ATTACHMENT 1

Existing Conditions Report

Bus Rapid and Conventional Transit Planning and Design Services

City of Saskatoon

November 2017

Project Team

HDR Corporation

Dillon Consulting

CIMA+

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Acronyms

Abbreviation	Complete Terminology
AADT	Annual Average Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ATP	Active Transportation Plan
AV	Automated Vehicle
BRT	Bus Rapid Transit
CHS	Children's Hospital of Saskatchewan
CNR	Canadian National Railway
COS	City of Saskatoon
CPR	Canadian Pacific Railway
EB(T/R/L)	Eastbound Through/Right/Left
GIS	Geographical Information System
GPS	Global Positioning System
HOV	High Occupancy Vehicle
HCM	Highway Capacity Manual
ITS	Intelligent Transportation Systems
LOS	Level of Service
MD	Midday
NB(T/R/L)	Northbound Through/Right/Left
PDO	Property Damage Only
ROW	Right-of-Way
RSA	Road Safety Audit
RUH	Royal University Hospital
SB(T/R/L)	Southbound Through/Right/Left
SC	Suburban Centre
SDA	Suburban Development Area
ST	Saskatoon Transit
TAC	Transportation Association of Canada
TAIS	Traffic Accident Information System
TOD	Transit Oriented Development
TSP	Transit Signal Priority
U of S	University of Saskatchewan
v/c	Volume to Capacity ratio
vphpl	vehicles per hour per lane
WB(T/R/L)	Westbound Through/Right/Left

1 Introduction

The City of Saskatoon is conducting a study to develop two bus rapid transit (BRT) routes and reconfigure the conventional transit network to align with the BRT routes. HDR was retained to conduct the functional plan and detailed design of the Red Line and Blue Line BRT corridors as well as BRT Station Design; a Reconfiguration of the Saskatoon Transit route network; a Park and Ride Study and Concept Design; an Intelligent Transportation System (ITS) Industry Scan; and an Implementation Plan.

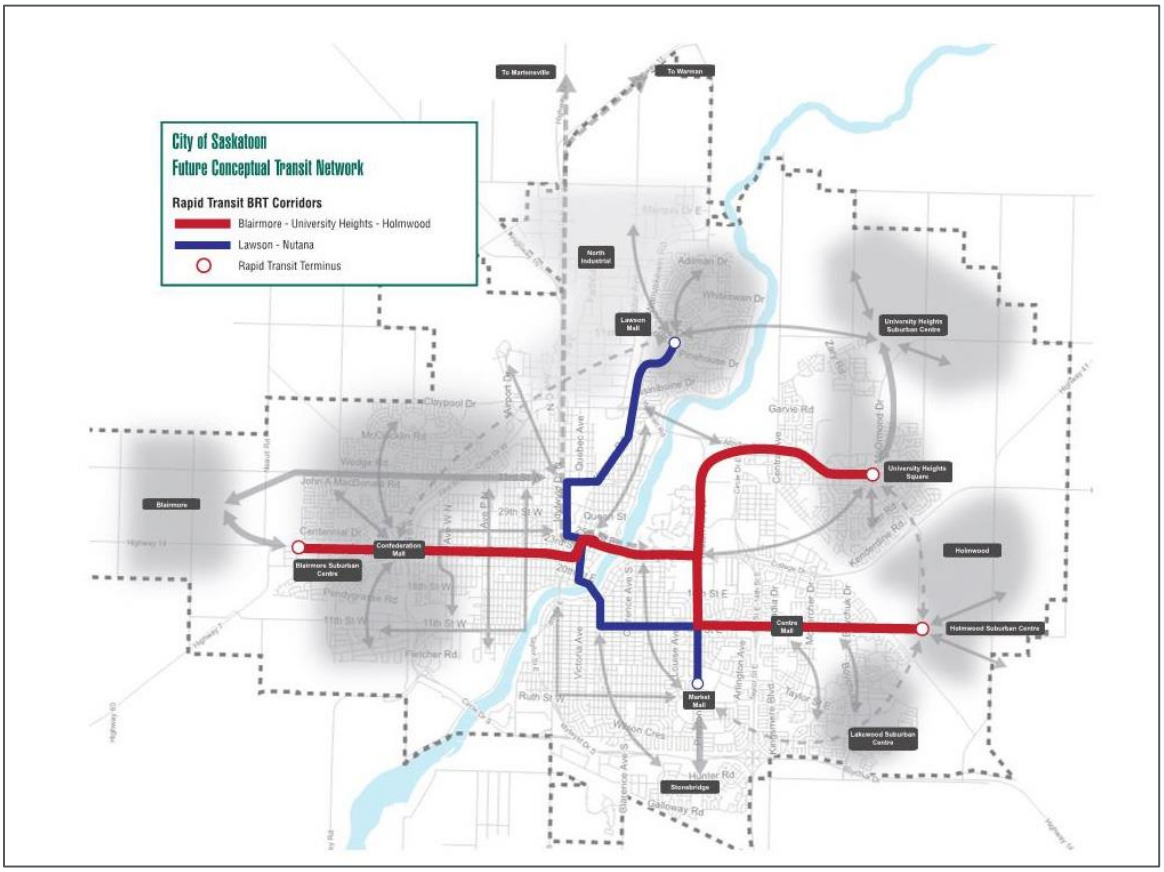
This Existing Conditions Report documents the Existing Conditions Assessment task of the City of Saskatoon's Bus Rapid and Conventional Transit Planning and Design Services Project. The report includes a summary of the existing conditions along the Red and Blue BRT corridors including:

- Preliminary routes
- Station locations
- Land use adjacent to the corridors
- Roadway geometry
- Transit network
- Corridor travel times
- Traffic conditions
- Existing traffic signal conditions
- Active transportation facilities
- Stage 1 Road Safety Audit

The report provides a foundation for the subsequent Functional Plan, Detailed Design and Implementation Plan.

The Red and Blue Line corridors are illustrated in **Figure 1-1**.

Figure 1-1: Proposed Red Line and Blue Line BRT Routes in Growth Plan



Source: Growth Plan to Half a Million, Technical Report, 2016

1.1 Project Background

The population of Saskatoon (246,376[1]) is predicted to approximately double to 500,000 within 30 years with a projected annual growth rate of 2.5%[2]. About 125,000 housing starts are expected with an even split between greenfield and infill development. If existing trends continue, i.e., a "business as usual" scenario, vehicle trips are expected to increase by 220% and travel times could increase by up to 300% for all vehicles, with severe congestion on all of the City's bridges.

The City's *Growth Plan to Half a Million* has two strategic goals:

- To ensure balanced growth between old and new neighbourhoods; and
- To improve city-wide connectivity by providing alternate travel modes to the automobile.

Core strategies highlighted by the Growth Plan include intensifying land use on major corridors, providing an efficient transit system with rapid transit and ensuring connectivity between the different sections of the city.

[1] 2016 Census of Canada
[2] Growth Plan Technical Report, 2016, Urban Systems Ltd.

The transit strategy consists of two components:

- The development of rapid transit in the form of two BRT lines; and
- A reconfiguration of the existing transit network to improve connectivity and support future population growth.

Introduction of BRT will support all core strategies as BRT will support growth along corridors and at transit villages, ease congestion at major bridge crossings and increase connectivity between major destinations.

A number of components will complement the BRT lines and transit network reconfiguration, including a Park and Ride study, an Intelligent Transportation Systems (ITS) study, and integration of BRT with Growth Corridors and Transit Villages. There is also a separate study on the feasibility of relocating or grade separating railways within the City, which may have an effect on the BRT lines.

1.2 References

Several relevant documents and standards were reviewed and referenced in the assessment of existing conditions as follows:

City-Wide Plans

- Saskatoon Transit 2015 Annual Report (September 2016), City of Saskatoon
- Active Transportation Plan (May 2016), Urban Systems Ltd.
- Growth Plan Summary (April 2016), Urban Systems Ltd.
- Growth Plan Technical Report (February 2016), Urban Systems Ltd.
- Employment Areas Study (March 2016), City of Saskatoon
- Saskatoon Transit Five Year Plan 2016 - 2020 (September 2015), Saskatoon Transit
- Official Community Plan Bylaw No. 8769 (January 2014), City of Saskatoon

Sector and Area Plans

- University Heights Sector Plan (August 2013), City of Saskatoon
- North Downtown Master Plan (March 2013), Perkin and Wills
- Holmwood Sector Plan (February 2012), City of Saskatoon
- Blairmore Sector Plan (September 2010), City of Saskatoon
- College Quarter Master Plan (January 2010), University of Saskatchewan
- Vision 2057: University Land Use Planning (October 2009), Brook McIlroy Inc.

Standards and Guidelines

- Complete Streets Design and Policy Guide (September 2017), City of Saskatoon
- Design and Development Standards Manual (January 2017), City of Saskatoon
- Geometric Design Guide for Canadian Roads (1999/2017), TAC
- Roadside Design Guide (October 2011), American Association of State Highway Officials (AASHTO)
- Canadian Road Safety Audit Guide (2001), Transportation Association of Canada (TAC)
- Highway Capacity Manual (2010), Transportation Research Board

2 Preliminary BRT Routes

This section presents the preliminary BRT routes to provide context for the description of the existing conditions. As presented in the City of Saskatoon's *Growth Plan to Half a Million*, two preliminary BRT lines are proposed.

The Red Line spans 22km from Betts Avenue in the west, through downtown and the University of Saskatchewan (U of S) to College Drive & Preston Avenue in the east, where it splits into two branches:

- Red Line North, heading northeast to University Heights Suburban Centre (SC); and
- Red Line South, heading southeast to the future Holmwood SC.

The Blue Line spans 12km from Pinehouse Drive in the north, through downtown to Market Mall in the south.

For the purpose of this report, the direction of travel along the Red and Blue Line BRT corridors will be referred as follows:

- Red Line BRT:
  - "eastbound" or "northbound" in the direction of travel from Betts Station to Preston/College Station and to University Heights Station
  - "westbound" or "southbound" in the direction of travel from University Heights Station to Preston/College Station and to Betts Station
  - "eastbound" or "southbound" in the direction of travel from Preston/College Station to McOrmond Station
  - "westbound" or "northbound" in the direction of travel from McOrmond Station to Preston/College Station
- Blue Line BRT:
  - "southbound", "eastbound" or "westbound" in the direction of travel from Pinehouse Drive to Market Mall
  - "northbound", "eastbound" or "westbound" in the direction of travel from Market Mall to Pinehouse Drive

2.1 Preliminary Routes, Segments and Station Locations

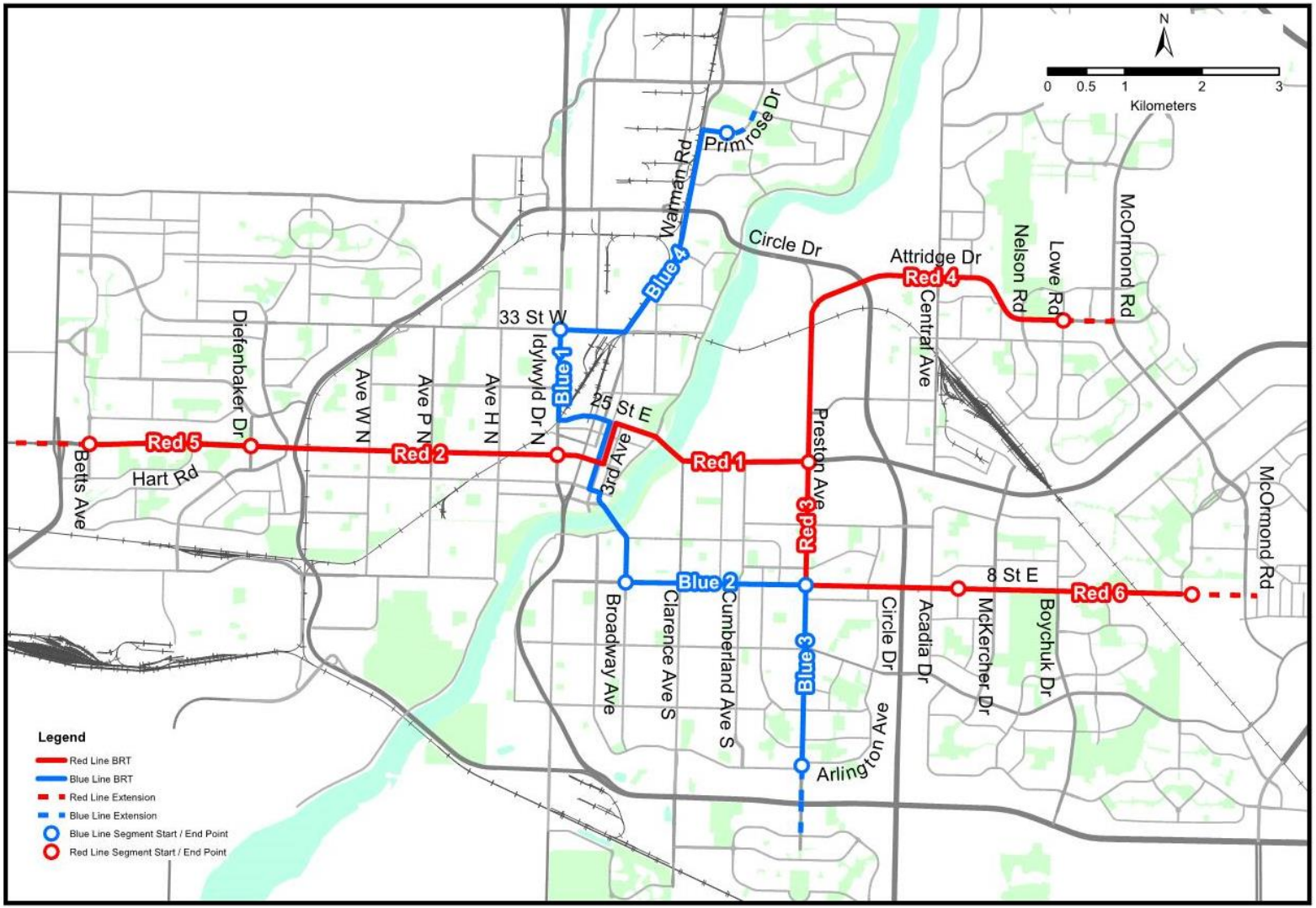
Preliminary routes and station locations have been identified by the City as shown in **Figure 1-1**. This study has identified alternative route and station options that will be assessed in later project stages.

The BRT corridors are divided into segments for planning purposes. The segments are shown in **Table 2-1** and illustrated in **Figure 2-1**.

Table 2-1: Planning Segments for BRT Corridors

Segment	From Intersection	To Intersection
Red 1	22nd St & Idylwyld Dr	College Dr & Preston Ave N
Red 2	22nd St & Idylwyld Dr	22nd St & Diefenbaker Dr
Red 3	College Dr & Preston Ave N	8th St & Centre Mall Entrance (east of Acadia Dr)
Red 4	College Dr & Preston Ave N	Northeast End (Willowgrove Blvd and McOrmond Dr)
Red 5	22nd St & Diefenbaker Dr	West End (22nd St & Betts Ave)
Red 6	8th St & Centre Mall Entrance (east of Acadia Dr)	Southeast End (8th St & McOrmond Rd)
Blue 1	Idylwyld Dr & 33rd St	Broadway Ave & 8th St
Blue 2	Broadway Ave & 8th St	8th St & Preston Ave
Blue 3	8th St & Preston Ave	South End (Market Mall)
Blue 4	Idylwyld Dr & 33rd St	North End (Primrose Dr & Pinehouse Dr)

Figure 2-1: BRT Corridor Segments



The segmentation allows for ease of planning and analysis. They represent approximate limits and will be modified for design. For example, specific improvements will be carried through an intersection even if the intersection is the start or end of a segment.

2.1.1 Red Line Station Locations

The 25 preliminary stations and the station spacing are listed in **Table 2-2**. The average station spacing along this corridor is 0.9 km. The specific station locations will be reviewed and refined as necessary through the functional planning stage of the study.

Table 2-2: Red Line Preliminary Station Locations and Spacing

Station Location	Station Spacing (km)
Betts	-
Shaw Centre	0.9
Confederation	1.7
Ave W	1.1
Ave P	0.8
Ave H	0.9
Ave D	0.4
Idylwyld	0.3
Central Downtown	0.6
North Downtown	0.5
Kinsmen	0.4
West Campus/Hospital	0.9
Cumberland	0.6
Preston/College	0.8
Red Line North	
108th St	0.6
Preston Crossing	1.7
Central	1.4
Nelson	1.3
University Heights	1.2
Red Line South	
14th St	0.8
Preston/8th St	0.8
Arlington	0.8
Acadia	0.8
McKercher	0.8
McOrmond	2.4
Total Route Length	**22.5**

2.1.2 Blue Line Station Locations

Potential station locations were not identified for the preliminary Blue Line BRT route.

2.2 Preliminary Route Alternatives

Two alternate route options were considered in the Growth Plan, but were ultimately not recommended. One option was for both BRT lines to use 1st Avenue through Downtown between 25th Street and 19th Street, while the other option was for the Red Line to continue

east on College Drive from Preston Avenue to Central Avenue, north on Central Avenue to 115th Street, east on 115th Street to Kenderdine Road, then to University Heights SC.

1st Avenue through Downtown
The 3rd Avenue corridor was preferred over 1st Avenue as the north-south connection between 22nd Street and 25th Street within Downtown. The 3rd Avenue corridor is within walking distance of more residents and employment areas than 1st Avenue. It was also determined that 1st Avenue would experience slightly more traffic disruption if the BRT routed along 1st Avenue.

College Drive, Central Avenue and 115th Street E
A route using Central Avenue, 115th Street and Kenderdine Road was considered as a route to the University, but ultimately not selected as the preferred route. Both Central Avenue, 115th Street and Kenderdine Road are two lane roadways with narrow ROWs while Preston Avenue and Attridge Drive are four lane roadways with wide medians. The preferred routing has greater potential to create transit priority opportunities and attract greater ridership.

3 Land Use and Development

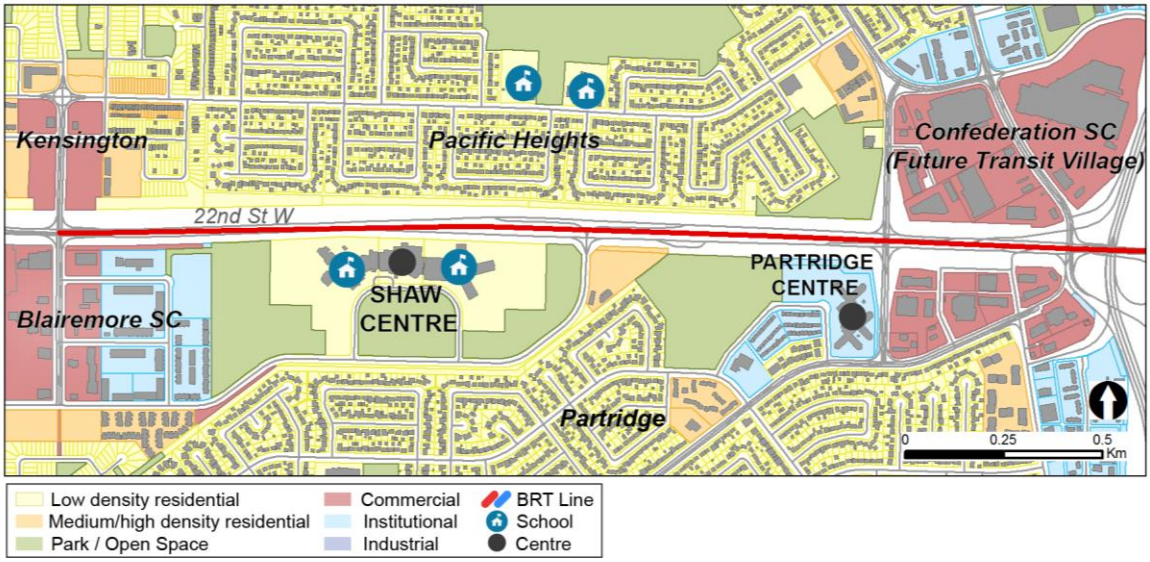
The Red and Blue BRT corridors span considerable portions of the City and cross a multitude of land uses. This section describes the general land use and key developments along the BRT corridors, the Growth Corridors and the proposed and future Transit Village locations.

3.1 Red Line BRT – Existing Land Use and Development

In general, the Red Line BRT crosses retail and commercial land uses with major institutional facilities at key locations. Retail and commercial land uses can be found in central segments of the corridor along 22nd Street, 8th Street and Downtown, while major institutional facilities are located centrally in the City, near or in Downtown, and along College Drive. A number of medium- to high-density residential developments, as well as single-family residential areas front Preston Avenue.

The land uses within approximately 400m of the corridor are described in the following subsections.

22nd Street West of Circle Drive



Neighbourhoods:

- Blairmore SC
- Confederation SC (including Transit Village)
- Kensington
- Pacific Heights
- Parkridge

Schools:

- Tommy Douglas Collegiate (grades 9-12)
- Bethlehem Catholic High School (grades 9-12)
- Lester B. Pearson (grades K-8)
- Father Vachon (grades K-8)

Future Transit Villages:

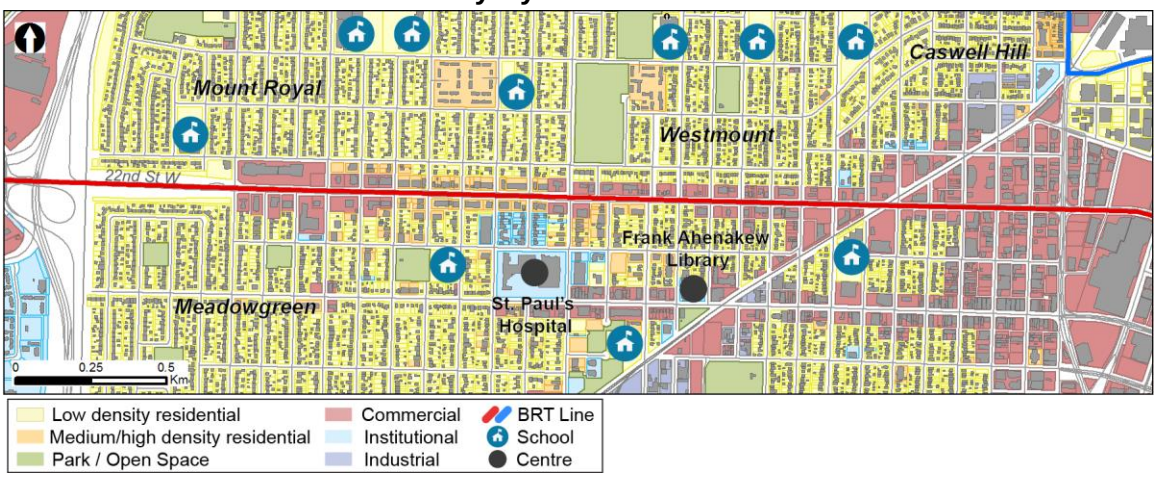
- Blairmore (potential with future BRT extension west of Highway 7)
- Confederation

Other Key Activity Centres:

- Shaw Centre (recreation facility)
- Parkridge Centre Special Care Home
- Confederation Mall

There is no direct property frontage on this section of 22nd Street West. At the west end of this section, new suburban development includes a combination of retail commercial and multi-family dwellings. Moving east, the area north of 22nd Street West is characterized by single family dwellings, while the area to the south is primarily recreational and institutional. Near the junction with Circle Drive, the adjacent land uses are mostly retail commercial.

22nd Street East of Circle Drive to Idylwyld Drive



Neighbourhoods:

- Mount Royal
- Westmount
- Caswell Hill
- Meadowgreen
- Pleasant Hill
- Riversdale

Future Transit Villages:

- None

Other Key Activity Centres:

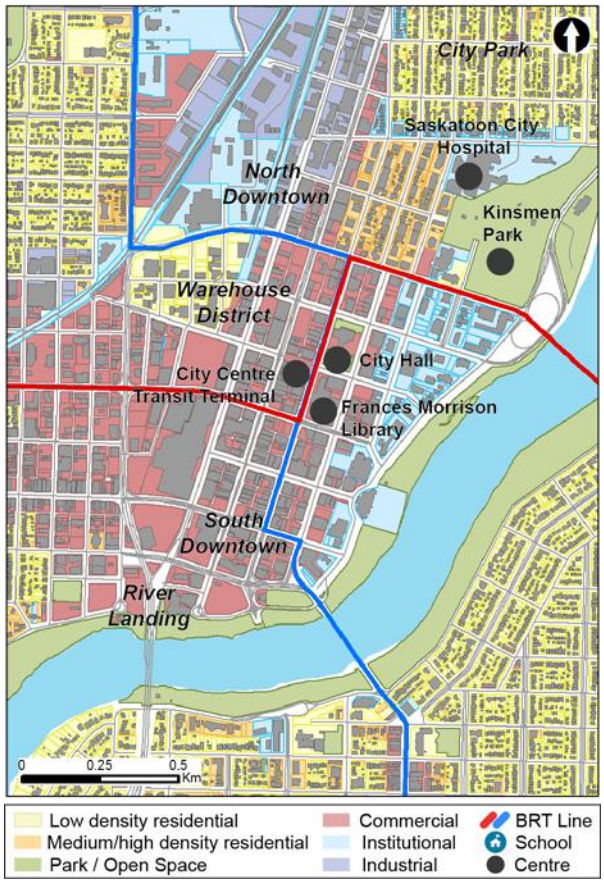
- Saskatoon Trades and Skills Centre
- St. Paul's Hospital (200 beds)
- St. Mary's Wellness and Education Centre
- Dr. Freda Ahenakew Library in Pleasant Hill

Schools:

- St. Gerard School (grades K-8)
- Royal West Campus (grade 12 for ages 18-21)
- Mount Royal Collegiate (grades 9-12)
- Howard Coad School (grades K-8)
- St. Maria Goretti Community School (grades K-8)
- ED Feehan Catholic High School (grades 9-12)
- Westmount Community School (grades K-8)
- Bedford Road Collegiate (grades 9-12)
- Pleasant Hill Community School (grades K-8)
- Princess Alexandra Community School (grades K-8)

This section of 22nd Street is dominated by vehicle-oriented commercial business, interspersed with multi-family and a few single family dwellings. The adjacent residential areas are established neighbourhoods laid out in a grid street network, primarily comprised of single family homes. The CPR line crosses 22nd Street between Avenue F and Avenue G. There are some industrial properties in the vicinity of the CPR line.

Downtown and City Park



Neighbourhoods:

- Warehouse District
- Central Downtown
- North Downtown
- South Downtown
- River Landing

Future Transit Villages:

- None

Schools:

- None

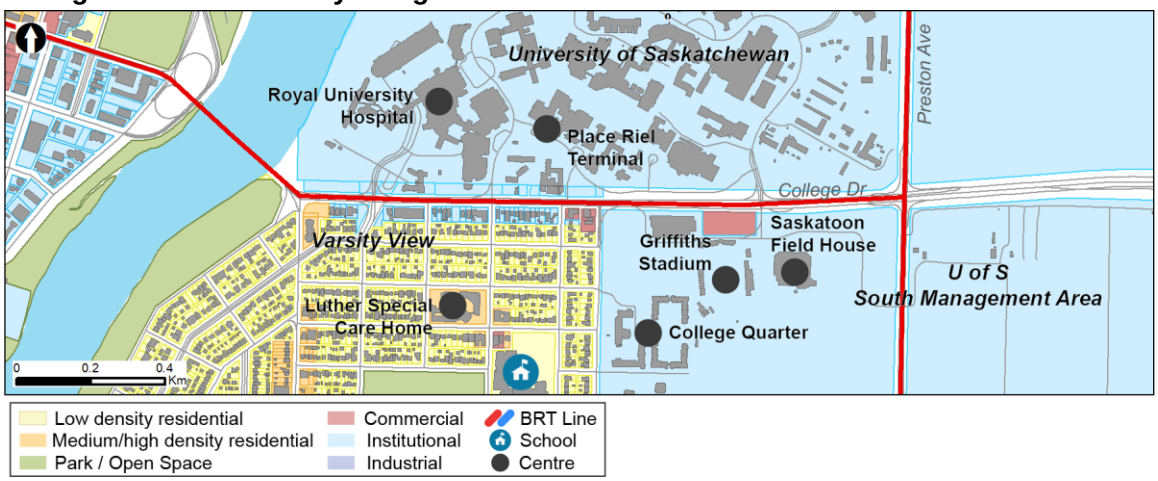
Other Key Activity Centres:

- Saskatoon CBD

The Warehouse District and Central Downtown are located on the Red Line corridor, and the other downtown areas are within walking distance. The city's Downtown has the highest level of urban activity, with residential, office, retail, institutional and a variety of other land uses.

The core neighbourhood of City Park is located north of Downtown along 25th Street.

College Drive – University Bridge to Preston Avenue



Neighbourhoods:

- Varsity View
- College Quarter

Future Transit Villages:

- None

Schools:

- Varsity View Cooperative Preschool

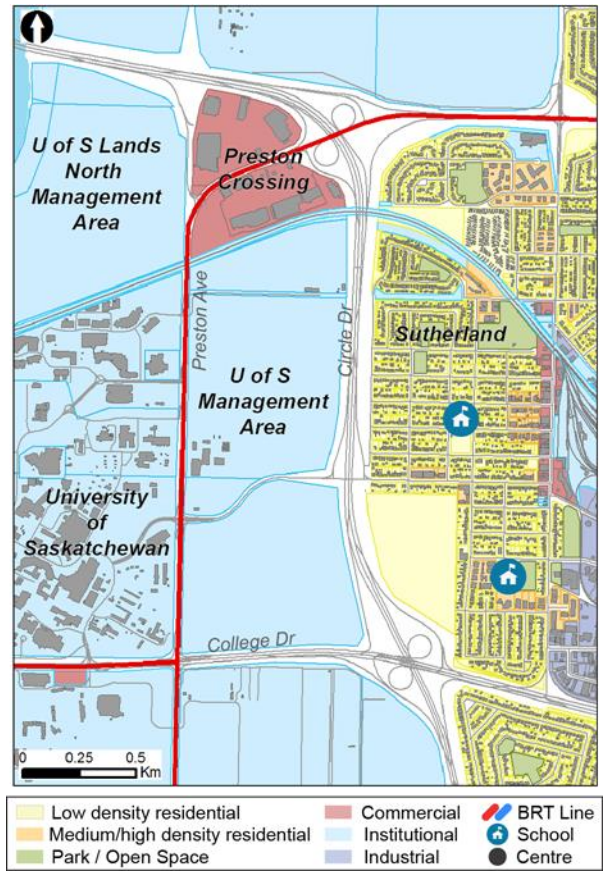
Other Key Activity Centres:

- University of Saskatchewan
- Saskatoon Field House
- Griffith Stadium
- Royal University Hospital (550 beds)
- Children's Hospital of Saskatchewan (176 beds)
- Irene and Leslie Dubé Centre for Mental Health (64 beds)

The north side of College Drive from University Bridge to Preston Avenue is occupied by the University of Saskatchewan (U of S) and the Royal University Hospital. With over 23,000 students and 7,000 faculty and staff members, the University and surrounding area is a high intensity activity centre. The U of S 2003 Campus Plan identifies potential growth areas within the campus.

The U of S extends across College Drive east of Cumberland Avenue, while the area south of College Drive west of Cumberland Avenue is an established single-family neighbourhood with a small number of multi-family dwellings. There is a small amount of retail and accommodation land use fronting College Drive.

Red Line North – Preston Avenue



Neighbourhoods:
- U of S Endowment Lands

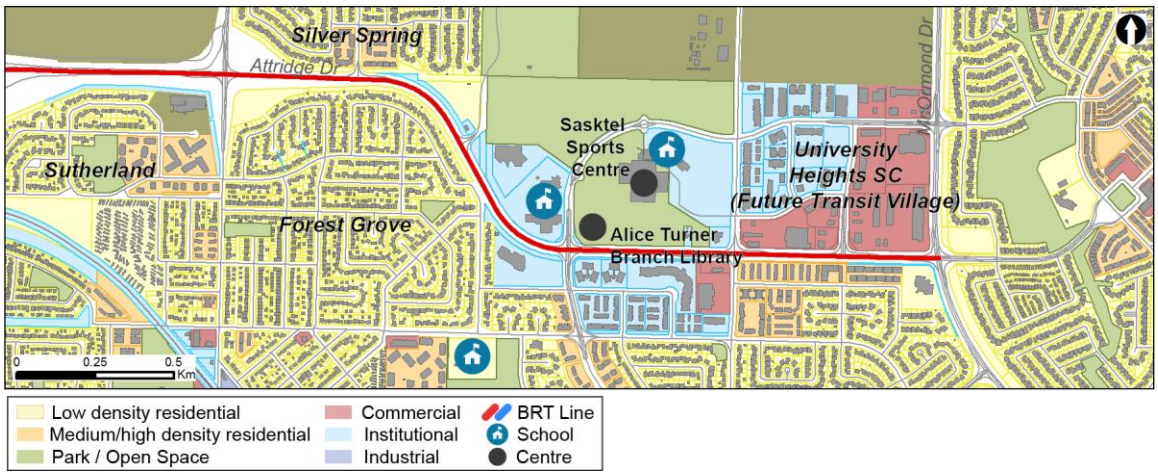
Future Transit Villages:
- None

Schools:
- None

Other Key Activity Centres:
- University of Saskatchewan
- Preston Crossing Shopping Centre

Land on both sides of Preston Avenue from College Drive to the CPR line are U of S lands, with the main campus and Innovation Place to the west and agricultural plots to the east. The land north of the CPR line and west of Preston Avenue is designated for future expansion of Innovation Place Research Park. Preston Crossing is located between the Yellowhead Highway and CPR railway, and bisected by Attridge Drive. Preston Crossing is a large auto-oriented open air shopping centre with big box stores, smaller retail stores and restaurants.

Red Line North – Attridge Drive



Neighbourhoods:

- U of S Management Area
- Silverspring
- Sutherland
- Forest Grove
- University Heights SC

Future Transit Villages:

- University Heights SC

Schools:

- École Forest Grove School (grades K-8)
- St. Volodymyr Catholic Elementary School (grades K-8)
- St. Joseph High School (grades 9-12)
- Centennial Collegiate (grades 9-12)

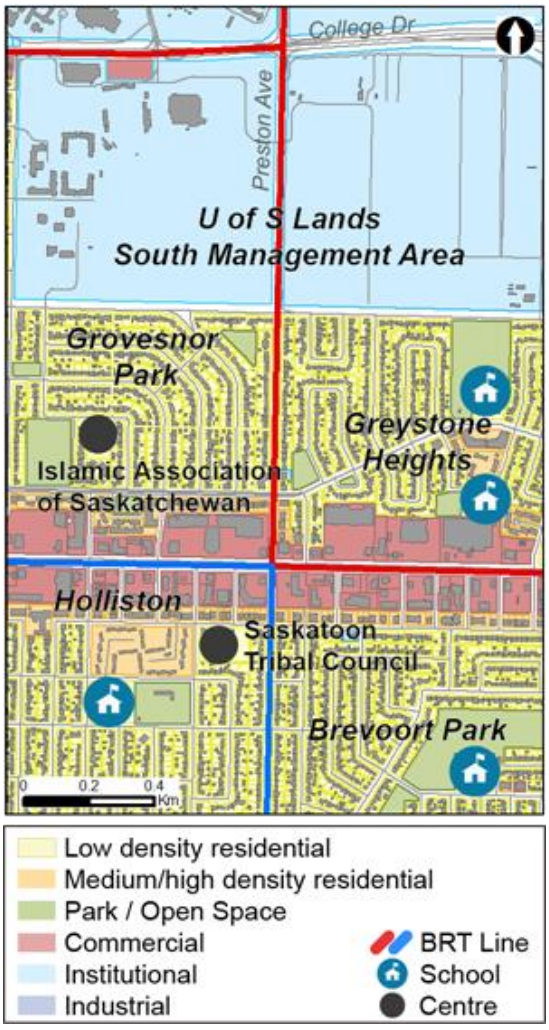
Other Key Activity Centres:

- Alice Turner Branch Library
- SaskTel Sports Centre

With the exception of one utility access, there are no property accesses to Attridge Drive. East of Nelson Road, the adjacent neighbourhoods are primarily established, single-family neighbourhoods on a curvilinear street network with little connection to Attridge Drive.

University Heights SC is a mixed-use suburban centre featuring medium density residential, major institutional facilities and commercial and retail development, and has been identified as a future transit village.

Red Line South – Preston Avenue



Neighbourhoods:
- U of S South Management Area
- Grosvenor Park

Future Transit Villages:
- None

Schools:
- None

Other Key Activity Centres:
- Grosvenor Park Centre Shopping Mall

The north half of this section of Preston Avenue bisects the U of S South Management Area, which will continue to be used for plant and crop research, although planning in the future may change long-terms plans for the this land. From 14th Street to 8th Street, most properties fronting Preston Avenue are single-family residential dwellings, with some multi-family dwellings and retail businesses at the intersection with 8th Street.

Red Line South – 8th Street E

Neighbourhoods:

- Greystone Heights
- College Park
- College Park East
- Brevoort Park
- Wildwood
- Briarwood
- Brighton

Future Transit Villages:

- Holmwood (potential, with future BRT extension to the east)

Schools:

- Greystone Heights School (grades K-8)
- École College Park School (grades K-8)
- Evan Hardy Collegiate (grades 9-12)
- Roland Michener School (grades K-8)
- St. Augustine School (grades K-8)
- École St. Matthew School (grades K-8)

Other Key Activity Centres:

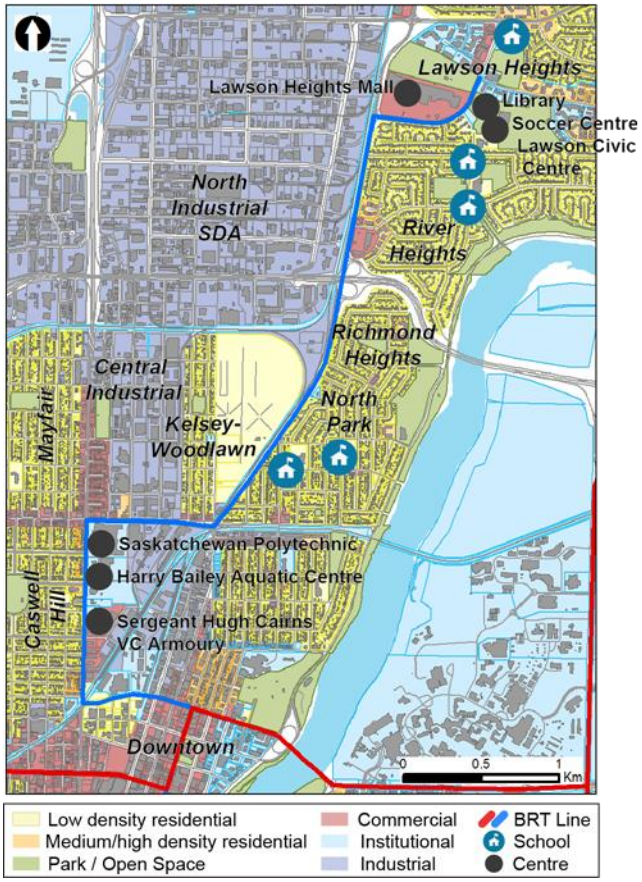
- Saskatoon Tribal Council
- Sherbrooke Community Centre (long-term residential care)
- Wildwood Golf Course

West of McKercher Road, 8th Street provides access to a wide range of retail businesses, from big box stores to local restaurants and shops. East of McKercher Road, there are no direct property accesses. The adjacent neighbourhoods beyond the commercial retail uses along 8th Street are mostly single family suburban style neighbourhoods on curvilinear street networks. There is a clustering of multi-family residential at McKercher Road.

3.2 Blue Line – Existing Land Use and Development

The land uses within approximately 400m of the corridor are described in the following subsections, from north to south. Any land uses shared with the Red Line BRT were previously described in **Section 3.1.**

Blue Line - Lawson Heights to Downtown



Neighbourhoods:

- Lawson Heights
- North Industrial SDA
- River Heights
- Richmond Heights
- North Park
- Kelsey-Woodlawn
- Caswell Hill
- Mayfair
- Central Industrial Area

Future Transit Villages:

- None

Schools:

- St. Anne School (grades K-8),
- École River Heights School (grades K-8)
- Bishop James Mahoney High School (grades 9-12)
- North Park Wilson School (grades K-8)
- École St. Paul Elementary School (grades K-8)

Other Key Activity Centres:

- Lawson Heights Mall
- Rusty Macdonald Branch Library
- Henry Ruys Soccer Centre
- Lawson Civic Centre
- Saskatchewan Polytechnic
- Harry Bailey Aquatic Centre
- Sergeant Hugh Cairns VC Armoury

North of 33rd Street, the Blue Line follows Warman Road, which parallels the CPR line to the west. As a result, there is almost no land uses fronting the west side of Warman Road. On the east side of Warman Road, most residential land use back onto the road, or access a frontage road, separated from Warman Road by a fence.

The section along 33rd Street is characterized by low intensity retail and warehouse types of development. From 33rd Street south to downtown, the west side of Idylwyld Drive is mostly established single-family neighbourhoods, while there are mix of institutional, commercial and industrial uses along the east side.

Blue Line - South Downtown to Preston Avenue

Neighbourhoods:

- Nutana
- Varsity View
- Grosvenor Park
- Haultain
- Holliston
- Cumberland Park
- Brevoort Park
- Nutana SC
- Nutana Park

Future Transit Villages:

- None

Schools:

- École Victoria School (grades K-8)
- Oskayak High School (grades 9-12)
- Nutana Collegiate (grades 9-12)
- Bishop Murray High School (grades 9-12)
- École Canadienne-Française Pavillon Élémentaire (grades K-8)
- Holliston School (grades K-8)
- Walter Murray Collegiate (grades 9-12)
- Holy Cross High School (grades 9-12)
- Brevoort Park School (grades K-8)
- École Canadienne-Française - Pavillon Gustave-Dubois (grades 9-12)

Other Key Activity Centres:

- Saskatoon CBD
- Grosvenor Park Centre
- Market Mall
- Lions Arena

South of the Broadway Bridge, Broadway Avenue is the main artery for one of the most densely populated neighbourhoods in Saskatoon, with a mix of local restaurants, shops, and small businesses fronting the corridor with single and multi-family residential dwellings in the surrounding area. Similarly, there is a mix of single and multi-family dwellings fronting onto 8th Street, although densities are lower than on Broadway Avenue.

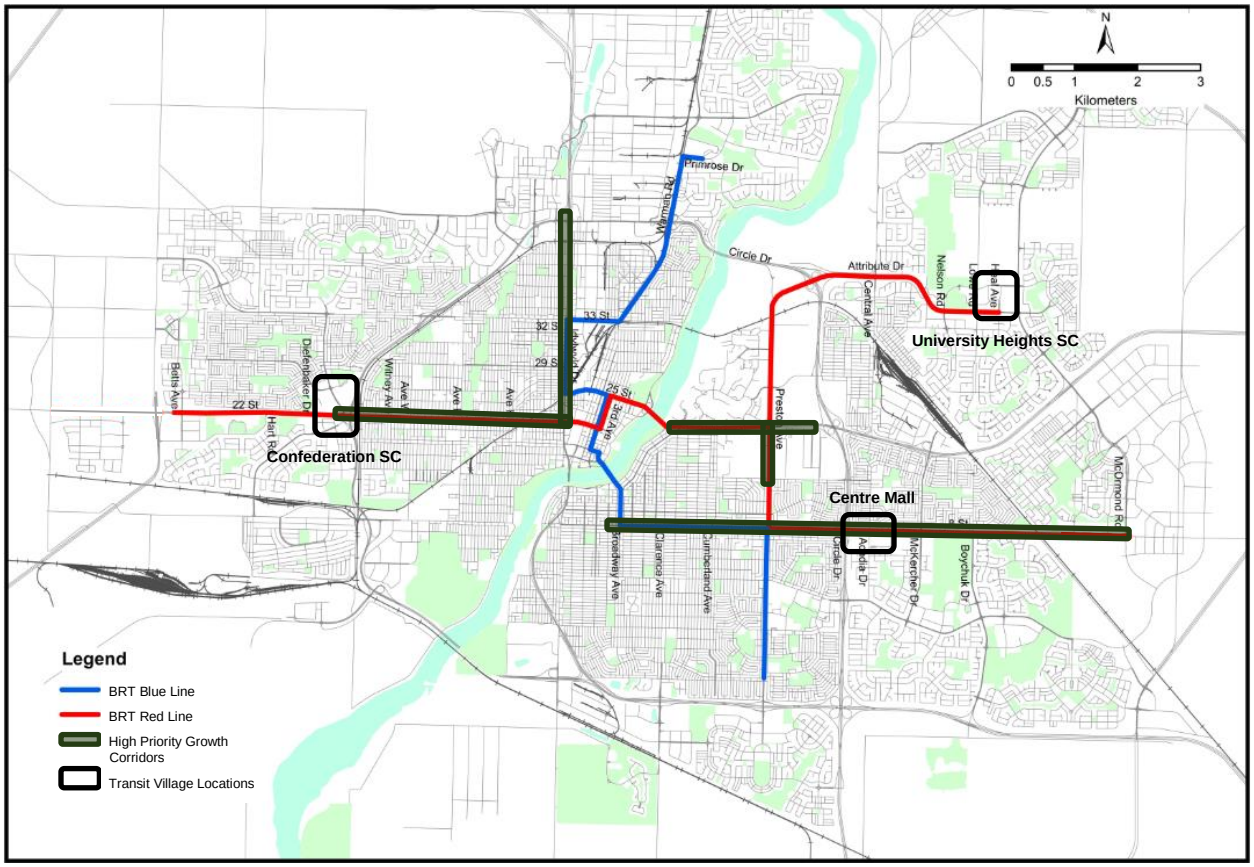
From 8th Street to north of Circle Drive, most property fronting Preston Avenue is single-family residential, with retail and institutional uses on the east side between Taylor Street and Louise Street.

3.3 Growth Corridors

The City of Saskatoon seeks to grow sustainably by encouraging up to 50% of all new population growth to settle inside Circle Drive. To achieve this, the Growth Plan will focus on intensifying development in existing Strategic Infill Areas, core neighbourhoods and along important corridors, which will constitute 25%, 10% and 15% of new growth respectively. Corridor intensification will focus on adhering to new Transit-Oriented Development (TOD) and Complete Street Guidelines, minimizing parking, linking various land uses and developing rapid transit.

A Corridor Planning Program is currently under development by the City. The Growth Plan has designated a number of high priority corridors high priority corridors with potential for intensification and redevelopment, as shown in **Figure 3-2**. These corridors will accommodate rapid transit, have sites suitable for redevelopment, and can access nearby neighbourhoods via local roads arranged in a compact grid and facilitate connections to major destinations.

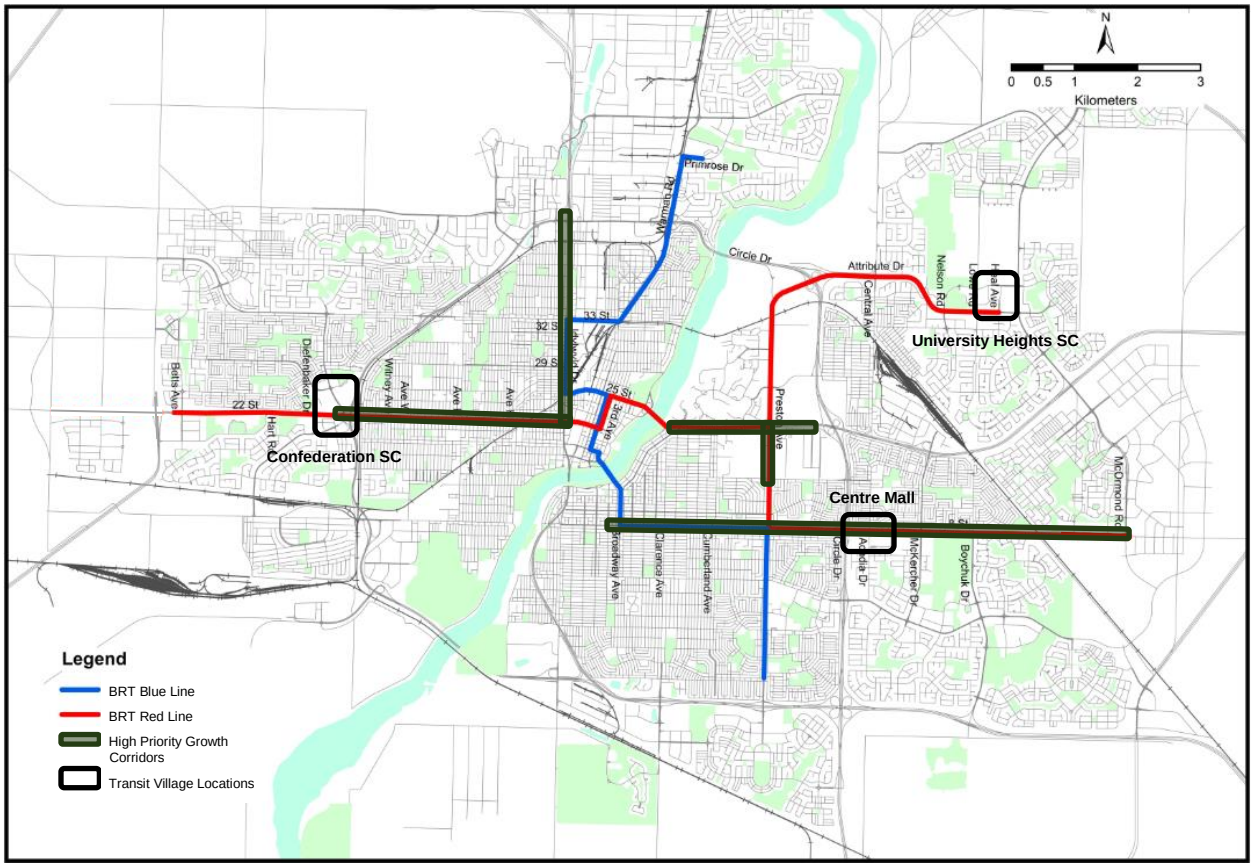
Figure 3-1: Locations of High Priority Growth Corridors and Transit Villages



3.4 Transit Villages

Transit villages are residential and mixed-use areas focused around a rapid transit route. Commercial, retail and recreational facilities will provide amenities to medium to high density residential development, while rapid transit routes will facilitate connections to the rest of the city. Active transportation infrastructure will ease connections between development and transit for pedestrians and cyclists. The development of transit villages along the potential Red Line BRT corridor will support the Growth Plan by further minimizing greenfield development and encouraging the use of public transit. Three potential transit villages are located at the Confederation SC, Centre Mall and University Heights Square, shown in **Figure 3-2.** These are undergoing planning for redevelopment, which will occur in the future when opportunities arise to increase intensification and redevelop land. Two additional areas at Blairmore SDA and Holmwood SC have been identified as future transit villages

Figure 3-2: Locations of High Priority Growth Corridors and Transit Villages



4 Street Network

This section includes a description of the street network characteristics along the Red and Blue Line BRT corridors.

4.1 Street Network Characteristics

The City classifies streets as Expressways, Major & Minor Arterials, Major & Minor Collectors, Local Streets and Lanes. Both the proposed Red and Blue Lines follow Expressway, Major Arterial and Major Collector streets with posted speed limits of either 50 km/h or 60 km/h. These are two 30km/h school zones (8:00AM to 5:00PM, Monday to Friday, September to June) on the Blue Line, one on Broadway Avenue and the other on 33rd Street. Speed limits, road classifications and number of lanes along the BRT corridor planning segments are provided in **Figure 4-1** to **Figure 4-4.**

There are 52 signalized intersections along the Red Line corridor and 40 along the Blue Line corridor. There are several cross-streets and driveways meeting and intersecting the corridors, especially within Circle Drive where grid street networks are more dense with more local connections to arterial streets.

There are four interchanges along the corridors: three on the Red Line, Circle Drive at 22nd Street, 8th Street and Preston Avenue; and one interchange with Circle Drive on the Blue Line at Warman Road.

Figure 4-1: Roadway Characteristics of Red Line BRT Segments 1, 2 & 5

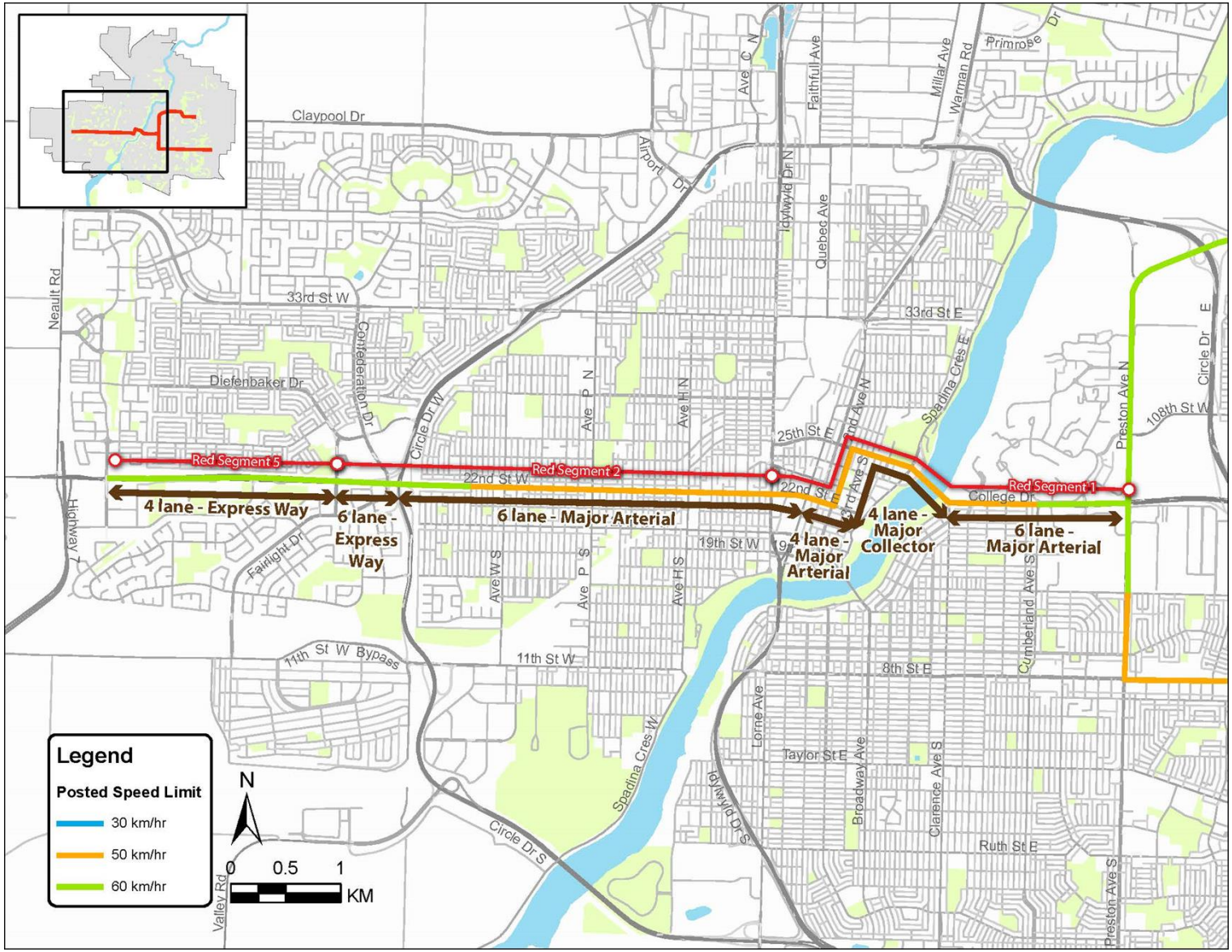


Figure 4-2: Roadway Characteristics of Red Line BRT Segments 3, 4 & 6

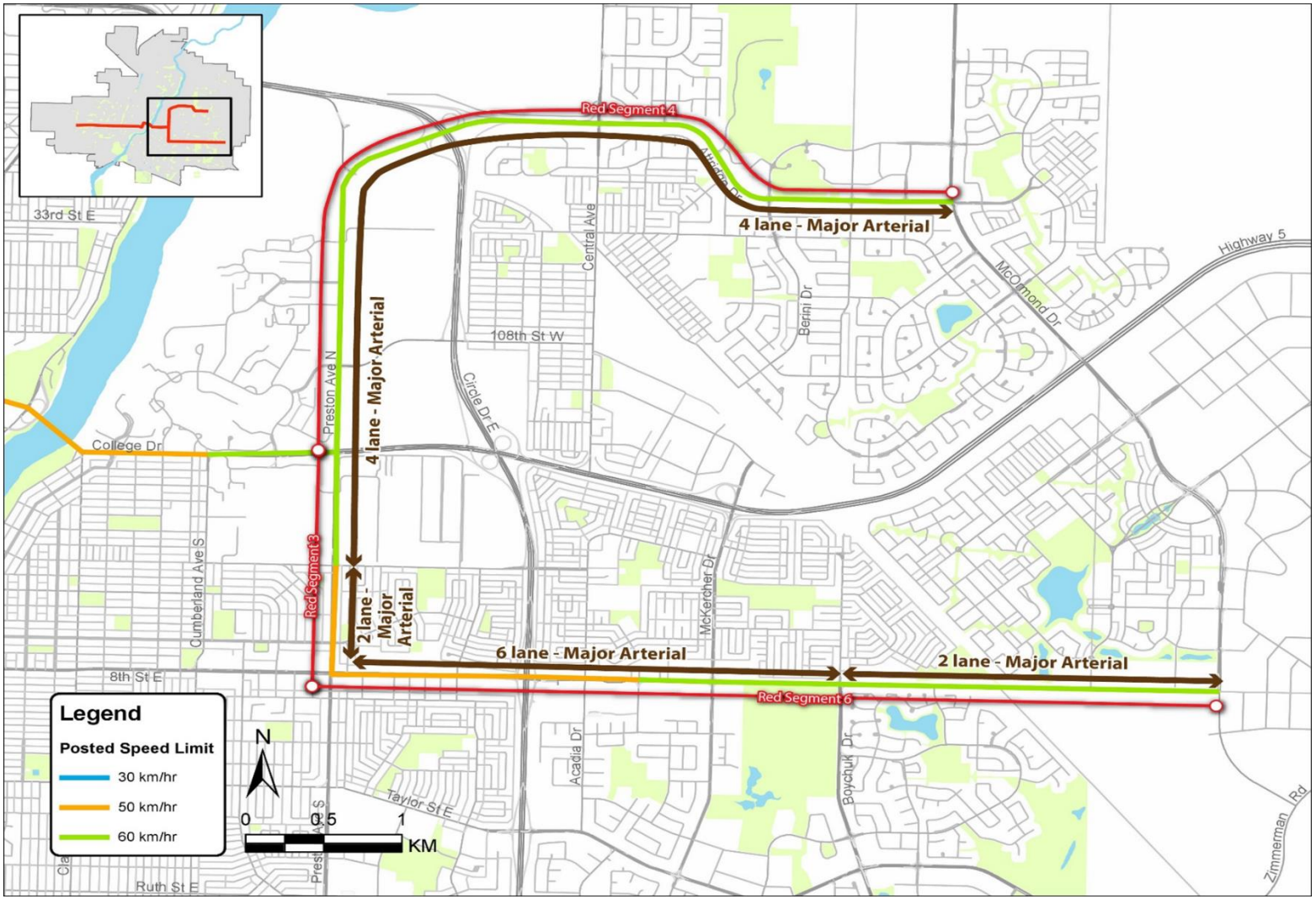


Figure 4-3: Roadway Characteristics of Blue Line BRT Segments 1 & 4

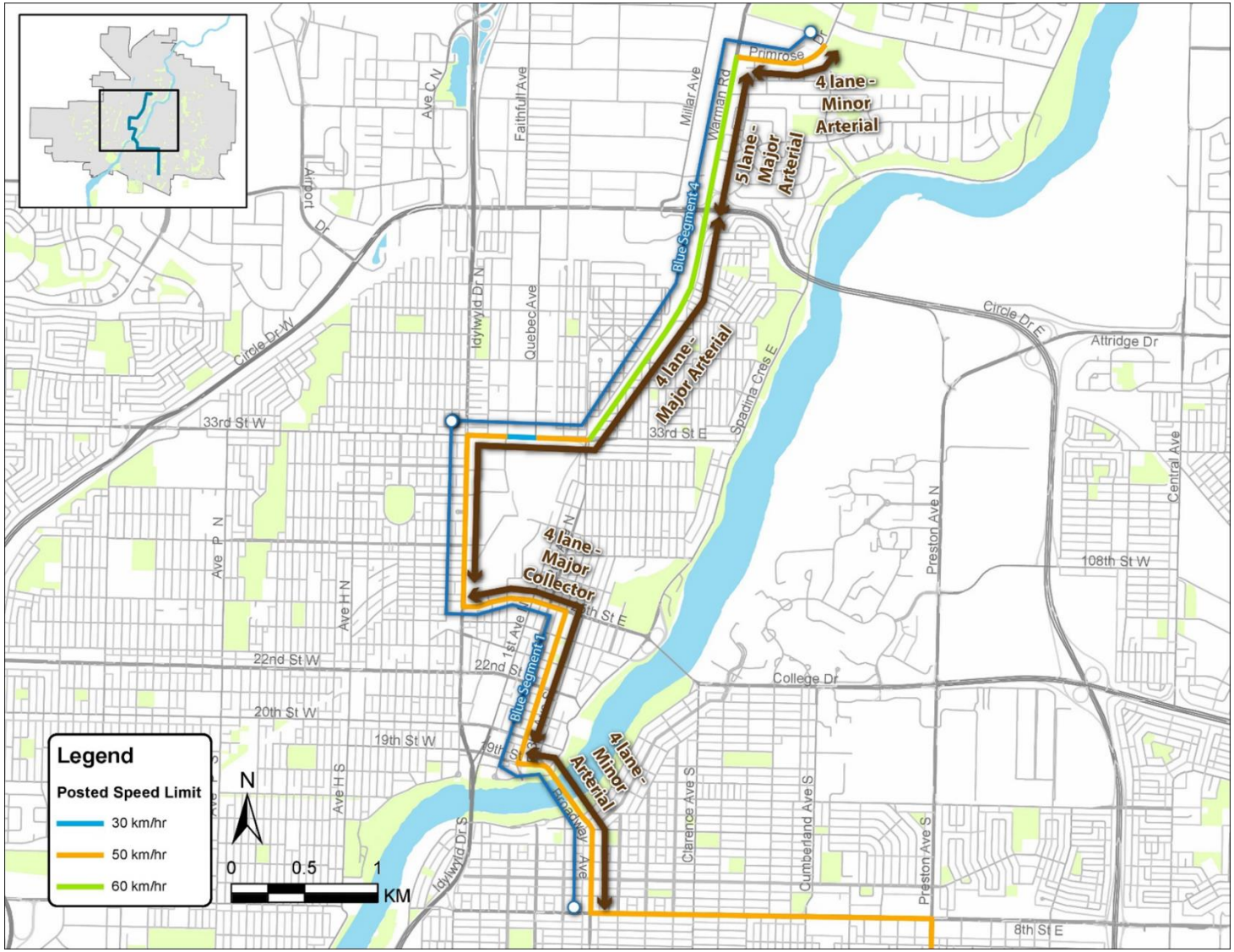
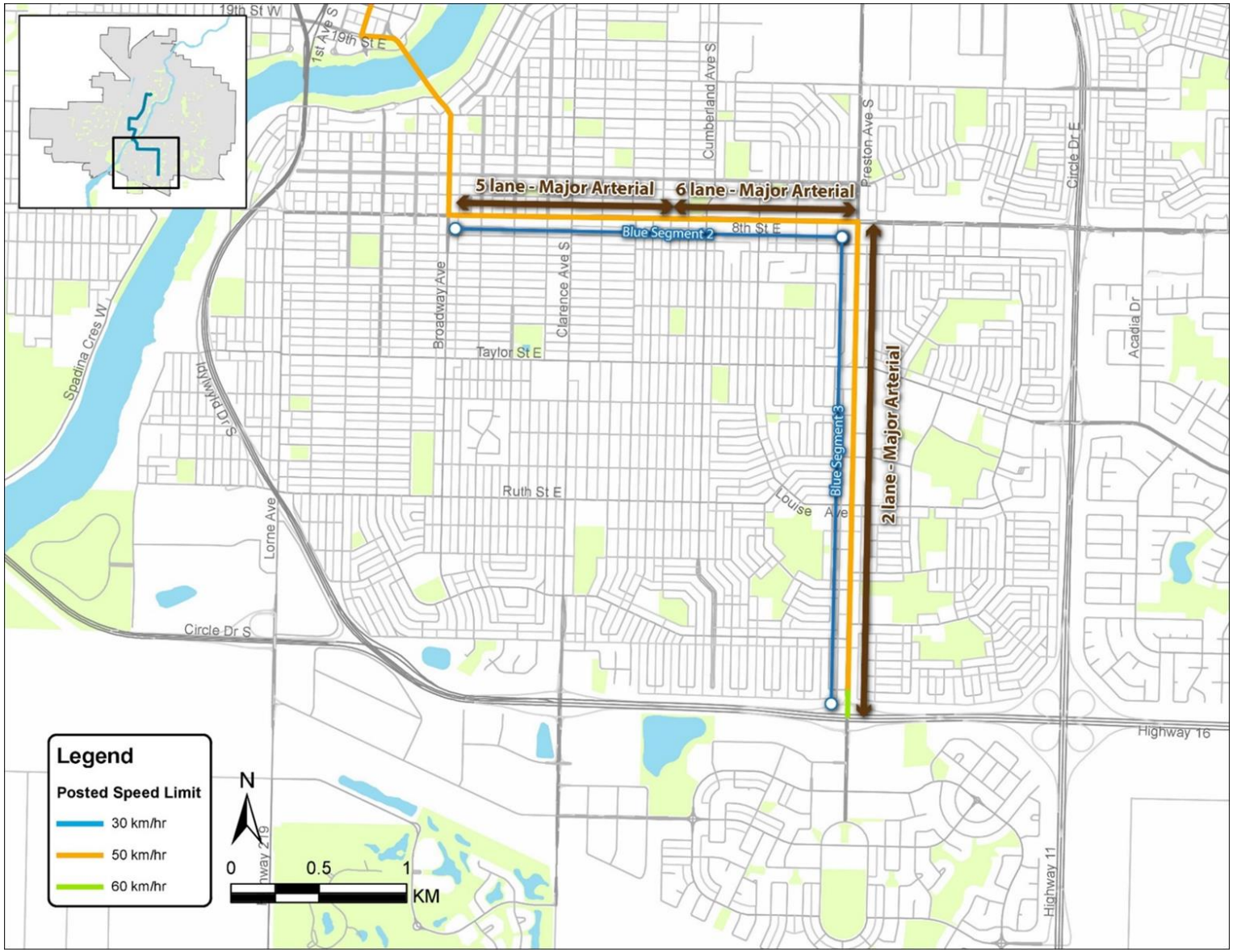


Figure 4-4: Roadway Characteristics of Blue Line BRT Segments 2 & 3



4.2 Railway Crossings

Both the Canadian Pacific Railway (CPR) and Canadian National Railway (CNR) have active rail lines through the City. Only the CPR interacts with the BRT corridors, as shown in **Figure 4-5**. The following provides a description of the railway crossings with a summary in **Table 4-1**.

Table 4-1: Current Railway At-Grade Crossings

Crossing	Railway	Control	AADT (Vehicles/day)	Average Trains/Day
22nd Street West of Avenue F	CPR	Gate and Signals	32,358	5
8th Street East of Briargate Road	CPR	Signals	2,678	6
Preston Avenue North of Research Drive	CPR	Gate and Signals	18,786	5
Idylwyld Drive and 25th Street	CPR	Gate and Signals	29,918	6

4.2.1 22nd Street west of Avenue F

The CPR line crosses the Red Line between Avenue G and Avenue F on 22nd Street. The crossing is controlled by gates, and there is a traffic signal for 22nd Street and Avenue F. Avenue G is a two-way stop. The Annual Average Daily Traffic (AADT) at this crossing is 32,358 vehicles, with 5 trains per day. Future average daily traffic and trains are expected to increase to 41,677 and 13, respectively, by 2043.

4.2.2 8th Street east of Briargate Road

The CPR crosses the Red Line along 8th Street about 450m east of Briargate Road and 550m west of McOrmond Road. The crossing is controlled by signals. The AADT at this crossing is 2,678 vehicles, with 6 trains per day on average.

4.2.3 Preston Avenue north of Research Drive

The CPR crosses the Red Line on Preston Avenue about 225m north of Research Drive/115th Street and about 500m south of Old Preston Avenue. There is an entrance to the Preston Crossing Shopping Centre about 125m north of the crossing. The crossing is controlled by gate arms and signals. The AADT at this crossing is 18,786 vehicles, with 5 trains per day on average crossing the roadway. Future average daily traffic and trains are expected to increase to 51,089 and 13, respectively, by 2043.

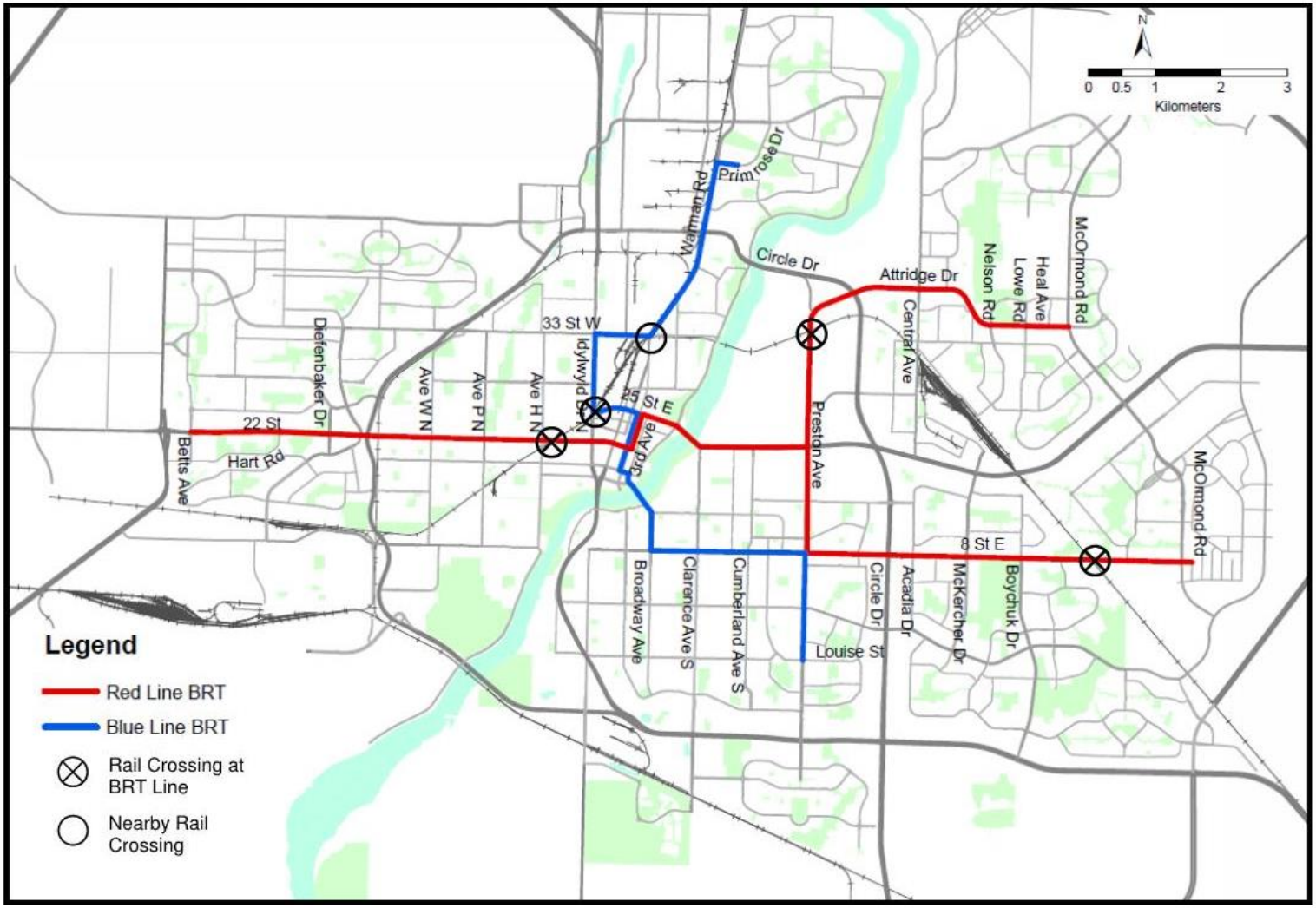
4.2.4 Idylwyld Drive & 25th Street

The CPR crossing through the T-intersection at Idylwyld Drive & 25th Street is controlled by gate arms and signals for all approaches. There are several businesses located in the former Saskatoon Station to the southwest. The AADT at this crossing is 29,918 vehicles, with 6 trains per day on average crossing the roadway. Future average daily traffic and trains are expected to increase to 45,362 and 13, respectively, by 2043.

There is also an at-grade crossing across 3rd Avenue south of the 3rd Avenue & 33rd Street intersection, which is not on the Blue Line BRT corridor, but may impede traffic when a train is crossing.

As well, there is a 100ft wide abandoned CNR right-of-way between 33 Street and 25 Street, just north of downtown Saskatoon. Some sections of the right-of-way are currently used for parking.

Figure 4-5: Locations of At-Grade CPR Crossings on the Red and Blue Line BRT Corridors



4.3 Major Utilities

One of the City's two main high voltage power line is located along the median of Preston Drive, from 14th Street to Taylor Street. It terminates at a substation on the southwest corner of Taylor Street & Preston Avenue, while north of 14th Street it runs along the east side of Preston Drive.

Other utilities running along or across the BRT corridors will be assessed during later project stages.

5 Transit Network

This section provides a description of the existing transit network conditions, including current and desired performance metrics and existing route information.

5.1 Existing Network Conditions

Saskatoon Transit (ST) was created in 1913 and now serves over 12 million revenue passengers per year, with about 25,000 passengers on any given weekday. The system is configured in a hub-and-spoke orientation with the majority of service oriented towards Downtown and the University of Saskatchewan (U of S). The system provides good coverage as all residential neighbourhoods have access to transit and 95% of Saskatoon's population lives within 450m of a bus route.

5.1.1 Existing Transit Terminals

In addition to the City Centre Terminal and Place Riel at the U of S, there are four other transit terminals in Saskatoon, at major commercial and retail areas called Suburban Centres (SCs). They are focal points for routes within their neighbourhoods and provide connection to Downtown and the U of S.

In all, there are six major terminals in Saskatoon:

- City Centre, downtown Saskatoon [28 routes];
- Place Riel, at the U of S [10 routes] ;
- Confederation Mall, west of Downtown at 22nd Street & Confederation Drive [10 routes];
- Centre Mall, southeast of Downtown at 8th Street & Acadia Drive [8 routes];
- Market Mall, southeast of Downtown at Preston Avenue & Louise Street [3 routes]; and
- Lawson Heights Mall, north of Downtown at Warman Road & Primrose Drive [4 routes].

About 55% of all transit trips are made during peak period, with 80% of those trips starting (in the PM Peak) or ending (in the AM Peak) at City Centre or Place Riel at the U of S. About 65% of all trips in the AM begin in the Lakewood (southeast), Lawson Heights (north) and Blairmore (west) surburban areas, corresponding to terminals at Centre Mall, Lawson Heights Mall and Confederation Mall respectively. Nearly 80% of passengers are regular riders and commuters, and 30% of all riders are post-secondary students.

There are six major terminals in Saskatoon:

City Centre Transit Hub
23rd Street between 2nd Avenue in the west and 3rd Avenue

Serves 27 routes

The terminal is closed to all non-bus traffic. All stops include shelters, garbage bins and benches. There is a Customer Service Centre located on the north side of the terminal where customers may obtain Saskatoon Transit information, purchase tickets and buy or reload GoPass smart cards.

Place Riel Terminal
In front of the Place Riel Student Centre at University of Saskatchewan

Serves 10 Routes

The section of Campus Drive located in front of the Place Riel Student Centre is closed off to all non-bus traffic. Two uncontrolled pedestrian crossings are located within the terminal, one near the entrance to the student centre and one at the east end of the terminal. No shelters or benches are provided, though route maps and schedules are provided inside of Place Riel.

Confederation Mall Terminal
Located along Laurier Drive at the north side of the mall

Serves 10 routes

There is a bus-only lane on the south side of Laurier Drive with a bus stop. It leads into a loop providing access to the other stops within the terminal. The exit from the terminal is controlled by traffic signals, which also control a pedestrian crossing across Laurier Drive. Shelters, benches and garbage bins are provided at the terminal.

Centre Mall Terminal
Located at the rear of the mall's eastern section, from Acadia Drive

Serves 8 routes

The mall entrance can be accessed by crossing Acadia Drive at the traffic signal which controls the pedestrian crossing and the bus-only access to the terminal. The terminal has shelters, benches and garbage bins.

Market Mall Terminal
Located on the south side of the mall, on Louise Street.

Serves 3 routes

Pedestrian access to the terminal from both the mall and the neighbourhood across Louise Street is uncontrolled, Shelters, benches and garbage bins are provided at the terminal.

Lawson Heights Mall Terminal
Located along the south side of the main roadway which loops within the mall

Serves 6 routes

There is no direct walkway access for pedestrians from the terminal to the neighbourhood, though a signalized pedestrian crossing exists across Primrose Drive at the east arm of Coppermine Crescent. A marked but uncontrolled crossing connects the terminal to the mall. Shelters, benches and garbage bins are provided at the terminal.

5.1.2 Existing Routes

The current ST route network is comprised of 39 Routes:

- 31 – All-day Monday to Sunday;
- 3 – All-day Monday to Friday;
- 4 – Peak-only; and
- 1 – AM Peak-only.

There are also four University Express Routes and fourteen High School Routes which run at specific times.

Routes that do not provide Monday to Sunday service serve industrial areas or university students. Most routes have a frequency of 30 minutes during weekdays and Saturday afternoons, and 60 minute frequencies on weeknights, Saturday mornings and evenings, and all day on Sundays and holidays. Only three routes provide better than 30 minute frequency during peak periods:

- Route 2/10 Meadowgreen/City Centre, 15 minutes (runs between City Centre and Confederation Mall via 20th Street, a 4 lane arterial serving low density commercial);
- Route 8 8th Street/City Centre, 7.5 minutes (runs from City Centre along 8th Street, an 6 lane arterial serving low density commercial to Centre Mall); and

- Route 17 Stonebridge/University, 20 minutes (runs from Place Riel at the U of S to the suburban neighbourhood of Stonebridge via Clarence Avenue, a two lane residential collector).

Hours of operation are from 5:30AM to 1:00AM on weekdays and Saturdays, and 8:00AM to 10:00PM on Sundays and holidays.

Overall, Saskatoon's routes have an on-time performance of 85%. Better performing routes include Route 21 University (AM Peak only route with 4 trips to U of S) and Route 2 (now Route 2/10 Meadowgreen/City Centre, connecting Confederation Mall with City Centre), both with over 60 passengers per service hour. There were four routes (Routes 1, 3, 14, 17) with less than 20 passengers per service hour in 2013, but these routes have been modified since then.

There are currently no provisions for transit signal priority in the City, and only a few geometric measures are used to separate buses from general purpose traffic, mostly at terminals to allow bus access while restricting access by other traffic. The majority of bus stops in the city are located on the far side of intersections, with at least 15m clearance from the intersection itself. Some stop locations are delineated with multiple bus stop signs to ensure other vehicles do not park at or otherwise use the bus zones.

A detailed inventory of all ST Regular and University Express routes is included in **Appendix A**, with frequencies, service spans and yearly ridership values provided. A detailed inventory on bus stop infrastructure directly along the proposed BRT corridors, including routes served, stops types, amenities and boardings, is provided in **Appendix B.**

5.2 Previous BRT Service

Previously, a number of routes were branded as DART Routes (Direct Access Rapid Transit) and featured limited stop service along their shared corridors, where combined frequencies could approach 6 minutes during peak periods. These routes primarily served suburban neighbourhoods, providing access to Downtown and the U of S. These corridors included 22nd Street, 25th Street and College Drive. Some of the routes still exist, but the DART branding is no longer used.

5.3 Transit Network Reconfiguration

Accompanying the introduction of rapid transit in Saskatoon will be a reconfiguration of the existing transit network to better meet the transit goals of the Growth Plan of supporting growth and development, providing frequent, direct and reliable service and enhancing safety and comfort for customers.

The Growth Plan envisions improving the customer experience, increasing service levels by 2.5%-3% per year, shifting the network from a hub-and-spoke system to a grid network and directing more resources to the largest markets. Different service types will be used and will vary in frequency and directness of route.

Recent improvements to frequencies on a number of existing routes have proven useful, which further reflects the need for a network with rapid transit at its core in order to provide

better service and enhance the customer experience. While ridership has grown by 4% annually since 2008, service hours have only increased by 2% each year with the gap steadily growing. Transit mode share remains at 4.5%, though trips to the Downtown have reached 10%. With a "business as usual" strategy, key performance targets will not be achievable, and coupled with an increasing population, may decline.

Current and target levels for key performance indicators for Saskatoon and peer cities are shown in **Table 5-1**. ST performance indicators are near average within its peer group.

Table 5-1: Saskatoon Transit Performance Indicators and Peer Cities

Statistic	Saskatoon, SK		CUTA Peer Group	Regina, SK	Victoria, BC	Winnipeg, MB
	Current	Target (2043)				
Population	262,900	500,000	200,000-550,000	210,600	330,100	631,800
Service Hours	372,737	900,000-1,000,000		336,000	726,220	1,326,780
Revenue Passengers	12,216,188			7,080,010	24,848,830	43,870,050
Transit Mode Share	4.5% Downtown 10%	8% Downtown 25%		3%	10%	14%
Service Hours per Capita	1.4	1.8 - 2.0	1.4	1.6	2.2	2.1
Passengers per Capita	46	62	51	32	75	69
Passengers per Hour	33	15 - 40 BRT > 40	34	21	34	33
R/C Ratio	37%	49%	41%	37%	43%	61%

6 Corridor Travel Times

Base travel time surveys were conducted in order to evaluate the travel time benefits of implementing transit priority measures along the potential BRT corridors. This section provides results of travel time surveys conducted for general purpose traffic and buses along the BRT corridors, as well as travel times for existing transit services.

Auto and bus travel time surveys were conducted for the corridors on September 12th to 14th. An iPad with a GPS tracking unit was used to capture the GPS track points for each trip which were then analyzed and compared to other trips. The application produces outputs that include trip length, point travel time, and point travel speed.

Travel time runs occurred between 7AM to 10AM in the AM peak period and between 3PM to 7PM in the PM peak period. The vehicle travel time runs covered three runs per direction per peak period. The bus travel time runs covered one run per direction during the AM peak period. Bus dwell times were applied following bus travel time surveys.

During the survey period, there was roadside construction between Avenue I and Avenue H along 22nd Street, with one lane closed during peak hours. The intersection of Attridge Drive and Centre Avenue was also under construction with one left lane closed. These lane closures increased travel time for both the bus and auto runs.

The travel time runs were used to calibrate the existing conditions for Synchro and VISSIM models and establish the existing operational performance of the corridor.

6.1 Auto Travel Times

6.1.1 Red Line North Auto Travel Times

The Red Line North section was assessed from Betts Avenue & 22nd Street to Attridge Drive & McOrmond Drive. This segment includes 58 intersections over approximate 16km. The Red Line North auto travel times are summarized in **Table 6-1**.

Table 6-1: Red Line North Auto Run Travel Times Summary

BRT Line / Direction	Period	Run	Start Time	End Time	Distance (km)	Travel Time (mm:ss)	Average Travel Distance (km)	Average Travel Time (mm:ss)	Average Travel Speed (km/h)
Red Line North Eastbound	**AM**	1	7:08 AM	7:29 AM	16.05	21:40	16.06	24:17	39.7
		2	9:36 AM	10:00 AM	16.05	24:00			
		3	10:05 AM	10:32 AM	16.07	27:10			
	PM	1	3:04 PM	3:35 PM	16.07	31:00	16.07	34:53	27.6
		2	4:40 PM	5:25 PM	16.08	45:20			
		3	6:05 PM	6:33 PM	16.07	28:20			
Red Line North Westbound	**AM**	1	6:43 AM	7:05 AM	16.05	22:10	16.05	26:17	36.7
		2	7:36 AM	8:06 AM	16.08	30:00			
		3	10:37 AM	11:03 AM	16.03	26:40			
	PM	1	4:04 PM	4:34 PM	16.01	30:40	16.01	30:43	31.3
		2	5:28 PM	6:00 PM	16.02	32:00			
		3	6:43 PM	7:12 PM	16.01	29:30			

The results of the travel time surveys across the Red Line North section are shown in **Figure 6-1** and **Figure 6-2**. The average cumulative travel time for both eastbound and westbound travel are similar; however, travel times in the eastbound direction are more volatile. PM peak travel times are longer than during the AM peak, indicating more congestion during PM peak hours.

Notable delays due to congestion were observed at the intersection of Attridge Drive & Central Avenue, with westbound queues spilling back to the intersection of Attridge Drive & Forestry Farm Park Drive during PM peak periods and eastbound queues extending to the intersection of Old Preston Avenue & Attridge Drive. Ongoing construction work at the intersection of Attridge Drive & Central Avenue also contributed to the eastbound delays.

Figure 6-1: Auto Travel Times of Red Line North Eastbound

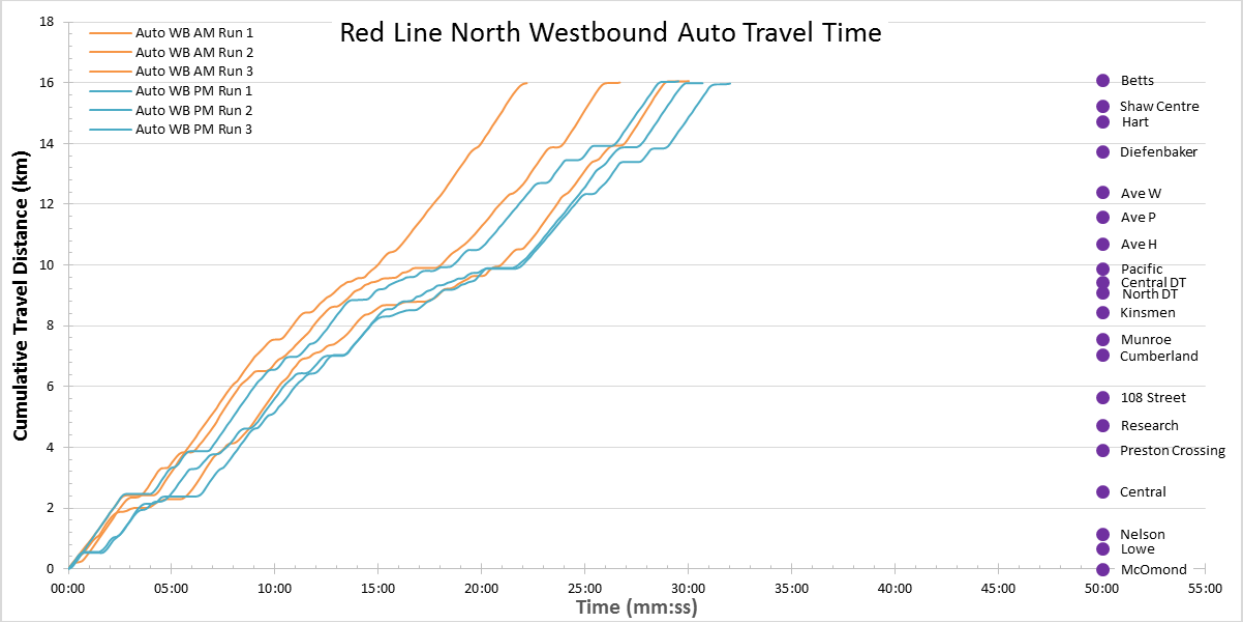
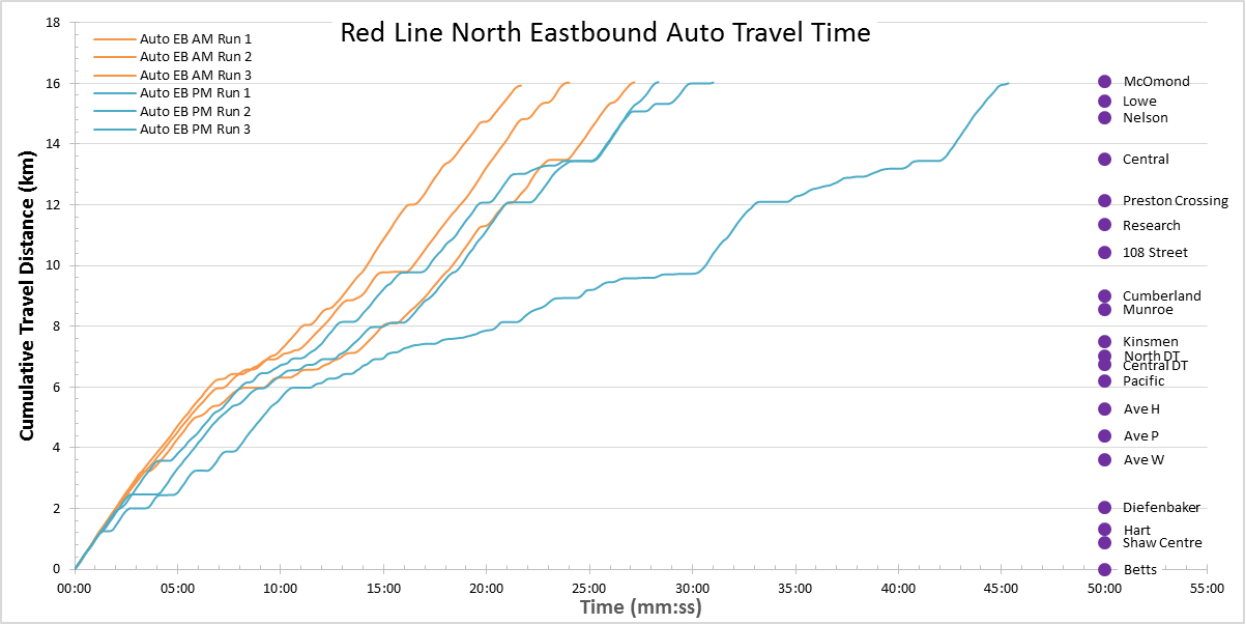


Figure 6-2: Auto Travel Times of Red Line North Westbound



6.1.2 Red Line South Auto Travel Times

The Red Line South corridor was assessed from the intersection of Betts Avenue & 22nd Street to the intersection of 8th Street & McOrmond Drive. This segment includes 70 intersections over approximately 16km. The Red Line South auto travel times are summarized in **Table 6-2**, with eastbound and westbound run details provided in **Figure 6-3** and **Figure 6-4** respectively.

Table 6-2: Red Line South Auto Run Travel Times Summary

BRT Line / Direction	Period	Run	Start Time	End Time	Distance (km)	Travel Time (mm:ss)	Average Travel Distance (km)	Average Travel Time (mm:ss)	Average Travel Speed (km/h)
Red Line South Eastbound	**AM**	1	6:18 AM	6:42 AM	16.24	23:40	16.25	26:47	36.4
		2	7:22 AM	7:50 AM	16.25	27:50			
		3	8:52 AM	9:21 AM	16.25	28:50			
	PM	1	2:47 PM	3:17 PM	16.27	30:00	16.28	33:20	29.3
		2	4:02 PM	4:39 PM	16.29	36:50			
		3	5:23 PM	5:56 PM	16.29	33:10			
Red Line South Westbound	**AM**	1	6:44 AM	7:08 AM	16.27	24:10	16.28	27:33	35.5
		2	8:20 AM	8:49 AM	16.27	29:20			
		3	9:25 AM	9:55 AM	16.29	29:10			
	PM	1	3:21 PM	3:53 PM	16.28	32:20	16.29	31:17	31.2
		2	4:40 PM	5:16 PM	16.30	35:40			
		3	5:57 PM	6:23 PM	16.29	25:50			

Figure 6-3: Red Line South Eastbound Auto Travel Times

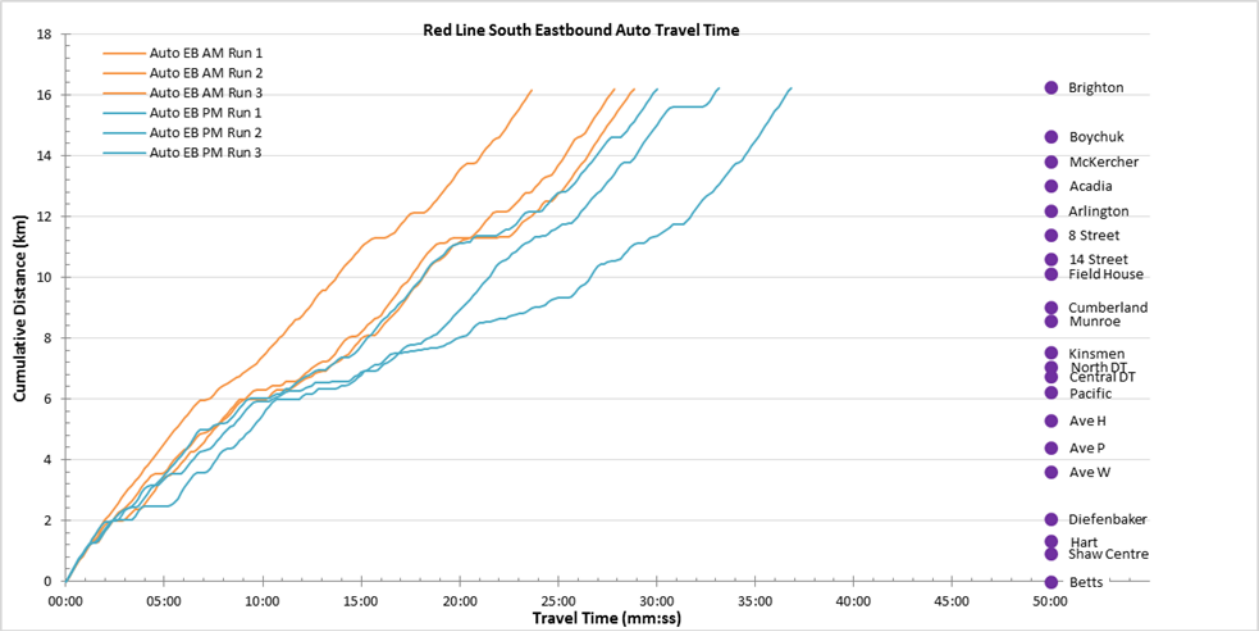
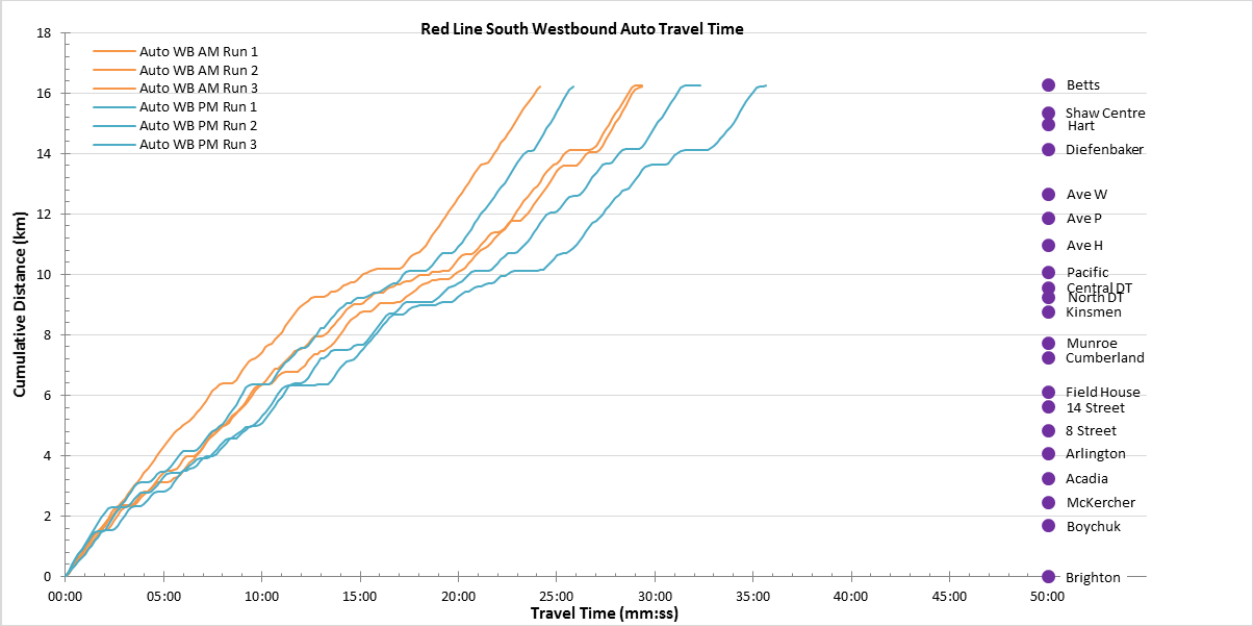


Figure 6-4: Red Line South Westbound Auto Travel Times



Travel times eastbound and westbound are comparable in both the AM and PM peak periods. Similar to the Red Line North section, eastbound travel times were more volatile, although severe traffic congestion was only observed at the University Bridge.

6.1.3 Blue Line Auto Travel Times

The auto travel time survey for the Blue Line was conducted from Lawson Heights Mall to the intersection of Arlington Avenue & Preston Avenue. This corridor includes 71 intersections over approximately 13km. The Blue Line auto travel times are summarized in **Table 6-3**, with southbound and northbound run details provided in **Figure 6-5** and **Figure 6-6** respectively.

Table 6-3: Blue Line Auto Run Travel Times Summary

BRT Line / Direction	Period	Run	Start Time	End Time	Distance (km)	Travel Time (mm:ss)	Average Travel Distance (km)	Average Travel Time (mm:ss)	Average Travel Speed (km/h)
Blue Line Southbound	**AM**	1	7:43 AM	8:16 AM	12.90	33:50	12.85	30:30	25.3
		2	8:54 AM	9:26 AM	12.89	32:00			
		3	10:11 AM	10:36 AM	12.76	25:40			
	PM	1	3:03 PM	3:34 PM	12.76	30:30	12.80	29:50	25.7
		2	4:12 PM	4:42 PM	12.76	30:00			
		3	5:15 PM	5:44 PM	12.88	29:00			
Blue Line Northbound	**AM**	1	8:18 AM	8:49 AM	12.90	31:50	12.89	26:40	29.0
		2	9:27 AM	9:48 AM	12.89	21:40			
		3	10:37 AM	11:03 AM	12.89	26:30			
	PM	1	3:35 PM	4:06 PM	12.80	31:30	12.79	28:33	28.9
		2	4:43 PM	5:10 PM	12.78	27:30			
		3	5:44 PM	6:10 PM	12.78	26:40			

Figure 6-5: Blue Line Southbound Auto Travel Times

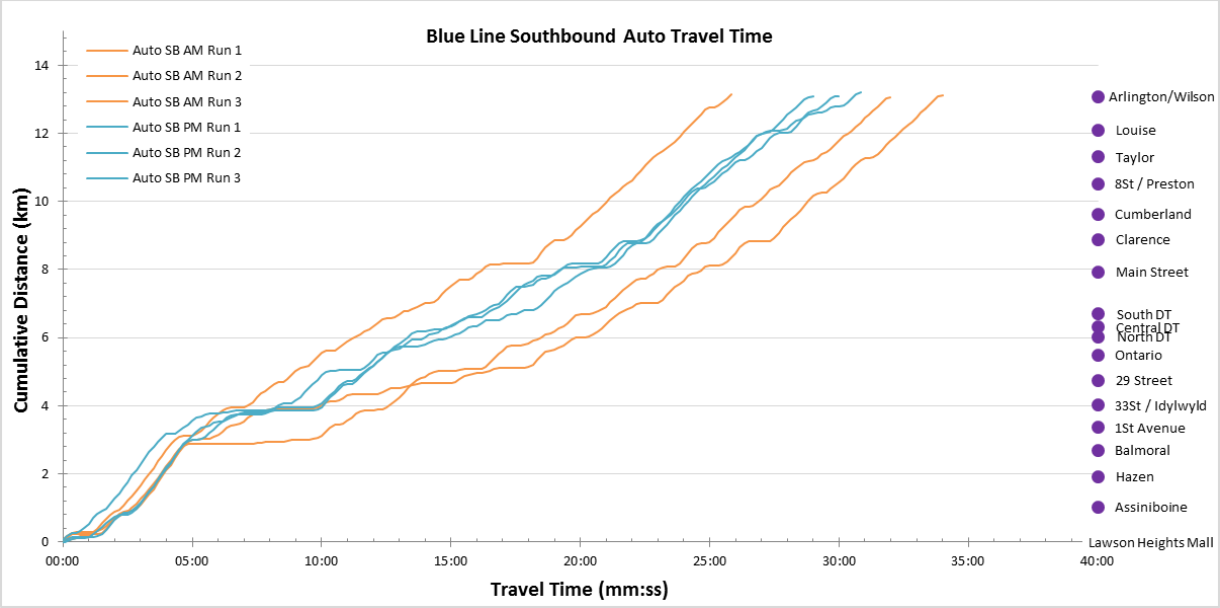
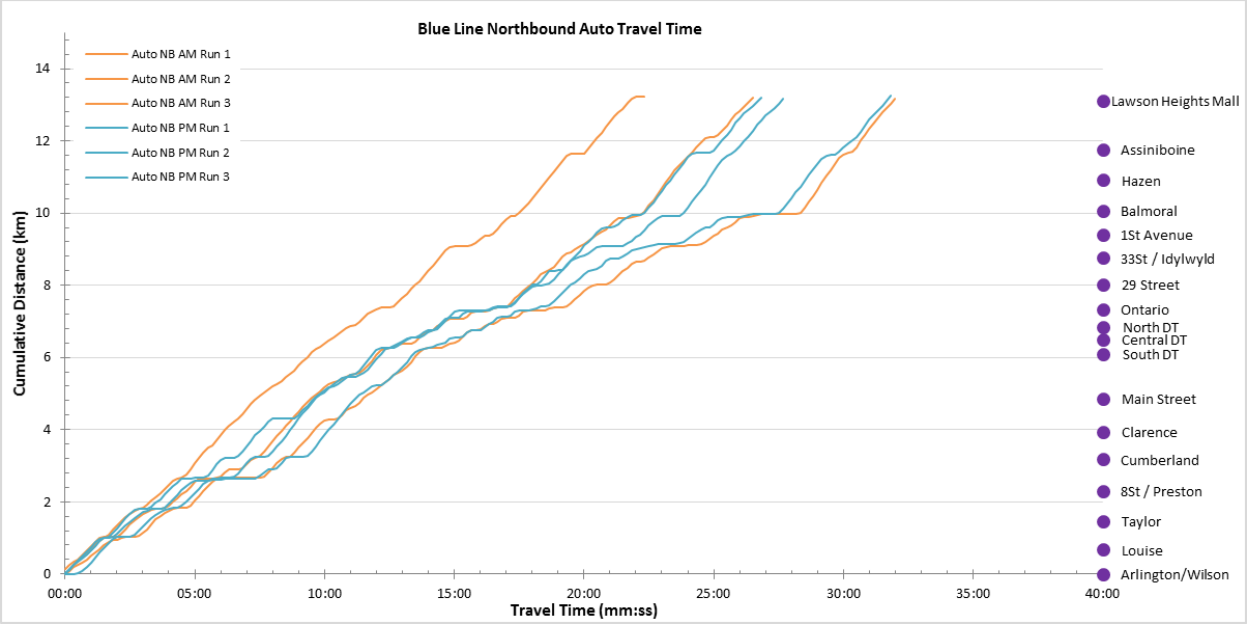


Figure 6-6: Blue Line Northbound Auto Travel Times



Travel speeds along Warman Road were faster than the rest of the corridor in both the northbound and southbound directions.

6.2 Bus Travel Times

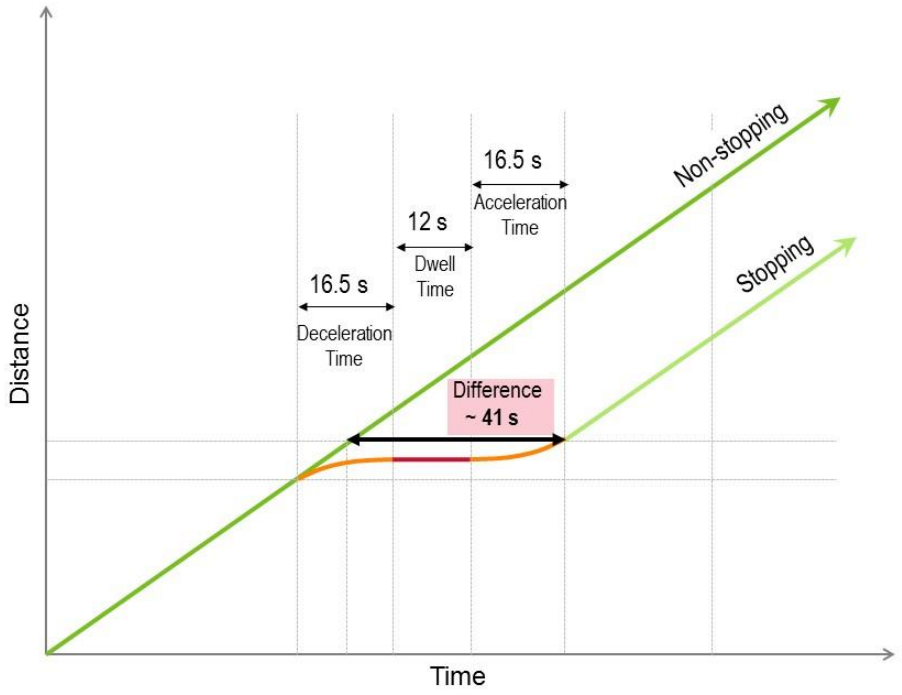
A bus travel time survey was conducted with a standard 12-metre Saskatoon Transit bus on Tuesday, September 12th, 2017 from approximately 7:00AM to 2:00PM. The survey consisted of two runs per direction along the proposed BRT corridors and summarized in **Table 6-4**. The runs were separated into AM (approximately 7:00AM to 10:00AM) and

midday (approximately 10:00AM to 2:00PM). Time for passenger boardings and alightings were calculated separately, and time added after the surveys.

During the travel time surveys, iPad tablets were used to collect GPS Track Logs which provided detailed information on travel speeds, distances travelled, number of stops and segment travel times for the planned routes. The transit travel time runs will be used to validate modeled transit travel times and speeds in the VISSIM models and the existing operational performance of the corridor.

The time required for a stop is based on an assumed 12 second dwell time and a typical acceleration and deceleration profile. The combined acceleration, deceleration and dwell time is about 45 seconds, with a difference in travel time with and without considering stops of about 41 seconds per station as illustrated in **Figure 6-7**.

Figure 6-7: Simulated Bus Stop Acceleration & Deceleration Profile for Travel Time Surveys



Roadway construction was encountered along 22nd Street and at Attridge Drive & Central Avenue. The closure of one lane resulted in congestion, especially around the intersection. Travel times and distances are summarized in **Table 6-4**.

Table 6-4: Bus Run Travel Time Summary

BRT Line / Direction	Period	Direction	Start Time	End Time	Distance (km)	Travel Time (mm:ss)	Average Travel Distance (km)	Average Travel Time (mm:ss)	Average Speed (km/h)
Red Line North*	**AM**	EB	9:38 AM	10:17 AM	16.1	38:38	16.07	38:33	25
		WB	9:50 AM	10:29 AM	16.0	38:28			
	MD	EB	1:02 PM	1:44 PM	16.1	41:48	16.06	41:33	23
		WB	1:15 PM	1:56 PM	16.0	41:18			
Red Line South	**AM**	EB	6:59 AM	7:41 AM	16.3	42:29	16.30	42:14	23
		WB	7:30 AM	8:11 AM	16.3	41:59			
	MD	EB	10:43 AM	11:25 AM	16.3	42:29	16.30	42:29	23
		WB	10:08 AM	10:50 AM	16.3	42:29			
Blue Line	**AM**	SB	8:31 AM	9:07 AM	12.9	36:16	12.85	35:11	22
		NB	8:58 AM	9:32 AM	12.8	34:06			
	MD	SB	12:19 AM	12:59 AM	12.9	40:16	12.85	39:06	20
		NB	11:50 AM	12:27 PM	12.8	37:56			

**The shared segment between both Red Line BRT branches was not included for the Red Line North section, with the data collected from the entire span of the Red Line South section utilized to analyze the total travel distance and time for the Red Line North.*

6.3 Auto and Bus Travel Time Comparison

Bus travel times, unlike auto travel times, must reflect both the travel time and the stopping time at stations. A direct comparison between vehicular and transit travel times is provided for context only. Many auto trips will not use the same route as the bus and the most direct route between origin-destination points may be different than the BRT route. **Table 6-5** compares the average in-vehicle travel times along the route.

Analysis results from the auto runs show that the PM peak period has an overall longer travel time than the AM peak period. During the survey, bus trips were not hindered by traffic lights along the Red Line BRT corridor from Betts Avenue to Downtown, which is abnormal. Further bus runs in both the AM and PM peak periods will be conducted to supplement the data collected to date.

Table 6-5: Mode Travel Time Comparison

BRT Line / Direction	Period	Direction	Mode		Difference (mm:ss)
			Planned BRT Route (mm:ss)	Vehicel (mm:ss)	
Red Line North	**AM**	EB	38:38	24:17	14:21
		WB	38:28	26:17	12:11
Red Line South	**AM**	EB	42:29	26:47	15:42
		WB	41:59	27:33	14:26
Blue Line	**AM**	SB	36:16	30:30	5:46
		NB	34:06	26:40	7:26

Figure 6-8 to **Figure 6-13** show travel time comparisons between the auto and bus runs for each route. No significant queues or delays were observed during bus operations.

Figure 6-8: Red Line North Eastbound Auto and Bus Travel Time Comparison

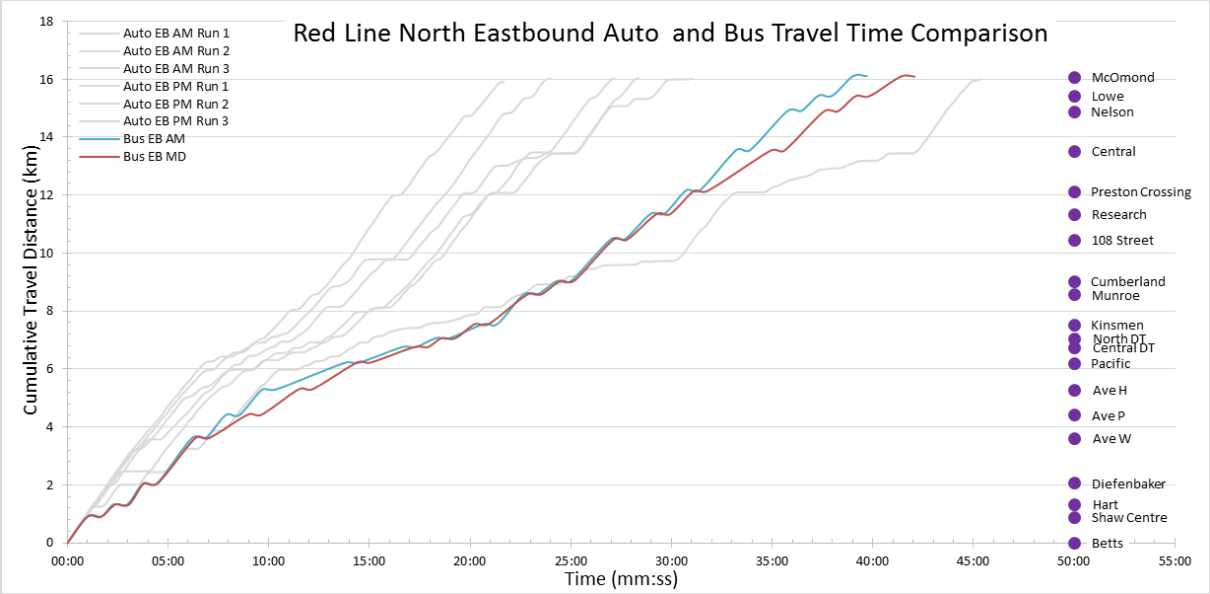


Figure 6-9: Red Line North Westbound Auto and Bus Travel Time Comparison

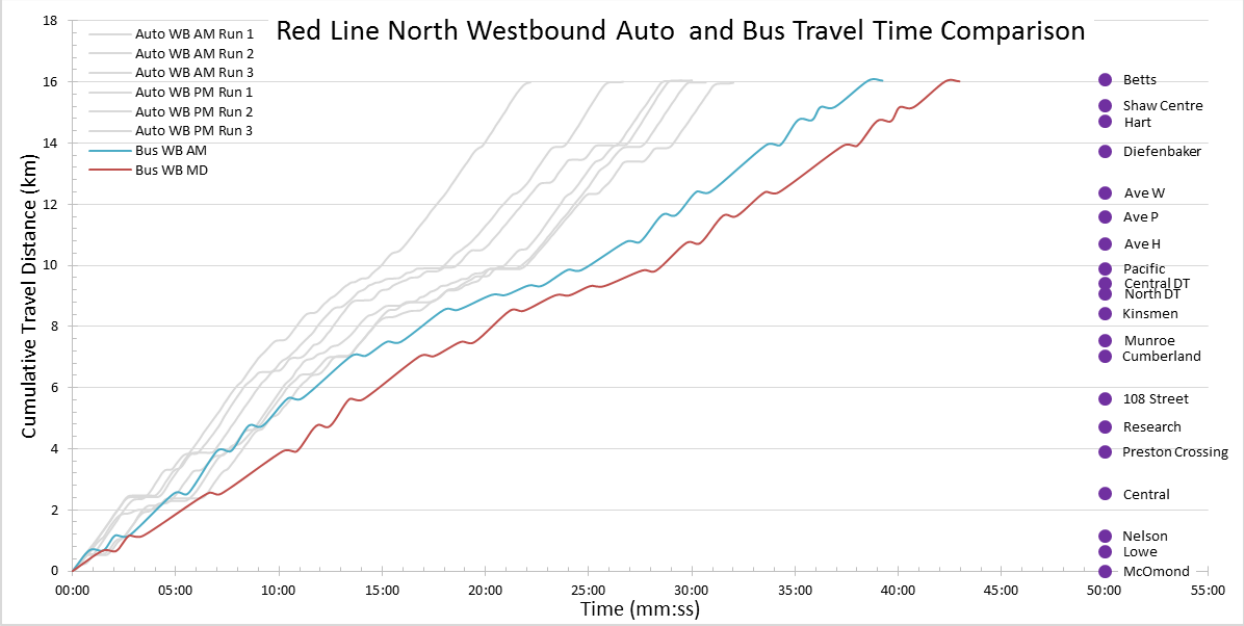


Figure 6-10: Red Line South Eastbound Auto and Bus Travel Time Comparison

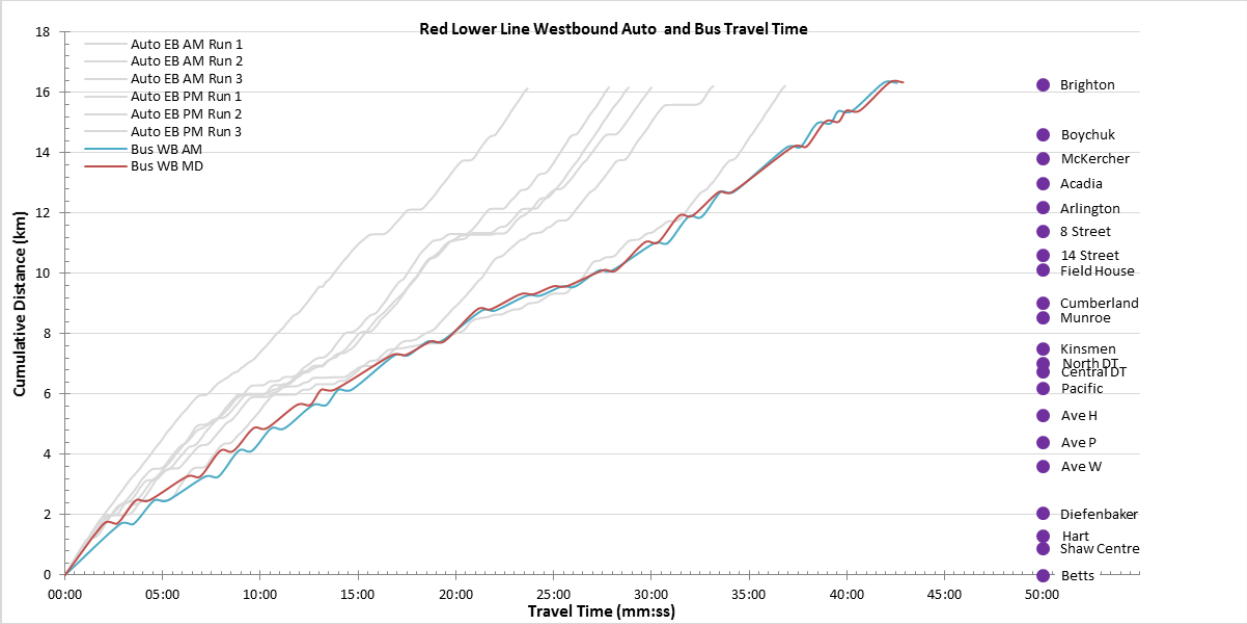


Figure 6-11: Red Line South Westbound Auto and Bus Travel Time Comparison

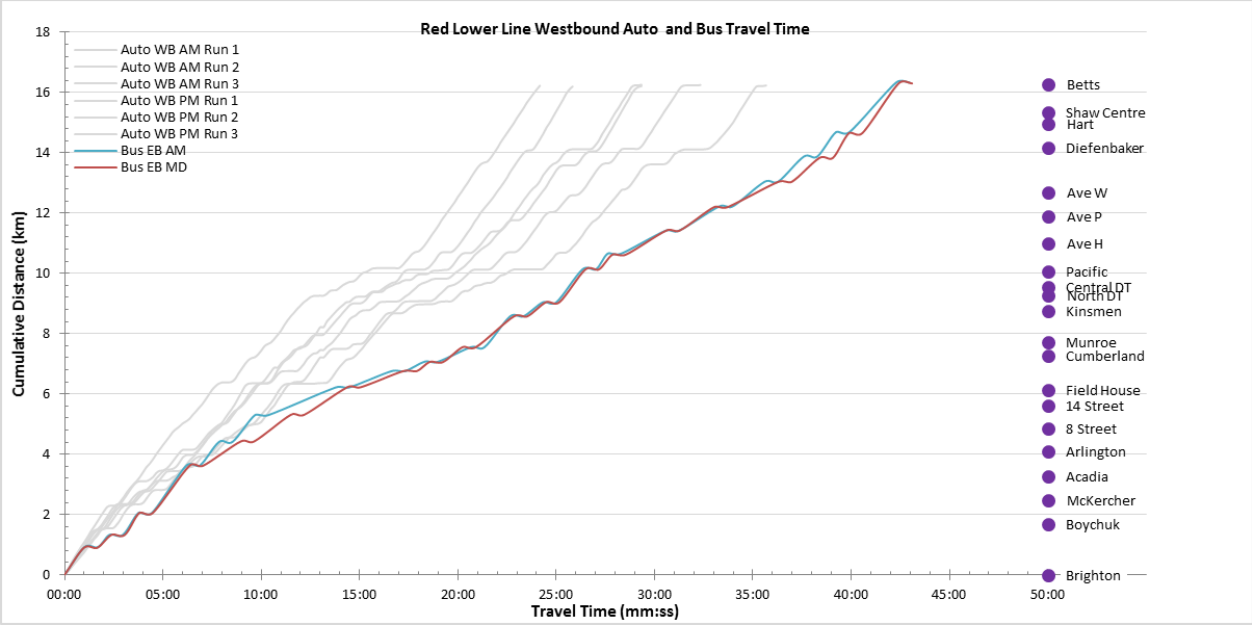


Figure 6-12: Blue Line Southbound Auto and Bus Travel Time Comparison

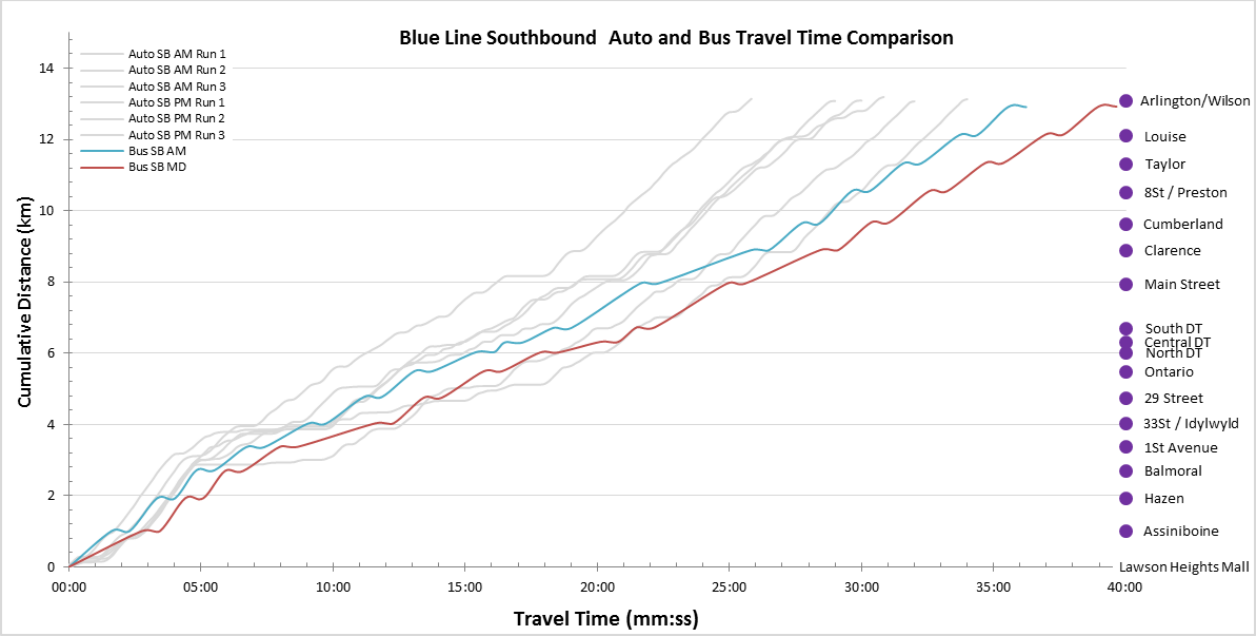
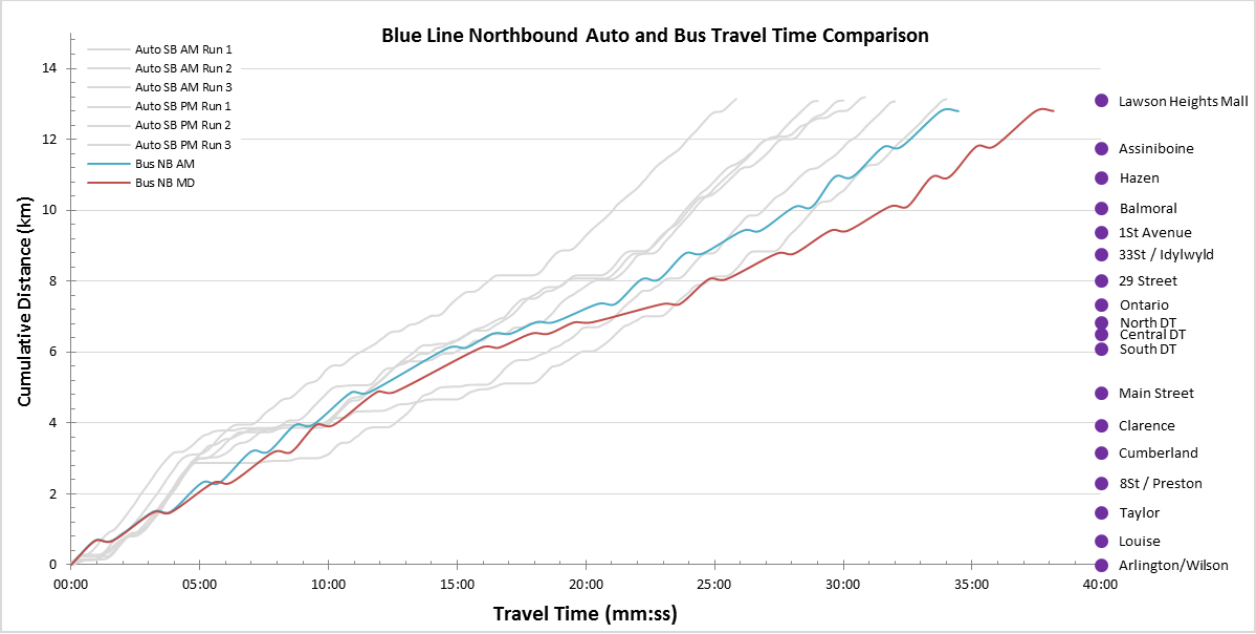


Figure 6-13: Blue Line Northbound Auto and Bus Travel Time Comparison



6.4 Existing Transit Travel Times

The planned BRT corridors will provide new higher-order transit routes for the City of Saskatoon. Several local routes currently travel along some portions of the planned corridor, but none provide direct crosstown service that the proposed BRT routes will provide.

To understand the existing transit service along the BRT corridors, transit trip times were obtained between key activity nodes and a number of the proposed transit villages, including the shopping centre at Betts Avenue, Confederation Mall, St. Paul's Hospital, Downtown, the Royal University Hospital (RUH) / U of S, University Heights Square, Centre Mall, Lawson Heights Mall and Market Mall. Travel times were estimated using Google Maps with a departure time at 8:30AM on a typical Wednesday. The travel times are summarized in **Table 6-6**.

Although multiple transit route options were available, the transit trip(s) with the shortest travel time was used to assess existing transit travel times. Direct service was available for some sections of the BRT corridors, but more than 50% of the transit trips required a minimum of one transfer. Trip times during off-peak hours are longer due to lower service frequencies and decreased service.

Table 6-6: Existing Transit Travel Times (in minutes)

Major Destination on BRT Corridors	Blairmore SC	Diefenbaker Mall	St. Patrica Hospital	Downtown Core	RUH / U of S	University Heights Square	The Central Mall	Lawson Height Mall	Market Mall
Blairmore SC		16 (0)	27(1)	28 (1)	42 (1)	59 (0)	49 (2)	54 (1)	54 (1)
Diefenbaker Mall	21 (0)		16 (0)	29 (0)	37 (0)	49 (0)	51 (1)	40 (1)	48 (1)
St. Patrica Hospital	29 (0)	21 (0)		19 (0)	33 (0)	45 (0)	42 (1)	39 (1)	47 (1)
Downtown Core	29 (0)	20 (0)	18 (0)		15 (0)	36 (0)	21 (1)	20 (0)	20 (0)
RUH / U of S	56 (1)	38 (0)	29 (1)	14 (0)		25 (0)	17 (0)	25 (0)	26 (0)
University Heights Square	79 (1)	62 (0)	51 (1)	37 (0)	34 (0)		44 (1)	48 (1)	52 (1)
The Central Mall	61 (1)	49 (1)	40 (1)	25 (0)	22 (0)	45 (1)		47 (1)	13 (0)
Lawson Heights Mall	59 (1)	44 (1)	37 (1)	23 (0)	24 (0)	52 (1)	42 (1)		53 (1)
Market Mall	71 (2)	53 (1)	40 (1)	25 (0)	24 (0)	44 (1)	12 (0)	49 (1)	

7 Traffic Conditions

This section provides an assessment of the existing traffic operations and queuing at study corridor intersections along the two proposed BRT routes. The analysis was conducted using Synchro to assess weekday AM and PM peak hour conditions on all roads along the BRT corridors. Available Synchro models for most of the roads were provided by the City and were updated to create a simple combined model, incorporating the latest traffic count data and traffic signal timing plans.

7.1 Turning Movement Count Data

The traffic analysis for the existing conditions was conducted using turning movement count data provided by the City of Saskatoon for all signalized intersections along the BRT corridors and selected other unsignalized intersections. A listing of the signalized and unsignalized intersections included in the Synchro analysis is provided in **Appendix E**. All counts were collected within the last 5 years, from 2012 to 2017. The 22nd Street & Hart Road mid-block pedestrian signals are also included. The following intersections are half signals (pedestrian signal and stop signs on the side street):

- 22nd Street & Avenue T
- 22nd Street & Avenue R
- 22nd Street & Avenue M
- College Drive & Munroe Avenue
- 33rd Street & Alberta Avenue
- 33rd Street and Ontario Avenue
- Idylwyld Drive and 32nd Street

7.2 Existing Intersection Operations

7.2.1 Analysis Methodology

Existing intersection operations were assessed for signalized intersections along the corridor.

The intersection operations analysis was conducted using the Synchro 9, Version 9.1, build 911 software, which employs methodology from the Highway Capacity Manual (HCM 2010) published by the Transportation Research Board.

The signalized intersection analysis considers two separate measures of performance:

- The capacity of all intersection movements based on a volume to capacity ratio (v/c); and
- The level of service (LOS) for all intersection movements, based on the average control delay per vehicle for each of various movements through the intersection, and for the overall intersection.

Level of service is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is

represented by a letter between 'A' and 'F', with 'F' being the longest delay. The volume to capacity (v/c) ratio is a measure of the degree of capacity utilized at an intersection.

HCM delays and corresponding level of service letter grades are shown below in **Table 7-1**.

Table 7-1: Signalized Intersection Level of Service (HCM 2010)

Level of Service (LOS)	Control Delay per Vehicle (s)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

Note: LOS derived from HCM 2010
Generally LOS A, B, and C are considered acceptable. LOS D indicates that delays are more perceptible. LOS E and F indicate notable delays but may be acceptable in urban contexts. They also indicate areas where transit priority measures will have the largest relative benefit for transit travel time reductions.

7.2.2 Analysis Methodology

The existing traffic operations for weekday AM and PM peak hours were assessed for signalized and selected unsignalized intersections (where counts were available).

An overview of the intersection level of service findings are shown in **Figure 7-1** and **Figure 7-2** for the weekday AM and PM peak hours, respectively.

Figure 7-1: Existing Overall Intersection Level of Service – Weekday AM Peak Hour

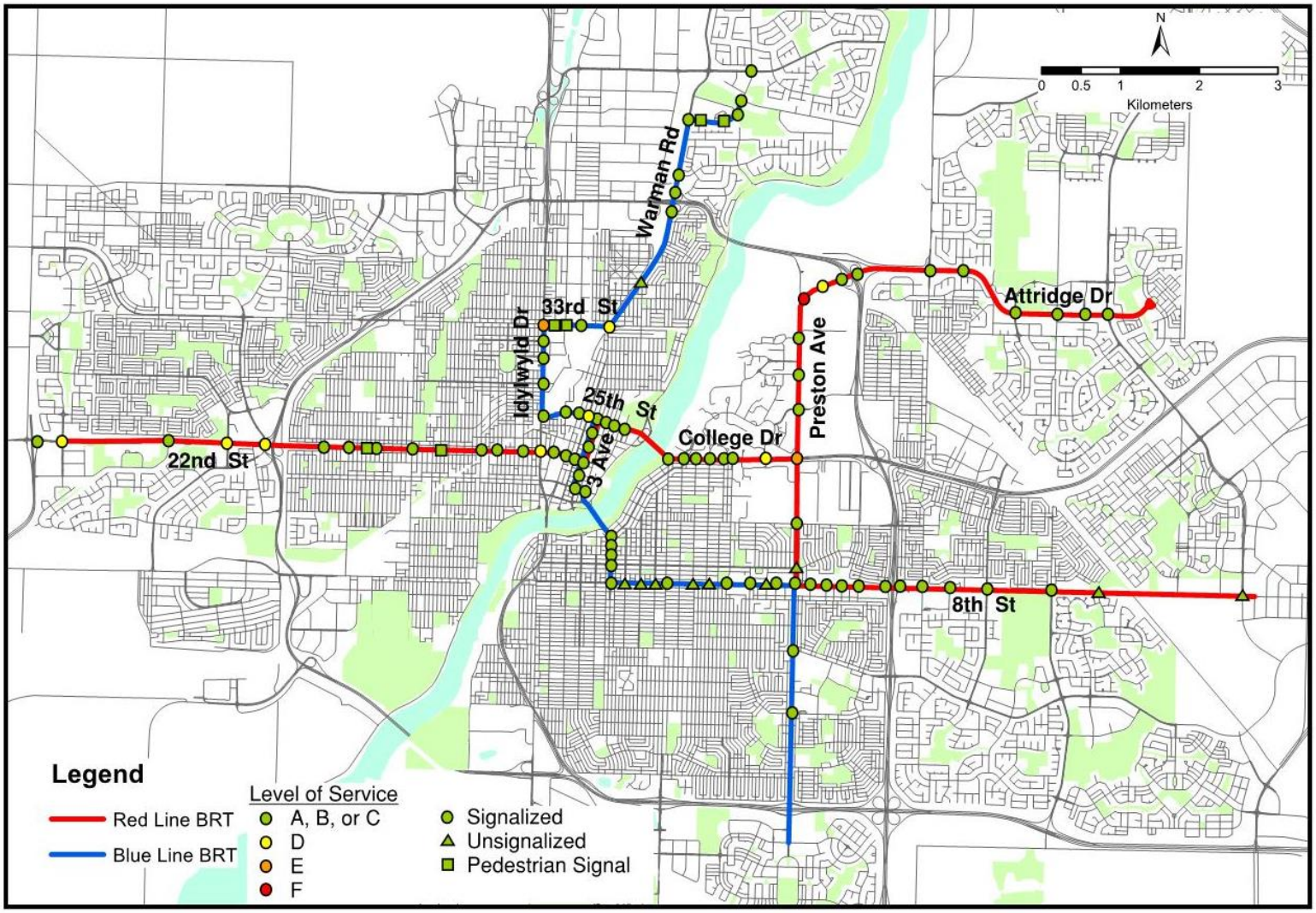
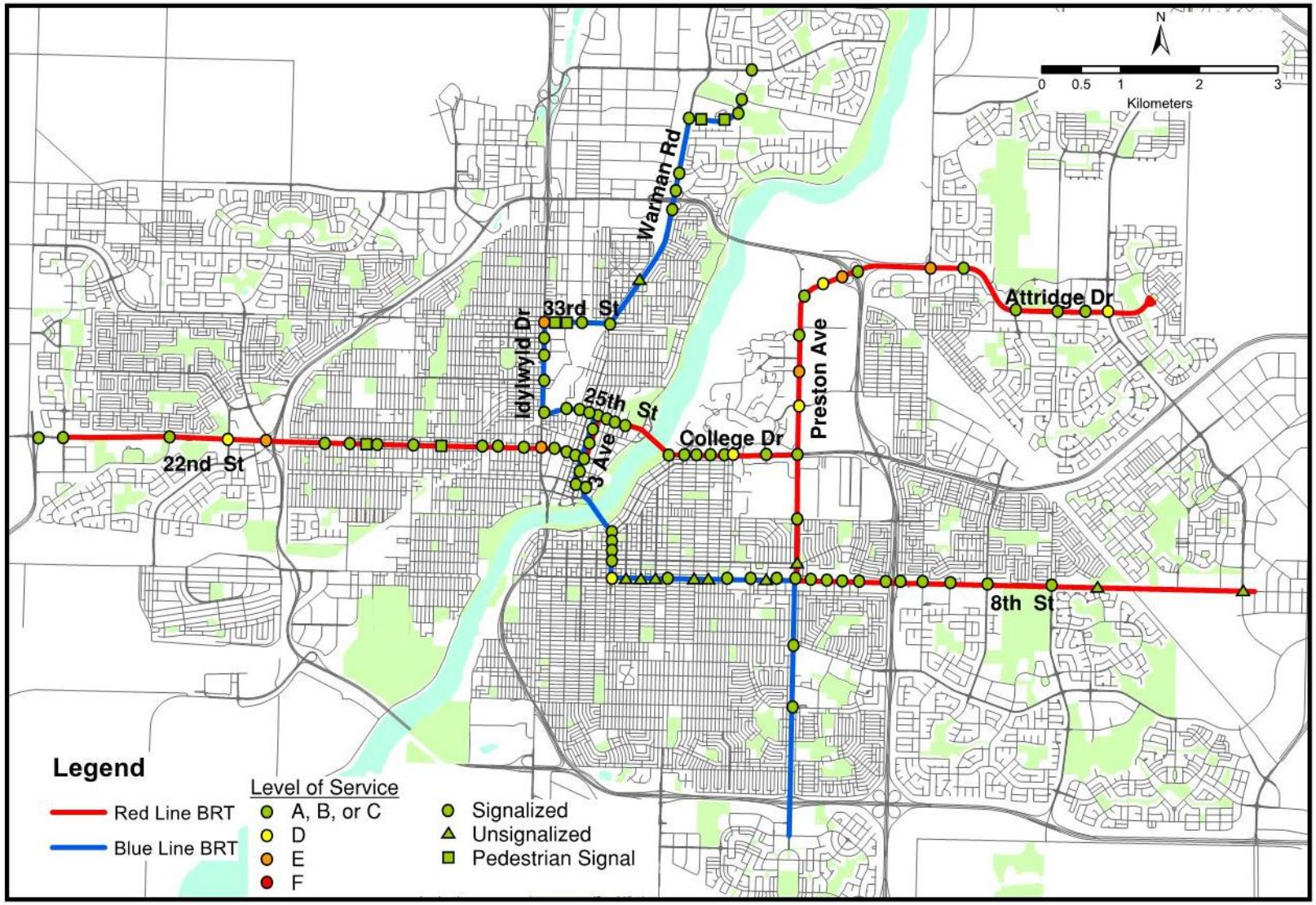


Figure 7-2: Existing Overall Intersection Level of Service – Weekday PM Peak Hour



Most intersections are currently operating with an overall level of service of LOS C or better but are individual turning movements with capacity deficiencies or long delays.

The existing traffic operations for each intersection are provided in **Appendix F**, which includes a schematic of the existing lane configuration (extracted from Synchro), and the overall intersection level of service. Turning movements operating with a volume to capacity (v/c) ratio of 1.0 or over, or with LOS E or F, are described below for each corridor.

Red Line Traffic Operation Summary
The majority of signalized intersections on the corridor (98 out of 109) are operating at a Level of C or better during the AM peak hour. All movements at these intersections are operating with v/c ratios of 1.0 or lower indicating that individual movements are operating at or better than their theoretical capacity despite some of them having delays.

Eight intersections are operating with an overall LOS of D during the AM peak hour:

- 22nd Street & Betts Avenue/Kensington Boulevard
- 22nd Street & Diefenbaker Drive
- 22nd Street & Confederation Drive
- 22nd Street & Idylwyld Drive
- College Drive & Campus Drive
- Preston Avenue & Preston Crossing (Mall Entrance)
- Warman Road & 33rd Street
- 25th Street & 2nd Avenue

Two intersections are operating with an overall LOS of E during the AM peak hour:

- College Drive & Preston Avenue
- 33rd Street & Idylwyld Drive

One intersection is operating with an overall LOS of F during the AM peak hour:

- Preston Avenue & Old Preston Avenue

Blue Line Traffic Operation Summary
The majority of signalized intersections on the corridor (97 out of 109) are operating at a Level of C or better during the PM peak hour. All movements at these intersects are operating with v/c ratios of 1.0 or lower indicating that individual movements are operating at or better than their theoretical capacity despite some of them having delays.

Six intersections are operating with an overall LOS of D during the PM peak hour:

- 22nd Street & Diefenbaker Drive
- College Drive & Cumberland Avenue
- Preston Avenue & 108th Street
- Preston Avenue & Preston Crossing (Mall Entrance)
- Attridge Drive & McOrmond Drive
- Broadway Avenue & 8th Street

Five intersections are operating with an overall LOS of E during the PM peak hour:

- 22nd Street & Confederation Drive
- 22nd Street & Idylwyld Drive
- Preston Avenue & Perimeter Road
- Attridge Drive & Central Avenue
- 33rd Street & Idylwyld Drive

At the intersections operating at LOS D, E or F, some movements are reported as operating with v/c ratios beyond the theoretical limit of 1.0. It is apparent that some movements at these intersections are approaching or at capacity and drivers are experiencing high delays. However, this could also be a result of several factors such as the timing plan. **Table 7-2** highlights all the intersections with individual turning movement v/c ratios greater than 1.0 (in red font).

Table 7-2: Intersections with v/c Ratios Greater Than 1.0 for AM and PM Peak Hours

Intersection Name	Movement Street Name	Movement	AM v/c ratio	PM v/c ratio
2nd Ave & 25th St	25th St	WBT	1.01	0.78
Idylwyld Dr & 33rd St	33rd St	EBT	1.18	1.65
College Dr & Campus Dr	College Dr	WBT	1.07	0.55
Preston Ave & College Dr	College Dr	WBT	1.11	0.56
Central Ave & Attridge Dr	Attridge Dr	EBT	0.52	1.03
Preston Ave & Old Preston Ave	Old Preston Ave	SBR	1.79	0.21
22nd St & Confederation Dr	22nd St	WBL	0.64	1.11
Warman Rd & Circle Dr S	Warman Rd	NBR	0.23	1.09
Cumberland Ave & College Dr	College Dr	EBT	0.51	1.01
Preston Ave & Perimeter Rd	Perimeter Rd	EBL	0.13	1.65
8th St & Broadway Ave	8th St	EBT	0.69	1.09

The intersection of Preston Avenue & Old Preston Avenue is operating at level of service F. This is due to high vehicle volumes exiting the Circle Drive Off-Ramp. The modeled operations in Synchro match field observations of the intersection operation.

Detailed Synchro reports are provided in **Appendix D**.

7.2.3 Intersection Queues

Intersection queuing was reviewed with a focus on through-movement queues. The 95th percentile queues were derived from the analysis using Synchro which are typically used to determine storage lane lengths for turning lanes. Often the 95th percentile queue will not be experienced due to metering effects of upstream traffic signals.

Furthermore, the 95th percentile queue represents a worst case scenario where traffic volumes for all movements peak or surge simultaneously (within a 15 minute period) and as such are considered to be somewhat conservative.

The 95th percentile through-movement queues with LOS D, E, or F for both AM and PM peak hours are shown in **Table 7-3** and **Table 7-4**. The 95th percentile queue lengths that are longer than the available storage lengths are highlighted in red.

For the western portions of the Red Line BRT, 22nd Street has no existing queuing concerns except at Confederation Drive and Diefenbaker Drive. Both intersections are operating at LOS D or F during both AM and PM peak hours. The Synchro reports indicated 95th percentile queues are long for these two intersections, due to the expressway on/off ramp at this location which causes high traffic volumes and congestion. For the eastern portions of the Red Line, Preston Avenue & College Drive is a concern in both AM and PM peak hours. The long queues also have negative impacts on adjacent intersections.

For the Blue Line, 33rd Street & Idylwyld Drive experiences long queues and high v/c ratios are experienced during both AM and PM peak hours. The long queue on Idylwyld Drive effects adjacent intersections. Warman Road and 33rd Street also has long queues and poor LOS.

Despite these queues, most intersections along the proposed BRT corridors are operating well.

Table 7-3: Existing Intersection Queue Lengths along BRT Corridors (AM Peak Hour)

Intersection Name	Movement Street Name	Movement	Available Storage (m)	95th Queue Length (m)
2nd Ave & 25th St	25th St	WBT	90	120
3rd Ave & 25th St	3rd Ave	NBT	150	30
22nd St & Confederation Dr	22nd St	EBT	120	140
Diefenbaker Dr & 22nd St	22nd St	EBT	730	110
Diefenbaker Dr & 22nd St	22nd St	WBT	180	85
22nd St & Idylwyld Dr	22nd St	EBT	85	95
Idylwyld Dr & 33 St	Idylwyld Dr	NBT	180	185
Warman Rd & 33 St	Warman Rd	SBT	400	145
Campus Dr & College Dr	College Dr	WBT	350	130
Preston Ave & College Dr	Preston Ave	NBT	375	65
Preston Ave & College Dr	Preston Ave	SBT	600	50
Preston Crossing & Attridge Dr	Attridge Dr	EBT	250	35
Preston Crossing & Attridge Dr	Attridge Dr	WBT	200	115

Table 7-4: Existing Intersection Queue Lengths along BRT Corridors (PM Peak Hour)

Intersection Name	Movement Street Name	Movement	Available Storage (m)	95th Queue Length (m)
1st Ave & 22nd St	22nd St	WBT	90	100
3rd Ave N & 25th St	3rd Ave	NBT	150	30
22nd St & Confederation Dr	22nd St	WBT	200	130
Diefenbaker & 22nd	22nd St	EBT	730	105
Diefenbaker & 22nd	22nd St	WBT	180	155
22nd St & Idylwyld Dr	22nd St	EBT	730	100
22nd St & Idylwyld Dr	22nd St	WBT	180	100
Idylwyld Dr & 33rd St E	33rd St E	EBT	85	120

Intersection Name	Movement Street Name	Movement	Available Storage (m)	95th Queue Length (m)
Idylwyld Dr & 33rd St E	Idylwyld Dr	NBT	180	210
Cumberland Ave & College Dr	College Dr	EBT	85	260
Campus Dr & College Dr	College Dr	WBT	350	145
Preston Ave & College Dr	Preston Ave	NBT	375	60
Preston Ave & College Dr	Preston Ave	SBT	600	70
Central Ave & Attridge Dr	Attridge Dr	EBT	550	350
Preston Crossing & Attridge Dr	Attridge Dr	WBT	200	40
8th St & Campbell St	8th St	WBT	190	130
Preston Ave & 8th St	Preston Ave	SBT	185	70
8th St & McKercher Dr	8th St	WBT	800	60

7.2.4 Microsimulation Modelling and Next Steps

The existing traffic assessment indicates that there are opportunities for improving the level of service, v/c ratios and queues in the study corridors. In reviewing options to support the BRT, a range of mitigation measures will be assessed including signal optimization and coordination, geometric improvements, TSP and other transit priority measures.

In addition to standard traffic analysis performed with Synchro, the VISSIM multimodal microsimulation tool will be used to analyze key segments of the BRT corridor with the above mitigation measures.

The VISSIM microsimulation model is needed to assess the effects of transit priority measures and transit signal priority, as well as innovative combinations of signal and geometric priority measures that cannot be properly analyzed using Synchro. VISSIM is also capable of simulating conditional transit priority, allowing signal controllers to assign priority based on the route, route direction, route schedule adherence, time of day, and transit vehicle occupancy.

As the City continues to evolve the intelligence capabilities of the signal controllers and controller to vehicle communication, signal phase time allocation and priority conflict resolution becomes increasingly complex. The microsimulation model can facilitate an understanding of the inherent complexities and determine the effectiveness of measures and their impacts before implementation.

7.2.5 Potential Locations for Geometric and Operational Improvements

Table 7-5 summarizes potential locations for geometric and operational improvement that could benefit both autos and transit, obtained by cross-referencing existing traffic deficiencies with the BRT movements. These locations will be investigated further during the functional planning phase of the project.

Table 7-5: Potential Geometric and Operational Improvement Locations

Roadway 1	Road 2	Turning Movement for improvement	Reverse Movement for Consideration
22nd St	Diefenbaker Dr	WBTR	EBT
College Dr	Cumberland Ave	EBTR	WBT
College Dr	Campus Dr	WBTR	EBTR
College Dr	Preston Ave	EBL	SBR
Preston Ave	Preston Crossing (Mall Entrance)	EBT	WBT
Attridge Dr	Central Ave	EBT	WBTR
Preston Ave	8th St	EBTR	WBTR
Primrose Dr	Warman Rd	WBLR	NBR
33rd St	Idylwyld Dr	NBTR	WBL
25th St	2nd Ave N	WBTR	EBTR
Broadway Ave	Main St	SBTR	NBTR

8 Existing Traffic Signal Conditions

Based on the Synchro model and signal timing plans provided by the City, it was determined that the traffic signal timings are operating sufficiently to accommodate traffic volumes present at most of the signalized intersections. The cycle length along the corridor ranged from 50s to 150s.**Figure 8-1** to **Figure 8-4** shows existing cycle lengths for AM and PM peak.

Figure 8-1: Existing Traffic Signal Cycle Length, AM & PM Peak Hour – Blue Line BRT North

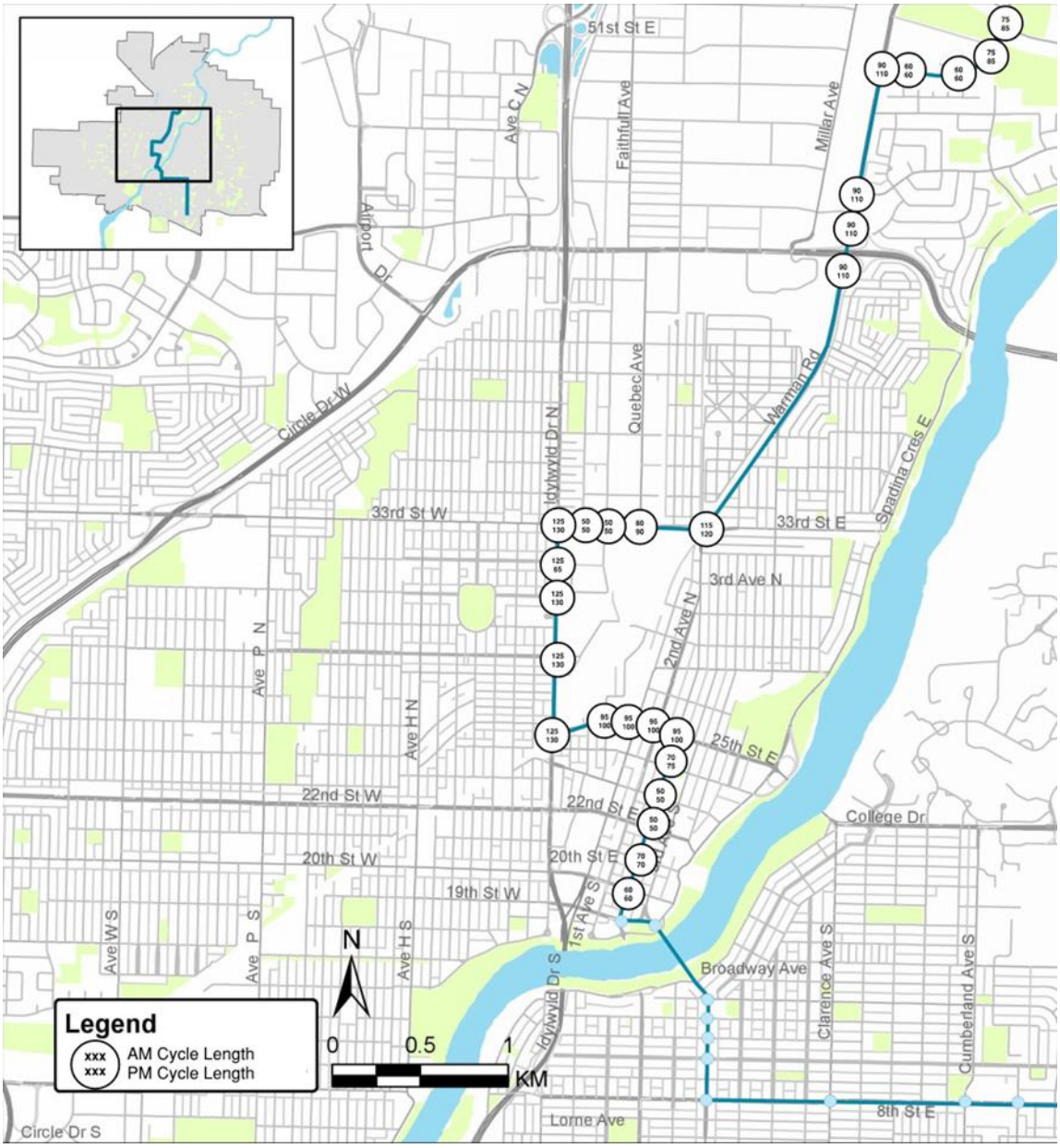


Figure 8-2: Existing Traffic Signal Cycle Length, AM & PM Peak Hour – Blue Line BRT South

Figure 8-3: Existing Traffic Signal Cycle Length, AM & PM Peak Hour – Red Line BRT West

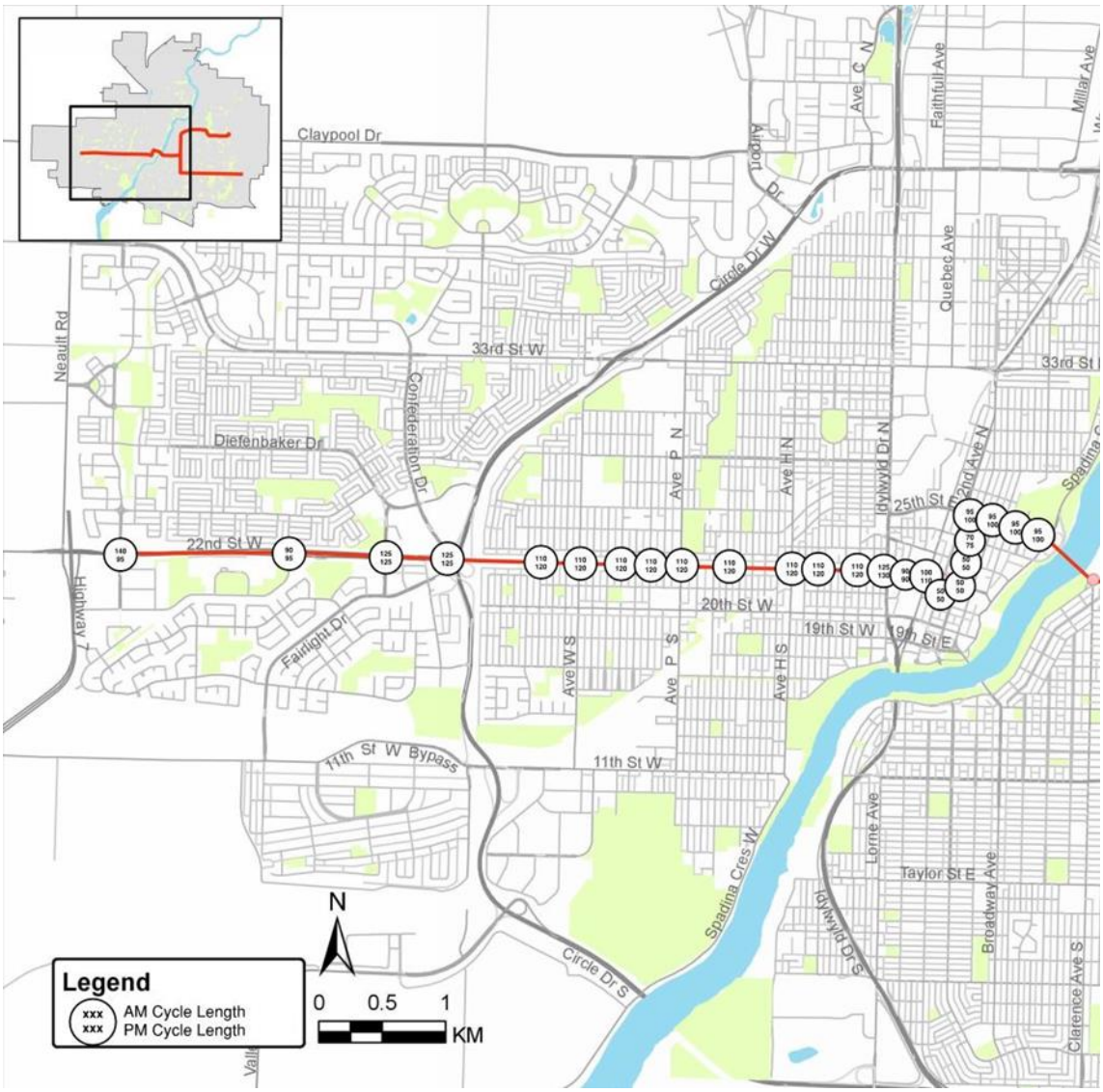
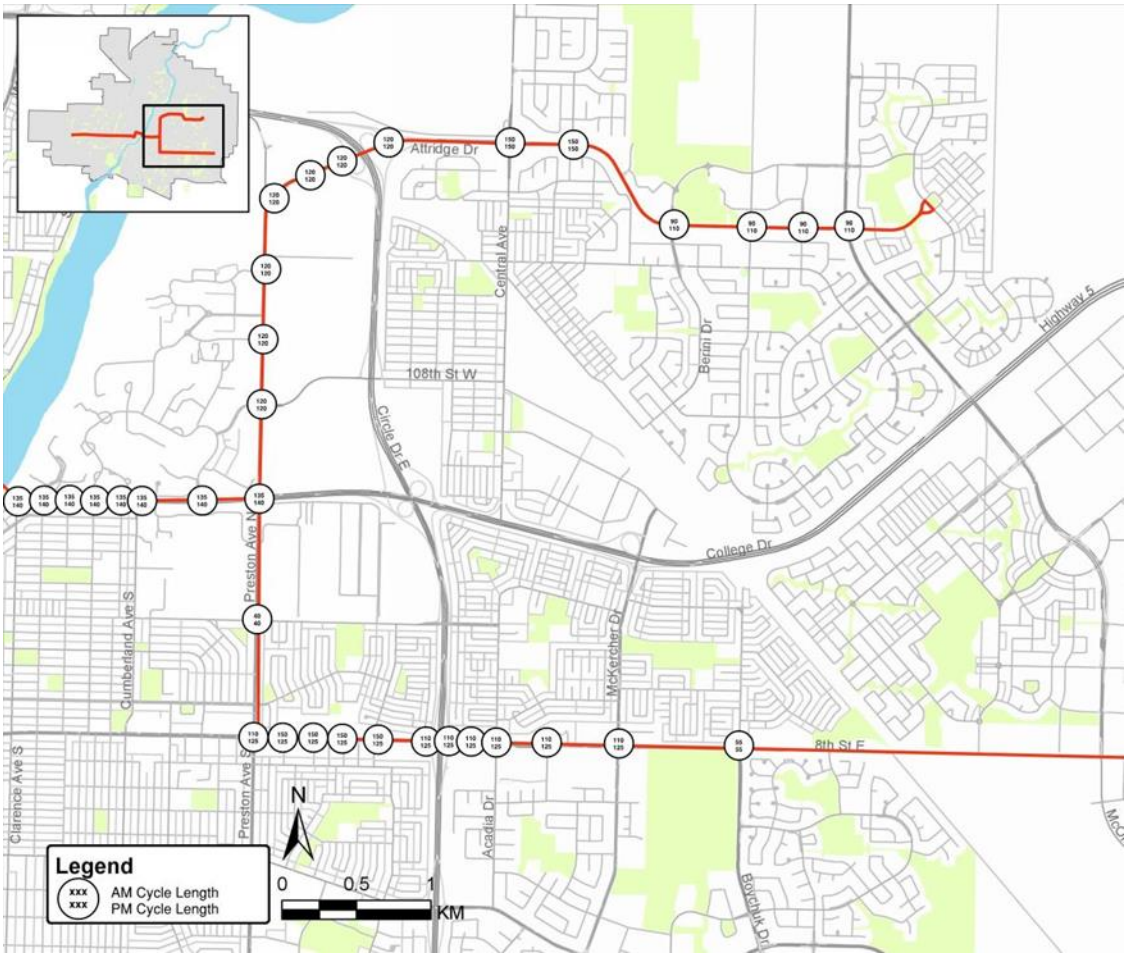


Figure 8-4: Existing Traffic Signal Cycle Length, AM & PM Peak Hour – Red Line BRT East



Most of the intersections are operating with pre-timed signal timing plans and no transit signal priority or coordination. Therefore, efficiencies can be gained through optimization or TSP. The existing signal timing plans have caused signal delays at some intersections based on the Synchro analysis. As mentioned above, future VISSIM models will be used to assess transit priority and other mitigation measures at individual intersections so that transit signal priority strategy can be applied.

9 Active Transportation

All transit customers begin and end their journey as pedestrians. Bus stops and BRT stations are the point at which customers transition from being pedestrians to passengers. Pedestrian and cycling connections to future BRT stations and the surrounding neighbourhood are critical components in creating a positive customer experience that is convenient, safe, comfortable and welcoming.

9.1 Saskatoon Active Transportation Plan

In 2016, the City of Saskatoon approved its first Active Transportation Plan (ATP). The ATP outlines several key directions related to transit:

- **Direction 1A** calls for the expansion and enhancement of the sidewalk network. Actions include the provision of sidewalks on both sides of the street, especially along major streets and transit routes.
- **Direction 1B** calls for the expansion and enhancement of the cycling network. Following the Growth Plan, the ATP specifically points to the development of multi-modal corridors on 22nd Street, Idylwyld Drive, 8th Street, College Drive, and Preston Avenue. The ATP recognizes that while these corridors serve desire lines in the cycling network, future studies are required to determine whether cyclists are better accommodated on parallel routes.
- **Direction 3B** is closely linked to Direction 1A and B in that, it calls for improving connections to transit. Actions include providing bicycle parking at high-use transit stops and terminals and improving customer experience with transit stop enhancements.

9.2 Existing Pedestrian and Cycling Infrastructure Overview

Summary maps of the missing sidewalks, crossings, and cycling infrastructure along the corridor are shown in **Figure 9-1** to **Figure 9-5**.

A more detailed description of the sidewalk and cycling inventory along each BRT segment is described in **Table 9-1**.

This information provides a high-level overview of available active transportation facilities as they relate to the BRT routes. For simplicity and alignment with directions from the ATP, only streets with sidewalks on one side or none at all have been identified.

It is important to note that the quality of the facilities and connectivity at the micro-scale will be assessed in greater detail in later stages of the project.

Figure 9-1. Sidewalk Conditions, Crossings, and Cycling Facilities along the Red Line BRT, West

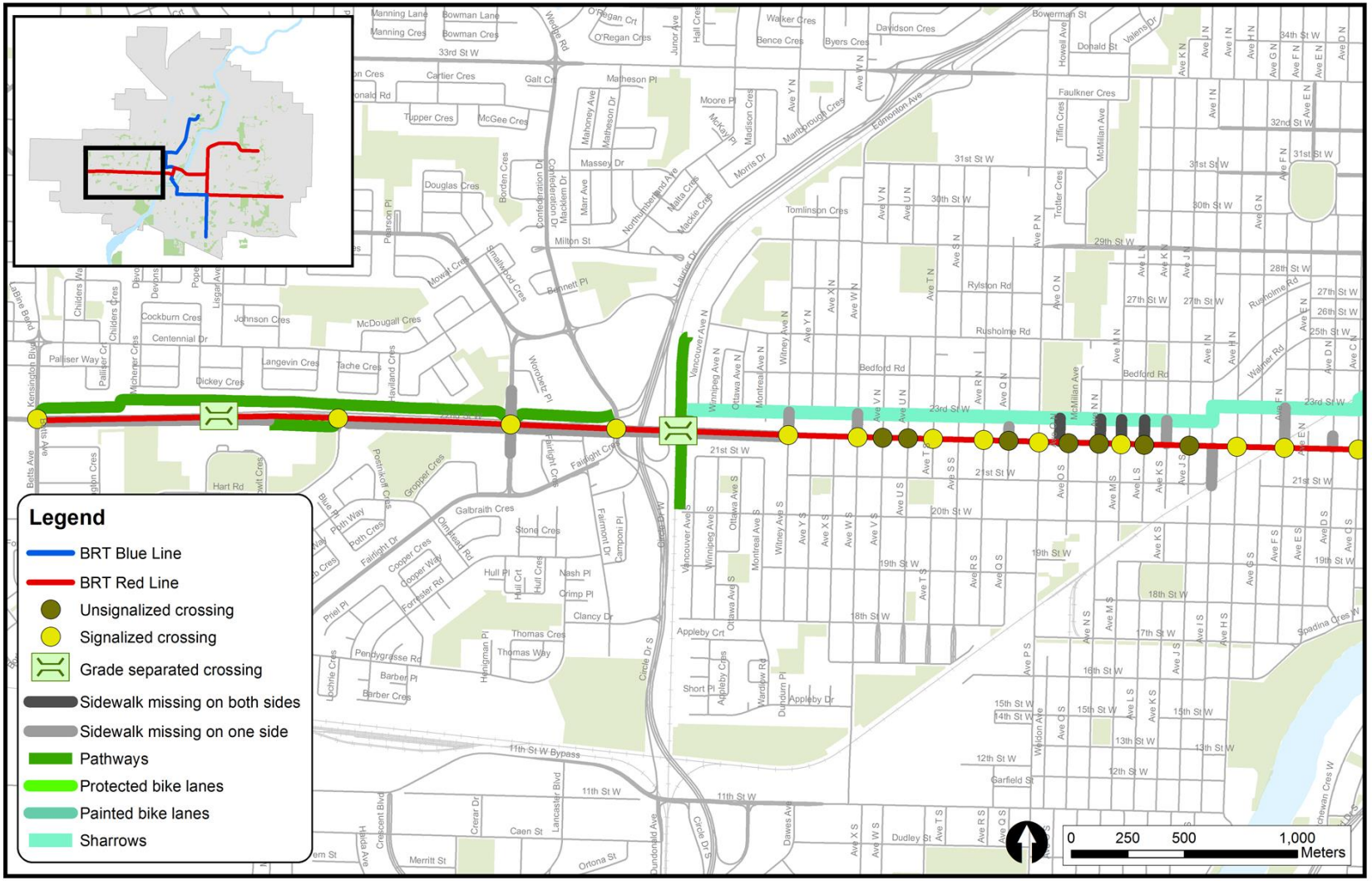


Figure 9-2. Sidewalk Conditions, Crossings, and Cycling Facilities along the Red Line BRT, Northeast

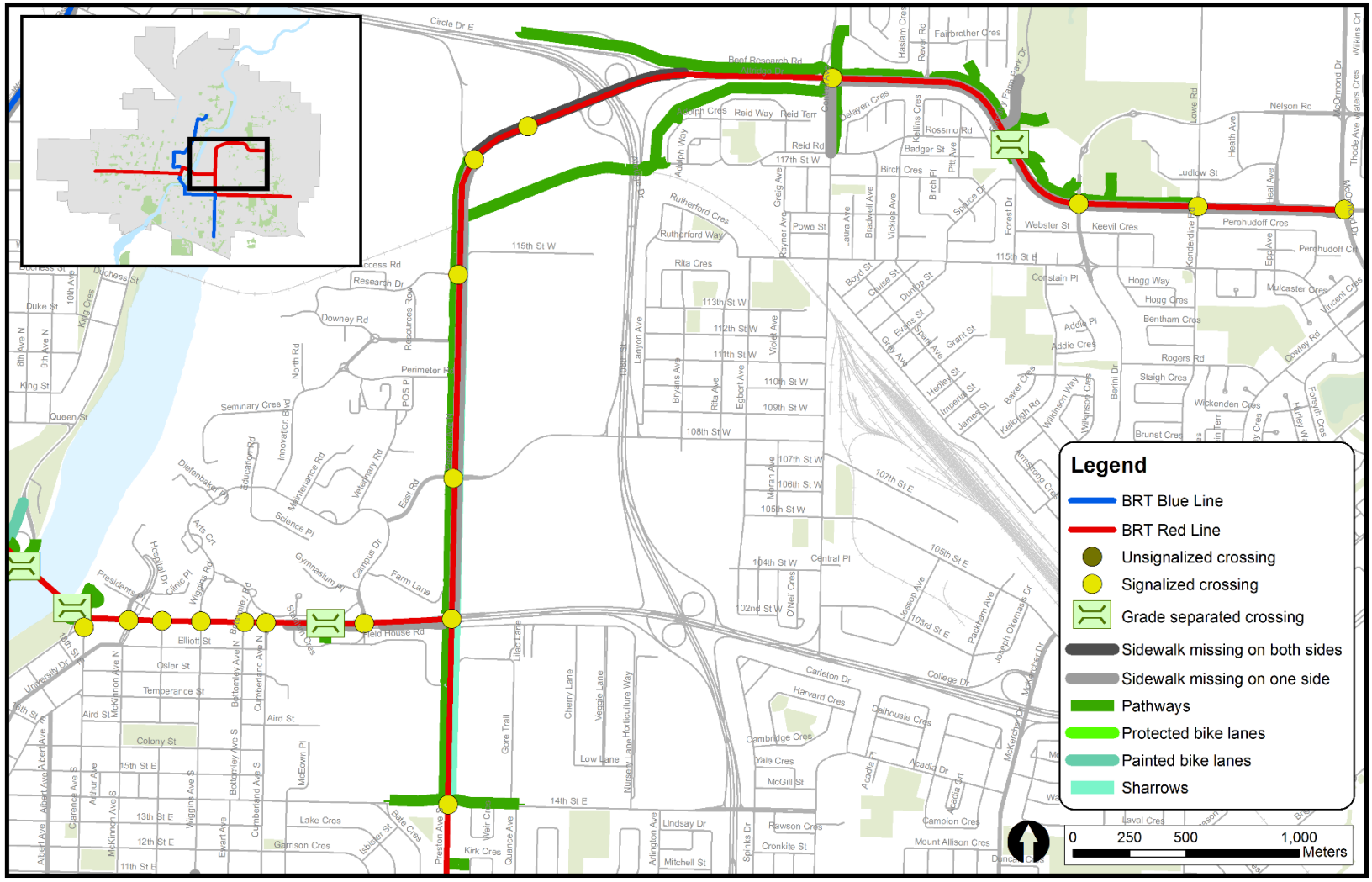


Figure 9-3. Sidewalk Conditions, Crossings, and Cycling Facilities along the Red Line BRT, Southeast

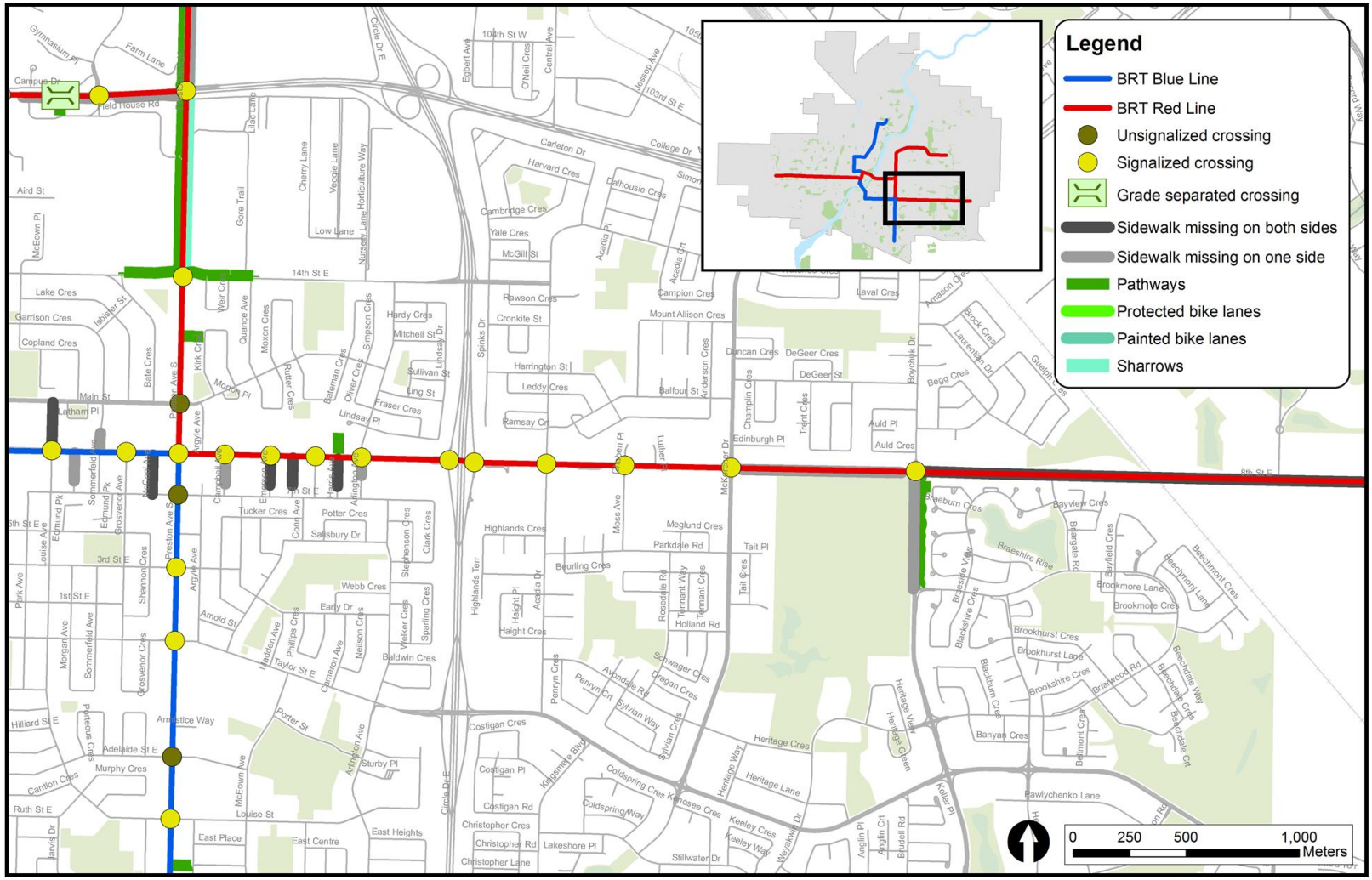


Figure 9-4. Sidewalk Conditions, Crossings, and Cycling Facilities along the Blue Line BRT, North

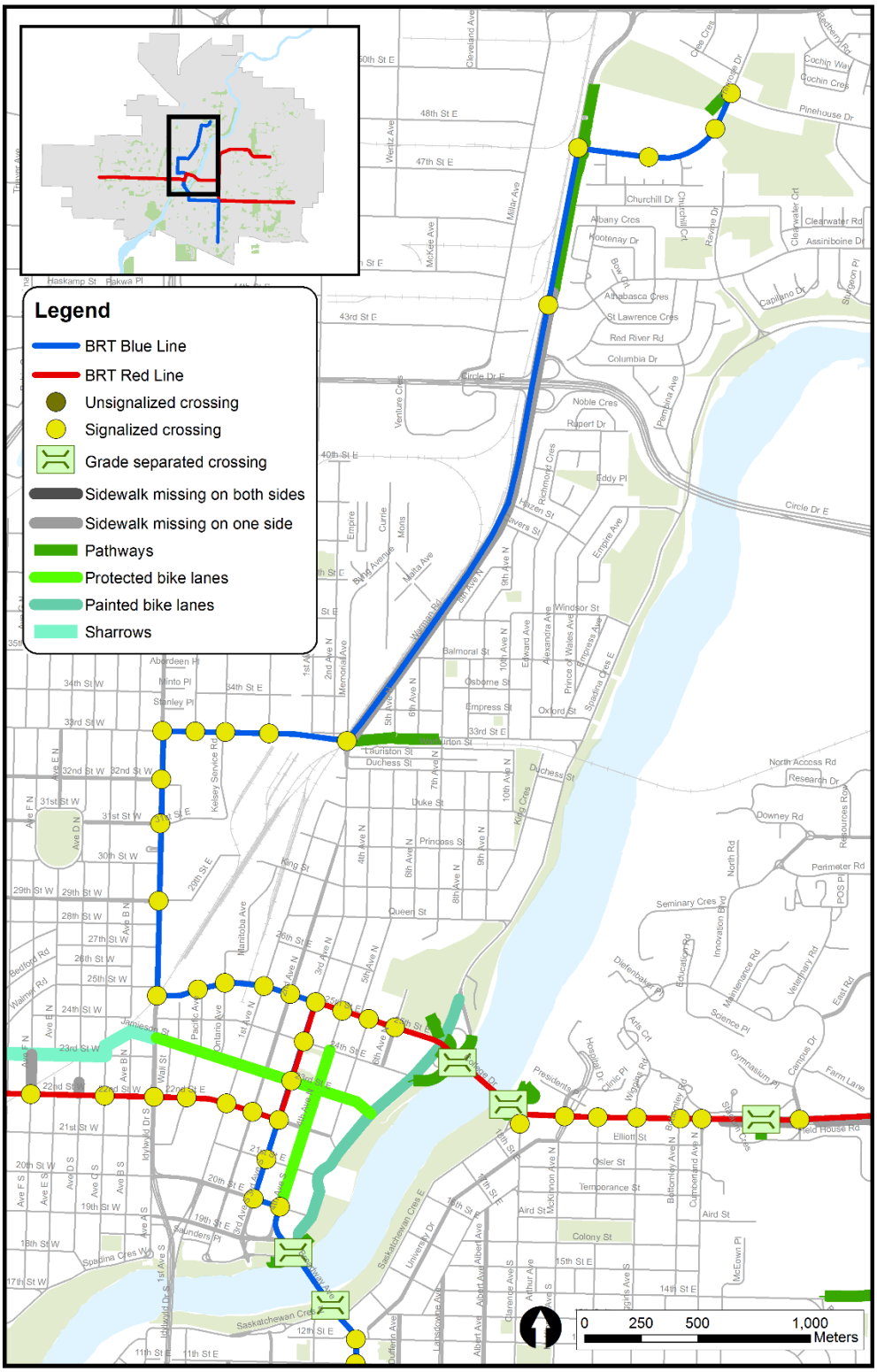


Figure 9-5. Sidewalk Conditions, Crossings, and Cycling Facilities along the Blue Line BRT, South

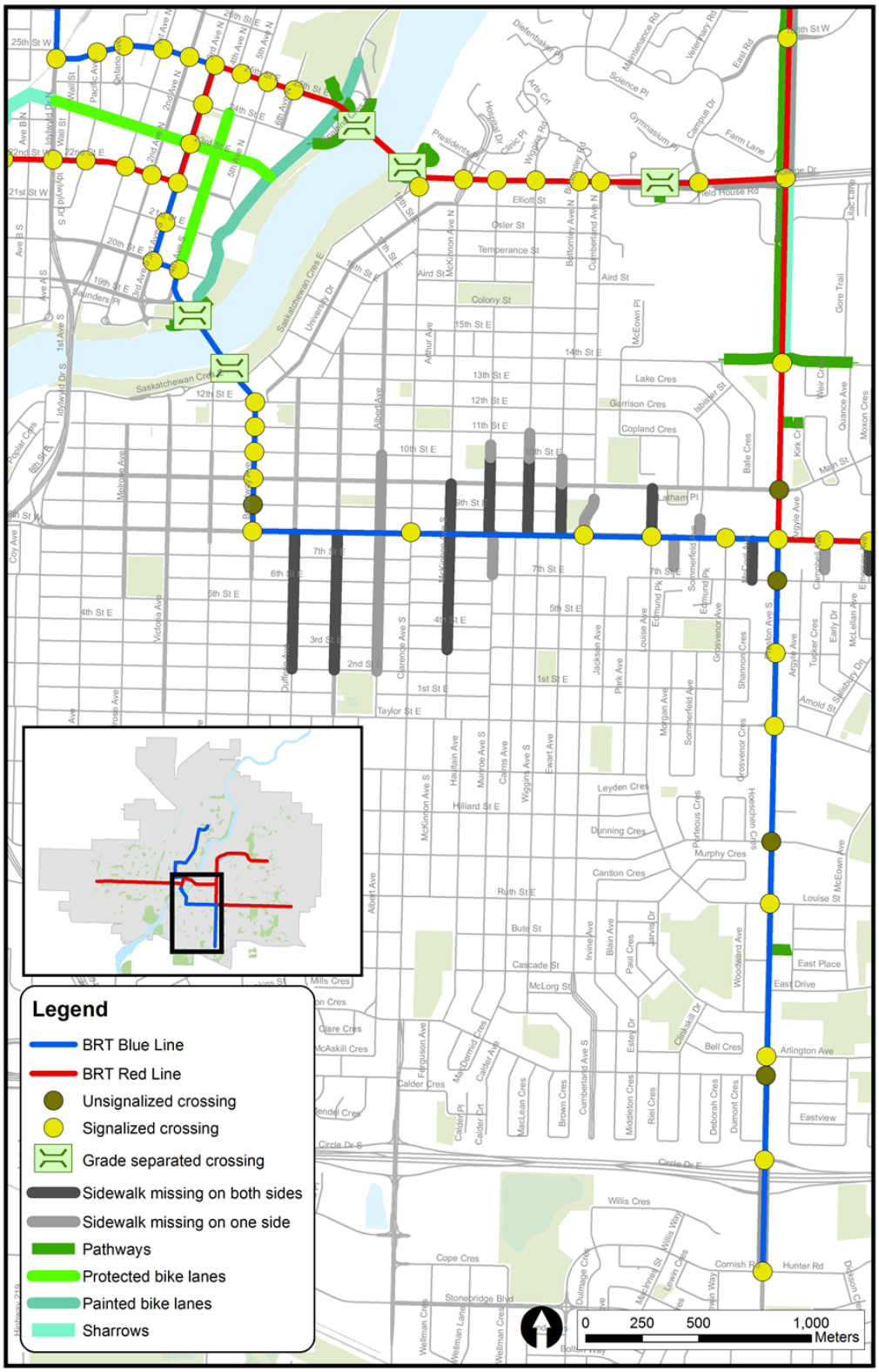


Table 9-1: Inventory of Sidewalks, Crossings, and Cycling Infrastructure along Corridor

BRT Line	Corridor Segment	Description of Sidewalks and Crossings	Description of Cycling Infrastructure and Connections

Red Line	22nd St & Betts Ave (West End) to 22nd St & Diefenbaker Dr	• Continuous multi-use paved pathway along the north side of 22nd St with connections to Betts Ave, Hart Rd and Diefenbaker Dr intersections and pedestrian overpass at Shaw Centre.
		• No pathway or sidewalk on the south side of 22nd St except for between Shaw Centre connecting to the intersection of Hart Rd & 22 St.
		• Pedestrian overpass across 22 St, connecting Dickey Crescent to the access road at Shaw Centre.
		• Signalized crossings at:
		  ○ 22nd St and Betts Ave
		  ○ 22nd St and Hart Rd
		  ○ 22nd St and Diefenbaker Dr
		• Unsignalized crossings of 22nd St with refuge in median at: Ave V, Ave U, Ave Q, Ave O, Ave N, Ave L, and Ave J.
		• Monowalk only along the east side of Diefenbaker Dr. No sidewalk along west side.
			• Continuous multi-use paved pathway along the north side of 22nd St from Betts Ave to Diefenbaker Dr.
			• Short pathway segment along the south side of 22nd St, from the Shaw Center to Hart Rd.

Red Line	22nd St & Diefenbaker Dr to 22nd St & Idylwyld Dr	• Continuous multi-use paved pathway along the north side of 22nd St from Diefenbaker to Confederation Dr. • Monowalk on north side of 22nd St from Confederation Dr to Whitney Ave. • No sidewalk along south side of 22nd St from Diefenbaker Dr to Whitney Ave, but informal worn dirt pathways are apparent from Fairmont Dr to Whitney Ave. • A pedestrian overpass crosses 22nd St east of Circle Dr (west of Vancouver Ave). • Signalized crossings at: Confederation Dr, Whitney Ave, Ave W, Ave T, Ave R, Ave Q, Ave P, Ave M, Ave H, Ave F, Ave C, and Idylwyld Dr. • Connection across northbound ramp from 22nd St to Circle Dr is signed but not marked. • At-grade rail crossing between Ave G and F. • Some cross streets are missing sidewalks on both sides of the street on the north side of 22nd St: Ave O, Ave N, Ave M, and Ave L. • Some cross streets are missing a sidewalks on one side of the street on the north side of 22nd St: Whitney Ave, Ave W, Ave Q, Ave K, Ave I (south side only) Ave F, and Ave D.	• Continuous multi-use paved pathway along the north side of 22nd St from Diefenbaker to Confederation Dr. • Connections to north-south multi-use pathway west of Vancouver Ave. • A parallel on-street bike route marked by sharrows runs along 23rd St from Vancouver Ave to Idylwyld Dr.
Red Line	22nd St & Idylwyld Dr to College Dr & Preston Ave	• Monowalks on both sides of street along the route and cross streets. • Signalized crossings at Pacific Ave, 1st Ave, 2nd Ave, 3rd Ave, 23rd St, 24th St, 25th St, 4th Ave, 5th Ave, Kinsmen Ave, Hospital Dr, Munroe Ave, Wiggins Ave, Bottomley Ave, Cumberland Ave, Campus Dr, and Preston Ave. • On east side of the University Bridge, crossing of College is provided by an underpass east of Saskatchewan Cres. • An overpass connects the Kinesiology Complex to Stadium Parkade across College Dr. • Sidewalks missing from south side of College Dr between Stadium Cres and Preston Ave.	• Protected bike lanes run along 23rd St and 4th Ave. • Painted bike lanes along Spadina Cres. • Connections to Meewasin Trail pathway system on either side of South Saskatchewan. • Connection across South Saskatchewan relies on University Bridge – either on 2.0m sidewalk or on travel lane.

BRT Line	Corridor Segment	Description of Sidewalks and Crossings	Description of Cycling Infrastructure and Connections
Red Line North	College Dr & Preston Ave to Willowgrove Blvd & McOrmond Dr	• A multi-use trail runs along west side of Preston Ave; from College Dr to Old Preston Ave there is no sidewalk on the east side of Preston Ave. • From Old Preston Ave to east of Circle Dr, there is no sidewalk on either side of Preston Ave. • A multi-use trail connects Preston Ave to the community of Sutherland. • Along the north side of Attridge Dr, an unpaved multi-use pathway runs the length of Beef Research Rd. • Central Ave, south of Attridge Dr, has a multi-use pathway along the east side. There is no sidewalk along the west side. Central Ave north of Attridge Dr is connected by a multi-use pathway on the east side. • Attridge Dr, from Central Ave to Kenderdine Rd has a multi-use pathway running along the north side. There is no sidewalk along the south side. The pathway crosses Attridge Dr via an underground tunnel east of Forestry Farm Park Dr. • Along Forestry Farm Park Dr there is no sidewalk running along the west side of the road. • Between Kenderdine Rd and McOrmond Dr there is no sidewalk along the south side of the road. • There are signalized crossings at East Rd, Research Dr, Old Preston Ave, Preston Crossing Mall entrance, Central Ave, Nelson Rd/Berini Dr, Kenderdine Rd/Lowe Rd, and McOrmond Rd.	• See sidewalk description.
Red Line South	College Dr & Preston Ave N to 8th St & Centre Mall Entrance (east of Acadia Dr)	• A multi-use pathway runs along the west side of Preston Ave from College Dr to 14th St. • Several cross streets south of 8th Street are missing sidewalks: Emerson Ave, Walpole Ave, and Harris Ave. • Campbell Ave and Arlington Ave are missing sidewalks on one side south of 8th St. • There is a four-way stop crossing at Preston Ave and Main St. • Signalized crossings at Campbell Ave, Emerson Ave, Goodwin Ave, Arlington Ave, Circle Dr ramps, Acadia Dr, Chaben Pl, McKercher Dr, and Boychuk Dr.	• A painted northbound bike lane connects College to 14th St. • A multi-use pathway connection exists between Kirk Cres and Preston Ave, and from Harris Ave to the north side of 8th St. • There is a multi-use pathway on the east side of Boychuk Dr connecting 8th St and Briarwood Rd.
Red Line South	8th St & Centre Mall Entrance (east of Acadia Dr) to 8th St & McOrmond Rd	• Between McKercher Dr and Boychuk Dr there are no sidewalks on the south side of 8th St, with the exception of a small section for a transit stop on the southwest corner of Boychuk Dr & 8th St. • Between Boychuk Dr and McOrmond Rd there is no sidewalk on either side of the road. • There are signalized pedestrian crossings at: 14th St, Campbell Ave, Emerson Ave and Goodwin Ave.	• There is a multi-use pathway on the east side of Boychuk Dr connecting 8th St and Briarwood Rd.
Blue Line	Lawson Heights Mall North Entrance to Idylwyld Dr & 33rd St	• There is a multi-use pathway/sidewalk running along the east side of Warman Dr from Primrose Dr to 33rd St. There is no sidewalk in the west side of Warman Dr. • There are signalized pedestrian crossings at: Primrose Dr and Pinehouse Dr, the entrances to Lawson Heights Mall, Primrose Dr & Warman Rd, Assiniboine Dr, Warman Rd & 33rd St, Quebec Ave & 33rd St, Ontario Ave & 33rd St, Alberta Ave & 33rd St, and Idylwyld & 33rd St.	• There is a short section of multi-use pathway connecting the intersection of Pinehouse Dr & Primrose Dr to the northwest corner of Lawson Mall. • There is a multi-use pathway running along the east side of Warman Rd, from Lawson Mall to north of Assiniboine Dr.

BRT Line	Corridor Segment	Description of Sidewalks and Crossings	Description of Cycling Infrastructure and Connections
			• At the intersection of Warman Rd & 33rd St there is a multi-use pathway connection along the rail corridor.
Blue Line	Idylwyld Dr & 33rd St to Broadway Ave & 8th St	• No issues with sidewalks of note. • There are signalized pedestrian crossings at: 32nd St, 31st St, 29th St, 25th St at Idylwyld, Kettles Pl, Ontario Ave along Idylwyld, 1st Ave, 2nd Ave, 3rd Ave, 24th St, 23rd St, 22nd St, 21st St, 20th St, 4th St, 12th St, 11th St, 10th St, Main St, and 8th St. • There is one unsignalized crossing of Broadway & 9th St.	• The 4th Ave protected bike lane ends at 20th St. • There are Meewasin Trail and Spadina Cres painted bike lane connections under the Broadway Avenue bridge on the east and west sides of the river. • Connections across the river are provided by vehicle lanes or sidewalk on either side of the bridge.
Blue Line	8th St & Broadway to 8th St & Preston Ave	• Several cross-streets have no sidewalks: ○ Dufferin Ave, Landsdowne Ave, McCool Ave south of 8th St ○ McKinnon Ave north and south of 8th St ○ Munroe Ave, Wiggins Ave, Ewart Ave, and Louise Ave north of 8th St. • Several cross-streets have one sidewalk: ○ Albert Ave north and south of 8th St ○ Munroe Ave and Morgan Ave south of 8th St ○ Cumberland Ave and Sommerfeld Ave north of 8th St	• None to note.
Blue Line	8th St & Preston Ave to Preston Ave & Circle Dr	• There are signalized crossings at: 3rd St, Taylor St, Louise St, Arlington Ave, Circle Dr ramps, and Cornish Rd/Hunter Rd. • There are unsignalized crossings at 7th St, Adelaide St, and Wilson Cres. • From Circle Dr to Cornish Rd/Hunter Rd, sidewalks exist on the east side only.	• There is a short multi-use pathway connection (catwalk) from Preston Ave to 400 East Place.

10 Road Safety Audit

A Stage 1 Road Safety Audit was conducted for locations along the proposed Red and Blue Line routes on Thursday September 29th, 2017. The safety audit identified some of the potential negative safety impacts along the corridor, with a summary provided below.

A historical collision analysis was completed for locations along the proposed BRT corridor. Bus-related collisions were summarized by severity, time of day, environmental conditions and road surface conditions. Collisions at interchange/ramp locations and left turn collisions at left turning locations for buses on the proposed BRT routes were also studied, as well as vulnerable user (pedestrian and bicyclist) related collisions.

There were a total of 182 bus-related collisions along the proposed corridors over the five year period studied. The majority of collisions were rear end or same direction side swipe collisions and resulted in property damage only. The greatest number of collisions occurred between 4:00PM and 5:00PM.

Analysis of collisions (not exclusive to bus-related collisions) at ramp/interchange locations showed that about 40% of the collisions at these locations were rear end or side swipe collisions. Due to potentially larger numbers of braking vehicles or vehicles changing lanes at these locations, it is suggested to refrain from placing bus stops close to interchanges /ramps be carefully reviewed or avoided. Further analysis could be performed if incomplete TAIS data (e.g. weather and road surface conditions) became available.

Three intersections – College Drive & Preston Avenue, 8th Street & Preston Avenue, and 3rd Avenue/Warman Road & 33rd Street – experienced more left-turn collisions compared to left turns at other intersections. Signal timing changes could be analyzed at these intersections to introduce protected left turn phases and reduce the probability of left turn collisions.

There were 288 vulnerable user-related collisions along the proposed corridors over the five year period studied. There were four fatalities, one for each year from 2013-2016.

From the site visit conducted to examine other potential safety impacts, the following improvements are suggested:

- Restrict curbside parking and waste collection near bus stops along Preston Avenue.
- Continue monitoring midblock pedestrian crossings along 22nd Street and to assess if Phase 2 and 3 improvements, such as placing pedestrian guardrails or removing pedestrian ramps from mid-block locations, would be needed to further improve safety and to minimize or prohibit crossings.
- Install anti-glare windshields and extended sun visors on buses to reduce extreme sun glare on 22nd Street.
- Increase enforcement of illegal parking along the BRT routes to prevent buses from having to switch lanes to avoid the illegally parked vehicles.
- Reduce driveway and channelized right turn conflicts at existing bus stop locations.
- Prevent bus and bicycle lane conflicts along Preston Avenue by moving the bicycle paths to the sidewalk (i.e. multi-use path or cycle track).

11 Summary

This report provides a detailed overview of the transit network within the City of Saskatoon and the existing conditions along the Red and Blue Line BRT corridors. The inventory and assessment of the existing conditions will inform the functional planning and design aspects of the project, ensure a logical plan and a comprehensive project delivery.

As stated by the Growth Plan, the goals of the transit system are to produce an exceptional experience for customers, attract new potential riders and enhance mobility for residents and visitors. The BRT lines will ensure future population growth can be managed and utilized to intensify development along corridors and in transit villages.

Understanding the existing situation will facilitate an inclusive and rigorous evaluation of the benefits the new routes would provide, ensure cost-effective improvements and priority measures are implemented and there are no undue impacts to the existing transportation system and land uses.