

**Attachment**

**STRATEGIC DEVELOPMENT OF CALGARY'S CTRAIN  
SYSTEM**

*Calgary Transit  
2004 February*

# ***STRATEGIC DEVELOPMENT OF CALGARY'S CTRAIN SYSTEM***

## **CTrain System Development**

Over the past 23 years, the CTrain has become the backbone of the Calgary Transit system and is widely regarded as one of the most successful Light Rail Transit (LRT) systems in the world.

The present CTrain service had its beginnings with the introduction of the Blue Arrow Express bus system in the early 1970s. The Blue Arrow system incorporated features such as limited stops between the suburbs and downtown, exclusive transit



lanes, complementary feeder bus services and park and ride lots at proposed LRT stations. Thus, the Blue Arrow expresses and its feeder bus systems and park and ride facilities combined to form a prototype for the LRT system that was eventually developed in south, northeast and northwest Calgary.

The present CTrain system encompasses 35.4 km of track, 34 stations, 11,000 park and ride stalls, 116 CTrain cars, and carries over 200,000 passengers each weekday. Table 1 presents a summary of the estimated replacement value of LRT physical assets that will be in place on 2004 July 1. The list encompasses the existing CTrain fleet, stations, track and support systems and includes the new CTrain extension to Somerset-Bridlewood. The estimated replacement value of these assets is approximately \$1 billion.

**Table 1**

<b>EXISTING LRT ASSETS (REPLACEMENT VALUE)</b>	<b>ASSET VALUE \$(000)</b>
CTrain Cars (84 U2's, 32 SD160's)	\$ 464,000
Track and Right-of-way	\$ 25,550
Traction Power System	\$ 95,600
Signal/Communications System	\$ 90,890
Park and Ride Lots (11,000 parking stalls, incl. land)	\$ 67,200
Garage/Maintenance Facilities (Anderson, Haysboro)	\$ 77,040
Stations (36)	\$ 166,000
Miscellaneous Equipment & Facilities	\$ 10,350
<b>TOTAL</b>	<b>\$ 996,630</b>

### **Strategic Development of the CTrain System**

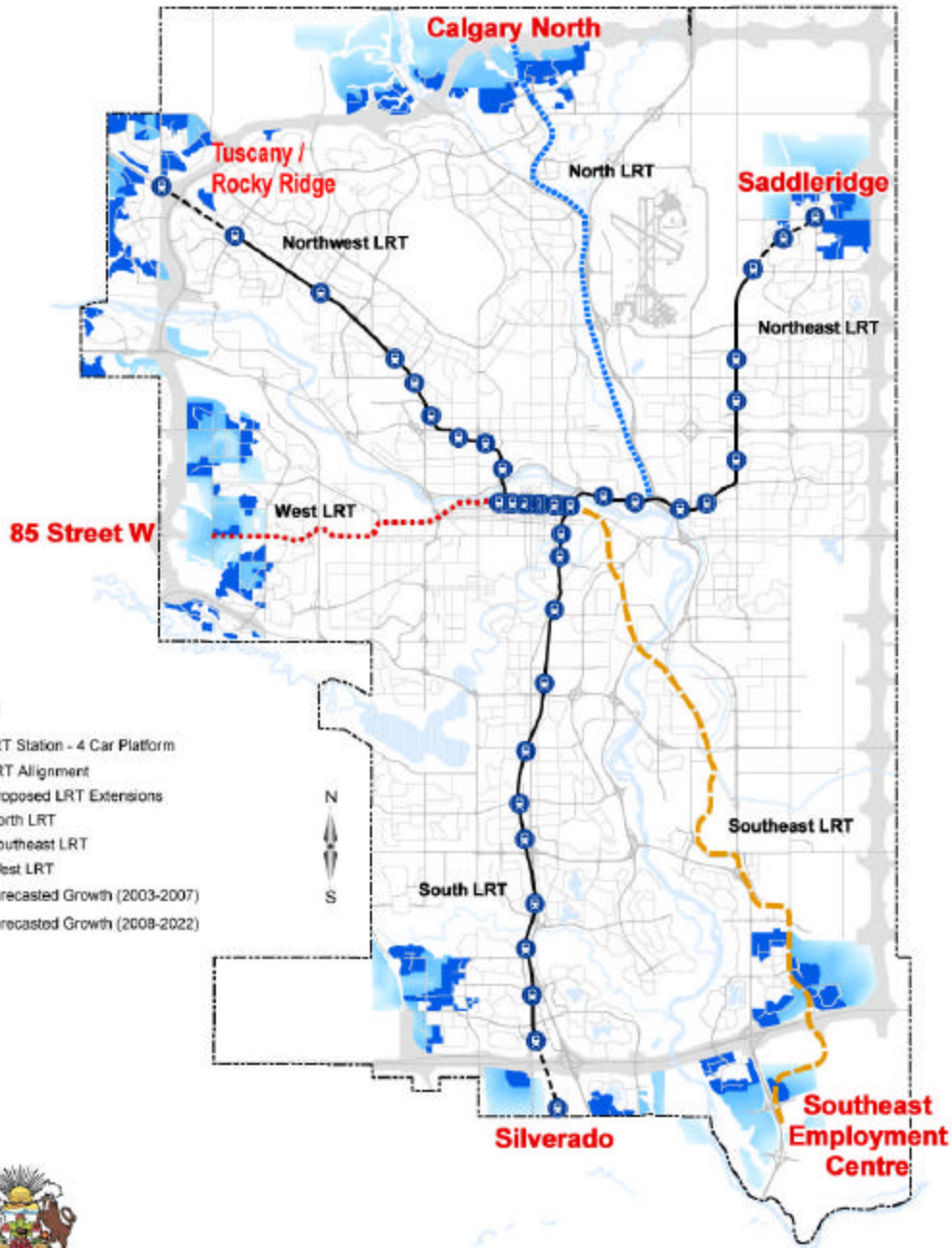
#### **Future CTrain System**

Planning for Calgary's future LRT needs has been updated and refined through a series of functional planning studies and community plans that have been undertaken since the early 1970s. These studies have identified that a network of six LRT lines will be necessary to accommodate a future city population of 1.5 million. A conceptual representation of this network is presented on page 3. The approved components of the future LRT network have been incorporated in the Calgary Transportation Plan.

The route and functional planning for all components of the future LRT network has yet to be completed; however, future plans include extensions of existing LRT lines to Rocky Ridge/Tuscany, south of Marquis of Lorne Trail and north of 96 Avenue NE. As well, new LRT lines are required to serve the west, north-central and southeast areas of Calgary. It is envisaged that the future LRT system will encompass approximately 112 km of track, 72 stations, 22,000 park and ride stalls, a downtown subway and a fleet of 325 CTrains, operating in four car trains sets, at a 3.5 minute headway during peak periods.

This report outlines the requirements for sequential development of the CTrain system to meet the growing needs of Calgarians over the next 20 years. The strategy outlined in this report is consistent with the Calgary Transit 20 Year Capital Plan (LPT2003-75).

# Proposed C-Train Long Term Network



The projected pattern of growth shown on this map is based on current population and employment forecasts, and is intended to guide the corporation's and prioritization of long-term municipal capital investments only. The information will be reviewed and updated annually, and is not intended to control absorption rates or land choice and competition in the market place. No measurement of distance or area should be taken from this map.

## **Current Issues/Challenges**

Calgarians have embraced the CTrain system as a key component of the transportation network and have ranked LRT expansion as one of the top priorities for The City. Expanded CTrain service is an essential component of the transportation infrastructure that is needed to sustain economic growth and maintain community and environmental quality.

To continue to provide effective and reliable transit service, Calgary Transit requires long-term, sustainable funding for LRT expansion to accommodate increased demand for service and address critical life cycle maintenance requirements.

## **Capacity and Service Expansion**

During the past decade, Calgary Transit has experienced unprecedented ridership growth. Between 1995 and 2003, annual transit ridership increased from 54 to 78 million revenue passengers. The 44 percent increase in ridership during this time period exceeded the rate of population growth by a significant margin. CTrain ridership increased at an even faster rate, from 104,000 to over 200,000 boarding passengers per weekday– a 92 percent increase.

Calgary Transit expects that ridership will continue to grow as approved CTrain extensions are completed and new development occurs in communities and employment areas within CTrain catchment areas. However, the ability to accommodate growth is severely constrained. All



available CTrain cars are currently in service and there is limited spare capacity available during peak periods to accommodate ridership growth. The current TIIP program contains funding for only seven additional CTrains, for service in 2010. However, this falls well short of the requirements to accommodate ridership growth that is anticipated.

As well, to maintain an appropriate balance in travel times between feeder buses and CTrain travel and accommodate future park and ride demand, there is a need to extend CTrain lines to complete the primary CTrain network.

## Life Cycle Maintenance

Virtually all of the CTrain physical plant has been built and acquired since 1980. Until recently, infrastructure maintenance costs have been relatively stable. However, these facilities now require an increasing amount of maintenance and, in some areas, upgrading and replacement is required. Areas with identified funding shortfalls include the refurbishment of CTrain cars, platforms and stations, track works, traction power, signals and communications, park and ride facilities and bus loops.



## Overview/Summary of CTrain Development Plan

To meet the needs of the Calgary community, the recommended 20- year CTrain development plan consists of four overlapping themes:

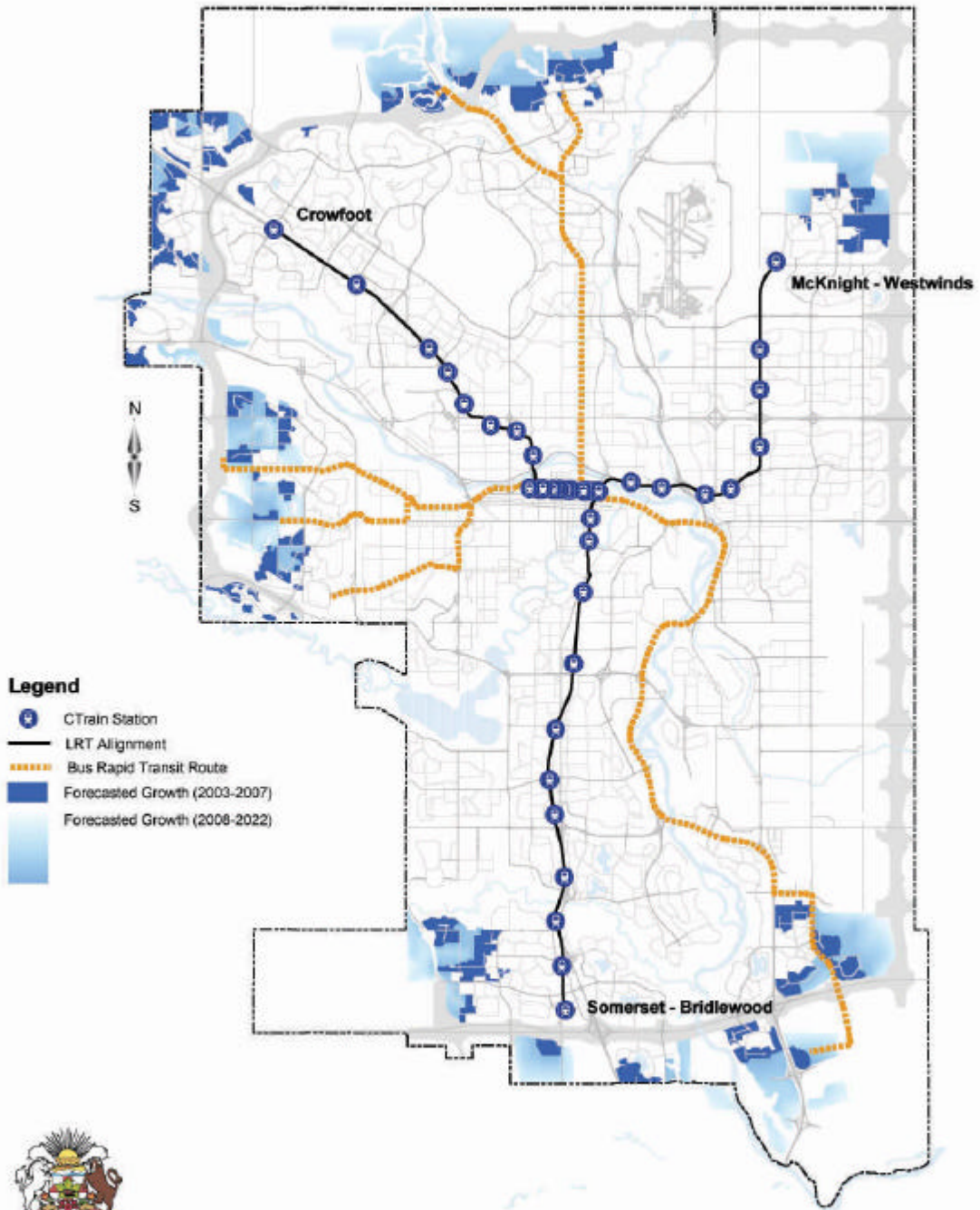
- Complete the Primary CTrain network;
- Increase Network Capacity;
- Develop Future CTrain Corridors; and
- Sustain Fleet and Infrastructure.

### 1. Complete the Primary CTrain Network

To accommodate population and employment growth in new communities and employment areas, CTrain extensions are required to complete the primary CTrain network. The elements of this plan include:

- South LRT extension to Somerset-Bridlewood (2004 June);
- Northeast LRT extension to McKnight-Westwinds (2010), including construction of the new LRT maintenance facility in northeast Calgary (2007);
- Northwest LRT extension to Crowfoot within 10 years.

# CTrain Primary Network



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This expansion plan will provide a primary CTrain network capable of accommodating projected growth in existing CTrain service areas for many years.

The primary CTrain network will provide a good balance between feeder bus and the CTrain and ensure that transit is an attractive travel alternative. Expanded park and ride opportunities and provision for other access modes such as walking and cycling will also be provided.

## **2. Increase Network Capacity**

To accommodate ridership growth and system expansion over the next 20 years, new CTrain cars are required. As well, the CTrain platforms and traction power system must be increased to handle four-car trains.

The focus of the strategy for expanding CTrain capacity for the next 10 years is to increase the frequency of CTrain service. There is capacity in the current 7<sup>th</sup> Avenue signal operation to increase CTrain service levels from every 5 minutes (present) to every 3.5 minutes, with three-car train operation. This would increase CTrain capacity from 7,200 to 10,200 passengers, peak hour peak direction (i.e., a 42 percent increase). By upgrading the CTrain platforms to four-car train lengths, CTrain capacity would be increased by an additional 33 percent to 13,600 passengers, peak hour peak direction. This would accommodate projected ridership growth for many years.

### ***New CTrain Cars***

#### **2004 to 2013**

Calgary Transit has identified a requirement for 34 new CTrain cars in the next 10 years to accommodate ridership growth and CTrain extensions that are required to complete the Primary CTrain network. Twenty-seven cars are required to accommodate ridership growth on approved CTrain lines and seven cars are required for the northwest LRT extension to Crowfoot.

The current TIIP program contains funding for seven cars, beginning in 2008. However, based on current cash flow and delivery schedules, no new cars will be available for service until 2010.

To address immediate service requirements, \$54 in funding is required to purchase 14 CTrain cars. An additional order of 13 cars (\$23.1 million) would be required to accommodate anticipated ridership growth by 2013.



## **2014 to 2023**

Between 2014 and 2023, there is a requirement for an additional 83 CTrain cars to accommodate projected ridership growth and new CTrain lines. Fifty-eight cars are required for new LRT lines in the west and southeast areas of Calgary and 25 to accommodate ridership growth on the Primary CTrain network.

### ***Upgrade CTrain Platforms to Accommodate Four-Car Trains***

## **2004 to 2013**

Upgrading CTrain platforms to accommodate four-car trains is a major undertaking and will require the revisions/upgrades to the platforms, traction power, and pedestrian crossing/signal systems, all while maintaining existing operations. In anticipation of this requirement, all new CTrain platforms are being constructed to accommodate four-car trains.

With respect to existing platforms, the proposed strategy is to complete the expansion of the 7th Avenue platforms and south LRT stations to accommodate four-car trains within the next 10 years. The 7<sup>th</sup> Avenue platforms are the most heavily used component of the CTrain system and are nearing the end of their life cycle; therefore, it is proposed that the platform reconstruction and associated streetscape improvements be completed within the next five to seven years. Extension of the south LRT platforms would also be completed by 2013.

When expansion of the 7<sup>th</sup> Avenue and south LRT platforms are completed, select peak period service on the south line could be operated as four-car trains to supply additional capacity for downtown travel. Currently, a limited number of trips on the south LRT line currently end or start service in the downtown to supply additional trips/capacity on the south line, where it is currently needed.

## **2014 to 2017**

Between 2014 to 2015, it is proposed that the northwest CTrain platforms be expanded to accommodate four-car trains. When this work is completed, four-car train service could be provided during peak periods on the entire length of the south/northwest CTrain line. The final phase of the program would be to complete the platform extensions to the northeast CTrain stations in 2016 to 2017.

### 3. Develop Future CTrain Corridors

#### 2004 to 2013

The present LRT service in Calgary was preceded by a network of “Blue Arrow” Express bus services that were introduced in the early 1970s. This service, with its complimentary feeder bus routes and park and ride facilities, operated in proposed LRT corridors and formed a prototype for the LRT system that was eventually developed.

Over the past decade, significant advances have been made in bus design, traffic engineering and information technology. These advances have been adapted by transit systems to create an enhanced form of express bus service that is been identified as “Bus Rapid Transit” or “BRT”.

BRT incorporates basic features such as frequent, limited stop service which are provided by current express bus service in Calgary. However, enhancements such as transit signal priority, bus zone amenities, real-time schedule information and unique buses have been incorporated to increase passenger comfort, operating speeds and service reliability to a level which is similar to existing LRT systems. One of the advantages of BRT is its flexibility, which allows transit systems to implement it in phases to match customer demand and budget resources.

It is envisioned that BRT will operate in future LRT corridors in the north, west and southeast areas of Calgary. In concept, BRT emulates the key features of LRT service and will serve as a prototype for the development of future LRT lines, similar to the earlier “Blue Arrow” expresses. It is proposed that the first phase of BRT service be introduced in the Centre Street and Bow Trail / 17 Avenue corridors in 2004



September and be expanded to other transit corridors over the next 10 years.

## **2014 to 2023**

Within the next ten-year period, there will be sufficient new growth within the west and southeast areas to warrant construction of the initial sections of the west and southeast LRT lines. Based on current growth forecasts and financing considerations, the proposed sequence for construction of new LRT lines is as follows:

1. West LRT from Downtown to 69 Street S.W.
2. Southeast LRT from Downtown to 114 Avenue S.E. (Douglasdale)

The West LRT line could be extended in future phases to west of 85 Street S.W.

The Southeast LRT line could be extended in subsequent phases to McKenzie Towne and the Southeast Employment Centre, south of Marquis of Lorne Trail.

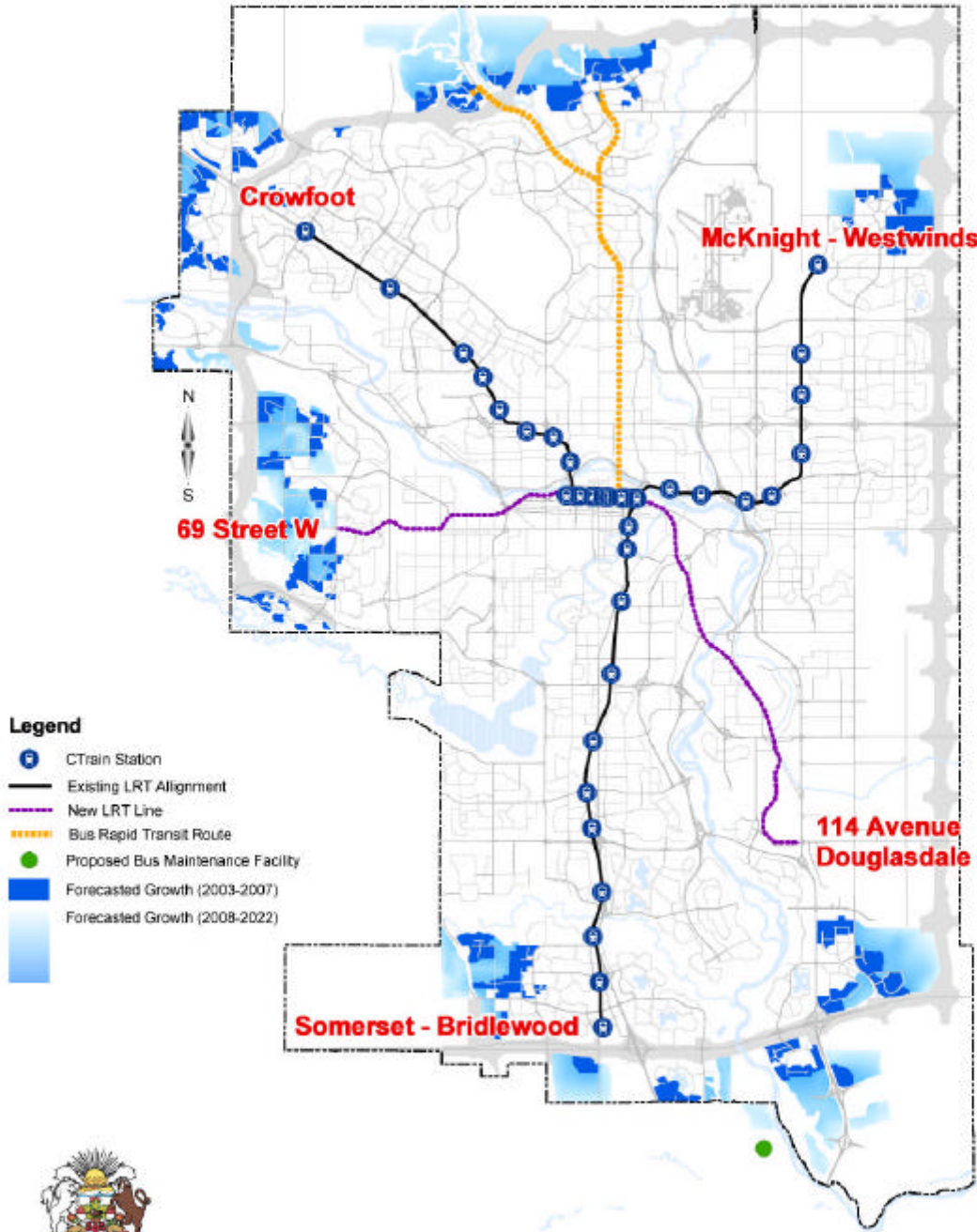
Calgary Transit is currently undertaking studies to determine an alignment and construction cost for future LRT lines and develop a strategy to integrate future LRT operations within the downtown. When these studies are completed, recommendations regarding the phasing of new LRT lines will be presented to Council for approval and will be incorporated in future updates to Calgary Transit's 20 Year Capital Plan and the Transportation Infrastructure Investment Program (TIIP) program.

## **4. Sustain Fleet and Infrastructure**

Virtually all of the existing CTrain infrastructure since 1980 and will require increased funding for life cycle maintenance over the next 20 years to sustain existing operations. Areas with identified funding shortfalls include:

- Refurbishment/replacement of existing CTrain platforms and stations, track works, traction power, signals and communications, park and ride facilities and bus bays/loops.
- Refurbishment of the 7<sup>th</sup> Avenue transit and pedestrian corridor;
- Life cycle extension and replacement of the original U2 model CTrain cars;
- Upgrading, refurbishment and replacement of existing technology (i.e., fare collection, passenger information and communication systems).

# CTrain Network 2014-2023



- Legend**
- CTrain Station
  - Existing LRT Alignment
  - New LRT Line
  - Bus Rapid Transit Route
  - Proposed Bus Maintenance Facility
  - Forecasted Growth (2003-2007)
  - Forecasted Growth (2008-2022)



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## Conclusion

Expanded CTrain service is an essential component of the Calgary Transportation Plan strategy to sustain future economic growth and maintain community and environmental quality.

During the past decade, CTrain service has not kept pace with demand during peak periods. Crowded conditions on the CTrain are deterring potential new customers and threaten the long-term effectiveness of transit service. As well, it is essential to complete life cycle maintenance projects to sustain the existing CTrain fleet and other components of the LRT infrastructure.



To ensure the long-term effectiveness and sustainability of CTrain service, a coordinated, long-term investment program is required to **complete the primary CTrain network, increase network capacity, develop future CTrain corridors and sustain fleet and infrastructure**. The flow chart on page 14 outlines the proposed sequence for this investment. The CTrain Development Strategy will be subject to regular review and updates based on community needs and funding availability.

# CTrain Development Strategy

2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

