

NORTH CENTRAL MOBILITY STUDY





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1.0 Project Overview

1.0 PROJECT OVERVIEW

In June 2020, City Council approved Administration's Green Line recommendation on the updated Stage 1 alignment as well as a series of other recommendations related to the project. Recommendation #6 states that during the Segment 2B functional planning and stakeholder engagement, that Administration would complete a series of plans that included the "Mobility Studies Plan" and report back no later than Q2 2021. The attachments that were included as part of that Council report noted that the Mobility Studies would include:

- A Community Traffic Review and Plan to address changes to the mobility network and which may include additions and modifications to existing community traffic-calming measures; and
- A Network Traffic Review to examine existing traffic patterns, determine which alternate routes will receive more traffic, and develop strategies to manage impacts.

This recommendation has been addressed by Administration through two projects. As part of the Green Line Segment 2B Functional Planning Study, the Crescent Heights Mobility Study reviewed the Crescent Heights area adjacent to the Centre Street N corridor south of 16 Avenue N. The second project, the North Central Mobility Study, is the subject of this attachment. It is a broader network review that is inclusive of a neighbourhood review for the communities generally bound by 16 Avenue N, McKnight Boulevard N, 4 Street N.W. and Edmonton Trail N.E.

1.1 GUIDING PRINCIPLES

The guiding principles that influence these studies are the prioritization of investments that enable city shaping, a prosperous economy, reduction in climate impact, equitable transportation and great communities. These communities are walkable, active and vibrant, and demonstrate urban design excellence, all while meeting a vision for Centre Street N and Harvest Hills Boulevard N as a mobility corridor with enhanced transit service. While this study specifically considers the changes to the network on opening day of Green Line, ultimately, as the LRT extends north along the corridor, this vision will continue to be achieved to a greater degree. The project is also guided by the Calgary Transportation Plan's (CTP) goal of developing an integrated, multi-modal transportation system that supports land use, provides increased mobility choices for citizens, promotes vibrant, connected communities, protects the natural environment, and supports a prosperous and competitive economy. This includes aligning the mode prioritization that is outlined in the CTP for City streets as illustrated below with

CTP Classification	TRANSPORTATION MODES					Example
	Walking	Cycling	Transit	Goods	Autos	
Skeletal Road						Deerfoot Trail
Arterial Street						McKnight Boulevard N
Urban Boulevard						Edmonton Trail NE
Parkway						Memorial Drive
Neighbourhood Boulevard						4 Street NW
Collector						20 Avenue N
Residential Street						1 Street NW

Accommodated with high standards
 Accommodated with variable standards
 Not required, or poor performance is acceptable

the types of improvements that have been recommended.



1.0 Project Overview

1.2 BACKGROUND

Centre Street N has historically served as one of the key routes in and out of downtown Calgary for all modes of travel. While the exact volumes have varied through the years, the corridor has consistently carried over 20,000 transit customers per day, over 20,000 vehicles per day and thousands of pedestrians and cyclists in and out of downtown Calgary. To increase the people moving capacity of Centre Street N, a lane reversal system was put in place to provide three travel lanes into downtown in the morning peak and three travel lanes out of downtown in the evening peak.

1.3 CHANGES IN THE NETWORK?

Stage 1 of Green Line will include a surface running Light Rail Transit (LRT) along Centre Street N south of 16 Avenue N that reduces the road to a single lane in each direction and removes the lane reversal. The North Central Bus Rapid Transit Functional Study (NCBRT Study) has identified improvements to transit service along Centre Street N and Harvest Hills Boulevard N. These proposed changes include the introduction of peak hour bus only lanes along Centre Street N that would also reduce Centre Street N to a single lane of traffic in each direction between 16 Avenue N and 43 Avenue N. Together these changes will help to continue transit mode progression along the corridor in support of the continued expansion of the Green Line to the north and the transformation of mobility in north central Calgary. Ultimately, this will allow the corridor to move significantly more people than it does today.





1.0 Project Overview

1.4 APPROACH & OBJECTIVES

The North Central Mobility Study includes a comprehensive review of north central Calgary's multi-modal transportation network to understand today's conditions and the anticipated conditions on opening day of Green Line Stage 1. The study area extends north from the Bow River to Beddington Trail N, east to Deerfoot Trail and west to 14 Street N.W. and then follows the future NCBRT alignment along Harvest Hills Boulevard N to 160 Avenue N, with a focus on the communities bordering Centre Street N. The study area as illustrated on **Figure 1-1**.

The goals of the study are to:

- Understand the existing conditions for all modes of travel (based on pre-COVID traffic volumes for the vehicular analysis).
- Understand the changes to travel patterns resulting from Green Line LRT Stage 1 and the proposed NCBRT improvements;
- Enhance overall mobility along the Centre Street N and Harvest Hills Boulevard N corridor;
- Protect community livability along the transit corridor by reducing cut-thru traffic; and
- Ensure safe and efficient movement for people walking, wheeling, driving, or taking transit on opening day of Green Line and into the future both on- and off-corridor.

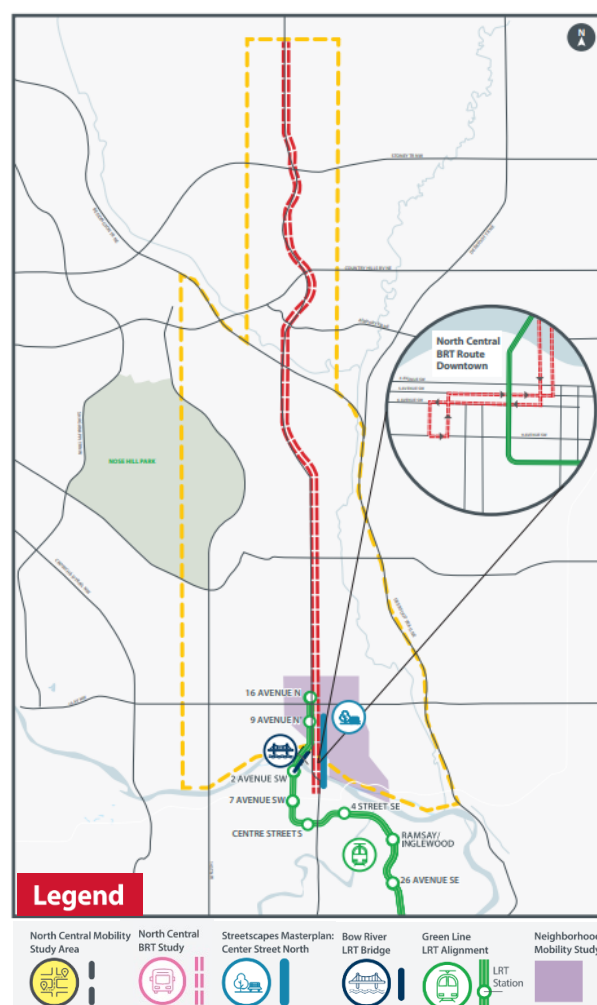


Figure 1-1 Study Area



2.0 Existing Conditions

2.0 EXISTING CONDITIONS

Prior to trying to understand the changes to the transportation network in north central Calgary resulting from the proposed changes to transit along the Centre Street N and Harvest Hills Boulevard N corridors, it was important to establish an understanding of the existing conditions. Understanding challenges in existing network will help understand where changes will be a result of Green Line. This work was broken up into a community traffic review that examined walking and wheeling, collision history and traffic calming, and an existing transit and vehicular operations review.

2.1 NEIGHBOURHOOD REVIEW

2.1.1 Walking and Wheeling Review

The Walking and Wheeling Review focused particularly on the area immediately adjacent to the Centre Street N corridor. A detailed review was conducted in the area referred to as the Community Traffic Review Area bound by 16 Avenue N to the south, McKnight Boulevard N to the north, 4 Street N.W. to the west and Edmonton Trail N.E. to the east. The area south of 16 Avenue N towards the Bow River was a focus of the Crescent Heights mobility work that was conducted as part of the Green Line project. Additional review was conducted along the Centre Street N and Harvest Hills N mobility corridor adjacent to the NCBRT route via the NCBRT Study.

The existing and proposed network for walking and biking was reviewed in terms of collision history, directness, connectivity, and accessibility. Missing connections in existing active transportation facilities were noted (e.g. missing sidewalks, bikeways not meeting 5A Network principles). The noted changes may be related to design or operations (e.g. speed and volume of motor vehicles). Notable locations in the existing network are on 4 Street N.W. between 40 Avenue N and north of McKnight Boulevard N, 40 Avenue N.W./41 Avenue N.E. throughout the study area, and 32 Avenue N.W. from 3 Street N.W. to 6 Street N.E.

2.1.2 Collision History Review

Collision history was reviewed throughout the Community Traffic Review Area and along Edmonton Trail N.E. south of 16 Avenue N, while the portion to the north along the Centre Street N and Harvest Hills Boulevard N corridor was conducted via the NCBRT project. The analysis included a review of crash data from 2010 to 2019. Based on the analyses completed, geometric and operational changes to the network are proposed to prevent collisions and enhance safety.

2.1.3 Existing Traffic Calming Facilities Review

The study area today contains moderate traffic calming measures, which include speed humps, traffic circles, turn restrictions, and curb extensions. Additionally, as part of the Neighbourhood Streets Program, the North Hill Area Project has implemented temporary traffic calming measures on 1 Street N.E., 2 Street N.W. and 24 Avenue N. The measures in this program include temporary diagonal diverters, an expansion of the park at Balmoral Circus, and numerous potential crosswalk improvements and stop sign direction changes. The program has been informed by engagement held over the last six years for Green Line, the North Hill Communities Local Growth



2.0 Existing Conditions

Planning and Main Streets, which all identified a desire to see reduced vehicle volumes and speeds along residential streets parallel to Centre Street N and to provide safe and comfortable walking and cycling routes. Feedback provided to the North Hill Area Project team has been considered in the review of the existing facilities.

2.2 EXISTING TRANSIT REVIEW

Centre Street N is the highest volume corridor for bus traffic and ridership in Calgary. Approximately 800 buses per day travel in and out of downtown Calgary on the Centre Street N corridor, with over 20,000 customers per weekday. A review of the existing transit service was undertaken within the bounds of 40 Avenue N, Edmonton Trail N.E., 10 Street N.W. and the Bow River. Transit services operating within this area are depicted in **Figure 2-1**.

Within the study area, Calgary Transit operates seven (7) conventional local routes, two (2) BRT routes on Centre Street N, five (5) express routes with point-to-point service during weekday peak periods, the MAX Orange North Crosstown BRT route and a community shuttle with localized service within Mount Pleasant and Parkview Village Seniors Housing to Lions Park LRT Station. Existing service frequencies based on pre-COVID 19 service levels were reviewed. Travel times vary on Centre Street N, with the greatest variability occurring during peak travel periods. There is greater consistency of travel time between local and express routes in the PM peak hours. Other corridors within the study area such as 16 Avenue N between SAIT Station and Russet Road Station used by the MAX Orange and Route 19, also showed similar variability in travel time between routes.



Figure 2-1 Existing Transit Service

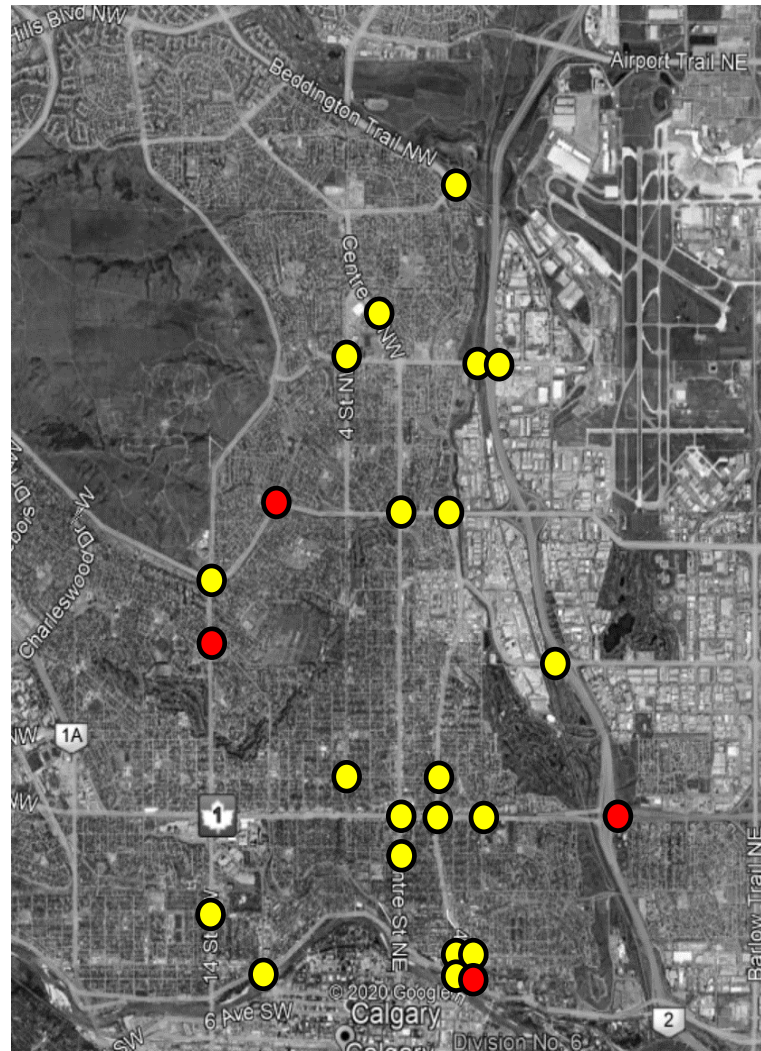


2.0 Existing Conditions

2.3 EXISTING MOBILITY OPERATIONS REVIEW

Since this study was initiated amid the COVID-19 pandemic, travel patterns were not at their typical pre-COVID levels. Therefore, available data from 2019 and earlier was utilized for this study. The major corridors in north central Calgary were analyzed to identify locations with known safety, congestion and delay issues for all users. Based on this analysis, a map of the existing conditions was developed to indicate which intersections could be improved to provide safe and efficient operations for all modes. (see **Figure 2-2**).

This existing conditions' analysis served as a basis for comparison with the operational analysis of the Green Line opening day condition that is discussed in the subsequent sections of this report.



- Intersections with moderate congestion and delays
- Intersections with significant congestion and delays

Figure 2-2 Existing Mobility Operations



3.0 Opening Day Mobility

3.0 OPENING DAY MOBILITY

After reviewing the existing conditions, the study next reviewed the anticipated changes associated with the implementation of Stage 1 of Green Line which will include a surface running Light Rail Transit (LRT) along Centre Street N south of 16 Avenue N that reduces the road to a single lane in each direction. The review also considered the operating conditions with and without dedicated peak hour bus only lanes along Centre Street N (from 16 Avenue N to McKnight Boulevard N) that would also reduce Centre Street N to a single lane of traffic in each direction. For purposes of this review the 2028 data forecasted by the City's Regional Transportation Model (RTM) was used for opening day of Stage 1 of the Green Line.

3.1 REDISTRIBUTION OF TRAFFIC

When Green Line eventually extends north to 160 Avenue N, it will move more people and will support the City's vision to promote sustainable travel modes. In Stage 1, when Green Line terminates south of 16 Avenue N, there will continue to be people that choose to commute by car within the study area. With the reduction of lanes on Centre Street N, people will move to parallel corridors to move in and out of downtown. An analysis has been completed to understand how the traffic will be dispersed onto parallel corridors. The City's RTM model data and a Dynamic Traffic Assignment (DTA) model were used to predict changes in travel patterns in the study area on opening day. Approximately 90 intersections within the study area were evaluated to understand the impacts from the dispersion of traffic. With the reduction of the vehicular capacity to a single travel lane in each direction, Centre Street N will see a significant reduction in traffic volumes, particularly during AM and PM peak periods when it is estimated that up to approximately 1,000 vehicles per hour will be displaced.

The study found that in the absence of more significant improvements to the skeletal roadway network, on opening day a significant number of vehicles currently using Centre Street N during the peak periods will shift to parallel corridors as illustrated on **Figure 3-1** and as identified in the below list:

- Approximately 30-40% diverted to Edmonton Trail N.E.
- Approximately 30-40% diverted to Memorial Drive (East and West of Centre Street N)
- Approximately 15-20% diverted to 14 Street N.W.
- Approximately 10% diverted to 10 Street N.W.

Additionally, beyond the shift of traffic to parallel corridors, there is also the expectation that there will be peak hour spread (or a lengthening of the AM and PM peak periods). The review of redistribution identified streets that will see increased volumes due to the changes proposed along Centre Street N. These streets include 20 Avenue N, 24 Avenue N, 32 Avenue N and Greenview Drive N.E. Each of these streets have been identified for additional traffic calming as will be discussed in a later section of this report.



3.0 Opening Day Mobility

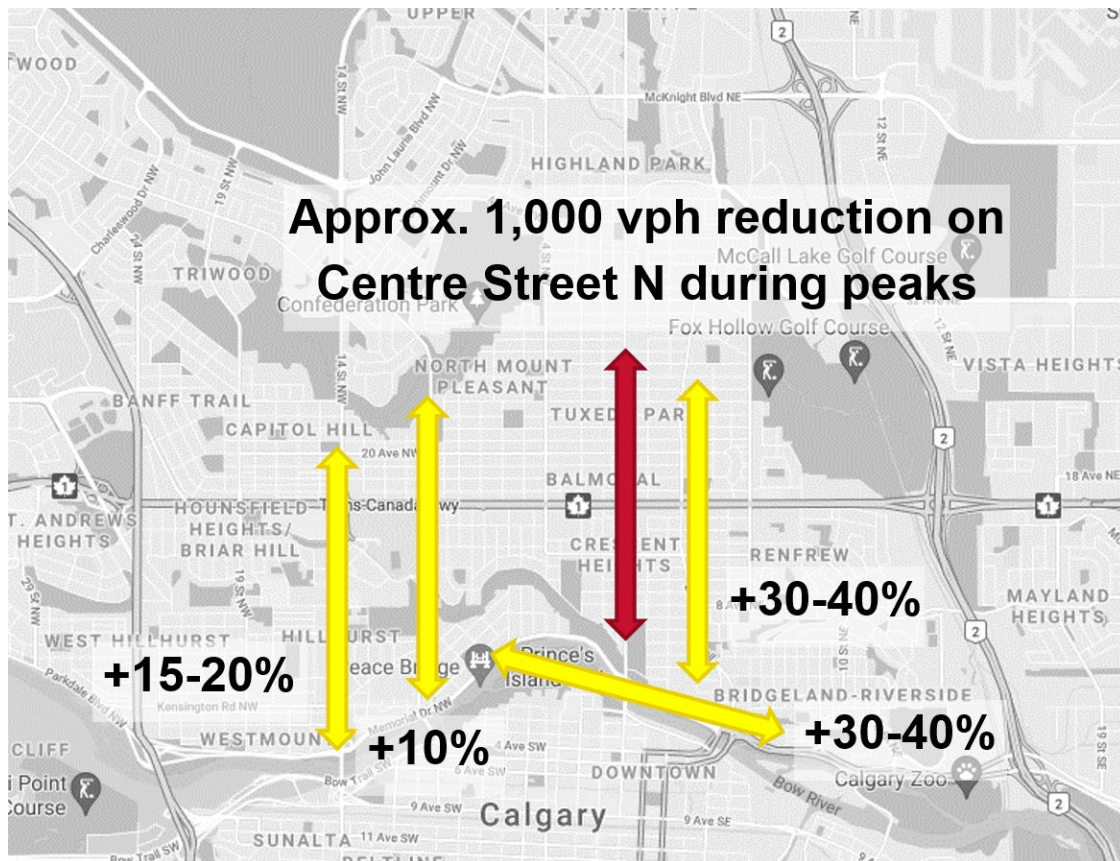


Figure 3-1 Peak Period Redistribution Map



3.0 Opening Day Mobility

3.1.1 Opening Day Mobility Operations

The 2028 opening day of Green Line analysis was split into two parts: the broader network and Centre Street N. The anticipated 2028 opening day volumes with the LRT and BRT improvements in place along Centre Street N were analyzed. The intersections anticipated to experience operational challenges like congestion, queueing of vehicles and delays for all modes are depicted in **Figure 3-2**. This map identifies intersections that will experience moderate to significant congestion and delays following the opening day which guided the identification of medium- and long-term improvements within the study area. Moderate congestion occurs when one peak movement will see consistent delays. Significant congestion occurs when more than one direction of movement will see consistent delays.

3.1.2 Centre Street N / Harvest Hills Boulevard N Corridor

The Centre Street N / Harvest Hills Boulevard N corridor contains a more complex set of operations when considering the interaction between the LRT, buses, traffic and pedestrians. A microscopic simulation model was developed using the PTV VISSIM software package to allow for a lane-by-lane analysis of traffic and transit operations. This analysis considered the North Central Mobility Study, NCBRT and Green Line LRT impacts to the corridor. The following two opening day scenarios were assessed. The first scenario included the LRT south of 16 Avenue N and a modified roadway cross-section between 16 Avenue N and McKnight Boulevard N to include one general purpose lane and one bus-only lane in each direction. The enhanced BRT route, therefore, has its own travel lane for approximately 3.5 km of the overall corridor, shared only with local buses and right-turning vehicles. Additional roadway improvements identified as part of the NCBRT study were also incorporated north of McKnight Boulevard N. The second scenario maintained the existing

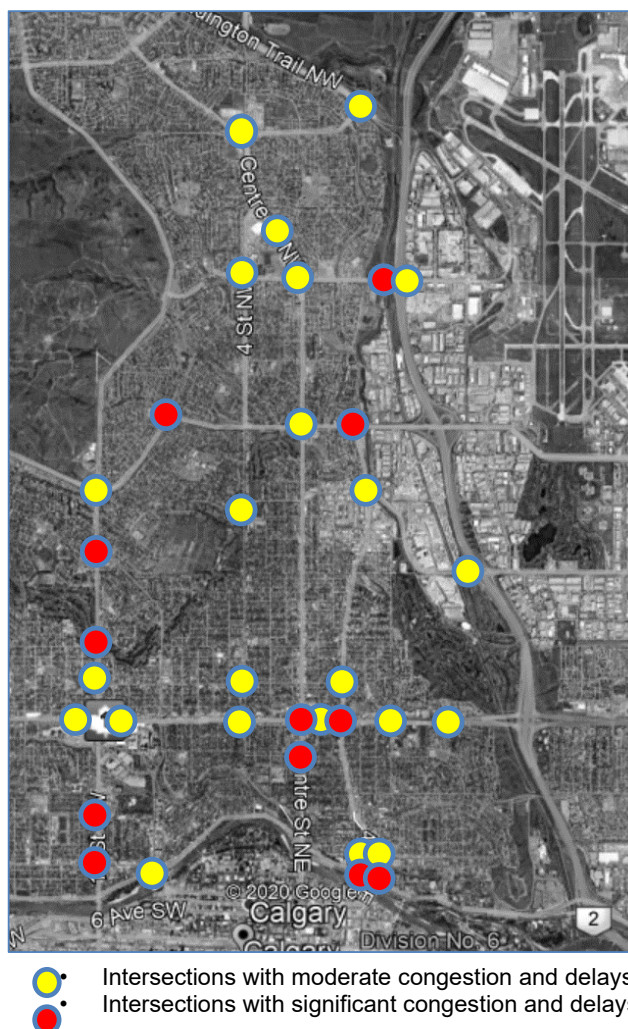


Figure 3-2 Opening Day (2028) Mobility Operations



4.0 Proposed Measures

roadway configuration of two lanes each way between 16 Avenue N and 43 Avenue N. In this scenario, the NCBRT travels in mixed traffic along the entire route to the North Pointe Park and Ride.

Each future year peak period was analyzed to obtain performance metrics. In addition to the operational review, more detailed travel times were also established. Travel times were reported separately for BRT buses and for general traffic. Comparisons were made between the two scenarios for the BRT bus travel time, to quantify what benefit the exclusive lane may accrue to the future BRT operations. Comparisons were also made against the existing conditions results for the roadway improvements north of McKnight Boulevard N to assess their efficacy. Based on the comparison and as expected, the provision of the BRT Lanes north of 16 Avenue N was found to result in a savings of approximately 3 minutes for the BRT versus not providing the peak hour dedicated bus lanes.

4.0 PROPOSED MEASURES

Consistent congestion on major roads will impact community livability. Hence a set of measures are proposed to address walking, wheeling and traffic calming in communities adjacent to the major corridors. A toolkit of operational improvements and network measures are also proposed to provide efficient movement of people and goods.

4.1 NEIGHBOURHOOD MEASURES

As noted in the discussion of the redistribution of traffic, there are anticipated to be changes to traffic patterns within north central Calgary resulting from the introduction of Green Line south of 16 Avenue N and the proposed introduction of peak hour bus lanes along Centre Street N between 16 Avenue N and McKnight Boulevard N. These changes, along with the review of the existing conditions discussed earlier in this report, led to a series of recommendations to enhance multi-modal mobility within the study area. The recommendations concentrate on reducing crash risk, continuing to build and connect the 5A bikeway network, ensuring connectivity for people walking by filling gaps, and implementing additional traffic calming measures. Taken together, the recommendations aim to increase safety for all road users and maintain livability in the area. All recommendations focus on short- and medium-term implementation.



4.0 Proposed Measures

4.1.1 Walking and Wheeling Measures

The City is moving towards the implementation of an Always Available for All Ages and Abilities (5A) network which supports community connections and providing Calgarians of all ages and abilities with safe and accessible year-round opportunities to walk and wheel throughout Calgary. The proposed 5A network identified in the CTP is included in **Appendix A**. The study considered the need to better connect active modes to the Centre Street N corridor both today and in the future as Green Line extends north as well as how the changes in traffic patterns will impact adjacent corridors. While the improvements identified for implementation through this study focus on the area south of McKnight Boulevard N, they are hinged to the continued implementation of the 5A Network throughout North Central Calgary. The proposed walking and wheeling improvements include recommendations to fill gaps in the network and increase the availability of safe crossing locations. Specific recommendations include:

- Building sidewalks where they are currently missing;
- Building shared use pathways and installing neighbourhood greenway features to further connect the 5A network;
- Upgrading sub-standard shared use pathways; and
- Providing enhanced pedestrian crossings at key locations.

The proposed location for each type of improvement is shown on the Proposed Walking and Wheeling Improvements map **Figure 4-1**. Enhanced pedestrian crossings are concentrated along main attraction points such as commercial areas, schools and parks where higher foot traffic is expected. In most locations, and particularly along Centre Street N, an enhanced crossing (current or proposed) will be available at least every second block. Proposed pathways and sidewalks are mostly concentrated in the northern half of the study area where there are gaps in infrastructure for walking and wheeling. In some cases, notably along 40 Avenue N.W. and 41 Avenue N.E., however the study also identified the need to continue to implement sidewalks within the industrial area east of 1 Street N.W. and west of Nose Creek as redevelopment occurs.

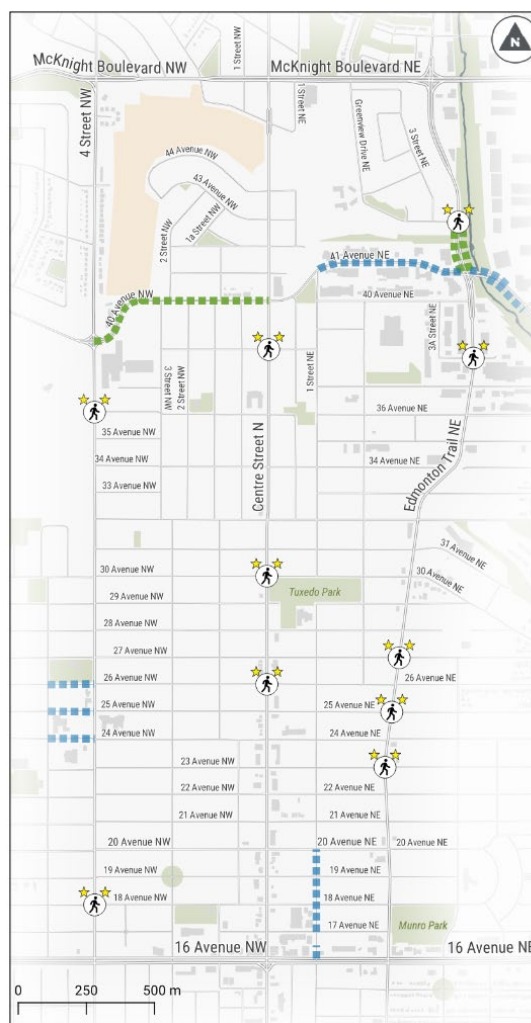
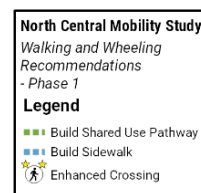


Figure 4-1 Proposed Walking and Wheeling Improvements





4.0 Proposed Measures

4.1.2 Traffic Calming Measures

As noted in the discussion of the redistribution of traffic, there are anticipated to be several changes to traffic patterns within north central Calgary. The modeling work helped to establish streets that were generally anticipated to see increased volumes due to the changes proposed along Centre Street N. These streets include 20 Avenue N, 24 Avenue N, 32 Avenue N and Greenview Drive N.E. Each of these streets have been identified for additional traffic calming.

Two categories of traffic calming measures are recommended for the area: formalizing existing temporary traffic calming and implementing traffic calming along new corridors. As shown in **Figure 4-2**, it is recommended that temporary traffic calming along the 1 Street N.E. and 2/3 Street N.W. corridors be made permanent, following a review of the feedback received which will help refine the final implementation. New traffic calming measures are recommended for corridors where it is anticipated that shortcutting may occur in the future. The objective of the new traffic calming features will be to manage the speed at which vehicles travel on the identified roads while also considering potential future transit needs of the specified corridor.

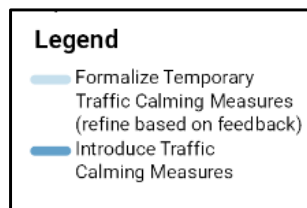


Figure 4-2 Proposed Locations for Traffic Calming



4.0 Proposed Measures

4.1.3 Toolkit of Operational Measures

A series of measures are recommended for intersections with the aim of reducing crash risk and improving operations. The list of proposed measures as well as the benefits of each measure is presented in **Table 4-1** below. An overview of intersections where these measures are recommended is shown in **Figure 4-3**.

Table 4-1 List of multi-modal intersection improvement measures

Proposed Measure	Expected Benefits
Exclusive left turn phase	<ul style="list-style-type: none"> Eliminates left turn conflicts with oncoming traffic
Review signal timings: yellow and all-red intervals	<ul style="list-style-type: none"> Longer clearance intervals reduce conflicts between different traffic movements
New signals	<ul style="list-style-type: none"> Regulates traffic and crossings With adequate spacing, can regulate traffic speeds through green waves Installed when warranted
Leading pedestrian intervals	<ul style="list-style-type: none"> Gives a 3-7s head start to people using crosswalks, increasing their visibility
Intersection cameras (red-light cameras with speed on green capability)	<ul style="list-style-type: none"> Enforces speeding and red light running, reducing the severity and frequency of crashes
Dynamic Signal Warning Flashers (advance warning flashers)	<ul style="list-style-type: none"> Encourages early braking for upcoming red signal Reduces rear-end crashes
Pedestrian Countdown Signals	<ul style="list-style-type: none"> Provides positive guidance to cross Helps people driving estimate the time to red (reduces rear-end crashes)
Corner radius reduction	<ul style="list-style-type: none"> Slows turning vehicles Reduces crossing distance when walking
Curb extensions	<ul style="list-style-type: none"> Increases sight distance and visibility Slows turning vehicles Reduces crossing distance when walking
Hardened centerlines	<ul style="list-style-type: none"> Reduces left turn speed Controls access to driveways mid-block
Redesign/eliminate channelized right turns Introduce smart tighter right turns	<ul style="list-style-type: none"> Reduces turn speed Increases field of view



4.0 Proposed Measures

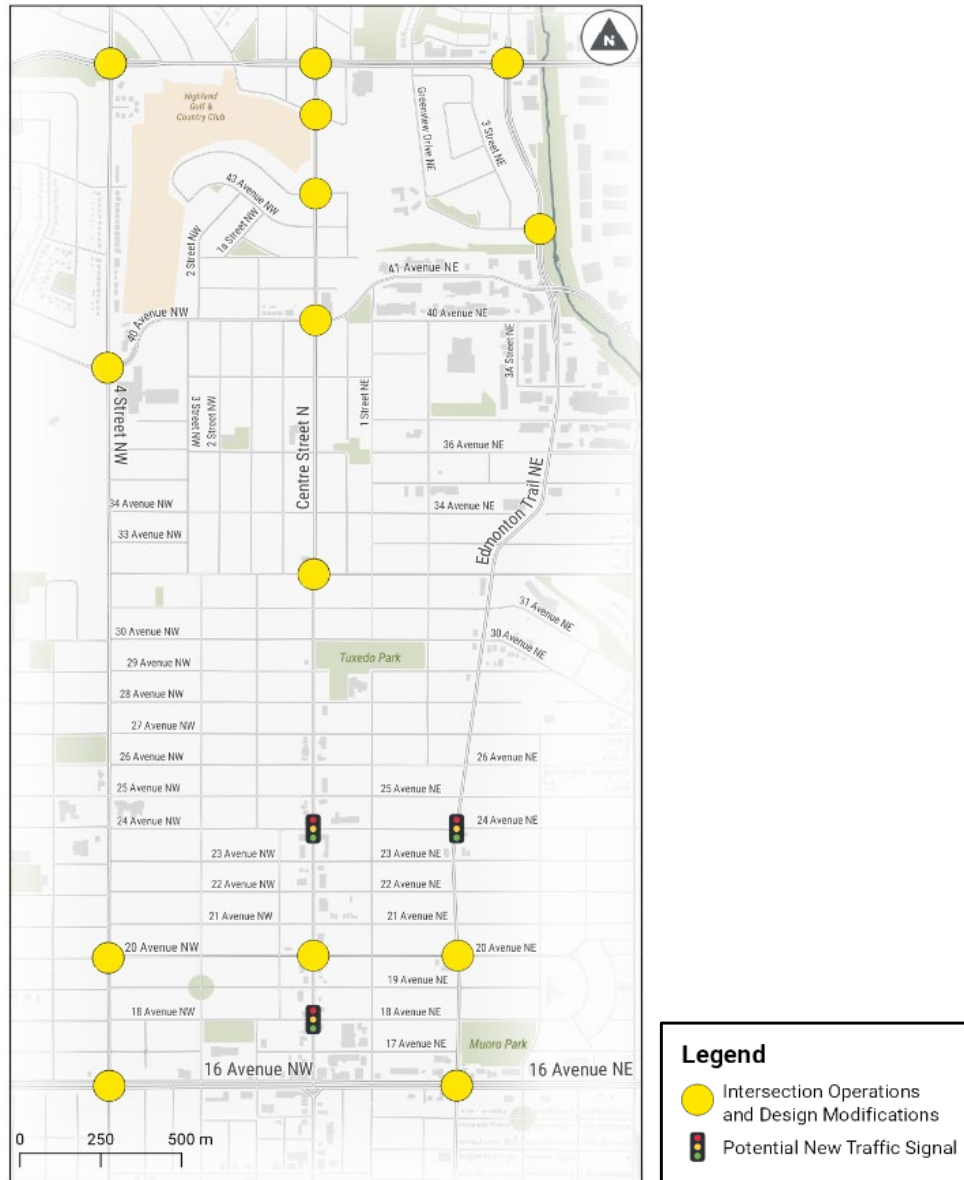


Figure 4-3 Proposed Intersections for Multi-Modal Enhancements



4.0 Proposed Measures

4.1.4 Network Measures

Prior to discussing the proposed network improvements, it is important to note a few of the key observations that were discussed in prior sections of this report. As noted in the discussion of the redistribution of traffic, beyond the shift of traffic to parallel corridors, there is also the expectation that the changes to the network will result in peak hour spread (or a lengthening of the AM and PM peak periods) due to the reduction in the capacity of the roadway network. Therefore, this study is recommending that The City maintain the remainder of the existing connections in and out of downtown. For example, maintaining the vehicular operations on the lower deck of the Centre Street Bridge and the peak hour vehicular capacity of Edmonton Trail N.E., 10 Street N.W. and 14 Street N.W., will be important for maintaining mobility choices in and out of downtown. The proposed medium and long-term measures are shown on **Figure 4-4**.

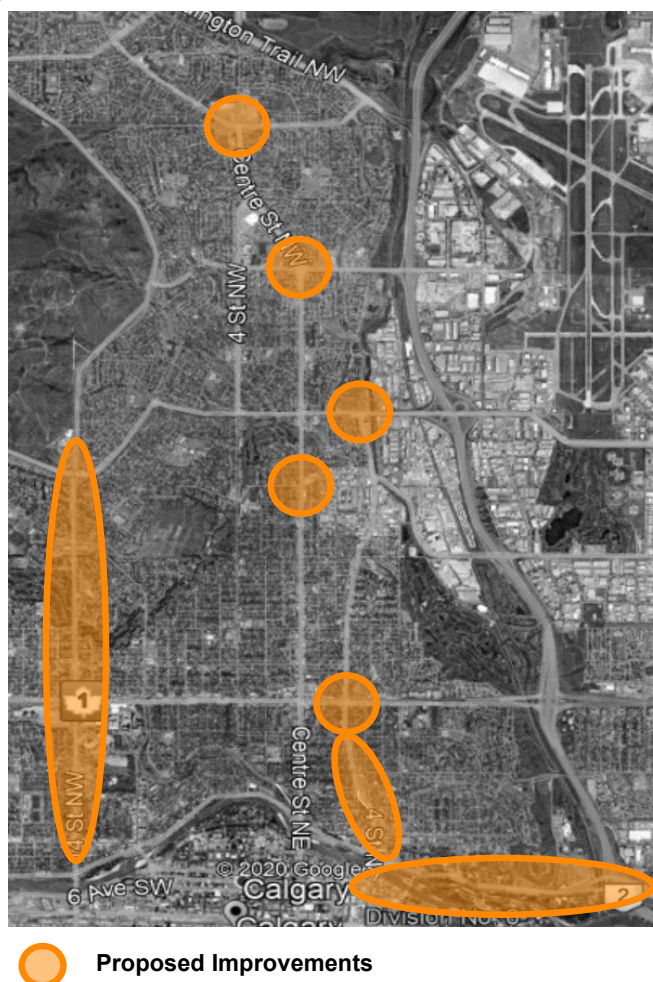


Figure 4-4 Network Measures



4.0 Proposed Measures

4.1.4.1 Medium-Term Recommendations

Corridor – Wide

As noted in the discussion of the opening day analysis, one of the corridor-wide improvements recommended is the optimization of the traffic signal timings. Additionally, due to the significant displacement of traffic to the Edmonton Trail N.E. corridor south of 16 Avenue N, and increase in congestion along 14 Street N.W., corridor-wide reviews for multi-modal enhancements are proposed. Additionally, recognizing that there are major improvements assumed within the study area that may or may not be constructed by the opening day of Green Line as currently assumed, it is recommended that a review of actual traffic volumes be conducted following the opening of Green Line at key intersections to determine if any additional medium-term improvements are required.

16 Avenue N/Edmonton Trail N.E.

The 16 Avenue N and Edmonton Trail N.E. intersection is currently configured with three through lanes in the east-west directions, two through lanes in the north-south direction and a dedicated left turn bay on all legs. On the N.W. and S.E. corners of this intersection, there are existing MAX Orange BRT stops. There is a bus lay-by on the S.W. corner of the intersection, and approximately 100m north of the intersection, there is a bus stop with a bus lay-by adjacent to Munroe Park. Under existing conditions, this location experiences congestion and delays. This intersection will see a significant increase in traffic on opening day, as a result of Green Line operations on Centre Street N and the assumed upgrades to the 16 Avenue N interchanges with Deerfoot Trail, 19 Street N.E. and Barlow Trail N.E. To ease capacity constraints in the peak periods, dedicated northbound and southbound right turn lanes are proposed. While these improvements do not address all the operational challenges anticipated at this intersection, the intent is to help improve the north-south traffic flow through the intersection during peak periods.

Edmonton Trail N.E./McKnight Blvd N.E.

The existing four-legged intersection of McKnight Blvd N.E. and Edmonton Trail N.E., which is approximately 1km west of Deerfoot Trail N, has two through lanes in each direction, with dedicated left turn lanes and channelized right turn lanes on each approach. Approximately 110 metres to the east of this intersection is the Nose Creek crossing and pathway. Under existing conditions, this location experiences moderate congestion. By the opening day horizon, the intersection is anticipated to have significant operational challenges.

While the northbound to eastbound movement at this intersection is not expected to see a significant increase in volume on opening day, it is anticipated that there will be an overall increase in traffic on Edmonton Trail N.E. and McKnight Blvd N.E. therefore, it is proposed that the northbound right turn movement be replaced with a free right turn movement with a dedicated lane to be extended as far south as possible while minimizing property and utility impacts. Given the proximity to Nose Creek and the grades in the area, this improvement would also require expanding the bridge over Nose Creek and reconfiguring the adjacent pathway.

Additional Measures

Other medium-term improvements are proposed through the NCBRT Study including the addition of a northbound and southbound left turn lanes at the intersection of Centre Street N and 40 Avenue N.W. / 41 Avenue N.E.,



4.0 Proposed Measures

lengthening the southbound left turn lane at Centre Street N and 64 Avenue N and monitoring the northbound left turn lane at Centre Street N and Beddington Boulevard N to determine if enhancements are required.

There are several other operational improvements that could be considered to address current (pre-COVID) areas of congestion in the network resulting from traffic displaced from Centre St. Implementation of these measures noted below will help address the changes in traffic patterns identified through this study. These measures include:

- Enhancements to Memorial Drive Eastbound east of the 5 Avenue S.W. flyover to provide four eastbound lanes and improve the flow of traffic from downtown towards Deerfoot Trail.
- Enhancements to Memorial Drive Westbound: between 9 Street N.E. and the 4 Avenue S.W. flyover to provide four westbound lanes between these points and thus improving the flow of traffic from Deerfoot Trail towards downtown.
- 14 Street W bridge: a lane realignment to enhance movement from eastbound Memorial Drive N.W. onto southbound 14 Street W to improve the flow of traffic into downtown.
- Review of existing bridges to provide cost-effective measures and enhance connections to and from downtown

4.1.4.2 Long-Term Measures

Connection between downtown and Deerfoot Trail

One of the key observations from the review of the modeling scenarios was that traffic disperses onto several of the parallel north-south routes because of capacity constraints between downtown and Deerfoot Trail N along Memorial Drive N.E. There is an opportunity to improve the connection for vehicles between downtown and Deerfoot Trail N via Memorial Drive N.E. These improvements would need to be linked closely to any future improvements that are implemented from the recently completed Deerfoot Trail corridor study that was a collaborative effort between the City of Calgary and Alberta Transportation.

In the medium-term improvements, the existing configuration of the bridges across the Bow River in and out of downtown have been assumed to be maintained at their existing width. However, in the long-term, consideration should be given to maximize the utilization of existing infrastructure and if feasible adding capacity to the existing bridge structures to improve connections in and out of downtown for all modes of travel.

4.2 IMPLEMENTATION PLAN

The measures identified in the sections above are listed in **Table 4-2** below with a recommended timeline for implementation. The improvements have been categorized into short (0-5 years), medium (5-10 years) and long (10+ years) term investments based on their alignment with Green Line Stage 1 operations. High level Opinions of Probable Cost (OPCs) Estimates (Class 5) were developed for each of the short and medium-term recommendations identified through this study will require approximately \$15 million in additional funding to implement. The costing includes 30% contingency, internal City costs and engineering costs of 22% and excludes GST.



4.0 Proposed Measures

Table 4-2 Implementation Plan

Area	Type of Improvement	Proposed Improvements	Location(s)	Timeline	OPC
4 Street N.W., Centre Street N & Edmonton Trail N.W. Corridors	Walking & Wheeling	Enhanced Pedestrian Crossing Control	16 Intersections as identified on the mapping	Short-Term	\$7.0 M
4 Street N.W.		Upgrade the existing pathway to a 3m wide smooth surface pathway	40 Avenue N.W. to McKnight Boulevard N.W.	Medium/Long-Term	
4 Street N.W.		Shared use pathway on east side of 4 Street N.W. and create greenway on 36 Avenue N.W.	40 Avenue N.W. to 36 Avenue N.W.	Short-Term	
West of 4 Street N.W.		Build Sidewalk	24, 25, 26 Avenue N.W.	Short-Term	
Edmonton Trail N.E.		Add pedestrian countdown signals	20 Avenue N.E.	Short-Term	
Edmonton Trail N.E.		Shared use pathway on east side (full) west side (partial)	41 Avenue N.E. to McKnight Boulevard N.E.	Medium-Term	
40 Avenue N.W.		Shared use pathway on south side	4 Street N.W. to Centre Street N	Medium Term	
41 Avenue N.E.		Build sidewalk	1 Street N.E. to Edmonton Trail N.E.	Medium-Term	
32 Avenue Connector N.E.		Build sidewalks on both sides	Edmonton Trail N.E. to 6 Street N.E.	Medium/Long-Term	
1 Street NE & 2/3 Street N.W.	Traffic Calming	Formalized temporary traffic calming measures (revised based on feedback)	16 Avenue N to 40/41 Avenue N	Short-Term	\$0.7 M
20, 24 & 32 Avenues N		Introduce Traffic Calming Measures	4 Street N.W. to Edmonton Trail N.E.	Medium-Term	
Greenvue Drive N.E.		Introduce Traffic Calming Measures	McKnight Boulevard N.E. to Edmonton Trail N.E.	Medium-Term	
4 St N.W., Centre St N & Edmonton Trail N.W. Corridors	Multi-Modal Mobility	Intersection Operations and Design Modifications	14 Intersections	Short-Term	\$2.9 M
Centre St N.W. & Edmonton Trail N.W. Corridors		Introduce new traffic signals	3 Intersections	Short-Term	
Edmonton Trail N.E., Centre Street N (lower deck), 10 Street N.W., 14 Street N.W.	Network Improvements	Maintain existing peak hour lane configurations prior to the northerly expansion of Green Line.	Area Wide	Short-Term	\$4.4 M
14 Street N.W. and Edmonton Trail N.E.		Corridor Reviews for multi-modal enhancements	Bow River north to John Laurie Boulevard N.W. (14 Street N.W.) and to 16 Avenue N.E. (Edmonton Trail N.E.)	Medium-Term	
Area Wide		Optimize Traffic Signal Timings	Area-Wide	Medium-Term	
Edmonton Trail N.E.		Add right-turn lanes	Northbound and southbound at 16 Avenue N.E. and northbound at McKnight Boulevard N.E.	Medium-Term	
Memorial Drive N.E.		Improve connection between downtown and Deerfoot Trail	4 Street/Avenue N.E. to Deerfoot Trail	Long-Term	TBD
Bridges across Bow River		Improved connections for all modes.	Bridges in and out of downtown.	Long-Term	



5.0 COMMUNICATIONS AND ENGAGEMENT

The North Central Mobility Study was conducted as part of the Green Line Segment 2 functional planning and in coordination with the NCBRT Study. As part of Green Line's segment 2 functional planning, the project team completed an integrated communications and engagement program that provided the opportunity for citizens to participate in meaningful engagement.

Engagement and communications occurred from October 2020 through to April 2021 over two phases of engagement and one phase of information sharing. Throughout the project, residents and Calgarians at-large, community associations, business improvement areas, local business owners, special interest groups and ward offices were engaged.

First phase of engagement included listening to Calgarians and exploring their perspectives on opportunities and challenges related to mobility and connections in the north central study area. The feedback from the first phase was used to inform initial concepts and improvements, which were presented back to the community for two rounds of evaluation in the second phase of engagement. The final phase included information sharing, reporting back on how community input has informed the recommendations and sharing the project recommendations with the citizens.

A variety of engagement and communications tactics were employed including online surveys, virtual workshops, meetings and presentations, digital web-based open houses, in-community sounding boards, postcards, signage, social media and email newsletters. Efforts included ensuring that the approach was meaningful, inclusive and removed barriers to participation, examples including but not limited to; the use of plain language and descriptive materials for those with low-vision, translated materials in simplified and traditional Chinese, the use of 311 for feedback and the piloting of new digital based tools to improve user experience.

For the North Central Mobility study, 29 public sessions and stakeholder meetings, 6 online surveys were hosted. In total over 60,000 people were made aware of the project through communications campaigns, that helped connect with over 11,000 participants through our engagement opportunities (online portal and sessions) and received over 750 ideas and contributions across all phases.

High-level themes heard from the public through engagement included:

- Concern around traffic flow and congestion on multiple routes
- Desire for better traffic calming
- Desire for traffic operations improvements with priority on specific corridors in the study area
- Desire to improve mobility for all modes of travel
- Desire for better walking and biking connections.

The input received through engagement has been used to inform and refine the recommended improvements and next steps outlined in this document.



6.0 NEXT STEPS

Upon acceptance of the proposed network improvements, functional planning will need to be advanced to further refine the design and costing.

After opening day of the Green Line there may be additional changes to the broader transportation network or traffic patterns may change post-COVID which may result in additional mitigation measures being required. Therefore, we are also recommending that a review of the actual traffic volumes be carried out after opening day of Green Line.

The City is moving towards the implementation of an Always Available for All Ages and Abilities (5A) network which supports community connections and providing Calgarians of all ages and abilities with safe and accessible year-round opportunities to walk and wheel throughout Calgary. As this study was under development, the 5A network was approved as part of the update to the CTP. As noted earlier in this report, we have identified several improvements that are part of that 5A network for implementation as a result of this study. However, we have also identified the need to develop an implementation strategy for the 5A network within north central Calgary so that the implementation can address how the networks is achieved and aligns with the continued northerly extension of Green Line.

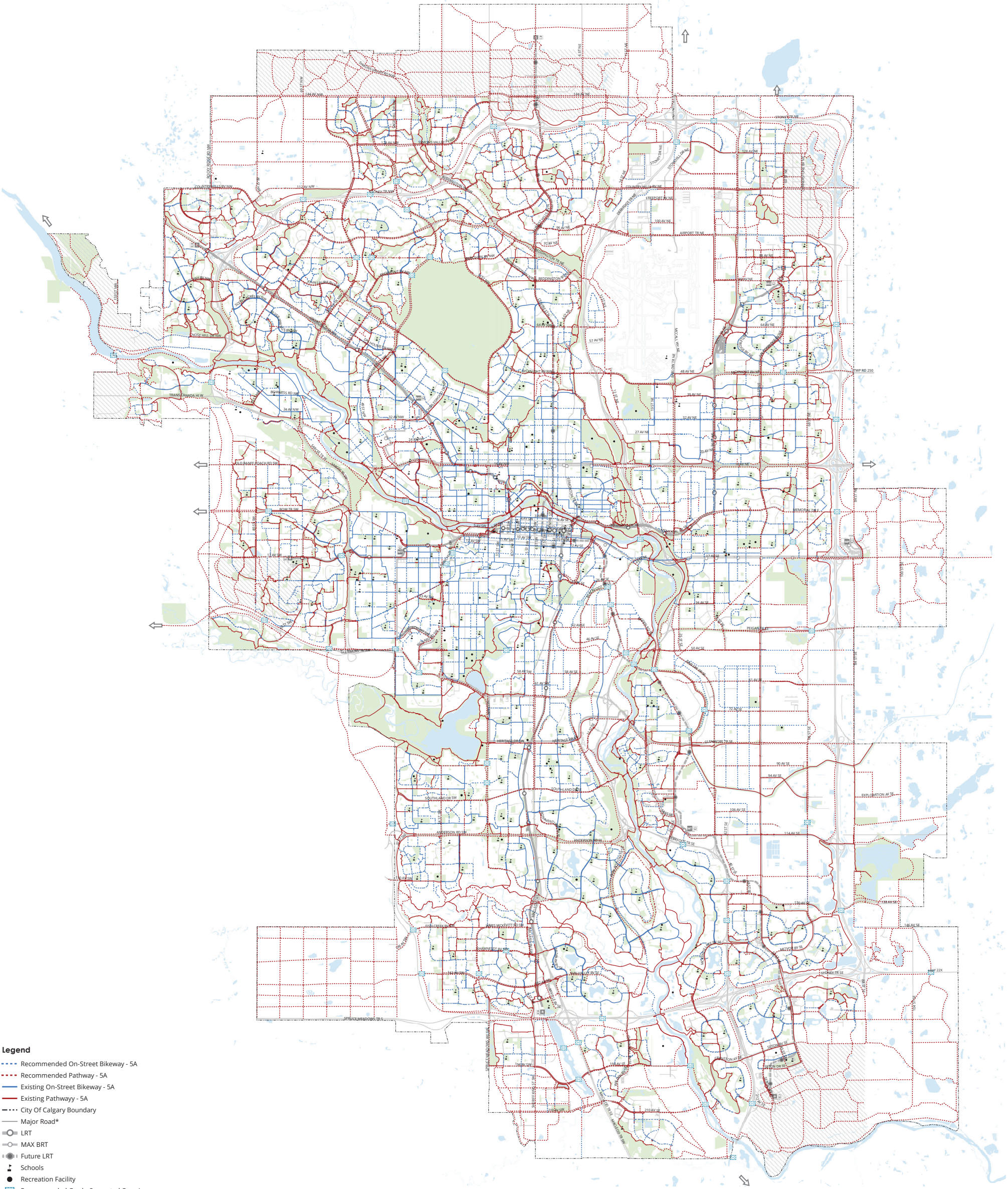


Appendix A 5A NETWORK MAP



Proposed Pathway and Bikeway Implementation Network

City wide 5A Network



- Legend**
- Recommended On-Street Bikeway - 5A
 - Recommended Pathway - 5A
 - Existing On-Street Bikeway - 5A
 - Existing Pathway - 5A
 - City Of Calgary Boundary
 - Major Road*
 - LRT
 - MAX BRT
 - Future LRT
 - Schools
 - Recreation Facility
 - Recommended Grade-Separated Crossing
 - Current ASP

*Skeletal Road, Arterial Road, Industrial Road, or Urban Boulevard.
This map indicates the future planned built out and includes existing, retrofit and future facilities.
Local context will dictate specific treatment.

