PART 4: CORE BRIDGES

In Saskatoon, as with many North American cities, the movement of people, goods and services is predominantly supported by the municipal road network and highway system. As previously indicated, vehicle travel is the primary mode of choice for Saskatonians. The city's road network is well developed with a distinct hierarchy of local, collector, arterial, and freeway roadways. A nearly continuous freeway route encircles the city's core providing relatively convenient travel for inter-regional traffic and a valuable option for cross-city travel. Major arterial roads lead into the city centre, supporting both passenger car and transit use, while acting as important commercial corridors.

As a city almost evenly bisected by the South Saskatchewan River, the six river crossings (including the Traffic Bridge) represent focal points of the road network and are defining elements of daily travel in Saskatoon. The city's bridges influence travel patterns in the city. In turn, these travel patterns are reflected in the performance of the bridges and road network.

Through recent planning, the City has considered ongoing build-out and improvements to the roadway network within and outside Circle Drive to accommodate planned growth in New Suburban Areas. With increased commitment toward sustainable growth patterns inside Saskatoon's core area within Circle Drive and commitment to rapid transit, the City now wishes to consider pressures on core area bridges and the surrounding networks.

This Core Bridges section of the Growth Plan explores forecast travel demands across bridges and identifies potential strategies to increase the people-carrying capacity of existing and potential future river crossings in Saskatoon's core area.

4.1 Existing Network Characteristics & Conditions

This section of the report highlights city-wide networks and travel patterns as well as the characteristics and conditions of the roadway network inside Circle Drive and across the South Saskatchewan River. It should be noted that the timing of the analysis occurred using traffic data prior to the opening of the Circle Drive South Bridge (from 2011 – 2012). The assessment contained in this report is augmented with a review of city-wide roadway network conditions after the bridge was complete and transportation model forecasts with all planned growth and roadway network improvements including the Traffic Bridge, Commuter Bridge and Perimeter Highway. Although the opening of the Circle Drive South Bridge was not explicitly examined as part of the existing conditions review, this and other planned roadway network improvements are accounted for in the future base case analysis as well as for optional river crossing improvement strategies.

4.1.1 City-wide Network and Travel Patterns

This section highlights the existing road network layout and travel patterns between key areas of the city.

- **Saskatoon's road network consists of major roadways and neighbourhood streets that serve distinct needs.** Both types of roadways provide access to a variety of destinations and fulfill travel needs for all trip purposes. **Figure 4.01** illustrates the roadway classes throughout the city, including freeway, arterial, collector, and local roads.

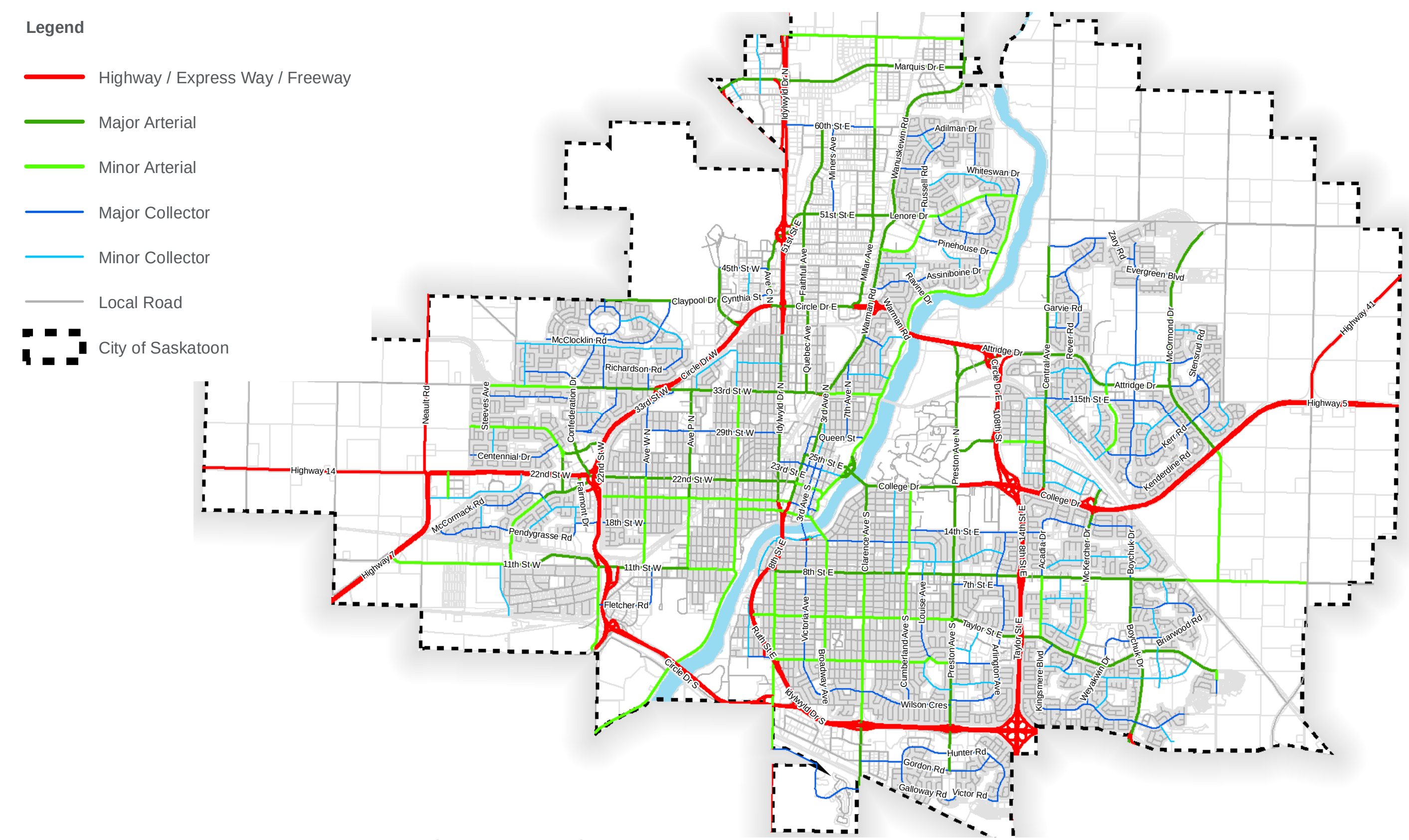

Figure 4.01 - Existing Roadway Network Classification System

- **The city's network structure inside Circle Drive is distinctly different than outside Circle Drive.** In the older, more established areas of the city inside Circle Drive, there is a grid network of urban arterials, collectors, and local roads that provide alternative and continuous east-west and north-south routes. Outside Circle Drive, the street system is more curvilinear, with fewer direct corridors and alternative routes to serve travel between areas of the City.

- **Weekday afternoon peak hour traffic is approximately 30% more than morning peak periods on roadways in many areas of the city. Figure 4.02** illustrates average weekday hourly traffic volumes crossing core screenlines around the city. These patterns indicate that the morning peak period for daily traffic across most screenlines occurs between 6am to 8am, and the afternoon peak occurs between 4pm and 6pm. The afternoon peak period is consistently higher than the morning peak across all screenlines by as much as 30%. These demand patterns are slightly different than transit ridership where morning and afternoon weekday peak period travel is generally consistent.

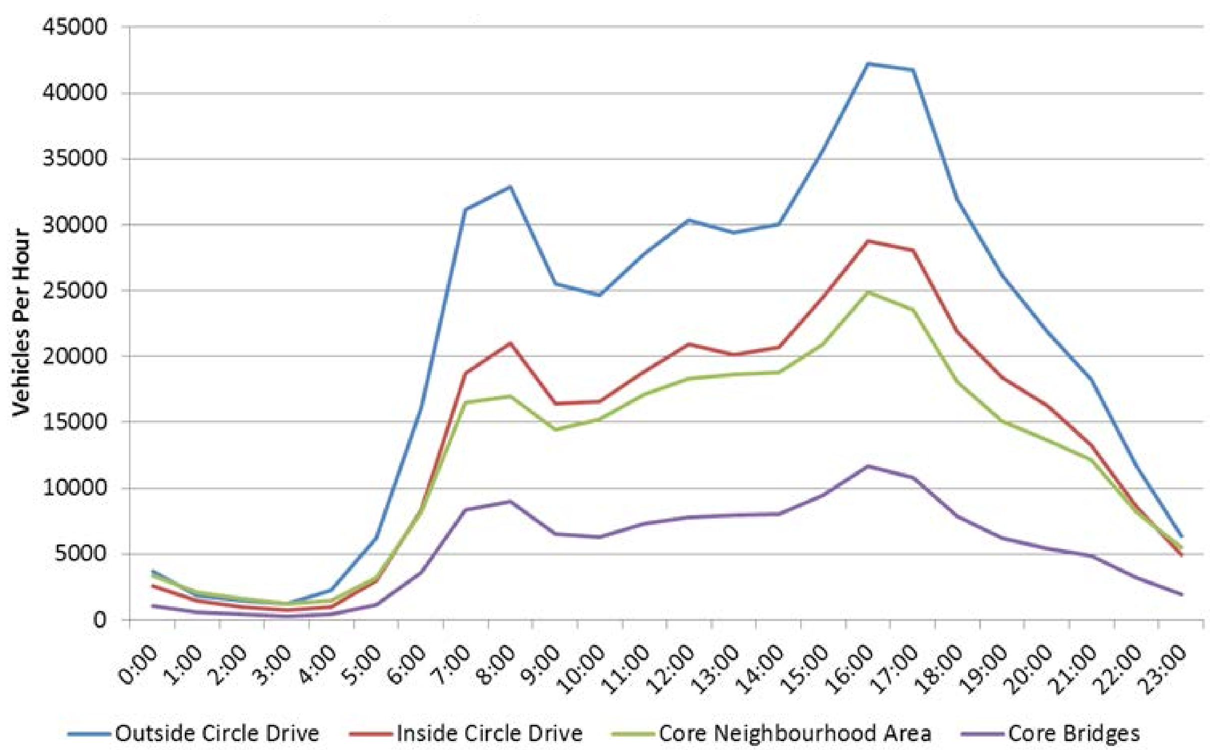

Figure 4.02 - 2011 Weekday Hourly Traffic Volumes Across Screenlines (Arterial Roads)

Note: This data represents conditions prior to the Circle Drive South bridge opening.

- **Prior to the opening of Circle Drive South Bridge, morning and afternoon peak hour traffic volumes are much higher around Circle Drive than volumes entering and leaving the core areas of the city.** Average AM and PM peak hour traffic volumes crossing core screenlines around the city are illustrated in **Figure 4.03**. The PM peak hour volumes are generally higher than the AM peak hour volumes at all screenline locations and in all directions. Traffic volumes around the Circle Drive screenlines are generally higher than the core area screenlines. This pattern highlights the important role of the Circle Drive corridor in providing an alternative route around the city rather than directing city-wide, regional and provincial traffic through the core area. It is anticipated that implementation of the Circle Drive South Bridge has further enhanced this route as an alternative to driving through the core areas of the city.

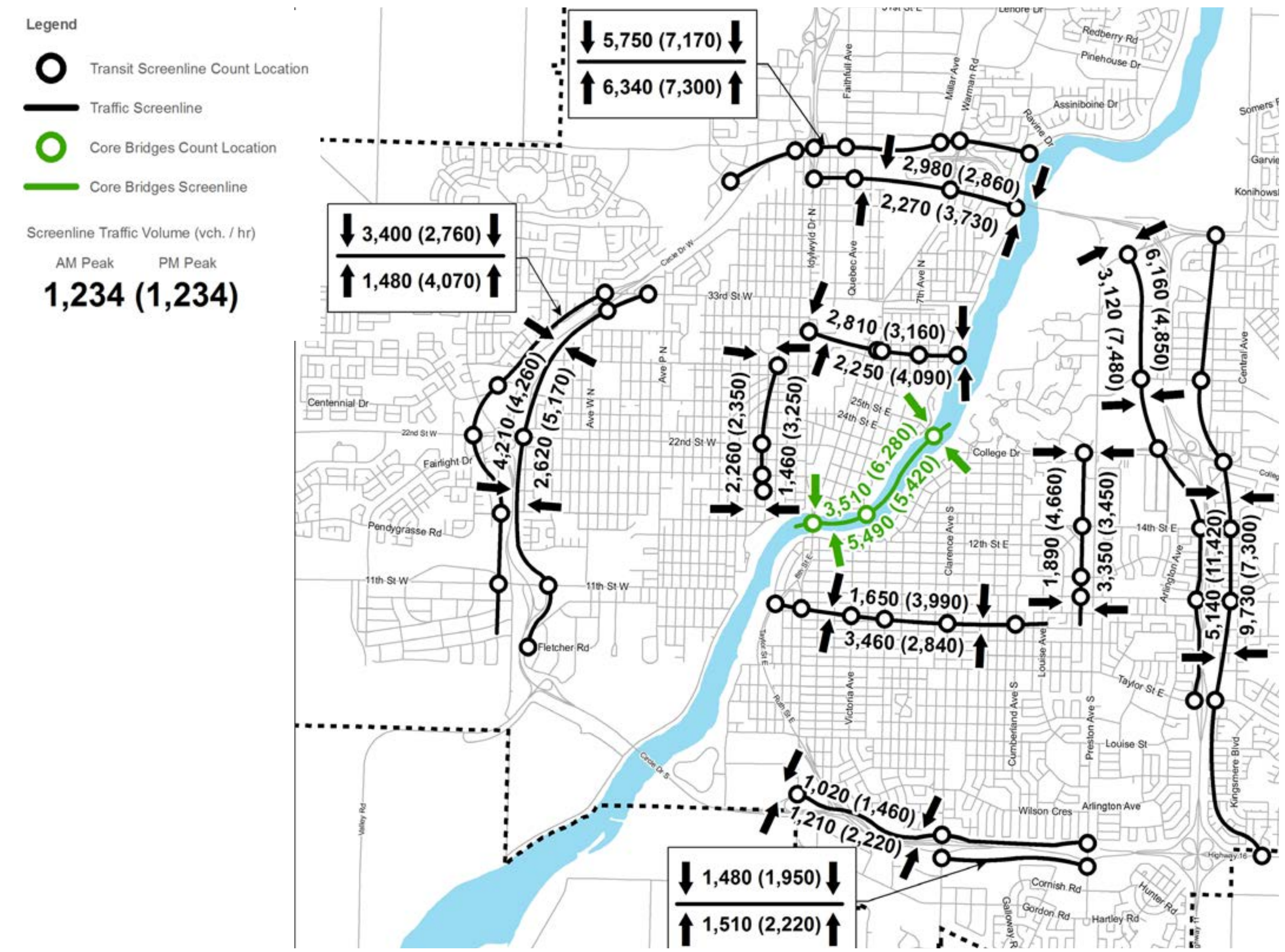

Figure 4.03 - 2013 Peak Hour Traffic Volumes Across the City (AM/PM vehicles per direction)

Note: This data represents conditions prior to the Circle Drive South Bridge opening.

Within the core area, peak directional volumes across the South Saskatchewan River suggest a higher demand toward the downtown in the morning and a balanced flow in both directions during the afternoon peak hour. Once again, these patterns are generally consistent with transit ridership where the passenger volumes are balanced in both directions across the core area bridges.

4.1.2 Core Area Networks and Bridges

Within the core area bordered by Circle Drive, the road network system may be best characterized as a traditional grid system. Additionally, the three core area bridges (i.e. Senator Sid Buckwold, Broadway, and University) significantly influence local travel patterns on either side of the river. The following discussion describes the core area bridge and network characteristics and conditions. Although the Traffic Bridge is approved for design and implementation for 2018, the existing conditions assessment does not incorporate this future connection.

- **Core Area Network and Arterial Roads.** Idylwyld Drive provides a direct highway to arterial connection to the Downtown approaching from the north and south. Other major arterial routes entering and leaving the core area of the city include 22nd Street and College Drive. These major arterials transition from six lanes to four lanes as one approaches the Downtown. Other major four lane arterials leading into the Downtown include 20th Street and 33rd Street from the west and Broadway Avenue from the south. Two lane collector roads support the arterial network and provide connections for the regular local grid system. The road networks, including number of lanes in the core area, is illustrated in **Figure 4.04**. Although there is a strong grid of major roads within the core area, river crossings and Circle Drive are "pinch points" in the network.

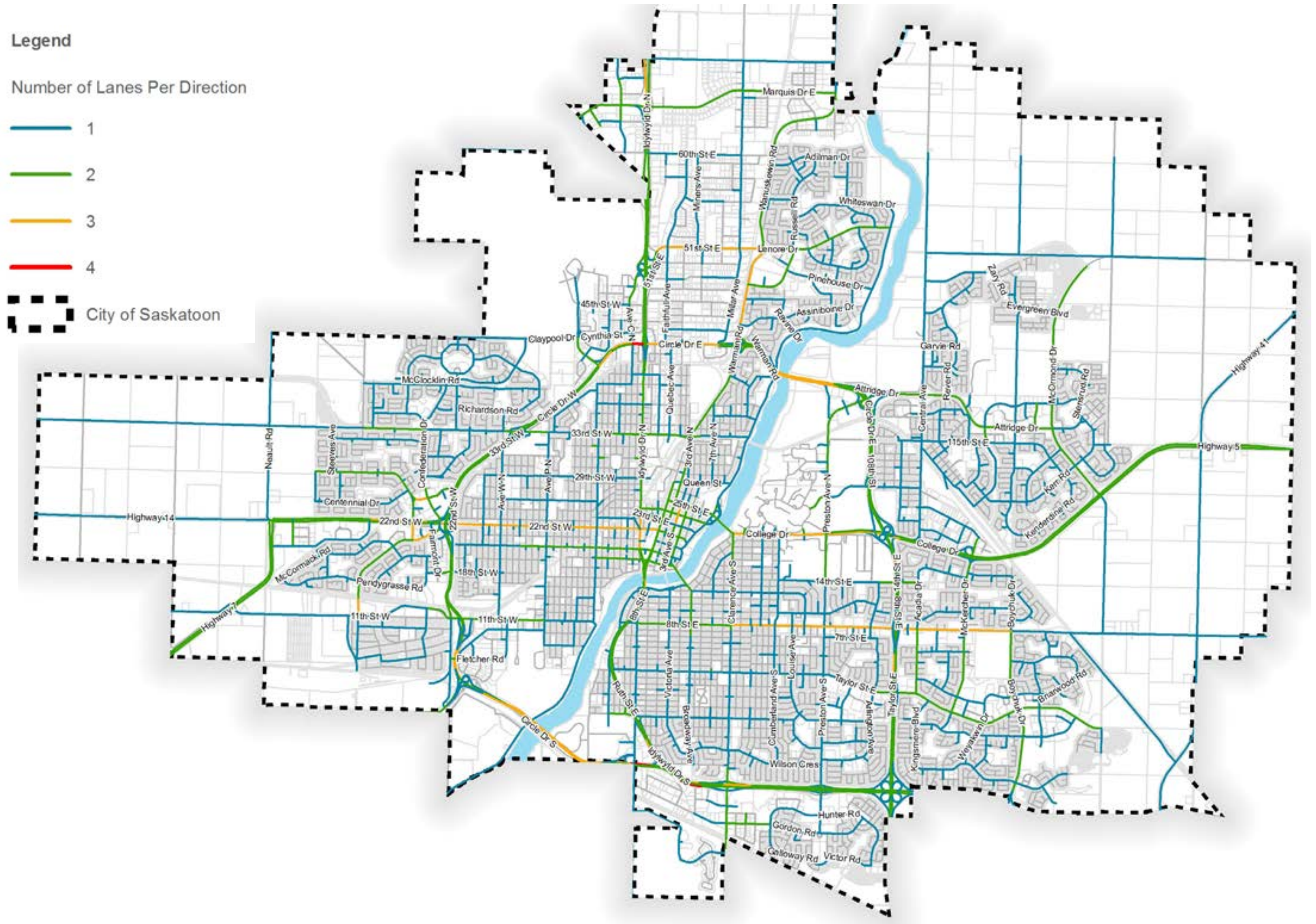

Figure 4.04 - Laning of Collector & Arterial Roads

- **The core area of Saskatoon is served by three bridges: Senator Sid Buckwold (Idylwyld Drive); Broadway; and University.** Although these bridges provide connections across the city, they increasingly serve local travel to, from, and within the core area. The University and Broadway Bridges are classified as major and minor arterials, respectively, by virtue of the roads they connect. Both bridges support two travel lanes in each direction and have separated pedestrian walkways on each side that are also shared with cyclists. The Senator Sid Buckwold Bridge is classified as a freeway from the south side of the Saskatchewan River through to the Downtown where the corridor transitions to the arterial roadways of Idylwyld Drive and 1st Avenue. This river crossing supports three traffic lanes per direction and a separated area for pedestrians and cyclists on the east side.

  The City has indicated that the structural characteristics of both the Broadway and University bridges could not support further widening for additional travel lanes or pathway facilities.

- **Prior to the opening of the Circle Drive South Bridge, core area bridges could generally support the existing peak hour traffic demands.** The Senator Sid Buckwold (Idylwyld Drive), Broadway and University Bridges connect the east and west sides of the city and the Downtown area. These three bridges provide a total of seven travel lanes in each direction and can serve up to approximately 8,900 vehicles. The assigned directional capacity per lane ranges from 1,000 vehicles per hour on crossings with signalized intersections on either end (such as the Broadway Bridge) to 1,500 vehicles per hour for bridges with grade-separated connections on either side (such as the Senator Sid Buckwold Bridge). **Table 4.01** below summarizes the existing traffic volumes and conditions in terms of volume-to-capacity ratio, as well as a level of service in the morning and afternoon peak direction. The level of service (LOS) is a measure of vehicle delay where LOS A suggests that there is no delay and LOS F indicates that there is significant delay. A minimum LOS D or better is generally used as a guideline for planning purposes.

Bridge	Number of Lanes	2012 Peak Directional Volume		Directional Capacity	Peak Directional V/C		Peak Directional Levels of Service	
		AM	PM		AM	PM	AM	PM
Sid Buckwold Bridge	3	2,390	2,890	4,500	0.53	0.64	C	C
Broadway Bridge	2	1,170	1,410	2,000	0.58	0.70	B	B
University Bridge	2	1,950	1,980	2,400	0.81	0.82	C	C
ALL CROSSINGS	7	5,510	6,280	8,900			-	-

Table 4.01 - Core Area Bridge 2012 Traffic Conditions

Note: This data represents conditions prior to the opening of Circle Drive South Bridge , and the levels of service do not reflect impacts of nearby signalized intersections.

- **Core area roads connecting to the bridges generally experience moderate delays with some isolated areas of congestion during the afternoon peak periods.** The performance of the network is generally measured in terms of delay which typically occurs at signalized intersections in urban areas. For the purposes of this review, however, the overall performance of the core area network is described using two sources of information as briefly highlighted below.

  - **Model volume-to-capacity (V/C) ratios.** The updated city-wide 2011 PM peak hour travel demand model provides V/C relationship for all corridors in the city based on a theoretical capacity of each roadway (depending on number of lanes, signals, etc.). As V/C ratios exceed 0.85 and approach 1.0, drivers will experience moderate to significant delays. Where V/C ratios exceed 1.0, traffic flow is considered to be in an unstable state and unable to serve the demand. This typically results in a breakdown of traffic flow until the peak demand subsides.

    Figure 4.05 below illustrates the modelled V/C ratios for the core area roadways prior to opening Circle Drive South Bridge. As illustrated, few areas of the network were operating beyond the capacity of the roadway with V/C ratios greater than 1.0. The model indicates that 'outbound' vehicle travel demands across the core area bridges are approaching their capacity and resulting in moderate to significant delays during the peak.

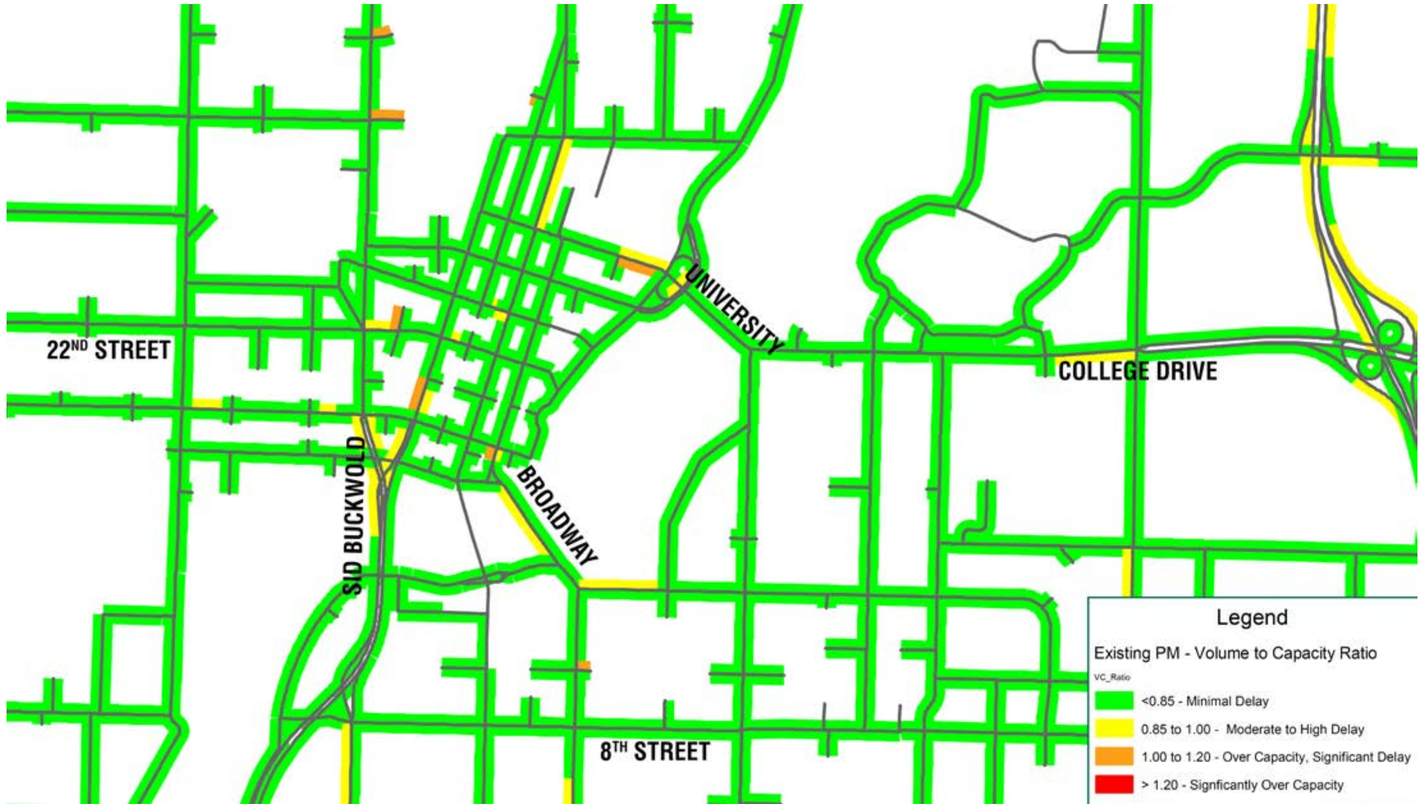

Figure 4.05 - 2011 Model PM Peak Hour Volume-to-Capacity Ratios

  - **Network travel speeds with Circle Drive South Bridge**. Recognizing that the timing for opening Circle Drive South Bridge occurred during the study, Google Maps was used to provide a streamlined approach to summarizing conditions with this significant network improvement. Although relatively new technology, Google Maps provides another perspective on typical peak period traffic conditions in Saskatoon. Google Maps provides real time traffic conditions as well as typical conditions during different periods of the day using Android cell phone data in cities throughout North America. By taking frequent samples of individual travelers, a picture of actual traffic flow conditions can be interpreted. An example of typical weekday afternoon conditions is illustrated in **Figure 4.06**. This data was taken over several days in September 2013. By comparing the Google Traffic Data to the city's existing conditions travel demand model, the resulting speed is estimated for each colour gradient.

    These results indicate that the City's network is generally operating at more than 50% of the posted speed during the PM peaks – or greater than 25km/hr on most urban roadways and higher on Circle Drive. This suggests that most corridors in the city are operating at LOS C or above and is typical for most urban areas where there is modest levels of congestion. Within the core area, the University Bridge and the south side of the Broadway Bridge are operating below 50% of the posted speed. As illustrated and experienced by many commuters, the University Bridge experiences vehicle queues extending west across the bridge from the first signalized intersection on the east side – Clarence Avenue. Similarly, the Broadway Bridge also experiences slight delay and queuing at the first signalized intersection on the south side – 12th Street – with shorter vehicle queues. Aside from these two locations, these overall patterns would suggest that most of the roadway network within the core area of the city was operating with relatively modest delay in 2013 – after the opening of the Circle Drive South Bridge.

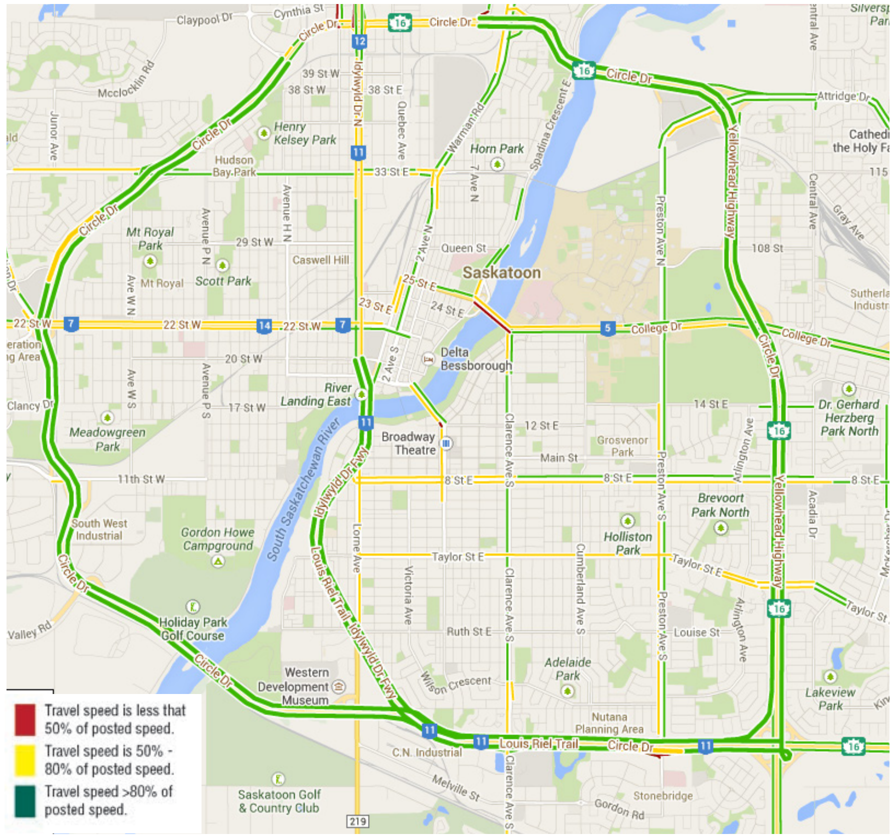

Figure 4.06 - Observed 2013 Network Performance (Google Traffic Data) - Weekday PM Peak
Source: Google Maps, 2013

4.2 Future ‘Business-as-Usual’ Network and Travel

Taking into consideration the planned population and land use changes (without Corridor Growth described in Section 2.0), in addition to the incorporation of planned road network improvements, a 30-year future ‘base’ travel projection has been developed using an updated version of the City’s transportation demand model. Using this tool, forecasted changes to travel patterns, traffic volumes, and road network/bridge performance can be projected. It should be noted that the ‘Business-as-Usual’ model scenario assumes no changes to mode choice for transit, walking and cycling.

This section of the Technical Report examines how growth is expected to influence travel patterns and the demands on the city’s road network and core area bridges. As previously indicated, the PM peak hour traffic conditions are generally 30% higher than the AM peak. Therefore, PM peak forecasts are used for the purpose of forecasting travel demands, identifying areas of congestion, and exploring possible improvements across core area bridges. It should be noted that the future ‘Business-as-Usual’ scenario includes planned growth to half a million people as described in Section 2.0 of the Technical Report. However, this assessment does not include the shift toward increased Corridor Growth as recommended in the Growth Plan. Although this form of sustainable growth is important to the transportation system, the core area bridge review would not be substantively different with Corridor Growth.

4.2.1 Planned Network Improvements

The City of Saskatoon and the Saskatchewan Ministry of Highways and Infrastructure have identified medium- and long-term network improvement projects to accommodate growth in the city and for regional and provincial travel in and around Saskatoon. This section outlines some of the more significant projects that are assumed to be part of the base condition and implemented in the long-term.

Key city and provincial road and highway improvement initiatives are illustrated in **Figure 4.07**. Selected projects most relevant to future city and regional travel patterns are briefly described below.

- **Traffic Bridge** – A few years ago, City Council approved the plan to replace the Traffic Bridge with a two lane steel truss bridge including 3 metre multi-use pathways on both sides to accommodate pedestrians and cyclists. This replacement bridge is now under construction and expected to be completed in 2018.

- **North Commuter Parkway Bridge and corridor** – The North Commuter Parkway Functional Planning Study identified the alignment and functions for a new bridge across the South Saskatchewan River. This new link is needed to connect east side neighbourhoods such as University Heights with the Marquis Industrial Area. The alignment extends Marquis Drive from the west side of the river to a McOrmond Drive extension at Fedoruk Drive. It is anticipated that truck traffic will continue to utilize the Circle Drive bridges and the future Saskatoon Freeway, noted below. The North Commuter Parkway will be constructed as a six lane roadway and bridge. Support roadway connections such as Central Avenue and others will be designed with features consistent with a town centre area as outlined in the University Heights Sector Plan. A grade-separated connection is planned for Idylwyld Drive and Marquis Drive. Construction of this new crossing of the South Saskatchewan River is also expected to be complete by the end of 2018.

- **Saskatoon Freeway and North Bridge** – This project is being planned by the Ministry of Highways and Infrastructure in partnership with the City of Saskatoon. Although the timing and phasing for implementation is unknown at this time, the Perimeter Highway will start from Highway 11 South (at Grasswood Road) and extend north to connect with Highways 5, 41, 11, 12 and 16 before ending at Highway 14 and 22nd Street West.

- **Other transportation network improvement projects** have also been identified as part of the Holmwood Sector Plan, University Heights Sector Plan, and Blairmore Sector Plan areas on the east and west sides of the city. These roadway improvement projects provide access to and from the major road system in Saskatoon and are included in all modeling and assessment of future travel demands and road network conditions. **Appendix B** lists all planned future roadway network improvements contained in the ‘Business-as-Usual’ model scenario and analysis.

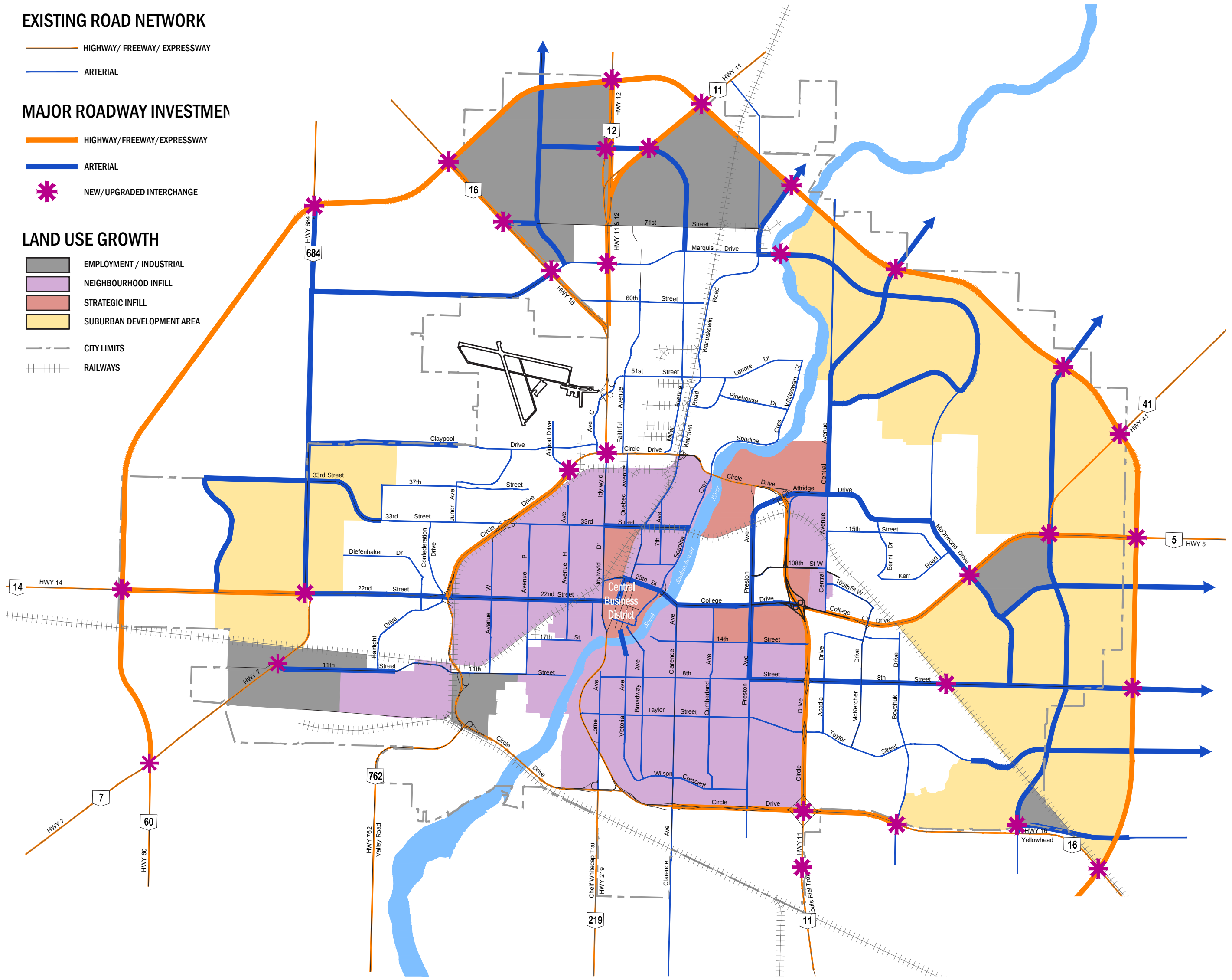

Figure 4.07 - Planned City & Provincial Long-term Network Improvement Projects

Source: City of Saskatoon

4.2.2 Forecast Travel Demands and Roadway Conditions

Growth in population, employment as well as commercial activity throughout the city will continue to increase travel demands to the areas of most significant change and place increasing pressures on the city's road network. This section of the Technical Report highlights the forecast traffic demand patterns and areas of greatest change with the planned growth and base network improvements identified by the City's and Province's current plans.

- **Over the next 30 years, the city roadway network will support 100,000 additional vehicle trips during the afternoon peak hour with planned growth and the 'base' improvements to the transportation system. Figure 4.08** illustrates the total vehicle trips generated by land uses within the city today during the afternoon peak hour as well as what is expected with half a million people. As illustrated, it is estimated that the city's roadway network accommodates approximately 86,000 vehicle trips in the afternoon peak hour today based on the transportation model. Over the next 30 years, the planned growth for half a million people is projected to result in a 220% increase to the total number of vehicle trips on the city's street system. This assumes that the mode share or the percentage of people using transit, walking and cycling remain relatively unchanged.

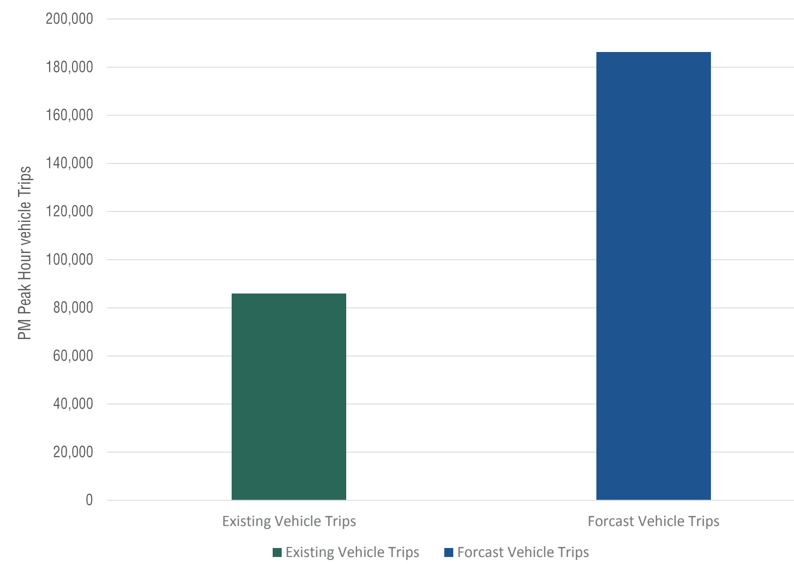

Figure 4.08 - Projected Change in PM Peak Hour Vehicle Trips

Source: City of Saskatoon Updated Model

- **Although all areas of the city will generate more vehicle travel, the North Industrial area, Downtown, University and new suburban areas will experience the largest increase in PM peak hour trip origins (see Figures 4.09 & 4.10).** These patterns indicate that while the urban areas of the city will continue to generate a significant amount of traffic, the suburban area growth will place more pressure on the street system outside Circle Drive.

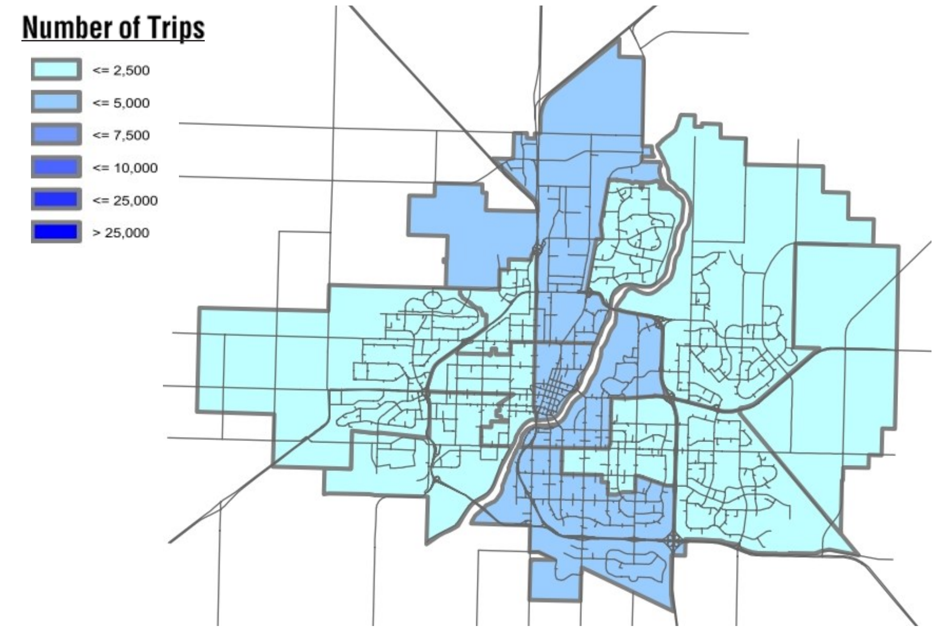

Figure 4.09 - Existing PM Peak Hour Vehicle Trip Origins

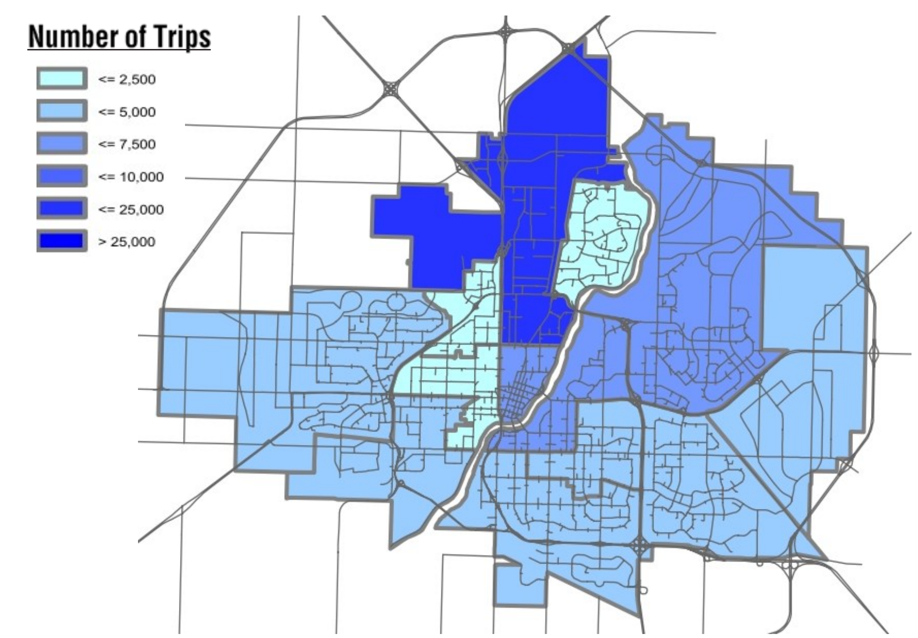

Figure 4.10 - Forcast PM Peak Hour Vehicle Trip Origins (30 year)

- **Similarly, suburban areas will experience the greatest increase in vehicle travel in the future as the highest PM peak hour destinations in the city, as illustrated in Figures 4.11 and 4.12.** Although all areas of the city are projected to grow as destinations for vehicle travel, the University Heights and Blairmore areas are projected to generate the most vehicle trips during the PM peak hour in the long-term.

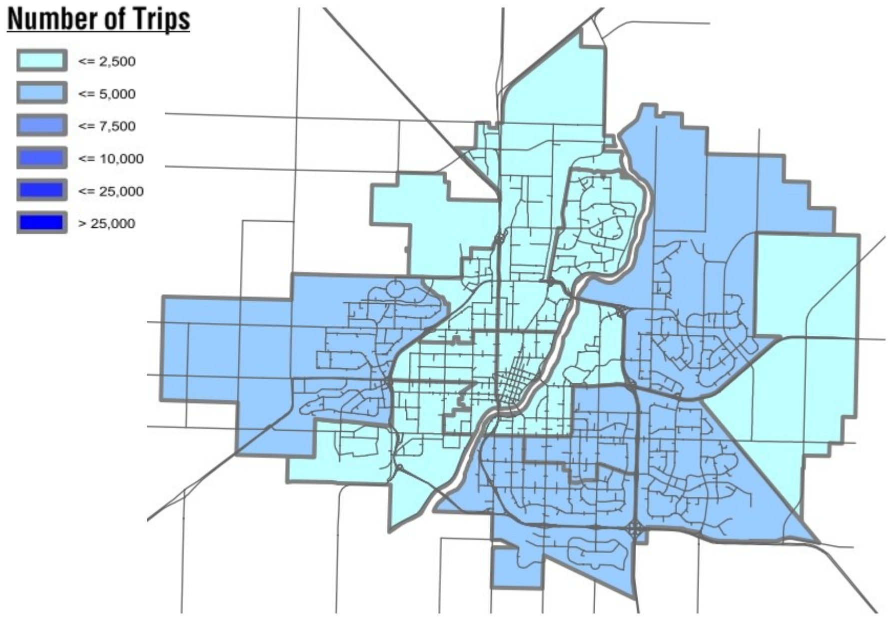

Figure 4.11 - Existing PM Peak Hour Vehicle Trip Destinations

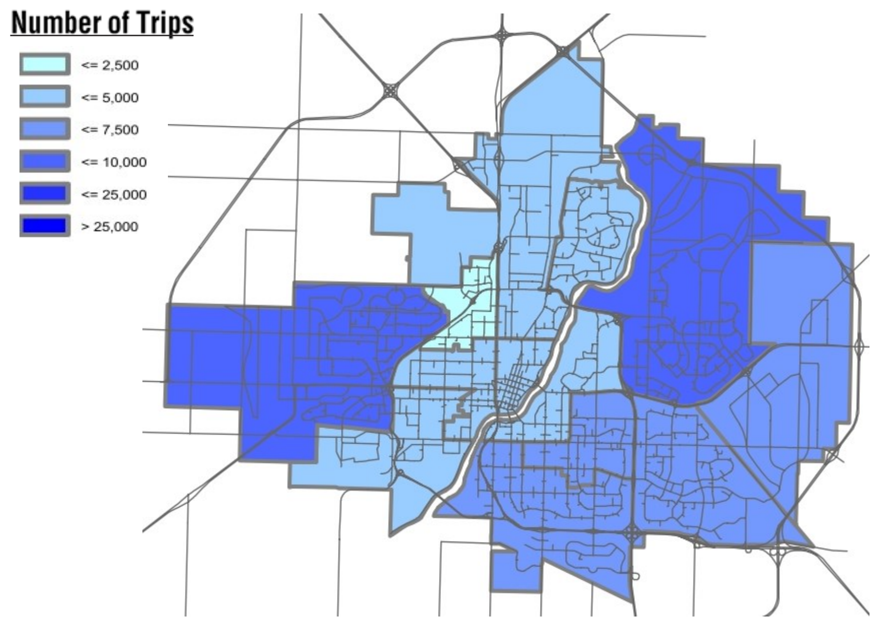

Figure 4.12 - Forecast PM Peak Hour Vehicle Trip Destinations (30 year)

- **As expected, the largest increases in PM peak hour vehicle travel are along select major roadways within and peripheral roadways outside and including Circle Drive. Figure 4.13** illustrates the projected long-term vehicle travel per direction on existing and planned roadways throughout the city over the next 30 years. These patterns suggest that some of the greatest and most significant change will be on roadways such as Circle Drive and adjacent networks connecting to this corridor as well as the planned Saskatoon Freeway. Leading to and from the core areas of the city, Idylwyld Drive, 22nd Street, Broadway Avenue, College Drive and Warman Road will see the largest increases in arterial road traffic.

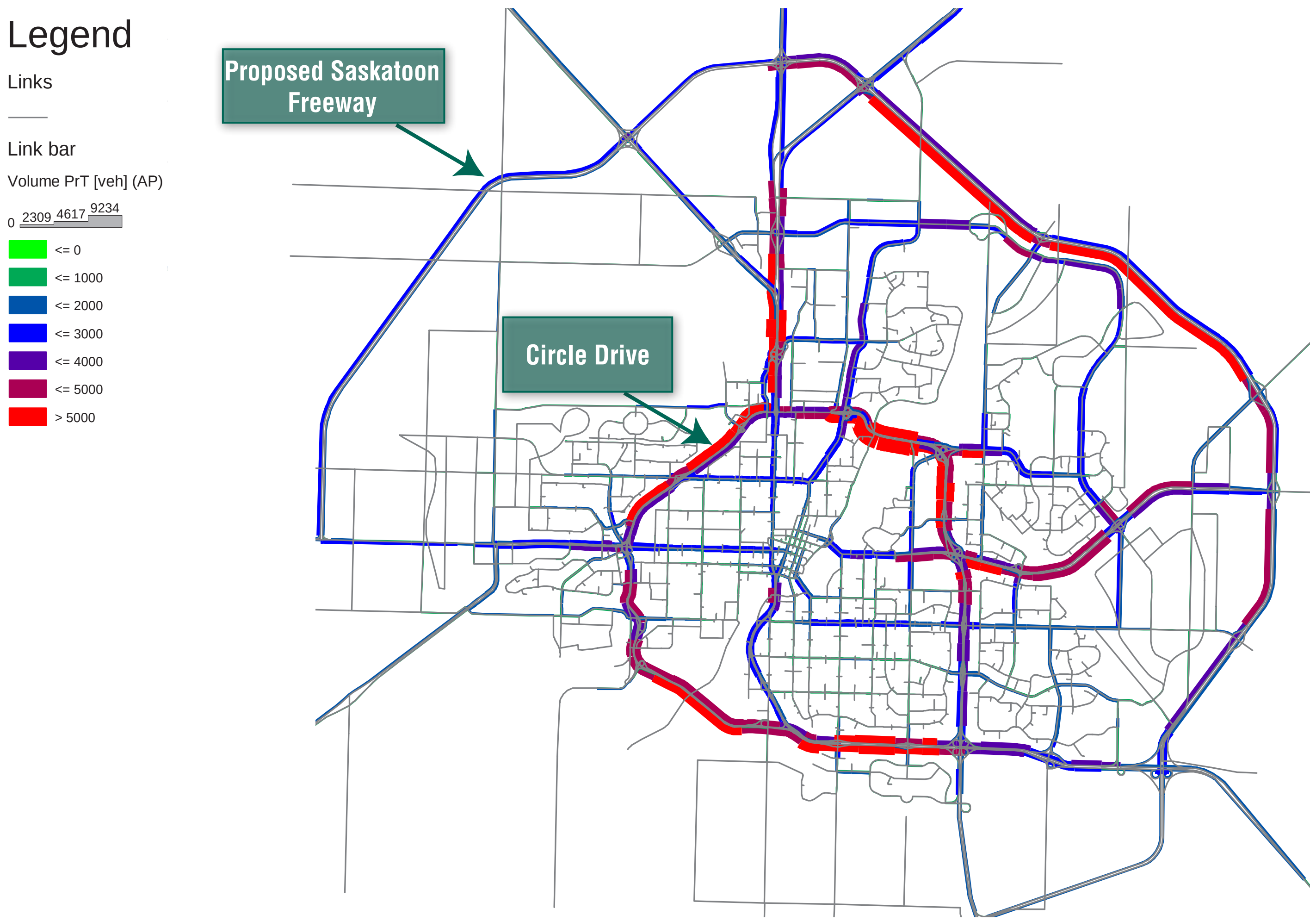

Figure 4.13 - Projected PM Peak Hour Model Directional Volume with Half a Million People

- **Although traffic on core area bridges and streets does not increase as much as in the outer areas, vehicle travel demands across the river are projected to increase by as much as 3,700 vehicles in the peak directions and 2,500 vehicles in the off-peak directions. Figure 4.14** illustrates the projected increase in PM peak hour directional traffic on all major screenlines in the downtown area. It should be noted that the transportation model includes the City's plan for half a million people as well as the planned roadway networks illustrated in **Figure 4.07**. While most individual corridors accommodate over an additional 1,000 vehicles per direction, traffic on the core area bridges is projected to increase to 5,500 and 6,300 in the morning and afternoon peak directions, respectively (a 60% to 75% increase).

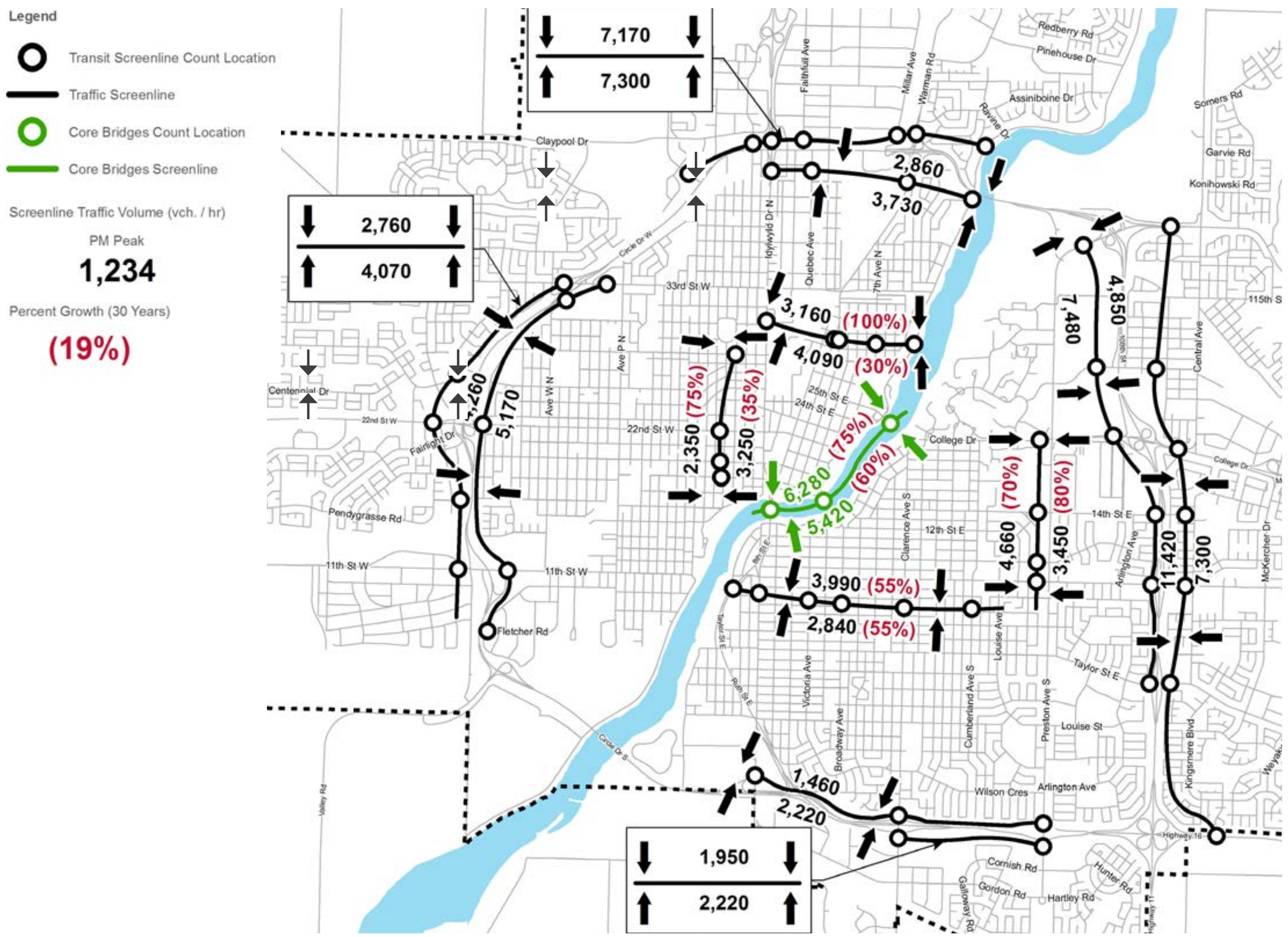

Figure 4.14 - Projected PM Peak Hour Directional Volume Growth (PM % Traffic Growth (30 Years))

- **Most core area bridges are projected to continue serving localized traffic as opposed to through traffic without an origin and/or destination in the core of the city.** Using the transportation model, **Figure 4.15** illustrates the forecast PM peak hour trip origins for vehicle trips across each of the core area bridges (otherwise referred to as the east / south flow bundles in the transportation model). As illustrated, a majority of the vehicle trips travelling east and south across the Senator Sid Buckwold, Traffic, Broadway and University Bridges begin inside the core areas of the city inside Circle Drive. In fact, a majority of the forecast vehicle trips originate from the downtown core area of the city during the PM peak hour. Although the Senator Sid Buckwold Bridge is forecast to principally serve core area travel in the long-term, PM peak origins extend to areas outside Circle Drive.

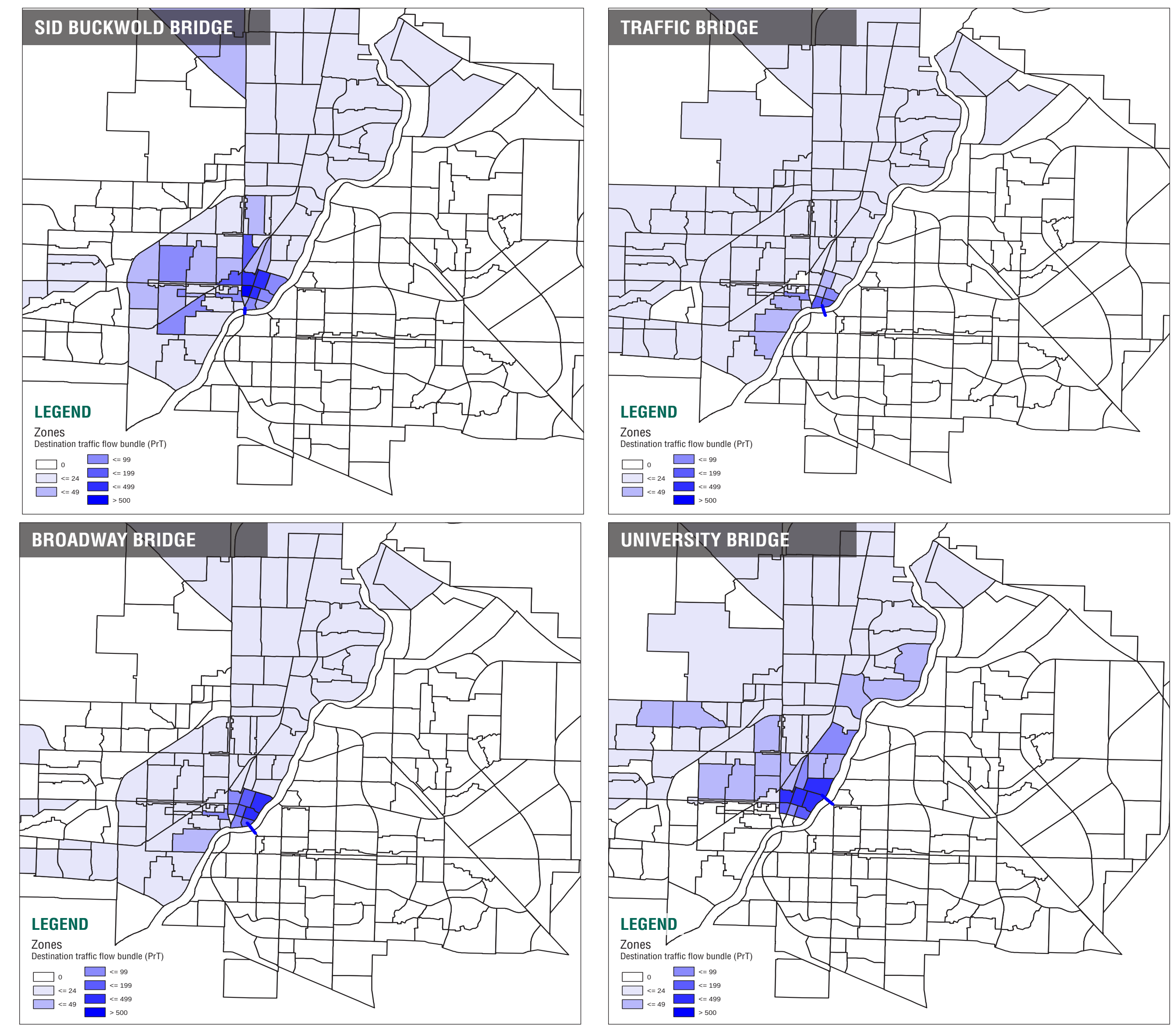

Figure 4.15 - Forecast PM Peak Hour Model Trip Origin Patterns for Core Area Bridges

- **Increased traffic demands on core area roadways are projected to significantly increase delays as the PM peak hour traffic volumes exceed the available capacity on several streets and each river crossing.** Projected 30 year PM peak hour volume-to-capacity (V/C) ratios are illustrated for the core area roads and bridges in **Figure 4.16**. Where v/c ratios exceed 0.85 and approach 1.0, traffic conditions and performance can be expected to begin to degrade resulting in increased congestion, slower speeds, and increased delays. Where v/c ratios exceed 1.0, traffic flow is considered to be in an unstable state and unable to serve the demand, typically resulting in a breakdown of traffic flow until the peak demand subsides.

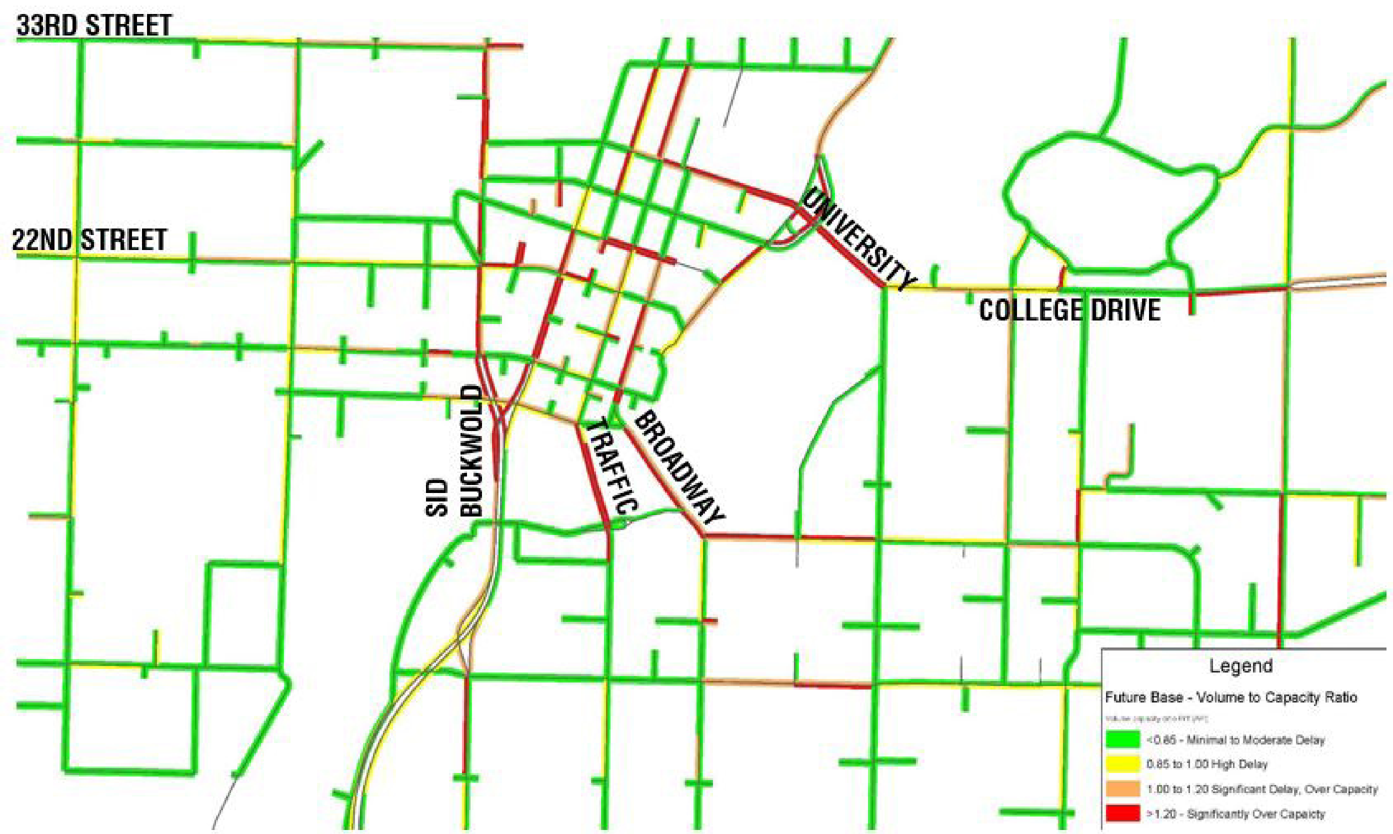

Figure 4.16 - Core Area Projected 30 Year PM Peak Hour Volume-to-Capacity Ratios

As illustrated in **Table 4.02**, the projected 30 year peak directional traffic demands will exceed the capacity of the core area bridges by over 1,000 vehicles during the PM peak hour (or as much as 2 lanes of traffic).

Bridge	NUMBER OF LANES	PEAK PM DIRECTIONAL VOLUME	DIRECTIONAL CAPACITY	PEAK DIRECTIONAL V/C
Sid Buckwold Bridge	3	4,410	4,500	0.98
Traffic Bridge	1	1,165	1,000	1.15
Broadway Bridge	2	2,100	2,000	1.05
University Bridge	2	3,350	2,400	1.40
ALL CROSSINGS	8	11,025	9,900	-

Table 4.02 - Projected PM Peak Hour Core Area Bridge Demands & Capacity (Eastbound or Southbound)

4.3 Problem Definition

The future ‘Business-as-Usual’ approach to accommodating the transportation needs of half a million people as previously described includes expansion of the roadway network to support New Suburban Areas, and modest investment in transit, cycling and walking facilities. In fact, the ‘Business-as-Usual’ approach assumes expanding the transit system in the city at levels below historical growth rates – 1.8% per year increase in service with 2.5% increase in the projected population. This actually means that the annual service levels would decrease on a per capita basis from 1.7 to 1.35 hours of service per person and the forecast conditions on the roadway network could get worse than estimated in the ‘Business-as-Usual’ scenario.

With a ‘Business-as-Usual’ approach toward investing in transit, cycling and walking over the next 30 years, peak hour vehicle trips in Saskatoon would increase by almost 220% across the city. As the city expands outwards, average vehicle trip distances during the peak period are projected to increase from approximately 6.3 km today to 9.8 km when the city’s population reaches half a million people. With the increase in travel distance and delays throughout the network, travel times are projected to increase significantly, particularly to and from the core areas of the city as illustrated below in **Figure 4.17.**

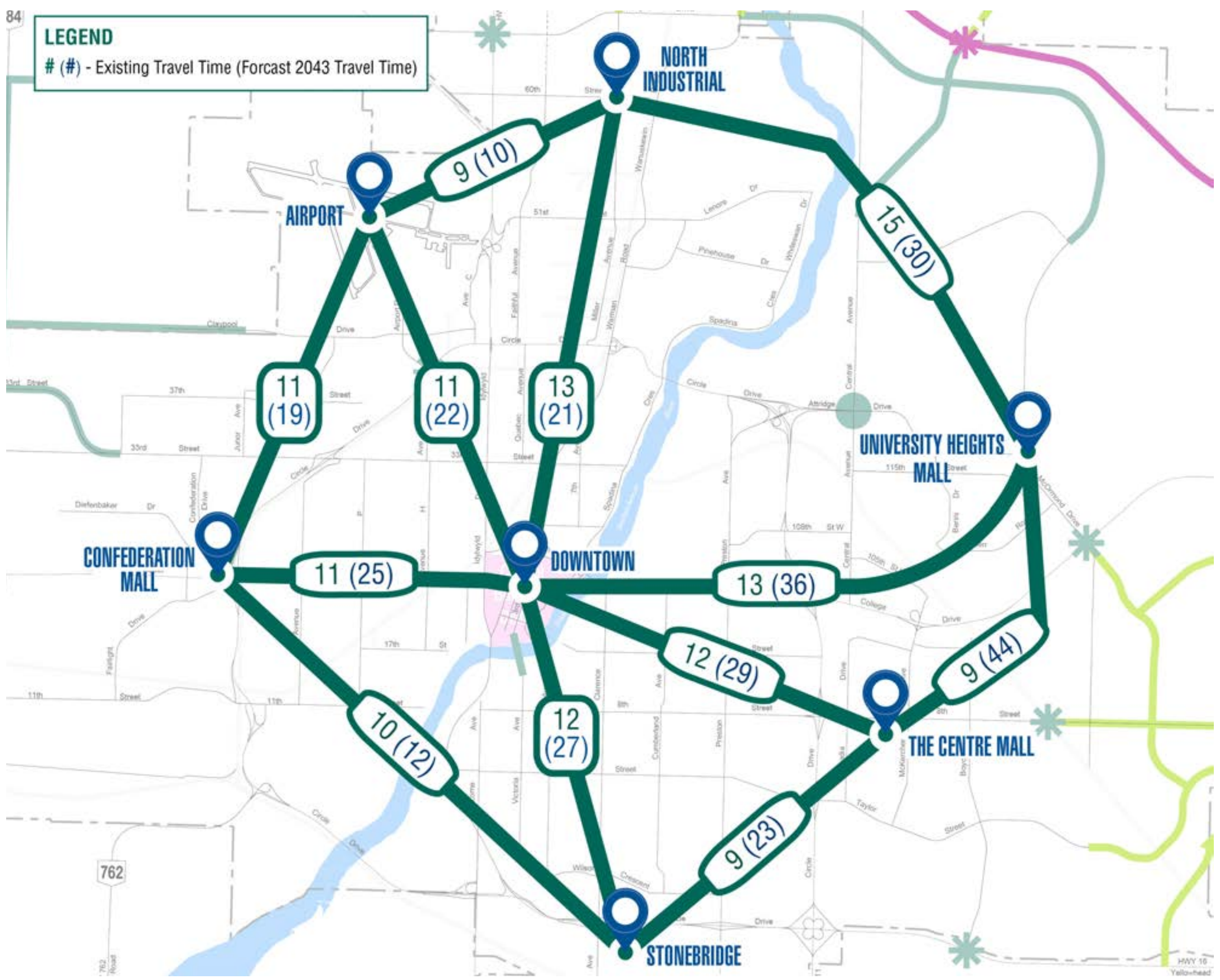

Figure 4.17 - Existing & Projected 30 Year PM Peak Hour Vehicle Travel Times (minutes)

Overall, the average vehicle trip time of approximately 15 minutes during the peak period today will more than double to over 40 minutes per trip in the long-term ‘Business-as-Usual’ scenario based on the city-wide transportation model. Although the travel times for suburban-to-suburban area trips are projected to generally increase by less than 70% in the western areas of the city, travel times from the Downtown area during the peak hours are projected to increase by 200% or more. Similarly, vehicle trips on the east side of the city from Downtown are projected to increase by more than 40 minutes or 300% of current day travel times. This increase in travel times will also significantly impact transit travel times and reliability.

Even with the Traffic and North Commuter Parkway Bridges as well as the overall network expansion to serve suburban growth areas of the city and region, overall delays and congestion are projected to increase significantly across the city. In fact, even with planned network improvements, several major roadways are expected to experience significant delays with half a million people as indicated by the projected PM peak hour roadway volume-to-capacity ratios illustrated in **Figure 4.18** (below).

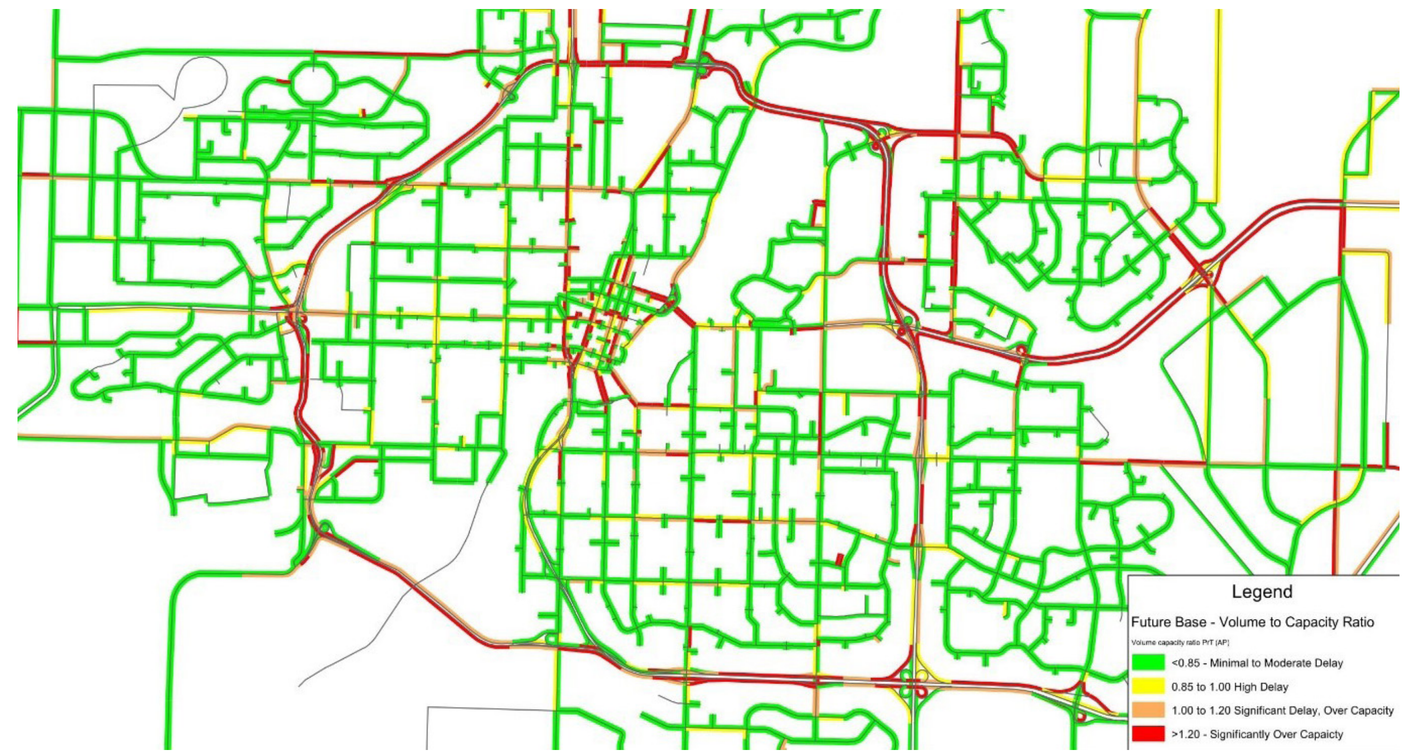

Figure 4.18 - Forecast PM Peak Hour Roadway Volume-to-Capacity Ratios

Within the core area of the city, all bridges and several major roadways such as Idylwyld Drive, 22nd Street, 33rd Street, College Drive and Warman Road are all projected to operate beyond their physical capacity. With almost half of the growth in the city planned for the core areas such as the City Centre, North Downtown, University as well as major corridors as described in Section 2.0, travel demands are understandably expected to increase within the core area and across the South Saskatchewan River. Even with the additional crossing capacity provided by new crossings such as the Traffic Bridge and the North Commuter Parkway Bridge, core area crossing demands are expected to exceed the capacity during the peak periods where severe congestion and delay will be experienced. **Figure 4.19** illustrates the forecast change in demands and levels of congestion expected relative to the four core area crossings. For most core area bridges and major roadways approaching them, average travel speeds are expected to decline to approximately 10km/hr or less during peak periods with the forecast levels of congestion. Even with increases to transit service levels, it should be noted once again that these delays and levels of congestion will also impact the attractiveness and cost effectiveness of transit service.

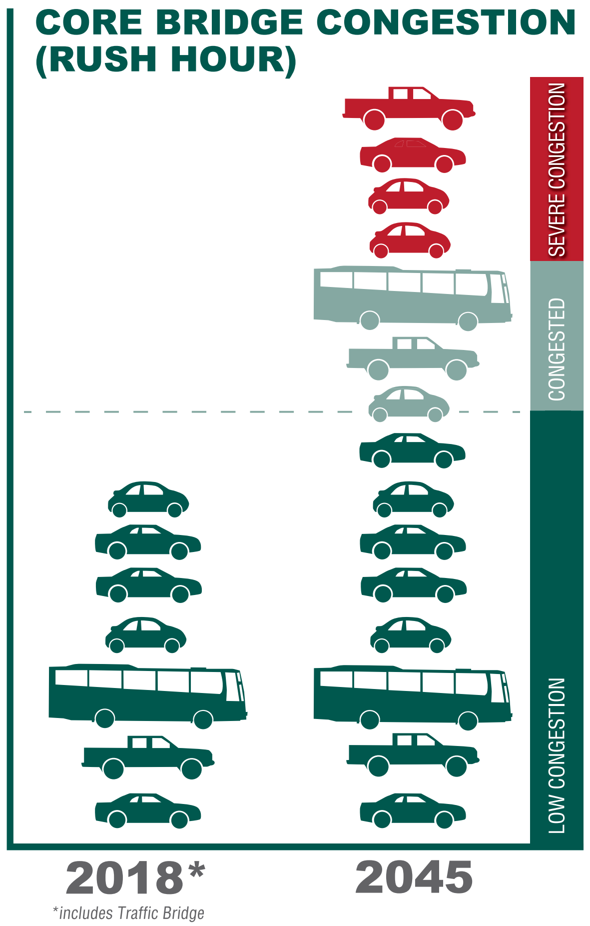

Figure 4.19 - Forecast Change in Congestion for Core Area Bridges

Within the core areas of the city, the Growth Plan explores the need for investments in additional crossings of the South Saskatchewan River and adjacent networks. In addition to considering vehicle demands, the analysis also considers the potential for rapid transit corridors to serve existing and projected transit markets, and to reduce pressures on the established urban area street system.

4.4 Vision and Possibilities for Core Bridges

This section of the report outlines the long-term vision and possibilities for accommodating core area growth in travel across the South Saskatchewan River, including additional people-carrying capacity to serve vehicles, transit, and other modes of travel. Optional concepts are identified and evaluated in comparison to a 'Business-as-Usual' scenario that includes planned improvements already identified by the City through recent land use and transportation planning initiatives as previously referenced in Section 4.2.

Through the Saskatoon Speaks process, city residents highlighted a desire for investment in roads and bridges to improve connectivity for all travel modes. This vision was further articulated in the City's Strategic Plan, as noted below. Through the Growth Plan process residents of Saskatoon provided input and feedback to these goals and objectives for core bridge crossings.

Saskatoon's Vision for Moving Around (from the 2013-2023 Strategic Plan)

Our investments in infrastructure and new modes of transportation have shifted attitudes about the best ways to get around. Our transportation network includes an accessible and efficient transit system and a comprehensive network of bike routes. People still use cars, and also rely on options such as public transit, walking and cycling.

Growth has brought new roads and bridges that improve connectivity for all travel modes. Improved streetscapes, interconnected streets and well-planned neighbourhoods encourage walking and cycling. Attractive options to the car alleviate congestion and ensure people and goods can move around the city quickly and easily.

Goal for Core Bridges (developed for the Growth Plan)

The core area bridges will continue to be the primary routes to and from the established areas of the city while planned peripheral roadways and bridges support vehicle travel between the suburban growth areas. As the City Centre, North Downtown and University area plans are implemented, the road network and bridges serving these areas should support these vibrant communities with priority treatments for transit and attractive pedestrian and cycling facilities.

Core Bridge Objectives

- To connect arterial roads that serve travel between core area communities in Saskatoon;
- To primarily serve core area travel rather than vehicle travel that starts and ends outside Circle Drive;
- To connect pedestrians, cyclists, transit, and vehicles to promote sustainable modes of travel within the core areas;
- To continue the grid street pattern that exists within the core area to not only promote use of alternative modes, but to minimize impacts of increasing traffic on neighbourhoods;
- To create an urban street character on both sides of any new or existing crossing within the core area.

4.4.1 Description of Possibilities

In order to support growth to half a million people, four core area river crossing scenarios were considered, as illustrated in **Figure 4.20**.

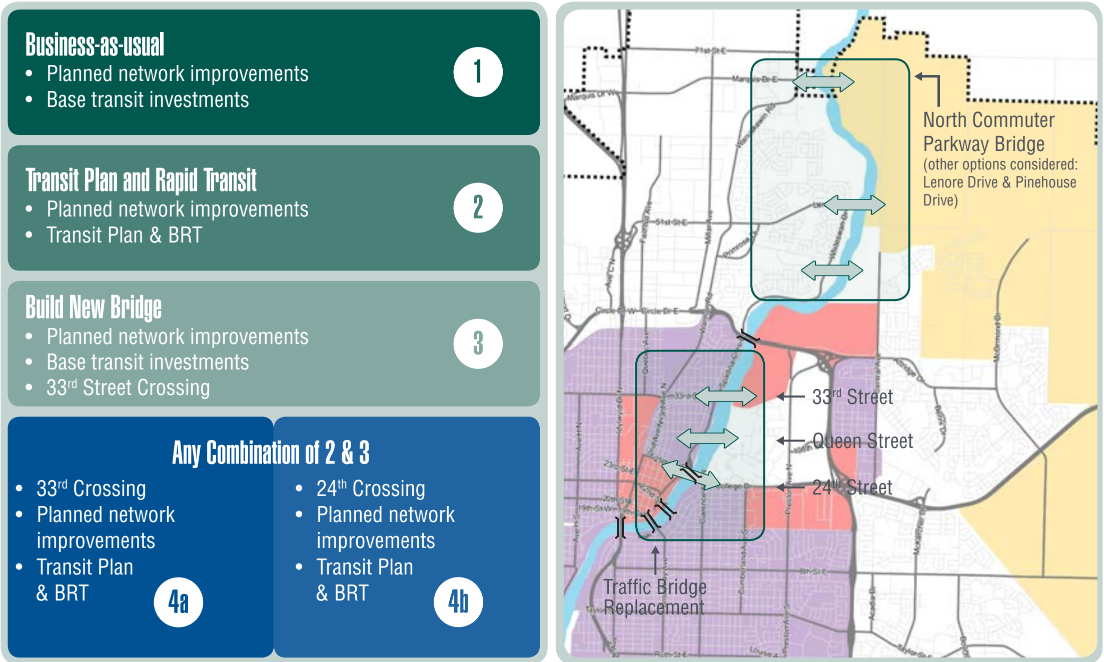

Figure 4.20 - Core Area River Crossing Scenarios

The capacity of bridges in Saskatoon are largely influenced by the urban street system and intersections that they connect to. In fact, one lane of a bridge that connects with a highway can typically support 75% to 100% more traffic per lane than one that connects with a signalized intersection. Although intersection improvements on either side of the Broadway, University and future Traffic Bridges may be considered to maximize the investments, they would not address long-term challenges and needs for core area river crossings by themselves. None-the-less, the City should consider operational strategies to improve and maximize the vehicle carrying capacity of existing river crossings as part of all other possibilities being considered. This strategy may include, but not be limited to: signal timing and prioritization for major roadways that connect to bridges; signal coordination along connecting roadways; additional lanes or modifications; and/or turn restrictions.

1. 'Business-as-Usual' (Base Case)

The first scenario considered is the 'Business-as-Usual' approach previously described which essentially includes building planned roadways for peripheral area growth with limited change to roadways inside Circle Drive other than the provision of the Traffic Bridge. As indicated, this approach includes modest increases to transit service levels as well as bicycle and pedestrian facilities and policies in order to theoretically maintain the existing mode share. Additionally, minor operational improvements to the intersections on either sides to existing core area bridges should be considered as part of this and all other crossing strategies. These should include either additional turn lanes at signalized intersections or turn restrictions and lane changes that would prioritize bridge traffic.

It should be noted that reversible lane concepts which prioritize peak directional traffic were considered in the Growth Plan process in order to optimize the use of Saskatoon's core area bridges; however, reverse lane concepts were eliminated for two principle reasons:

- The off-peak directional traffic volumes are 85% of the peak direction today and in the long-term.
- The projected off-peak directional traffic volumes are projected to be utilizing 90% of existing capacity and therefore well beyond the capacity of reduced lanes on any core area bridge.

2. Transit Plan & Rapid Transit (plus 'Business-as-Usual')

The second scenario includes significant increases in transit service hours (anywhere from 2.8% to 3.9% per year) in order to increase the people-carrying capacity of existing major roadways as well as core area bridges. This Transit Plan scenario also includes the provision of the Red and Blue Line rapid transit corridors as described in Section 3.0 of the Growth Plan. The Bus Rapid Transit (BRT) service would provide direct, reliable and frequent connections between the Downtown / University areas and the Blairmore, University Heights, and Holmwood Suburban Centres as illustrated in **Figure 4.21** below.

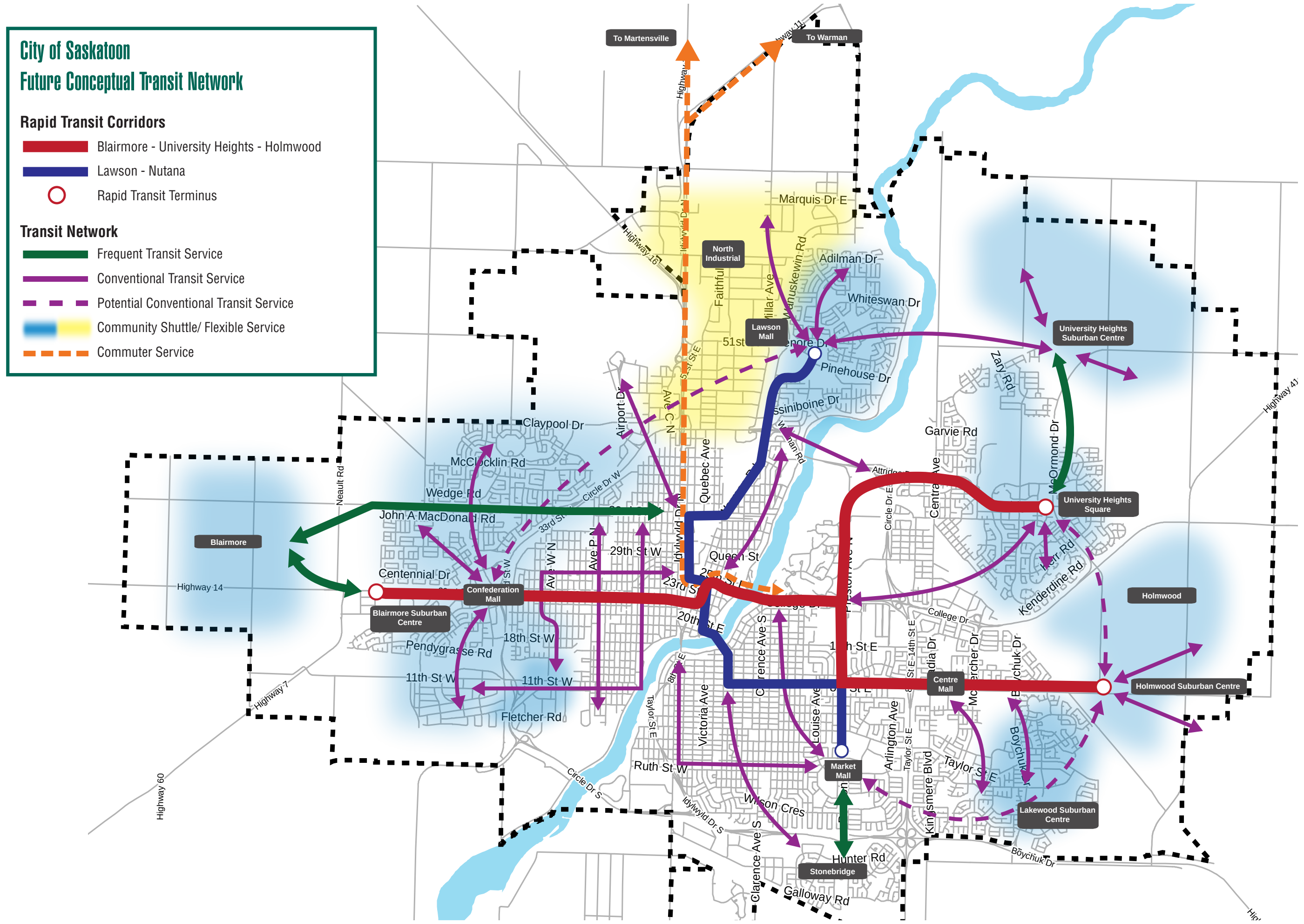

Figure 4.21 - Long-term Transit Plan

As part of this scenario, dedicated BRT lanes would be implemented across the University Bridge and connecting roadways on the east (eg. College Drive, Preston Avenue and Attridge Drive) and west sides (25th Street, 3rd Avenue and 22nd Street). Within the core area of the city where right-of-way is limited, traffic lanes would be converted to bus-only lanes as a method of increasing people-moving capacity. In particular, two travel lanes across the University Bridge would be converted to bus only lanes in order to carry up to 1,600 passengers per hour in each direction during the afternoon peak – equivalent to 1,400 vehicles that would otherwise require an additional two travel lanes in each direction. Outside the core area, the number of general purpose travel lanes may be retained in most cases with widenings to accommodate bus-only lanes.

This approach also includes the 'Business-as-Usual' investments in planned roadway networks to support growth to half a million people, in addition to operational improvements on either sides of existing core area bridges.

3. Build a New Bridge

The third scenario for the core area includes building a new bridge to serve planned growth that includes an approximately 125,000 additional people in Strategic Growth Areas, Neighbourhood Infill and Corridor Growth areas described in Section 2.0 of the Growth Plan. This crossing strategy would also include the 'Business-as-Usual' improvements with planned networks and transit investments.

As part of the process, two alternative crossings that would support the forecast growth in east-west travel across the city were identified: 33rd Street and Queen Street.

Ultimately, the 33rd Street crossing would connect the arterial road system on the east and west sides of the river with a four lane roadway, and provide a continuous east-west corridor across the core area of the city. On the west side of the river, 33rd Street is a minor arterial with two to four travel lanes west of Idylwyld Drive and a minor arterial east to Spadina Crescent with two travel lanes and on-street parking. The road and right-of-way width east of Warman Road is approximately 20 metres or more, with sidewalks on the north side of the street and a multi-use path on the south side. On the east side of the river, 33rd Street would extend northeast to connect with Attridge Drive at Preston Avenue. Both connecting roadways along with Old Preston Avenue to the north are classified as major arterials with four travel lanes. The right-of-way for the east side connection to Attridge Drive has not been identified, but the alignment would need to support University plans for growth and development of the endowment lands as envisioned in the University of Saskatchewan's **Vision 2057: University Land Use Plan**.

With forecast travel demands of more than 2,500 vehicle trips per direction during the PM peak hour as described later in the report, the 33rd Street Bridge would connect the west side communities to the University Lands with a multi-modal connection that includes up to four travel lanes, separated bicycle facilities as well as sidewalks on both side of the bridge. **Figure 4.22** illustrates the candidate crossing concept and connections on either side of the river.

An alternative Queen Street crossing was also considered during the process in response to community feedback. Queen Street is a collector roadway on the west side of the river extending between 1st Avenue to Spadina Crescent. A crossing at this location would traverse through the central area of the University of Saskatchewan Campus on the east side of the river before connecting with Preston Avenue.

The objectives outlined at the outset of this section and other considerations were used to compare as assess these two crossing alternatives, as briefly described on the right:

Figure 4.22 - 33rd Street and Preston Avenue /Attridge Drive Crossing Concept

- **Connect arterial roads where their function is already designed to serve travel between neighbourhoods and areas of the City**. A University to Queen Street river crossing would connect Preston Avenue to Queen Street at Spadina Crescent. Queen Street is classified as a two lane collector with space for parking on both the north and south sides of the street. Consistent with most collector roads in the city, Queen Street is designed to support neighbourhood traffic which includes travel to and from the hospital. Within the University lands, a new crossing and connection to Preston Avenue could potentially be classified as an arterial roadway with four travel lanes. In comparison to a Queen Street crossing alternative, the 33rd Street crossing would connect to the arterial network on both sides of the river. Consistent with the City's classification system, these roadways are expected to carry traffic between neighbourhoods locally and across the city.

- **Add to the grid pattern of streets within the core area of the city inside Circle Drive to properly disperse traffic and manage the scale of any particular major corridor to four traffic lanes**. A Queen Street crossing would be located approximately 1.5 kilometres south of Circle Drive and 400 metres north of the University Bridge. In many urban areas, the typical spacing of arterial roadways ranges anywhere from a minimum of 400 metres to 800 metres with a grid system of collector and local roads between them. As a comparison, the 33rd Street crossing would be located approximately 800 metres away from both the University and Circle Drive Bridges. This spacing is more consistent with other urban areas of the city and other communities. Ultimately, a grid street system will serve to disperse traffic and manage the scale of all major roadways in the city as well as the impact of through traffic on neighbourhoods.

- **Have the ability to handle projected traffic volumes with reasonable improvements to the roadway network on either side without significant impacts on and requirements for property**. A four lane river crossing at Queen Street would attract approximately 1,800 to 2,000 vehicles in both directions during the morning and afternoon peak periods. Although a two lane Queen Street may be maintained between Spadina Crescent and Idylwyld Drive, traffic volumes would be notably higher than today (slightly higher than expected for a typical collector roadway). Additionally, forecast turning movements at the Queen Street and Spadina Crescent intersection would also impact the intersection and likely the bridge configuration with a double westbound left turn lane. Although traffic volumes forecast on 33rd Street between Idylwyld Drive and Spadina Crescent would increase substantially with the 33rd Street crossing, volumes west of Idylwyld Drive to Circle Drive would be only moderately higher than 'Business-as-Usual'.

- **Serve core area travel demands today and what's projected for the long-term with an increase in population and employment in Strategic Growth Areas, Neighbourhood Infill Areas, as well as Corridor Growth**. In this regard, a majority of the trips using core area bridges should serve core area needs with an origin and/or destination within Circle Drive. It is anticipated that a Queen Street Bridge and 33rd Street Bridge would primarily serve core area travel with more than 80% of all peak travel starting or ending their trip inside the Circle Drive area.
- **Benefit walking, cycling and transit** by adding to the network and providing more opportunities to enhance facilities and increase use of sustainable modes within the core area of the city. An alternative crossing at Queen Street would provide an attractive crossing for pedestrians and cyclists, but would not likely serve transit. Conversely, a 33rd Street crossing could potentially serve transit, cycling and walking.
- **The impacts associated with a new arterial roadway through the centre of the University lands are significant.** Sections of the corridor would cross lands that are designated for crop science research that are to remain part of the campus uses as outlined in the University's Vision 2057. A proposed arterial corridor would also dissect the campus in areas intended for future university expansion. In fact, a Queen Street crossing would not serve planned development north of the railway corridor which would otherwise be served by the 33rd Street crossing and connection through to Preston Avenue/Attridge Drive.

Based on this preliminary scan, it would appear that there are some 'show stoppers' and limitations to a Queen Street river crossing. Although the forecast traffic volumes and patterns would be comparable to a 33rd Street river crossing, the networks on either side of the river could not be modified to support east-west travel demands. In particular, the collector roadway function of Queen Street would serve as a constraint to this new east-west connection. On the east side of the river, a new arterial roadway connection through the University lands would likely impact existing buildings and would not be consistent with Vision 2057.

4. Combined Bridge and Transit Strategy

The fourth and final scenarios include combinations of planned network improvements, the Transit Plan as well as a new crossing at either 33rd Street or 24th Street. These two possible river crossings concepts are briefly described below.

A) 33RD STREET CROSSING & TRANSIT PLAN (INCLUDING RAPID TRANSIT)

Consistent with Scenario 3, the first option combines a new crossing at 33rd Street with increased investments in transit services as described in Option 2 (Transit Plan). The potential four lane crossing (with a widening of 33rd on the west side of the river) would support forecast growth planned for the University lands, as well as other Strategic Growth Areas, Neighbourhood Infill and Corridor Growth. Investments in significantly expanding the transit system and BRT would generate 1,600 or more transit passengers in each direction across the South Saskatchewan River in the PM peak hour as projected in the long-term Transit Plan.

B) 24TH STREET CROSSING & UNIVERSITY BRIDGE BRT LANES

A second combined option includes the planned roadway networks, the Transit Plan and BRT along with a 24th Street crossing to connect with College Drive on the east side. Combined with the University Bridge / 25th Street corridor in the Downtown area, this crossing would serve as part of a one-way couplet between Downtown and the University area as illustrated in **Figure 4.23**.

Depending on the preferred configuration for accommodating BRT on College Drive – centre or curb lane – the 24th Street Bridge would support two general purpose travel lanes in the eastbound direction as well as a multi-use pathway for cyclists and pedestrians. A centre bus lane configuration along College Drive would include BRT services operating on the University Bridge, while a curb side BRT configuration with the one-way couplet system would place westbound services on the University Bridge / 25th Street and eastbound services on 24th Street within downtown and across the river to connect with College Drive. This configuration would require a three lane 24th Street crossing to support a bus only lane and two general purpose lanes. The University Bridge may remain four lanes with a bus only lane and three general purpose traffic lanes. Alternatively, consideration may be given to enhanced cycling and pedestrian facilities by providing only two general purpose traffic lanes.

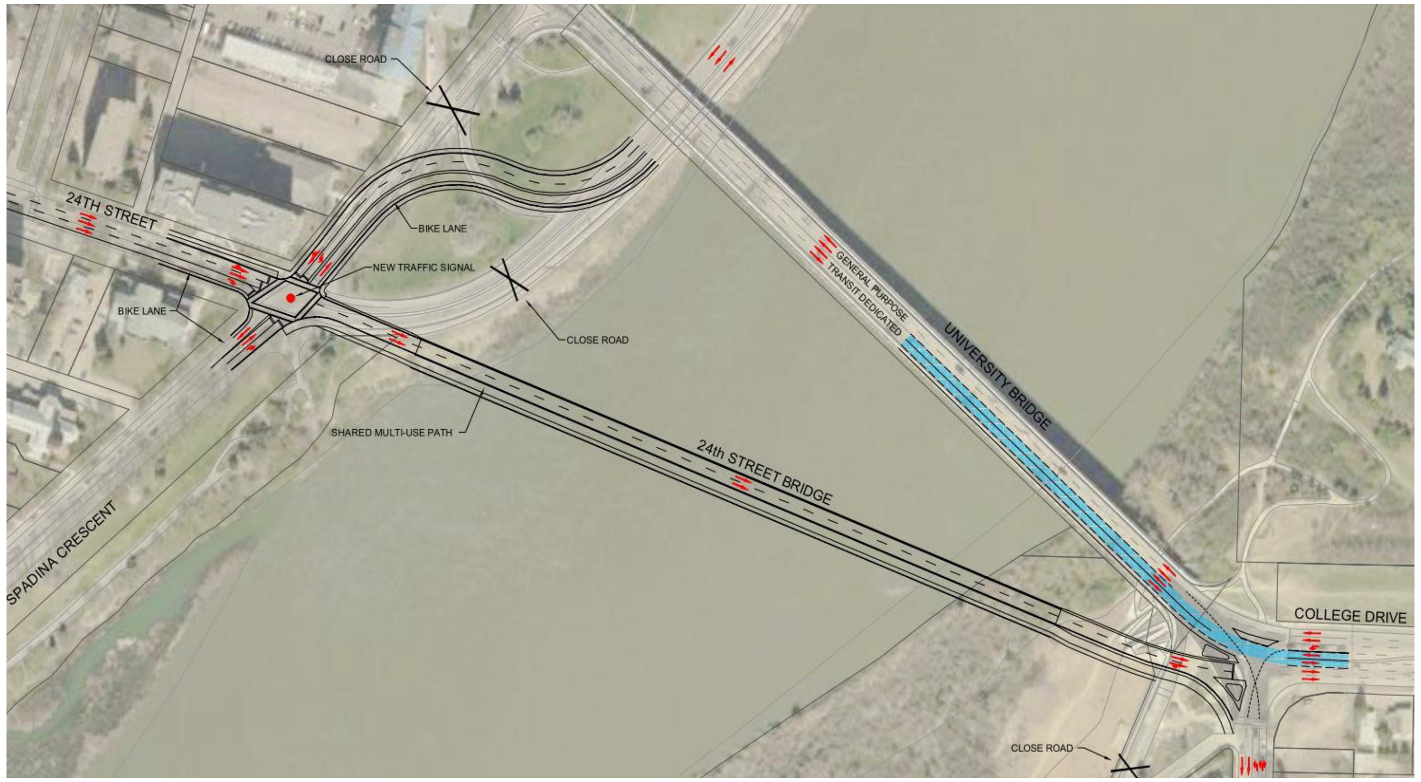

Figure 4.23 - 24th Street Bridge Concept with BRT on University Bridge

4.0 CORE BRIDGES

Although this option supports additional people-carrying capacity with the provision of bus only lanes, there is virtually no increase in vehicle capacity to the existing University Bridge crossing of two travel lanes in each direction. It should also be noted that the 24th Street Bridge couplet would only be considered if BRT services and dedicated lanes were to be introduced to the College Drive corridor.

4.4.2 Options Analysis

For the growth to half a million population, core area river crossing possibilities are compared with the 'Business-as-Usual' Scenario in terms of overall traffic patterns and transit ridership. The highlights that will be of interest to the broader community and underscore the technical benefits and impacts of each possibility are described in terms of:

- **What's changed** in terms of forecast traffic patterns relative to the 'Business-as-Usual' scenario using the city-wide transportation model?
- **What are the potential benefits** in terms of reduced congestion (as measured by bridge volume-to-capacity travel, travel speeds, etc.), reduced vehicle travel demands and/or increased transit ridership and travel times?
- **Where are the potential impacts** of traffic diversion caused by the network changes beyond what is projected in the 'Business-as-Usual' scenario?

Scenario 2 – Convert Existing Lanes for Bus Rapid Transit (BRT)

The following discussion highlights the long-term traffic and transit ridership patterns relative to a 'Business-as-Usual' scenario.

A) What's changed?

- **Transit ridership across the core area bridges is expected to increase significantly with expanded and redesigned transit services and implementation of BRT**. As described in Section 3.0, the transit mode share across the city is projected to increase from 5% in the 'Business-as-Usual' scenario to 8% with the Transit Plan and BRT investments. Within the established areas of the city, transit ridership across the core area bridges is expected to increase from approximately 1,200 passengers in the peak hour direction with the 'Business-as-Usual' Scenario to 1,800 passengers, as illustrated in **Figure 4.24**.

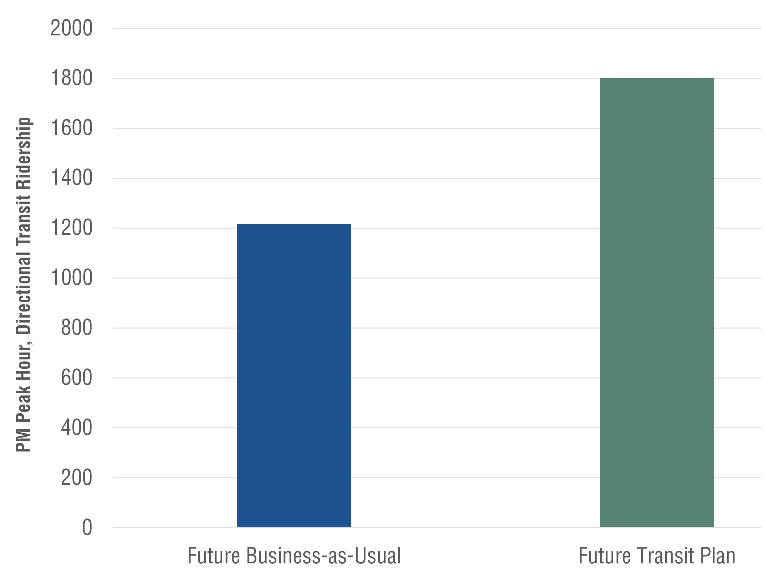

Figure 4.24 - 2045 PM Peak Hour Directional Transit Ridership Across Core Area Bridges

- **Increased transit ridership will reduce core area bridge traffic volumes by approximately 1,000 and 1,500 vehicles from the 'Business-as-Usual'** (see **Figure 4.25**). The decline in vehicle travel across core area bridges relative to the 'Business-as-Usual' Scenario may be partially attributed to increased transit ridership. At the same time, the reduction in vehicle crossing capacity on the University Bridge from the 'Business-as-Usual' scenario will force traffic to use other crossings.

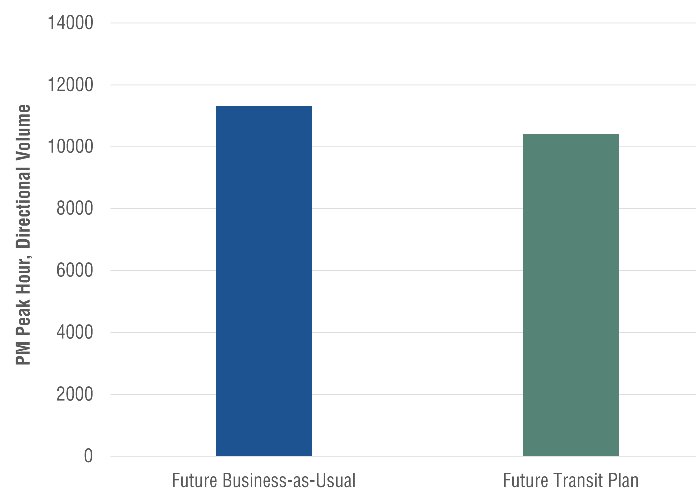

Figure 4.25 - 2045 PM Peak Hour Directional Traffic Volumes Crossing Core Area Bridges

- **University Bridge is projected to support approximately 2,000 vehicles per direction during the PM peak hour in the 30 year time frame. Figure 4.26** below illustrates the projected 2045 PM peak hour corridor volumes in the core area of the city. Although the projected demands crossing the University Bridge are generally well beyond the capacity of a two lane bridge, the laning and available movements of signalized intersections on either side may be altered to accommodate a portion of the increased traffic volumes.

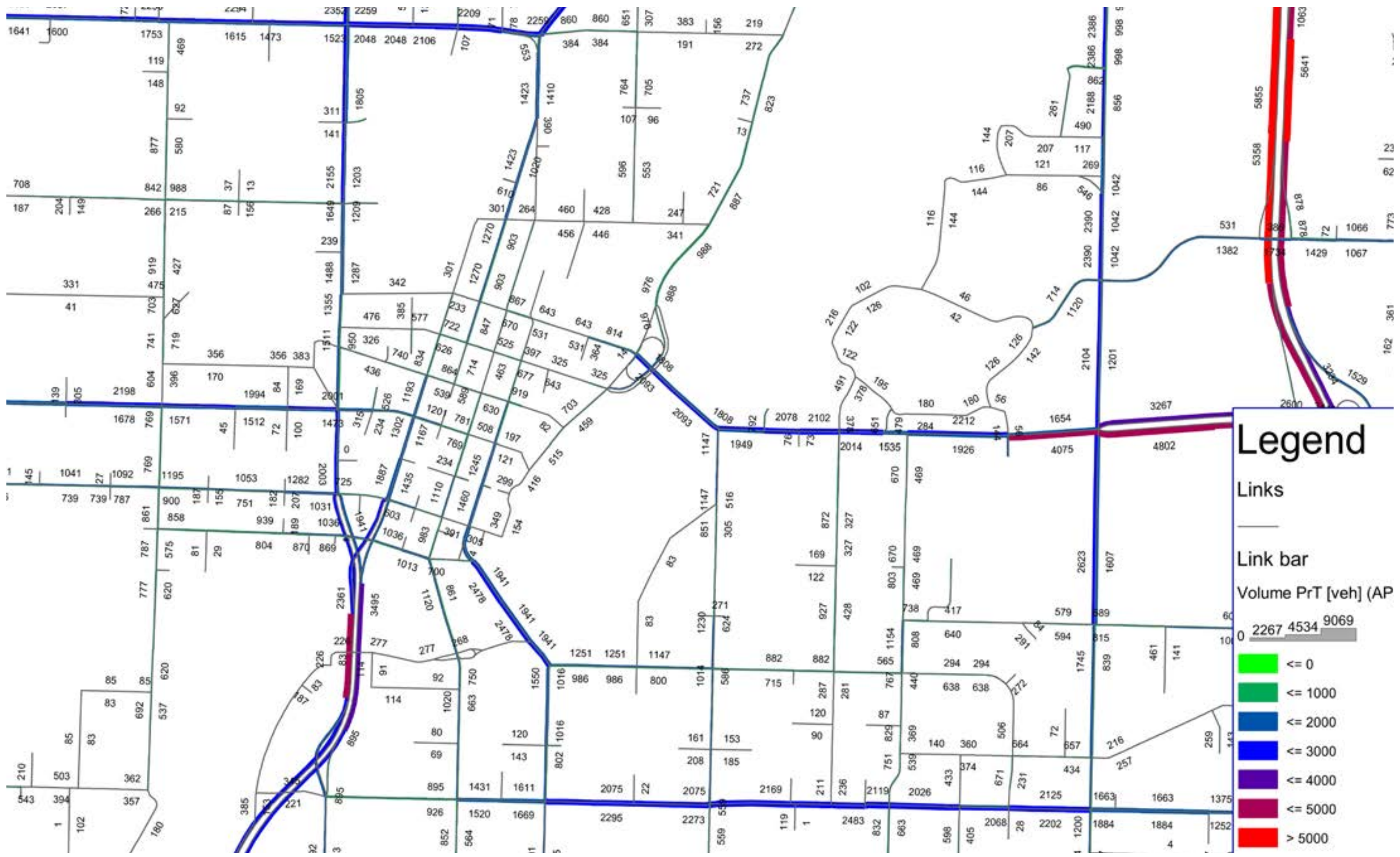

Figure 4.26 - Forecast 2045 PM Peak Hour Corridor Volumes (Scenario 2 : Transit Plan)

- **More than 90% of all traffic using the University Bridge originate from or are destined to areas inside the core of the city. Figure 4.27** illustrates the distribution of westbound vehicle trips projected for the University Bridge. A two-lane University Bridge is largely serving traffic to and from the Downtown and University areas. In this regard, the major arterial service function does not change with the reduced travel lanes.

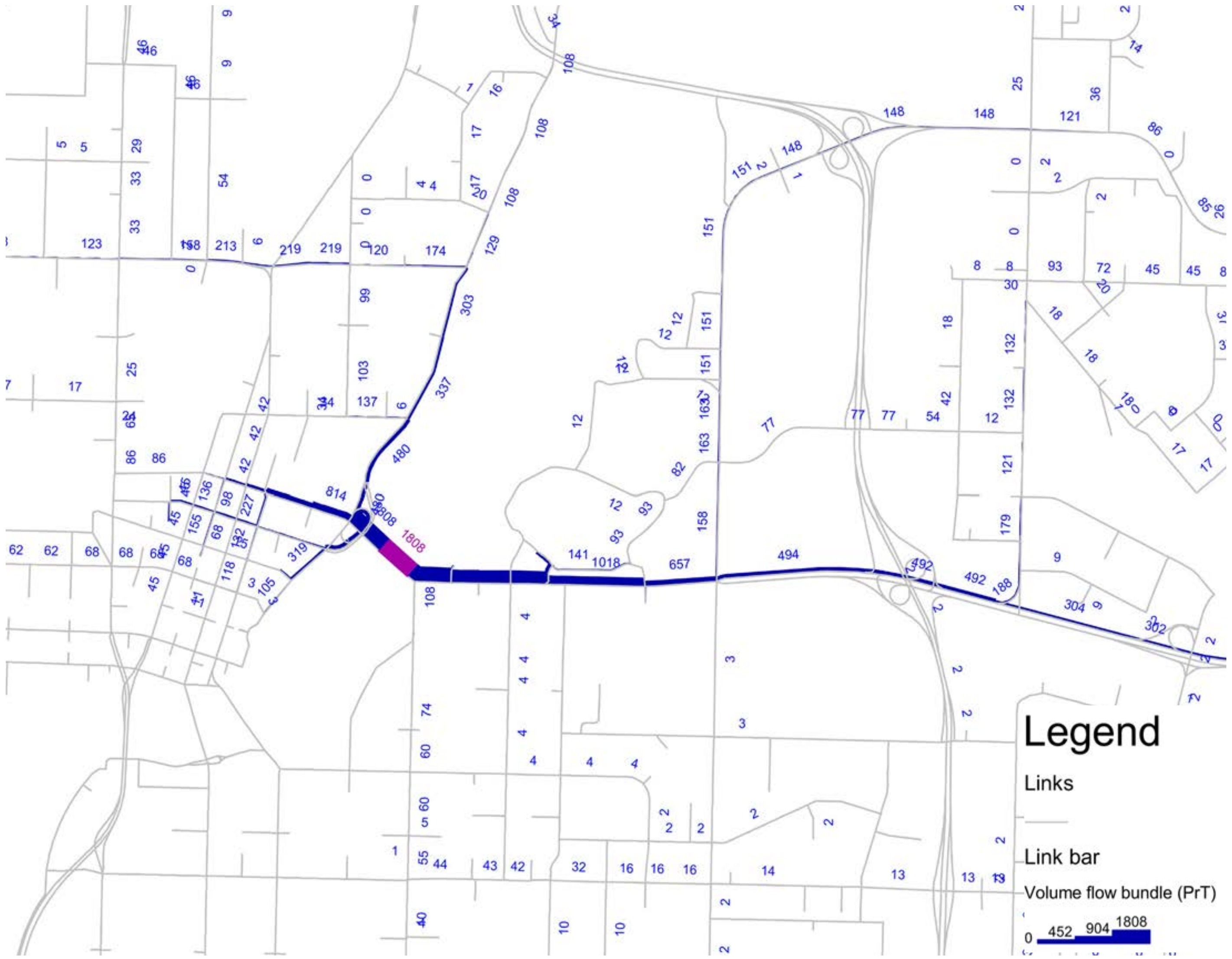

Figure 4.27 - Forecast 2045 PM Peak Hour Westbound Traffic Flow Bundle for University Bridge (Scenario 2: Transit Plan)

- **Forecast PM peak hour traffic volumes on nearby core area river crossings and major roadways inside the core area will not substantially change from the 'Business-as-Usual' traffic volumes with reduced travel lanes on the University Bridge and other rapid transit corridors. Figure 4.28** illustrates the forecast traffic volume changes with the reduced travel lanes along the Red Line BRT corridor relative to the forecast 'Business-as-Usual' scenario. The overall increase in transit ridership throughout the city and across the river reduces total vehicle travel across core area bridges. Additionally, the potential lane reductions and vehicle carrying capacity on core area roadways such as 22nd Street, 3rd Avenue, 25th Street, and College Drive do not adversely impact other roadways in the city. In other words, the projected volumes and amount of congestion for other core area streets will not be dramatically different than the 'Business-as-Usual' scenario in the long-term with the implementation of the Transit Plan and the provision of BRT services and facilities.

Figure 4.28 - Forecast 2045 PM Peak Hour Traffic Volume Differences (Scenario 2: Future Transit Plan vs. Scenario 1: 'Business-as-Usual')

- **The significant investment in transit and BRT will result in increased transit ridership across the University Bridge and other major roadways in the city. Figure 4.29** illustrates the forecast PM peak hour transit ridership along all major corridors in the Downtown area. In addition to the University Bridge, rapid transit corridors such as College Drive on the east side to the University, 3rd Avenue, and 22nd Street carry anywhere from 1,400 to 2,300 passengers per hour in the PM peak direction. These travel demands would be equivalent to 1,250 to 2,100 cars on the road that would otherwise require two travel lanes in each direction.

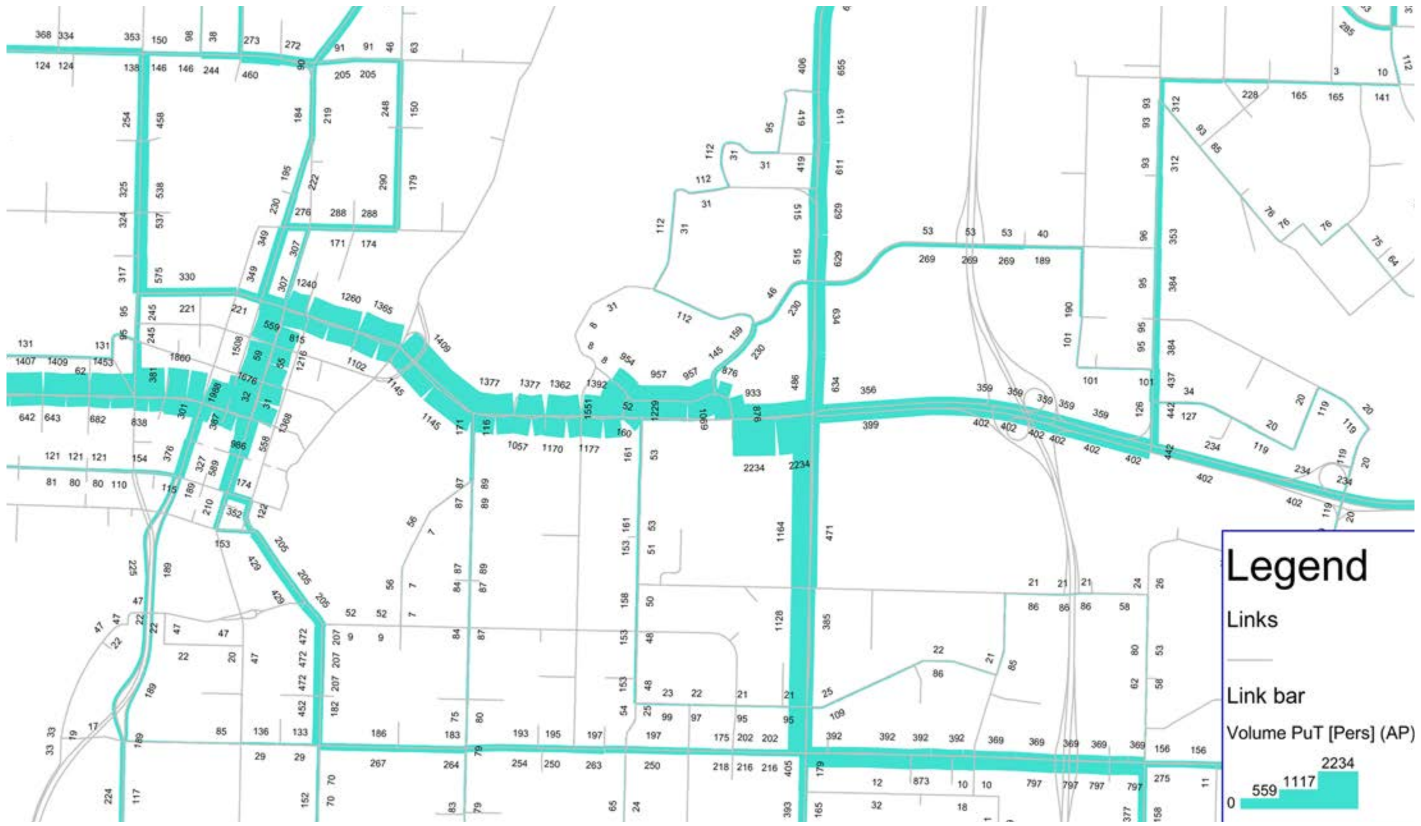

Figure 4.29 - Forecast 2045 PM Peak Hour Transit Passenger Volumes (Scenario 2: Transit Plan)

B) What are the potential benefits?

- **The total vehicle-kilometers travelled across the city during the PM peak hour are projected to decrease by approximately 5% from the 'Business-as-Usual' scenario with increased transit usage.** With investments in rapid transit and the overall transit system, there is a projected decrease in the vehicle-hours and vehicle-km travelled. These forecasts indicate that the increase in ridership and the relative changes for vehicle travel will contribute toward reducing the personal costs for travel as well as vehicle emissions.

- Improves people-carrying capacity of the University Bridge and other BRT corridors. The forecast PM peak hour transit ridership increases significantly along the proposed Red Line BRT corridor and moderately along the Blue Line BRT corridor. This will in turn make better use of existing capacity of the city's roadway network.

- Results in limited traffic diversion to other major corridors in the city with the provision of dedicated bus-only lanes along the Red Line BRT corridors. With the increased investment in transit and dedicated bus-only lanes, the increase in overall ridership and reduction in vehicle travel relative to 'Business-as-Usual' results in minimal diversion to other east-west roadways.

C) What are the potential impacts?

- **Consistent with the 'Business-as-Usual' scenario, the forecast PM peak hour volumes will be 20% over the capacity of the core area bridges with the lane reductions and changes in vehicle travel** (see **Figure 4.30**). In the long-term, the crossing capacity of the core bridges is exceeded by approximately 15% for the 'Business-as-Usual' scenario and further to 20% above capacity with the lane conversion across the University Bridge. As previously noted, all core area bridges will operate beyond capacity with these forecast travel demands and lane reductions to the University Bridge.

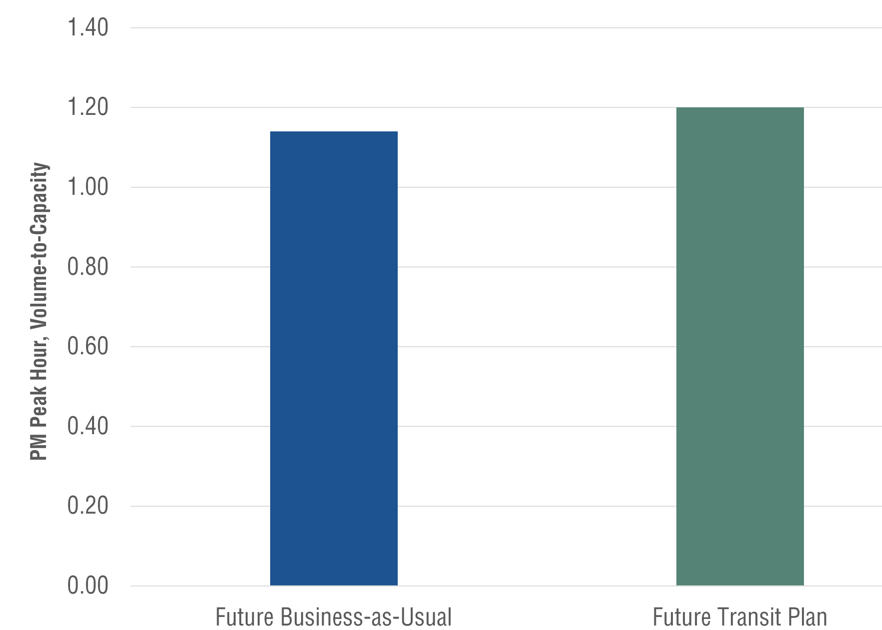

Figure 4.30 - 2045 PM Peak Hour Traffic Volumes Crossing Core Area Bridges (Scenario 2: Transit Plan)

- **Average travel speeds across most core area bridges do not change dramatically from the 'Business-as-Usual' scenario, with the exception of the University Bridge**. **Figure 4.31** compares link travel speeds across core area roadways and bridges for the 'Business-as-Usual' and Transit Plan scenarios. With the increase in transit ridership (and corresponding reduction in vehicle travel) as well as the reduced lanes to accommodate the east-west BRT on roadways such as 22nd Street, 25th Street, University Bridge and College Drive, vehicle travel speeds do not change on most major roadways. As illustrated however, the average vehicle speeds crossing the University Bridge during the afternoon peak hour are projected to be approximately 3km/hr and 5km/hr in the peak and off-peak directions respectively.

Figure 4.31 - Forecast 2045 PM Peak Average Vehicle Speeds (km/hr)

Scenario 3 – Build New Bridge (33rd Street Crossing)

The following discussion highlights the long-term traffic and transit ridership patterns with a 33rd Street crossing in relation to a 'Business-as-Usual' scenario.

A) What's changed?

- All core area bridges combined will accommodate approximately 13,000 vehicles in the peak direction and 1,200 passengers on transit. With the addition of the 33rd Street Bridge, core area bridges will potentially support an additional 1,500 vehicles per hour in the PM peak direction across the South Saskatchewan River. **(see Figure 4.32).**

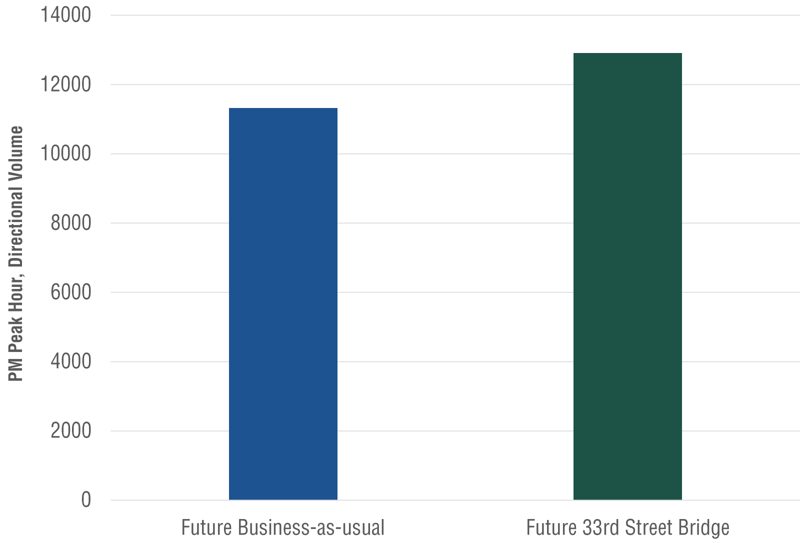

Figure 4.32 - Core Bridge 2045 Peak Hour Directional Volumes

- **33rd Street Bridge is projected to support anywhere from 2,500 to 2,700 vehicles in the peak hour per direction in the 30 year time frame** (see **Figure 4.33**). These peak hour directional volumes are slightly below what's forecast for the University Bridge in the long-term 'Business-as-Usual' scenario, but generally exceed the capacity of a four lane bridge connecting with signalized intersections on either side.

- **Forecast PM peak hour volumes across the 33rd Street Bridge are generally balanced in both directions.** Similar to today's patterns and forecasts for the long-term across existing core area bridges, the westbound volumes are more than 90% of the peak eastbound direction traffic forecasts during the afternoon peak hour, as illustrated in **Figure 4.33**.

- **Forecast PM peak hour traffic will decrease for all bridges in the core areas as well as the north Circle Drive North Bridge relative to a 'Business-as-Usual' scenario**. As illustrated in **Figure 4.33**, approximately 80% of the traffic (or 2,150 vehicles) using the 33rd Street crossing will shift from using other core area bridges. The most notable shift is from the Circle Drive North Bridge, which is projected to experience significant delays in the 'Business-as-Usual' Scenario.

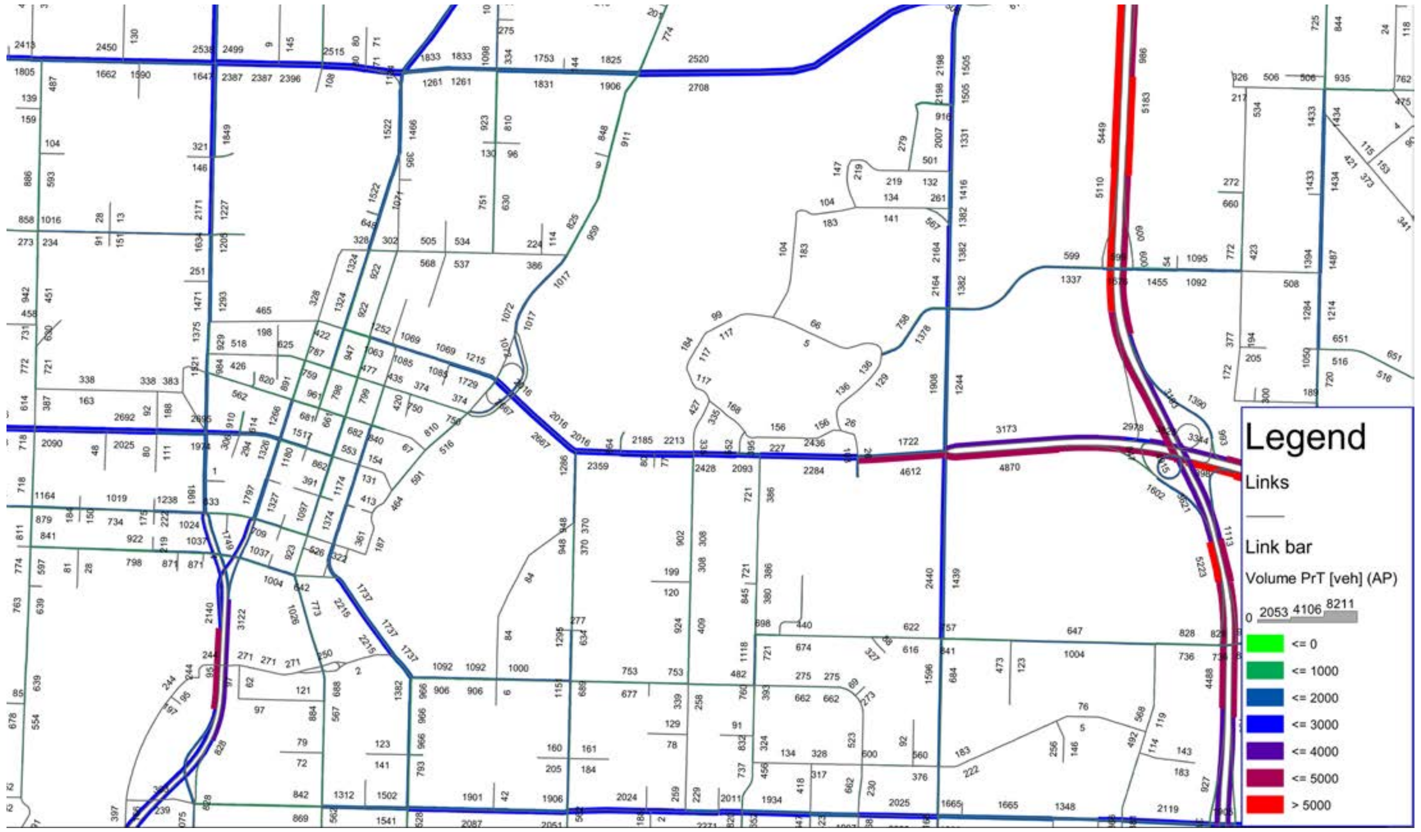

Figure 4.33 - Forecast 2045 PM Peak Hour Corridor Volumes (Scenario 3: 33rd Street Bridge)

- **On the west side of the river, 33rd Street between Spadina Crescent and Warman Road / 3rd Avenue will serve approximately 1,800 vehicles per direction during the PM peak hour in the long-term.** This peak directional traffic demand will require additional travel lanes on 33rd Street between Spadina Crescent to Warman Road from two to four lanes. The City should consider whether this is a peak only operation and on-street parking may be permitted during off-peak periods.

- **Approximately 75% or more of the traffic using the 33rd Street Bridge originates from or is destined to areas inside Circle Drive**. **Figure 4.34** illustrates the distribution of modeled eastbound vehicle trips crossing the river in terms of where they are projected to flow to and from during the afternoon peak hour. As illustrated by these flow diagrams, a majority of these vehicle trips begin or end inside the Circle Drive area. For the 2,700 eastbound vehicle trips projected on the 33rd Street Bridge, most trips are coming from the downtown using Spadina Crescent, 7th Avenue and Idylwyld Drive in addition to 33rd Street to the west. These patterns are generally consistent with the westbound bridge traffic where 75% of all trips also originate from or are destined to the core areas of the city.

Figure 4.34 - Forecast 2045 PM Peak Hour Traffic Flow Bundle for a 33rd Street Bridge (Scenario 3: 33rd Street Bridge)

- **Other than the increase in forecast traffic on 33rd Street between Spadina Crescent and Warman Road, forecast corridor traffic volumes on many core area roadways do not change dramatically**. **Figure 4.35** illustrates the change in traffic from the 'Business-as-Usual' Scenario with a 33rd Street Bridge. As previously noted, the forecast volumes along 33rd Street east of Warman Road are projected to increase significantly. Additionally, traffic volumes on Warman Road (north) and Spadina Crescent are also expected to decrease. Beyond these corridors, traffic volumes are not projected to change dramatically on roadways connecting to the bridge or other crossings where traffic is projected to decline. Although the model suggests traffic would increase slightly on 7th Avenue North, intersection improvements at 33rd Street and Warman Road could potentially limit this diversion to this and other corridors. These patterns would suggest that the 33rd Street Bridge is serving forecast local area traffic that will be on the network regardless, as opposed to generating additional vehicle trips to the core area of the city.

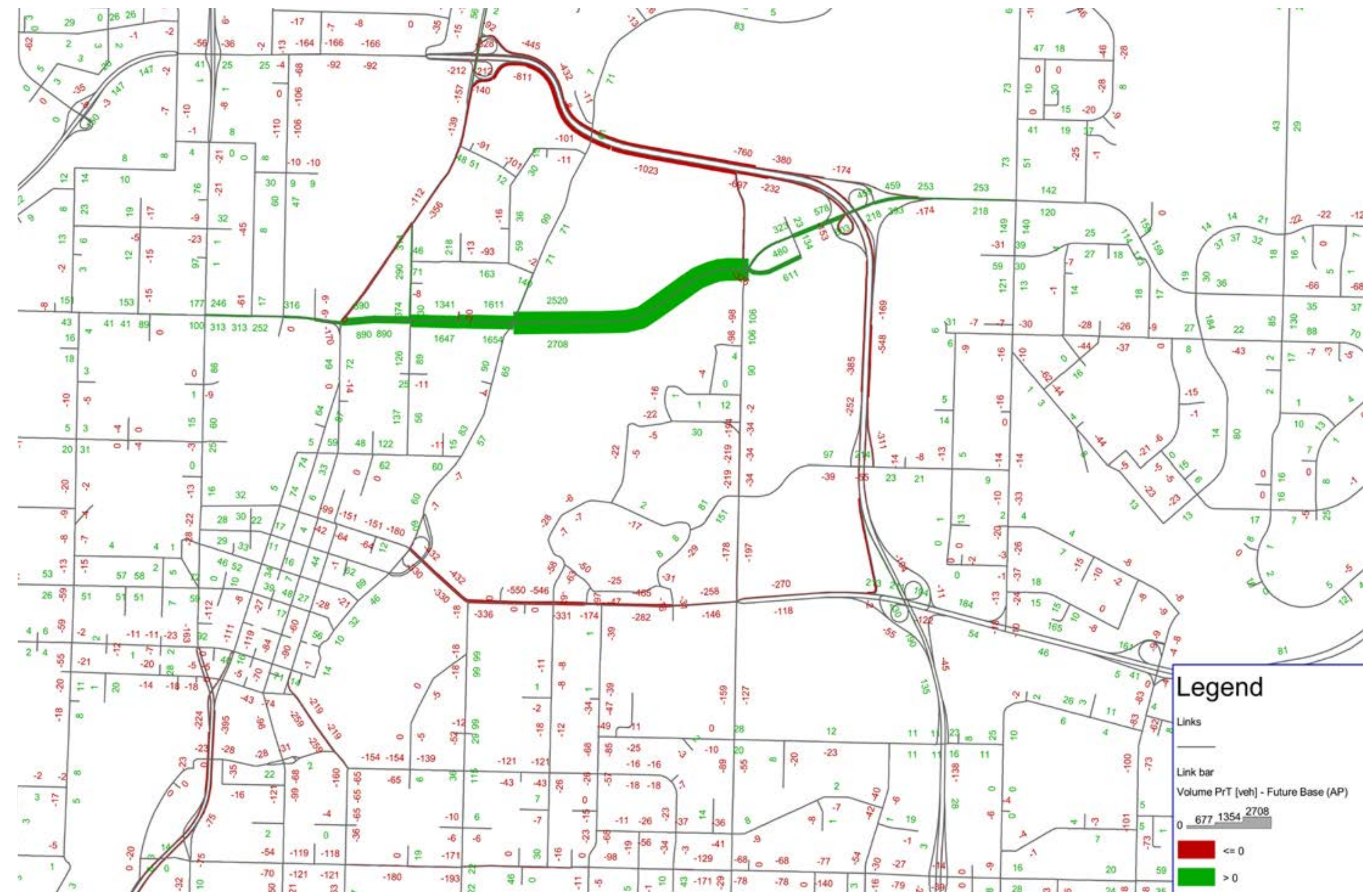

Figure 4.35 - Forecast 2045 PM Peak Hour Traffic Volume Difference (Scenario 3: 33rd Street vs. Scenario 1 'Business-as-Usual')

- **Forecast transit ridership with the 33rd Street Bridge and network connections would remain relatively unchanged from the 'Business-as-Usual' scenario**. The forecast transit ridership across the core area bridges is projected to remain relatively unchanged from the base transit investment scenario. Although not confirmed at this stage of planning, a 33rd Street crossing may potentially offer another east-west route to serve transit customers through the northern areas of University of Saskatchewan Campus and the University Heights Suburban Centre.

B) What are the potential benefits?

- **The forecast PM peak hour bridge crossing volumes will decline slightly, but remain approximately 5% over the capacity of the core area bridges**. The projected peak directional volumes, illustrated in **Figure 4.36** are forecast to be 15% above the crossing capacity in the 'Business-as-Usual' scenario and 5% for the 33rd Street crossing scenario, resulting in slightly less congestion.

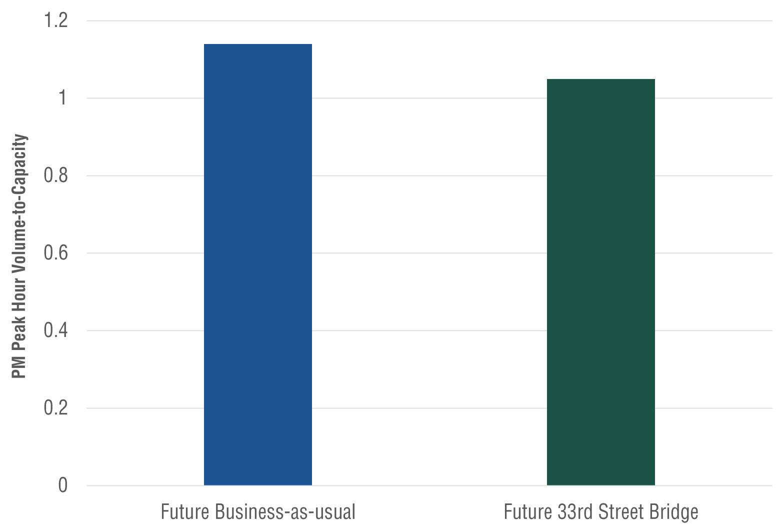

Figure 4.36 - 2045 PM Peak Average Crossing V/C Ratios

- **The average vehicle trip length in the city is projected to decline slightly with the 33rd Street crossing**. Today, the average trip length by car is estimated to be approximately 6.3 kilometres based on transportation modelling. The average trip length is projected to increase to 9.8 kilometres with planned development and expansion of the network as defined in the 'Business-as-Usual' scenario. The provision of the 33rd Street crossing will serve to slightly reduce the average trip length (1% for the city-wide average) and in particular provide more direct connections for travel to, from and within the core areas of the city.

- **The 33rd Street crossing will enhance the grid system of streets within the core area of the city, providing an alternative east west corridor to serve increasing travel by car, transit, walking and cycling**. As traffic demand grows along with delays on the major roadways in Saskatoon, so will short-cutting and other impacts on neighbourhood traffic inside the core areas of the city. The 33rd Street crossing will continue to reinforce the grid system of streets in the established area. Although the grid system will provide additional east-west capacity, the network structure will serve to manage neighbourhood traffic spillover and manage the scale of major roads to ensure livability along the corridor.

- **Average travel speeds across core area bridges will increase slightly with the 33rd Street crossing. Figure 4.37** (on the following page) compares link travel speeds across core area bridges for the 'Business-as-Usual' and 33rd Street Bridge crossing scenarios. As illustrated, the shift in traffic demands across all core area bridges will result in increased average vehicle speeds – or reduced delays. For example, average vehicle travel speeds across the University Bridge will increase from 8km/hr to 12km/hr in the PM peak direction and from 14km/hr to 22km/hr in the off-peak direction. The increase in average vehicle travel speeds will also support transit across the core area bridges.

- **Support access to the University's Strategic Growth Area**. The Growth Plan outlines the importance of sustainable growth patterns in the city not only to increase housing and other choices, but to create and strengthen neighbourhoods inside the core areas of Saskatoon. Consistent with that goal, the University's Vision 2057 outlines plans for development of the endowment lands. A 33rd Street crossing and corridor connecting with Preston Avenue/Attridge Drive would connect the established and growing areas on the east and west sides of the river, providing access for walking, cycling, transit and car. In fact, the development of this area should support the urbanized character of the east-west corridor and potential crossing.

C) What are the potential impacts?

- **Residents on the 33rd Street corridor east of Idylwyld Drive will experience a significant increase in traffic volumes.** Today, the 33rd Street corridor is a minor arterial between Spadina Crescent and Warman Road with two travel lanes, on-street parking, and driveway access to adjacent residential properties. The 33rd Street crossing and additional travel lanes along 33rd Street west of Spadina Crescent will impact residents that currently own properties along that section of the corridor.

- **Potential for spillover traffic on neighbourhood streets.** East of Idylwyld Drive, the increased traffic volumes using 33rd Street means that more traffic is headed to this corridor in order to cross the river. A 33rd Street Bridge means that there is potential for neighbourhood short-cutting on roadways such as 7th Avenue, Spadina Crescent as well as other connections. As overall traffic increases on 33rd Street with or without a new crossing, the City will need to monitor and address the potential of neighbourhood spillover traffic during peak and off-peak timeframes.

- **Potential removal of on-street parking along 33rd Street during peak periods to support four travel lanes.** With or without the 33rd Street Bridge, traffic volumes along 33rd Street west of Idylwyld Drive during the morning and afternoon peak periods will require four travel lanes. With the implementation of a 33rd Street Bridge, this section of 33rd Street will experience significant change and still require four travel lanes. The City should consider whether this is a peak only operation and on-street parking may be permitted during off-peak periods.

Figure 4.37 - 2045 PM Peak Average Vehicle Travel Speeds (km/hr)

Scenario 4 - Combined Bridge and Transit

The following discussion highlights the long-term traffic and transit ridership for the 33rd Street or 24th Street river crossing combined with the Transit Plan investments.

A) What's changed?

- **Transit ridership across the core area bridges is expected to increase significantly with additional transit services and the implementation of BRT compared to the 'Business-as-Usual' scenario** as shown in **Figure 4.38.** As described in Section 3.0, the transit mode share across the city is projected to increase from 5% for the 'Business-as-Usual' and 33rd Street Bridge scenarios to 8% with the city-wide Transit Plan and other combined scenarios with a new crossing. Within the established areas of the city, transit ridership across the core area bridges is expected to increase from approximately 500 passengers in the peak hour direction today to 1,800 passengers in either the 24th Street or 33rd Street bridge crossing scenarios.

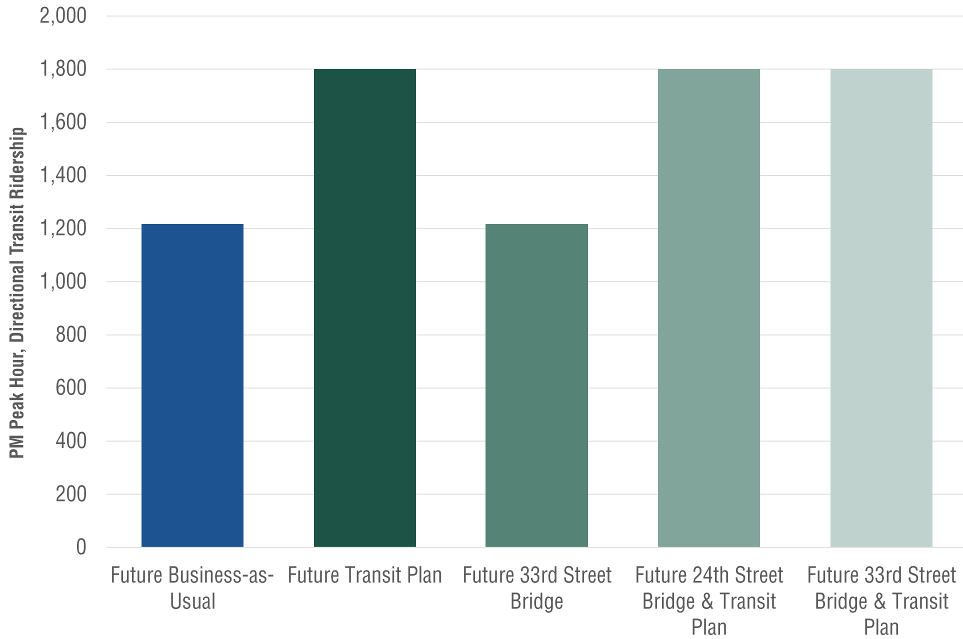

Figure 4.38 - Core Bridge Forecast PM Peak Hour Directional Transit Ridership

- **Core area bridge traffic volumes crossing the river will be moderately lower than the 'Business-as-Usual' scenario with the 24th Street Bridge, and slightly more with the 33rd Street Bridge**. In fact, the provision of the 24th Street Bridge and increased investments in transit will result in approximately 10,600 vehicles per hour crossing the river in the PM peak direction as illustrated in **Figure 4.39**, and almost 12,100 vehicles per hour crossing the river in the PM peak direction with the 33rd Street crossing scenario (in comparison to 11,300 in the 'Business-as-Usual' scenario).

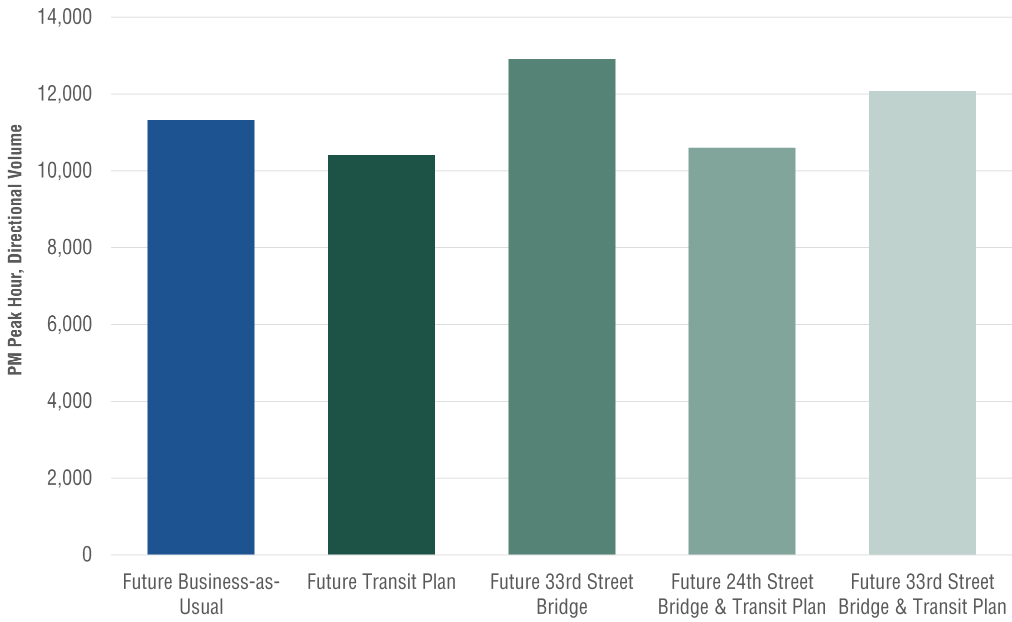

Figure 4.39 - Core Bridge Forecast PM Peak Hour Directional Traffic Volumes

- **Both the 33rd Street and 24th Street crossings will reduce pressures on other bridges in the core area of the city.** A greater network benefit is realized with the 33rd Street Bridge and corresponding investments in transit. **Figure 4.40** (on the following page) illustrates the projected 2045 PM peak hour volume differences between the two network scenarios and the traffic volumes for Scenario 2 – Transit Plan. The vehicle trips assigned to the road network are comparable for each of these scenarios and highlight the actual impacts of each crossing assuming that the Transit Plan is implemented. It should be noted that the increase in PM peak hour westbound traffic volumes crossing the University Bridge for the 24th Street Bridge scenario is principally due to retaining the two travel lanes (relative to the reduced travel lanes in Scenario 2).

  The 33rd Street Bridge scenario draws slightly more traffic from other core area crossings (as well as the Circle Drive North Bridge) than the 24th Street Bridge scenario. In the PM peak hour, the 33rd Street Bridge draws approximately 800 to 1,000 vehicles per direction away from other core area bridges, while the 24th Street Bridge crossing diverts approximately 500 vehicles per hour per direction. The extent of the diversion with the 33rd Street Bridge suggests that this scenario would reduce network delays more than the 24th Street Bridge scenario.

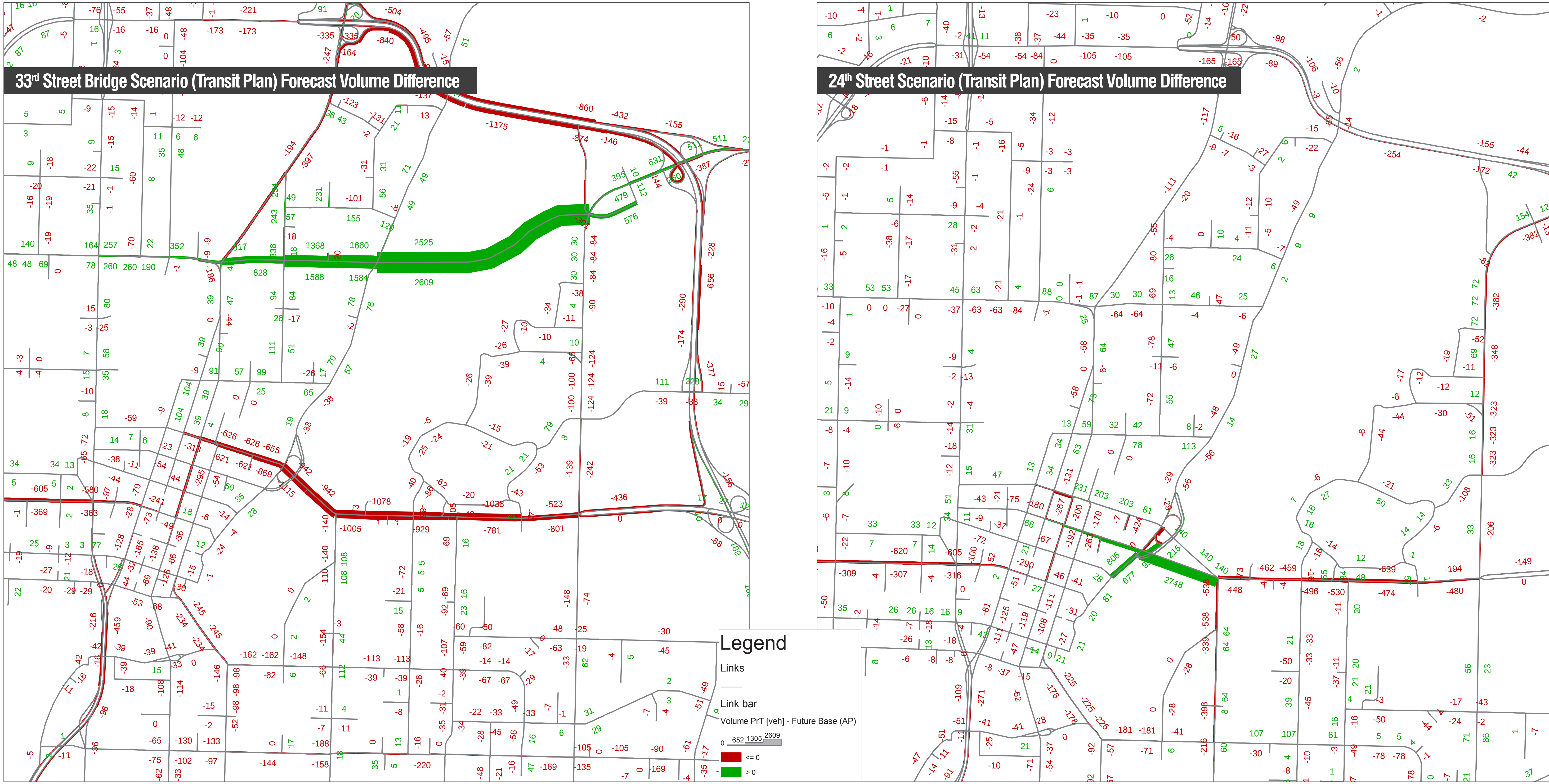

Figure 4.40 - Forecast 2045 PM Peak Hour Traffic Change (Scenario 4A and 4B vs. Scenario 2: Transit Plan)

- **Similar to the University Bridge today, the 24th Street Bridge would serve more traffic between the Downtown and University areas while the 33rd Street Bridge would serve more traffic to and from the core area and beyond the University area**. **Figure 4.41** illustrates the dispersion of forecast PM peak hour eastbound traffic across the 33rd Street and 24th Street bridges for the respective scenarios. As described for the 33rd Street Bridge scenario (without the Transit Plan investments), almost 75% of the traffic using the 33rd Street Bridge originates from and/or is destined to areas inside Circle Drive. In other words, the 33rd Street Bridge would serve as an important connection for supporting growth projections inside the core areas of the city. Whether traffic is diverted from other bridges (relative to a 'Business-as-Usual' scenario) or the Circle Drive North Bridge, the 33rd Street Bridge would provide a more direct connection inside the core area of Saskatoon.

The patterns illustrated in the traffic flow diagrams below suggest that the 24th Street Bridge would serve a similar core area function. In fact, in the PM peak hour, approximately 90% of the forecast 2,750 eastbound vehicles crossing the 24th Street Bridge will be generated from and/or destined to areas of the city inside Circle Drive.

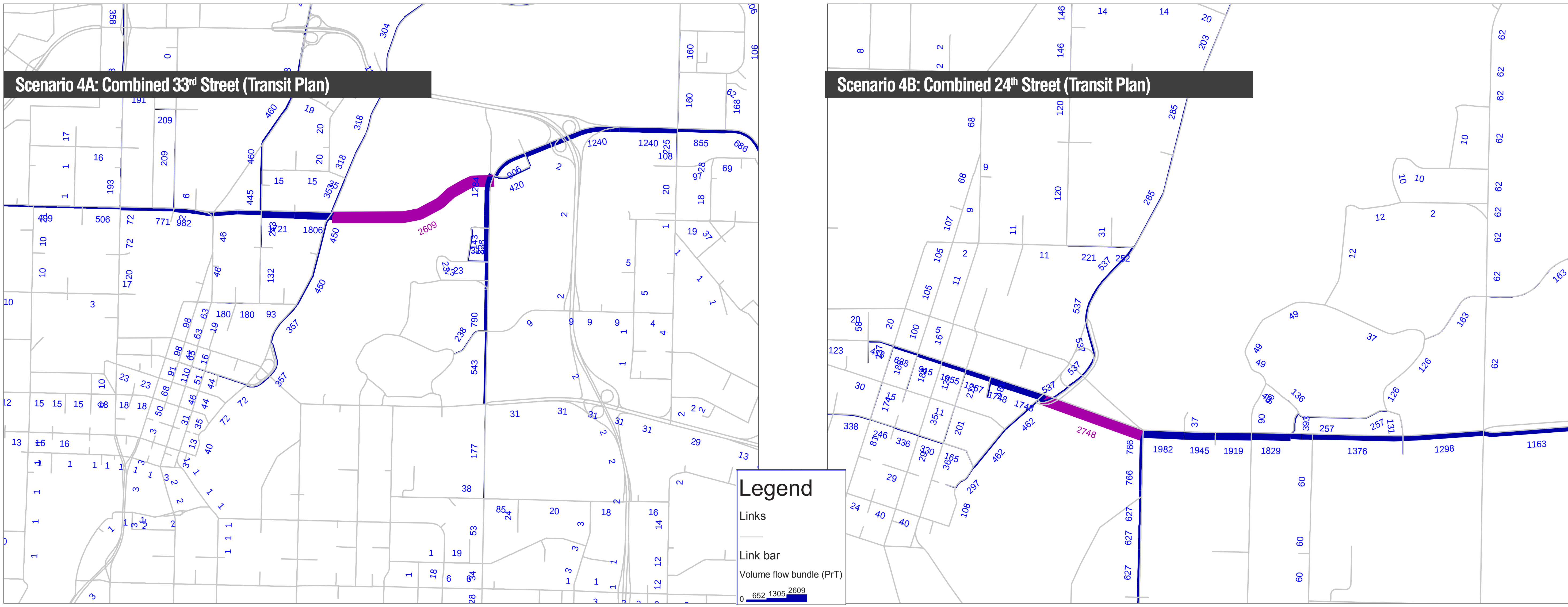

Figure 4.41 - Forecast 2045 PM Peak Hour Eastbound Traffic Flow Bundle for 33rd Street and 24th Street Bridges

- **With similar investments in the Transit Plan, both network scenarios are projected to experience a significant increase in transit ridership, with the largest growth along the proposed BRT corridors across the city**. **Figure 4.42** illustrates the forecast PM peak hour transit ridership along all major corridors in the Downtown area. This ridership is largely unchanged from Scenario 3 – Transit Plan. Although not assumed in this network scenario analysis, the 33rd Street Bridge may also serve as an alternative east-west transit connection across the city, serving similar travel patterns within the core area to the traffic patterns previously noted.

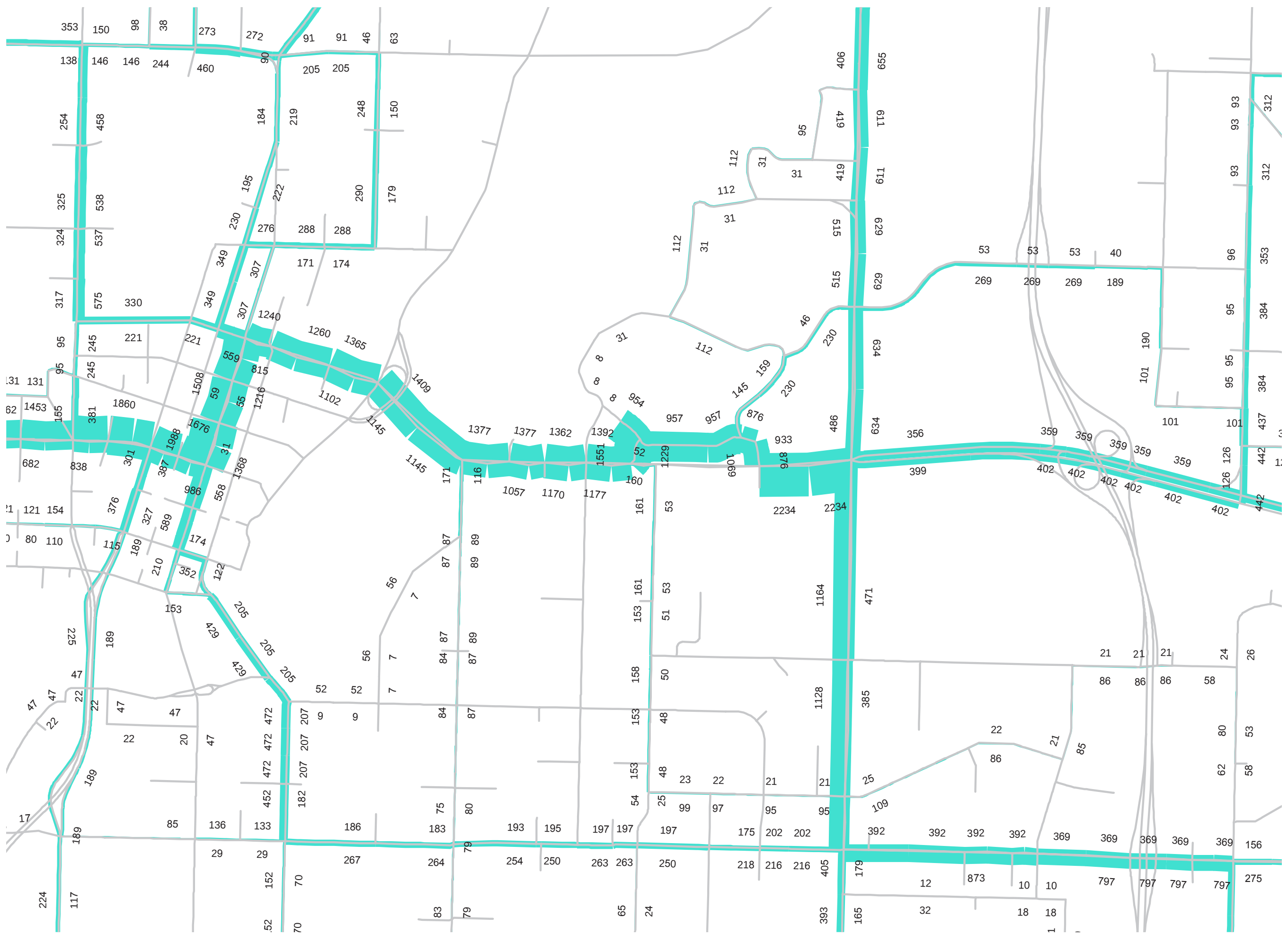

Figure 4.42 - Forecast 2045 PM Peak Hour Transit Passenger Volumes (Scenario 4A and 4B)

B) What are the potential benefits?

- **The bridge volume-to-capacity ratios or delays crossing the core area bridges are projected to be lower for both the 33rd Street and 24th Street Bridge crossing scenarios in comparison to a 'Business-as-Usual' Scenario**. **Figure 4.43** compares the v/c ratios for the core area bridge crossings for all network scenarios. As illustrated, the 'Business-as-Usual' scenario and Future Transit Plan scenarios will experience the highest delays crossing the core area bridges with projected PM peak directional volumes of 15% to 20% more than the capacity of the crossings. Forecast traffic crossing the core area bridges in the 24th Street and 33rd Street Bridge scenarios will exceed the capacity of the crossings by slightly more than 5%.

- **Although the system-wide vehicle-kilometers travelled in the city during the PM peak hour are slightly lower with either crossing, the system-wide vehicle hours travelled are significantly lower for the 33rd Street Bridge scenario**. The system-wide modeling work indicates that the total vehicle distance travelled (measured by vehicle-km) is slightly lower with the 33rd Street Bridge scenario than the 24th Street Bridge scenario (a difference of less than 1% for both options). The 33rd Street Bridge scenario provides significantly greater benefits in terms of reduced vehicle hours travelled by approximately 4% relative to the 'Business-as-Usual' scenario (as compared to reduced vehicle hours of 0.4% for the 24th Street Bridge scenario).

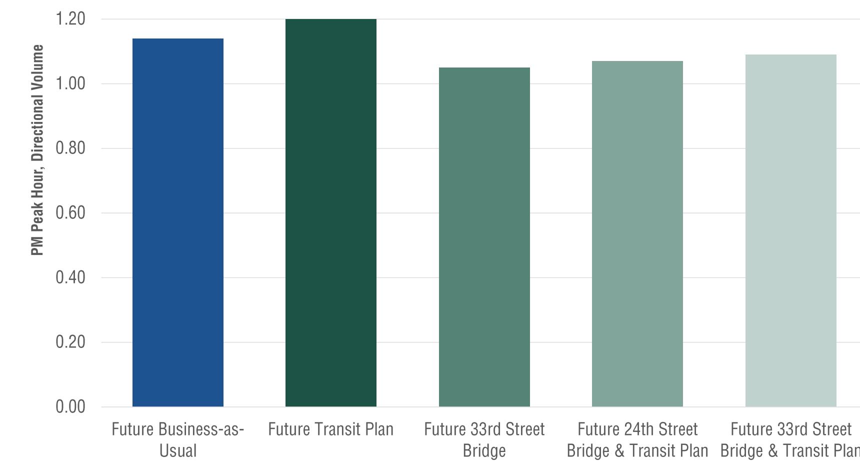

Figure 4.43 - Core Bridge Forecast PM Peak Hour Crossing V/C Ratios

- **Improves people-carrying capacity of the University Bridge and other BRT corridors.** The forecast PM peak hour transit ridership increases significantly along the proposed Red Line BRT corridor and moderately along the Blue Line BRT corridor. This will in turn make better use of existing capacity of the city's roadway network.

- **Results in limited traffic diversion to other major corridors in the city with the provision of dedicated bus-only lanes along the Red Line BRT corridors.** With the increased investment in transit and dedicated bus-only lanes, the increase in overall ridership and reduction in vehicle travel relative to 'Business-as-Usual' results in minimal diversion to other east-west roadways.

C) What are the potential impacts?

- **Residents on the 33rd Street east of Idylwyld Drive will experience a significant increase in traffic volumes.** Today, the 33rd Street corridor is a minor arterial between Spadina Crescent and Warman Road with two travel lanes, on-street parking and driveway access to adjacent residential properties. As illustrated by the volume differences relative to the 'Business-as-Usual' scenario (**Figure 4.43**), the 33rd Street crossing and additional travel lanes west of Spadina Crescent will increase traffic volumes by approximately 1,500 vehicles per direction and impact residents that currently own properties along that section of the corridor. Traffic volumes along other connecting roadways such as Spadina Crescent and 7th Avenue are also expected to increase moderately during peak and off-peak periods. Additional steps may be taken to manage undesirable spillover traffic impacts.

- **Traffic access and circulation within the downtown area would be impacted with a one-way couplet system between 25th Street and 24th Street.** Although the impact would be relatively modest, local residents and business access would be altered as a result of implementing a one-way couplet system between 24th and 25th Streets.

4.4.3 Options Evaluation

The comparative evaluation between candidate core area bridge and/or transit scenarios is intended to highlight the primary differences as well as the overall benefits and impacts as previously summarized. The evaluation criteria provide a multiple account assessment of key factors that will interest the community and decision makers in terms of the transportation system, community, environmental and financial accounts. The accounts and relative measures evaluated for each integrated network scenario are compared to the 'Business-as-Usual' scenario using the criteria summarized in **Table 4.03** below.

The following discussion highlights the comparative review of each core area bridge and network scenario for each of the accounts.

Criteria	Relative measure compared to the 'Business-as-Usual" scenario
TRANSPORTATION	
Vehicle Mobility Savings	Change in travel time per vehicle
Transit Mobility Savings	Change in travel times per person
Traffic Diversion	Traffic diversion from other river crossings
Transit Ridership Change	Change in PM peak hour transit ridership
Walking & Cycling	Potential for increased walking and cycling
COMMUNITY	
Neighbourhood Impacts	Degree of community severance (barriers that limit mobility)
Property Requirements	Change in property requirements
Community Connectivity	Change to community connectivity
ENVIRONMENT	
Impact on GHG Emissions	Relative vehicle emissions
Impact on Sensitive Areas	Potential impact on sensitive areas (ESAs)
FINANCIAL	
Annual Transit Operating Cost Increase	Increase in annual operating cost
River Crossing	Conceptual Capital Cost
Transit Travel Time Savings	% reduction in passenger transit travel time
Vehicle Travel Time Savings	% reduction in vehicle travel time

Table 4.03 - Core Area Bridge & Network Evaluation Criteria

Transportation

The relative changes from the future 'Business-as-Usual' scenario are summarized for the transportation account below in **Table 4.04**. The relative assessments highlight the transportation benefits of investing in the Transit Plan in order to increase the people-carrying capacity of the city's roadway network in comparison to a new 33rd Street Bridge or combinations of transit and bridge crossing improvements.

Criteria	SCENARIO 1 (Business-as-Usual)	SCENARIO 2 (Transit Plan)	SCENARIO 3 (Build New 33rd Street Crossing)	SCENARIO 4A (33rd Street Crossing & Transit Plan)	SCENARIO 4B (24th Street Crossing & Transit Plan)
TRANSPORTATION SYSTEM					
Vehicle Mobility Savings: Change in travel time per vehicle	-	Moderate	Moderate	High	Moderate
Transit Mobility Savings: Change in travel times per person	-	High	Low	High	High
Traffic Diversion: Traffic diversion from other river crossings	-	Low	High	High	Moderate
Transit Ridership Change: Change in PM peak hour transit ridership	-	High	Low	High	High
Walking & Cycling: Potential for increased walking and cycling	-	Low	Moderate	Moderate	Low

LOW MODERATE HIGH

Table 4.04 - Transportation Account Evaluation Summary

- **Vehicle Mobility Savings**. Scenarios 2 and 4A/B generally include approximately 3% fewer vehicles on the network than both the 'Business-as-Usual' scenario and Scenario 3, as the transit mode share increases from 5% to 8% city-wide. None-the-less, the average vehicle speeds improve even with the reduction in vehicle capacity along major corridors such as 22nd Street, 25th Street and College Drive in order to accommodate bus-only lanes. As such, the average travel time per vehicle declines moderately for Scenarios 2, 3 and 4B, and more significantly for Scenario 4A.

- **Transit Mobility Savings**. The average trip time by transit is improved with the investments in BRT facilities and the overall Transit Plan, which provides more direct service on dedicated road space in Scenarios 2 4A and 4B.

- **Traffic Diversion**. The significance of the diversion from other crossings for Scenario 3 and Scenario 4A is much greater than Scenario 4B. The 33rd Street Bridge supports travel to and/or from the core areas of the city and moderately reduces demands across other core area bridges as well as the Circle Drive North Bridge.

- **Transit Ridership Change**. Transit ridership is projected to increase by about 5,000 trips during the PM peak hour with the implementation of the Transit Plan services and facilities in Scenarios 2, 4A and 4B relative to the 'Business-as-Usual' scenario. The introduction of a broader range of services across the city along with BRT will provide an enhanced customer experience and increase long-term mode share from 5% to 8% city-wide.

- **Support Walking and Cycling**. Scenarios 3 and 4A (with the 33rd Street Bridge Crossing) have a moderate benefit to walking and cycling across the River with a new northern connection to serve growth and development of the University Endowment Lands and the northern parts of the city's core area.

Community

The relative changes from the future 'Business-as-Usual' scenario are summarized for the community account below in **Table 4.05.**

Criteria	SCENARIO 1 (Business-as-Usual)	SCENARIO 2 (Transit Plan)	SCENARIO 3 (Build New 33rd Street Crossing)	SCENARIO 4A (33rd Street Crossing & Transit Plan)	SCENARIO 4B (24th Street Crossing & Transit Plan)
COMMUNITY					
Neighbourhood Impacts: Degree of community severance	-	○	○	○	◐
Property Requirements: Impacts on property	-	●	○	○	○
Community Connectivity: Impacts on community connectuvity	-	◐	◐	●	◐

○ NEGATIVE ◐ NEUTRAL ● POSITIVE

Table 4.05 - Community Account Evaluation Summary

- **Neighbourhood impacts**. Scenarios 3 and 4A (with the 33rd Street Bridge Crossing) have the greatest potential community impacts for those residents currently living along the minor arterial connector west of the river. Additionally, existing high density residential development would be impacted by a 24th Street crossing. Scenario 2 would not impact existing neighbourhoods.
- **Property Requirements**. The 33rd Street Bridge Crossing Scenarios will require new rights-of-way within the University Endowment Lands through to Attridge Drive at Preston Avenue. Additionally, development of the University lands will require road connections to serve the surrounding area. West of the river, some additional right-of-way may be required around major intersections depending on the configuration. This should be determined through corridor functional planning. A 24th Street crossing would require additional right-of way on the west side of the river.
- **Community Connectivity**. Scenarios 2, 4A and 4B, increase travel choice and connectivity across Saskatoon with transit investments. In Scenario 4A, the 33rd Street Bridge provides the added benefit of a new connection in the northern areas of the city's core, where the University and Circle Drive North Bridges are approximately 2.7km apart. The 33rd Street Bridge provides an intermediate crossing that will serve to enhance long-term connectivity for the growing areas of the city.

Environmental

The relative changes from the future 'Business-as-Usual' scenario are summarized for the Environmental Account below in **Table 4.06**.

Criteria	SCENARIO 1 (Business-as-Usual)	SCENARIO 2 (Transit Plan)	SCENARIO 3 (Build New 33rd Street Crossing)	SCENARIO 4A (33rd Street Crossing & Transit Plan)	SCENARIO 4B (24th Street Crossing & Transit Plan)
ENVIRONMENT					
GHG Emissions: Vehicle emission reductions	-	◐	◐	●	◐
Sensitive Areas: Potential impact on sensitive areas	-	○	◐	◐	◐

○ LOW ◐ MODERATE ● HIGH

Table 4.06 - Environmental Account Evaluation Summary

- **Greenhouse Gas Emissions (GHG).** Although all scenarios reduce total vehicle hours travelled (a surrogate for GHGs), the investments in the Transit Plan and BRT in Scenario 4A (with the 33rd Street Bridge Crossing) contributes to slightly larger reductions.
- **Impacts on Environmentally Sensitive Areas.** Although any new crossing can impact watercourses as well as embankments on either side of the South Saskatchewan River, these impacts are rated neutral as they can generally be mitigated through design and other treatments.

Financial

The financial account summarized in **Table 4.07** below is typically expressed in monetary benefits and costs relative to the future 'Business-as-Usual' scenario. It should be noted that the relative travel time savings for transit and vehicle travel are summarized for each scenario rather than the actual monetized value. The significance of the delay for the future 'Business-as-Usual' scenario appears to exaggerate the extent of the travel time savings for a major improvement and its corresponding value for the following reasons:

- The 'Business-as-Usual' network is a preliminary network strategy for the City based on current plans and known projects. The Growth Plan work and recommended directions on core area bridges, transit and BRT as well as overall corridor growth will complete the foundational strategies in which to undertake further long-term network planning across the city.
- The 'Business-as-Usual' model scenario with half a million people projects no significant delays. Therefore, the modeled travel time benefits in congested networks can be exaggerated because of the exponential effects of congestion on travel time. As such, the relative travel time savings are summarized as a percentage change across the city relative to the 'Business-as-Usual' scenario.

Criteria		Scenario 1 (Business-as-Usual)	Scenario 2 (Transit Plan)	Scenario 3 (Build New 33rd Street Crossing)	Scenario 4A (33rd Street Crossing & Transit Plan)	Scenario 4B (24th Street Crossing & Transit Plan)
FINANCIAL						
Costs (2014 $)	**Annual Transit Operating Cost Increase:** Estimated increase in annual operating cost		$22-32M	$0	$22-32M	$22-32M
	River Crossing: Estimated Capital Cost		N/A	$100M	$100M	$70M
Benefits	**Transit Travel Time Savings:** % reduction in passenger transit travel time	-	(5.0%)	(0.1%)	(5.0%)	(5.0%)
	Vehicle Travel Time Savings: % reduction in vehicle travel time	-	(3.4%)	(2.9%)	(5.2%)	(3.5%)

Table 4.07 - Financial Account Evaluation Summary

- **Annual Transit Operating Cost Increase.** The annual operating costs for Scenarios 3 and 4A/B are expected to increase from the 'Business-as-Usual' scenario where the annual service levels grow from approximately 675,000 service hours per year to approximately 900,000 to 1,000,000 service hours per year. Based on 2014 dollars, this change is estimated to cost an additional $22 to $32 million per year in system operating costs (not including the investments in BRT facilities).
- **River Crossing Costs.** Conceptual, order-of-magnitude cost estimates are provided for the 33rd Street and 24th Street river crossings using unit costing for bridge structures and roadways. These estimates are referred to as Class D costs and are typically only used to understand relative differences between concepts and should not be used to prepare project budgets. The 33rd Street crossing is expected to cost as much as $100 million, and the 24th Street crossing is estimated to cost as much as $70 million.
- **Annual Transit Travel Time Savings.** The system wide delays and transit travel times are projected to increase significantly in the long-term 'Business-as-Usual' scenario. Scenario 3 (33rd Street Crossing) is expected to reduce system transit travel times marginally by less than 0.1% with some traffic diversion to the 33rd Street Bridge. In Scenarios 2 and 4A/B, the increase in ridership and overall system travel time by passengers is off-set by the provision of dedicated BRT facilities. Dedicated lanes across the Red Line BRT corridors would contribute toward a significant transit system travel time savings of approximately 5.0% system-wide.
- **Annual Vehicle Travel Time Savings.** All core area bridge scenarios result in some network level vehicle travel time savings. Scenario 2 (Transit Plan) includes the provision of BRT facilities and services as well as the implementation of significant transit services that reduce overall vehicle travel relative to a 'Business-as-Usual' scenario. The reduction in vehicle travel as well as the vehicle lanes produces a vehicle travel time savings of approximately 3.4% across the city. Scenario 4B (24th Street Bridge Crossing) results in a marginally higher system-wide vehicle travel time savings, while Scenario 4A is projected to experience the most significant vehicle travel time savings of 5.2% compared to the 'Business-as-Usual' scenario.

4.4.4 Evaluation Summary

The multiple account evaluation for each of the four integrated core area bridge and network scenarios are summarized in **Table 4.08**. Scenario 4A (33rd Street Crossing & Transit Plan) receives the highest ranking based on the technical evaluation of transportation, community, environmental and financial criteria. Scenario 4A includes the 33rd Street crossing as well as the implementation of the Transit Plan as previously described. This scenario also includes dedicated bus-only lanes across the city and University Bridge between Blairmore, University Heights and Holmwood. The 33rd Street crossing would connect arterial roadways on both sides of the river that are generally intended to connect neighbourhoods across the city. In fact, the spacing of the 33rd Street crossing (approximately 1.5 kilometres north of the University Bridge and south of the Circle Drive Bridge) would enhance the grid system of arterial roadways typically needed to support attractive transit services as well as walking and cycling facilities, and minimize travel on neighbourhood streets. Much like the other crossings options, the 33rd Street crossing would principally serve local area travel to and from the core areas of the city. With growth planned on both the east and west sides of the river in the North Downtown and University areas, a 33rd Street crossing would also provide improved walking and cycling connections and allow for the provision of frequent transit services to these communities.

Recognizing the importance of encouraging alternative modes throughout the city, the 33rd Street crossing may be deferred for the very long-term through accelerated investments in transit services and facilities, maintaining general purpose travel lanes across the University Bridge, and other land use and transportation demand management strategies.

Criteria	SCENARIO 1 (Business-as-Usual)	SCENARIO 2 (Transit Plan)	SCENARIO 3 (Build New 33rd Street Crossing)	SCENARIO 4A (33rd Street Crossing & Transit Plan)	SCENARIO 4B (24th Street Crossing & Transit Plan)
TRANSPORTATION					
Vehicle Mobility Savings: Change in travel time per vehicle	-	◐	◐	●	◐
Transit Mobility Savings: Change in travel times per person	-	●	○	●	●
Traffic Diversion: Traffic diversion from other river crossings	-	○	●	●	◐
Transit Ridership Change: Change in PM peak hour transit ridership	-	●	○	●	●
Walking & Cycling: Potential for increased walking and cycling	-	○	◐	◐	○
COMMUNITY					
Neighbourhood Impacts: Degree of community severance	-	○	○	○	◐
Property Requirements: Impacts on property	-	●	○	○	○
Community Connectivity: impacts on community connectivity	-	◐	◐	●	◐
ENVIRONMENT					
GHG Emissions: Vehicle emission reductions	-	◐	◐	●	◐
Sensitive Areas: Potential impact on sensitive areas	-	○	◐	◐	◐
FINANCIAL					
Costs (2014 $) — **Annual Transit Operating Cost Increase:** Estimated increase in annual operating cost		$22-32M	$0	$22-32M	$22-32M
Costs (2014 $) — **River Crossing:** Estimated Capital Cost		N/A	$100M	$100M	$70M
Benefits — **Transit Travel Time Savings:** % reduction in passenger transit travel time	-	(5.0%)	(0.1%)	(5.0%)	(5.0%)
Benefits — **Vehicle Travel Time Savings:** % reduction in vehicle travel time	-	(3.4%)	(2.9%)	(5.2%)	(3.5%)
Technical Ranking	5	3	4	1	2

○ LOW / NEGATIVE ◐ MODERATE / NEUTRAL ● HIGH / POSITIVE

Table 4.08 - Overall Evaluation Summary for Core Bridge Scenarios

4.5 Long-term Plan for Core Bridges

Core areas inside Circle Drive are expected to accommodate 50% of the city's growth, with 125,000 new residents concentrated in the city's Strategic Growth Areas (University, North Downtown and City Centre), as well as along major corridors and through Neighbourhood Infill. With this growth, more people will need to move to, from, and within the core area of the city inside Circle Drive.

The overarching vision guiding the review and evaluation of alternative core area river crossing strategies is centred on creating a transportation system that supports vibrant communities in the core area of the city and prioritizes mobility for transit, walking and cycling. In doing so, any core area bridge strategy must connect arterial roads, primarily serve core area travel needs, increase sustainable modes of travel, continue the grid system of streets that are characteristic of Saskatoon's core area and contribute toward enhancing the urban character of major roadways within the city.

After an extensive process of considering all possibilities to address long-term challenges and evaluating alternative strategies, the plan for core area river crossings has three distinct features that are essential to supporting the overall growth of Saskatoon to half a million people. The features of the plan include:

A) Maximize Capacity of Existing River Crossings

The capacity of bridges in Saskatoon are largely influenced by the urban street system and intersections that they connect to. As previously described, one lane of a bridge that connects with a highway can typically support 100% more traffic per lane than one that connects with signalized intersections. Although intersection improvements on either side of the Broadway, University and future Traffic Bridges may be considered to maximize the investments, they would not address long-term challenges and needs for core area river crossings by themselves. None-the-less, the City should consider operational strategies to improve and maximize the vehicle carrying capacity of existing river crossings.

Recommended Actions:

- **As part of an ongoing strategy, the city should consider improvements to urban street intersections on both sides of core area bridges in order to maximize the actual capacity of the river crossings and to defer other major roadway and bridge investments.**
- **Operational improvement strategies may include, but not be limited to: signal timing and prioritization for major roadways that connect to bridges; signal coordination along connecting roadways; additional lanes or modifications; and/or turn restrictions.**

B) Transit Plan

The long-term Transit Plan described in Section 3.5 of the Technical Report outlines the critical elements of a successful transit system for Saskatoon that will not only provide transportation choice, but will also support planned growth across the city over the next 30 years. The core bridge review also found that the Transit Plan is essential to reducing pressures on the city's roadway network and in particular the core area river crossings.

The Long-term Transit Plan includes: customer service improvements; plan for enhanced and increased services; support facilities; Red Line BRT corridor; and Blue Line BRT corridor. As indicated in the assessment of core area bridges, the Transit Plan significantly increases the transit mode share in the city from 5% to 8%, and in turn decreases vehicle travel relative to a 'Business-as-Usual' approach to investing in transit. In this regard, the people-carrying capacity of the city's street system will also grow with more attractive transit services. In particular, investments in dedicated bus-only lanes along the Red Line BRT corridor will ensure that the University Bridge is designed to carry the projected 1,600 passengers per hour in the peak direction (and even more beyond the 30 year time-frame of the Growth Plan).

Recommended Actions:

- **Implement the Transit Plan as described in Section 3.0 of the Technical Report in order to defer the need for an additional crossing.**
- **Prioritize transit investments wherever possible to potentially defer investments in roadway network improvements planned for other areas of the city.**

C) 33rd Street Bridge

Beyond and well after the city accelerates investments in attractive transit services and BRT facilities, a 33rd Street Bridge is also recommended to address core area travel based on the technical review. With planned growth of more than 40,000 people across the University of Saskatchewan lands on the east side of the river and other growth projected for Strategic Growth Areas as well as along major corridors, an east-west crossing will support travel for all modes and connect these growing communities. In comparison to the 'Business-as-Usual' approach, a 33rd Street Bridge will provide direct connections between growing urban areas of the city, and reduce overall travel distances and time for core area trip making.

Consistent with the vision for alternative core area crossings, a 33rd Street Bridge will:

- Connect arterial roads that serve travel between core area communities in Saskatoon;
- Primarily serve core area travel rather than vehicle travel that starts and ends outside Circle Drive;
- Connect pedestrians, cyclists, transit, and vehicles to promote sustainable modes of travel within the core areas;
- Continue the grid street pattern that exists within the core area to not only promote use of alternative modes, but to minimize impacts of increasing traffic on neighbourhoods; and
- Create an urban street character on both sides of the bridge.

With forecast travel demands of more than 2,500 vehicle trips per direction during the PM peak hour, the 33rd Street Bridge would connect the west side communities to the University Lands with a multi-modal connection that may include up to four travel lanes, separated bicycle facilities as well as sidewalks on both side of the bridge as conceptually illustrated in **Figure 4.44** below. Functional planning in the future will determine the required capacity and number of lanes for the bridge.

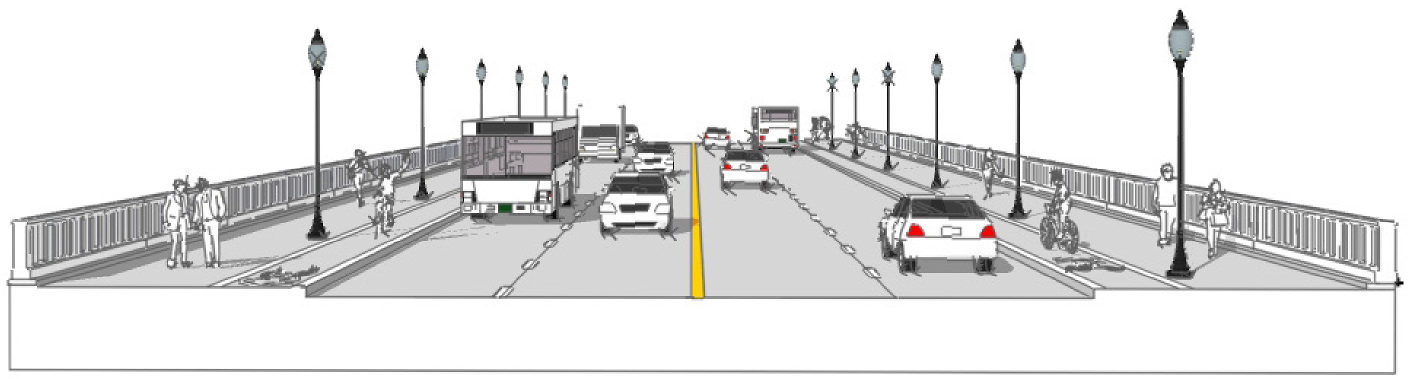

Figure 4.44 - Potential Configuration of a 33rd Street River Crossing

Recommended Actions:

- **Utilize other strategies to optimize operation of existing river crossings and investments in transit facilities and services to defer the need to plan for and invest in the 33rd Street Bridge.**
- **Plan, design and implement the 33rd Street river crossing as a long-term improvement required to support planned growth on the University of Saskatchewan lands in addition to the city's other Strategic Growth Areas – City Centre and North Downtown.**

4.6 Implementing the Plan

The long-term plan for core area bridges requires a multi-faceted approach to increasing transportation choices by investing in transit and maximizing the use of existing river crossings before investing in a new crossing. The following discussion highlights the implementation priorities needed to achieve the vision for core area bridges and to support the overall Growth Plan.

4.6.1 5 Year Priorities

Within the first five years, the City will want to explore operational improvements of the urban street system connecting core area river crossings in order to maximize existing capacity and investment. As described in the Plan, these strategies are largely centred on the nearby intersections and include: signal timing and prioritization for prioritize major roadways; additional lanes or modifications; and turn restrictions.

During this initial stage of implementation, the City will also be improving existing transit services to maximize these resources and investing in new services and facilities to attract the largest transit markets. In particular, the City will begin implementation of the Red Line BRT corridor with the potential of dedicated bus-only lanes and stations along College Drive and 3rd Avenue.

The investments in transit services and facilities will ensure not only that residents across the city have attractive travel choices, but that investments are made in those areas of the city that will have the greatest potential to increase transit ridership. This strategy will also serve to reduce pressures on core area bridges by increasing the people-carrying capacity of the existing roadway network.

4.6.2 10 Year Priorities

Between 5 and 10 years, the City will want to examine changes in vehicle and transit passenger travel demands across core area bridges and identify any changes in traffic patterns resulting from the opening of the Traffic and North Commuter Parkway bridges. In concert with the monitoring program for transit investments, changes in core area bridge travel should be noted and assessed in relation to the long-term Plan. These results may inform further investments in either operational improvements on either side of the bridge and/or transit services and facilities serving customers that cross the river.

During this period, the City should continue to invest in significantly expanding and improving transit services to support the largest customer markets. At the same time, investments in transit facilities such as the Red and Blue Line BRT corridors as well as other support facilities and customer programs will be required. In particular, dedicated BRT lanes and stations should be implemented along 25th Street and 22nd Street to enhance the customer experience by avoiding areas of recurring congestion and further increasing the people-carrying capacity of Saskatoon's major roadways. During this period, it is anticipated that investments in rapid transit will also be required to support Corridor Growth, which will in turn, serve to provide more sustainable travel patterns and choices.

4.6.3 Long-term (Beyond 10 Years)

The long-term plan includes the implementation of a 33rd Street river crossing to serve development on the University of Saskatchewan lands as well as other planned Strategic Growth areas of the city, and to support east-west travel with Preston Avenue/ Attridge Drive. As suggested, the City will want to monitor progress on planned growth and development in these key areas in order to maintain the vision for the Growth Plan. At the same time, the City will also want to examine and monitor travel demand patterns to ensure planned investments in transit are achieving their intended objectives and projected ridership before investing in a new core area river crossing.

Assuming that growth is occurring as planned and that transit investments are resulting in significant ridership increases across core area bridges, the City could start planning the design of the 33rd Street river crossing and connections through to Preston Avenue/ Attridge Drive. Although a conceptual configuration was presented in the Plan, the assessment should consider needs and optional strategies to support all modes of travel. At the same time, the City will want to ensure that the urban street character is preserved and/or created on both sides of the river rather than providing a corridor that is simply designed to serve transportation needs. Consistent with the aspirations presented with Corridor Growth, the river crossing and connecting streets must be designed to create a vibrant street environment and to support the land uses that surround them.

4.6 Financing Core Bridges

A 33rd Street crossing and connection through the University lands to Preston Avenue/ Attridge Drive is the preferred long-term recommendation to serve planned growth, particularly in the core areas of the city. In support of the Growth Plan, the City recently completed a study on funding growth related infrastructure (Financing Growth Study). Consistent with the Planning and Development Act, the City has the authority to impose development levies for roadway related infrastructure (including bridges) needed to support growth. There are essentially three approaches that may be used to fund the crossing and associated roadworks as highlighted below:

- **Development Levies.** The City of Saskatoon imposes development levies for local and offsite services required to service new development. With the exception of growth that does not require a subdivision of land, levies for roadways can be applied as a city-wide charge where all development pays the same rate regardless of location.

  The levy is calculated by determining all growth related capital required to service the forecasted growth areas. Costs of the capital projects are determined using the most recent tenders. The total cost for each category of capital projects is then divided by the total projected growth in order to determine the rate for the development levy. The levy is reviewed each year by adding new growth related projects, removing completed projects, and updating the growth forecast and costs using the most recent tenders.

- **Property Taxes and Government Grants.** Provincial and federal cost sharing has been used extensively to fund major roadway and transportation related infrastructure related to growth that may or may not be supported by development levies. Within the City, the costs for major roadway improvements such as the North Commuter Parkway are also funded through property taxes and other government grants. Unfortunately, grants are not recognized as a predictable or reliable source of funding. In fact, grant programs often favour projects that are shovel ready and disadvantage those that are not delivered for many years.

- **Subdivision Agreements.** For 'on-site' related growth, Subdivision Agreements may require construction of adjacent major roadways. Although they are an unlikely source of funding for the 33rd Street crossing, local area improvements on the east side may be required as part of the University land use plans.

APPENDIX B - PLANNED ROADWAY IMPROVEMENTS

Part 1 - Planned Future Roadway Improvements (all scenarios)

Project	Attributes
Perimeter Highway	4 lanes highway (110km/hr) Interchange type: ■ Half diamond interchange - Highway 11 and Highway 14 ■ Diamond interchange – 8th Street, Highway 5, Highway 41, Central Avenue ■ Cloverleaf Interchange: Highway 11, Highway 12 and Highway 16 (North) Interchange at Highway 16 (south near Rosewood)
Stonebridge Flyover	One off-ramp from Highway 11 SB onto Victor Road and one on-ramp from Victor Road to Highway 11 NB
North Commuter Bridge	6 lanes major arterial (70km/hr)
Boycuk Drive & Highway 16	Interchange at Boychuk Drive and Highway 16
Rosewood Interchange	Interchange at Rosewood Gate and Highway 16
8th Street over CPR	■ Extending 8th Street to Perimeter Highway ■ Diamond interchange at Perimeter Highway
College Drive & McOrmond Drive	Interchange at College Drive and McOrmond Drive
Attridge Drive & Central Avenue	Intersection modification only
McOrmond Drive/Central Avenue/Fedoruk Drive	4 lane major arterial (70km/hr)
Highway 684/Beam Road/Claypool Drive/33rd Street	■ Claypool Dr – 4 lane major arterial controlled access (60km/hr) ■ Highway 684 (up to Claypool Dr) – 4 lane major arterial (60km/hr) ■ 33rd Street – relocation
Traffic Bridge	2 lanes major collector (50km/hr)
Airport Drive & Circle Drive	Interchange
Marquis Drive & Highway 16	Interchange
Marquis Drive & Idylwyld Drive	Interchange

Table B.01 - Planned Future Roadway Improvements (all scenarios)

Source: City of Saskatoon