# North Central Calgary Transit Corridor Review

Transit Planning Calgary Transit

2006 February

## **Report Overview**

## Purpose

The purpose of this report is to determine the long term transit service requirements for North Central Calgary (see Figure 1).

## Summary

North Central Calgary is described as being generally north of the Bow River, east 14 Street NW, and West of Deerfoot Trail. The population of North Central Calgary is expected to more than double by time Calgary reaches a population of 1.5 million. The most significant growth will occur in the area north of Stoney Tr. Employment growth is also expected, however, the area will continue to be a mostly residential area with the majority of the inhabitants employed in other areas of the city. Weekday transit travel towards the downtown is expected to increase from about 3,700 today to nearly 10,000 in the peak hour.

Planning studies, including the Calgary Transportation Plan indicate a need for a high capacity transit service from the North Central Calgary area to the downtown. Projected transit ridership would support an LRT line; however, a suitable, centrally located LRT right-of-way is not feasible within the area south of Beddington Trail. Although a right of way located in the median of Harvest Hills Bv is reserved for a future LRT line, a central alignment for LRT south of Beddington Tr. would result in significant community disruption and low LRT operating efficiency.

An enhanced Bus Rapid Transit (BRT) service on Centre St, augmented by express and mainline bus services on the areas major north / south roads is capable of serving the expected transit demand in North Central Calgary for at least the next 20 years. The current BRT will be expanded and improved to provide service during all time periods. Higher capacity articulated buses will be added beginning in 2007.

Beyond the 1.25 million population horizon, an LRT line will be needed to serve the combined volume of transit trips expected from the existing communities and the future residents who will live mainly in communities planned north of Stoney Trail.

It is concluded that LRT can be constructed within the Nose Creek valley between the Harvest Hills Bv alignment, through the future Aurora Business Park and connect to the downtown via the existing Northeast LRT line. This line would offer a travel time saving for the transit trips generated by the northern growth areas. BRT and other bus services would continue to serve Symons Valley and the communities located south of Beddington Tr.

# Introduction

North Central Calgary extends from the Bow River to the north City limits. It is bracketed in the west by 14 Street NW / Nose Hill Park / Sarcee Trail and to the east by Deerfoot Trail (see Figure 1). During the next 30+ years, North Central Calgary is expected to accommodate a significant portion of Calgary's growth.

Transportation plans for the area have historically identified the need for a Light Rail Transit (LRT) connection between North Central Calgary and the downtown. Most of this area is located outside the Northwest and Northeast LRT service areas. A right of way for LRT has been reserved north of Beddington Tr. However, no route for LRT has been determined south of Beddington Tr. As the North Central area continues to develop it is important to develop a transit service plan for this major travel corridor. This report will outline a short and long term strategy to provide this area with a higher capacity transit service and to protect a right of way for a future LRT line.

This report is divided into two parts. The Background section examines the anticipated growth in North-Central Calgary, reviews existing transit service trends and provides an estimate of future transit ridership. The second section outlines a transit service strategy to meet these needs.

# Background

The study area, described above and illustrated in Figure 1, can be divided into three distinct areas.

- Existing Communities are located south of Beddington Trail.
- Developing Communities are located north of Beddington Trail. These are mostly residential neighbourhoods that have been developing since the mid 1980s.
- *Future Communities* are planned north of the future Stoney Trail alignment. Development has already begun in the Symons Valley area and is expected to grow substantially in other northern areas over the next 30+ years.



Figure 1...North Central Calgary Study Area

# **Planning Policies**

Over the past 20 years, a number of planning studies have been conducted to establish policies and a development framework for this area. These studies are listed below. The highlights of each document can be found in Appendix. 1.

- North Bow Design Brief (1977)
- North Bow Special Study (1979)
- Calgary North Structure Plan (1981)
- Calgary North Policy Report (1981)
- Crescent Heights Area Redevelopment Plan (1997)
- The Calgary Transportation Plan (1995)
- The Calgary Plan (1998)
- Inner City Transportation Study (1998)
- North Hill Area Redevelopment Plan (1998)

Most of these planning documents contain statements or policies related to the need for some form of higher capacity transit service in North Central Calgary. Specific references in these documents can be found for the following concepts:

- Recognition of the future need for a north central LRT line.
- Location of LRT in the median of Harvest Hills Bv, north of Beddington Trail (Calgary North Policy Report).
- Increasing role of Centre Street N as a bus corridor including the provision of bus / carpool lanes and transit priority measures. (Crescent Heights ARP)
- Use of Edmonton Trail as a bus corridor with potential for widening the Edmonton Trail crossing of the Bow River for non-auto uses. (Inner City Transportation Study)
- Use of a range of transit service options to accommodate transit travel within the North Central communities (CTP).

#### The Calgary Transportation Plan (1995)

The Calgary Transportation Plan (CTP) provides land use and transportation policies to guide the development of Calgary's transportation system up to the 1.25 million city population horizon. Key CTP policies relate to providing for an increasing role for public transportation, more efficient use of existing infrastructure, and modest construction of new major roadways, primarily in new areas.

The CTP transit network (see Figure 2) shows a central transit corridor in North Central Calgary with express buses that would serve North Central Calgary's growth areas.

To increase the attractiveness of transit, the CTP also includes policies related to improving the level and quality of service, provision of transit priority measures, improved accessibility, and passenger amenities.



## **Transit Network**

Calgary Transportation Plan

# **Current and Future Land Use**

Currently, the predominant land use in the North Central Calgary area is low-density residential (see Figure 3). Commercial establishments and other businesses are located intermittently along major roadways, particularly at major intersections. Existing activity centres include the North Hill Shopping Centre and Southern Alberta Institute of Technology (SAIT), Beddington Towne Centre (Beddington Blvd. and Centre St. N.) and the North Pointe Centre (Country Hills Blvd. and Harvest Hills Blvd).

Light industrial businesses are located mainly east of Edmonton Tr. and north of 32 Ave. NE. There are several prominent recreational / natural areas including Nose Hill and Confederation Park. The Nose Creek valley is a significant, natural feature with recreational facilities that helps define the east boundary of the study area. The west branch of Nose Creek also divides the 'existing communities' area from the 'developing communities' along the north side of Beddington Trail.

The central 'developing communities' area and northern future communities' (see Figure 1), make up about one third of the study area. The developing communities, located between Beddington Trail and the future Stoney Trail include Harvest Hills, Coventry Hills, Hidden Valley and Panorama Hills. This area is expected to be fully developed in the near future. A major office park – Aurora Business Park - is being planned for the southeast corner of Harvest Hills Bv and 96 Av NE.

The northern most 'future communities' area is now mainly agricultural but is forecast to fully develop with mostly residential uses during the next 20 to 35 years. Figure 4 shows the general future land use distribution taken from the Calgary Plan at a city-wide population of approximately 1.25 million. An employment area is identified adjacent to Deerfoot Trail and a commercial node will be located in the central portion of the area.



Figure 3...Existing Land Use



## **Projected Growth**

The city is expected to reach 1.25 million population by 2025 and 1.5 million by about 2040.

#### Population Growth in North Central Calgary

Between 2005 and 2040, the population of the study area is expected to increase by about 168,000; more than double the existing level. Table 1 (below) and Figure 5 summarize the existing and forecast population levels for the 'established', 'developing', and 'future communities' within North Central Calgary at the key city population horizons.

Year	Established Communities	Developing Communities	Future Communities	Study Area Total
2005	111,400	32,900	1,500	145,800
1.25m	119,000	53,000	71,000	243,000
1.5m	123,000	51,000	140,000	314,000

 Table 1..Current and Projected Population in North Central Calgary

The established communities south of Beddington Trail are expected to experience only a modest population increase during the next 35 years. The developing communities between Beddington Trail and the future Stoney Trail are forecast to fully develop by the 1.25 million city population horizon, increasing in population by over 60 percent from the current level. As well, significant development is projected to occur within the future communities, located north of Stoney Trail during these time frames. Ultimately, this area will contain approximately 44 percent of the study area population by the time Calgary's population reaches 1.5 million. Currently, about three quarters of the study area population resides south of Beddington Trail.

#### Employment / Jobs Growth in North Central Calgary

Forecasts indicate that new employment opportunities will be created within the study area as it develops. Table 2 and Figure 3 illustrate the number of jobs located in the established, developing and future communities with projections for these areas when Calgary reaches the 1.25 and 1.5 million population horizon years.

Established Developing Future Study Year Communities Communities Communities Area Total 37,200 2005\* 32,000 5,000 200 1.25m 36,700 13,000 7,500 57,200 1.5m 41,600 18,500 18,300 78,400

 Table 2..Current and Projected Jobs in North Central Calgary

\* Estimate based on 2001 civic census



Figure 5 - Current and Projected Population

The majority of employment growth is expected to occur within the developing and future communities north of Beddington Trail. Currently, very few jobs are located in these areas but they are expected to contain approximately half of all jobs in the study area by the 1.5 million horizon. The area south of Beddington Trail is projected to experience limited job growth but it will continue to provide about half of the area's employment.

#### **Balance of Population and Jobs**

In 2001 (the most current employment data), the ratio of jobs to population for all of Calgary was approximately 0.54. This means that, on average, 54 percent of the total population was employed. It is projected that by the time the city population reaches 1.5 million, this ratio will increase slightly to 0.55. In 2001, the ratio of jobs to population in North Central Calgary was about 0.26. Table 3 indicates that this ratio is not expected to change as the area develops. Therefore, at least half of North Central Calgary residents will continue to commute to jobs located outside the study area, mostly to employment areas such as the downtown, northeast, and southeast.

Year	Calgary Ratio	North Central Calgary Ratio		
2001	0.54	0.26		
1.25m	0.54	0.24		
1.5m	0.55	0.25		

#### Table 3 Jobs / Population Balance



Figure 6 - Current and Projected Jobs in North Central Calgary

# **Transportation Network**

Table 4 provides a listing and characteristics of key roadways within the study area. The roadway network is illustrated on Figure 7.

Roadway	Predominant Functional Classification	Average Weekday Traffic Volumes (2003)		
East Wes				
Stoney Tr	Future Expressway	future		
Country Hills Bv	Major Road	44,000		
96 Av Future Major Road to Deerfoot Tr		future		
Beddington Tr	Expressway	45,000		
64 Av	Major Road	33,000		
McKnight Bv	Major Road	56,000		
16 Av	16 Av Major Road			
North / South Roads at 16 Avenue				
Deerfoot Tr	Expressway	151,000		
Edmonton Tr	Major Road	22,000		
Centre St N	Major Road	25,000		
4 St NW	Collector	11,000		
14 St NW	14 St NW Major Road			

#### Table 4...Major Roads in North Central Calgary

The roadway network in North Central Calgary is designed so that there is limited access between the communities located north and south of Beddington Trail. Deerfoot Trail is intended to provide for the majority of north / south auto trips to areas outside of the developing and future communities. This design reflects the limited capacity of the major north / south roads south of Beddington Trail to accommodate traffic coming from the new communities to the north. Bus only crossings on Harvest Hills Boulevard at Beddington Trail and on 4 Street south of 64 Avenue NE provide Calgary Transit with direct north / south connections. Stoney Trail, Country Hills Boulevard and the future 96 Avenue connections to Deerfoot Trail (and beyond) will provide key east / west links.



Figure 7.. Major Roads in North Central Calgary

## **Existing Transit Service**

Bus service within the North Central Calgary area is extremely successful. A compact land use pattern with increasing density along major road corridors, an efficient road network with direct links to the downtown and short walking distances to express, mainline (bus routes serving downtown), and local feeder bus services combine to make transit an attractive travel alternative in North Central Calgary.

Current transit service in North Central Calgary includes:

- A Bus Rapid Transit (BRT) service along the Centre St N corridor. Route 301 service (introduced in 2004) provides frequent, limited stop service between 0600 and 2200 on weekdays. Route 301 also serves Southwest Calgary along Bow Tr and 17 Av SW. During the next few years, this service will be expanded to operate during all time periods, seven days a week. As well, higher capacity articulated buses will be introduced on this route beginning in 2007.
- Mainline bus routes operate along Edmonton Tr, Centre St N, 4 St NW and 10 St NW with frequent stops providing access to local destinations and serving trips going to and through the downtown.
- Peak period express bus routes provide direct, limited stop service from local communities to the downtown on weekdays.
- Feeder routes serve local community destinations or connect with BRT, mainline or crosstown bus routes.
- Crosstown routes operate on major east / west roadways and provide service to destinations outside of the downtown.

#### Transit Facilities

There are three transit terminals in North Central Calgary that facilitate transfers to/from the various express, mainline, crosstown and BRT services. A fourth terminal is planned in the developing Symons Valley community. These bus terminal locations are:

- 78 Ave. and Centre Street NE.,
- Sandstone Terminal at Beddington and Berkshire Blvd
- North Pointe Terminal at Harvest Hills Blvd and Country Village Way NE.
- Symons Valley north of 128 Ave. NW (future)

A total of 1,285 park and ride spaces are currently provided mainly at the existing terminals with an additional 1,250 spaces planned at two additional locations. Table 5 lists the locations and capacity of the current and planned North Central Calgary park and ride lots.

Location	Total Spaces	
Current		
North Pointe - Harvest Hills Blvd and Country Village Way	900	
Sandstone - Sandstone Drive at Berkshire Blvd NW	245	
78 Avenue - Centre Street at 78 Avenue NE	100	
Centre Street at 36 Avenue NW	40	
Current Total	1,285	
Future		
96 Ave. & Harvest Hills Blvd	350	
Symons Valley – 128 Ave. NW	900	
Current + Future Total Spaces	2,535	

#### Table 5...North Central Calgary Park and Ride Lots

#### Transit Ridership

Table 6 shows the volume of peak hour/peak direction bus volumes and ridership on the BRT, express and mainline routes operating on Centre Street N, 4 Street NW, 10 Street NW., and Edmonton Trail (spring 2005).

Corridor	Route Type	AM Bus Volumes	AM Ridership
	Express	30	1,400
Centre St N	Mainline	25	1,100
& 4 St NW	BRT	7	400
	Sub Total	62	2,900
Edmonton Tr	Edmonton Tr Mainline		600
10 St NW	Mainline	6	200
Тс	otals	81	3,700

# Table 6...Express and Mainline Transit TripsNorth Central Calgary – AM Peak Hour/Peak Direction

Table 7 provides a summary of total weekday transit passenger boardings for all express, feeder, mainline and crosstown service in the study area. The feeder route passenger total includes high school routes.

#### Table 7..North Central Calgary - Weekday Transit Ridership

Service Type	Weekday Boardings		
Bus Rapid Transit	2,200		
Express	4,100		
Mainline	26,400		
Crosstown & Feeder	8,800		
Total Ridership	41,500		

#### Transit Priority

Transit buses have priority over general traffic at several locations within the study area:

- A bus-only crossing on Harvest Hills Bv / Centre St provides for direct north / south transit and emergency vehicle access between the communities located north and south of Beddington Tr.
- A bus only crossing on 4 St. NE. provides for direct north / south transit and emergency vehicle access on 4 St. NE. between 64 Ave and McKnight Bv.
- A traffic signal queue jumper provides an advance signal for eastbound buses on 16 Avenue at Centre Street.
- A weekday, peak period HOV lane on Centre St N, between 18 Ave. and the downtown, reserves the curb lane for buses and other vehicles with two or more occupants. This lane operates in conjunction with a peak period, lane reversal system that designates three out of four Centre St travel lanes for peak direction travel.
- Traffic signal priority is provided on Harvest Hills Bv, Beddington Bv, and Centre St N. Calgary Transit buses can request extended traffic signal 'green time' or a shorter red signal using an onboard emitter.
- A short northbound bus only lane on northbound Edmonton Tr. allows buses to bypass northbound traffic queues at Memorial Dr.
- The median of Harvest Hills Bv. is reserved for future LRT service.

## **Transit Ridership**

#### **Current Peak Hour / Peak Direction Passenger Volumes**

As indicated in Table 6, there are approximately 3,700 am peak hour trips to the downtown from North Central Calgary via BRT, express and mainline bus routes. This is just slightly less than the average volume of peak hour passengers entering the downtown on the Northwest or Northeast CTrain lines. This reflects the attractiveness and effectiveness of transit service in the North Central corridor.

Recently, transit travel in the North Central corridor has experienced significant growth, particularly during peak periods. Between 1999 and 2005 peak period ridership leaving the North Central communities increased by approximately 20 percent as a result of increasing population, increased transit service including introduction of BRT in 2004, and the implementation of the Centre Street N. HOV lane in September 2000. In comparison, overall Calgary Transit ridership increased by 15 percent during this same period.

#### Table 8.. Peak Hour / Peak Direction CTrain Trips Entering Downtown

South LRT	7,300,
Northwest LRT	4,600
Northeast LRT	4,500.
North Central Bus	3,700

## **Future Travel Forecasts**

Table 9, below, provides estimates for am peak hour travel between North Central Calgary to other city quadrants at the 1.25 and 1.5 million Calgary population horizons. These peak hour travel estimates were generated using the Transportation model that predicts travel based on population, employment, road, and transit system design.

	AM Peak Hour Transit Trips From North Central Calgary					
Transit Trip	Total Trips		Via Transit		Via Automobile	
Destination	1.25 m	1.5 m	1.25 m	1.5 m	1.25 m	1.5 m
Internal	9,500	16,600	1,400	2,000	8,100	14,600
Downtown	13,700	16,500	7,000	9,800	6,700	6,700
Northwest	11,500	14,900	2,400	3,100	9,100	11,800
Northeast	13,700	19,300	700	800	13,000	18,500
Southwest	5,900	6,100	700	1,100	5,200	5,000
Southeast	4,600	4,900	200	200	4,400	4,700
Total Trips	58,900	78,300	12,400	17,000	46,500	61,300

#### Table 9..Projected AM Peak Hour Trips Originating in the North Central Calgary Area 1.25 And 1.5 Million Population Horizons

The left hand columns in Table 9 show that the highest concentrations of total peak hour travel from North Central Calgary will be to destinations in the downtown, northeast and northwest plus internal trips. It is predicted that nearly 60 percent of trips to downtown Calgary from the North Central area will be made via transit (middle columns).

#### Future Transit Trips from Developing and Future Communities

It is important to note that transit trips from the developing and future communities will account for approximately 3,900 and 6,600 of the total peak hour / peak direction trips forecast in Table 9 for the 1.25 million and 1.5 million population horizons, respectively. Therefore, at these time horizons, transit trips from the areas north of Beddington Trail to the downtown will be about 55 and 65 percent of total peak transit travel from the North Central area. Trips from the existing communities, south of Beddington Trail are expected to remain similar to the current level.

#### Future Crosstown Transit Trips

Table 9 indicates that, compared to transit trips to the downtown, the volume of trips using peak hour transit service for travel to other areas of the city will be lower because of the typical dispersion of these trips within lower density employment areas such as the northeast and southeast industrial areas. This table indicates that there may be potential to establish additional transit routes to attract some of this cross town travel.

#### Future Off-Peak Transit Service

About 40 percent of total weekly transit trips are made during off peak periods. In major transportation corridors, where a high level of transit service is provided (e.g. LRT and major bus corridors), transit serves a considerable off-peak volume of trips. For example, during the weekday mid day and evening periods, the CTrain carries an average of 23,000 customers on each line. By comparison, mainline routes in North Central Calgary currently carry about 11,000 customers during weekday off-peak periods.

It is expected that demand for off-peak transit service within the North Central Calgary corridor will increase significantly as the area develops. To meet the objectives of the Calgary Transportation Plan (i.e., to attract and serve increased travel by transit) frequent and more rapid off-peak service is required in the North Central corridor.

# North Central Transit Corridor Service Alternatives

Population and employment forecasts for North Central Calgary, outlined in the previous section indicate that demand for transit travel to and through the downtown from this area is expected to nearly triple from existing levels during the next 35 years. Auto traffic on major roadways is also expected to increase significantly as well. Table 9 (above) indicates that future peak hour / peak direction (north/south) transit passenger demand is estimated to be approximately 7,000 and 10,000 at the 1.25 and 1.5 million population horizons respectively.

As the city develops northward, all trips (transit and auto) will become longer both in terms of distance and time. In order to attract and serve the anticipated transit demand transit service in North Central Calgary must provide sufficient passenger capacity and offer attractive levels of levels of speed, comfort and convenience.

Plans for the North Central area have identified the need for higher capacity transit service in a central north/south transit corridor. The future peak hour transit volumes described above are certainly best handled by LRT. An LRT right-of-way has been reserved in the median of Harvest Hills Bv, however, an alignment that would allow this LRT line to connect with the downtown has not been identified.

The purpose of this section of the report is to identify a strategy for providing higher capacity transit service and ultimately LRT within the North Central travel corridor.

## **Bus Rapid Transit**

Bus Rapid Transit (BRT) is emerging as a relatively low cost means of providing a faster, higher capacity, bus-based transit service within urban transportation corridors. In many cities, BRT has demonstrated its attractiveness to urban travelers since it reduces transit travel times and provides frequent, high capacity service. BRT services operating in the South American cities of Curitiba, Brazil and Bogata, Columbia are well documented. Here BRT services transport over one million passengers a day<sup>1</sup>. In the United States, the Federal Transit Administration (FTA) has sponsored BRT development projects in ten US cities. In Canada, BRT services operate in Quebec City, Montreal, Toronto, and Vancouver.

Key elements of BRT are:

- frequent, limited stop service,
- distinctive, buses and bus stops,
- higher capacity buses
- operation on regular roads with transit priority
- relatively low capital costs

<sup>&</sup>lt;sup>1</sup> "Mass Transit, Bus Rapid Transit Shows Promise, United States General Accounting Office, Report to Congressional Requesters, GAO-01-984, 2001 September.

Flexibility is an important attribute of BRT. Since it is a bus service it can be operated on regular roads, in mixed traffic. Supporting infrastructure such as enhanced passenger waiting areas and information systems can be added as required. Transit priority features can also be staged and can range from traffic signal priority to exclusive or separate bus lanes. Service can begin with regular buses and higher capacity buses can be introduced as ridership increases.

#### Calgary BRT Introduction

In September 2004, a Bus Rapid Transit (BRT) service (Route 301) was introduced to serve north and west Calgary. Route 301 operates along Centre St N, through the downtown and along the Bow Trail / 17 Ave SW roadways. Initially, BRT offers weekday service during peak and mid day periods. BRT stops are being enhanced with larger waiting areas, larger distinctive red shelters and park and ride at some outlying stops. Stops are spaced approximately 800 to 1,000 metres apart versus about 300 metres for regular service. Traffic Signal Priority (TSP) is provided at all traffic signals outside of the downtown to provide buses with a shorter red and extended green time at traffic signals.

To date, the new BRT service has proven very popular with a high level of customer satisfaction. BRT has contributed to a growth in overall ridership of approximately 12 percent in the North Central corridor and 8 percent in the west. In North Central Calgary, BRT now carries 17% of weekday transit trips along Centre St. N. A survey conducted in 2005 found that customers access BRT via walking (average 500 to 700 metres), auto (park and ride or drop off) or via a connecting bus. As well, 12 percent of customers who used to drive now make their trip using BRT.

The introduction of BRT has shown that this form of service can attract ridership and provide a higher level of service. It should be recognized that Route 301 – BRT operates in concert with express, mainline and feeder bus services. Each type of service has unique service features. Express buses (e.g. #64, #109) only operate during peak periods and provide a limited number of trips. They serve multiple stops in communities and then travel directly to the downtown along the major north / south roads with very few stops. Mainline bus routes (e.g. #2, #3) operate mainly along major roads with frequent stops on the journey between the established communities and the downtown. Feeder bus routes provide service to local community destinations (e.g. schools, shopping) and connect with BRT and mainline bus routes.

#### Proposed BRT Expansion

Plans are underway to expand the current BRT service on Route 301. During the next few years, more frequent service and operation during all time periods, including weekends is planned. As well, further bus stop improvements will be carried out in 2006 and higher capacity articulated buses be introduced on this route in 2007.<sup>2</sup> In North Central Calgary, additional BRT legs are planned. One will serve the Symons Valley area where a transit terminal with park and ride is planned. As well, a future BRT service to the Calgary International Airport, with a potential connection to Northeast LRT is planned with the completion of 96 Ave NE. Future BRT terminals will be established in more northern communities as the city continues to grow. The proposed BRT route network for the North Central area is shown on Figure 8.

#### Short Term Transit Service Strategy for North Central Calgary

It is proposed that expansion and improvements planned for BRT, the continued operation of express and mainline bus routes and the development of new local feeder bus routes will offer an effective level of transit service North Central Calgary for many years. A possible scenario for how this service could operate is provided below. It is recognized that there are other possible combinations of buses for these services.

#### • Bus Rapid Transit

As noted above, BRT will provide all day, two way service with limited stops along three routes serving North Central Calgary and the Calgary International Airport.

#### • Express Bus

North Central Calgary express bus routes are required to supplement the BRT service during peak periods. Express buses would mainly serve communities north of Beddington Blvd. In addition to Centre St, express bus routes could utilize 14 St N, Edmonton Tr. or Deerfoot Tr. for access to downtown.

#### • Feeder Bus Service

Feeder bus service in the developing and future communities (north of Beddington Blvd) will provide service to local destinations (schools, shopping, etc.). Feeder buses would also provide for transfers to BRT service at the terminals and BRT bus zones, particularly during the off peak periods.

#### • Mainline Local Bus

Mainline bus routes (currently Routes #2, 3, 4, 5, 9, & 17) would continue to provide downtown oriented service, with frequent stops between the communities south of Beddington Blvd. via 10 St. NW, 4 St. NW, Edmonton Tr. and Centre St N.

<sup>&</sup>lt;sup>2</sup> In 2004 and 2005 Calgary Transit conducted trials with double decker and articulated buses. It was concluded that articulated buses would be best suited to provide higher capacity bus service in Calgary since they would require no modifications to roads or bridges and only minor modifications to transit maintenance facilities and bus stops. In western Canada, Vancouver, Edmonton and Winnipeg have successfully introduced articulated buses into their fleets.



Figure 8... Proposed BRT Service

Centre St N in combination with Harvest Hills Bv carries the majority of buses in this corridor. Centre St. provides the most direct connection from the outer most northern communities to the downtown. A key link for transit service is the bus-only connection at Beddington Tr. that allows buses to travel between Harvest Hills Blvd and Centre St. This bus only link also limits the volume of traffic on Centre St. Traffic signal priority (TSP) and an HOV lane enable buses to provide a travel time advantage for transit passengers.

Table 11 (below) indicates a potential combination of bus volumes that could be assigned to each of these services and the resulting peak hour passenger capacities. As well, the table provides a comparison with the current service levels. This table indicates how one possible combination of bus services is capable of transporting between 7,000 and 10,000 peak hour transit passengers between North Central Calgary and the downtown at the 1.25 and 1.5 million population horizons respectively. The upper end of this range depends on using articulated buses on the BRT and mainline routes. It is also possible to increase the volume of regular size buses but this is less efficient since many buses would fill quickly and bypass stops early in their routes as they proceed toward their destination.

	Peak Hour Service					
	Curren	t Volumes	Potential Volumes			
	Buses Per Passenger Hour Capacity @ 60/bus		Buses Per Hour @ 60/bus		Passenger Capacity @ 100/bus	
BRT	7	400	30	1,800	3,000	
Express	30	1,800	60	3,600	3,600*	
Mainline	44	2,600	30	1,800	3,000	
Total	81	4,400	120	7,200	9,600	

#### Table 11.. Peak Hour Transit Service Combinations for North Central Calgary

\* It is assumed that express buses would be regular size.

#### Long Term Transit Service Strategy for North Central Calgary

The transit service strategy outlined above is feasible and should serve the North Central communities for at least the next 20 years years. However, when the city population moves past the 1.25 million mark there will be significant growth north of Stoney Trail. Bus travel times, particularly to the downtown will be approaching one hour. Increasing traffic congestion will also contribute to slower travel. As well, the number of buses required for this service will begin to challenge the downtown roadway capacity. Despite using higher capacity articulated buses, many buses will be full before they leave their community. As a result, the operating efficiency of this service will decline.

Clearly, with a forecast population of over 300,000 for North Central Calgary, this area merits LRT service. LRT has proven to be the best means of efficiently moving large numbers of passengers during a short time period. As well, LRT offers a comfortable, rapid and generally direct trip.

#### Potential for a Central LRT Line

A review of the North Central Calgary study area indicates that to attract and serve increasing transit demand for trips to the downtown, service should be centrally located within the corridor. Unfortunately, south of Beddington Trail, a central, north/south route suitable for LRT service is not readily available. Existing north / south road rights-of-way such as Centre St., 4 St NW, or Edmonton Tr, do not have sufficient width to accommodate LRT without either a reduction in road capacity and function (e.g. loss of traffic lanes, turn lanes and space for on-street stopping or parking) or significant property acquisition.

To facilitate rapid, safe and reliable operation, LRT requires a protected right of way and a limited number of at-grade roadway crossings. Along its suburban sections, Calgary's CTrain operates mostly within such a protected environment where trains can safely achieve operating speeds of up to 80 km per hour. With limited station stops, the overall average travel speed along these corridors is approximately 40 km per hour. In the downtown, LRT operates in a semi-exclusive environment (shared with buses, emergency and service vehicles). CTrain movements are controlled by traffic signals that are optimized for LRT but there are multiple roadway crossings and limited right-of-way protection. In this environment, the maximum LRT operating speed is 40 km/hr and the average travel speed through the downtown is only 15 km/hr (includes station and traffic signal stops).

It is not feasible to locate LRT within one of the major road corridors in North Central Calgary (e.g. Centre St N) and have it provide the travel speed necessary to address ridership demand without significant physical intrusion into the local communities. A CTrain line here would require barriers along the right-of-way, grade separated roadway and pedestrian crossings, traffic signal preemption, east/west road closures or restrictions and property acquisition. Alternately, without these measures, even with a dedicated lane, LRT would have to operate at much reduced speeds over most of its route. In this environment, LRT would not improve on the travel speed offered by a bus. In this scenario, the full operating capabilities of LRT could not be realized and the substantial investment could not be justified.

It is acknowledged that Calgary has a number of examples where the CTrain has been successfully integrated with residential and business communities. However, in some of these cases, the LRT rights-of-way were planned as part of the original development (e.g. Memorial Dr. and 36 St. NE). In other communities, integration along short segments of the alignment was possible using mitigation measures and environmental design techniques such as sound barriers, decorative fencing, landscaping, property purchase, etc.

#### Proposed LRT Line in Nose Creek Valley

A review of potential rights of way has found that the Nose Creek valley would offer a routing for a North Central LRT line that would not require considerable community disruption.

The Nose Creek valley runs along the east side of the study area and accommodates two major, regional north / south transportation links - Deerfoot Trail<sup>3</sup> and the Canadian Pacific Railway (CPR) line<sup>4</sup>. South of Beddington Tr. and west of the CPR tracks, land use in the valley is mostly recreational or open space, with some industrial areas. The City of Calgary owns the majority of the land and a right-of-way for LRT could be established with some minor acquisition of industrial lands near McKnight Blvd. Alternately, property could be leased from the CPR from within the existing rail right-of-way.

While the Nose Creek valley affords an opportunity for a continuous north / south LRT alignment it has several limitations:

- The Nose Creek corridor is not central to the service area. Those wishing to travel from the communities south of Beddington Tr via LRT would face considerable out of the way travel at both ends of the journey.
- The valley affords only limited access due to adjacent land use including Deerfoot Trail, and the rail line. As well, at major roadway crossings there are significant elevation changes and steep grades.
- There are only limited opportunities to establish park and ride lots and bus terminals within the valley.

However, the Nose Creek corridor would provide a suitable alignment for LRT designed mainly to serve the 'developing' communities north of Beddington Tr and the 'future communities' that will develop north of Stoney Trail. It is expected that these areas will have a combined population of over 200,000 when Calgary reaches the 1.5 million population horizon at about 2040.

Figure 9 illustrates the proposed North Central LRT alignment. North of Beddington Trail LRT would utilize the right-of-way reserved in the median of Harvest Hills Blvd. A connection can be made to the Nose Creek corridor by passing through the future Aurora Business Park located south of 96 Ave NE. South of 96 Ave, the line would parallel the CPR tracks. The line would connect with Northeast LRT at Memorial Drive just east of the Calgary Zoo station. Northeast LRT and the Deerfoot Tr / Memorial Dr interchange were designed to permit this connection. The North Central and Northeast CTrain service would share the existing LRT track from here into the downtown.

<sup>&</sup>lt;sup>3</sup> Alberta Provincial Highway #2

<sup>&</sup>lt;sup>4</sup> CPR Red Deer subdivision

Three options to connect the proposed North Central LRT line with the downtown have been reviewed. It was concluded that a connection of the North Central line to the Northeast line just east of the Calgary Zoo station is the most feasible, based on minimizing cost (capital and operating) and travel time. The options reviewed and a detailed drawing of this connection are shown in Appendix 2.

A Nose Creek based LRT line would be approximately 21 kilometres in length between the current North Pointe bus terminal and park and ride lot just north of Country Hills Bv and the centre of the downtown. Although this route is longer than a central alignment (i.e. Centre St. N), LRT service, with limited stops and typical LRT operating speeds along the Nose Creek valley could offer a 30 percent travel time improvement compared with a centrally located bus service.

Proposed LRT station locations are shown on Figure 9. These include:

- Stations located approximately every 1.5 to 3 kilometres within the northern communities, including the existing North Pointe bus terminal / park and ride,
- Stations within the Aurora Business Park near 96 Ave including a potential multimodal interchange terminal that would offer connections with a possible high speed rail station and a transit connection to the Calgary International Airport.
- South of Beddington Trail stations are feasible at 64 Ave, 32 Ave and the future Science Centre site south of 8 Ave NE.

A functional planning study is needed to determine the requirements for this route.

As noted above, this LRT line would provide very limited service for the existing communities south of Beddington Tr. There are only limited opportunities to provide access to the line and it would require most transit customers to travel away from their primary direction of travel to reach LRT. Therefore, the area south of Beddington Trail and the Symons Valley area would continue to be served by the existing combination of BRT, mainline and express bus services.

Figure 10 illustrates the general origins and peak hour volumes of transit customers that will be traveling towards the downtown at the 1.25 million population horizon. A bus based solution using BRT, mainline and express buses is proposed to accommodate these trips. As well, Figure 10 shows how the projected peak hour transit passenger demand at the 1.5 million population horizon can be transported using a combination of LRT and buses.



Figure 9... Proposed Nose Creek LRT Alignment



Figure 10...Future Peak Hour Transit Ridership Scenarios

# Conclusion

The population of North Central Calgary is expected to more than double by time Calgary reaches a population of 1.5 million. The most significant growth will occur in the area north of Stoney Tr. Employment growth is also expected, however, the area will continue to be a mostly residential area with the majority of the inhabitants employed in other areas of the city. Weekday transit travel towards the downtown is expected to increase from about 3,700 today to nearly 10,000 in the peak hour.

Planning studies, including the Calgary Transportation Plan indicate a need for a high capacity transit service from the North Central Calgary area to the downtown. Projected transit ridership would support an LRT line; however, a suitable central LRT right-of-way is not feasible within the area south of Beddington Trail.

A BRT service on Centre St, augmented by express and mainline bus services on other major north / south roads is capable of serving the expected transit demand in North Central Calgary for at least the next 20 years. The current BRT will be expanded and improved to provide service during all time periods. Higher capacity articulated buses will be added beginning in 2007.

Beyond the 1.25 million population horizon, an LRT line located within the Harvest Hills Bv median and the Nose Creek valley can accommodate the needs of future growth within the corridor. BRT and other bus services would continue to serve Symons Valley and the communities located south of Beddington Tr

# Recommendations

- 1. That the current BRT service in North Central Calgary be expanded to serve the growing areas north of Beddington Trail and Stoney Trail.
- That a functional planning study be conducted to identify the requirements for a future North-Central LRT line to utilize the Nose Creek valley between Harvest Hills Bv / Beddington Tr and connect to the downtown via the existing Northeast LRT line.

# **APPENDIX 1**

# **Planning Policies for North Central Calgary**

Over the past 20 years, a number of planning studies have been conducted to establish the development framework for this area. These planning documents have consistently made provisions for a centralized, higher capacity transit service in North Central Calgary.

#### Calgary North Policy Report (1981)

The Calgary North Policy Report provides a general framework for future land uses in the area north of Beddington Trail. The plan provides for an LRT line within the right of way of Harvest Hills Blvd, extending north and beyond Stoney Trail. A minimum of three LRT stations is identified within this alignment. The report also indicates that the LRT line would be preceded by an express bus service to the downtown and to other employment centres. The median of Harvest Hills Blvd, north of Beddington Trail has been constructed with sufficient width to accommodate an LRT line. As well, a future transit terminal with a 900-stall park and ride lot has been developed in conjunction with the North Pointe commercial centre, just north of Country Hills Boulevard.

#### Crescent Heights Area Redevelopment Plan (1997)

The Crescent Heights Area Redevelopment Plan identifies and recommends several transit service improvements for the area north of downtown including:

- The need for a Centre Street transit corridor to accommodate increasing numbers of buses serving North Central Calgary. The transit corridor would include bus lanes, bus bays, and queue jumpers to achieve reduced transit travel time.
- The need for pedestrian and transit friendly land uses along the Centre St. transit corridor
- Recognition of 16 Ave. and Centre St. N. as an important transfer point for transit customers
- Recognition of the long term need to determine an alignment for a north LRT service

#### The Calgary Transportation Plan (1995)

The Calgary Transportation Plan (CTP) provides land use and transportation policies to guide the development of Calgary's transportation system. The foundation of the CTP are policies that provide for an increasing role for public transportation, more efficient use of existing infrastructure, and modest construction of new major roadways.

The CTP does not identify any new or expanded north-south roadways for North Central Calgary. Existing facilities, i.e., Deerfoot Trail and major roads such as 14 Street NW, 10 Street NW, Centre Street, Harvest Hills Boulevard, Beddington Trail and Edmonton Trail, will continue to meet travel needs.

The CTP places considerable emphasis on an expanding role for public transportation. The CTP transit network (see Figure 2) includes a central transit corridor that is intended to accommodate express buses from North Central Calgary's developing and future communities to downtown and other employment areas. Feeder bus and mainline routes will continue to provide service to existing and new communities. As well, inner and outer crosstown routes will link communities with suburban employment areas, schools, recreation and commercial facilities.

To increase the attractiveness of transit, the CTP includes policies that call for:

- more extensive and frequent transit service,
- minimizing transit travel times by providing transit vehicle priority in traffic with such measures as traffic signal priority, bus only or bus / carpool lanes, transit only links, traffic signal 'queue jumpers', and optimizing route design,
- minimizing the need to transfer,
- providing a comfortable and safe environment in vehicles, stations, and shelters,
- facilitating access to transit for seniors and persons with disabilities,
- integrating transit with other modes of travel.

#### The Calgary Plan (1998)

The Calgary Plan (Municipal Development Plan) provides policies and direction for Calgary's long term growth. The plan includes policies and strategies on environmental quality, land use, economic development, and transportation. The Calgary Plan incorporates the policies and plans found in the CTP and places them in the context of these development issues, i.e., stronger linkages between land use and transportation, such as:

- Focusing new suburban jobs in mixed-use, higher density centres that work well for pedestrians and transit to improve the jobs/population balance in all areas of the city
- Encouraging appropriate new office development to locate in transit-supportive areas through the amendment of land use classifications and the provision of infrastructure etc.
- Promoting greater land use efficiency and convenience by encouraging new housing close to transit facilities and within mixed-use centres to support transit and pedestrian mobility choices
- Using a range of transit service types such as LRT, express buses, crosstown routes, feeder routes, community shuttles, etc.
- Minimizing transit travel times
- Integrating transit with other modes of travel

#### Inner City Transportation Study (1998)

The Inner City Transportation Study (ICTS) was conducted to address issues related the area immediately adjacent to the downtown. The ICTS recommendations support the principles and policies of the CTP. The ICTS recognizes that transit will require special transit priority measures within the Inner City and on the approaches to the downtown including:

- Bus only / carpool lanes on streets such as Centre Street N. and 10 Street NW, and traffic signal priority for transit at key intersections to improve transit travel times
- Bus only lanes on 5 and 6 Avenues S. in the downtown.
- Widening the Edmonton Trail river crossing for non-auto uses.

#### **Other Planning Studies**

Several earlier, approved planning documents also include references that recognize the need for higher capacity transit service (e.g., LRT) to serve the North Central Calgary area and transit supportive land uses along major roadways. These documents include:

- North Bow Design Brief (1977)
- Calgary North Structure Plan I (1981)
- North Bow Special Study (1979)
- North Hill Area Redevelopment Plan (1998)

# Appendix 2



**Options to Connect North Central LRT to Downtown** 



**Recommended Connection of North Central LRT to Northeast LRT**