit service. These requirements will need to be prioritized with network growth as further capital funding streams are identified.

Internal Consultation

Calgary Transit consulted internally with Calgary Neighbourhoods, Calgary Housing, Calgary Parks, Transportation Planning, Transportation Infrastructure, and Green Line to populate and analyze project prioritization data, ensuring data and methodology consistency. Calgary Transit further consulted with Transportation Planning and Green Line to ensure alignment with the Green Line Program, MDP/CTP update, and Transportation COVID-19 Recovery Scenarios.

Next Steps

The next steps will be to amend the current RouteAhead document to include an Appendix 1 containing information from Attachments 2 and 3 of this report. Following future planning work with the Green Line, an updated priority list will be developed that includes refined cost estimates for the Green Line and Passenger Rail as well as other projects. In 2022, RouteAhead will be 10 years old and Administration will provide a major review and update to the long-range strategy.

RouteAhead: Prioritzation of Future Capital Projects

STAKEHOLDER ENGAGEMENT AND COMMUNICATION (EXTERNAL)

☐ Public Engagement was undertaken

☒ Public Communication or Engagement was not required

☐ Public/Stakeholders were informed

☐ Stakeholder dialogue/relations were undertaken

This report has been developed internally based on a technical review of Bus Rapid Transit Network projects using updated data and a standardize weighting and ranking process as previously approved by Council.

IMPLICATIONS

Social, Enviromental and Economic Implications

The RouteAhead is an important contributor to the City meeting Council's approved GHG reduction target of 80 percent below 2005 by 2050. Rapid transit projects are also key contributors to social inclusion and economic vitality. The Social, Environmental and Economic Implications are summarized in Attachment 4.

Service and Financial Implications

No anticipated financial impact

Administration has responded to economic conditions by focusing on improved efficiency and effectiveness of service delivery and support. Strategic direction for capital investments in the rapid transit network have been proposed. There are no capital budget implications associated with the recommendations in this report.

RISK

There is potential for unforeseen impacts on project prioritization due to COVID-19 as summarized in Attachment 5.

ATTACHMENT(S)

1. Previous Council Direction, Background
2. Route Ahead Prioritization Report
3. Project Summary Pages
4. Social, Environmental and Economic Implications
5. Risks

RouteAhead: Prioritzation of Future Capital Projects

Department Circulation

General Manager	Department	Approve/Consult/Inform
Doug Morgan	Transporation	Approve

Background

In 2011 Council directed that a new long-term plan for Calgary Transit be created in accordance with the Calgary Transportation Plan (CTP). The RouteAhead strategic plan was developed to guide both operations and investment in transit over the next 30 years. The plan was approved by Council in 2013. RouteAhead establishes a clear vision for transit in Calgary and will be used by City Council and Administration to make informed decisions regarding customer-centric improvements, investments in capital and operating budgets, service changes and other major business decisions.

In 2018, Council directed the RouteAhead team to develop open and transparent criteria that was easy to understand, easy to apply to a variety of transit capital projects, evaluated relative benefits of various projects across the city and could be replicated in the future with different projects. The general outcomes desired for future projects reflect those in the RouteAhead document:

- Support of Land Use
- Improving the Customer Experience
- Provision to serve high ridership and overall mobility

In 2019, Council approved the guiding framework for the prioritization of Future RouteAhead Capital Projects. The intention of the framework was to use criteria and weighting to produce an assessment of the rapid transit projects based solely on benefits first, independent of capital and operating cost constraints. The second part of the approach was to compare the projects against the net operating costs and capital costs, to evaluate the relative benefits, value and financial impacts.

Previous Council Direction

DATE	REPORT NUMBER	DIRECTION/DESCRIPTION
9/30/2020	TT2020-1082	**RouteAhead Project Prioritization Report Deferral** Deferral request was approved for the RouteAhead Project Prioritization report to not later than the end of Q4 2020 to allow for improved alignment with the ongoing capital infrastructure planning processes.
12/18/2019	TT2019-1590	**Deferral of the RouteAhead Project Prioritization Report to no later than the end of Q3 2020** Deferral request was approved to defer the RouteAhead Project Prioritization report to no later than Q3 2020.
7/22/2019	TT2019-0637	**Direction for framework for future stages of rapid transit** Council adopted Administration's recommendations contained in report TT2019-0637 and directed Administration "to use the framework and list of major transit growth projects in Attachment 1 for prioritizing the future stages of growth of the rapid transit network, and provide an update through the SPC on Transportation & Transit by Q4 2019."

12/6/2018	TT2018-1405	**Direction to prioritize major transit growth projects by 2019 Q3** Green Line: Staging and Right-of-way and RouteAhead Update – Deferral Request, was approved with the recommendation that "Council approve Administration's request to defer the reports on … 'RouteAhead Update to prioritize major transit growth projects' to no later than 2019 Q3".
6/25/2018	TT2018-0617	**Direction to use framework for major transit growth projects by 2019 Q1** RouteAhead Update was approved with the recommendation that Council "Direct Administration to use the attached prioritization framework for major transit growth projects and provide an update to Council through the SPC on Transportation & Transit by Q1 2019".
1/14/2013	TT2012-0833	**Direction to prepare annual status report of RouteAhead** RouteAhead: A Strategic Plan for Transit in Calgary, was approved with the recommendation that Council direct Administration to prepare an annual status report on implementation of RouteAhead. Reports providing updates were subsequently prepared annually from 2013-2018.

Prioritization of Future RouteAhead Capital Projects

Executive Summary

The RouteAhead long-term strategic plan guides both operational and capital investments in transit. In the past seven years, Calgary Transit has made strong progress on overall transit network infrastructure development and increased efficiency of service delivery. In 2019, Council approved an updated evaluation framework and list of major transit growth projects. This report provides an updated prioritized project list that sets a clear vision for transit in Calgary. This information will be used by City Council and Administration to make informed decisions regarding customer-centric improvement, and investments in capital projects. The project prioritization will not change the current approved capital projects in One Calgary 2019-2022 as the projects are outside of the four-year anticipated capital funding envelope.

Prioritization Considerations

Business units citywide must establish priorities and decide how to allocate limited resources for public investment. This challenge is particularly pronounced in the case of transit infrastructure development, where funding and financing is often dependent on collaboration with other levels of government. Therefore, Calgary Transit requires a robust prioritization process that considers current and future social, economic, and environmental benefits, capital and long-term operating investments, and impacts to transit ridership. The following principles guided overall development of the prioritization process:

- Providing an objective process that can be applied consistently to all projects;
- Establishing a collaborative and transparent process to evaluate project information;
- Balancing current and longer-term community growth needs;
- Promoting high ridership and overall mobility while improving the customer experience;
- Supporting existing and future land uses; and
- Reducing required future operating funds by evaluating projects that reduce net operating costs.

Prioritization Approach

RouteAhead Project Prioritization used the same methodology as the Green Line to analyze project benefits. Green Line's methodology was based on the original RouteAhead project work. This ensured consistency with past work. A two-dimensional prioritization approach was used to evaluate rapid transit projects by first analyzing project benefits, independent of capital and operating investments. This allowed projects to be first analyzed using the weighted criteria and values approved by Council in the Guiding Framework document (TT2019-0637).

The second dimension used a prioritization matrix to examine benefit analysis results and compared them against the estimated 30-year net operating and capital investments using Net Present Value (NPV). This allowed for the evaluation of relative benefits and financial impacts. The two-dimensional approach produced two key outputs: 1) an overall project ranking based solely on the benefits and 2) a matrix plotting benefits against project investments that highlights readiness. The following section outlines the methodology of the two dimensions of the processes that make up the approach.

<u>Dimension 1: Project Benefits – Criteria and Weighting</u>

Figure 1 below shows the list of key criteria, the metrics for measurement and the weightings used for each criteria. This process allows qualitative data to be meaningfully compared and measured. These criteria were used in the Green Line analysis and based on feedback from Council and other stakeholders. The highest weight was placed on Ridership (30%), followed by Customer Experience (20%), Economic (20%), Social (20%), and Environmental (10%) benefits (Table 1). The criteria weighting signifies a focus on maximizing benefits for the most customers, and highlights associated positive outcomes from rapid transit projects.

Raw data values for each criteria were divided into quintiles then converted into quintile scores to normalize the data. Quintiles divide the data into five equal parts, with each part, or quintile, containing 20% of the values in the total data range. Benefits quintile scores were then weighted based on the assigned weights to each criteria.

Table 1: List of Project Benefits – Criteria and Weighting

	Weighting (%)	Criteria		Metric
Benefits	30	Ridership		Passengers per avg. weekday
	20	Customer Experience	Increases travel time advantage	mins / trip
			Overcomes issues of reliability and delay	on time performance
			Increases passenger capacity	capacity / corridor
	20	Economic	Population Opening Day	# Population in 800m radius
			Population Future	# Population in 800m radius
			Jobs Opening Day	# Jobs in 800m radius
			Jobs Future	# Jobs in 800m radius
	20	Social	Community Services	# of Services in 1,000m radius
			Affordable Housing Units	# of Affordable Housing Units in 600m
			Low Income Population Served	Total # of Low Income Pop in 600m radius
	10	Environmental	GHG Emissions Reductions	Tonne CO2/Year
			Proximity to MDP Activity Centres and Corridors	# Stations within Corridor in 800m

Data from the 2048-time horizon was used to analyze benefits to allow for consistent project comparisons. The 2048-time horizon assumes buildout of communities that are currently new and developing, eliminating any bias against transit projects in communities with lower population and job numbers in 2020. Comparable population values are important because the population values were used to scale and calculate other criteria. For example, a low population value translates to lower values for ridership, Greenhouse Gas (GHG) emissions, affordable housing units, and low-income population. The 2048-time horizon was also used for the Green Line prioritization analysis to maintain consistency.

Dimension 2: Prioritization Matrix

A prioritization matrix is an analysis tool that uses specific criteria to objectively compare choices and determine which projects are the best value to the organization depending on the funding available. It is intended to provide an intuitive platform for displaying results and allow for a quick review of information. The RouteAhead Prioritization Matrix used the benefits ranking previously calculated in Dimension 1 and plotted the values against the project investment calculated using Net Present Value (NPV). NPV calculates a single number that considers the time value of money invested into the project in present day. NPV is considered an absolute measure of a project's worth and accounts for operational savings, including revenue. The NPV of a project is calculated using 30-year operating costs, initial capital investment, and a discount rate. A discount rate is the rate of return used to discount future cash flows back to their present value, typically representing. It is commonly the average interest rate central banks charge institutions.

Operating costs used in the calculations represent net annual operating costs in 2018 dollars for the year 2048. The operating costs assume transit service levels for the year 2048 and consider feeder bus service changes and efficiencies realized once a transit capital project is complete, as well as fare

revenue from new ridership along the route. Operating costs were calculated by finding the difference between a 'base' project scenario –the operating cost of transit in 2048 without the capital project, and a 'test' project scenario –the operating cost of transit in 2048 with the capital project complete and fare revenue accounted for. Some projects therefore exhibit a net operating cost savings, due to feeder bus efficiencies, fare revenue, or a combination of both. Other projects result in net operating costs due to less potential for feeder bus efficiencies, the introduction of new routes, and significant increases to route length and/or frequency.

RouteAhead Project List

There are 18 rapid transit network growth programs listed below that include 29 projects. They are divided between LRT Programs (Table 2) and BRT Programs (Table 3). The majority were previously identified in RouteAhead. The following projects were added to the list as they were approved by Council after RouteAhead: Westbrook to MRU Transit Connection, and in-street MAX improvements to Routes 301 and Route 302. Three projects previously identified as beyond the RouteAhead timeframe are now included due to advances in approved development within the project area, they include: 162 Ave Transitway, Shaganappi High-Occupancy Vehicle (HOV) lanes, and 144 Ave North Regional Context Study BRT. See Appendix 1 - Future Rapid Transit Projects on page 13.

The term program is used below to describe a grouping of projects. Projects can indicate separate work segments that can be done to advance a program as funding becomes available. Some programs may contain a single project. Projects have been evaluated both individually and collectively within a program. In the case of Green Line North and South, Blue Line NE and MAX Purple extensions, projects have been divided into discrete segments. This is to allow for incremental expansion based on operational and customer requirements, funding and consistency with the traditional success of Calgary Transit network expansions. This does not preclude multiple projects from being constructed together if funding is available at the time. See Attachment 3- RouteAhead Project Summaries for more information about the individual projects.

Note: The project list below does not include previously approved and funded projects such as Green Line 16 AV N to Sheppard.

Table 2: LRT Programs

Airport Transit Connector	Blue Line to Airport
	Green Line to Airport
Blue Line NE extension	Saddletowne to 88 AV NE
	88 AV NE to 128 AV NE
	128 AV NE to Stonegate
Blue Line W extension	69 ST SW to 85 ST SW
Green Line N extension	16 AV N to 64 AV N
	64 AV N to Beddington BV N
	Beddington BV N to 96 AV N
	96 AV N to North Pointe
	North Pointe to 160 AV N
Green Line S extension	Shepard to McKenzie Towne
	McKenzie Towne to Auburn Bay/Mahogany
	Auburn Bay/Mahogany to Seton
Red Line S extension	Somerset-Bridlewood to 210 AV S
Westbrook to MRU Transit Connection	Blue Line connection to Mount Royal University and Currie Barracks area
8 AV Subway	Red Line/Blue Line downtown separation

Table 3: BRT Programs

MAX 301 North*	In-street improvements to Route 301 BRT North
MAX 302 Southeast	In-street improvements to Route 302 BRT Southeast
MAX Purple extension	Transitway extension: 52 ST SE to 84 ST SE
	Transitway extension: 84 ST SE to City Limits
	Downtown/Green Line tie-in
MAX Teal extension	In-street extension from Douglas Glen to 68 ST SE
North Regional Context Study/144 AV N BRT	New in-street BRT route: Tuscany Station to Nose Creek
NW-HUB/West Campus Mobility	New in-street routes
Route 305 West	In-street improvements to Route 305 BRT West
Shaganappi HOV	HOV lanes: Bowness RD to Stoney TR
52 ST BRT	In-street BRT route from Saddletowne to Seton
162 AV S Transitway	New transitway BRT route: Somerset-Bridlewood to west Providence

**MAX 301 North (existing route in-street) was approved by Council on June 16, 2020.*

The following projects have been removed from the analysis:

- 8th Avenue Subway (Red Line/Blue Line separation) was removed from project prioritization analysis since the high estimated capital cost at $1.5 billion leads to a significant distortion in the data analysis, especially when calculating NPV, making it difficult to compare projects. Additionally, the need for the 8th Avenue Subway is driven by the need for extra capacity on Red Line South. With the recent approval of Green Line Stage 1, which is expected to create extra capacity on Red Line South, the need for the 8th Avenue Subway diminishes greatly over the 2048 timeframe considered in RouteAhead project prioritization.
- Green Line North and South are not included in the RouteAhead analysis as Administration will be updating the future planning recommendations.
- Note: Regional projects, such as extending service to Chestermere, are not included on the list as they represent distinct projects with varying timelines that are dependent on transit needs in other municipalities as well as the current Calgary Municipal Regional Board regional growth plan work. Regional projects will be considered and evaluated as they are proposed. Regional service extensions are expected to be based on cost recovery model.

Dimension 1 Analysis: Evaluation of Benefits

Table 4 below shows the individual scores for each of the projects. The project scores are solely based on the analysis of the benefits and do not consider capital investments or project readiness for funding or design.

Table 4. Future Rapid Transit Network Growth project benefit scores

Project	Benefits Score
52 Street E BRT	92
MAX 301 North	91
Westbrook to MRU Transit Connection	85
North Regional Context Study/144 Ave N BRT	79
Airport Transit Connector - Blue Line to Airport	75

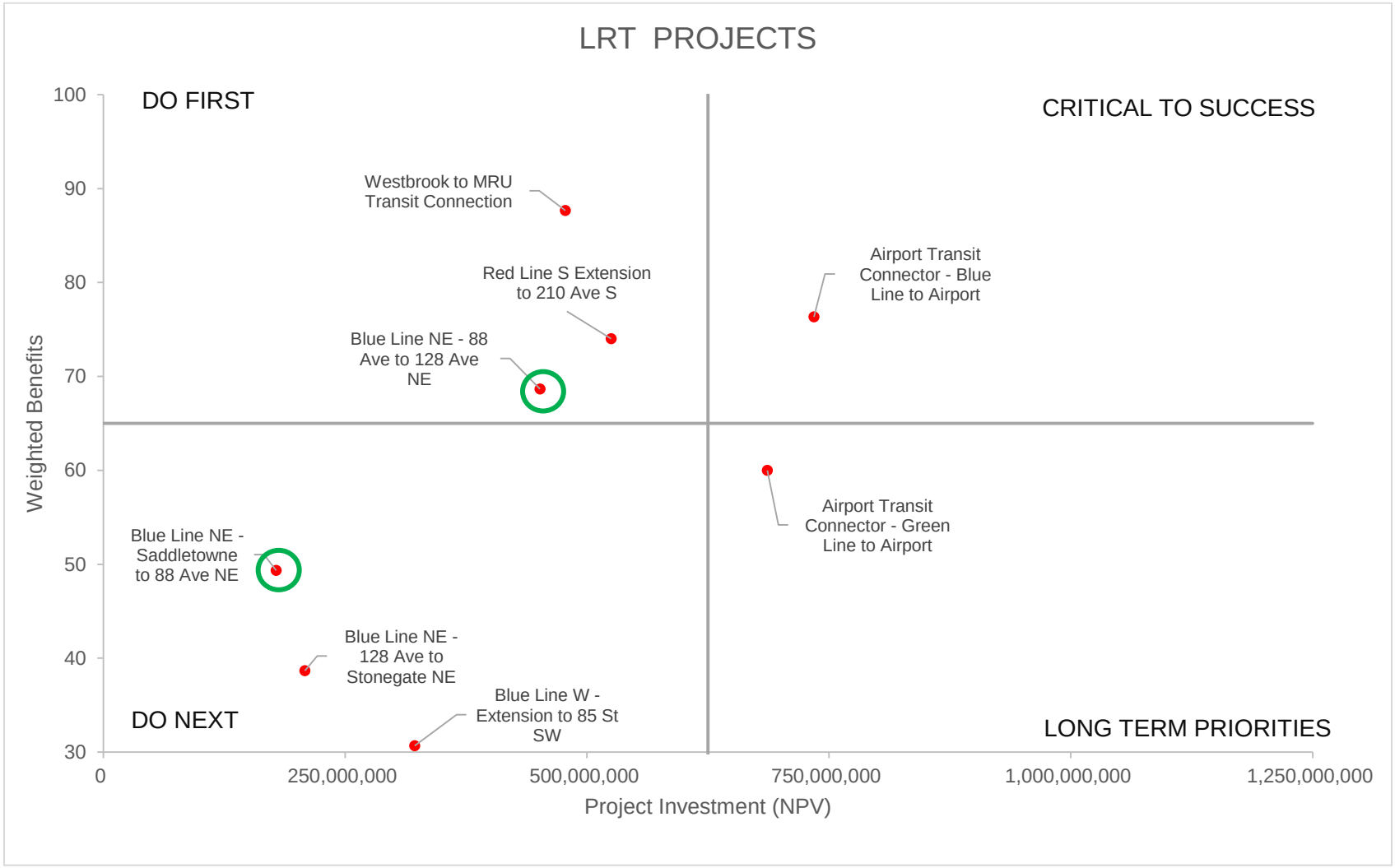
Shaganappi HOV: Bowness Road to Stoney Trail	73
Route 305 West - existing route, in-street	72
Red Line S Extension to 210 Ave S	72
Blue Line NE - 88 Ave to 128 Ave NE	68
MAX 302 South, existing route, in-street	67
NW-HUB / West Campus Mobility	67
162 Ave Transitway/BRT	64
Airport Transit Connector - Green Line to Airport	59
Blue Line NE - Saddletowne to 88 Ave NE	48
MAX Purple/17 Ave SE - Blackfoot Truck Stop to Downtown	44
MAX Purple/17 Ave SE - 52 St E to 84 St SE	43
Blue Line NE - 128 Ave to Stonegate NE	39
MAX Purple/17 Ave SE - 84 St E to City Limits	38
Blue Line W to 85 St SW	31
Max Teal/South Crosstown BRT to 68 St E	28

Dimension 2 Analysis: Prioritization Matrix

Tables 5 and 6 show the results of the prioritization matrix divided between LRT and BRT projects, due to the comparative costs between the two modes. The matrices show benefits plotted against project investment, calcuated using the NPV of each project. Each matrix is broken into four quadrants. The quandrants indicate where projects fall on the specturm of low to high benefit and low to high investment. Projects located in the upper left hand corner indicate high benefit and lower relative cost, and have been labelled – Do First. The projects in the upper right hand side indicate high benefit and high relative cost, and have been labelled – Critical to Success. The projects in the lower left side indicate lower relative benefit and low relative cost, and have been labelled – Do Next. The projects in the bottom right corner indicate lower relative benefit and higher relative cost, and have been labelled – Long Term Priorities.

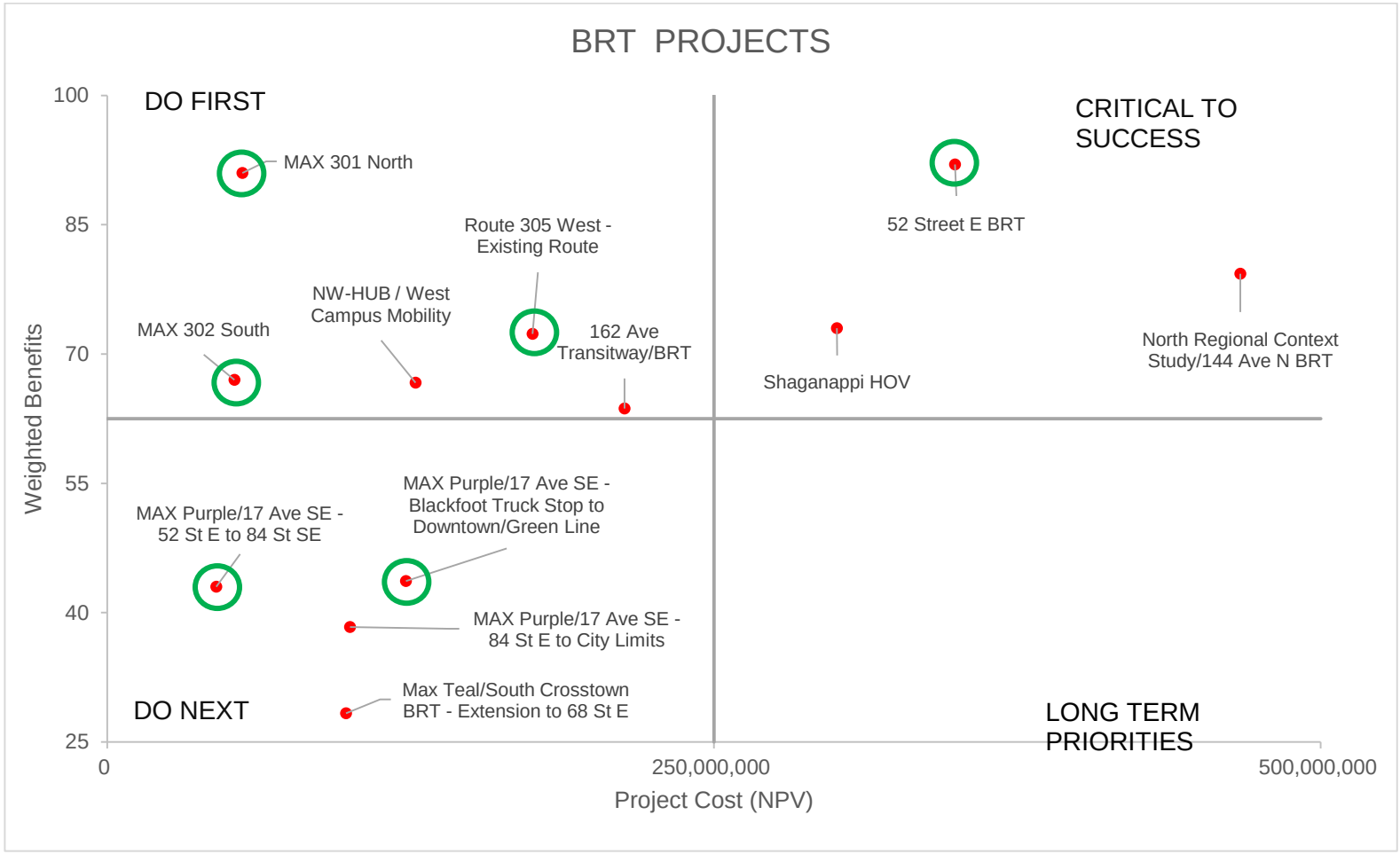
Projects circled in green indicate a high degree of readiness in the next 5 -10 years based on function planning, system capacity, and/or surrounding development. The green circle considers additional project characteristics such as ridership capacity and strategic alignment. Additional considerations such as high ridership corridors, Transit Oriented Development and Coordination with other City Departments and key City strategies were incorporated from a qualitative perspective to account for project readiness and corporate coordination. See Attachment 3- RouteAhead Project Summaries. City of Calgary COVID-19 recovery scenarios were also taken into account and are outlined in Attachment 5 – Risks.

Table 5: LRT Projects - Weighted Benefits, Project Investment and Project Readiness



The green circles indicate project readiness in the next 5-10 years.

Table 6: BRT Projects - Weighted Benefits, Project Investment and Project Readiness



The green circles indicate project readiness in the next 5-10 years.

Summary of Prioritization Results

Tables 7 and 8 provide a ranking of projects into two categories: short-term, defined as projects with readiness in 5-10 years, and long-term, defined as projects that exceed 10 years. Within these categories, projects are ranked based on the higest benefits compared to project investment. Projects have been organzied according to logical sequencing for build out.

Ongoing capital investment programs in assets such as bus and train procurement, infrastructure maintenance, and station refurbishments have not been prioritized against the rapid transit network expansion projects through this process but will need to be identified and accounted for as further capital funding streams are identified. Appropriate funding is needed for ongoing maintenance of these critical assets to remain in a state of good repair and support safe and reliable transit service.

Table 7: Short-term future rapid transit projects ranked according to benefit and investment.

Short-term Projects	Rank
52 Street E BRT	1
MAX 301 North	2
Route 305 West	3
Blue Line NE*	4
MAX 302 South	5
MAX Purple/17 Ave SE - Blackfoot Truck Stop to Downtown	6
MAX Purple/17 Ave SE - 52 St E to 84 St SE	7
Max Teal/South Crosstown BRT - Extension	8

**Includes both Blue Line NE - Saddletowne to 88 Ave NE & 88 Ave to 128 Ave NE Projects*

Table 8: Long-term future rapid transit projects ranked according to benefit and investment.

Long-term Projects	Rank
Westbrook to MRU Transit Connection	1
North Regional Context Study	2
Airport Transit Connector - Blue Line to Airport	3
Shaganappi HOV: Bowness Road to Stoney Trail	4
Red Line S Extension to 210 Ave S	5
NW-HUB / West Campus Mobility	6
162 Ave Transitway/BRT	7
Airport Transit Connector - Green Line to Airport	8
Blue Line NE - 128 Ave to Stonegate NE	9
MAX Purple/17 Ave SE - 84 St E to City Limits	10
Blue Line W to 85 St SW	11

In summary, Calgary Transit is in a positive position to continue to advance the long-term 30-year rapid transit network growth strategy. The evaluation found that BRT Projects rank as beneficial to LRT projects and that the agile delivery of capital projects will be needed as funding becomes available so that individual projects can be funded to advance high priority rapid transit programs. It is important to note that the benefit rankings tended to favour longer projects, as they result in more benefits. For example,

the longer the physical length of the project, generally the more population, jobs, services, and affordable housing that are captured in the analysis.

Appendix 1: Future Rapid Transit Network

Airport Transit Connector – Blue Line to Airport

Connecting the Blue Line LRT from 88 Ave NE Station to the Airport, this project brings travelers and employees to and from the Calgary International Airport, with a stop in the NE industrial area, via a new transit line.

2048 WEEKDAY RIDERSHIP
13,000

CAPITAL COST
$600,000,000

NET ANNUAL OPERATING COST
$6,800,000

BENEFITS SCORE **75**

Additional Considerations

- Dependent on future construction of Blue Line NE to 88 Avenue Station.
- Coordination required with Airport Trail NE interchanges and Calgary International Airport master planning and infrastructure investments.
- Current Airport demand is met by Routes 100 and 300, future travel demand forecasted increases support mode progression to a higher capacity rapid transit connection.
- Functional planning complete.
- Operating cost primarily based on increased service hours and frequency on the Airport Connector.
- Moderate risk to ridership in Increased Crisis COVID-19 recovery scenario due to decreased airport travel.
- Supports Calgary's Economic Strategy by connecting rapid transit lines and enhancing access between the Centre City, airport and the region.

Length	**6 km**
Readiness	**No**
Technology	**People Mover**
Trip Generators	**Airport**

Airport Transit Connector – Green Line to Airport

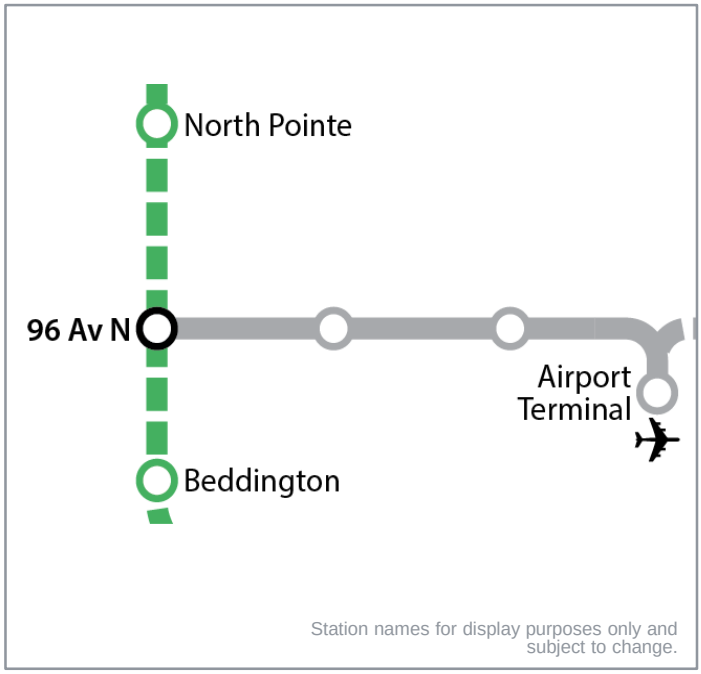
Connecting the Green Line LRT from 96 Ave N Station to the Airport, this project brings travelers and employees to and from the Calgary International Airport, with several industrial area stops, via a new transit line.

2048 WEEKDAY RIDERSHIP
9,500

CAPITAL COST
$750,000,000

NET ANNUAL OPERATING COST
$-3,200,000

BENEFITS SCORE **59**



Additional Considerations

- Dependent on future Green Line construction to 96 Ave N.
- Current Airport demand is met by Routes 100 and 300, future travel demand forecasted increases support mode progression to a higher capacity rapid transit connection.
- Requires coordination with Green Line LRT, Aurora Business Park planning/development, and Calgary International Airport master planning and infrastructure investments.
- Functional planning complete.
- Operating cost savings primarily based on removal of route 300.
- Moderate risk to ridership in Increased Crisis COVID-19 recovery scenario due to decreased airport travel.
- Supports Calgary's Economic Strategy by connecting rapid transit lines and enhancing access between the Centre City, airport and the region.

Length	**5 km**
Readiness	**No**
Technology	**People Mover**
Trip Generators	**Airport, industrial area**

Blue Line NE - Saddletowne to 88 Ave NE

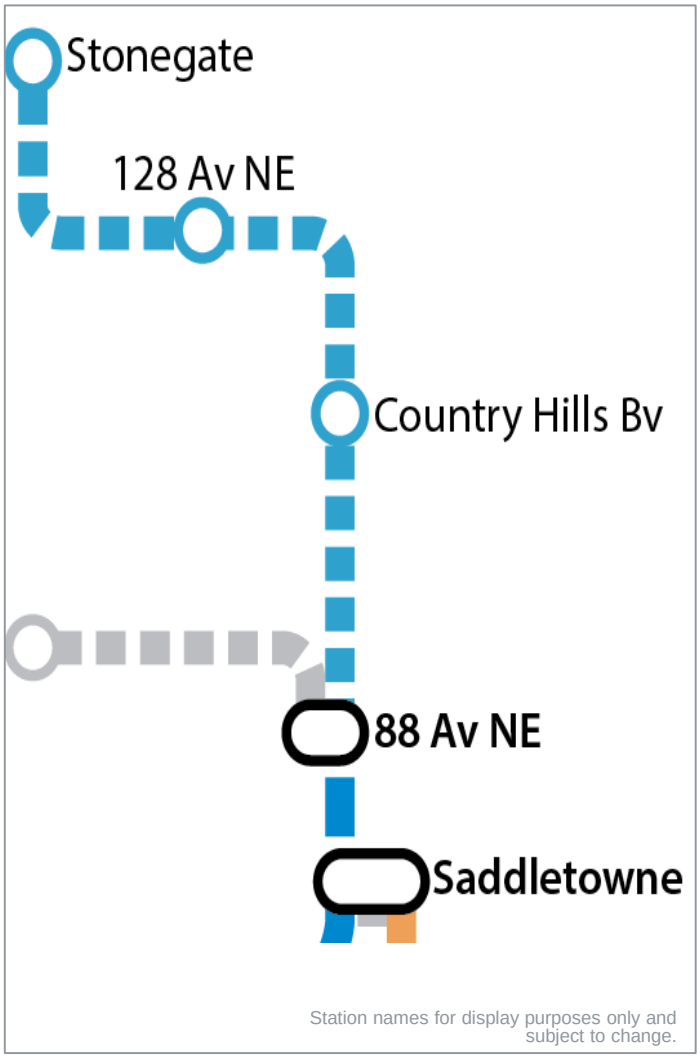
Extending the existing Blue Line LRT further to the NE, this project provides LRT service to high-density northeast Calgary communities, also enabling the Blue Line portion of the Airport Connector.

2048 WEEKDAY RIDERSHIP
3,500

CAPITAL COST
$158,000,000

NET ANNUAL OPERATING COST
$1,000,000

BENEFITS SCORE 48



Additional Considerations

- Serves new and developing communities and provides the transfer station between the Blue Line and Airport Transit Connector.
- Land acquisition near completion.
- Enables Blue Line Airport Transit Connector.
- Requires coordination with the Airport Transit Connector, specifically the transfer station connecting the two services.
- Functional Study approved by Council after stakeholder and public consultation in 2012.
- Operating cost based on shorter LRT feeder routes and increased LRT length.
- Presents logical mode progression from
- feeder bus network to LRT.
- Moderate to high risk in all COVID-19 recovery scenarios due to potential for decreased commuting, significant impact in Increased Crisis scenario from decreased travel.

Length	**0.9 km**
Readiness	**Yes**
Technology	**LRT**
Trip Generators	**Northeast communities**

Blue Line NE - 88 Ave to 128 Ave NE

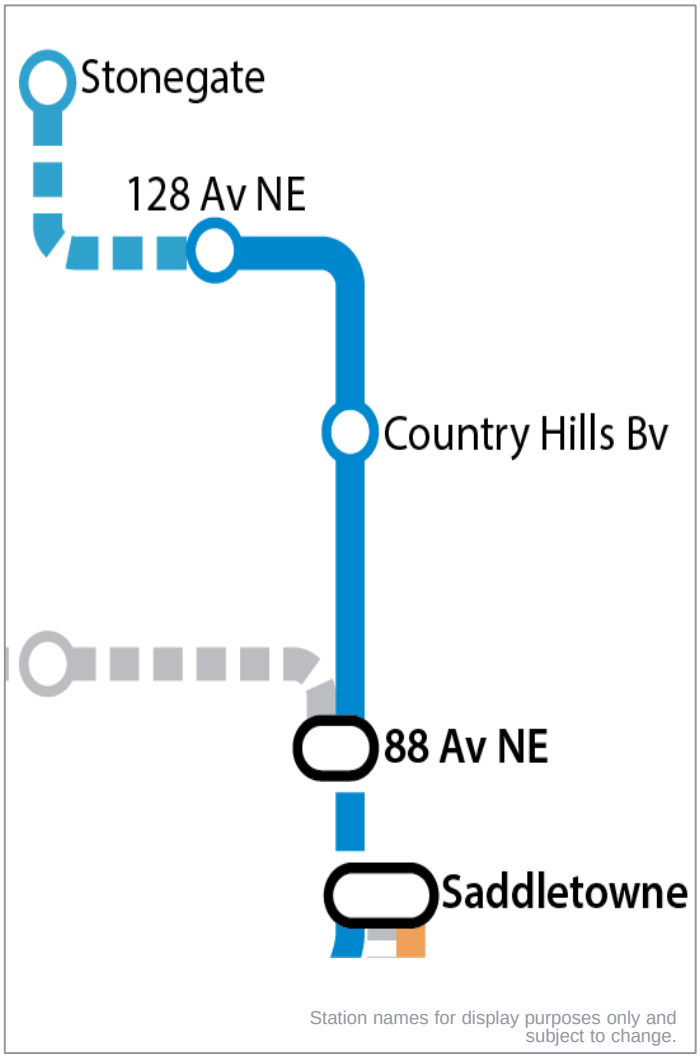
Extending the Blue Line LRT by two stations to Country Hills Blvd. and 128 Ave. NE, this project provides LRT service to high-density developed and developing northeast Calgary communities.

2048 WEEKDAY RIDERSHIP
9,700

CAPITAL COST
$405,000,000

NET ANNUAL OPERATING COST
$2,300,000

BENEFITS SCORE 68



Additional Considerations

- The Blue Line NE extension from 88 Ave NE to 128 Ave NE serves new and developing communities.
- Requires coordination with the Airport Transit Connector, specifically the transfer station connecting the two services.
- Functional Study approved by Council after stakeholder and public consultation in 2012.
- Operating cost based on shorter LRT feeder routes and increased LRT length.
- Significant impact in all COVID-19 recovery scenarios due to decreased commuting and slow to negative growth in new communities.

Length	**4.2 km**
Readiness	**Yes**
Technology	**LRT**
Trip Generators	**NE communities, MAC at Country Hills Blvd**

Blue Line NE - 128 Ave to Stonegate NE

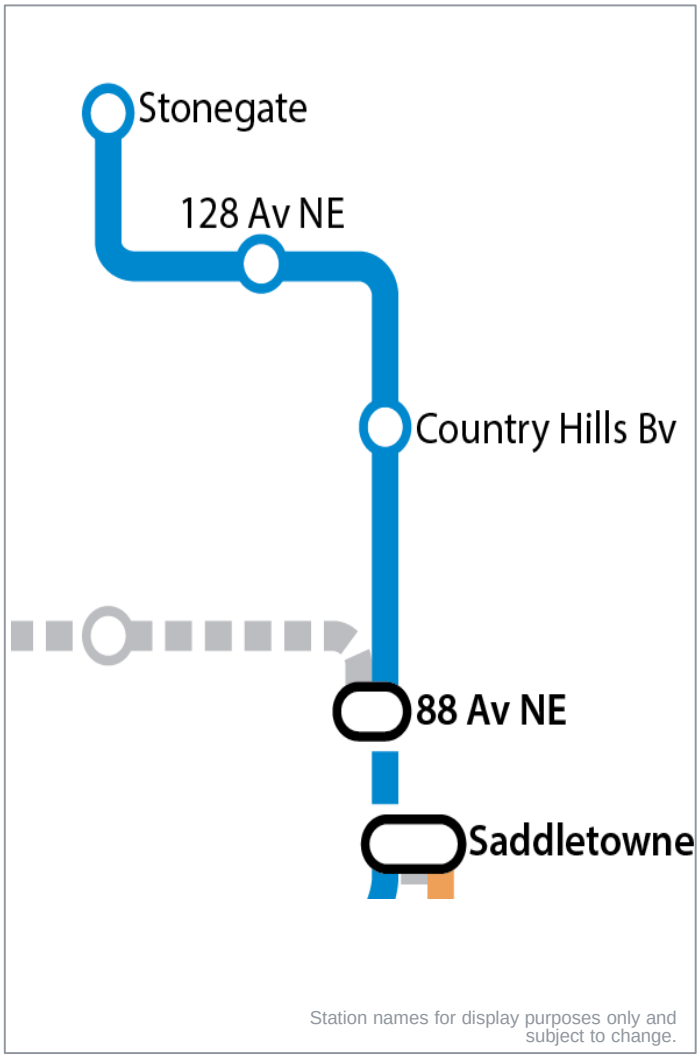
Extending the Blue Line LRT by one station to Stonegate NE, this project provides LRT service to high-density developing northeast Calgary communities with a primary focus on serving the industrial area.

2048 WEEKDAY RIDERSHIP
3,700

CAPITAL COST
$160,000,000

NET ANNUAL OPERATING COST
$2,400,000

BENEFITS SCORE 39



Additional Considerations

- The Blue Line NE extension from 128 Ave NE to Stonegate serves new and developing communities and industrial areas.
- Functional planning not complete.
- Operating cost based on shorter LRT feeder routes and increased LRT length.
- Less impacted by Transformational Change COVID-19 recovery scenario due to front line worker ridership to the industrial area, but significant impact due to location in a new community which may experience slower development and relies first on extension to 128 Ave NE.

Length	**2.1 km**
Readiness	**No**
Technology	**LRT**
Trip Generators	**New NE residential and industrial developments**

Blue Line W – Extension to 85 St SW

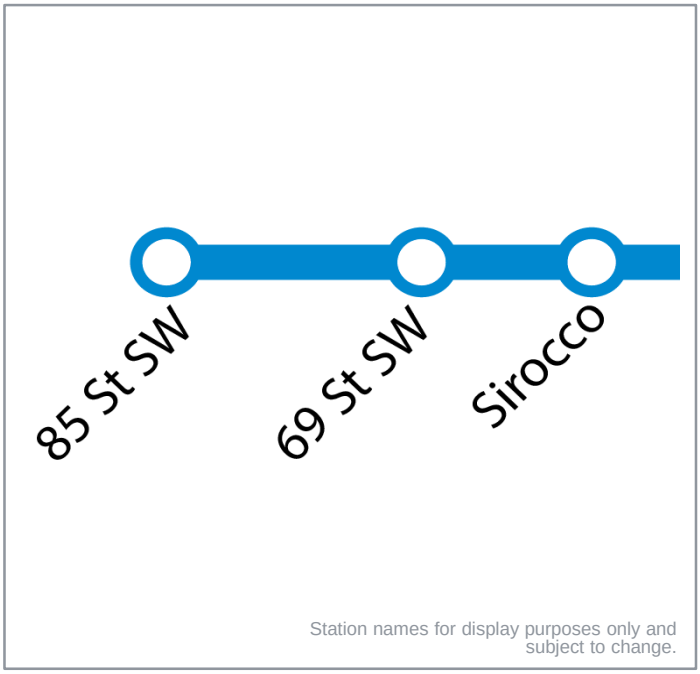
Extending the existing Blue Line West LRT by one station, this project provides LRT service to existing communities in West Calgary.

2048 WEEKDAY RIDERSHIP
1,500

CAPITAL COST
$213,000,000

NET ANNUAL OPERATING COST
$5,400,000

BENEFITS SCORE **31**



Additional Considerations

- The current Blue Line West terminus, 69 St SW Station, has the highest ridership of the West LRT stations, likely a combination of adjacent land uses (multiple institutional and recreation uses) and feeder bus service to the station. A new station at 85 St W may transfer some of this this high ridership to the new terminus.
- Future LRT right-of-way has been reserved at the early stages of community planning.
- Operating cost attributed to additional length, and therefore service hours, on the Blue Line.
- Significant impact projected in all COVID-19 recovery scenarios due to reduced commuting, especially given nature of trips on this leg of the LRT.

Length	**2.1 km**
Readiness	**No**
Technology	**LRT**
Trip Generators	**West communities**

Red Line S - Extension to 210 Ave S

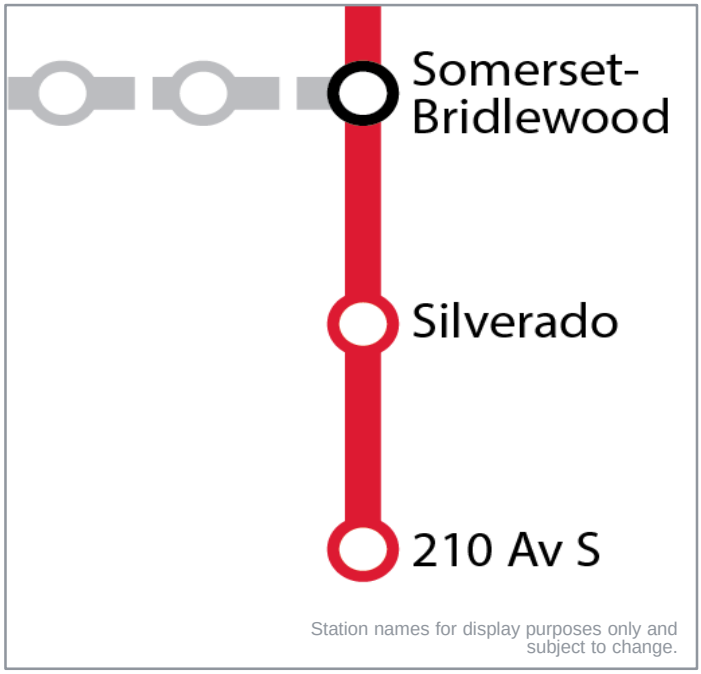
Extending the existing Red Line LRT S by two stations to 210 Ave. S, this project provides LRT service to developing residential communities.

2048 WEEKDAY RIDERSHIP
14,700

CAPITAL COST
$341,000,000

NET ANNUAL OPERATING COST
$9,300,000

BENEFITS SCORE 72



Additional Considerations

- Extends the Red Line South, Calgary's highest ridership LRT leg, to serve new and developing communities.
- Potential to increase capacity issues during peak periods as additional riders will be attracted to the system.
- Includes a Storage and Maintenance Facility (MSF) to expand Calgary Transit's ability to store and maintain light rail vehicles to ensure maximum lifecycle from this investment.
- Operating cost attributed to additional length, and therefore service hours, on the Red Line.
- Significant impact in all COVID-19 recovery scenarios from commuting reduction and risk that suburban development will slow; however, construction could be justified by need for new SMF.

Length	**3.5 km**
Readiness	**No**
Technology	**LRT**
Trip Generators	**New south communities**

Westbrook to MRU Transit Connection

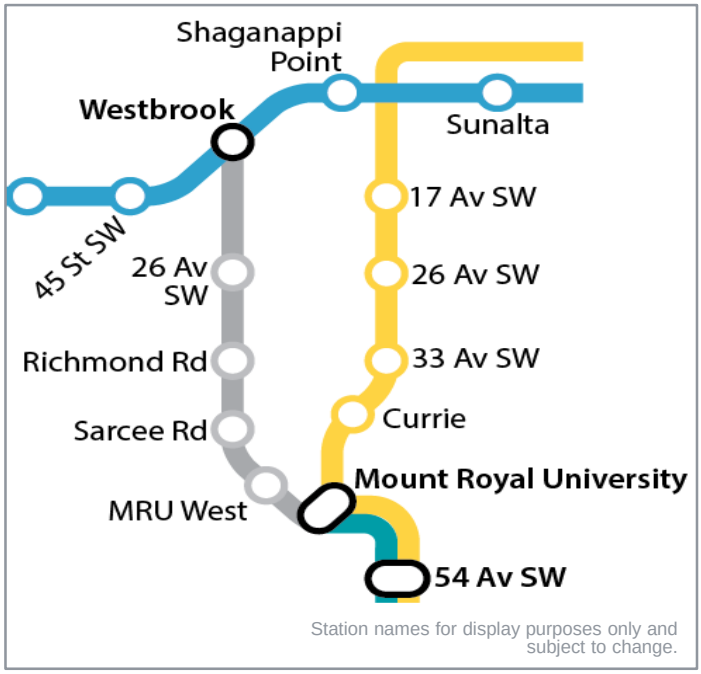
Providing a connection in SW Calgary between Westbrook Station and Mount Royal University, this project would use streetcars to serve the 37 Ave SW corridor.

2048 WEEKDAY RIDERSHIP
9,400

CAPITAL COST
$292,000,000

NET ANNUAL OPERATING COST
$9,300,000

BENEFITS SCORE 85



Additional Considerations

- MAX Teal already serves this area using same route and currently has capacity. This project would likely result in shortened MAX Teal route.
- There are potential benefits and risks of introducing new streetcar technology to the existing system.
- Operating cost attributed to high frequency, and therefore additional service hours, on the streetcar line.
- Small impact on ridership in Increased Crisis COVID-19 recovery scenario if Westbrook mall doesn't redevelop; minimal to no impact in Rapid Recovery and Transformational Change scenarios.

Length	**5.2 km**
Readiness	**No**
Technology	**Streetcar**
Trip Generators	**Westbrook, Mount Royal University**

MAX 301 North

Upgrading the current Route 301 to reflect a MAX level service, this project aims to improve travel times and transit service along the Centre Street N corridor.

2048 WEEKDAY RIDERSHIP
12,500

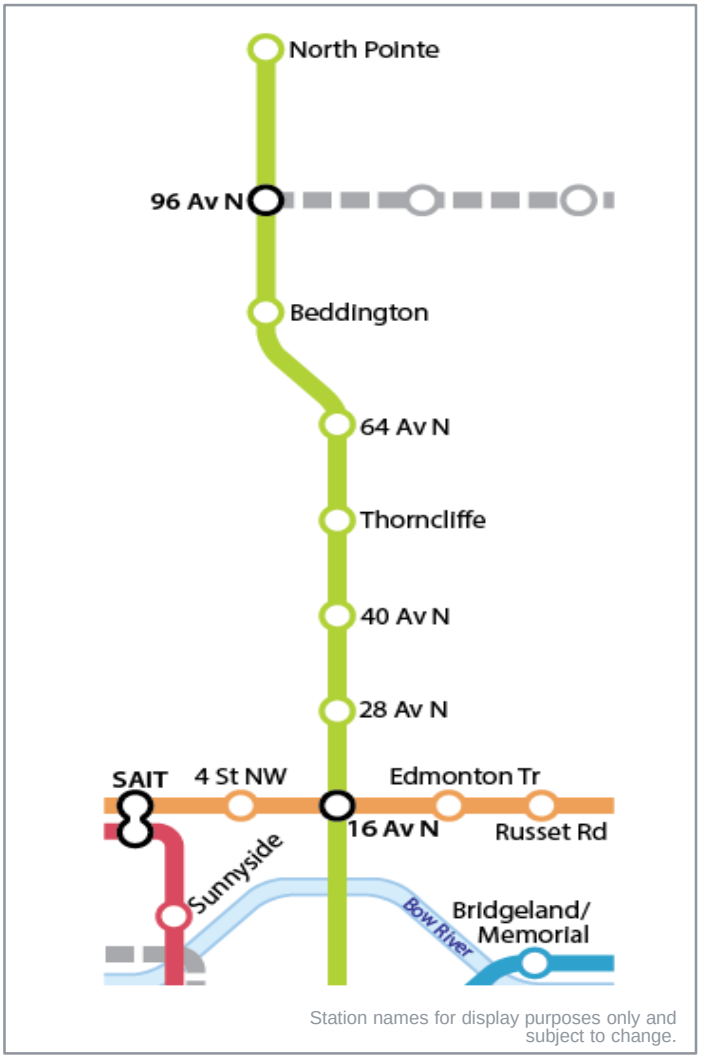
CAPITAL COST
$22,500,000

NET ANNUAL OPERATING COST
$1,700,000

BENEFITS SCORE **91**

Additional Considerations

- Contributes to mode progression and increased transit service along the Green Line North corridor.
- Requires coordination with Green Line Stage 1 construction and future tie-ins, and depends on Green Line Stage 1 timelines.
- Operating cost attributed to route length and high revenue from ridership.
- Minimal impact in all COVID-19 recovery scenarios as Centre St ridership was steady during COVID-19.



Length	**13.5 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**Downtown, Centre Street N Corridor**

MAX 302 South

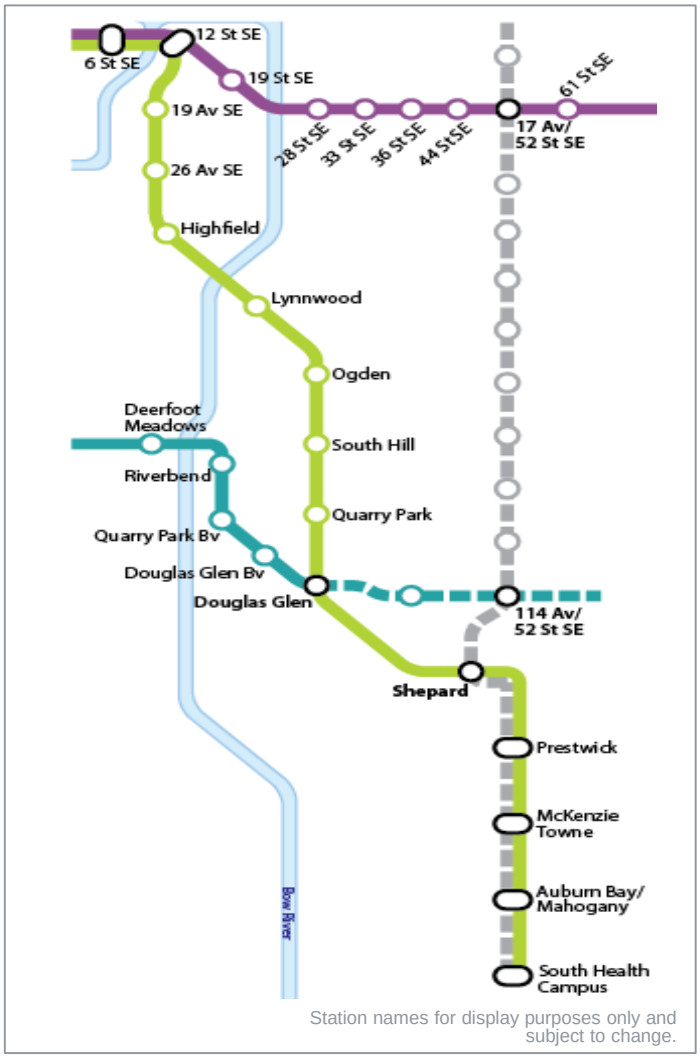
Upgrading the existing route Route 302 to reflect an in-street MAX level service this project aims to improve travel times and transit service from SE Calgary to Downtown.

2048 WEEKDAY RIDERSHIP
6,400

CAPITAL COST
$13,500,000

NET ANNUAL OPERATING COST
$2,000,000

BENEFITS SCORE 67



Station names for display purposes only and subject to change.

Additional Considerations

- Contributes to mode progression and increased transit service along the Green Line South corridor.
- Requires coordination with Green Line Stage 1 construction and future tie-ins, and depends on Green Line Stage 1 timelines.
- Requires coordination with 52 St BRT, as the routes connect in the far SE. Capital cost is subject to change depending on project sequencing with 52 St BRT.
- Operating cost attributed to route length.
- Significant impact in all COVID-19 recovery scenarios from commuting reduction, but industrial connections mitigate impact.

Length	**8.5 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**Downtown, Quarry Park, SE communities & industrial**

MAX Purple/17 Ave SE - 52 St E to 84 St SE

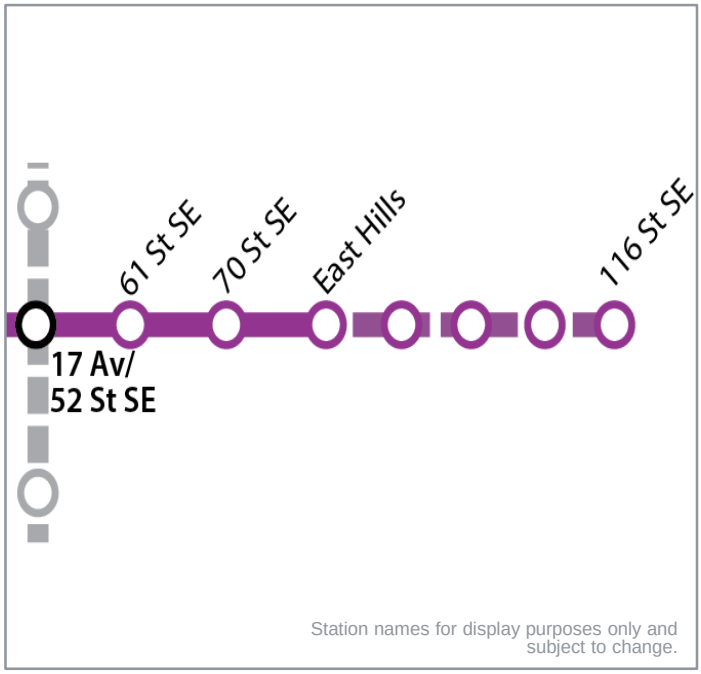
Extending the existing MAX Purple transitway from its current end point at 52 St E to the current MAX Purple route terminus at 84 St SE, this project improves travel time and efficiency.

2048 WEEKDAY RIDERSHIP
3,300

CAPITAL COST
$43,000,000

NET ANNUAL OPERATING COST
$-200,000

BENEFITS SCORE **43**



Additional Considerations

- Improves transit service levels on existing MAX Purple route to current terminus at East Hills.
- Contributes to development along 17 Ave SE, and sets up potential regional transit connections to the east.
- Operating cost savings due to faster run times on the same length of route.
- Moderate impact in Transformational Change COVID-19 recovery scenario due to resiliency of 17 Ave main street corridor. Moderate impact in Increased Crisis scenario due to established communities potentially shrinking in population. Minimal impact in Rapid Recovery Scenario from reduced commuting.

Length	**2.8 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**International Ave, East Hills**

MAX Purple/17 Ave SE - 84 St E to City Limits

Extending the existing MAX Purple route and transitway from its current terminus at 84 St SE to the east City Limits, this project provides BRT service to new communities.

2048 WEEKDAY RIDERSHIP
2,200

CAPITAL COST
$71,000,000

NET ANNUAL OPERATING COST
$1,500,000

BENEFITS SCORE **38**

Additional Considerations

- Project timing largely depends on the rate of development in east Calgary.
- Contributes to development along 17 Ave SE, and sets up potential regional transit connections to the east.
- Operating cost increase due to added route length, therefore additional operating hours to serve a longer route.
- Higher risk in Transformational Change and Increased Crisis COVID-19 recovery scenarios due to less suburban development. Minimal impact in Rapid Recovery scenario due to reduced commuting.

Length	**3.3 km**
Readiness	**No**
Technology	**BRT**
Trip Generators	**New west communities**

MAX Purple/17 Ave SE - Blackfoot Truck Stop to Downtown/Green Line

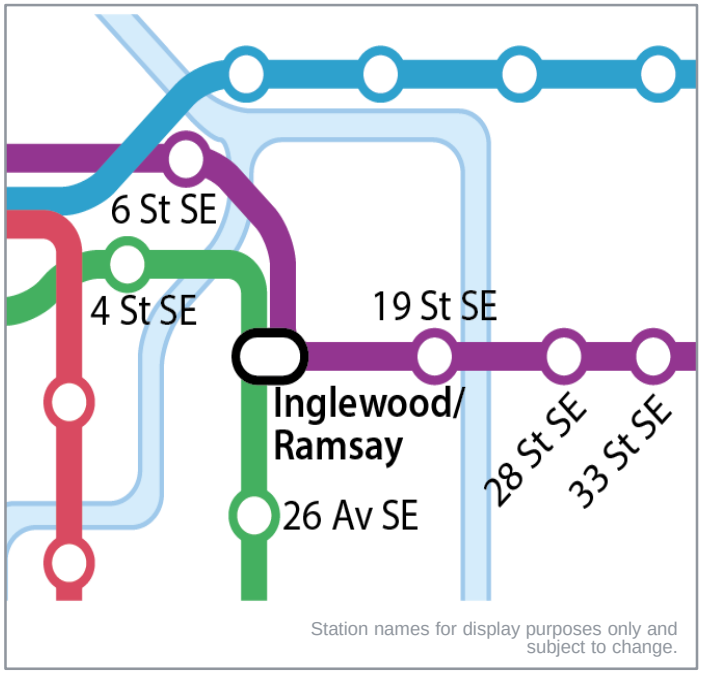
Extending the existing MAX Purple transitway from its current end point at Blackfoot Truckstop westward to Downtown, this project improves travel time and efficiency, while creating a connection to Green Line South.

2048 WEEKDAY RIDERSHIP
1,980

CAPITAL COST
$156,000,000

NET ANNUAL OPERATING COST
$-1,700,000

BENEFITS SCORE 44



Additional Considerations

- Increases transit service levels east of downtown and provides Green Line connection.
- Requires coordination with Green Line on the Green line tie-in connection and timelines.
- Operating cost savings due to faster run times on the same length of route as exists today.
- Moderate impact in Transformational Change COVID-19 scenario since this project builds connections to other downtown lines, but has high resilience due to nature and ridership of MAX Purple along a main street. Moderate impact in Increased Crisis scenario from reduced commuting to downtown. Minimal impact in Rapid Recovery scenario from slightly reduced commuting.

Length	**1.4 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**Downtown, Inglewood**

Max Teal/South Crosstown BRT - Extension to 68 St E

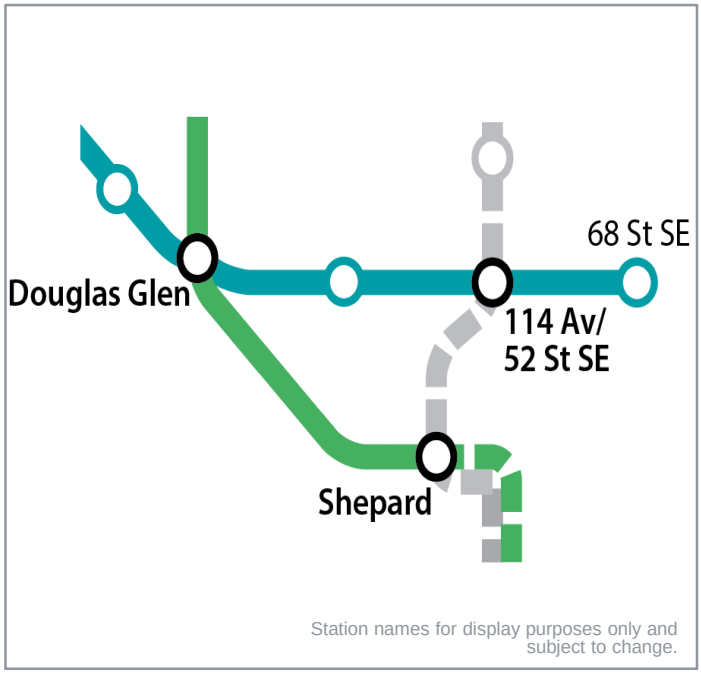
Extending the existing MAX Teal route in-street further east to 68 St, this project provides BRT service to Calgary's industrial and employment area.

2048 WEEKDAY RIDERSHIP
1,500

CAPITAL COST
$6,600,000

NET ANNUAL OPERATING COST
$4,600,000

BENEFITS SCORE **28**



Additional Considerations

- Provides additional connections in SE Calgary to the MAX Teal route which currently serves Westbrook, Mount Royal University, and Rockyview Hospital.
- Tie-in and coordination with WB to MRU transit connection is required.
- Increased operating cost due to increased route length and more service hours required.
- Minimal impact in all COVID-19 recovery scenarios due to nature of the route serving industrial and front line work areas.

Length	**4.5 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**Quarry Park, SE industrial**

North Regional Context Study/144 Ave N BRT - Tuscany to Nose Creek

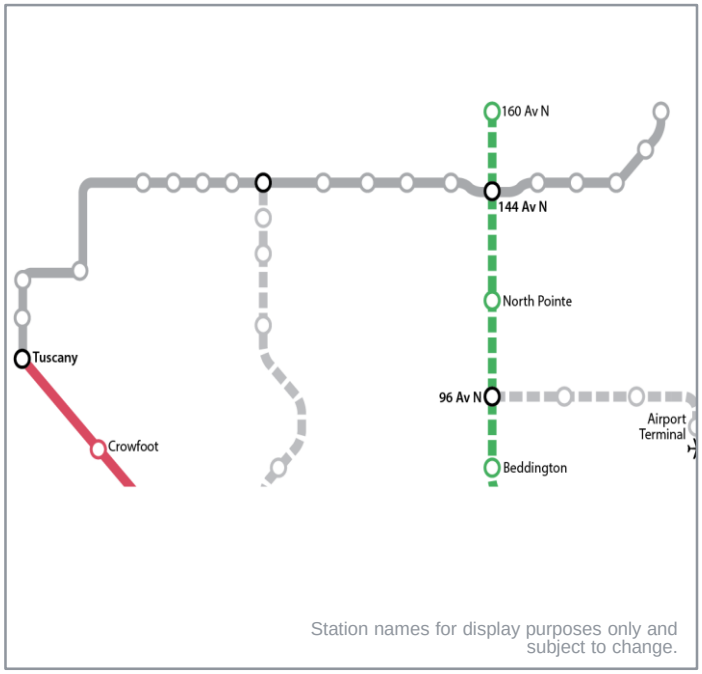
Providing a new in-street BRT route across north Calgary on 144 Ave, this project serves new and developing residential communities.

2048 WEEKDAY RIDERSHIP
10,800

CAPITAL COST
$42,000,000

NET ANNUAL OPERATING COST
$21,400,000

BENEFITS SCORE 79



Additional Considerations

- Project timing largely depends on the rate of development in north Calgary.
- Provides a significant crosstown connection in the north.
- High operating cost attributed to long route length.
- Moderate risk in Transformational Change and Increased Crisis COVID-19 recovery scenarios since developing communities may not experience the same rate of urban growth due to increased exurban growth, and may take longer for buildout. Minimal impact in Rapid Recovery scenario.

Length	**22 km**
Readiness	**No**
Technology	**BRT**
Trip Generators	**New north communities**

NW-HUB / West Campus Mobility

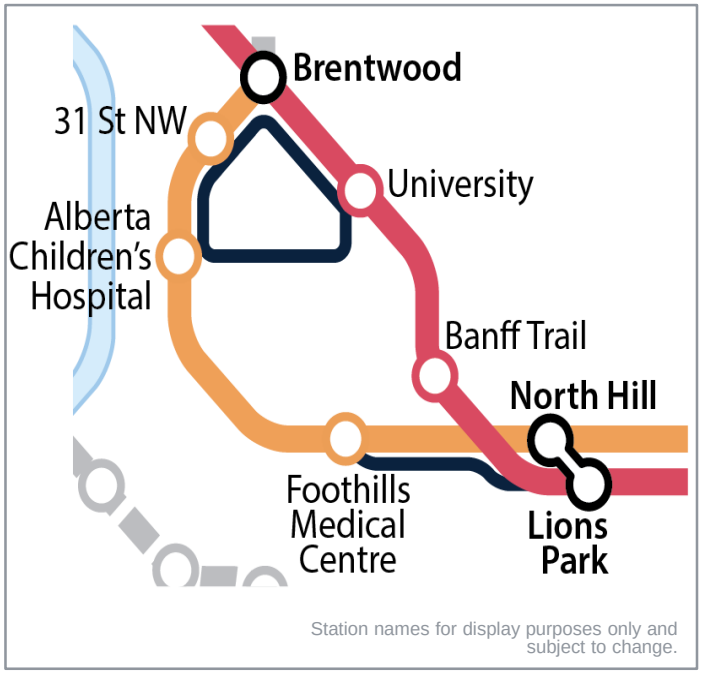
Providing a new in-street circulator route to serve the University of Calgary and Foothills Medical Centre area, this project improves transit service in a major activity centre and newly developing residential community.

2048 WEEKDAY RIDERSHIP
4,220

CAPITAL COST
$22,000,000

NET ANNUAL OPERATING COST
$5,300,000

BENEFITS SCORE 67



Additional Considerations

- NW Hub provides enhanced transit service to major activity centres and the actively developing community of University District.
- Operating cost attributed to increased service hours with introduction of new route.
- Low impact in Transformational Change and Increased Crisis COVID-19 recovery scenarios due to the project serving a major activity centre and front line work, and minimal risk to inner-city development in University District. Minimal impact in Rapid Recovery scenario.

Length	**5 km**
Readiness	**No**
Technology	**BRT**
Trip Generators	**University, Foothills Hospital, McMahon Stadium**

Route 305 West

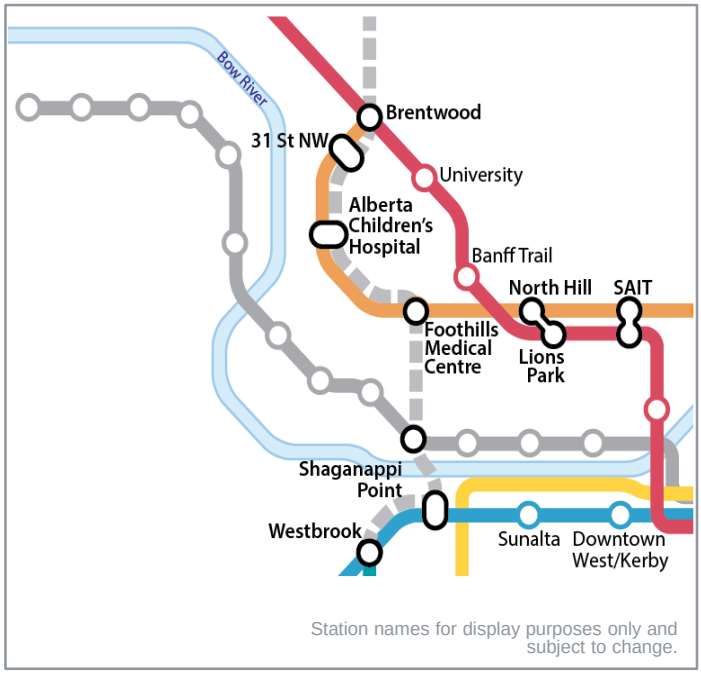
Upgrading the existing Route 305 in-street service, this project improves transit service between new and developed residential communities and Canada Olympic Park in west Calgary, and Downtown.

2048 WEEKDAY RIDERSHIP
6,700

CAPITAL COST
$30,000,000

NET ANNUAL OPERATING COST
$7,300,000

BENEFITS SCORE 72



Additional Considerations

- Route 305 currently operates as peak only service. Route 1 currently provides all-day service along the same route. Capacity exists along both routes.
- Coordination and consideration is required on the effect of upgrading Route 305 on Route 1.
- Operating costs due to increased service hours attributed to shorter headways and all-day service.
- High impact in Transformational Change and Increased Crisis COVID-19 recovery scenarios due to reduced commuting; impact slightly buffered by main street service in Bowness. Moderate risk in Rapid Recovery scenario.

Length	**13 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**Downtown, Bowness, Canada Olympic Park**

Shaganappi HOV - Bowness Road to Stoney Trail

Enhancing transit service in NW Calgary along Shaganappi Trail through High Occupancy Vehicle (HOV) Lanes, this project provides better transit service for established communities.

2048 WEEKDAY RIDERSHIP
8,000

CAPITAL COST
$179,000,000

NET ANNUAL OPERATING COST
$6,100,000

BENEFITS SCORE 73

Station names for display purposes only and subject to change.

Additional Considerations

- Project depends on traffic and congestion along Shaganappi Tr to trigger need for HOV lanes.
- Capital cost represents all-in cost for Shaganappi Tr corridor construction, of which transit will use the HOV lanes.
- Operating costs due to increased service hours attributed to short headways.
- Significant impact in all COVID-19 recovery scenarios due to reduced commuting.

Length	**14 km**
Readiness	**No**
Technology	**BRT**
Trip Generators	**NW communities**

52 Street E BRT - Saddletowne to Seton

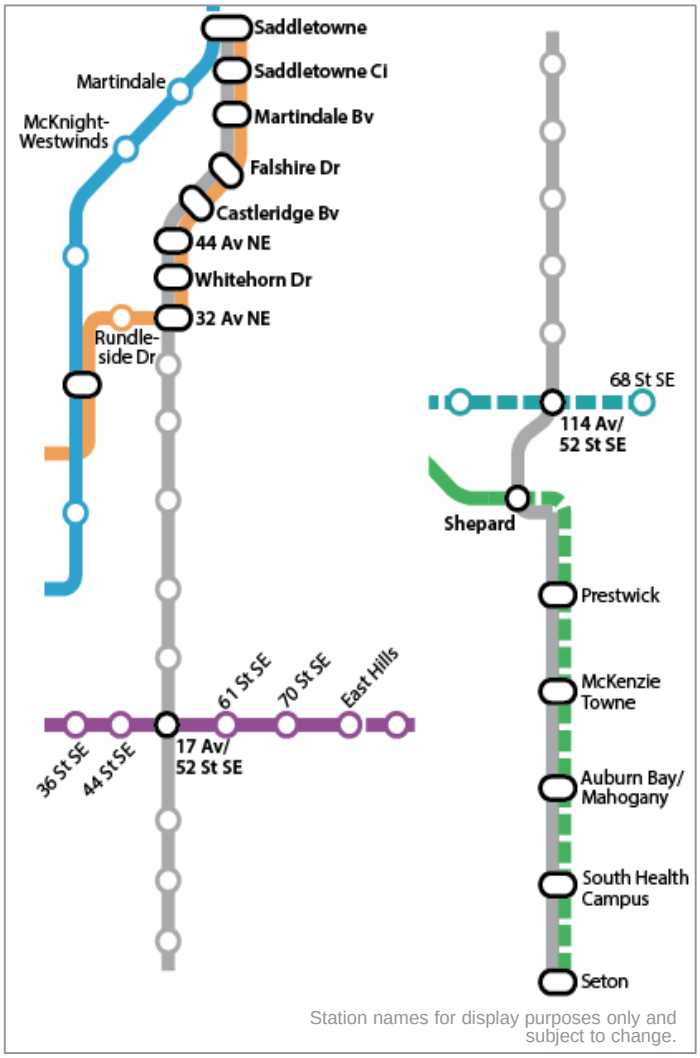
Enhancing transit service with a north to south crosstown route in-street in east Calgary, this project connects new and developed residential communities in north and south Calgary with the SE industrial area.

2048 WEEKDAY RIDERSHIP
20,500

CAPITAL COST
$60,000,000

NET ANNUAL OPERATING COST
$14,600,000

BENEFITS SCORE **92**



Additional Considerations

- Route 23, which currently serves a portion of the 52 St corridor, is at or near capacity.
- Considerations required for tie-ins to MAX 302 and Green Line connections in the south.
- Capital cost subject to change depending on project sequencing with MAX 302 South due to shared stops.
- Operating costs due to sheer length of route and increased service hours attributed to short headways.
- Low to no impact in all COVID-19 recovery scenarios due to route directness serving industrial areas, built-out residential communities, and the hospital.

Length	**30 km**
Readiness	**Yes**
Technology	**BRT**
Trip Generators	**SE industrial, South Health Campus, Seton**

162 Ave BRT - Somerset Bridlewood Station to Providence

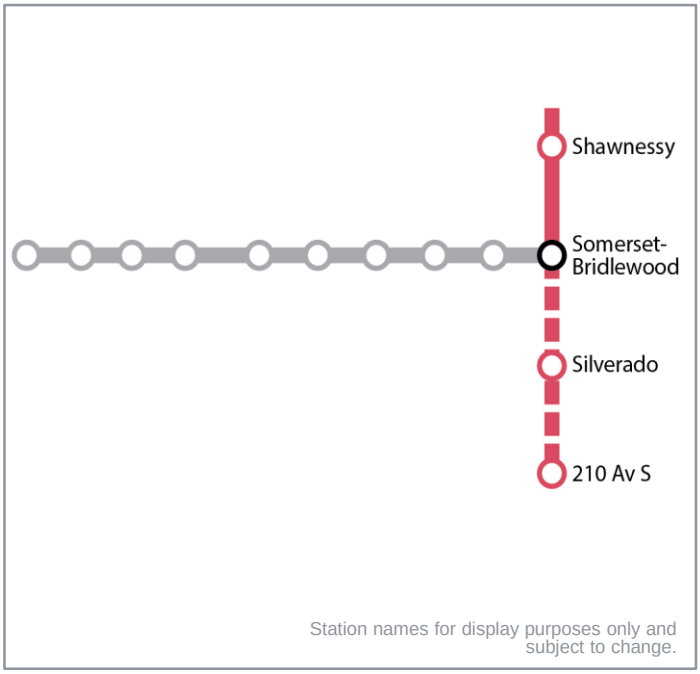
Providing a new transit route in SW Calgary, this project serves newly developing residential communities with BRT level transit service along a transitway.

2048 WEEKDAY RIDERSHIP
6,500

CAPITAL COST
$95,000,000

NET ANNUAL OPERATING COST
$6,000,000

BENEFITS SCORE **64**



Additional Considerations

- Project timeline largely depends on buildout of new communities in the SW providence area.
- Transitway right of way has been protected and considered during planning of new communities.
- High operating costs due to short headways reflecting BRT level of service.
- High to significant impact in all COVID-19 recovery scenarios due to reductions to commuting and potential for slow growth in new communities.

Length	**9 km**
Readiness	**No**
Technology	**BRT**
Trip Generators	**SW communities**

Attachment 4 - Social, Environmental and Economic Implications

Social

Prioritizing future rapid transit network growth projects by both benefits and costs contributes to an equitable distribution of transit services. The prioritization approach uses social equitability criteria such as community services, affordable housing units and low-income population served as part of the triple bottom line analysis of project benefits. Increasing the accessibility of the transportation system and the amount of travel by walking, cycling and transit allows all Calgarians to more fully participate in work and social activities. Public transit provides choice, expanded opportunity to move and connect with the community, with a more convenient and socially inclusive mode of travel.

Environmental

Transit projects contribute to a significant reduction in greenhouse gases (GHG) and will help the City meet the Council approved GHG reduction strategy of 15 Mt CO2e by 2050. A 25 per cent expansion of transit contributes 2.1 Mt CO2e to the reduction of GHG. Continuing to promote high-quality transit helps shift Calgarians out of single occupancy vehicles into lower or no emissions modes. The City of Calgary uses a wind power contract for the LRT network, enabling zero-emissions door-to-door travel in Calgary for CTrain customers. A single bus can carry as many people as 41 cars; with emissions per passenger-kilometre close to one quarter the level of cars. Calgary Transit buses are clean-burning, use compressed natural gas or premium quality low-sulphur diesel fuel and are maintained for continuous efficient performance. The Municipal Development Plan (MDP) and the Calgary Transportation Plan (CTP) work collectively to align land uses with the transportation networks to reduce the impact of travel on the environment by curbing land consumption, protecting air and water quality, and reducing energy consumption.

Economic

Prioritized investments in the rapid transit network and bus connections to growing employment and education centres supports improved economic development, business growth and place-making. Providing transit service plays a key role in Calgary's overall mobility plan and supports economic resilience by embracing participation for all. In addition to the direct transit customer benefits, investment in public transit benefits the broader community by:

- helping revitalize corridors and main streets,
- connecting employers to an expanded workforce,
- supporting redevelopment, particularly at Transit Oriented Developments, and
- providing Calgarians with a cost-efficient alternative of movement to all parts of the city.

Attachment 5 – Risks

Green Line Project Risks

Calgary Transit has been working closely with Green Line to ensure alignment with RouteAhead project prioritization and the ongoing Green Line program work. Continued coordination with Green Line is required moving forward as the downtown alignment of Stage 1 is considered and Green Line LRT and BRT functional planning work is completed. The prioritization of future rapid transit network growth projects is dependent on the advancement of the approved segments of the Green Line. Changes to the scope, scale, or timing of the Green Line, specifically Phases 2a and 2b, will results in the need to reprioritize future rapid transit projects. Additional commentary on project specific sequencing and project readiness can be found in Attachment 3 under Additional Considerations.

COVID-19 Recovery Scenario Risk Analysis

The Transportation department developed three COVID-19 recovery scenarios using a strategic foresight process to identify potential medium-to-long term impacts from the pandemic on the transportation system for the year 2040. The scenarios are not projections but identify a plausible range of impacts the department should plan for, given the uncertainties inherent to pandemic recovery. A preliminary review of potential impacts identified two general key areas where the pandemic is accelerating changes in trends that were already emerging before the pandemic:

- Increasing acceptance of remote work by employees and employers, and
- Increasing demand for delivery services rather than traditional shopping trips.

While the above imply a lower demand for transit service, there is also a short-term desire for physical distancing on transit vehicles, and consistent demand for service throughout the day to provide mobility to Calgarians who need and choose to ride transit for a variety of trip purposes.

Future Capital Projects identified in RouteAhead were evaluated using the recovery scenarios to examine risks. A project specific analysis of the potential impact of the pandemic scenarios and key findings for each project are in Attachment 3. General impacts to RouteAhead projects based on the three pandemic recovery scenarios are summarized below:

1. Rapid Recovery: The rapid recovery scenario is characterized by a pandemic exit in early 2021, population and job growth remain steady while growth is suburban focused and commuting to downtown experiences a 25 per cent peak reduction. This pandemic recovery scenario generally poses the lowest risk to all RouteAhead projects, due to a relatively lower decline in commuting, and relatively high suburban growth leading to a greater need for transit connections in new communities. In rapid recovery, many customers continue to rely on transit for downtown commuting throughout the week, and transit corridors passing through main streets and those connecting to non-downtown activity centres experience minimal risk.

2. Increased Crisis: The increased crisis scenario is characterized by a severe second wave leading to a pandemic exit late 2021, Calgary experiences a population decline followed by slow growth, particularly in suburban communities, and up to a 40 per cent peak commuting reduction to downtown. In general, this scenario poses a greater risk than Rapid Recovery, particularly to projects in suburban areas which may not warrant transit as soon as planned due to population decline and slow growth. Projects along corridors with a downtown commuter focus may also be significantly impacted. Transit serving main streets, industrial areas, and non-downtown activity centres are likely to experience less risk due to large and varied trip demand.

3. Transformational Change: This recovery scenario is characterized by a multi-year, multi-wave pandemic, slow and steady population growth, remote work leading to a greater share of growth going to other municipalities in the region, and a 40 per cent reduction in peak commuting to downtown. Projects

along corridors which serve commuters experience the highest risk, while projects serving diverse corridors such as Main Streets, activity centres, and front-line work are less impacted. Some projects in new and developing communities are moderately impacted and may take longer to build out as this scenario assumes slower suburban growth.