

Transitways and the RouteAhead for Calgary Transit

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Abstract

This paper outlines the findings of the RouteAhead project, Calgary Transit's 30-year strategic plan, with a focus on bus rapid transit (BRT) service.

RouteAhead includes the following areas of focus:

- Capital infrastructure plans (e.g. rapid transit projects, fleet, facilities)
- Service delivery objectives (e.g. frequency, span of service, networks)
- Fiscal strategy (e.g. costs, revenues, fare structure, projected funding sources)
- Customer service objectives (e.g. satisfaction and reducing barriers to use)
- Organizational structure and governance (e.g. staffing, resourcing, oversight)

RouteAhead's public engagement provided Calgary Transit with feedback on all of its services, including bus rapid transit (BRT). Calgary Transit evaluated the effectiveness of BRT and transitways (busways) in the future context. This paper describes the results of evaluation of recent infrastructure investments and the findings of the RouteAhead project, including:

- Current role of BRT in Calgary - BRT is a cost-effective approach to increase mobility on key corridors. BRT has been implemented in Calgary as limited stop service with articulated buses and transit priority measures to address bottlenecks. The paper highlights the success of BRT in Calgary based on key performance measures, including customer satisfaction.
- Future role of BRT under RouteAhead – BRT is a key tool on new cross-town corridors that connect smart growth areas and major trip generators outside the downtown. The paper demonstrates the logical progression of these services on several of these major transportation corridors.
- Future role of transitways - the plan includes enhanced BRT facilities that will include long transit-only lanes and/or busways, high-quality stations, real-time arrival information displays, off-board fare payment, and other customer service technologies. The paper demonstrates the customer service and operational improvements associated with transitways through a case study analysis of the Southeast Transitway (SETWAY) corridor in Calgary.

Introduction

RouteAhead examines the future of Calgary Transit and establishes a clear vision for public transit in Calgary for the next 30 years. The project was initiated in December 2011 by the City of Calgary Transportation department as a partnership between Calgary Transit and Mayor Naheed Nenshi's office. The project culminated in Calgary City Council's approval of the plan in March 2013.

RouteAhead includes a new capital plan for Calgary Transit, including a new rapid transit network. The rapid transit network includes services that are new to Calgary, including low-floor light rail transit (LRT) and transitways --- enhanced bus rapid transit (BRT) facilities that will include long transit-only lanes and/or busways, high-quality stations, real-time arrival information displays, off-board fare payment, and other customer service technologies.

RouteAhead – A 30-Year Strategic Plan for Transit in Calgary

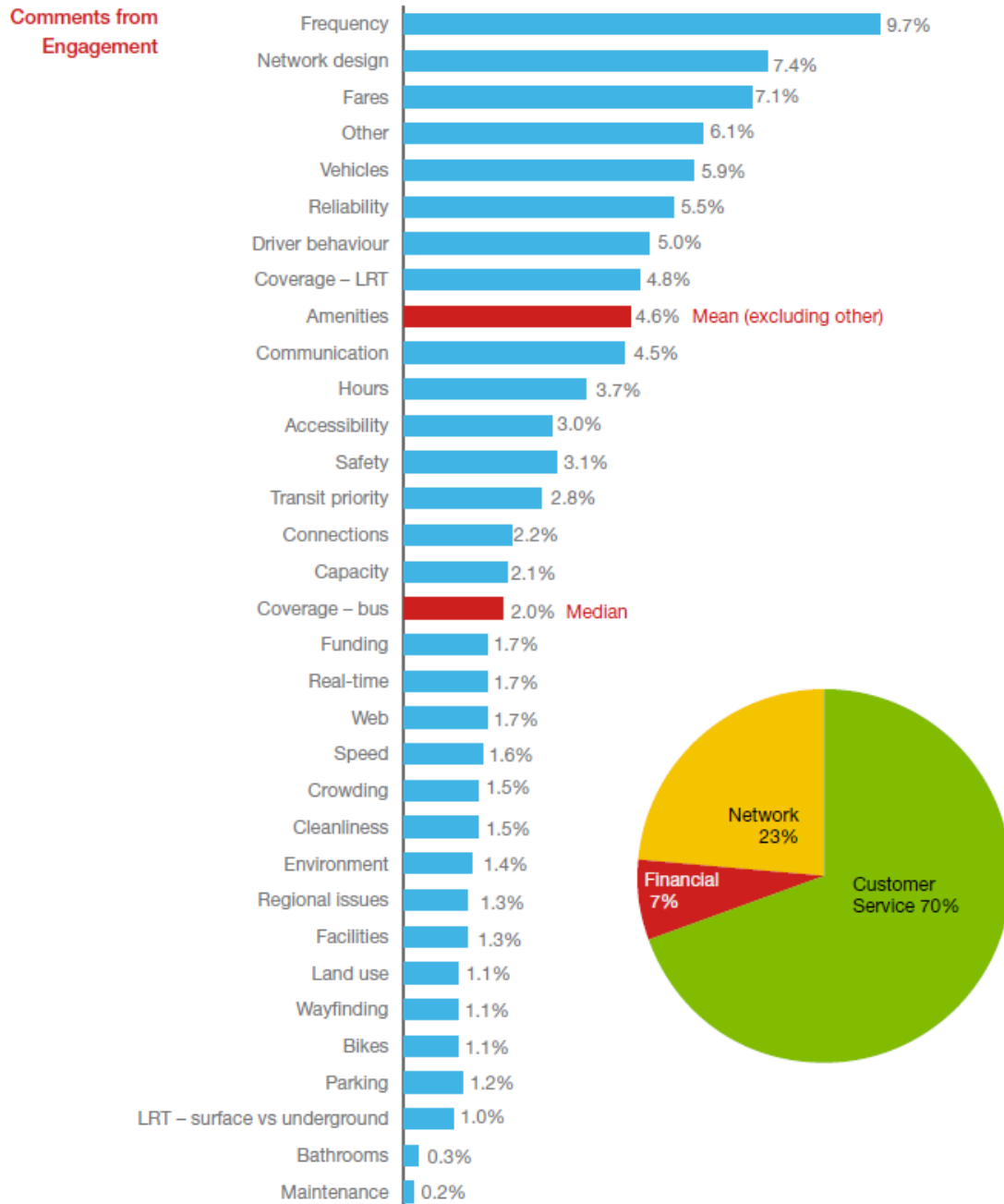
In 2011, Calgary's City Council directed that a new long-term plan for Calgary Transit be created in accordance with the Calgary Transportation Plan (a 60-year plan for all transportation in Calgary). A team was established early in 2012 to develop this plan, now called RouteAhead.

RouteAhead provides strategic direction for transit in Calgary for the next 30 years and will be used to develop future business plans and budgets for Calgary Transit. It includes customer service improvements and an infrastructure plan developed using feedback from extensive public engagement.

The RouteAhead project included three phases:

- **Phase one** included engagement, discussion and information gathering, focusing on customer and citizen needs, the current state of Calgary Transit and best practices of other organizations. The goal was to gain a clear understanding of what stakeholders want now and how they see transit in Calgary in 30 years. The engagement in phase one was "blue sky" in nature. Questions asked included, "Where do you see Calgary Transit in 30 years," "what are we doing well?" "what could we improve?" and similar questions. Feedback from citizens from this "blue sky" phase is illustrated in Figure 1, below.

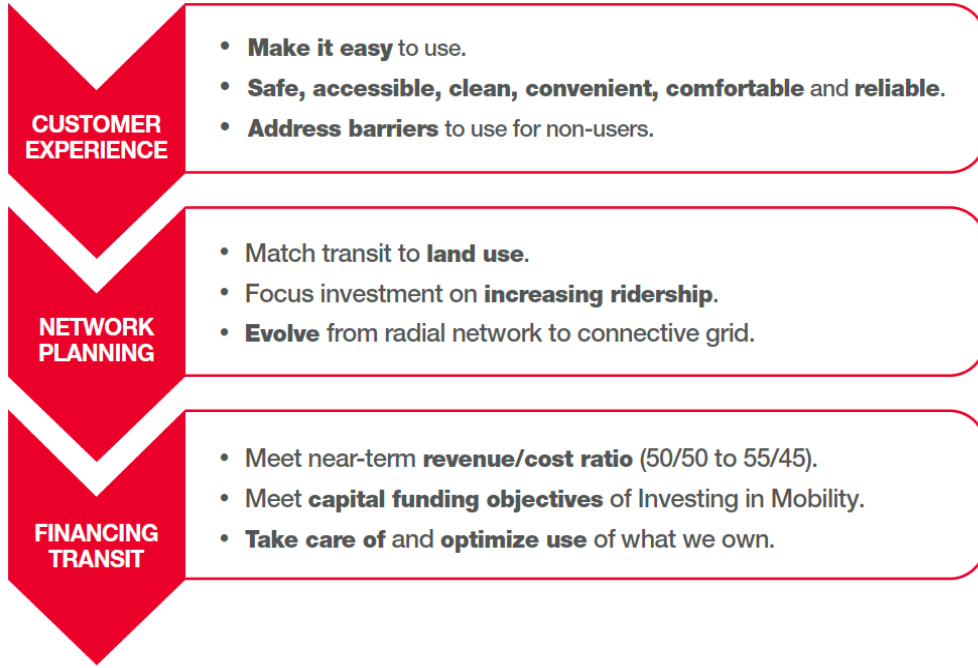
Figure 1. Comments from RouteAhead Blue Sky Engagement (% indicates the percentage of total comments falling under each category)



- Phase two** involved studying the pieces that need to be in place to meet the needs and wants of stakeholders. This phase examined customer commitment, service strategy, supporting infrastructure, and resource requirements. Using feedback received from Council, Administration and the public, core principles for public transit in Calgary were developed. The principles, shown in Figure 2 below, were presented to City Council for approval in September 2012 to serve as the guiding principles for drafting the plan. “Investing in Mobility” refers to the City’s overarching 10-year infrastructure plan for all

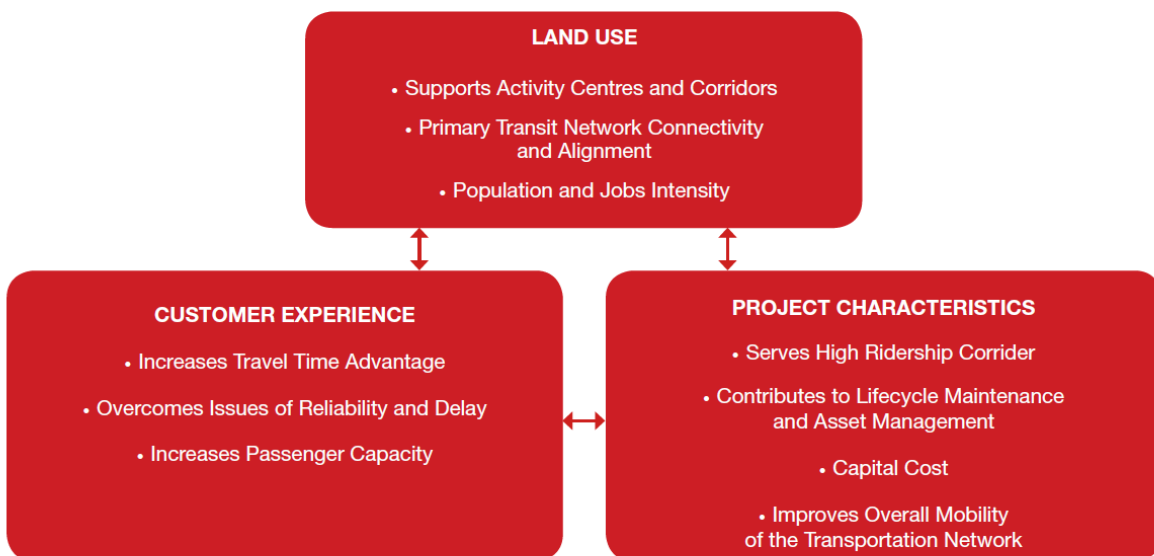
Transportation Department projects, including active modes, roadway and transit capital improvements.

Figure 2. Core Principles for Public Transit in Calgary



Evaluation criteria to rank capital projects were also developed. These criteria, shown in Figure 3, were also approved by City Council and helped guide the finalization of a rapid transit network.

Figure 3. Evaluation Criteria for Rapid Transit Projects



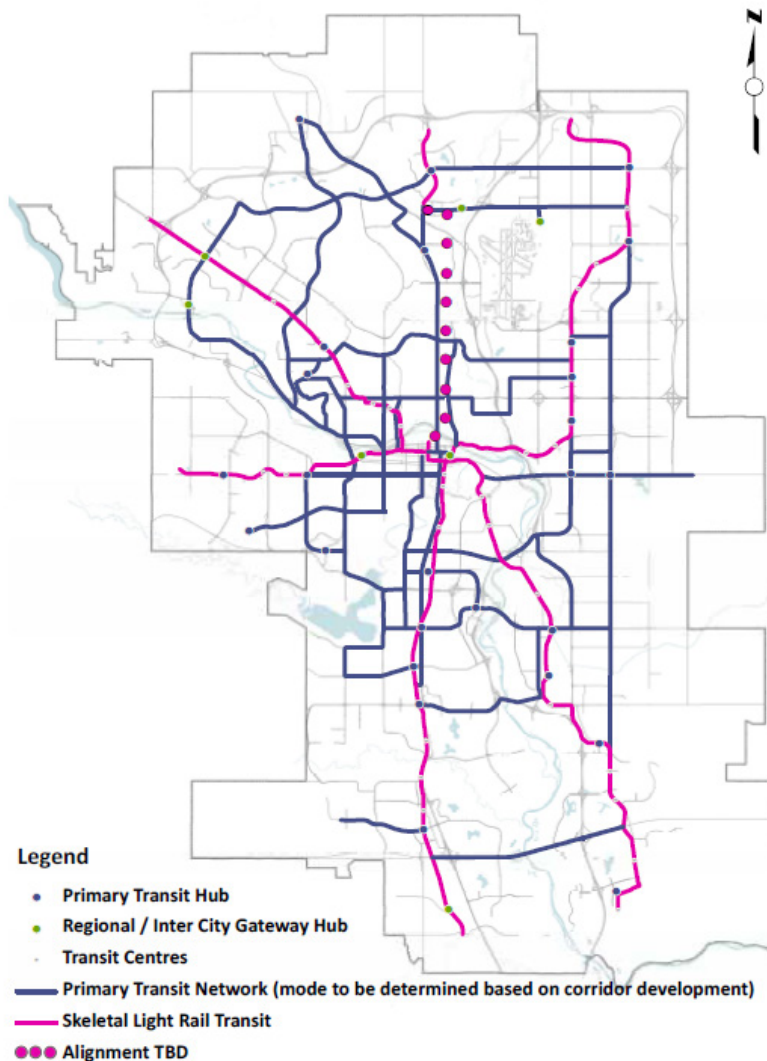
Phase three of RouteAhead involved developing the strategic plan itself. The RouteAhead plan consists of six sections:

- Section 1: The 30-year Vision for Public Transit in Calgary
- Section 2: About RouteAhead
- Section 3: The RouteAhead for the Customer Experience
- Section 4: The RouteAhead for Calgary Transit's Network
- Section 5: The RouteAhead for our Finances
- Section 6: What's Next

The plan includes visions, directions and strategies to address the future customer experience, network/capital plan, and funding of public transit in Calgary.

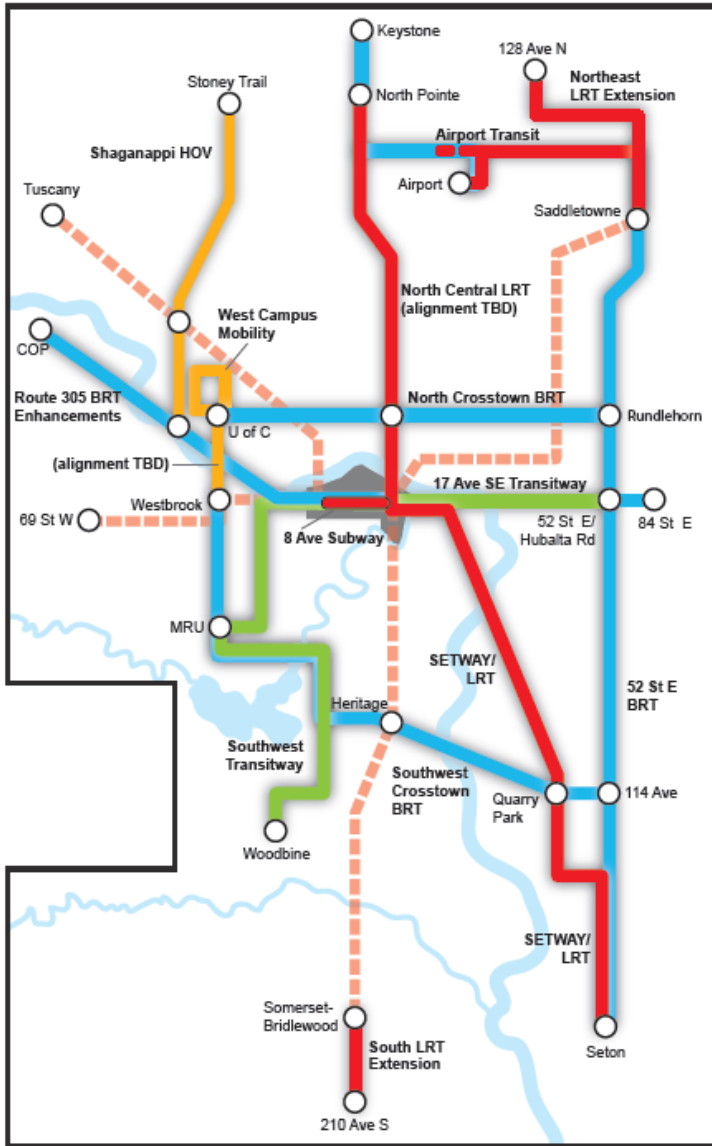
A Primary Transit Network, illustrated in Figure 4, will be developed in phases over the next 30 years. This core network will feature high frequency, longer span of service, speed/directness, service reliability, and increased transit capacity.

Figure 4. Primary Transit Network



A rapid transit network, illustrated in Figure 5, was developed as a subset of the primary transit network to indicate the segments where significant investments in capital infrastructure is needed to create a limited-stop network that is a faster way to travel.

Figure 5. Rapid Transit Network



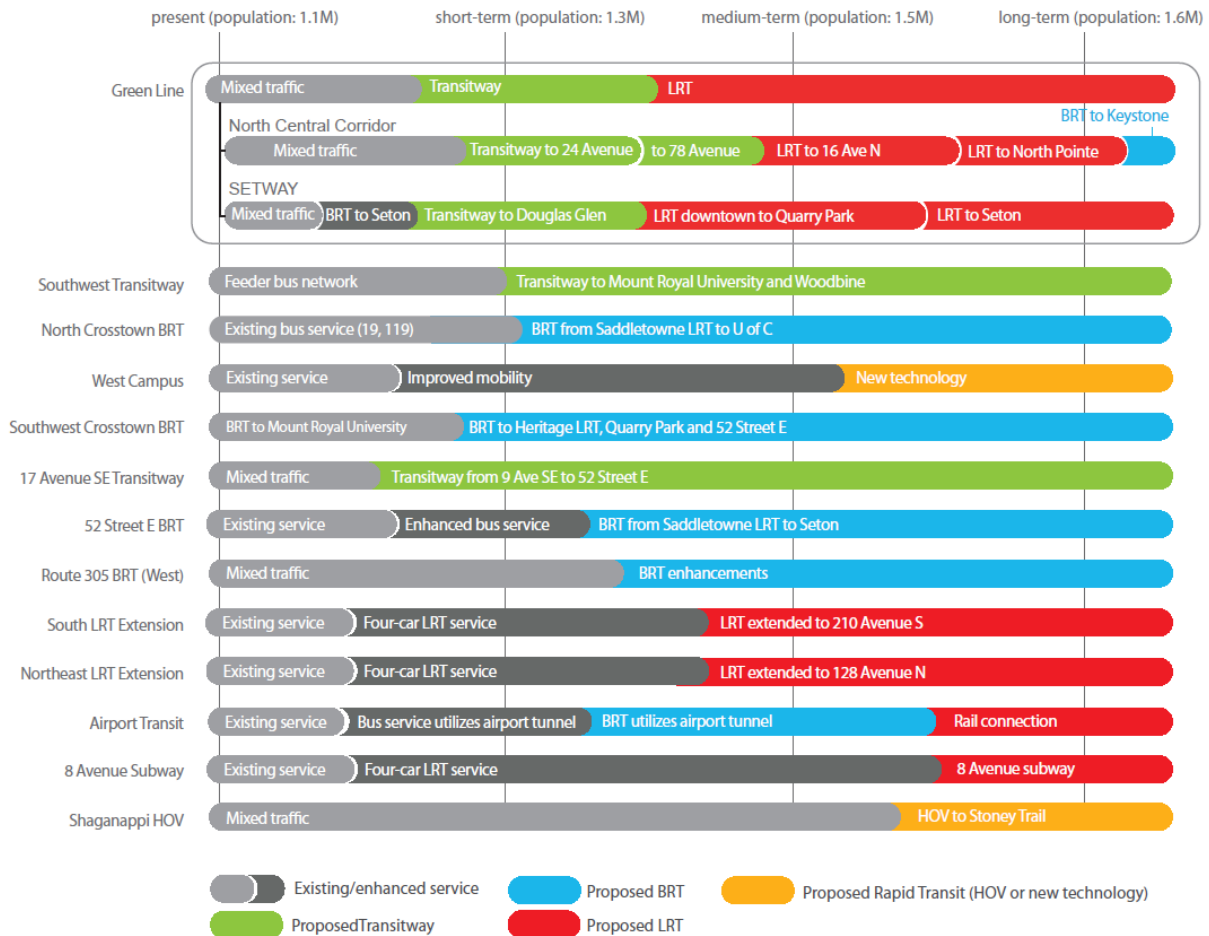
Legend

- Terminus/Connection
- Existing LRT

- Proposed Transitway (bus-only lanes/roads)
- Proposed LRT (light rail transit)
- Proposed BRT (bus rapid transit)
- Proposed Rapid Transit (high-occupancy vehicle (HOV) or other)

The RouteAhead plan includes the phasing of rapid transit projects, illustrated in Figure 6, and The City’s overarching 10-year capital plan identifies the recommended phasing of projects in the 10-year timeframe.

Figure 6. Phasing of Rapid Transit Projects



Implementation of the visions, directions and strategies in the RouteAhead plan is underway, including design and construction of the rapid transit plan. A status report on the implementation of RouteAhead strategies will be delivered in December 2013.

Evolution of BRT in Calgary

BRT is a transit service concept that relies on a number of strategies and design features to achieve an enhanced operating environment for buses and a faster, more convenient trip for transit customers. Depending on local objectives, priorities, budget and environment, a BRT service can include many features. Since first introduced in 2004 through today, BRT in Calgary includes the following features:

- Limited stops (i.e. stops spaced every 800 to 1200 metres vs 300 metres for local service)
- Enhanced distinctive bus stops with large shelters
- Park and ride lots
- Transit priority at intersections

- Queue jump lanes at some intersections
- Bus-only and high-occupancy vehicle lanes on existing roadways

The BRT concept offers significant implementation and operating flexibility. As demand grows, BRT services can evolve from a basic bus service or they can be introduced at once as a major service improvement for an entire corridor. Depending on the need and availability of funding, BRT can be implemented in short segments or over considerable distance. New features can be added incrementally as required, or incorporated from the outset of operation into a new corridor. In comparison to LRT, BRT does not require the significant capital cost of acquiring and constructing a separate right-of-way, or signaling, trackworks communication and traction power.

Bus priority is a key feature of BRT. This contributes to shorter transit travel times, smoother ride and more reliable transit service. The nature and scale of bus priority measures may be dependent on the local street and operating environment. Examples of bus priority applications range from peak period bus-only lanes, permanent bus-only lanes, contra-flow bus operation with separate traffic signals, traffic signal preemption or special turn restrictions.

The RouteAhead plan identifies a transition on several corridors from today’s in-street BRT service to a higher-order BRT with several improvements, as outlined below.

Table 1. Evolution of BRT to Meet RouteAhead Visions

<p>Customer experience</p>	<ul style="list-style-type: none"> • Enhance BRT to draw more customers through real-time passenger information, off-board fare collection, and integrated stops/stations at activity centres. • Introduce distinct branding, new vehicles, and additional comfort/amenities on BRT (requires separate BRT vehicle/bus maintenance facility). • Introduce separate lanes for buses to make BRT competitive with autos and closer to LRT average operating speed.
<p>Network</p>	<ul style="list-style-type: none"> • Connect areas where land use intensification is identified in the long-term Municipal Development Plan • Introduce separate lanes, bus-only crossings, and transit priority measures to improve schedule adherence and reliability. • Invest in service hours to boost frequency. • Extend services to regional municipalities where appropriate.
<p>Financing transit</p>	<ul style="list-style-type: none"> • Match investments in service hours to demand and land use intensification. • Conduct land use planning for transit-oriented development at BRT stations to build ridership and make the most of public investments in facilities. • Locate stations in high-use activity centres. Incorporate stations into functional plans/designs for new developments before they are built to minimize land costs.

To distinguish between today's in-street BRT services in Calgary and this RouteAhead vision, the concept of a transitway was introduced. The section below describes the advantages of a transitway.

Calgary's Transitway Concept

Transitways can be comprised of transit-only lanes separated from regular roadways, separate lanes on existing roadways, shoulders on an existing roadway, or any combination of these. In each case, the transitway lanes are for the exclusive use of transit and emergency services vehicles, and provide transit customers with a number of benefits. A transitway:

- » reduces travel times
- » increases speed of travel
- » improves schedule reliability
- » reduces operating cost
- » offers integrated station opportunities at activity centres
- » increases the attractiveness of transit as a travel option
- » increases customer safety by reducing conflicts with transit vehicles

Transitways are designed according to community context. Several examples are approved and constructed in Calgary. These have been designed with attention to the following factors for success:

- » ease of access onto / off the bus lanes
- » access by all modes: pedestrians, cyclists, customer transferring from other transit routes
- » proximity of activity centres and future land use opportunities
- » ability to minimize interaction with auto traffic
- » need for and difficulty of enforcement
- » land impacts

Separate *busways* are approved as part of the Southwest Transitway, 17 Avenue SE Transitway, and other corridors. In Calgary, the transitway is separated from regular traffic as shown in Figure 7 below. This example includes installation of a multi-use pathway as part of construction of the busways recognizing that all transit customers arrive at transit as pedestrians.

Figure 7. Transitway Concept: Busway



Transit-only lanes on existing roadways are currently in use on the Crowchild Trail corridor, as shown in Figure 8. These separate bus-only lanes allow transit vehicles to travel more quickly through congested roadway segments. The primary difference between busways and transit-

only lanes is the degree to which enforcement is needed to ensure success. Also, when transit-only lanes are introduced as shoulder or curb-side lanes on opposite sides of a roadway, stations for travel in opposite directions are typically separated by roadway traffic lanes. This can make station integration more challenging which in turn affects customer navigation.

Figure 8. Transitway Concept: Transit-Only Lanes



Figures 9 and 10 show new transit-only lanes at a key congestion point on Centre Street N. at McKnight Boulevard. Approximately 1,700 buses pass through this facility each weekday.

Figure 9. Centre Street/McKnight Boulevard Transit-Only Lanes

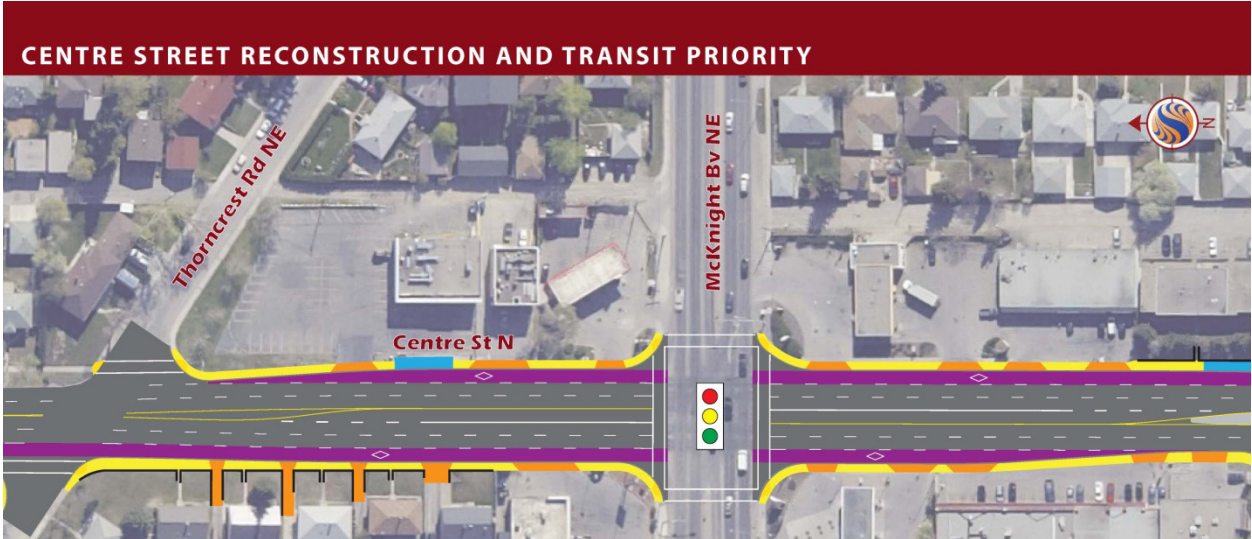


Figure 10. Centre Street/McKnight Boulevard Transit-Only Lanes Implementation – Buses at Front of Queue



Transitways in Southeast Calgary

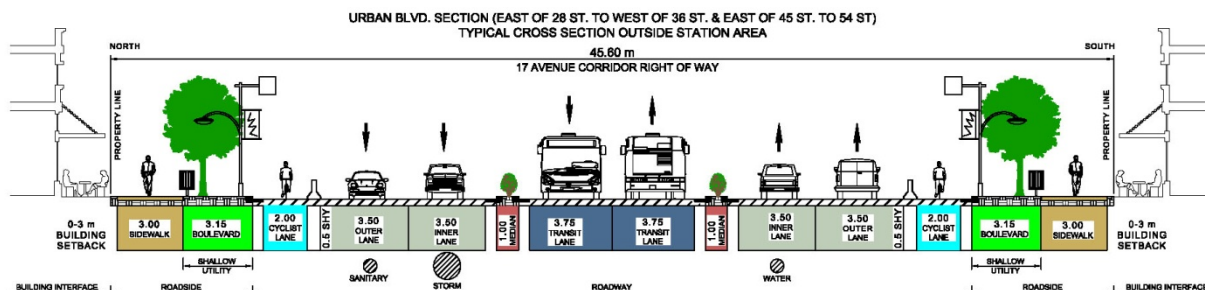
Two BRT lines in southeast Calgary (Routes 302 and 305) are examples of overlay services. BRT is often applied as a service overlay or along regular bus routes that have been demonstrated to be successful. They are adapted in that the number of stops is minimized to provide a more reliable service between important destinations. In these cases, the benefits of transit priority measures like queue jumps and bus-only lanes are shared by both BRT and local routes.

These two routes (302 and 305) operated completely in-street when they were first introduced. Plans for conversion of the corridors from in-street operation to transitways will be staged based on ridership, budget, land use, opportunity and community readiness. They are identified in the RouteAhead plan as the 17 Avenue SE Transitway and the Southeast Transitway (SETWAY).

A cross section that includes the addition of new travel lanes - median bus lanes – has been approved for the 17 Avenue SE Transitway in east Calgary. The advantage of this particular cross section through this segment is the ability to:

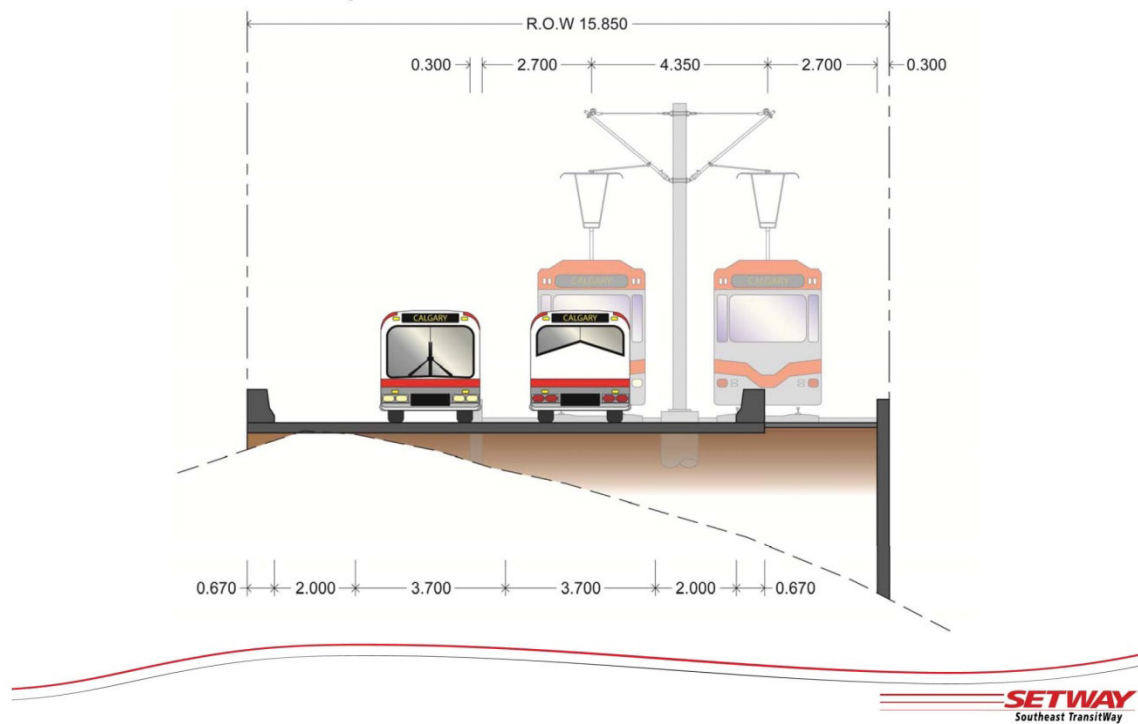
- » minimize congestion impacts on transit services to ensure on-time performance
- » co-locate bus lanes: allows limited stop services to pass local services
- » separate buses and bikes, creating a more comfortable cyclist environment
- » enhance the sidewalk and public realm
- » encourage intensification and more transit oriented design
- » transition to rail if it were required in the long term

Figure 11. 17 Avenue SE Transitway: Median Busway Concept



In southeast Calgary, Route 302 was introduced in 2009. The route operates exclusively in-street and is intended to grow ridership as planned communities and employment centres take shape. Route 302 closely mimics the alignment of the “Green Line” in southeast Calgary. The Green Line is a future 40 km LRT route connecting southeast and north Calgary through the downtown. The cost of the full buildout of the LRT route in the corridor is estimated at \$5 billion. As with past LRT construction in Calgary, it is anticipated that the LRT facility will be built in phases. Thus it is necessary to implement short-to-medium term transitway improvements on the corridor. Calgary Transit initiated a study (SETWAY) to determine the best way to enhance service in southeast Calgary while minimizing throwaway costs and construction impacts on customers. The result was a staged plan, shown in Figure 12.

Figure 12. Southeast Transitway: Concept for Conversion of Busway to LRT



Segments of the LRT right of way would be built in the short-to-medium term as a busway. The segments would be identified based on bus's ability to enter / exit the bus lanes; construction would be prioritized according to congestion impacts on transit service and land use opportunities. Upon conversion to LRT the additional right of way would be used as a multi-use pathway.

The SETWAY concept of converting busway to LRT is considered fairly unique. As part of the SETWAY concept development, a review was conducted to identify whether agencies had successfully converted busways to LRT facilities. The review indicated that convertibility is challenging and few examples exist to date.

Despite the challenges anticipated converting first to busway and next to LRT, the benefits of the approach are considerable. In terms of travel time savings, converting to busway is anticipated to achieve 50 % of the total time savings for 10 % of the overall budget. Further study on construction methods and future infrastructure requirements (rail ducting, rail fixation and electrification) is needed to better protect for seamless conversion.

Conclusions

RouteAhead identifies a role for BRT and transitways as part of the long-term rapid transit network in Calgary. In some cases, like the 17 Avenue SE Transitway and the Southwest

Transitway, high-capacity buses will provide the capacity needed to address long-term land use projections, and the transitway will be a permanent facility. In the case of others, like the Green Line corridor between southeast and north Calgary, the facility will require conversion to LRT in the medium-to-long term, and the transitway will be an interim facility. Conversion to LRT while minimizing customer impacts during construction becomes a major consideration in facility design.

The benefits of this higher-order BRT in Calgary include:

- Improvements to the customer experience: quality of ride, speed, and reliability of service increase.
- Service design flexibility: more than one route can use the facility, reducing the need for bus-to-bus transfers in some locations, and buses can bypass each other.
- Cost-effectiveness: the facilities support land use goals and grow ridership at a much lower cost than LRT, allowing future funding to be dedicated to LRT projects in locations that have a true need for the capacity of LRT.
- Active mode improvements: parallel active mode facilities will be constructed, and there is a focus on how pedestrians and cyclists access the station.
- Opportunities for transit-oriented development: the permanency of transitway stations and busways give developers more certainty regarding the lasting value of improvements.

The evolution to a higher-order BRT through transitways and other service improvements is underway in Calgary on several corridors, and BRT will have a lasting role in Calgary's future transit network.