Appendix A SOUTH SHAGANAPPI STUDY 2015 – 2018 ENGAGEMENT SUMMARY REPORT

South Shaganappi Study 2015 - 2018
Engagement Summary Report

Report completed: April 2018

Table of Contents

Executive Summary

In 2009, Council approved the Calgary Transportation Plan (CTP) which reclassified Shaganappi Trail to an Arterial Street. Based on this reclassification, the South Shaganappi Study was initiated with stakeholders and the public to reimagine Shaganappi Trail. The Study was specifically interested in exploring the most effective ways of supporting community connections in the area, enhancing the safety and efficiency of the corridor, and providing easy movement through the corridor for all modes of transportation. The goal of the Study was to develop short- and long-term recommended plans that would guide the design of south Shaganappi Trail in the coming years.

The study included three phases that focused on gathering stakeholder and public input to inform and shape the design of the study area:

- Phase 1 – Project initiation and definition
- Phase 2 – Concept analysis and development
- Phase 3 – Preferred concept selection and finalization

Throughout these phases a range of engagement activities were held including face-to-face meetings with specific stakeholders, in-person events for stakeholders and the public, online engagement opportunities, and pop-up events in public places. These engagement opportunities sought input from a wide range of people including residents and businesses in adjacent and surrounding communities, those who work in and/or commute through the study area, community associations and planning committees, special interest groups, institutions, and the general public.

As the design of south Shaganappi Trail would have the greatest impact on the adjacent communities of Montgomery, Parkdale, and Point McKay, one of the focal points for the study team was ensuring the ongoing involvement of residents and businesses in these communities. Specific adjacent-community-only events were held to ensure community members had dedicated time to discuss their unique perspectives, and to review plans as they progressed from draft through to final stages.

A Community Advisory Group was also established to bring representative stakeholder and public voices to the design process. This group met regularly with the project team. As the project progressed, the project team also met regularly with the Montgomery Community Association.

Throughout the course of the study, the technical team worked closely with stakeholders and the public to ensure that short- and long-term recommendations met the needs and vision of those who would be most impacted by the plans. This integrated and responsive approach to engagement resulted in recommended plans that meet the study's objectives while reflecting the unique character of the communities they serve.

1.0 Background and Overview

1.1 Study background

Shaganappi Trail has long been identified as an important link in Calgary's transportation network.

In 1970, The City completed the Shaganappi Trail Functional Planning Study. At that time, Shaganappi Trail was classified as an expressway. The study recommended a major interchange at the junction of 16 Avenue, Bowness Road, Memorial Drive, and Shaganappi Trail. It also recommended Shaganappi Trail be extended across the Bow River through Edworthy Park to connect commuters to Sarcee Trail.

In 2009, Council approved the Calgary Transportation Plan (CTP). The CTP reclassified Shaganappi Trail to an Arterial Street and identified the corridor as a primary route for transit, cycling and HOV (high-occupancy vehicles). In addition, the CTP confirmed that the Bow River crossing recommendation included in previous transportation plans for Shaganappi Trail would be removed. As an Arterial Street, the function of Shaganappi Trail would be to provide reasonably direct connections between communities and major destinations rather than the major north-south connection that had previously been planned.

In light of this reclassification, the South Shaganappi Study was established to work closely with stakeholders and the public to reimagine Shaganappi Trail as an Arterial Street. The Study was specifically interested in exploring the most effective ways of supporting community connections in the area, enhancing the safety and efficiency of the corridor, and providing easy movement through the corridor for all modes of transportation.

Working with stakeholders and the public the study identified both short- and long-term recommendations that accommodate all modes of transportation and align the study area with the CTP, the Municipal Development Plan (MDP), and adjacent land use plans.

1.2 Engagement strategy

Engagement for the South Shaganappi Study occurred in phases and focused on gathering specific stakeholder and public input to inform and shape the design of the study area. The three phases of engagement are outlined below and discussed in more detail in subsequent sections of this report.

Phase	Objectives
1: Project initiation & definition	1. Introduce stakeholders and the public to the study 2. Learn about stakeholder and public needs, values, and vision for the study area.

2A: Concept Analysis	1. Collaborate with stakeholders and the public to generate potential design ideas for the study area
2B: Concept Development	1. Develop preliminary short- and long-term design concepts for the study area
3A: Preferred Concept Selection	1. Review and refine short- and long-term recommended plans with stakeholders and the public
3B: Preferred Concept Finalization	1. Present final short- and long-term recommended plans to stakeholders and the public

1.3 Building relationships

A priority on building relationships with stakeholders and developing trust with the public was a focus throughout the study. The project team connected with a broad range of stakeholders, and through this process identified a variety of needs and desires with regards to engagement. This led to a tailored engagement approach that respected the needs of different stakeholders and public users. With a focus on working together with stakeholders, the project team's effective relationships led to the creation of recommendations for the short- and long-term design of South Shaganappi Trail that incorporate a wide range of perspectives.

Engagement with adjacent communities

After the first public engagement opportunity it became clear that the communities adjacent to the study area, i.e. Montgomery, Parkdale, and Point MacKay, had concerns related to the safety and comfort of their residents that were not necessarily shared by other Calgarians. It was clear that the impacts of the study would be felt most directly by these communities. To ensure that community members had an opportunity to receive information and provide their unique input on the study, the project team split engagement activities into two separate streams for Phases 2 and 3.

In Phases 2 and 3 all in-person engagement activities were held twice. The first event was open only to adjacent community members, while the second event was open to all Calgarians. This split provided those living and doing business in adjacent communities a chance to have in-depth discussions with fellow community members and the project team in a forum focused on their unique needs.

Bringing public input and technical expertise together

Throughout the study, the technical team was highly involved in the engagement process. Technical staff from a variety of backgrounds was on hand for all open house events to ensure stakeholders could ask questions and provide input about any aspect of the study. Technical staff also worked with stakeholders to help bring the community's ideas to life in design idea workshops. The core technical team was present at all engagement meetings and events to ensure stakeholder input was heard, and also brought back to the engineering table to directly inform design ideas and outcomes.

Short-term recommendation input

The short-term recommendations for the study area were of particular interest to stakeholders because they are anticipated to be implemented within five years (pending funding). When the short-term recommendations were first presented, the project team received feedback from stakeholders about concerns and questions related to the impacts of the recommendations on adjacent communities. In response, the project team revised their engagement plan and added two meetings each with the Montgomery Community Association and the Community Advisory Group. In these meetings technical experts participated with stakeholders to review each modification that was being suggested within the short-term recommendations and then worked to refine the modifications to better meet stakeholder needs. This led to some modifications being eliminated from consideration, while others were added or refined based on the feedback

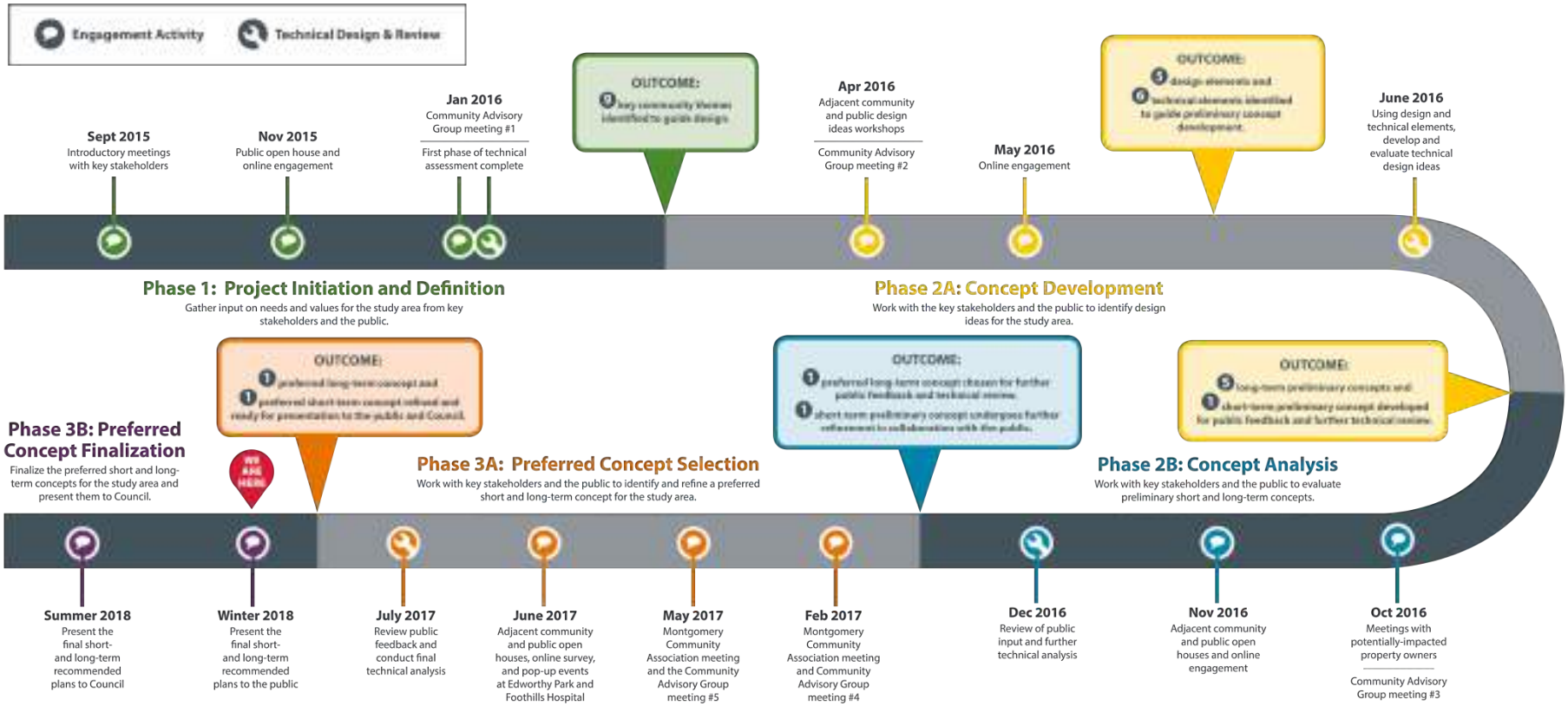
Adding a public engagement opportunity

After refining short-term recommendations with key stakeholders, the project team wanted to ensure that both the short- and long-term recommendations fully considered community needs. To give stakeholders an additional opportunity to provide feedback, the project team added a public engagement opportunity to the original plan. During this engagement, adjacent communities and the public were presented with the refined short-term recommendations and the preferred long-term recommendation for review. By adding this opportunity for stakeholders and the public to learn about the changes and provide feedback on the plans, the project team was able to make final adjustments to the designs to ensure they reflected community needs as much as possible.

1.4 Engagement Activities

The table below provides an overview of the engagement activities used to gather feedback from stakeholders and the public over the course of the study

Phase	Engagement Activity	Date	Participants
1	Pre-engagement stakeholder meetings	October 7 – November 23, 2015	6 stakeholder groups
	Public open house	November 19, 2015	115
	Online feedback	November 19 to December 3, 2015	11
2A	Design idea workshops	April 9, 2016	60
	Online feedback	May 11 – 25, 2016	171
2B	Adjacent communities and public open houses	November 23 & 24, 2016	68
	Online feedback	November 23 – December 12, 2016	272
3A	Adjacent communities and public open houses	June 13 & 14, 2017	69
	Online feedback	June 14 – July 4, 2017	74
	Pop-up events (Edworthy Park and Foothills Hospital)	June 26, 2017	118
3B	Public information session	March 17, 2018	54
	Public information session at Montgomery Main Streets Open House	March 21, 2018	168


Engagement Activity
Technical Design & Review
Sept 2015
Introductory meetings with key stakeholders
Nov 2015
Public open house and online engagement
Jan 2016
Community Advisory Group meeting #1
First phase of technical assessment complete
OUTCOME:
Apr 2016
Adjacent community and public design ideas workshops
Community Advisory Group meeting #2
May 2016
Online engagement
OUTCOME:
June 2016
Using design and technical elements, develop and evaluate technical design ideas
Phase 1: Project Initiation and Definition
Gather input on needs and values for the study area from key stakeholders and the public.
Phase 2A: Concept Development
Work with the key stakeholders and the public to identify design ideas for the study area.
OUTCOME:
OUTCOME:
OUTCOME:
Phase 3B: Preferred Concept Finalization
Finalize the preferred short and long-term concepts for the study area and present them to Council.
Phase 3A: Preferred Concept Selection
Work with key stakeholders and the public to identify and refine a preferred short and long-term concept for the study area.
Phase 2B: Concept Analysis
Work with key stakeholders and the public to evaluate preliminary short and long-term concepts.
Summer 2018
Present the final short- and long-term recommended plans to Council
Winter 2018
Present the final short- and long-term recommended plans to the public
July 2017
Review public feedback and conduct final technical analysis
June 2017
Adjacent community and public open houses, online survey, and pop-up events at Edworthy Park and Foothills Hospital
May 2017
Montgomery Community Association meeting and the Community Advisory Group meeting #5
Feb 2017
Montgomery Community Association meeting and Community Advisory Group meeting #4
Dec 2016
Review of public input and further technical analysis
Nov 2016
Adjacent community and public open houses and online engagement
Oct 2016
Meetings with potentially-impacted property owners
Community Advisory Group meeting #3

1.5 Stakeholders

Engagement events were promoted to a broad group of stakeholders including:

- Residents and businesses in the adjacent communities of Montgomery, Parkdale, and Point McKay
- Residents and business in surrounding communities e.g. Bowness, St. Andrews Heights, University Heights
- Calgarians – General Public
    - People who work in and walk, bike, drive, or take transit through the area, e.g. employees at Foothills Medical Centre, and Edworthy Park users
- Community associations, e.g. Montgomery Community Association, Bowness Community Association, Parkdale Community Association, etc.
- Planning committees, e.g. South Shaganappi Area Strategic Planning Committee
- Special interest groups, e.g. Bike Calgary, Business Revitalization Zones, Calgary River Valleys
- Large institutions in the area, e.g. schools, universities, health care services
- City Councillors
- City of Calgary staff

Communication with stakeholders included a variety of strategies and tactics, which are described in more detail in Section 5.0 of this report.

1.6 Community Advisory Group

In addition to broad stakeholder communications, a Community Advisory Group (CAG) was established in December 2015 to provide ongoing advice to the project team about community needs and interests. Members were chosen through an expression of interest process that asked Calgarians to submit an application for membership to the CAG. The City of Calgary in consultation with the project team selected 17 members to represent a variety of community interests, including:

- Surrounding businesses and business associations
- Surrounding communities and community associations
- Community non-profit organizations
- Community services
- General public

The CAG was instrumental in developing relationships and maintaining an ongoing dialogue between the project team and the stakeholder groups associated with the south end of Shaganappi Trail. The CAG met throughout the study to provide advice to the project team on:

- Community ideas, interests and needs;
- Opportunities to connect with the public and obtain public input;
- Evaluation criteria for design concepts;
- Design elements;
- Preliminary long-term design concepts;
- Short-term recommended plans; and
- Striking an appropriate balance between community, public and transportation network needs

Community Advisory Group members

CAG members included representatives from:

Organization / Representatives
Bowness Community Association
St. Andrews Heights Community Association
Varsity residents
University of Calgary, Facilities Development
University of Calgary, West Campus, Senior Development Manager
Alberta Health Services, Planner
Bike Calgary
Montgomery Community Association
Montgomery Business Revitalization Zone
University Heights Community Association
Point McKay Community Association
Parkdale Community Association
Northwest Storage
Parkdale residents
Montgomery residents
Calgary River Valleys
Study area commuters

Community Advisory Group meetings

Six meetings were held with the Community Advisory Group on the following dates:

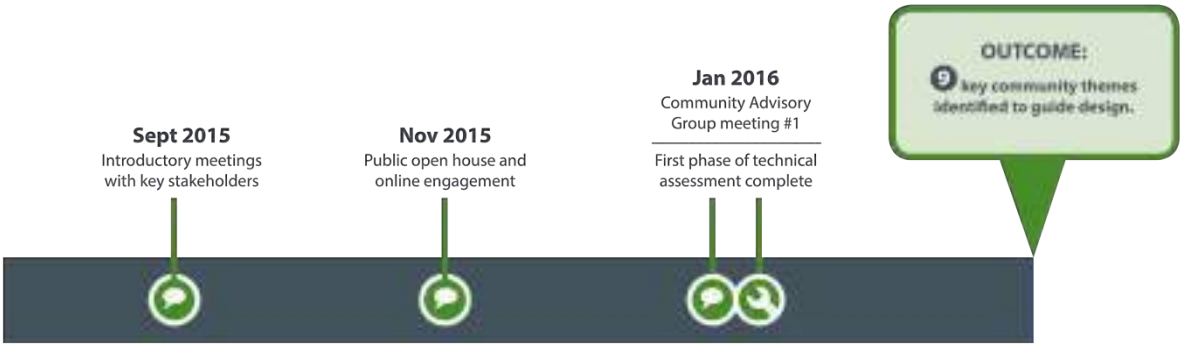
Meeting	Date	Time	Location	Topic
1	January 20, 2016	6:30 to 8:30pm	Montgomery Community Association	Review Terms of Reference, and assist with the development of evaluation criteria
2	April 26, 2016	6:30 to 8:30pm	Foothills Academy, Wellness Centre	Review design ideas and technical elements to inform development of preliminary design concepts for the study area
3	October 25, 2016	6:30 to 8:30pm	Foothills Academy, Wellness Centre	Review preliminary design concepts for the study area
4	March 7, 2017	6:30 to 8:30pm	Foothills Academy, Wellness Centre	Review short-term recommendations for the study area
5	May 31, 2017	6:30 to 8:30pm	Foothills Academy, Wellness Centre	Review the revised long-term and short-term recommendations for the study area.
6	March 15, 2018	6:30 to 8:30pm	Foothills Academy, Wellness Centre	View the finalized long-term and short-term recommendations for the study area

In addition to the Community Advisory Group meetings, the project team met specifically with the Montgomery Community Association on three occasions to review design impacts for their community:

Meeting	Date	Time	Location	Topic
1	March 1, 2017	6:30 to 8:30pm	Montgomery Community Association	Review short-term recommendations for the study area
2	May 30, 2017	6:30 to 8:30pm	Montgomery Community Association	Review the revised long-term and short-term recommendations for the study area.
3	March 14, 2018	6:30 to 8:30pm	Montgomery Community Association	View the finalized long-term and short-term recommendations for the study area

2.0 Phase 1: Project Initiation and Project Definition

Phase 1 involved introducing the study to stakeholders and the public, and working to better understand specific community interests and values surrounding the study area. This phase involved broad communications to ensure a variety of viewpoints and perspectives were heard. This phase also included establishing and hosting the first meeting of the Community Advisory Group.



Phase 1: Project Initiation and Definition

Gather input on needs and values for the study area from key stakeholders and the public.

2.1 Engagement activities – What we asked

In Phase 1, engagement activities focused on working with stakeholders and the public to understand their interests, values, challenges, and to identify issues that they felt needed to be addressed. Engagement activities explored stakeholder and public values and their vision for the future of the area, by asking questions like:

- What areas of your community are most important to you and why?
- What areas of your community would you like to see changed and why?
- What do you envision for the future of the south end of Shaganappi Trail?
- What is the one most important thing the project team needs to know about your community and why?

Calgarians were invited to provide input on the study during a number of engagement opportunities, including:

Stakeholder meetings

The study team met with business groups and community associations to introduce the South Shaganappi Study and to better understand valued places, as well as the communities' values and vision for the future.

Meetings were held with the following groups:

Group	Date
South Shaganappi Area Strategic Planning Group (SSASPG)	October 7, 2015
Montgomery Business Revitalization Zone	October 30, 2015
Bowness Community Association	November 4, 2015
Montgomery Community Association	November 10, 2015
St. Andrews Heights Community Association	November 16, 2015
Bowness Business Revitalization Zone	November 23, 2015

Public Open House

A public open house was held on November 19, 2015 to introduce stakeholders and public to the study, gather feedback on the community's values and vision for the study area, and to give participants an opportunity to meet and ask questions of the study team. 115 people attended the event. This event included opportunities for open dialogue and a written comment form to rate the value of the open house and for participants to provide additional comments. The event also included two interactive engagement displays:

- **A scrawl wall** – The scrawl wall provided participants with a place to answer the questions 'When you think about the future, what do you envision for the south end of Shaganappi Trail?' and 'What is the one most important thing the project team needs to know about your community?'

- **An interactive community values map** – This aerial map of the study area provided participants with an opportunity to 'Tell us what matters to them in their community' by marking important places and routes on the map using string, pins, and sticky notes.

Online Feedback

An online feedback opportunity was made available between November 19 and December 3, 2015 for those who had additional comments to share or were unable to attend the open house. 11 people provided comments via the online feedback. Participants were asked about the areas

in need of change and/or preservation, their ideas for the future of the south end of Shaganappi Trail, and the most important thing for the project team to understand about the study area.

Community Advisory Group Meeting #1

The first Community Advisory Group meeting was held on January 20, 2016 and focused on establishing the Terms of Reference for the group and gathering input on evaluation criteria for the study. In particular, members were asked to:

- Review and comment on the Terms of Reference
- Provide input on how to include important community considerations in the study's evaluation criteria

Participants were asked to provide input during group discussions through:

- **Round table discussion**: A group discussion provided participants with an opportunity to comment on and ask questions about the proposed Terms of Reference for the group.
- **Table exercise**: The group broke into two to review the study's goals and objectives and to provide feedback on how the study's evaluation criteria could best reflect community values and needs.

2.2 What we heard

Input from meetings, the open house, the online survey, and the Community Advisory Group revolved around eight main community considerations:

Safety
Safety was a dominant theme with study participants. Traffic turns and pedestrian crossings were repeatedly mentioned as areas of concern.

Traffic flow & connectivity
Participants expressed interest and concern over traffic flow; specifically how the south study connects to the north study and how traffic flows onto 16th Avenue particularly westbound but eastbound as well. There were discussions around turning times and ease of access along Shaganappi Trail.

Pedestrian and bicycle access
Participants expressed concerns about access points for pedestrians and bicycles and noted interest in building those access points while keeping their destination in mind. There was some interest in separating bicycles from other pathways but a general consensus to ensure connectivity to the community.

Community connectivity
Participants reflected the need to join the communities on either side of Shaganappi Trail. Montgomery was mentioned numerous times as being separated by 16 Avenue, and

participants saw Shaganappi Trail as an opportunity to unite the communities of Montgomery, Point McKay, and Parkdale.

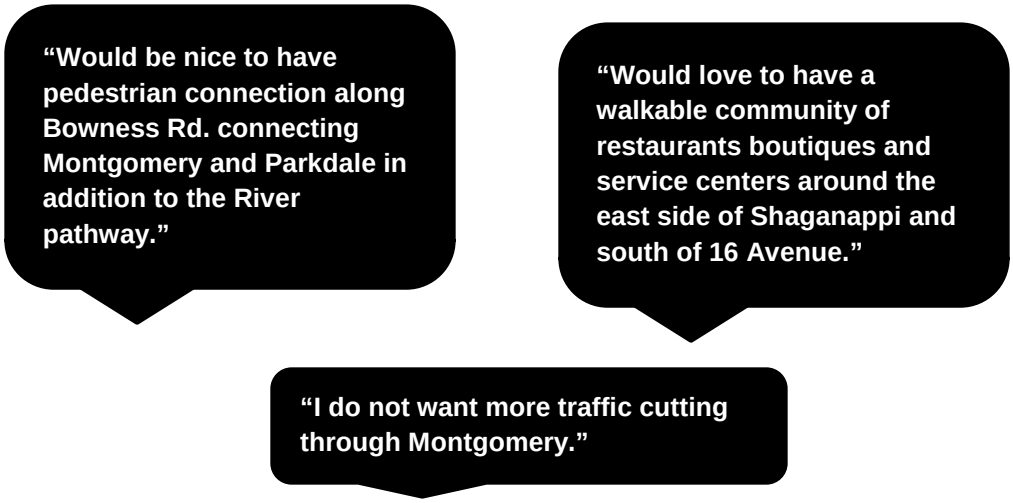
Accessibility to businesses
Accessibility to area businesses was noted as an important consideration. This included access to the West Campus development, Alberta Children's Hospital, Foothills Medical Centre, Market Mall, and businesses in the Point McKay area.

Land use – parks, pathways and parking lots
Participants indicated that the Bow River Pathway parking lot is well utilized by businesses and other Calgarians. A number of participants expressed interest in maintaining and enhancing this space. There was interest in integrating more park, environmental and recreational uses for the land as well as creating a more walkable area. Participants also felt that parking should be considered.

River crossing
Participants reflected that the removal of the river crossing puts more pressure on Crowchild Trail. There was also some relief that a bridge would not be built to run into Edworthy Park. In addition, participants expressed concerns over flooding and public safety.

Open house organization
Generally, participants were satisfied with the layout of the room, the information that was provided and the staff that was available to answer questions. There was reference to appreciating the historical information that was displayed, and some interest in seeing more tangible ideas such as design concepts, although the mapping activities were mentioned numerous times as being a good idea.

Quotes from participants



2.3 How we used the input

The input gathered through Phase 1 was used to develop nine key community themes. These themes were used to guide the development and evaluation of design ideas and preliminary concepts in Phase 2.

The nine key community themes developed through Phase 1 were:

1. Safe movement for all modes of transportation through the study area
2. Efficient traffic flow through the study area
3. A balance between the needs of people who walk, bike, take transit, and drive
4. Easy access to local businesses
5. Connections between communities
6. Quality of life in adjacent communities
7. Environmental health
8. Planning for future growth in the area
9. Seeing the study area as part of the City's transportation network (an integrated view of the study area)

2.4 Key outcomes of Phase 1

The key outcomes of Phase 1 included:

1. The project team identified and began to establish relationships with key stakeholders.
2. The Community Advisory Group was established and met for the first time.
3. The project team engaged with stakeholders and the public to identify community interests, values, and challenges, and to identify issues that need to be addressed.
4. The project team identified nine key community themes to guide the development of design ideas.
5. The project team adjusted the engagement approach for Phases 2 and 3 to ensure adjacent communities were able to provide input in a forum that met their unique needs.

2.5 Lessons learned

The project team took valuable communication and engagement lessons away from Phase 1 including:

Interactive activities can create positive conversation about the things that matter most to stakeholders and the public

The interactive mapping exercise used at the first public open house was positively received by participants and helped them identify the areas of their community that were most important to them. The exercise also allowed participants and the project team to visualize the areas of greatest value in relation to the study area and opened discussions about the ways in which the study could benefit or impact adjacent communities. This activity provided insight into ideas and values, and provided an opportunity for the project team to open important dialogue with stakeholders and the public.

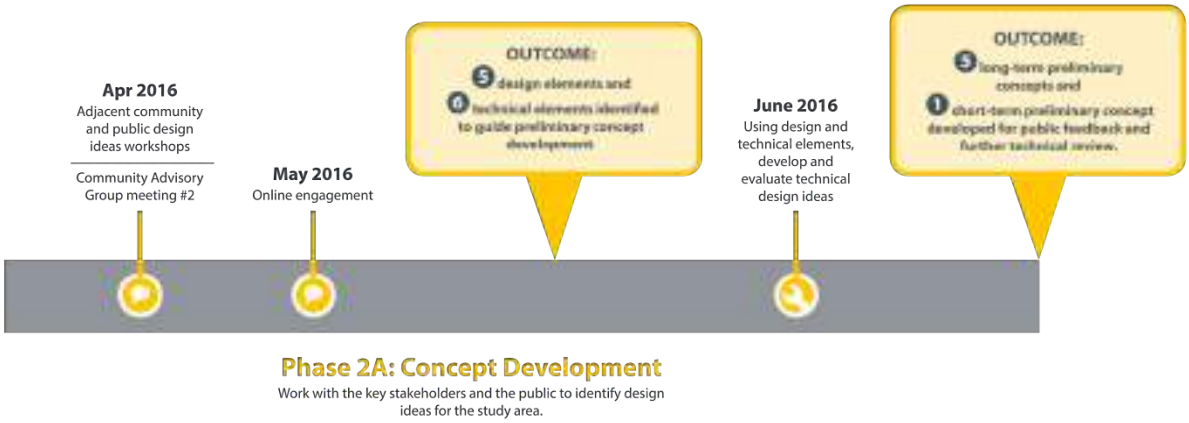
Stakeholders appreciate a personal and proactive approach to communications

Postcards were developed to invite businesses in the study area to the first public open house. Postcards were hand delivered to businesses throughout adjacent communities, providing an opportunity for the project team to speak directly with business owners and managers. This approach was well received and effective relationships were developed with many owners expressing their gratitude for the proactive and personal outreach, and for the opportunity to ask questions of a project team member. By reaching out directly and early in the engagement process, the project team communicated to stakeholders that their perspectives were valued and desired. This tactic created a connection and helped develop relationships with the project team that generated interest in the engagement process and helped to bring a variety of stakeholder voices to the study.

3.0: Phase 2: 2A Concept Development & 2B Concept Analysis

3.1 Phase 2A: Overview

Phase 2A Concept Development involved the creation of different potential design concepts with the community. Design idea workshops brought the public and technical staff together to begin sketching out potential designs. The 11 designs created in the workshops were then distilled into common design and technical elements that were used by the technical team to design four preliminary long-term concepts and one preliminary short-term concept that were reviewed by the public in Phase 2B.



3.2 Phase 2A: Engagement activities – What we asked

Design Idea Workshops

On April 9 2016, the project team held two design idea workshops with adjacent community members and the general public to create potential design ideas for the study area. Workshops were divided into two sessions: one in the morning for the adjacent community residents of Montgomery, Parkdale, and Point McKay, and an afternoon session that was open to all Calgarians. 60 people participated in these sessions.

Participants worked in groups of five-seven people. Each group had three project team members assisting in the design process: a facilitator, a note-taker, and a technical illustrator. The workshop sessions produced 11 different design idea drawings. In addition, participants also provided comments on the design idea drawings of other groups noting what they liked or did not like and why. Notes were also captured detailing each group's thought process and their considerations in designing the study area.

Community Advisory Group Meeting #2

The second Community Advisory Group Meeting was held on April 26, 2016 to review and provide input on the design and technical elements that came out of the design idea workshops and subsequent technical analysis.

Online Feedback Opportunity

After the CAG reviewed the design and technical elements, online engagement was developed to validate the elements and gather broad public input on any refinements stakeholders and the public wanted to see. The online opportunity also provided participants with information about the benefits and trade-offs of each element, and drew attention to important considerations for each. The survey ran from May 11 – 25, 2016 with a total of 171 responses.

3.3 Phase 2A: What we heard

The project team reviewed the 11 design idea drawings and all comments provided by workshop participants. During this review, the project team identified that nearly all the design idea drawings contained six common design elements. For example, many groups noted a desire to change the junction at Shaganappi Trail and 16th Avenue N.W., to address the way traffic flows along 16th Avenue N.W., and to create better connections for people who walk and bike. The project team decided to focus on these elements to ensure they were working with the best representation of the community's input.

In addition to the design elements, the project team identified four technical elements that were not developed by the public. It was also important to gather feedback on these in order to ensure effective concept creation. After reviewing the technical elements identified by the project team, CAG members identified one additional technical element for inclusion in the online feedback opportunity, bringing the total number of technical elements to five.

Quotes from participants

“There needs to be a clearly defined space for cyclists (bike lane) with equal access to spaces vehicles can travel.”

“Shaganappi and 16th functions well for what it is but if either were asked to take on additional traffic they would quickly become congested.”

“Walking paths are vital!”

3.4 Phase 2A: How we used the input

The input gathered through Phase 2A was used to finalize the six design elements and five technical elements that would guide the development of preliminary concepts in Phase 2B.

The six design elements developed and validated through Phase 2A were:

1. Change the design of the junction at Shaganappi Trail and 16th Avenue N.W. to improve the safety and traffic flow for all modes of transportation.
2. Encourage people who drive to take 16th Avenue N.W. by revisiting how the road functions within the study area.
3. Improve access and reduce traffic volume and speed on Bowness Road to better accommodate people who walk, bike, and take transit.
4. Explore how land within the study area could be used to improve the area.
5. Design safe and efficient movement for all modes of transportation through any at-grade intersections that may be developed.
6. Improve connections to surrounding communities, key destinations, and pathways for people who walk and bike.

The five technical elements developed and validated through Phase 2A were:

1. Improve access, amenities, and travel time within the study area for people who take transit and carpool.
2. Change the role of Shaganappi Trail south of 16th Avenue N.W. to support local and community traffic on Bowness Road.
3. Change how the roads connect to draw the communities of Montgomery, Parkdale, and Point McKay together.
4. Realign Shaganappi Trail to reduce the footprint of the roadway and free land for other uses.
5. Provide easy access to all roads in the study area so emergency vehicles can get to their destinations efficiently.

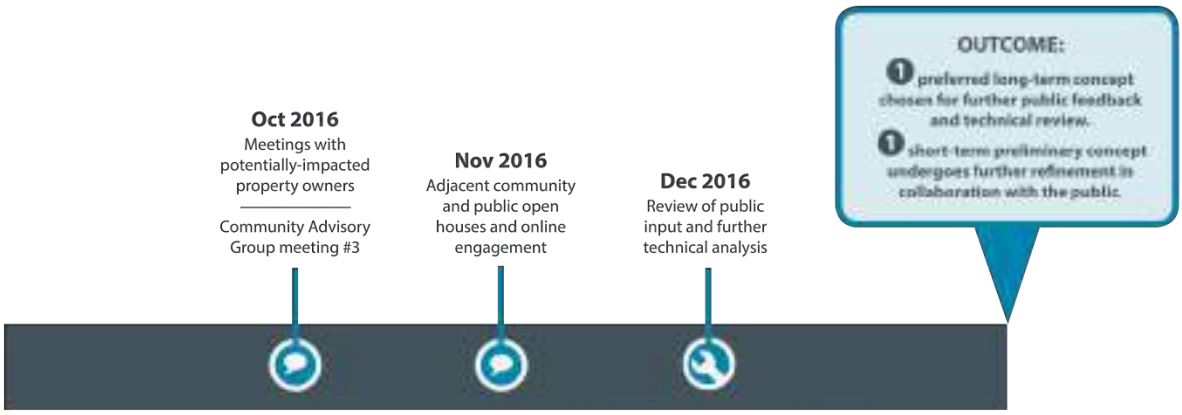
3.5 Key outcomes of Phase 2A

The key outcomes of Phase 2A included:

1. The Community Advisory Group met for the second time.
2. The project team engaged with stakeholders and the public to develop design ideas for the study area.
3. The project team finalized the six design elements and five technical elements they would use to guide the development of preliminary concepts in Phase 2B.

3.6 Phase 2B: Overview

Phase 2B Concept Analysis involved the evaluation of four preliminary long-term concepts and one preliminary short-term concept. This phase included meetings with property owners who may have been potentially impacted by the preliminary concepts, as well as an open house, online engagement, and technical analysis that led to the identification of one preferred long-term concept and further evaluation of the preliminary short-term concept.



Phase 2B: Concept Analysis

Work with key stakeholders and the public to evaluate preliminary short and long-term concepts.

3.7 Phase 2B: Engagement activities – What we asked

Meetings with Potentially Impacted Property Owners

In line with the priority of developing relationships and thorough communications, at the beginning of Phase 2B the project team met with property owners along Montgomery View to introduce them to the four preliminary long-term concepts and confirm the impacts to their homes were understood. The meeting focused particularly on the East-West Couplet preliminary concept. This concept, if chosen, could lead to property acquisition along Montgomery View, an impact the project team wanted to alert property owners to. In addition to discussing and answering questions about the preliminary long-term concepts, the project team explained the planning process, including how a preferred concept would be chosen, and the process and timelines for implementation.

Community Advisory Group Meeting #3

The Community Advisory Group met on October 26, 2016 to review the four preliminary long-term concepts for the study area. The short-term preliminary concept was not presented at this meeting, as it was still in development. During this meeting, CAG members were asked to review the concepts in detail with a project team member and to provide feedback about the concepts. The group also offered feedback about the way in which preliminary concepts were

being presented and offered suggestions for improvements prior to the next in-person and online engagement opportunities.

Open Houses

Two open houses were held on November 23 and 24, 2016 to gather input on the preliminary concepts for the South Shaganappi Study. The first open house was for adjacent community residents of Montgomery, Parkdale and Point McKay and was attended by 31 people. The second open house was for all Calgarians and was attended by 37 people.

At the open house participants viewed display panels that presented the four preliminary long-term concepts:

- At-Grade Intersection concept
- Tight-Diamond Interchange concept
- Hybrid concept
- East-West Couplet concept

Participants were also presented with a no-build concept and a preliminary short-term concept for the study area.

Participants were provided with feedback forms and asked to evaluate the different concepts against the study's objectives and community themes. For the preliminary short-term concept, participants were asked to provide feedback on post-it notes about what benefits, challenges and changes they noted for the recommendations.

Online engagement

In addition to the open houses, an online engagement opportunity was provided between November 24 and December 9, 2016. The online tool included the same information and requested the same feedback as the open house. There were 2465 unique visits to the online tool that generated a total of 272 comments on the concepts.

3.8 Phase 2B: What we heard

Through Phase 2B, stakeholders and the public identified benefits, challenges, and potential

changes to each of the preliminary long-term concepts, the no-build concept, and short-term preliminary concept as follows:

Concept	Benefits	Challenges	Changes
At-Grade Intersections	1. An expected lower cost for infrastructure; 2. Potential future uses for land that is not used; 3. Connections for people who walk and bike; 4. A reduction in vehicle traffic speed and equal flow in all directions.	1. Additional signalized intersections are generally viewed as negative; 2. Additional signalized intersections contribute to slower commute times and less flow; 3. Intersections may be intimidating for people who walk to cross.	1. Continue to look at possible infrastructure to enhance safety for people who walk and bike.
Tight-Diamond Interchange	1. Traffic flow on 16th Avenue because there are no signalized intersections; 2. It is a safe and efficient concept for all modes	1. Higher cost of infrastructure; 2. Increased number of signalized intersections on Shaganappi Trail; 3. Connections for people who walk and bike; 4. Preference to maintain an exit from 16th Avenue eastbound to Bowness Road.	1. Look at all possible options for Shaganappi Trail intersections, concern of congestion and reduced safety with two signalized intersections so close in proximity.
East-West Couplet	1. The concept is easy to understand for people who drive and provides some flow; 2. Vehicle speeds are reduced by signalized intersections; 3. There may be a lower infrastructure cost.	1. Too many signalized intersections leading to traffic congestion and lack of flow; 2. Some impact to Montgomery property owners; 3. There may be less land for potential future use.	1. Signalized intersections would have to be optimally timed to limit congestion.
Hybrid	1. Traffic flow for people who drive; 2. Connections for people who walk and bike	1. Traffic flow for people who drive; 2. Difficulty crossing 16th Avenue for people who walk and bike; 3. Potential higher cost of infrastructure.	1. Explore additional safe infrastructure for crossings of 16th Avenue for people who walk and bike.

No-build	1. Lowest cost option short-term; 2. The current design is understood by frequent users.	1. There were many perspectives based on different uses.	1. There were many perspectives based on different uses.
Short-term preliminary concept	1. Removal of 16 Avenue westbound to Shaganappi Trail southbound; 2. Attention and willingness to integrate connections for people who walk and bike.	1. May add traffic in Montgomery through Bowness Road; 2. Addition of signalized intersections may reduce traffic flow; 3. Clarity on the cost/benefit for short-term; is it worth it?	1. Information about the benefits and impact considerations of the 43rd Street and 16th Avenue signalized intersection; 2. Look at optimal alignment for a safe merge from eastbound 16th Avenue to northbound Shaganappi Trail.

With regards to the short-term preliminary concept, Community Advisory Group members and members of the Montgomery Community Association expressed concern that the concept could have significant impact on the amount of cut-through traffic being directed through the Montgomery community. In response, an additional engagement opportunity was added to Phase 3 to ensure CAG members and Montgomery Community Association members could meet with the project team to review the plans and suggest modifications as necessary (See Phase 3A in the following section of this report).

Quotes from participants

"Significantly less traffic on Bowness Road is a benefit."

"This [tight-urban diamond] seems to be the best option at achieving the desired goals. Free flow 16th; reasonable access on/off Shaganappi; limited. Bowness traffic. Looks good!"

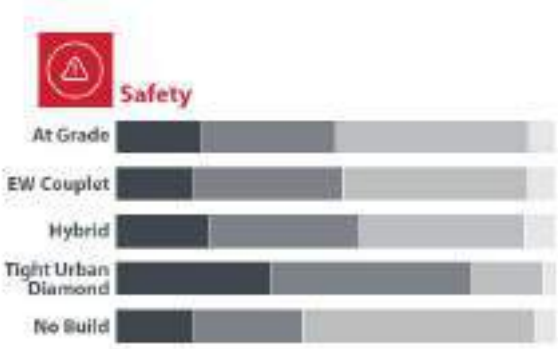
"It seems to me that traffic at these intersections will back up significantly. As a cyclist I would feel less safe when drivers are impatient and urgent in making left turns."

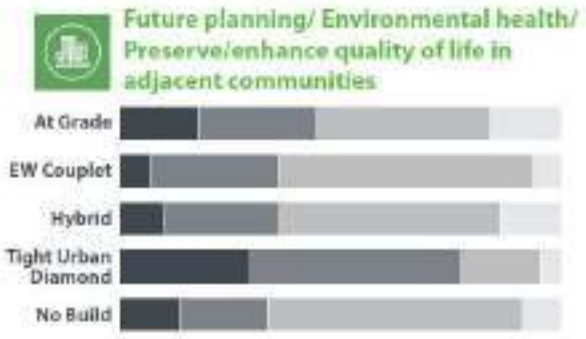
3.9 Phase 2B: How we used the input

The input gathered through Phase 2B was used to identify the preferred long-term recommended plan. The evaluation of the five concepts (four preliminary concepts and the no-build concept) was done using a multiple accounts evaluation (MAE). The MAE included public input as one of the accounts.

Feedback on long-term preliminary concepts

Public evaluation of the different concepts identified the Tight-Urban Diamond concept as the preferred concept. The results below reflect the public's evaluation of the different concepts against community values and project objectives:





Within the overall MAE, the Tight-Urban Diamond was also the highest ranked concept, and moved forward for final review and refinement in Phase 3B.

Feedback on preliminary short-term concept

The preliminary short-term concept was identified as needing a detailed review in collaboration with specific stakeholders, and was moved forward for further engagement in Phase 3A.

3.10 Key outcomes of Phase 2B

The key outcomes of Phase 2B included:

1. The Community Advisory Group met for the third time to provide feedback on the four preliminary concepts.
2. The project team engaged with stakeholders and the public to gather feedback on four preliminary concepts, a no-build concept, and a short-term preliminary concept for the study area.
3. The project team identified the Tight-Urban Diamond concept as the preferred preliminary long-term concept.
4. The project team initiated additional engagement with the Montgomery Community Association and the Community Advisory Group to evaluate and modify the short-term preliminary concept to better meet community and stakeholder needs.

3.11 Lessons learned from Phases 2A & B

The project team took valuable communication and engagement lessons away from Phases 2A&B including:

Bringing technical experts together with stakeholders and the public helps to create design options that are truly reflective of community needs and values.

In the design idea workshops, transportation engineering staff was brought together with stakeholders and members of the public to develop potential designs for the study area. This process resulted in the creation of multiple design options for the study area. When compared against each other, the designs were revealing. Although each design was different, they all had common elements that attempted to deal with the same community needs and values in different ways. By identifying these common design elements, the project team was able to better understand the core needs and values of the community and ensure those were top of mind during the creation of the preliminary design concepts.

Bringing technical experts together with stakeholders and the public can develop relationships and lead to improved communication about the project.

In addition to ensuring the preliminary design concepts were reflective of community needs and values, the designs generated by the workshops were also helpful in understanding how to better communicate to the public about the project. The workshop designs revealed common technical elements that were missed by workshop participants during the design exercise, and

those needed to be considered during the development of preliminary design concepts. It was clear that more effective communication about the technical needs of the project were needed. In response, the project team developed a list of technical elements and ensured these were included in Phase 2B communications. By identifying these technical elements, the project team was able to communicate back to the public about the key technical considerations that were also guiding design of the study area in a way that made sense to everyone.

4.0: Phase 3: 3A Preferred Concept Selection & 3B Preferred Concept Finalization

4.1 Phase 3A: Overview

Phase 3A Preferred Concept Selection involved presenting the preferred long-term concept to stakeholders and the public, and working with stakeholders to modify the preliminary short-term concept and shape it into a final preferred concept. Using the feedback provided through this phase, the technical team refined the preferred long-term and short-term concepts for final presentation to the public and Council in Phase 3B.

Phase 3A: Preferred Concept Selection

Work with key stakeholders and the public to identify and refine a preferred short and long-term concept for the study area.

4.2 Phase 3A: Engagement activities – What we asked

Community Advisory Group Meeting #4 and Montgomery Community Association Meeting #1

The Montgomery Community Association met with the project team on March 1, 2017 for the first time to provide feedback on the preliminary short-term concept for the study area. The Community Advisory Group met on March 7, 2017 for the fourth time to also provide feedback on the preliminary short-term concept. These meetings were the result of concerns raised through Phase 2B about the impact of the short-term recommended plan on adjacent communities.

The short-term recommended plan was presented to the groups and existing problem areas were highlighted. Each modification being suggested was then presented and discussed individually. The groups were asked to provide feedback on each modification and to suggest any areas of concern the project team may have missed.

Community Advisory Group Meeting #5 and Montgomery Community Association Meeting #2

The Montgomery Community Association met with the project team on May 30, 2017 to provide feedback on the revisions that were made to the preliminary short-term concept based on their feedback, and to review the draft long-term recommended plan. The Community Advisory Group met for the fifth time on May 31, 2017 to also provide input on the revised preliminary short-term concept, and to review the draft long-term recommended plan.

The revised short-term recommended concept was presented to the groups and once again, each modification was addressed and discussed individually. Groups were asked to validate the changes that had been made and to make suggestions for further improvements. The draft long-term recommended plan was also presented to the groups for feedback.

Open Houses

Two open houses were held on June 13 and 14, 2017 to gather feedback on the draft short- and long-term recommended plans for the study area. In addition, as a result of further consultation with stakeholders on the short-term recommended plans, potential options for the redesign of 43rd Street were also presented in the interest of improving travel for people who walk and bike along this corridor.

The first open house was for adjacent community residents of Montgomery, Parkdale and Point McKay and was attended by 30 people. The second open house was for all Calgarians and was attended by 39 people. Participants were presented with the short- and long-term recommended plans along with information on the evaluation process used to arrive at the recommended plans, the estimated costs, and infrastructure funding process.

Participants were provided with a feedback form and asked to identify any improvements they saw for the short- and long-term recommended plans. The form also asked them to identify the benefits and challenges they saw to each of the options for the 43rd Street configurations that were presented, and to comment on the value of the open house.

Online Engagement

An online engagement opportunity was available on The City's Engage website at engage.calgary.ca from June 14 to July 4, 2017. It included the same information and requested the same input as the open house events. There were a total of 1515 public visits to the engage website with 42 public that contributed feedback.

Community Pop-up Events

Two pop-up events were held, at Foothills Medical Centre and Edworthy Park, to capture input from hospital employees, patients and visitors, and those using the Bow River Pathway, Edworthy Park, and South Shaganappi parking lot. These events were held on June 26, 2017. A total of 94 people visited the pop-ups, and were provided with an overview of the draft recommended plans and directed to the online engagement to provide their input.

4.3 Phase 3A: What we heard

Community Advisory Group and Montgomery Community Association Meetings

During the review of the proposed and revised preliminary short-term concept, the Montgomery Community Association and the Community Advisory Group discussed several key considerations including:

- The capacity of the design to handle traffic volumes at peak times
- Safety for people who walk and bike through the study area, using a variety of methods including sensors and raised crossings
- The mitigation of cut-through traffic in Montgomery
- The configuration of the intersection of 43rd Street and 16th Avenue to ensure safety for those who walk and bike through this area, and to maintain the safety of families utilizing the playground near this intersection

When reviewing the draft long-term recommended plan, the groups discussed considerations that included:

- Ensuring ramps from 16th Avenue will accommodate increases in traffic volumes
- Monitoring for future traffic growth and needs
- River bank stability

Open House, Online Engagement, and Community Pop-up Events

The draft short- and long-term recommended plans generated comments regarding the impact of plans on residents and those who drive through and use the amenities and services in the area. In particular, participants noted considerations around:

- The impact of additional signals on traffic flow through the study area
- Ensuring plans provide easy access to communities and businesses from Bowness Road

- The possibility that people who drive will use residential streets in the Montgomery community to bypass areas of congestion
- Ensuring plans provide easy connections for people who walk and bike through the study area

Participants noted a desire for more information on historical decisions about the study area (i.e. the removal of the bridge crossing), construction timing and potential impact to nearby residents, and some of the design decisions made within both the draft short- and long-term plans.

Regarding the three ideas for the design of 43rd street, the majority of participants who responded noted the ‘right-out only’ design had the most benefits. Benefits included the potential reduction in traffic volumes along 43rd Street and the fact that the design maintains bus routes and convenience of access to the area for residents

Generally participants provided positive feedback regarding the engagement process, including appreciation that the study has given the public an opportunity to comment on many elements and scenarios. Participants also noted they felt community feedback had been well integrated in the decision-making process.

Quotes from participants

“Instead of using button activated pedestrian lights, use non button, automatic lights. This way when a pedestrian or cyclist arrives after a light change, they won't have to wait until a whole cycle of light changes or be tempted to cross without a walk light.”

“I live at the corner of Bowness Road and 43rd Street. The number of near misses with vehicles and pedestrians, cars driving around south turning vehicles without consideration for the high pedestrian and bicycle traffic has been a concern for the 17 years we have lived here.”

“This plan works well and addresses the issues and preferences from locals at the workshops.”

“Not sure that there is enough benefit from this [short-term] proposal to be worth the cost of construction.”

4.4 Phase 3A: How we used the input

The input gathered through Phase 3A was used to make refinements and finalize the short- and long-term recommended plans. The refinements arising from the feedback gathered in Phase 3A included:

- Identifying a suggested right-out-only modification at 43rd Street and Bowness Road to ensure safety for those who walk and bike through this area, and to maintain the safety of families utilizing the playground near this intersection (this modification to be considered as part of the Montgomery Main Streets - Bowness Road N.W. project)
- Adding infrastructure to support the safe movement of people who walk and bike through the study area (e.g. pedestrian overpasses, multi-use pathways etc.)
- Modifying ramp configurations to better accommodate future traffic volume growth
- Identifying potential future modifications to ensure traffic flow is maintained through the study area

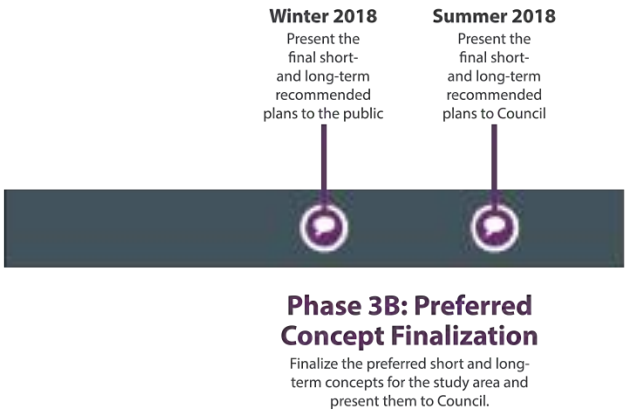
4.5 Key outcomes of Phase 3A

The key outcomes of Phase 3A included:

1. The Community Advisory Group met for the fourth and fifth time.
2. The Montgomery Community Association met with the project team twice.
3. The project team gathered feedback on the draft short- and long-term recommended plans from stakeholders and the public.
4. The project team refined and finalized the short- and long-term recommended plans for presentation to stakeholders and the public in Phase 3B.

4.6 Phase 3B: Overview

Phase 3B Preferred Concept Finalization involved completing final technical analysis and refinements, and presenting the final short- and long-term preferred concepts to the public and Council.



4.7 Phase 3B Engagement activities – What we asked

Community Advisory Group Meeting #6 and Montgomery Community Association Meeting #3

At these meetings members reviewed and asked questions about the final short- and long-term recommended plans. The groups particularly focused on the most recent changes to the plans, including improved accommodations for people who walk and bike, as well as adjustments to ensure future traffic volumes are accommodated.

Members also reviewed the engagement process for the study and were introduced to the related projects that are overlapping with or occurring close to the South Shaganappi Study.

Information Session Overview & Montgomery Main Streets Open House

The information session introduced participants to the final recommended short- and long-term plans. Participants at the information session were asked to review the final short- and long-term recommended plans and ask questions of the project team. They were also asked to comment on the success of the information session and the overall engagement process for the study.

As an extension of the information session, the project team also attended the Montgomery Main Streets open house, introducing

participants to the final recommended short- and long-term plans and inviting them to ask questions of the project team.

4.8 Phase 3B: What we heard

Montgomery Community Association Meeting and Community Advisory Group Meetings

These groups noted a few considerations for the short- and long-term recommended plans moving forward, including:

Short-term considerations:

- Ensuring crossings for people who walk and bike through study area are safe and easy to use
- Discouraging cut-through traffic with the design
- Installing pedestrian-scale lighting along the multi-use pathways
- Providing better drainage along the pathway at the south side of 16 Avenue

Long-term considerations:

- Ensuring easy movement for all modes through the study area
- Plans for land repurposing
- Ensuring that the design of the study area is built to be human-scale, safe, and walkable, and that it helps create community connections

Information Session & Montgomery Main Streets Open House

Feedback form respondents at the information session generally felt that the session provided clear information and that staff was able to answer their questions. The majority of participants felt they could see public input reflected in both the short and long-term recommended plans.

Other suggestions for future improvements to the engagement process included:

- Extending the time the information session was open and/or adding an additional date to give people more opportunities to participate
- Providing a digital rendering of the plans to allow people to experience it in 3D
- Providing information about how the plans go from the final recommended plan to final engineering design

Quotes from participants

“There needs to be increased parking for car-bike commutes from the west and north communities, especially with the water plant taking up space.”

“Thanks for giving residents of this community an opportunity for input! Always remember we live here and have to live with these changes.”

“Traffic lights controlling access off ramp from Parkdale Blvd west bound onto 16th Ave westbound are of questionable value.”

4.9 Phase 3B: How we used the input

The input gathered through Phase 3B will be used to inform future engagement activities and where relevant, will be provided to other City of Calgary project teams working in and around the South Shaganappi study area. The information gathered will also be kept on file with the City of Calgary to inform the implementation of the recommended short- and long-term plans in the future.

4.10 Key outcomes of Phase 3B

The key outcomes of Phase 3B included:

1. The Community Advisory Group met for the final time.
2. The Montgomery Community Association met with the project team for the final time.
3. The project team presented the final recommended short- and long-term plans to stakeholders and the public.

5.0 Communications Strategies and Tactics

The communications strategy for the study focused on supporting the phased engagement approach. Tactics were designed to create awareness and understanding of the project, and to encourage participation in engagement activities. Communications focused on three main strategies:

1) Provide clear information about the study

Ensuring that stakeholders and the public had a clear understanding of the project was central to the communications strategy, because accurate information is the basis of meaningful engagement. This strategy included providing information such as the project background, goals, and objectives, and developing materials that met specific stakeholder needs. For example, a related projects map and information sheet.

Several tactics supported this strategy, including:

- **A project webpage and a project page on the Engage! platform** that provided clear and concise project information as well as ongoing information about engagement activities and outcomes
- **Project information sheets** including a general project information sheet, and a map providing information on related projects happening close to the study area
- **Engagement display boards** that were used at engagement events and posted online to explain the project, the engagement process, and to convey technical information about the study and concept development
- **A project email address and the 311 information line** were used to ensure that people could contact the project team or ask questions at any time throughout the study

2) Create a clear line of site between public input and the outcomes of each phase

Public input played a central role in the South Shaganappi Study, and significantly influenced the outcome of each phase. For this reason communications focused on ensuring that stakeholders and the public could clearly see where and how their input was being used.

Several tactics supported this strategy, including:

- **Project timeline infographics** that showed how and where public input and technical analysis were working together to produce outcomes and move the study towards preferred short- and long-term concepts
- **Icons and charts** that helped to clearly explain the benefits and challenges of different preliminary concepts using community-identified priorities
- **If-not-why-not explanations** that identified key community ideas that would not move forward in the study, and why the ideas would not be used

- **What We Heard reports** to provide comprehensive reports on the input that was provided, including summaries of input and verbatim recordings of the feedback provided

3) Widely promote public engagement opportunities

Another important communications strategy was to ensure that engagement opportunities were widely promoted in the adjacent communities and beyond. In some cases this involved staff going out into the community to inform and engage people directly.

Several tactics supported this strategy, including

- **Hand-delivered postcards** to businesses in adjacent communities to create awareness of the project and promote the first open house event.
- **Postcards mailed to adjacent communities** to invite residents to attend adjacent-community-only events including the design idea workshops in Phase 2A, and the open houses in Phases 2B and 3A.
- **Signs in adjacent and surrounding communities** including Bold Signs in key locations and A-frame signage in Edworthy Park to promote public engagement events.
- **Community association newsletters** for communities near the study area were used to disseminate information about upcoming engagement events and encourage participation.
- **Emails to stakeholders and members of the public** who signed up for project updates provided information about upcoming events and encouraged participation.
- **Social media posts** including Facebook and Twitter posts on The City of Calgary's channels promoted event dates and times.
- **Website updates** ensured that the latest information about engagement opportunities were available to all Calgarians.

Combined together these strategies and tactics provided a strong support for engagement processes by ensuring that stakeholders and the public were well informed about the project, could clearly see how they were influencing the process and its outcomes, and understood exactly how and where they could be involved.

Appendix B EXISTING CONDITIONS TRAFFIC ANALYSIS

Memo

To:	Lei Ma City of Calgary	From:	Japji Chahal-Virk Stantec Consulting Ltd.
File:	113677973	Date:	December 11, 2015

Reference: Shaganappi Trail South Corridor Study – Existing (2015) Traffic Volumes

Existing traffic volumes were obtained on Tuesday, June 16, 2015 and Wednesday, June 17, 2015 at the following intersections:

- 43 Street / 16 Avenue NW
- 42 Street NW / Bowness Road
- 16 Avenue NW / Bowness Road
- 16 Avenue NW/ Shaganappi Trail
- 16 Avenue NW / West Campus Boulevard – on and off ramps only
- Shaganappi Trail / Bowness Road NW
- Montgomery View NW / Riverside Club parking lot (intersection just south of Bowness Road)
- Bowness Road / Point McKay Crescent right-in/right-out (north & south of Bowness Road)
- Bowness Road / Point Drive NW
- Bowness Road / Veterans Way NW
- Bowness Road / 37 Street NW

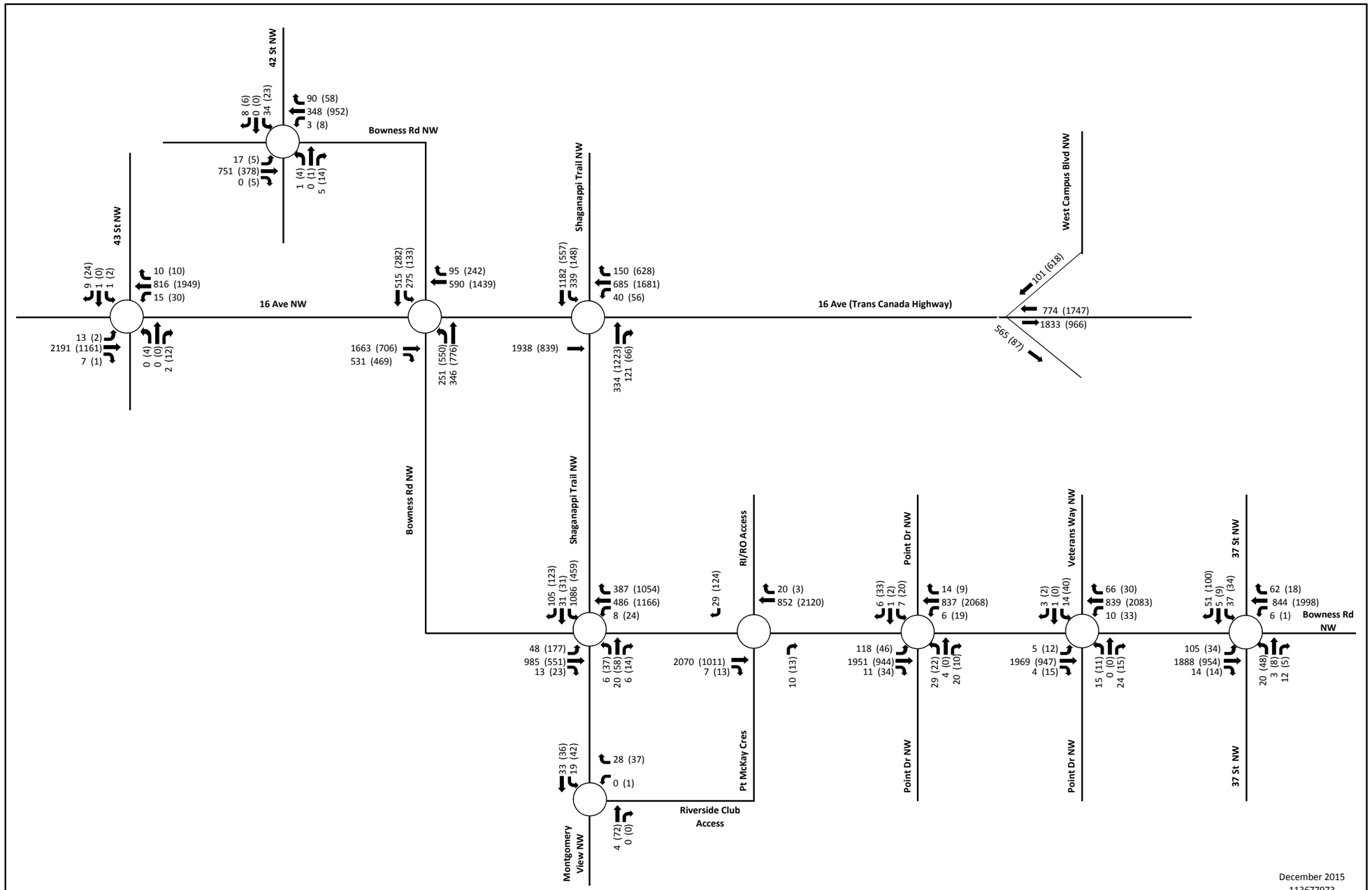
The counts were conducted for the AM peak period (7:00 AM - 9:00 AM) and the PM peak period (4:00 PM - 6:00 PM). The AM peak hour for the system was 7:45 – 8:45 AM and PM peak hour for the system was 4:15 – 5:15 PM. The resulting existing 2015 AM and PM peak hour traffic volumes are shown in **Figure 1**.

Stantec Consulting Ltd.

Japji Chahal-Virk, P.Eng.
Transportation Engineer
Phone: (403) 569-5380
Fax: (403) 716-8129
Japji.Chahal-Virk@stantec.com

Attachment: Figure 1 – Existing 2015 Traffic Volumes

c. Madhuri Seera – City of Calgary
Arliss Szysky – Stantec Consulting Ltd.



December 2015
113677973

Stantec

200 - 325 25th Street SE
Calgary, AB T2A 7H8
www.stantec.com

Legend

xxx (xxx) AM (PM) PEAK HOUR TRAFFIC VOLUMES

Client/ Project

CITY OF CALGARY
SHAGANAPPI TRAIL SOUTH CORRIDOR STUDY

Figure No.

1

Title

EXISTING 2015 TRAFFIC VOLUMES

Appendix C EXISTING COLLISION DATA REVIEW & DIAGRAMS

Stantec

Memo

To:	Lei Ma, P.Eng., PTOE, PMP, M.Eng.	From:	Ryan Martinson, M.Eng., P.Eng. Kennith Lin, EIT
	City of Calgary		Stantec Consulting Ltd.
File:	113677973	Date:	January 29, 2016

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

A key component of the Shaganappi Trail South Corridor Study is understanding the safety performance within the study area. The study area is focused on the interchange at 16 Avenue NW at Bowness Road NW and Shaganappi Trail NW. Collisions are an indication of safety risks on a roadway section, and collision trends may reveal opportunities for road improvements.

City's Collison Review

The City of Calgary completed a Collision Review (CR) dated September 8, 2015, for the following locations:

- 16 Avenue / Shaganappi Trail NW interchange;
- 16 Avenue NW & Bowness Road NW interchange;
- Shaganappi Trail NW & Bowness Road NW intersection

The conclusions as per the Collision Review completed by the City of Calgary are as follows:

1. *While all yield controlled loop ramps make a substantial contribution of collision cost to society the 16 AV & Shaganappi Trail loop ramp is most concerning.*
2. *The largest collision cluster occurred at the 16 AV & Shaganappi TR interchange rooted in inadequate geometry for traffic control.*
3. *There are relatively few collisions that involved eastbound-southbound left turning vehicles at 16 AV & Shaganappi TR.*

It was also concluded that *collision reduction can be achieved through revising the geometry to fit the traffic control (i.e. improving intersection angle, reducing radius of loop ramp); however, due to the nature of traffic on 16 Avenue (Trans-Canada Highway) this may violate driver expectation. Hence, the feasibility of providing merge traffic control should be investigated harmonizing geometry, traffic control, and motorist expectations. This may involve changes to the existing interchange layout, but is expected to result in significant collision reduction.*

These findings, including the analysis presented in the City's CR will be used in the development of concept designs for the study area.

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Collision Data Review

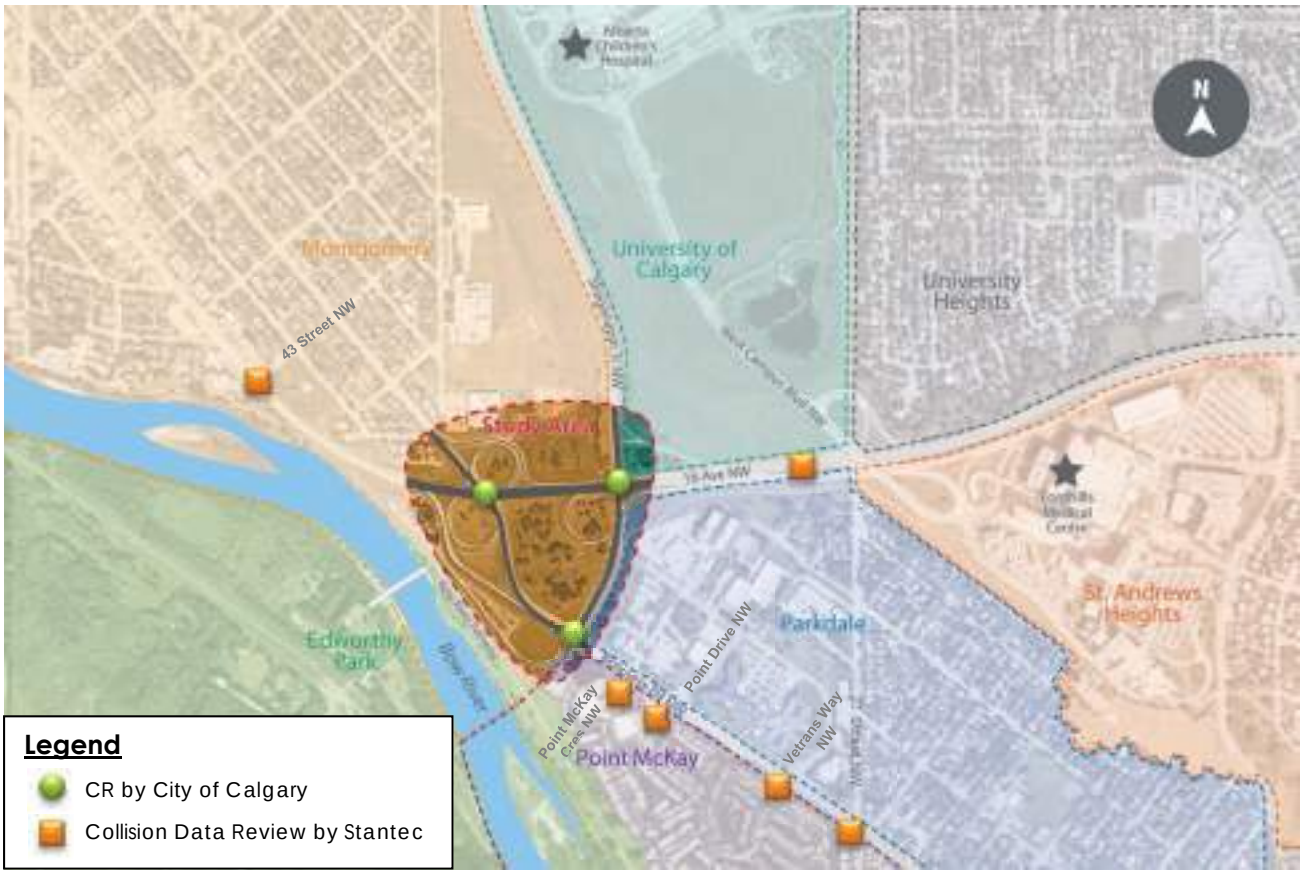
In addition to the CR, Stantec completed a Collision Data Review (CDR) for locations west to 43 Street NW and east to West Campus Boulevard NW on 16 Avenue NW; and east to 37 Street NW on Bowness Road NW. The addition of the word Data for the CDR by Stantec is provided only to differentiate in this memo the locations covered by the CR and the CDR.

The CDR includes the following intersections:

- 16 Avenue / 43 Street NW (two-way stop control);
- 16 Avenue NW between Shaganappi Trail NW and West Campus Boulevard NW (weave);
- Bowness Road / Point McKay Crescent NW (signalized intersection);
- Bowness Road / Point Drive NW (signalized intersection);
- Bowness Road / Point Drive NW/Vetrans Way NW (signalized intersection).
- Bowness Road / Street NW (signalized intersection);

The results from the CDR for the above six intersections are provided in the following memo with the CR by the City of Calgary provided as an attachment. **Figure 1** illustrates the intersections reviewed.

Figure 1 - Shaganappi Trail South Corridor Study Area



The CDR is based on the available data from the City of Calgary for the period of 2010 to 2014. The collision rate, expressed as the average number of collisions per million entering vehicles, were calculated in the City of Calgary's CR to obtain an understanding of the frequency of collisions with respect to the volume of traffic at an intersection. The collision rate is not calculated in this CDR due to the requirement for the number of entering vehicles in the calculation. To ensure consistency in the results between the CR and CDR, the same source of the number of entering vehicles should be obtained for the CDR to help reduce any potential bias of the collision rate. As a result, only general remarks regarding collisions at these locations are discussed. Collision rates for the following intersections may be calculated with available volume data which are commensurate to the CR. The determination of collision rates will provide more measurable results which takes into account exposure with the consideration of collisions and the volume of vehicles using an intersection.

Overall collision trends from the CDR are summarized as follows for each of the six intersections identified.

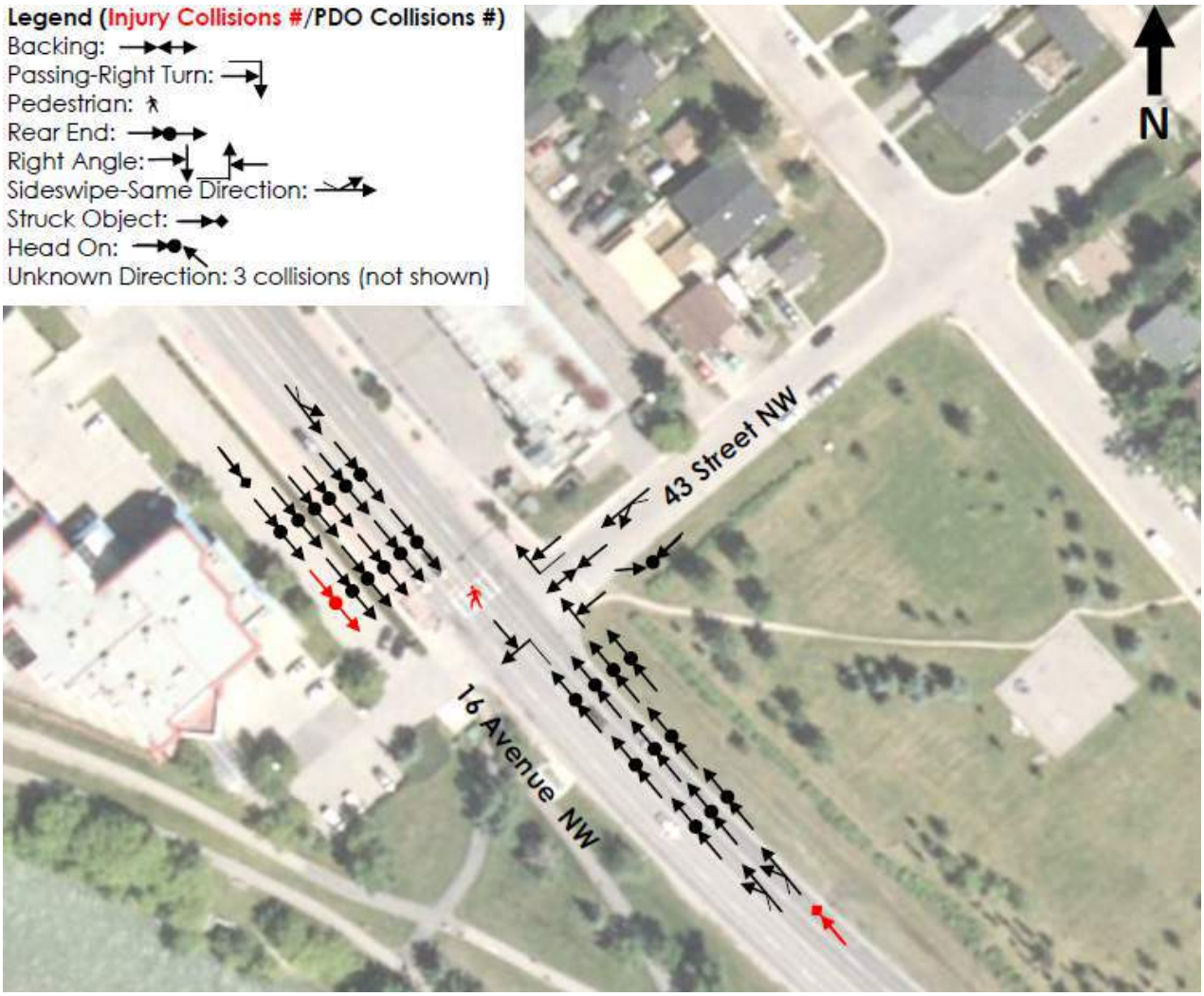
16 Avenue / 43 Street NW (two-way stop control)

For the intersection of 16 Avenue / 43 Street NW, the following information was compiled for review as part of the CDR: **Figure 2** illustrates the number and type of collisions at the intersection; **Table 1** summarizes the collision type, frequency and severity of the collisions experienced at the intersection; and **Figure 3** provides a temporal summary of the collisions at the intersection.

The majority of collisions at this intersection consisted of rear ends. Approximately 75% of the rear ends occurring at this intersection were reported to have been related to drivers stopping for pedestrians in the crosswalk. Additionally, two of the five collisions on southbound 43 Street had reports regarding drivers becoming impatient and either backing up or overtaking another vehicle.

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Figure 2 – 16 Avenue NW & 43 Street NW – Collision Diagram

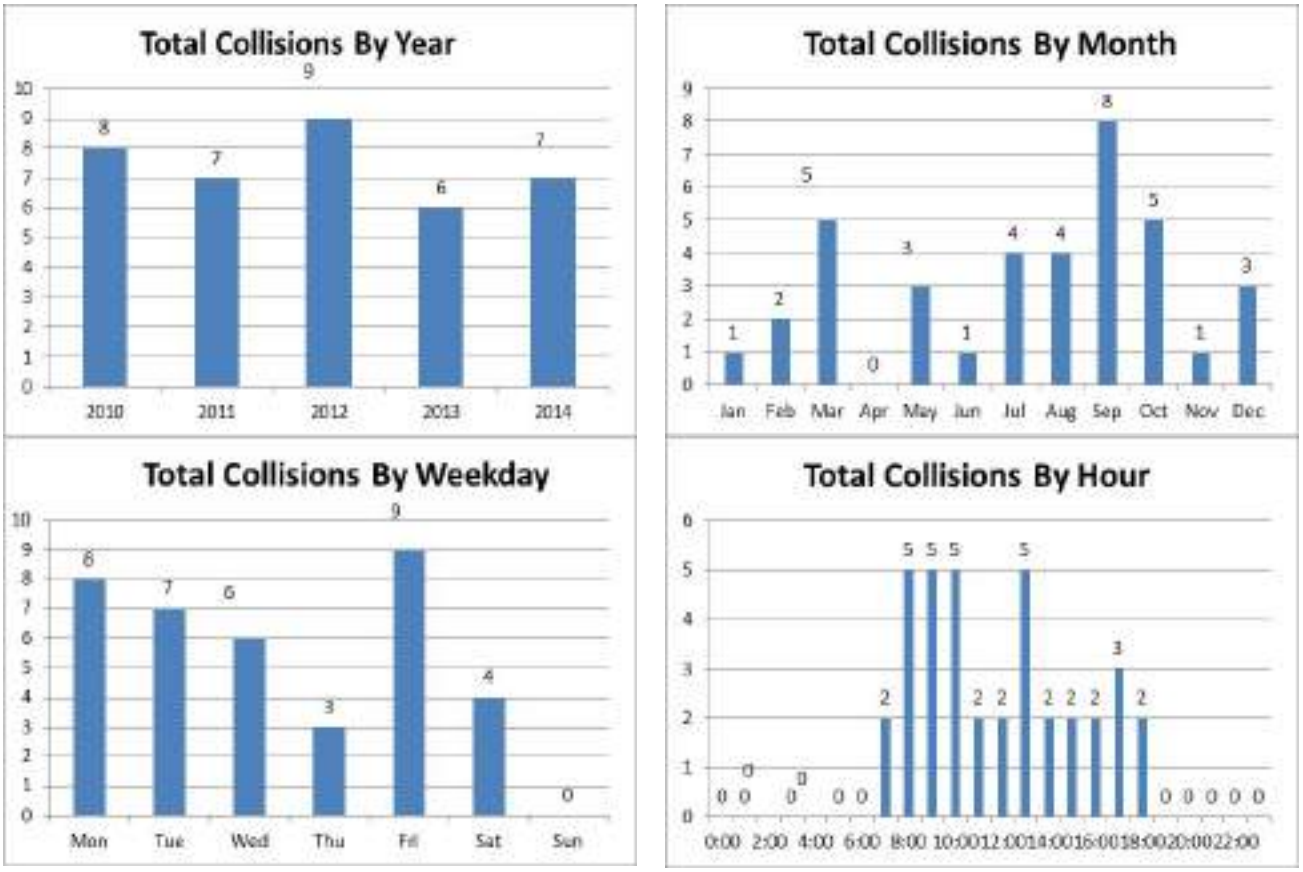


Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Table 1 – 16 Avenue NW & 43 Street NW – Collision Type, Frequency and Severity

Type of Collisions	Year					Total	Fatal	Injury	PDO
	2010	2011	2012	2013	2014				
Backing			1			1			1
Other				1		1			1
Passing-Right Turn			1			1			1
Pedestrian	1					1		1	
Rear End	7	5	4	3	5	24		1	23
Right Angle			1		1	2			2
Sidewsipe-Same Direction			2	2		4			4
Struck Object		2				2		1	1
Head On					1	1			1
Grand Total	**8**	**7**	**9**	**6**	**7**	**37**		**3**	**34**
Fatal									
Injury	1	1			1	3			
PDO	7	6	9	6	6	34			

Figure 3 – 16 Avenue NW & 43 Street NW – Temporal Summary



16 Avenue NW between Shaganappi Trail NW and West Campus Boulevard NW (weave)

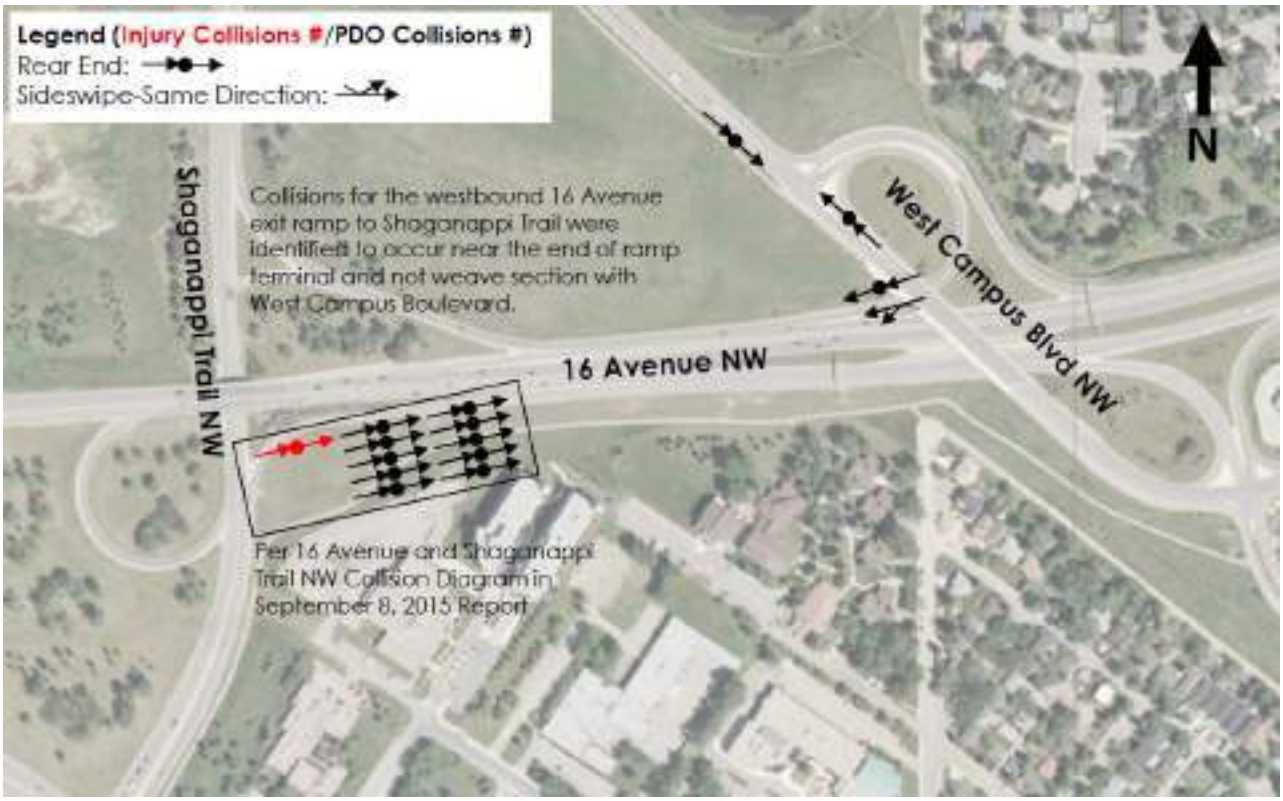
For the weave section on 16 Avenu NW between Shaganappi Trail NW and West Campus Boulevard NW, the following information was compiled for review as part of the CDR: **Figure 4** illustrates the number and type of collisions at the intersection; **Table 2** summarizes the collision type, frequency and severity of the collisions experienced at the intersection; and **Figure 5** provides a temporal summary of the collisions at the intersection.

For reviewing the 16 Avenue NW weave section between West Campus Boulevard NW and Shaganappi Trail NW, collisions from the CR at the 16 Avenue NW & Shaganappi Trail NW interchange were reviewed to take into account collisions which may be related to this weave section. The collisions occurring on the westbound 16 Avenue NW to Shaganappi Trail NW ramp were related to interactions closer to Shaganappi Trail NW(such as at the stop control) and would have minimal implications to weave conditions on 16 Avenue NW. As the focus for this CDR is on the weave segment, collisions not directly related to the weave section are not summarized in this CDR – reference may be made to the attached CR for more information. For weave related collisions at this location:

- Two collisions were reported for westbound 16 Avenue NW coming from West Campus Boulevard NW– Rear end and sideswipe.
- Eleven rear end collisions were reported on the northbound Shaganappi Trail NW to eastbound 16 Avenue NW ramp. As shown in the CR, the southbound Shaganappi Trail NW to eastbound 16 Avenue NW ramp also exhibited a higher number of rear end collisions than the northbound to eastbound ramp. A major difference between the two ramps is the southbound ramp is yield control while the northbound ramp provides a lane continuation (weave) up until the West Campus Boulevard NW exit.

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Figure 4 – 16 Avenue NW between Shaganappi Trail NW and West Campus Boulevard NW – Collision Diagram

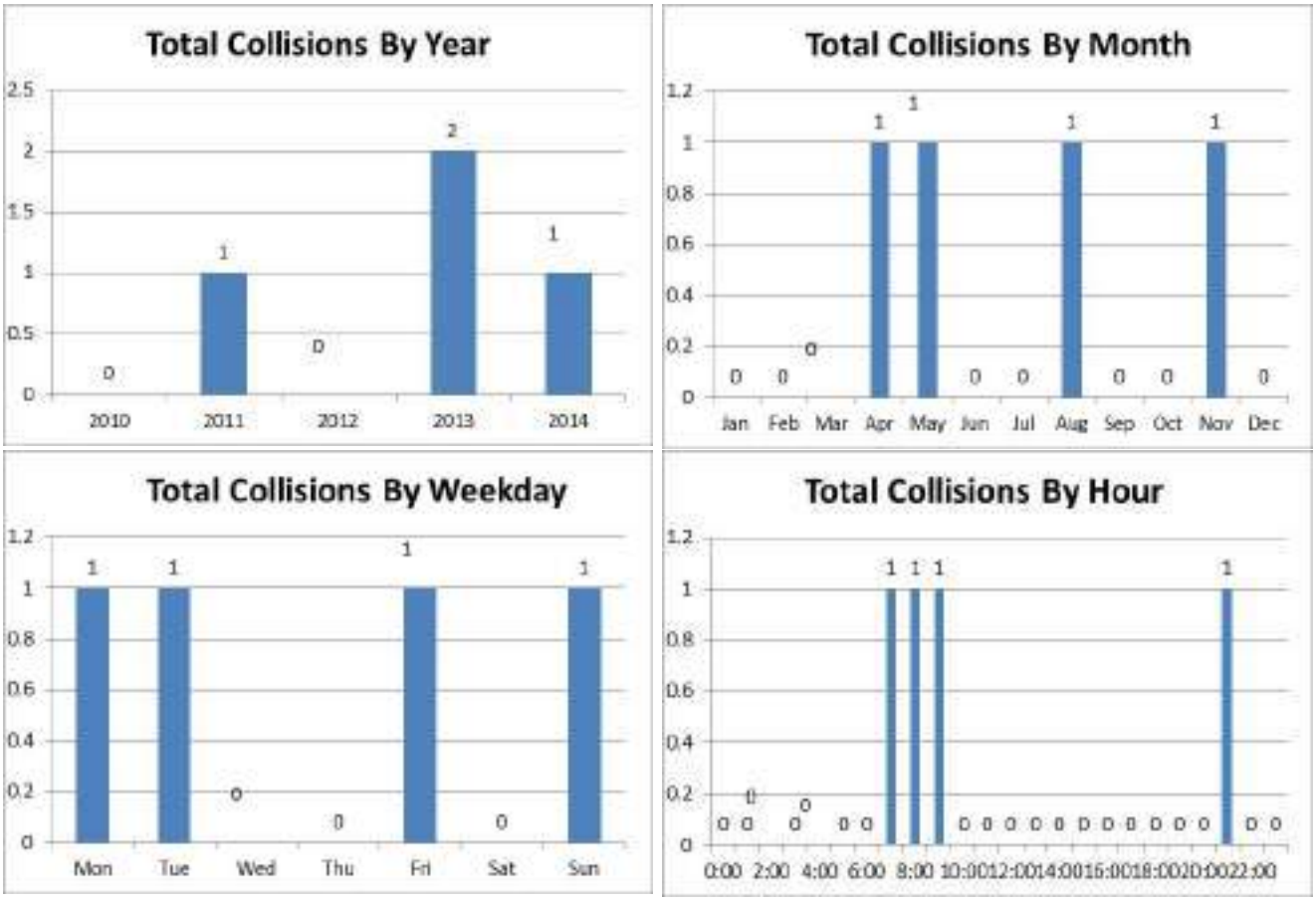


Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Table 2 – 16 Avenue NW between Shaganappi Trail NW and West Campus Boulevard NW – Collision Type, Frequency and Severity

Type of Collisions	Year					Total	Fatal	Injury	PDO
	2010	2011	2012	2013	2014				
Rear End				2	1	**3**			3
Sidewsipe-Same Direction		1				**1**			1
Grand Total		**1**		**2**	**1**	**4**			**4**
Fatal									
Injury									
PDO		1		2	1	**4**			

Figure 5 – 16 Avenue NW between Shaganappi Trail NW and West Campus Boulevard NW – Temporal Summary



Bowness Road / Point McKay Crescent NW (right-in/right-out)

For the intersection of Bowness Road / Point McKay Crescent NW, the following information was compiled for review as part of the CDR: **Figure 6** illustrates the number and type of collisions at the intersection; **Table 3** summarizes the collision type, frequency and severity of the collisions experienced at the intersection; and **Figure 7** provides a temporal summary of the collisions at the intersection.

Three of the collisions at this intersection may potentially have been mitigated now with the recent introduction of the raised median which now only allows for right-in /right-out movements.

Figure 6 – Bowness Road NW & Point McKay Crescent NW – Collision Diagram

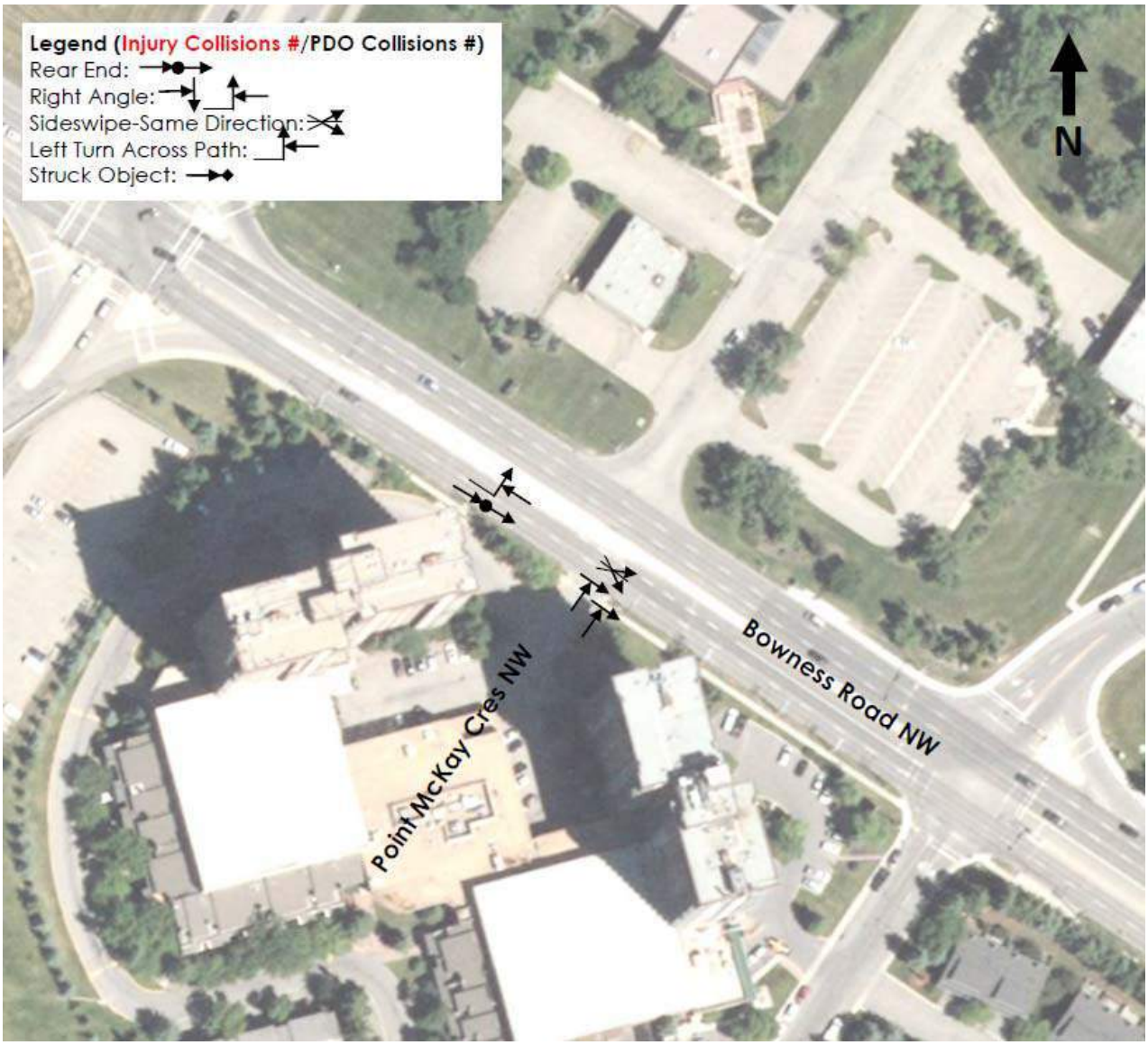
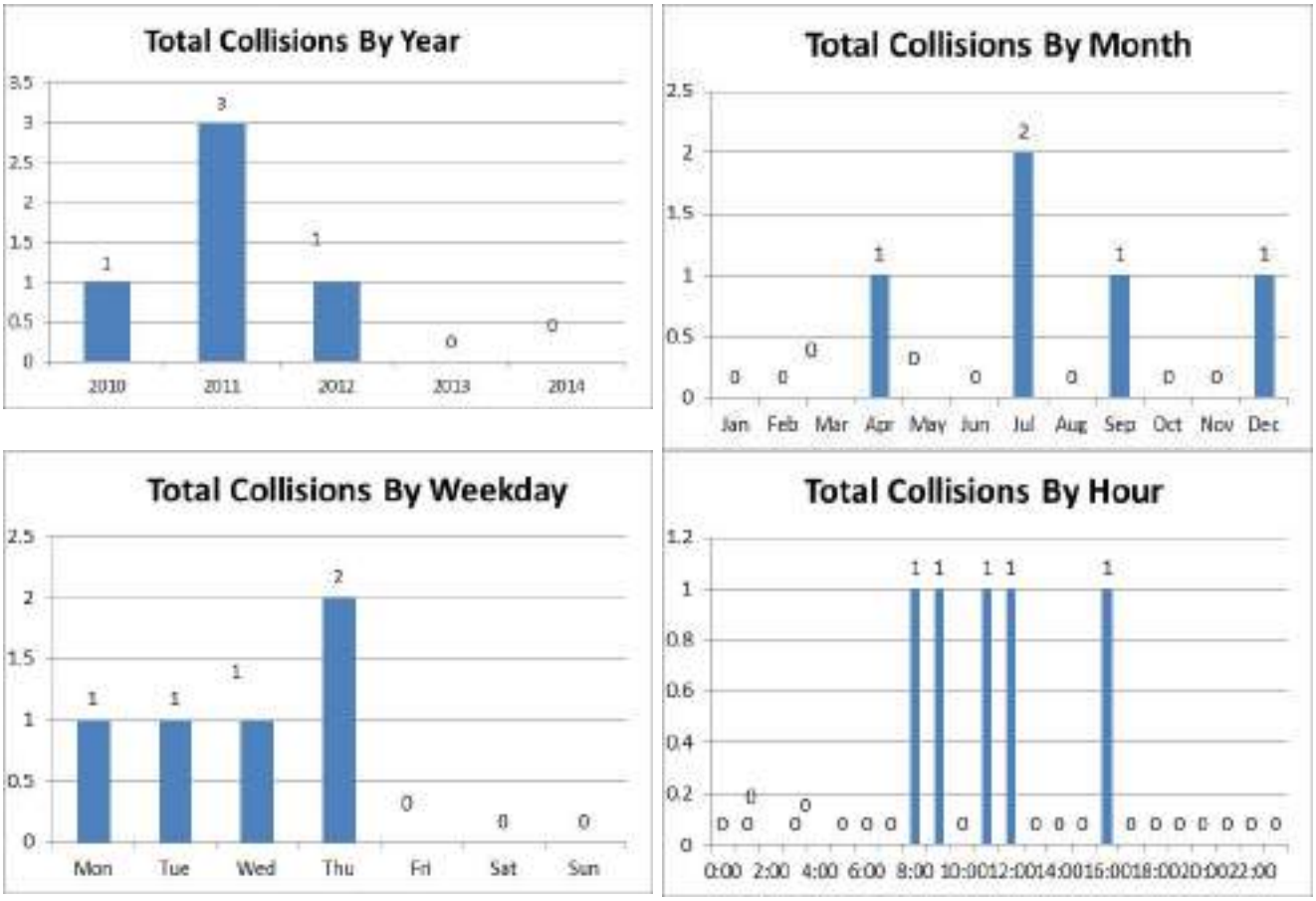


Table 3 – Bowness Road NW & Point McKay Crescent NW – Collision Type, Frequency and Severity

Type of Collisions	Year					Total	Fatal	Injury	PDO
	2010	2011	2012	2013	2014				
Left Turn Across Path	1					1		1	
Rear End			1			1			1
Right Angle		2				2			2
Sidewsipe-Same Direction		1				1			1
Grand Total	**1**	**3**	**1**			**5**		**1**	**4**
Fatal									
Injury	1					1			
PDO		3	1			4			

Figure 7 – Bowness Road NW & Point McKay Crescent NW – Temporal Summary



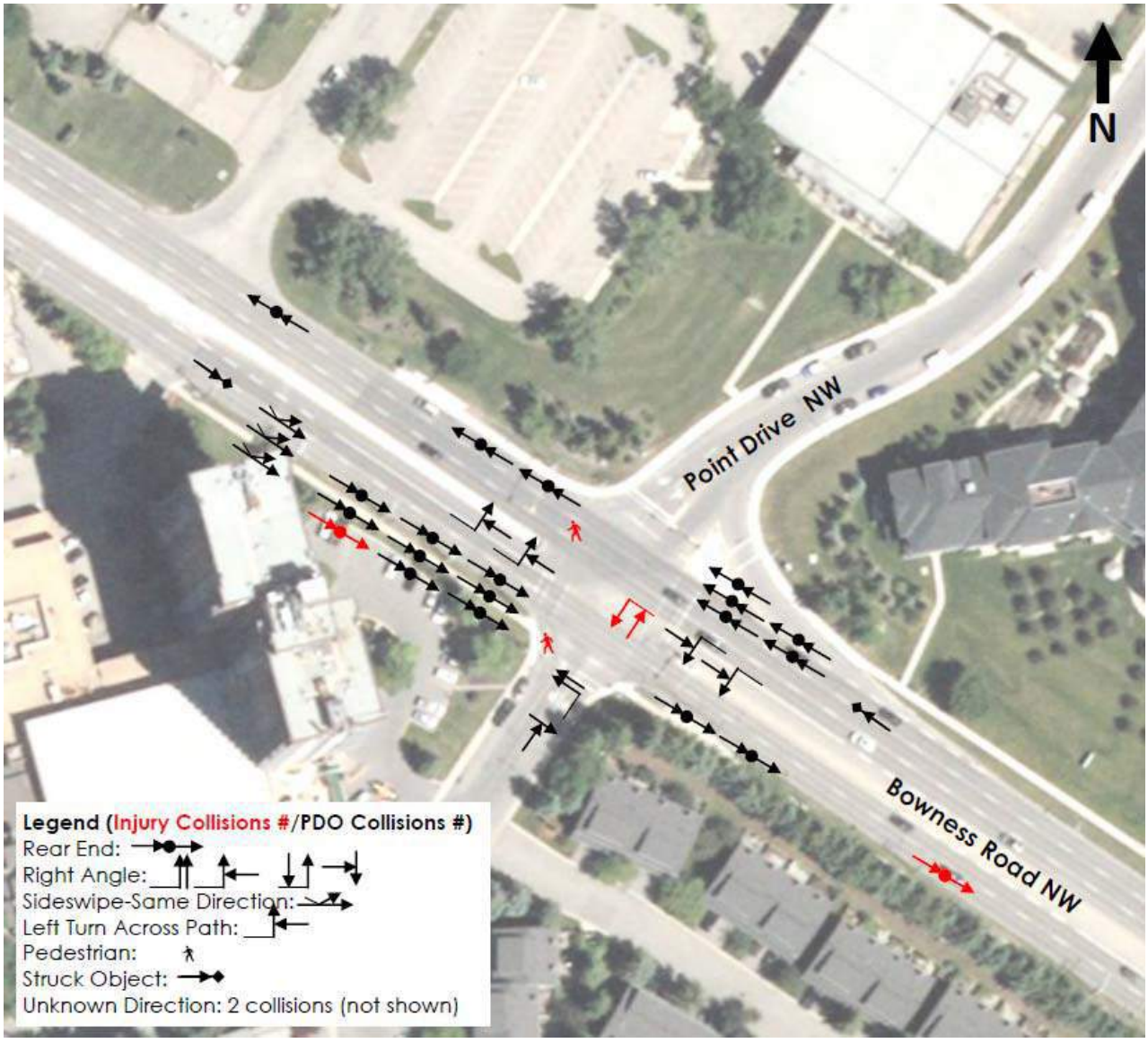
Bowness Road / Point Drive NW (signalized intersection)

For the intersection of Bowness Road / Point Drive NW, the following information was compiled for review as part of the CDR: **Figure 8** illustrates the number and type of collisions at the intersection; **Table 4** summarizes the collision type, frequency and severity of the collisions experienced at the intersection; and **Figure 9** provides a temporal summary of the collisions at the intersection.

A qualification for this intersection as well as at Bowness Road NW & Vetrans Way NW is that documentation of the collisions may have resulted in the wrong intersection being documented due to Point Drive NW intersecting at two locations. Efforts were made in the analysis to reallocate the collisions to the proper intersection where it was evident that a collision occurred elsewhere (specific mention of Vetrans Way) which only had three occurrences. Rear end collisions were the most frequently occurring at this intersection with the majority occurring on the eastbound approach. Left turn across path collisions were the next most frequently occurring. Two pedestrian related collisions are also of mention at this signalized intersection. Some far-side rear end collisions at this intersection have been reported with mention of vehicles stopping behind a bus at the far-side bus stops.

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Figure 8 – Bowness Road NW & Point Drive NW – Collision Diagram

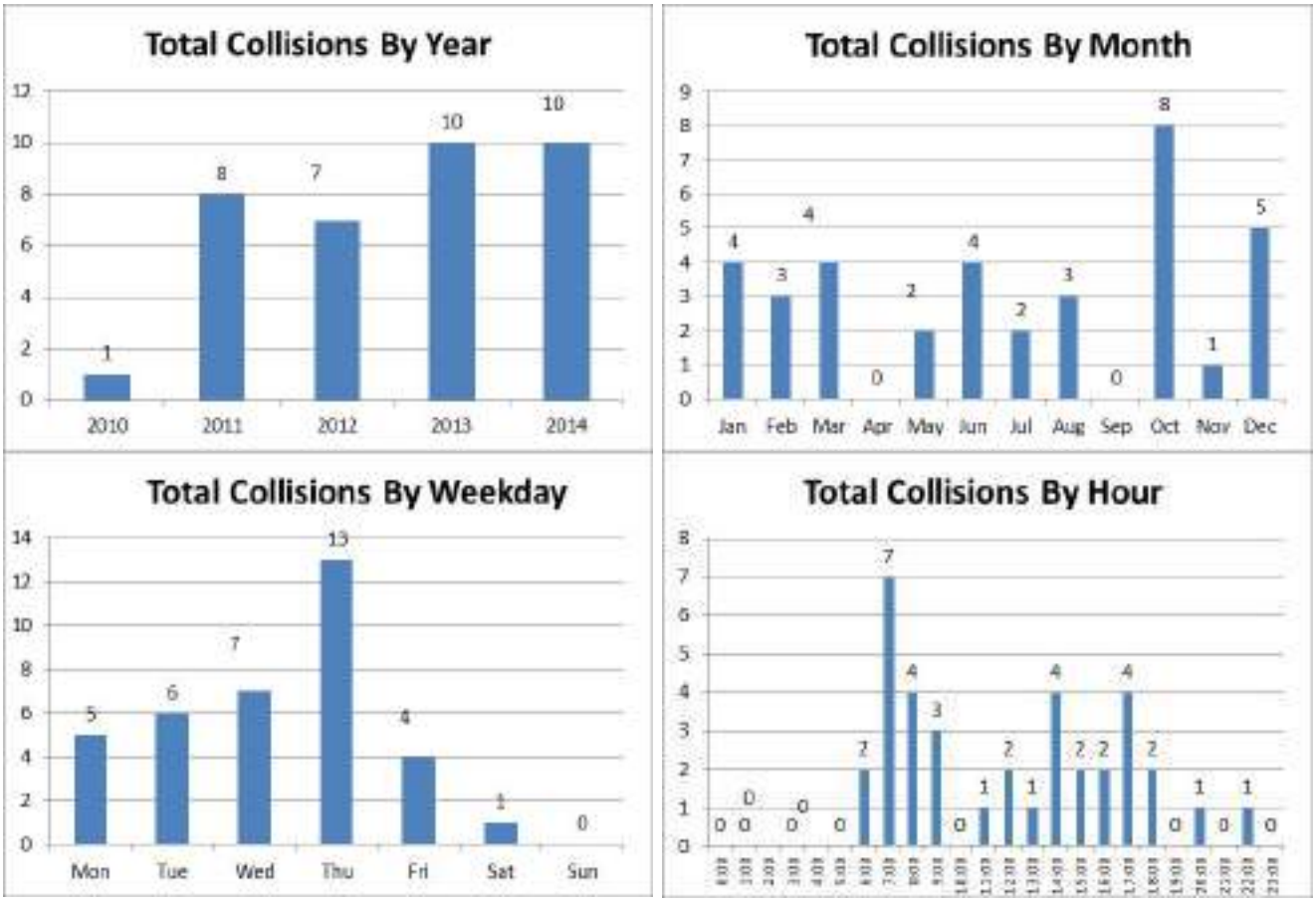


Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Table 4 – Bowness Road NW & Point Drive NW – Collision Type, Frequency and Severity

Type of Collisions	Year					Total	Fatal	Injury	PDO
	2010	2011	2012	2013	2014				
Left Turn Across Path			2	2	1	**5**		1	4
Pedestrian				2		**2**		2	
Rear End	1	5	5	2	8	**21**		2	19
Right Angle		1		1		**2**			2
Sidewsipe-Same Direction		1		1	1	**3**			3
Struck Object		1		2		**3**			3
Grand Total	**1**	**8**	**7**	**10**	**10**	**36**		**5**	**31**
Fatal									
Injury		1	1	2	1	**5**			
PDO	1	7	6	8	9	**31**			

Figure 9 – Bowness Road NW & Point Drive NW – Temporal Summary



Bowness Road / Point Drive NW (signalized intersection)

For the intersection of Bowness Road / Point Drive NW, the following information was compiled for review as part of the CDR: **Figure 10** illustrates the number and type of collisions at the intersection; **Table 5** summarizes the collision type, frequency and severity of the collisions experienced at the intersection; and **Figure 11** provides a temporal summary of the collisions at the intersection.

The above qualification regarding documentation of collisions for the Bowness Road NW & Point Drive NW intersection also applies to this intersection. Rear end collisions were the most frequently occurring at this intersection with the majority occurring on the eastbound approach. Left turn across path collisions were the next most frequently occurring along the eastbound approach.

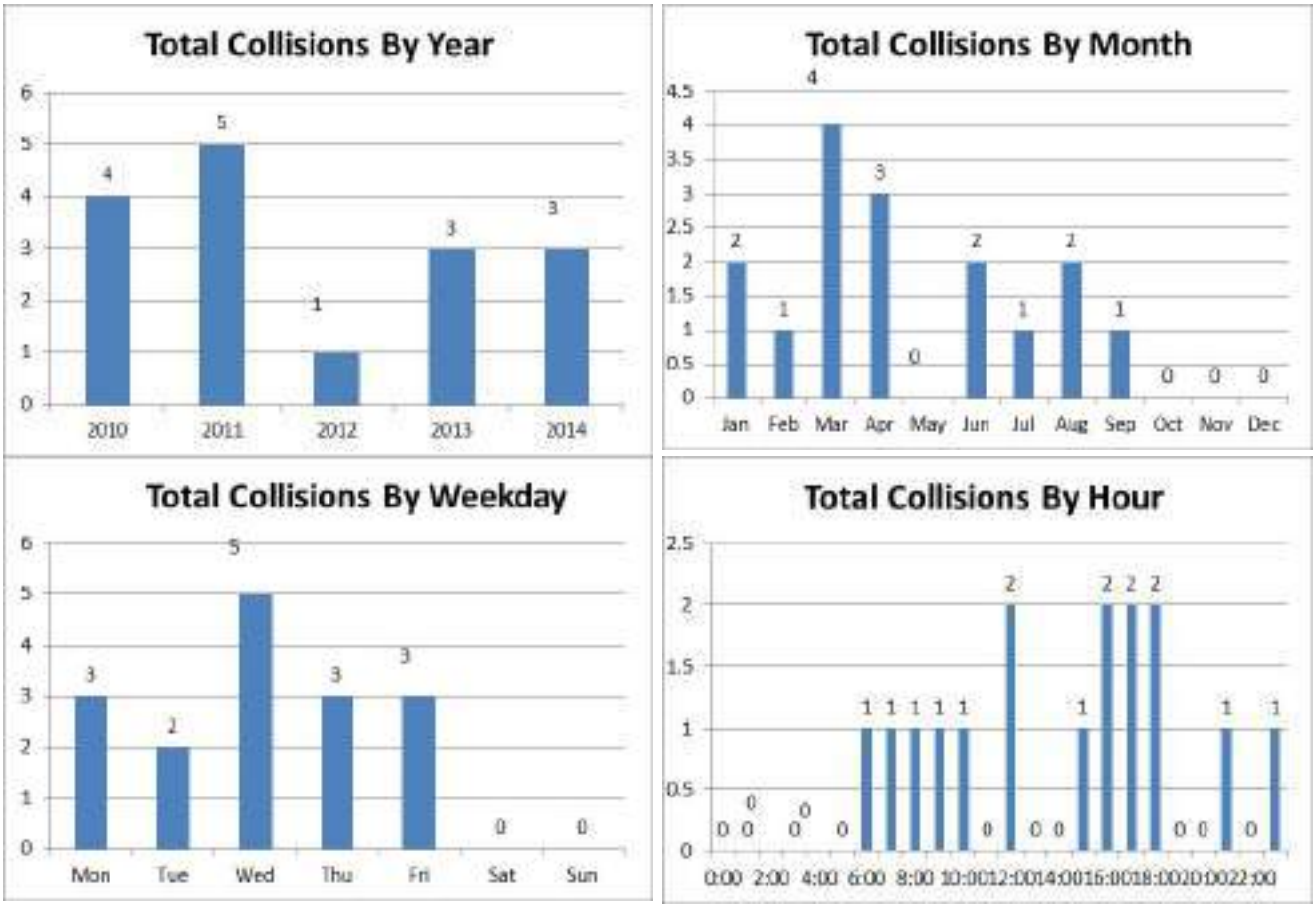
Figure 10 – Bowness Road NW & Vetrans Way NW – Collision Diagram

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Table 5 – Bowness Road NW & Vetrans Way NW – Collision Type, Frequency and Severity

Type of Collisions	Year					Total	Fatal	Injury	PDO
	2010	2011	2012	2013	2014				
Backing	1					**1**			1
Left Turn Across Path	1	3	1			**5**		1	4
Passing – Left Turn					1	**1**			1
Rear End	2	2		3	2	**9**			9
Grand Total	**4**	**5**	**1**	**3**	**3**	**16**		**1**	**15**
Fatal									
Injury		1				**1**			
PDO	4	4	1	3	3	**15**			

Figure 11 – Bowness Road NW & Vetrans Way NW – Temporal Summary



Bowness Road / 37 Street NW

For the intersection of Bowness Road / 37 Street NW, the following information was compiled for review as part of the CDR: **Figure 12** illustrates the number and type of collisions at the intersection; **Table 6** summarizes the collision type, frequency and severity of the collisions experienced at the intersection; and **Figure 13** provides a temporal summary of the collisions at the intersection.

The majority of collisions at this intersection consisted of rear ends. Five of the thirteen eastbound rear ends at this location had specific mention of a left turning vehicle being involved in the shared through-left lane.

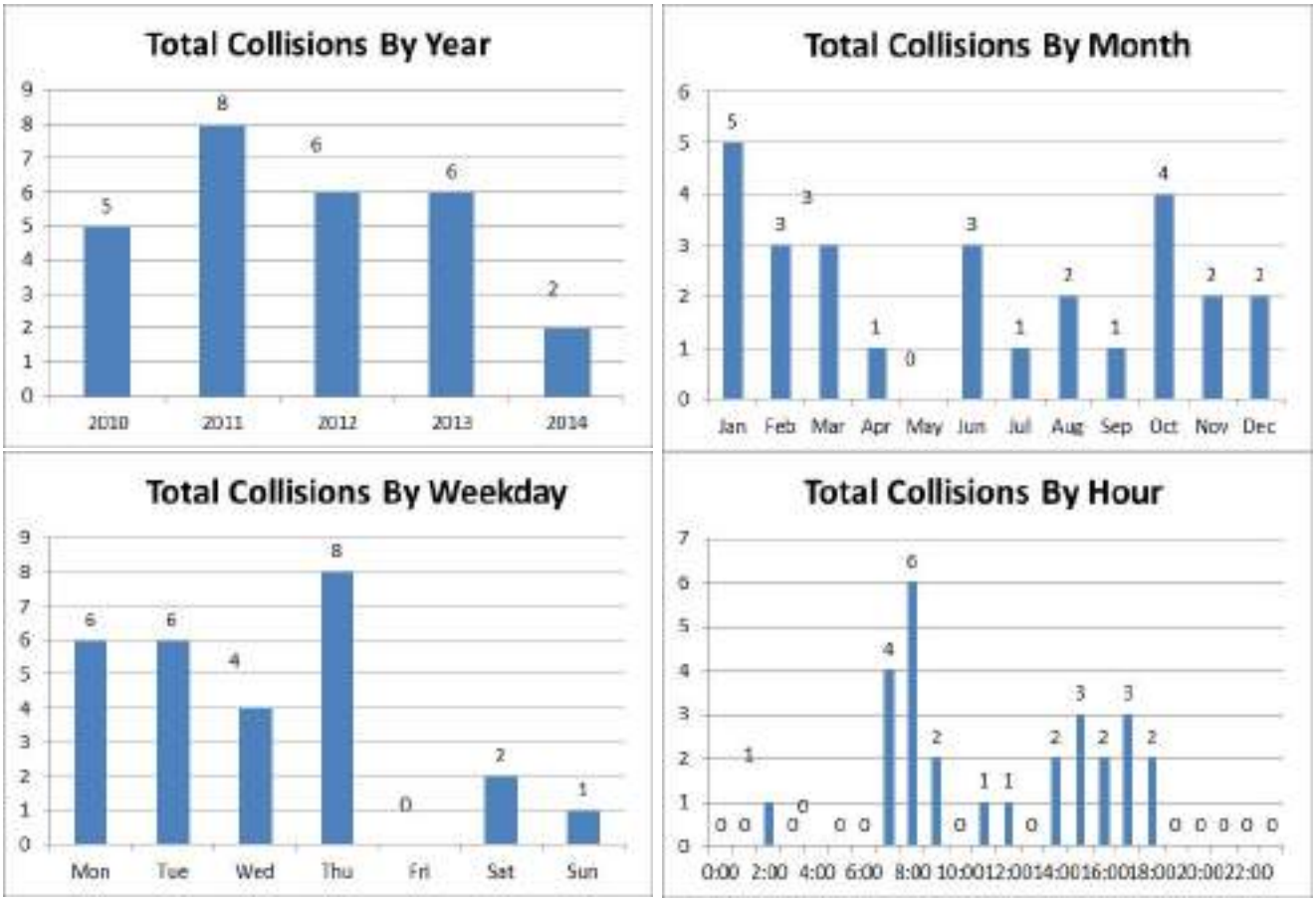
Figure 12 – Bowness Road NW & 37 Street NW – Collision Diagram

Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Table 6 – Bowness Road NW & 37 Street NW – Collision Type, Frequency and Severity

Type of Collisions	Year					Total	Fatal	Injury	PDO
	2010	2011	2012	2013	2014				
Backing		1				**1**			1
Left Turn Across Path	1					**1**			1
Rear End	3	3	5	5	2	**18**		1	17
Right Angle		1				**1**			1
Sidewsipe-Same Direction	1	3	1	1		**6**			6
Grand Total	**5**	**8**	**6**	**6**	**2**	**27**		**1**	**26**
Fatal									
Injury			1			**1**			
PDO	5	8	5	6	2	**26**			

Figure 13 – Bowness Road NW & 37 Street NW – Temporal Summary



Reference: Shaganappi Trail South Corridor Study - Collision Data Review

Conclusions

The results from the CDR may be considered in any modifications to future designs. If volume data commensurate to the City's CR is available, the collision rates should be incorporated to ensure that the review of the collisions is more representative with respect to the exposure or volume of vehicles at a location rather than occurrences.

No recommendations are made as future conditions are subject to significant change. In areas where no change will occur, recommendations related to the safety performance will be provided.

Please contact the undersigned for any questions with regards to this Collision Review Summary Memo.

Stantec Consulting Ltd.

Ryan Martinson, M.Eng., P.Eng.
Associate – Sustainable Transportation Specialist
403-716-8138
Ryan.Martinson@stantec.com

Kennith Lin, EIT
Transportation Engineer In Training
403-750-2334
Kennith.Lin@stantec.com

Attachment: Collision Review (CR): 16 Avenue & Shaganappi Trail/Bowness Road NW

c. Madhuri Seera – The City of Calgary
Arliss Szysky – Stantec Consulting Ltd.
Japji Chahal-Virk, P.Eng.

Appendix D EXISTING BRIDGE CONDITIONS EXISTING

Memo

To:	Lei Ma, P.Eng, PTOE, PMP, M.Eng The City of Calgary	From:	Cari Walker, E.I.T. Stantec Consulting Ltd.
File:	113677973	Date:	January 27, 2016

Reference: Shaganappi Trail South Corridor Study – Existing Bridge Conditions

Currently within the Shaganappi Trail South Corridor Study area there are two existing interchanges. This memo summarizes the existing conditions of the bridge structures for those interchanges, on 16 Avenue NW over Bowness Road NW and over Shaganappi Trail NW. Figure 1 shows the existing bridges.

Figure 1 – Existing Bridges

The structures are located only 250 meters apart and have a similar construction history. The existing structures were originally built in 1960 and have since undergone several rehabilitations, with the most recent one completed in 2012. Typical rehabilitation that has been completed on these structures includes;

- Expansion joint replacements,
- Partial depth deck repairs,
- Upgrades to bridge rail and approach rail, and
- Concrete repairs.

CURRENT CONDITION

BOWNESS ROAD

The overpass on 16 Avenue NW over Bowness Road NW is composed of two structures, one eastbound and one westbound, joined at the median. The structures are composed of a voided slab deck with concrete piers on concrete piles and concrete abutments on steel H-piles. There are two 3.7 m lanes in both directions and there is currently no accommodation for pedestrians on the bridge. The current bridgerails are PL-2 (TL-4) combination barriers which are sufficient height for cyclists.

Underneath the bridge there are 2 lanes in both the northbound and southbound directions with sidewalks on both sides and a vertical roadway clearance of 5.1 m.

During the 2012 rehabilitation the following items were completed: partial depth deck repairs, a polymer modified asphalt (PMA) wearing surface was installed, the expansion joints were replaced, a new bridgerail and approach rail were installed, the slope protection was replaced and the top portion of the abutment H-piles were encased in concrete. It was noted in the preliminary engineering report that the bridge rehabilitation was designed for a CL-800 vehicle loading.

SHAGANAPPI TRAIL

The overpass on 16 Avenue NW over Shaganappi Trail NW is composed of a single 20 m wide structure with two 3.7 m lanes in both the westbound and eastbound directions. There is currently no accommodation for pedestrians on the bridge. The structure has a cast-in-place solid deck slab with concrete abutments and piers and a steel H-pile foundation. The current bridgerails are PL-2 (TL-4) combination barriers which are sufficient height for cyclists.

Underneath the bridge there are 2 lanes in the southbound direction and 1 lane in the northbound direction with sidewalks on both sides and a vertical roadway clearance of 4.6 m.

During the 2012 rehabilitation the following items were completed: partial depth deck repairs, a PMA wearing surface was installed, the expansion joints were replaced, a new bridgerail and approach rail were installed, the slope protection was repaired and concrete patching and repairs on the piers and abutments. It was noted in the preliminary engineering report that the bridge rehabilitation was designed for a CL-800 vehicle loading.

REMAINING LIFE

According to the 16 Avenue / Bowness Road NW & 16 Avenue / Shaganappi Trail NW Preliminary Engineering Report prepared by AECOM dated October 27, 2011, the expected remaining life of the structures with the rehabilitations complete would be 35 years. Therefore the bridges could remain in service until 2045 under the current conditions with typical general maintenance and minor rehabilitations.

Beyond the 35 year service life, major rehabilitation would be required. A life-cycle cost assessment should be conducted prior to completing any major rehabilitation on the structures. The preliminary engineering report indicated a replacement cost of approximately $5.9 million for the Bowness Road NW bridge and $3.4 million (in 2011 values) for the Shaganappi Trail NW bridge.

Reference: Shaganappi Trail South Corridor Study – Existing Bridge Conditions

FUTURE REHABILITATION

In the next 10 years there is no anticipated major maintenance required, however, typical general maintenance should include cleaning, snow clearing and regular inspections.

Below is a summary of anticipated future maintenance for both structures:

- PMA wearing surfaces have a typical life span of approximately 15 years, which corresponds to an estimated replacement year of 2027.
- A strip seal joint has a typical life span of approximately 25 years, which corresponds to an estimated replacement year of 2037
- Typical concrete patching and repair will be ongoing as necessary.

It is assumed that the rehabilitation in 2012 was completed corresponding to the record drawings. If installed correctly, the partial depth deck repair should last the remaining 35 year service life of the bridge.

CONCLUSION

The current bridge conditions are summarized based off of existing documentation on the structures, a field review was not conducted. This report should not be substituted for regular inspections. Current conditions of the bridge can change based on collision damage, environmental changes, traffic changes, or other unexpected changes. A full life-cycle cost analysis should be completed prior to initiating any major rehabilitation.

Stantec Consulting Ltd.

Cari Walker, E.I.T
Bridge Engineer in Training
Phone: (403) 716-8067
Fax: (403) 716-8129
cari.walker@stantec.com

Kris Karvinen, M.A.Sc., PMP, P.Eng.
Discipline Lead, Bridges
Phone: (403) 716-1489
Fax: (403) 716-8129
kris.karvinen@stantec.com

c. Ariss Szysky – Stantec Consulting Ltd.
Madhuri Seera – The City of Calgary

Appendix E ACTIVE TRANSPORTATION

Stantec

Memo

To:	Lei Ma, P.Eng, PTOE, PMP, M.Eng City of Calgary	From:	Ryan Martinson, M.Eng., P.Eng. Stantec Consulting Ltd.
File:	113677973	Date:	January 28, 2016

Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

This memo is a summary of existing counts for pedestrians, cyclists, and local transit routes. The counts for pedestrian, cyclist and transit usage indicate a relatively high level of activity that may warrant infrastructure upgrades when considering infrastructure changes or improvements.

EXISTING PEDESTRIAN & CYCLIST COUNTS

Existing pedestrians and cyclists volumes were obtained on Tuesday, June 16, 2015 and Wednesday, June 17, 2015 at the following intersections:

- 43 Street / 16 Avenue NW
- 42 Street NW / Bowness Road
- Shaganappi Trail / Bowness Road NW
- Montgomery View NW / Riverside Club parking lot (intersection just south of Bowness Road)
- Bowness Road / Point McKay Crescent right-in/right-out (north & south of Bowness Road)
- Bowness Road / Point Drive NW
- Bowness Road / Veterans Way NW
- Bowness Road / 37 Street NW

The counts were conducted for the AM peak period (7:00 AM - 9:00 AM) and the PM peak period (4:00 PM - 6:00 PM). The AM peak hour for the area was 7:45 – 8:45 AM and PM peak hour for the area was 4:15 – 5:15 PM. Please note that the AM and PM peak hours are based on the vehicle peak hour.

The total AM and PM peak hour pedestrians and cyclists volumes are shown in **Figure 1** and **Figure 2** respectively.

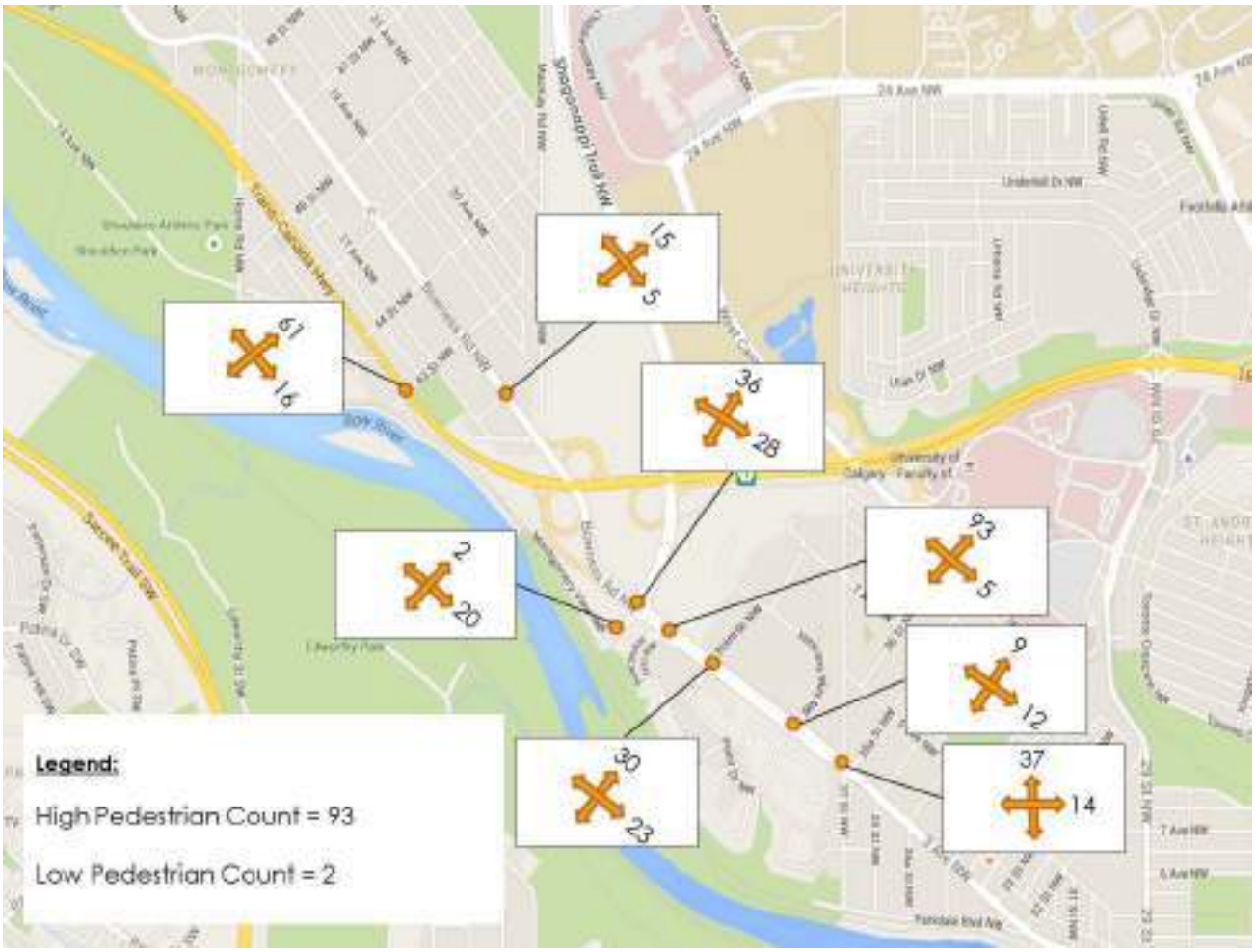
In general, significant activity was noted at the following locations:

- At the 16 Avenue / 43 Street NW intersection: Pedestrians crossing 16 Avenue NW for and cyclists crossing 43 Street NW for cyclists
- At the Bowness Road / Shaganappi Trail NW intersection: Pedestrians and cyclists crossing both Bowness Road NW and Shaganappi Trail NW
- At the Bowness Road / Point McKay Crescent NW intersection: Pedestrians crossing Bowness Road NW
- At the Bowness Road / Point Drive NW intersection: Pedestrians crossing Bowness Road NW
- At the Bowness Road / 37 Street NW intersection: Pedestrians and cyclists crossing 37 Street NW

Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

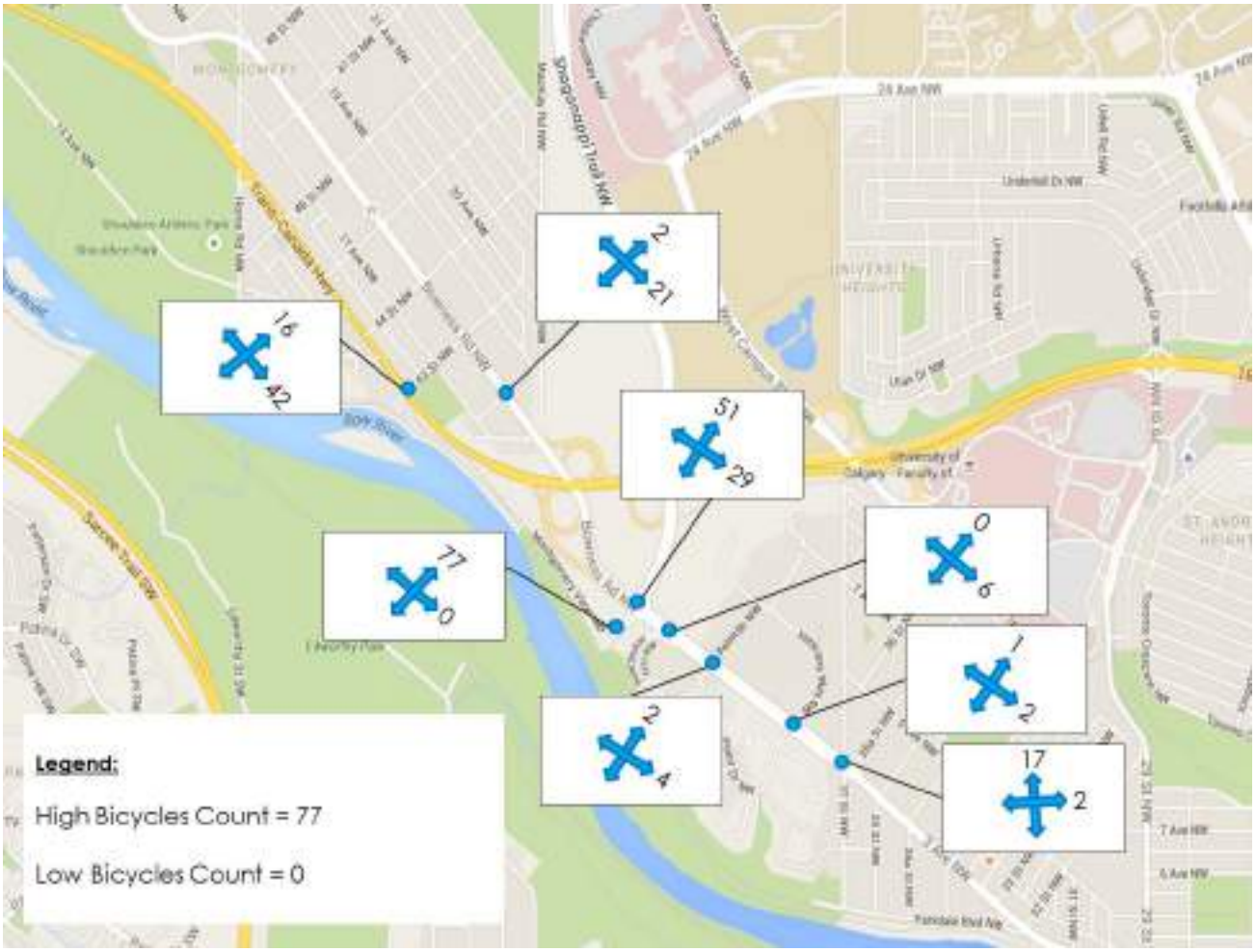
The connection to the Bow River pathway system to the south of these locations likely contributes to the amount of activity. 16 Avenue NW and Bowness Road NW have retail and mixed land uses on the north and south sides of the road that would also contribute to the high levels of active modes activity. Additionally, the bus stop locations and the pedestrian signals at the 16 Avenue / 43 Street NW intersection also contribute to the high levels of active modes activity.

Figure 1 - Pedestrian Count Summary



Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

Figure 2 - Cyclist Count Summary



TRANSIT COUNTS

Boarding and alighting data was also obtained from Calgary Transit for the four existing bus routes within the study area. These routes are:

- Route 1 – Bowness / Forest Lawn which travels straight along Bowness Road and onto 3 Avenue NW
- Route 40 – Crowfoot / North Hill which travels along 16 Avenue NW and connects onto Bowness Road towards 3 Avenue NW
- Route 91 – Lions Park / Brentwood which travels along West Campus Boulevard but does not connect to the Shaganappi Trail interchange at 16 Avenue NW
- Route 305 BRT – Bowness / 17 Avenue SE which travels straight along Bowness Road and onto 3 Avenue NW similar to Route 1

The corresponding route maps are included in **Attachment A**.

The total average weekday ridership by route is shown in **Table 1** below. The data presented below was provided by the City of Calgary. The data was collected in 2015.

Table 1 – 2015 Ridership Summary

Route	Average Weekday Ridership (people/day)
1	10,042
40	1,025
91	990
305	2,166

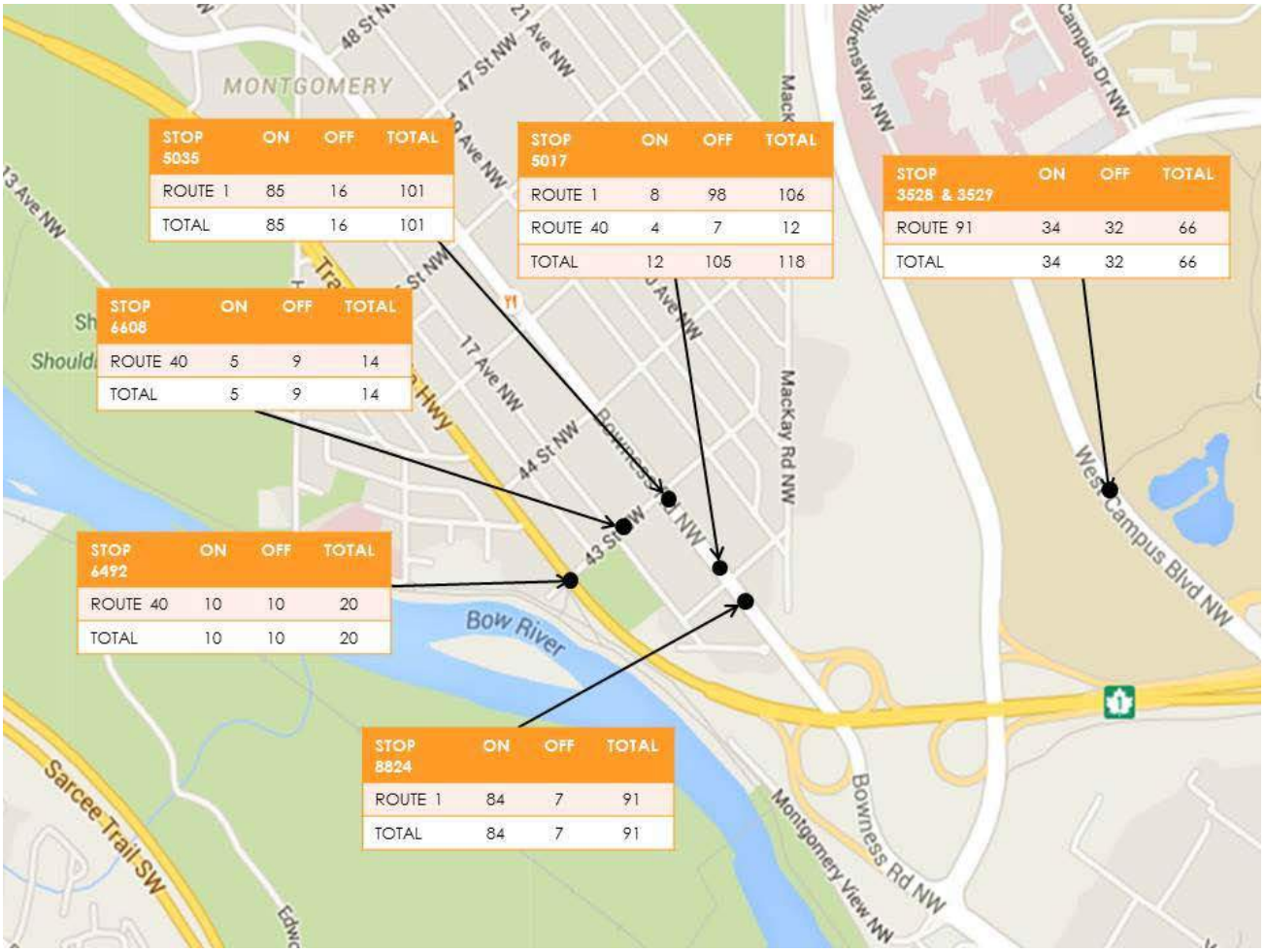
The ridership presented in Table 1 represents the ridership along each entire route from start to end, with Route 1 having the highest ridership.

Figure 3 and **Figure 4** show the average numbers of riders boarding and alighting at bus stops near the study area. As shown in Figure 3, the average peak hour ridership north of 16 Avenue NW is typically higher along Bowness Road NW. The highest recorded total is at Bowness Road NW and 42 Street NW with 118 riders boarding and alighting.

As shown in 4, the average peak hour ridership south of 16 Avenue NW is overall higher than west of Shaganappi Trail NW. The highest recorded total is at Bowness Road NW and Point Drive NW with 175 riders boarding and alighting.

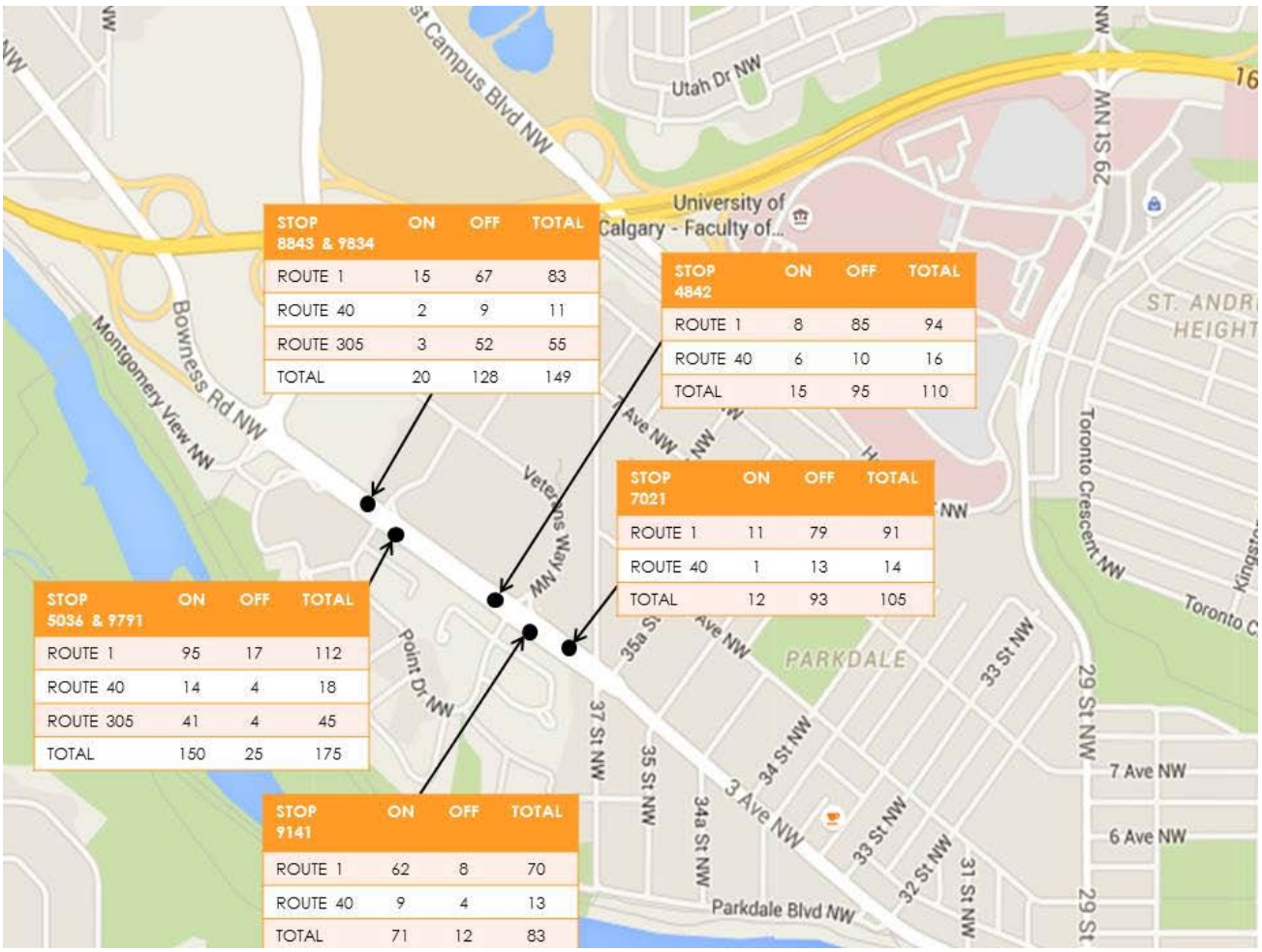
Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

Figure 3 - Average Boarding/Alighting North of 16 Avenue NW



Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

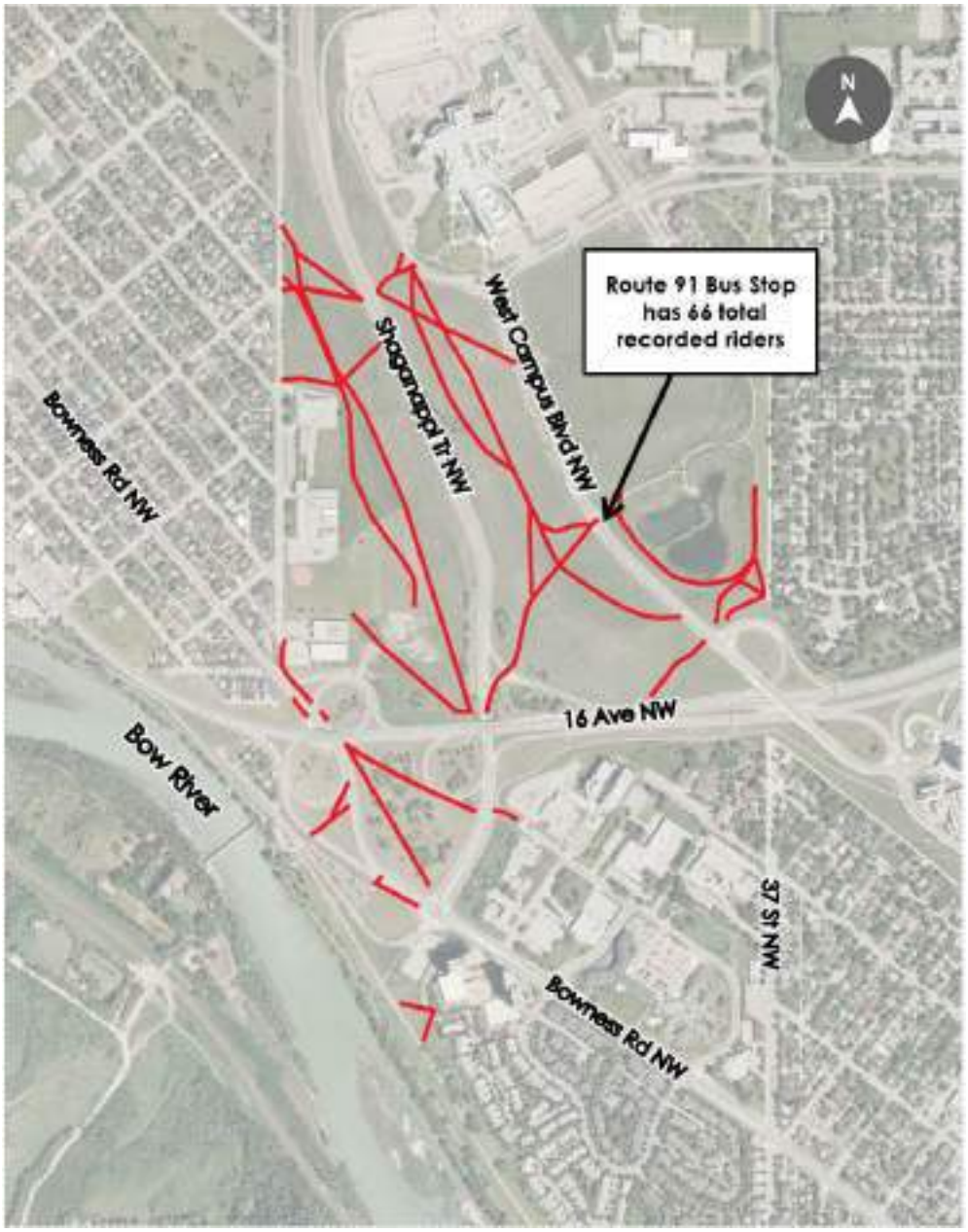
Figure 4 - Average Boarding/Alighting South of 16 Avenue NW



Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

It should also be noted that Route 91 alone has 66 total recorded riders boarding/alighting on West Campus Boulevard NW. The desire lines shown in **Figure 5** indicate that pedestrians are likely using dirt trails to access the bus stop for Route 91 on West Campus Boulevard. Having a connection from the south to the bus stop for Route 91 should be a consideration when concepts are developed

Figure 5 - Observed Desire Lines



Reference: Shaganappi Trail South Corridor Study – Active Modes & Transit Counts

CONCLUSIONS

The pedestrian and cyclist counts indicate significant activity near the Bow River Pathway and along Bowness Road NW, as well as significant transit usage along Bowness Road NW in the proximity of the study area. This indicates that any infrastructure changes/improvements of the roadways in the area should accommodate for these users and ensure that they are able to safely cross between the east and west sides of Bowness Road NW.

Please feel free to contact me should you wish to discuss our summary further.

Stantec Consulting Ltd.

Ryan Martinson, M.Eng., P.Eng.
Associate – Sustainable Transportation Specialist
403-716-8138
ryan.martinson@stantec.com

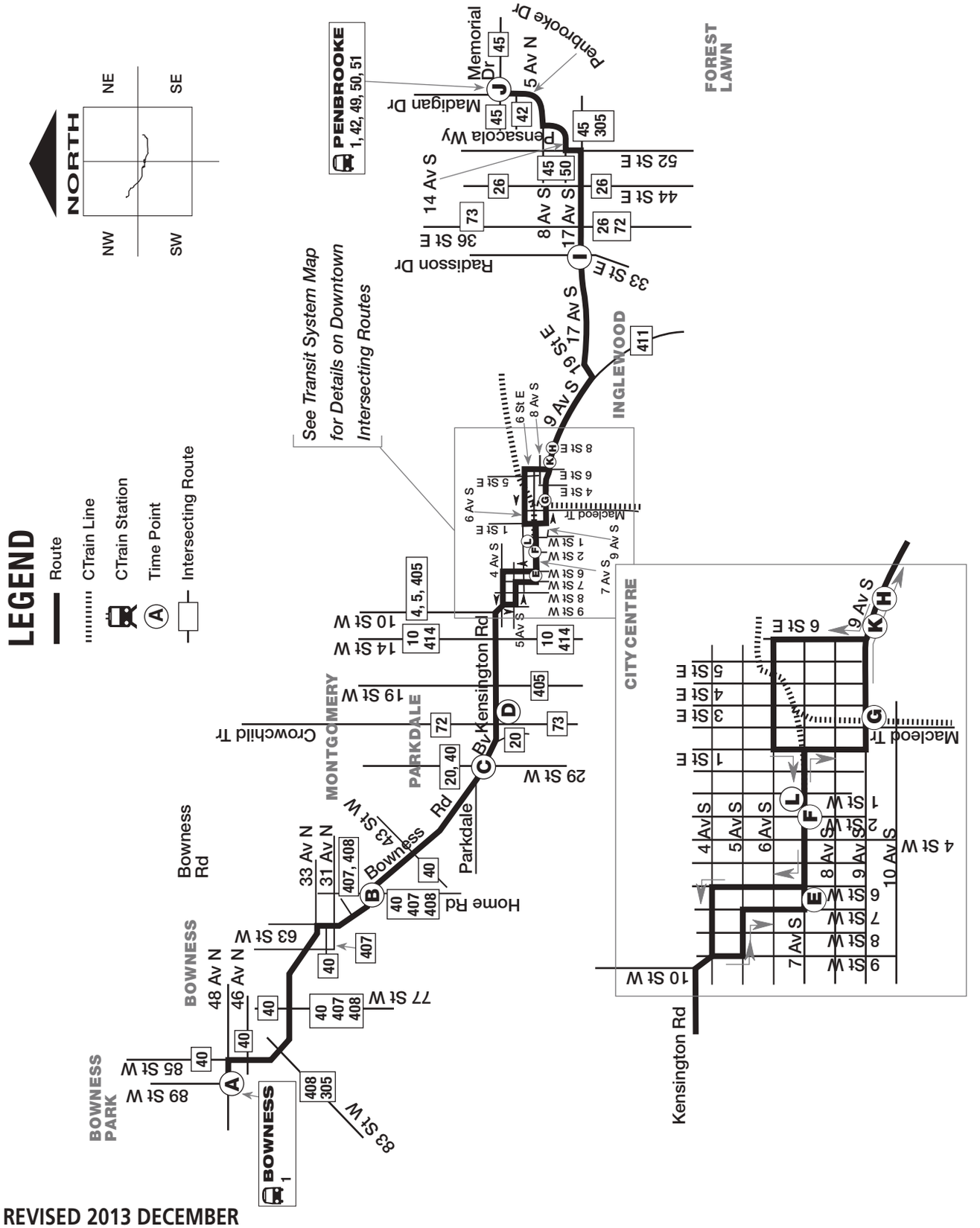
Attachment: Attachment A – Bus Route Maps

c. Madhuri Seera – The City of Calgary
Arliss Szysky – Stantec Consulting Ltd.
Japji Chahal-Virk – Stantec Consulting Ltd.

ATTACHMENT A – Bus Route Maps

Bowness/Forest Lawn

Route 1



REVISED 2013 DECEMBER

Crowfoot/North Hill

Route 40

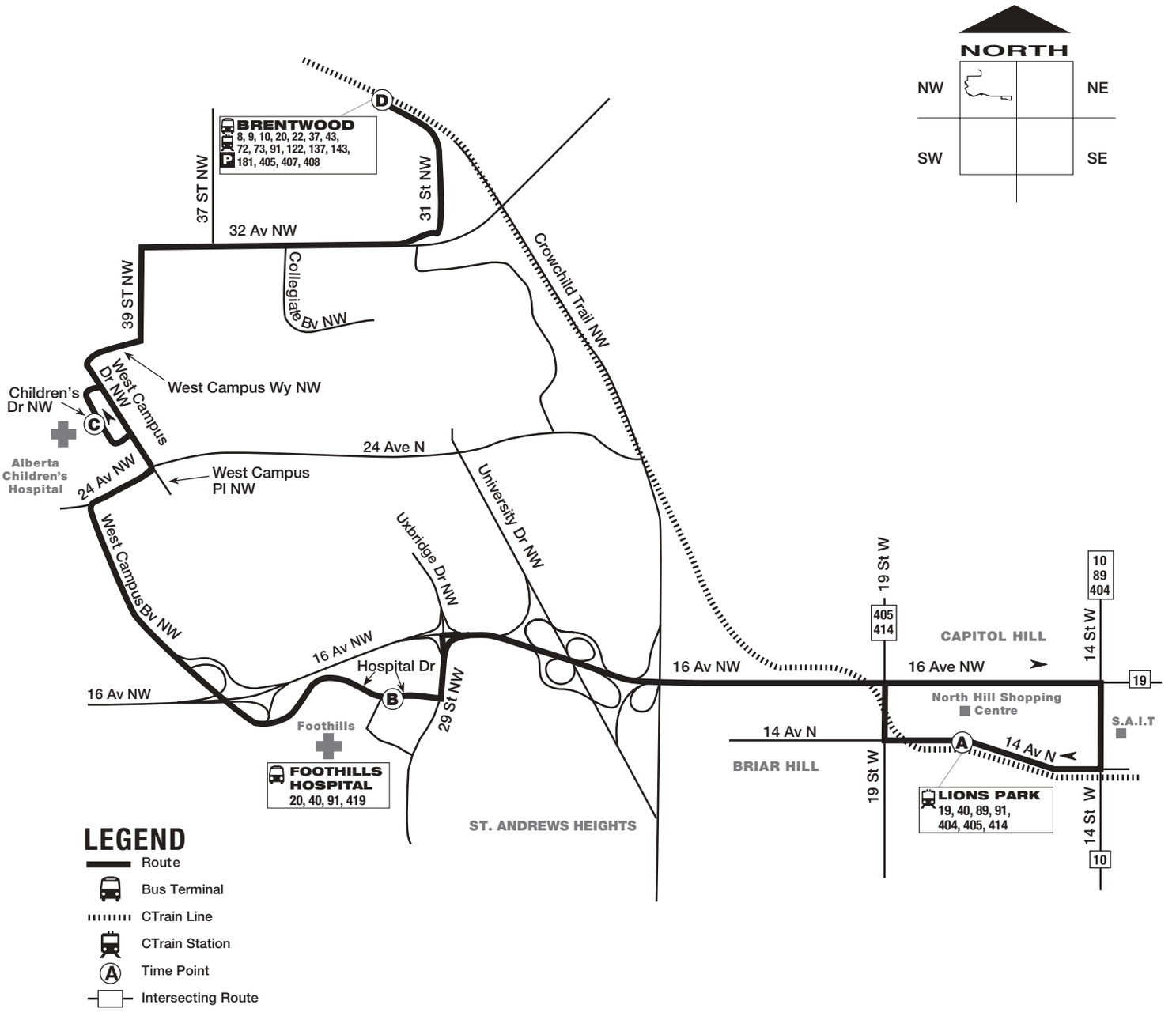
LEGEND

- Route
- CTrain Line
- CTrain Station
- Time Point
- Intersecting Route
- Park and Ride

REVISED 2014 SEPTEMBER

Lions Park/Brentwood

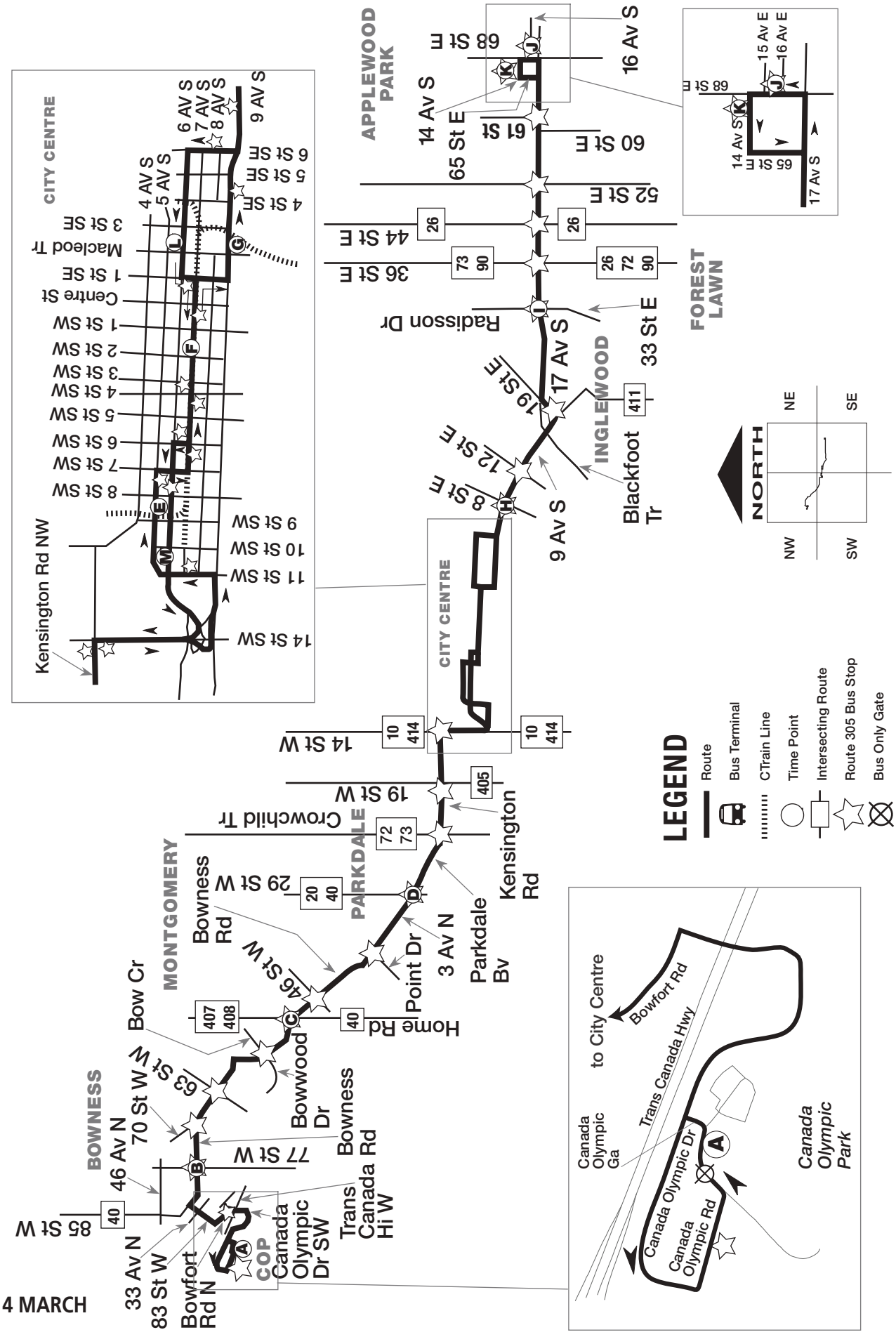
Route 91



REVISED 2014 DECEMBER

BRT Bowness/17 Ave. S.E.

Route 305



REVISED 2014 MARCH

Memo

To:	Lei Ma, P.Eng, PTOE, PMP, M.Eng. The City of Calgary	From:	Ryan Martinson, M.Eng., P.Eng. Stantec Consulting Ltd.
File:	113677973	Date:	January 28, 2016

Reference: Shaganappi Trail South Corridor Study - Existing Active Modes Summary

This memo is a summary of the existing pedestrian and cycling network in the vicinity of the Shaganappi Trail South Corridor Study area. The study area is focused on the interchange at 16 Avenue NW at Bowness Road NW and Shaganappi Trail NW as shown in **Figure 1** below. This active modes summary identifies the existing active transportation network and identifies areas of strong origins and destinations for pedestrians and cyclists in addition to barriers in the network.

Figure 1 - Shaganappi Trail South Corridor Study Area

ACTIVE TRANSPORTATION NETWORK

Since the study is located in an area of established communities, the active transportation network connects across several areas. Bicycle lanes and signed routes connect to the regional pathway and connect the communities north of the river including Montgomery, Parkdale, Point McKay, and St. Andrews Heights. South of the river the regional pathway connects through Edworthy Park to bicycle lanes and signed routes and connects the communities of Wildwood and Spruce Cliff. These communities are divided by the Bow River but are all connected through the regional pathway with the Harry Boothman bridge over the river south of 16 Avenue NW near Montgomery View NW.

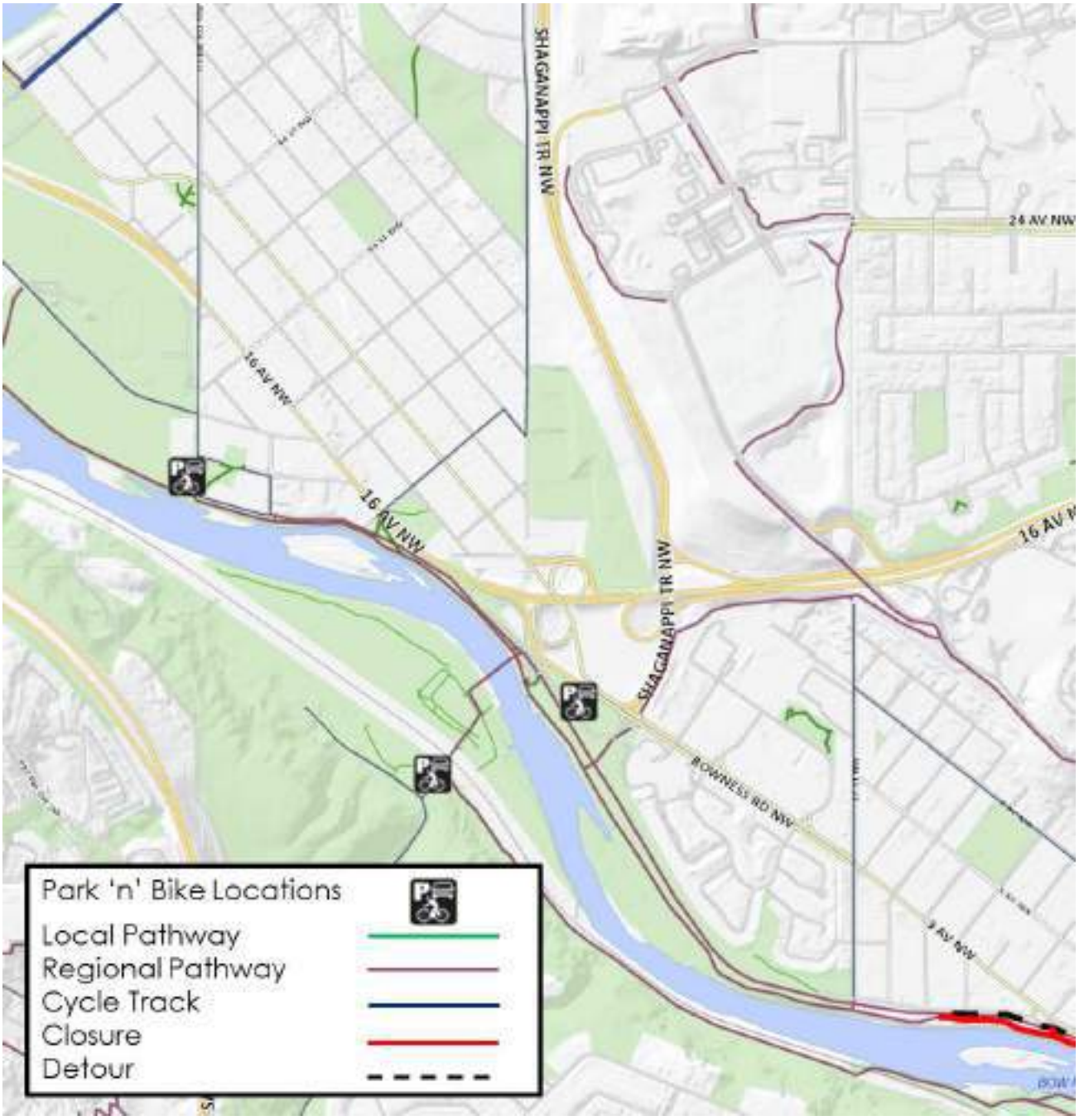
Some of the active transportation facilities that connect these communities include:

- Regional Pathway
- Signed bicycle routes that are shared with automobiles
- Local pathways

The locations of these facilities that form the active transportation network are shown on the City of Calgary Pathways and Bikeways Map. A snapshot of this map is shown in **Figure 2** and displays the facilities in and around our study area. The Park 'n' Bike locations, the multiple pathways in the area, and the proximity to Edworthy Park draw users to the area and contribute to the level of activity.

Reference: Shaganappi Trail South Corridor Study - Existing Active Modes Summary

Figure 2 – Existing Active Modes Network



Source: City of Calgary Pathways and Bikeways Map

Reference: Shaganappi Trail South Corridor Study - Existing Active Modes Summary

The importance of the regional pathway connection across the Bow River is shown in the Strava heat map in **Figure 3**. Strava heat maps show the intensity of pedestrians and cyclists by color, with blue representing lower volumes of users and red representing higher volumes of users. This map shows that main routes near our study area include the pedestrian bridge over the Bow River, the Bow River pathway on the north side of the river, and Bowness Road NW west of Shaganappi Trail NW. The heat map of the existing network shows that large roadways (including Shaganappi Trail NW and 16 Avenue NW) are physical barriers as the level of use is lower north of the study area.

Figure 3 - Strava Heat Map

Reference: Shaganappi Trail South Corridor Study - Existing Active Modes Summary

ORIGINS AND DESTINATIONS

The land within the study area was assessed more closely to identify additional desire lines and missing links in the existing network. Desire lines were based on observations made of worn paths through the grassed areas. **Figure 4** shows these observed worn paths, or desire lines that exist in the study area.

Part of what forms the desire lines shown in Figure 4 is the presence of origins and destinations within the study area. Some of the destinations in these communities include the Shouldice Athletic Park, commercial areas along 16 Avenue NW and Bowness Road NW, Alberta Children's Hospital and the Foothills Hospital.

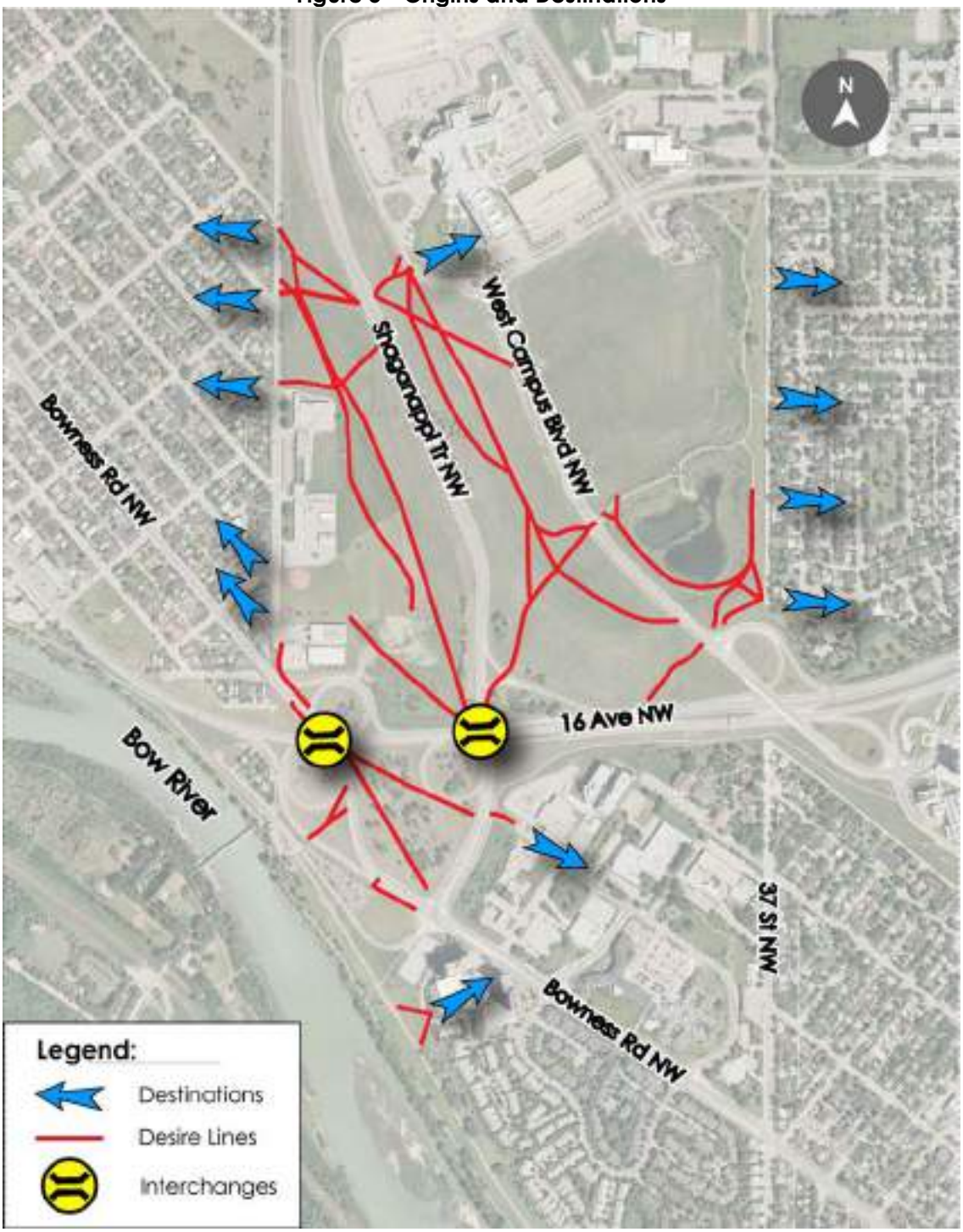
Figure 4 - Observed Desire Lines

As shown in the Figure 4, the desire lines are a result of the physical barriers present in the area such as the roadways, interchanges and the escarpment. These physical barriers are preventing people from connecting to communities more directly.

Figure 5 shows how the observed desire lines originate at the edges of the communities and, in many cases, track towards the interchanges. The interchanges provide opportunities to cross 16 Avenue NW via sidewalks running along Bowness Road NW and Shaganappi Trail NW underneath the bridges; however, these sidewalks do not connect to sidewalk links that lead into the communities.

Reference: Shaganappi Trail South Corridor Study - Existing Active Modes Summary

Figure 5 - Origins and Destinations



ACTIVE TRANSPORTATION BARRIERS

The previous figures indicate that there are physical barriers in the existing active transportation network such as roadways, the escarpment, and interchanges. The Strava heat map shows activity along the Bow River Pathway and Bowness Road NW, yet almost no use within the rest of the study area. This lack of use is thought to be due to these physical barriers within the study area as follows:

- **Roadways -** Arterial streets in the area include Shaganappi Trail NW and West Campus Boulevard NW. 16 Avenue NW is classified as a skeletal road east of 43 Street NW and an urban boulevard west of 43 Street NW. Bowness Road NW is classified as a parkway south of 16 Avenue NW and as a neighborhood boulevard north of 16 Avenue NW. These roads border the communities of Montgomery, Parkdale, St. Andrews Heights, and the University of Calgary. With speeds of up to 70 km/hr, high automobile volumes, a lack of designated crossings for pedestrians, and limited sidewalks, these roads are difficult for pedestrians and cyclists to navigate.
- **Escarpment -** The escarpment between Shaganappi Trail NW and West Campus Boulevard NW are difficult for people to travel due to the grade and partial fencing along the east side of Shaganappi Trail NW.
- **Interchanges -** Bowness Road NW and Shaganappi Trail NW both have sidewalks directly below the 16 Avenue NW bridges but are missing sidewalk links into the communities. On the upper level of the bridge on 16 Avenue NW there are no pedestrian connections. However, as 16 Avenue NW transitions into the community of Montgomery there are sidewalks on both sides. The lack of sidewalk continuity along the bridges makes it difficult for pedestrians and cyclists to connect to destinations west of Bowness Road NW. It should be noted that this location is also a concern for cyclists. Due to the lack of bicycle lanes on Bowness Road NW and Shaganappi Trail NW beneath the 16 Avenue NW bridges, cyclists are left to share the road with vehicles on an uncomfortable section of roadway.

It should be noted that these physical barriers were determined based on the usage that was observed in the area via worn paths, Strava heat map and pedestrian/cyclist counts. As such, perceived barriers that are present which are currently preventing people from making trips via walking or biking have not been explicitly identified. However, using experience from previous transportation studies, it is possible that these perceived barriers could include Safety, Security, Time Constraints, Distance (e.g. availability of destinations in close proximity), and Convenience (e.g. access to comfortable facilities). The future designs of the study area should aim to mitigate these issues, as well as the physical barriers outlined above.

OPPORTUNITIES & CONCLUSIONS

The desire lines that have been observed show that people are traveling between the communities that border the Shaganappi Trail NW / 16 Avenue NW interchange. This indicates that there is demand for connection between the Bow River pathway and the communities of Montgomery, Parkdale, the University of Calgary, and St. Andrew's Heights. Creating connections that respond to the existing desire lines in this area is recommended as concepts are further developed.

Reference: Shaganappi Trail South Corridor Study - Existing Active Modes Summary

Please feel free to contact me should you wish to discuss our summary further.

STANTEC CONSULTING LTD.

Ryan Martinson, M.Eng., P.Eng.
Associate – Sustainable Transportation Specialist
403-716-8138
ryan.martinson@stantec.com

Attachment: Attachment A – Bus Route Maps

c. Madhuri Seera – The City of Calgary
Arliss Szysky – Stantec Consulting Ltd.
Japji Chahal-Virk – Stantec Consulting Ltd.

Appendix F EXISTING UTILITIES

Stantec

Memo

To:	Lei Ma, P.Eng. City of Calgary, Network Planning	From:	Japji Chahal-Virk, P.Eng. Stantec
File:	113677973	Date:	November 5, 2015

Reference: South Shaganappi Corridor Study - Water Pump Location Review

We have reviewed the proposed site locations for the new Shaganappi Pump Station provided by The City of Calgary, Water Resources group (the figure is attached to this memo). Our review is solely from a transportation perspective and how each location can potentially affect the South Shaganappi Corridor Study. Table 1 summarizes our comments on each of the locations based on the plan provided.

Table 1 – Proposed Site Locations

Location	Property Owner	Comments
1	Alberta Infrastructure	Locations 1 and 2 would be good options as it can easily tie into the existing feeder main. In addition, this location will have little impact on our study because there is low probability that our study will be affecting these lands.
2	Private Owner	
3	City of Calgary	Location 3 will have significant impact as it is located right within our study area. Placement of the water pump at this location will constrain the concept development of the corridor.
4	City of Calgary	We understand that this location may be a good option as it can easily tie into the existing feeder main. However location 4 is adjacent to the existing park and bike facility. It is our understanding that Parks is looking to expand the parking lot into the open space located east of the existing parking lot. Since this parking lot is well used, there is demand to expand the parking lot. Expanding the parking lot into this area would be considered an interim solution. The preferred future concept will accommodate a park and bike facility however it may not be located in the existing location. If the water pump is placed in this location, it will constrain the concept development. In addition, the water pump will occupy land that has significant development potential as it is prime land along the riverfront.
5	City of Calgary	We understand that Location 5 may be a good option as it can easily tie into the existing feeder main. However, similar to Location 4, Location 5 will also occupy land that has significant development potential since it is prime land along the riverfront. This location will also impact the existing Riverside parking lot.
6	City of Calgary	This location is within our study area and may constrain concept development. It is difficult to quantify the impacts at

Reference: South Shaganappi Corridor Study - Water Pump Location Review

		this time.
7	University of Calgary	No specific comment for this location, as it is outside of our study area.

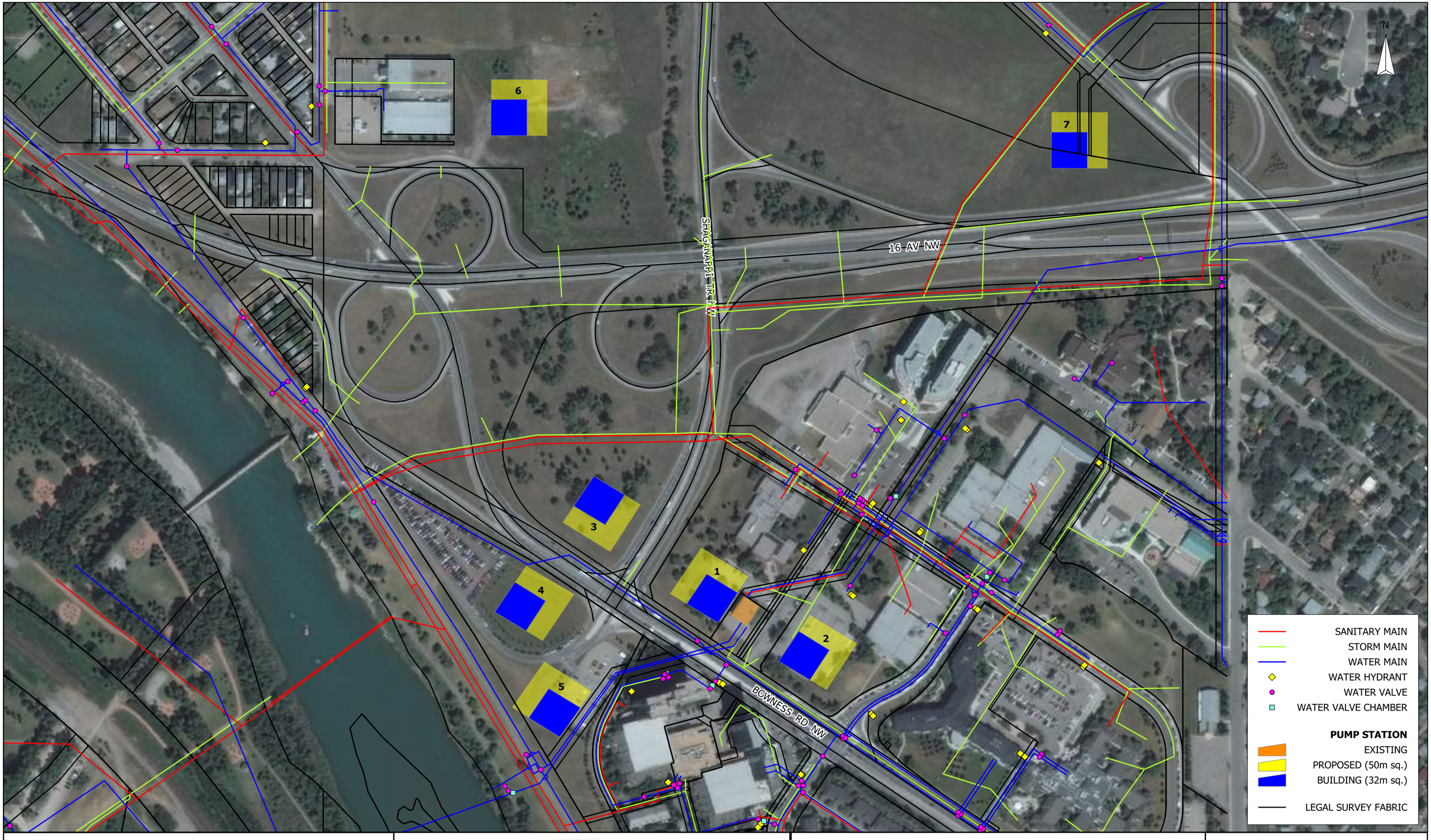
In summary, Locations 1, 2, and 7 will have little impact on the South Shaganappi Trail Corridor Study. It is our understanding that Water Resources and Associated Engineering will be evaluating the proposed water pump locations from multiple perspectives. We highly suggest our involvement in this evaluation process and stress the importance of maintaining flexibility to the areas within our study boundary (i.e. locations 3, 4, 5 and possibly 6) in order to come up with the most desirable solution from a transportation perspective.

Stantec Consulting Ltd.

Japji Chahal-Virk, P.Eng.
Transportation Engineer
Phone: (403) 569-5380
Fax: (403) 716-8129
Japji.Chahal-Virk@stantec.com

Attachment: New Shaganappi Pump Station Proposed Site Locations Figure

c. A. Szysky - Stantec



Associated Engineering

New Shaganappi Pump Station
Proposed Site Locations Figure

PROJECT No: 2015-3533

DATE: 14 OCT 2015

SCALE: NTS

Appendix G SHORT TERM IDEAS EVALUATED

Idea: Construct a new ramp and acceleration lane from southbound Shaganappi Trail to eastbound 16 Avenue

Issue Identified

Idea Evaluated

Input We Heard

- Would a speed limit reduction and better signage reduce collisions?
- Concern that idea requires a lot of space and the removal of a significant number of trees.

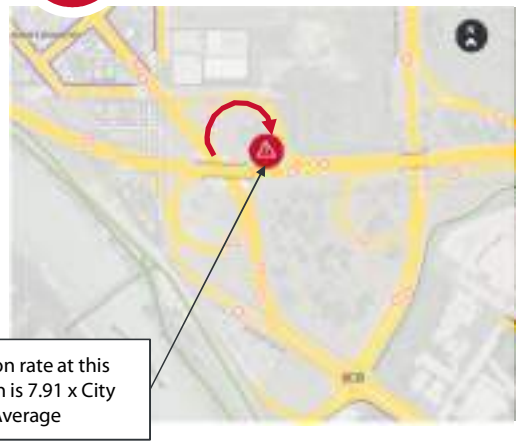
Technical Analysis

- This addresses the most significant collision history issue within the study area.
- Trees would need to be removed for construction (Future study to review and minimize impacts).

Idea moves forward to Phase 3

Idea: New traffic signal to control northbound Bowness Road to westbound 16 Avenue

Issue Identified



Idea Evaluated

Input We Heard

- Concern that the traffic signal will create congestion.
- Consider placing dual lanes on the loop ramp.

Technical Analysis

- Idea would minimize collisions at this location.
- A dual lane entrance ramp is feasible, and will improve the operation of this intersection beyond the operation offered by a single lane signalization.
- A two phase signal would control the westbound movement on 16 Avenue and the on-ramp movement from Bowness Road. The eastbound movement on 16 Avenue would remain free flowing.

Idea moves forward to Phase 3

Idea: Introduce left turn from southbound Shaganappi Trail to westbound 16 Avenue

Issue Identified

Create a more direct movement for SB Shaganappi to WB 16 Avenue.

Idea Evaluated

New signal would better provide access

Input We Heard

- Concerns with increased traffic delays and shortcutting through Montgomery.

Technical Analysis

- Impacts to operations of all movements at this intersection.

Idea not moving forward

Idea: Close the existing loop ramp from southbound Bowness Road to eastbound 16 Avenue

Issue Identified

Collision rate at this location is 7.86 x City Average

Idea Evaluated

Close existing ramp

Input We Heard

- Concerns that it will impact the operation of Shaganappi Trail and Bowness Road NW.

Technical Analysis

- Based on the detailed safety assessment completed , the benefit to cost ratio of this change is more moderate when considering both the increased collisions elsewhere and cost for construction.
- With no rerouting of traffic on 43 Street NW, there are impacts to the operation of Bowness Road and Shaganappi Trail (with and without the implementation of dual eastbound left turn lanes).

Idea not moving forward

Idea: New traffic signal at 43 Street and 16 Avenue to provide additional capacity for people who drive

Issue Identified

Increased traffic volume anticipated with loop ramp closure

Collision rate at this location is 7.86 x City Average

Idea Evaluated

Introduce a signalized intersection

Input We Heard

- Strong opposition due to the additional traffic it may create on a residential street.
- Would be supportive of a traffic control signal for people who walk, and/or to end 43 Street as a cul de sac.

Technical Analysis

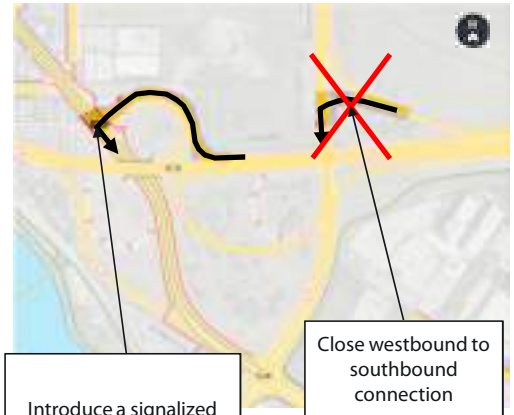
- Additional traffic on 43 Street will introduce new safety concerns at 16 Avenue and along 43 Street.
- Impacts to traffic operation on 16 Avenue.

Idea not moving forward

Idea: Close existing connection from westbound 16 Avenue to southbound Shaganappi Trail and replace with a new traffic signal at Bowness Road and the 16 Avenue off ramp.

Issue Identified

Idea Evaluated



Input We Heard

- Addressing this issue would be costly and has limited benefits, as people who drive are able to access westbound 16 Avenue from 29 Street.

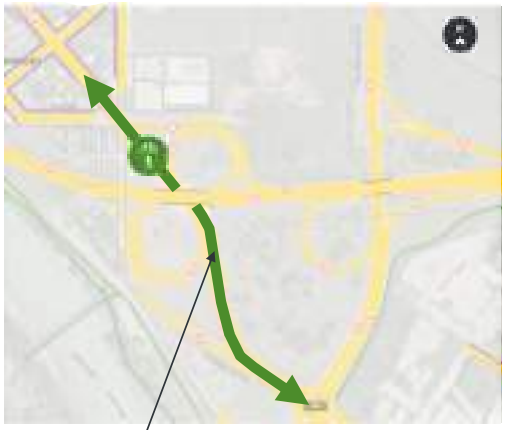
Technical Analysis

- Does not address an existing collision history issue
- Alternative access provided at 29 Street

Idea not moving forward

Idea: Introduce connectivity enhancements along Bowness Road for people who walk and bicycle

Issue Identified



There is no existing connectivity for people who walk and bicycle on Bowness Road

Idea Evaluated

Input We Heard

- Better connections for people who walk and bike and better access to key destinations is valued.

Technical Analysis

- Marked bicycle lanes and/or separated bicycle lanes are not feasible to introduce under the 16 Avenue Bridge on Bowness Road.
- Identification that the north side curb of Bowness Road requires replacement.
- Assessment of motor vehicle travel lane requirements through the interchange and up to 43 Street.
- Review of desire lines for people who walk and bike in this area.

Idea moves forward to Phase 3

Idea: Reduce the speed limit on 16 Avenue within the study area

Issue Identified

High travel speeds amplify collision history concerns

Idea Evaluated

Reduce speed limit on 16 Avenue

Input We Heard

- A reduced speed limit on 16 Avenue will help address collision history issues.
- Reduced travel speeds entering into Montgomery are desired.

Technical Analysis

- A speed limit reduction by itself is not sufficient to eliminate collision history concerns.
- A broader review outside the study area is necessary to confirm the feasibility of speed limit changes.

Idea moves forward to future study

Idea: Realign the ramp from eastbound 16 Avenue to southbound Bowness Road

Issue Identified

Idea Evaluated

Input We Heard

- Accessing NB Shaganappi Trail is difficult from EB 16 Avenue due to the short weaving distance from the ramp.
- This encourages more people to take Home Road instead of Shaganappi Trail

Technical Analysis

- Feasibility assessment for realignment of ramp.
- Traffic analysis for reduced ramp entry speed onto Bowness Road.
- Assessment of impacts to Bus Only Lane.

Idea moves forward to Phase 3

Idea: Introduce connectivity enhancements along 43 Street for people who walk and bicycle

Issue Identified

Travel along 43 Street and across 16 Avenue is uncomfortable for people who walk and bicycle.

Idea Evaluated

Three (3) different options to improve travel Along 43 Street for people who walk and bike

Input We Heard

- An improved connection along 43 Street is needed to enhance comfort for people who walk and bike.
- A pedestrian overpass is desired at this location.
- 43 Street is an important link between the river and Bowness Road.
- Consider an option similar to that at 7 Street and Memorial Drive NW.

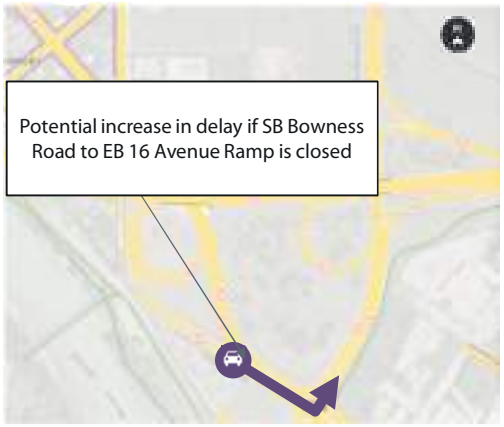
Technical Analysis

- Review feasibility of different options discussed.
- Identification of impacts to other modes of transportation for each option.

Idea moves forward to Phase 3

Idea: Introduce a dual left turn lane from eastbound Bowness Road to northbound Shaganappi Trail

Issue Identified



Idea Evaluated

Input We Heard

- A second eastbound left turn lane at Bowness Road and Shaganappi Trail should be considered, especially if the SB Bowness Road to EB 16 Avenue ramp is being closed.

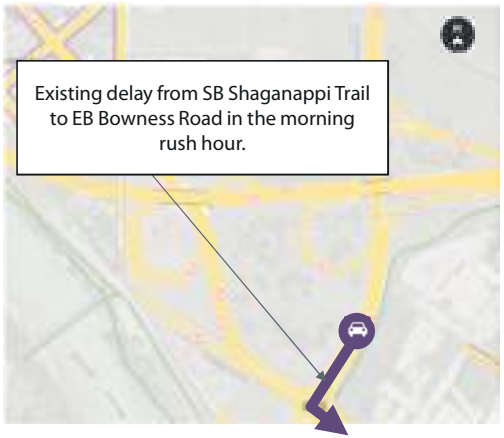
Technical Analysis

- Traffic analysis of introducing a second left turn lane (with and without closure of SB Bowness Road to EB 16 Avenue ramp).
- Feasibility assessment of the work required indicated a high cost and the potential need to acquire property because it will be necessary to widen Bowness Road between Shaganappi Trail and Point McKay Drive.

Idea not moving forward

Idea: Close the south leg of the intersection and provide parking lot/residential access elsewhere

Issue Identified



Idea Evaluated

Input We Heard

- Closing the south leg of this intersection could potentially improve traffic flow during peak times.

Technical Analysis

- Traffic analysis indicated that this change does not result in improvement to traffic flow unless the east side crosswalk is closed. This is an important connection for access to the Foothills Medical Centre, and is not recommended for closure.
- Rerouting access to Point McKay Towers and the Edworthy Park parking lot would introduce additional delays elsewhere.

Idea not moving forward

Idea: Introduce a new signal at 16 Avenue and 46 Street

Issue Identified

Idea Evaluated

Input We Heard

- 46 Street was identified as an area of opportunity for redevelopment through the Main Streets Project.
- Additional traffic on 46 Street may be more acceptable.

Technical Analysis

- A detailed review of this intersection was not completed, as a broader understanding of other potential changes on 16 Avenue is necessary.
- Assessment of short and long-term options as part of 16 Avenue Corridor Study recommended.

Idea moves forward to future study

Idea: Investigate enhancements to traffic signal operations east of Shaganappi Trail on Bowness Road

Issue Identified

Idea Evaluated

Input We Heard

- The intersection of Bowness Road and Shaganappi Trail seems to operate poorly during the morning rush hour because the signals are not well coordinated further to the east.

Technical Analysis

- Confirmation that signals are already optimized with signal cycle lengths and coordination during the rush hour periods.
- Identification that eastbound left turns are creating significant delays at 37 Street during the morning rush hour.
- Confirmation that an eastbound left turn bay will improve traffic flow.
- Planned for construction in 2017.

Idea moves forward to Phase 3

Idea: Introduce a new ramp for people driving from northbound Bowness Road to westbound 16 Avenue

Issue Identified

Idea Evaluated

Input We Heard

- Since a signal is being introduced, consider building a new ramp for NB to WB traffic.

Technical Analysis

- Traffic analysis indicated that this modification would result in significantly increased delays for people who drive in all directions.

Idea not moving forward

Appendix H SHORT TERM OPINION OF PROBABLE COST

Opinion of Probable Cost – Construct a new ramp and acceleration lane from southbound Shaganappi Trail NW to eastbound 16 Avenue NW

							Reference
Roadway							
Interchange							
ACP	t	939	$	125.00	$	117,400.00	
GBC	t	1805	$	30.00	$	54,200.00	
C&G	m	683	$	100.00	$	68,300.00	
Earthworks							
Interchange							
Import (1.2 Fill Factor)	m3	19224	$	20.00	$	384,480.00	
Other							
Landscaping	LS	1	$	3,530.00	$	3,530.00	
Removals	LS	1	$	30,201.75	$	30,201.75	
Erosion and Sediment	LS	1	$	12,500.00	$	12,500.00	

Subtotal	$	670,611.75
Contingency	$	201,183.53
Engineering / Testing	$	104,600.00
City Admin and Traffic Control	$	183,077.01
Total	**$**	**1,159,472.28**

Does not include cost of land acquisition

Completed by:	MAB & AM 2017-05-24	
Contingency:	30%	
Engineering / Testing:	12%	*Bowfort Interchange Preliminary OPC*
City Administration and Traffic Control:	21%	*Bowfort Interchange Preliminary OPC*

Opinion of Probable Cost – Install a new traffic signal and dual lane entrance ramp to control northbound Bowness Road NW to westbound 16 Avenue NW

Roadway						*Reference*
Interchange						
ACP	t	209	$	125.00	$ 26,100.00	
GBC	t	395	$	30.00	$ 11,900.00	
C&G	m	383	$	100.00	$ 38,300.00	
Other						
Landscaping	LS	1	$	3,530.00	$ 3,530.00	
Removals	LS	1	$	30,201.75	$ 30,201.75	
Erosion and Sediment	LS	1	$	12,500.00	$ 12,500.00	
Traffic Signal	ea	1	$	250,000.00	$ 250,000.00	
				Subtotal	$ 372,531.75	
				Contingency	$ 111,759.53	
				Engineering / Testing	$ 58,100.00	
				City Admin and Traffic Control	$ 101,701.17	
				Total	**$ 644,092.44**	

Does not include cost of land acquisition

Completed by:	MAB & AM 2017-05-24	
Contingency:	30%	
Engineering / Testing:	12%	*Bowfort Interchange Preliminary OPC*
City Administration and Traffic Control:	21%	*Bowfort Interchange Preliminary OPC*

Opinion of Probable Cost – Introduce connectivity enhancements along Bowness Road NW for people who walk and bicycle

							Reference
Roadway							
C&G	m	702	$	100.00	$	70,200.00	
Concrete Flatworks	LS	1	$	246,552.00	$	246,600.00	
Pathway	m2	3243	$	40.00	$	129,720.00	
Retaining Walls							
West Bowness Road	LS	1	$	125,000.00	$	125,000.00	
Other							
Shallow Utilities	LS	1	$	500,000.00	$	300,000.00	
Landscaping	LS	1	$	3,530.00	$	3,530.00	
Removals	LS	1	$	30,201.75	$	30,201.75	
Erosion and Sediment	LS	1	$	12,500.00	$	12,500.00	

Subtotal	$	917,751.75
Contingency	$	275,325.53
Engineering / Testing	$	143,200.00
City Admin and Traffic Control	$	250,546.23
Total	**$**	**1,586,823.50**

Does not include cost of land acquisition

Completed by:	MAB & AM 2017-05-24	
Contingency:	30%	
Engineering / Testing:	12%	*Bowfort Interchange Preliminary OPC*
City Administration and Traffic Control:	21%	*Bowfort Interchange Preliminary OPC*

Opinion of Probable Cost – Realign the ramp from eastbound 16 Avenue NW to southbound Bowness Road NW

							Reference
Roadway							
Interchange							
ACP	t	540	$	125.00	$	67,500.00	
GBC	t	1035	$	30.00	$	31,100.00	
C&G	m	276	$	100.00	$	27,600.00	
Earthworks							
Interchange							
Import (1.2 Fill Factor)	m3	2376	$	20.00	$	47,520.00	
Other							
Landscaping	LS	1	$	3,530.00	$	3,530.00	
Removals	LS	1	$	30,201.75	$	30,201.75	
Erosion and Sediment	LS	1	$	12,500.00	$	12,500.00	
				Subtotal	$	219,951.75	
				Contingency	$	65,985.53	
				Engineering / Testing	$	34,300.00	
				City Admin and Traffic Control	$	60,046.83	
				Total	**$**	**380,284.10**	

Does not include cost of land acquisition

Completed by:	MAB & AM 2017-05-24
Contingency:	30%
Engineering / Testing:	12%
City Administration and Traffic Control:	21%

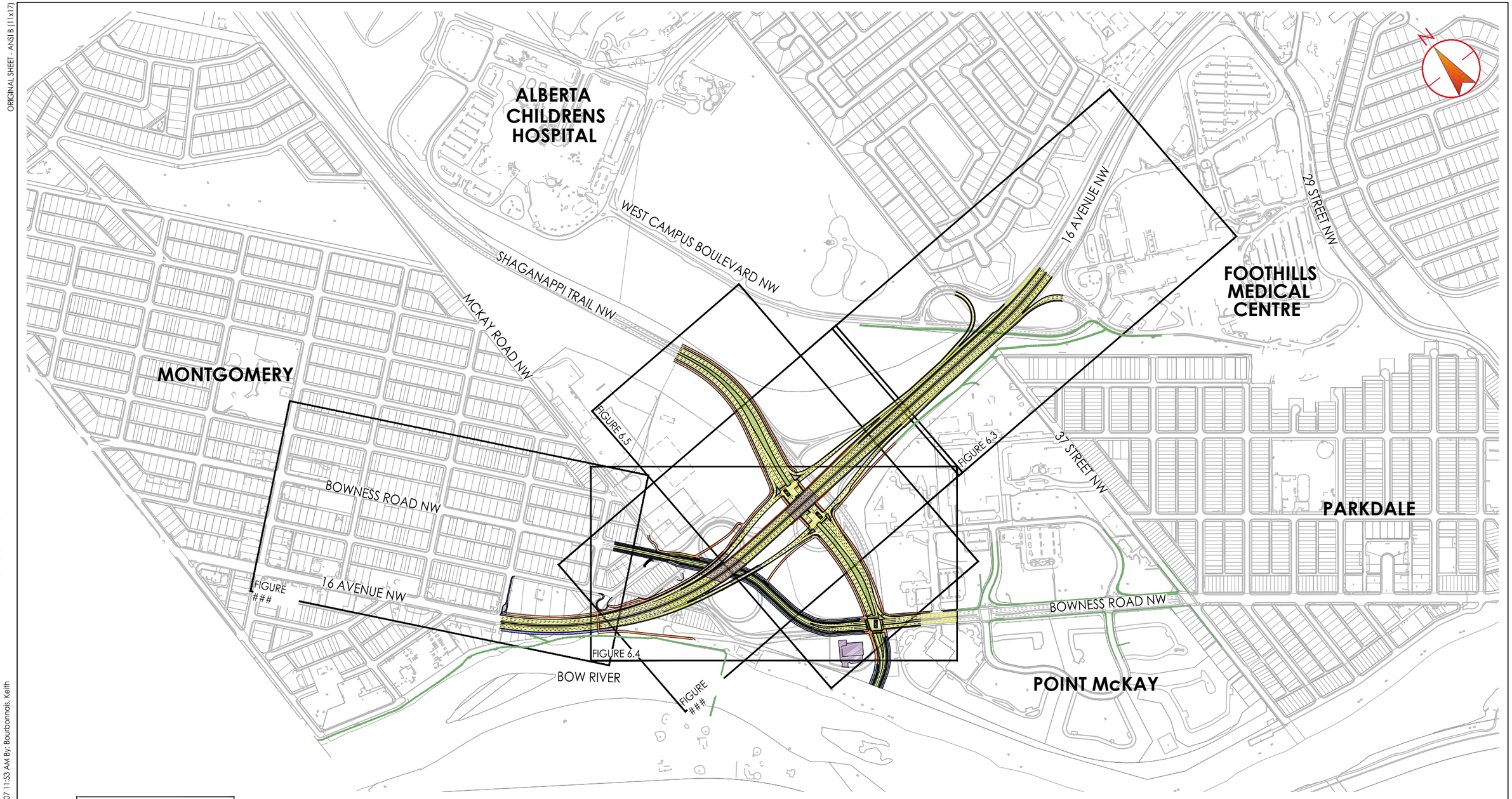
Appendix I MULTIPLE ACCOUNT EVALUATION – SUMMARY OF RESULTS

South Shaganappi Study
Draft Long Term Concept Evaluation

Account		Project Objective	ID #	Evaluation Criteria	Expanded Description	Representative Metric	Do Nothing Option	At-Grade Intersections	East-West Couplet	Hybrid	Tight Urban Diamond	Notes/Comments
1	**Safety**	Address safety for those who use and/or live by the corridor	1.1	Conflict Points	The proposed concept reduces the number and/or severity of conflict points between vehicles.	Number of conflicts	1	1	2	4	5	The Tight Urban Diamond Concept ranks the highest overall as it provides for grade separated junctions of both Shaganappi Trail and Bowness Road at 16 Avenue.
			1.2	Pedestrian and Bicycle Exposure	Minimizes conflicts between pedestrians, bicycles, and vehicles.	Number of lane crossings.	1	2	1	3	4	The Tight Urban Diamond Concept ranks the highest in this evaluation because it has the fewest number of lane crossings at intersections compared to the other options.
Safety TOTAL							2	3	3	7	9	
											✓	
2	**Access and Connectivity**	Address accessibility across and throughout the corridor, reconnecting adjacent communities.	2.1	Community Access	Access to communities, institutions, and adjacent businesses in the study area are maintained or enhanced.	Number of reduced or improved accesses between the three roadways	2	4	1	2	3	The At-Grade Intersections Concept ranks the highest in this as it has direct connectivity to all major roads connected within the study area through the signalized intersections. Therefore, all movements can be made by traveling through a maximum of two at-grade intersections.
			2.2	Remnant Parcel Access	Opportunity to provide satisfactory safe access between remnant land parcel and existing communities.	Qualitative	1	4	2	5	3	The Hybrid Concept ranks the highest as it provides the most flexibility for direct access to the remnant parcels with multiple configurations feasible for internal site layout and connectivity.
Access and Connectivity TOTAL							3	8	3	7	6	
								✓				
3	**Multi-Modal Transportation**	Accommodate all modes of transportation including walking, cycling, HOV (high occupancy vehicles), and transit.	3.2	Network of Routes	A network of high quality connected bicycle routes is provided within the study area to minimize additional travel time for bicycle users.	Density of network connections.	1	4	4	3	3	Both the At-Grade Intersections Concept and the East-West Couplet Concept perform highest under this criteria. This is due to the additional crossing opportunities provided for people who walk and bicycle, offering a greater level of route directness to access the communities and destinations adjacent to the study area.
			3.3	Transit	Infrastructure supports direct and efficient transit operation for both current and planned routes through the study area.	Number of reduced or improved accesses between the three roadways.	2	5	4	1	2	The At-Grade Intersections Concept ranks highest due to the level of flexibility for future bus routes on Shaganappi Trail, 16 Avenue, and Bowness Road; along with flexibility for bus stop placement.
Multi-Modal Transportation TOTAL							3	9	8	4	5	
								✓				
4	**Efficient Traffic Flow**	Move people and goods in an efficient way, providing continuous traffic flow and a reduction in green house gas (GHG) emissions.	4.1	Travel Time	The proposed concept optimizes reliable travel time for motor vehicles on 16 Avenue, Shaganappi Trail, and Bowness Road NW (south of Shaganappi Trail	Intersection delay and queue lengths.	4	2	1	4	5	The Tight Urban Diamond performs highest in this criteria primarily because there are no signalized intersections introduced on 16 Avenue.
			4.2	Shaganappi and 16 Avenue Connection	The proposed concept optimizes turn movements for motor vehicles between Shaganappi Trail and 16 Avenue NW.	Turning movement v/c and delay.	1	2	1	3	5	The Tight Urban Diamond performs highest in this criteria because of the efficient access between all directions of Shaganappi Trail and 16 Avenue, with grade separation for the primary through movements on 16 Avenue.
Efficient Traffic Flow TOTAL							5	4	2	7	10	
											✓	
5	**Land Enhancement**	Preserve and enhance land within the study where there are opportunities.	5.1	Parcel Size Flexibility	Remnant land parcel sizes have flexibility for access and servicing.	Future access/servicing flexibility.	1	4	4	5	4	The Hybrid Concept ranks highest in this criteria due to the flexibility for parcel sizing that can be established with internal road networks and access points onto Shaganappi Trail and Bowness Road.
			5.3	Parcel Integration with River	Remnant land parcels are optimized for the quality location and orientation to the river.	Flexibiliy in Bowness Road Alignment and anticipated traffic volume on Bowness Road.	2	2	1	4	5	The Tight Urban Diamond Concept provide the best opportunity for integration with the Bow River.
			5.4	Within City Owned Lands	The proposed concept fits within existing City-owned lands.	Encroachment requirements.	5	4	1	5	5	Both the Hybrid Concept , the Tight Urban Diamond Concept , and the Do Nothing Concept are fully located within City owned land.
Land Enhancement TOTAL							8	10	6	14	14	
										✓	✓	
6	**Stakeholder Input**	A plan that reflects the values and priorities of the community.	6.1	Public Perception	Input provided through the Phase 2 Open Houses and Online Survey.	Open House and Online Survey Scoring and Qualitative Input.	2	4	2	1	5	The Tight Urban Diamond Concept was the most strongly supported based on the feedback that was provided.
Stakeholder Input TOTAL							2	4	2	1	5	
											✓	
OVERALL TOTAL							23	38	24	40	49	
								✓✓		✓	✓✓✓✓	

Appendix J LONG TERM CONCEPT

ORIGINAL SHEET - ANSI B (11x17)



NOT FOR CONSTRUCTION

JUNE 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_lt_keyplan_package_a.dwg
2018/03/07 11:53 AM By: Bourbonnais, Keith

Scale: NTS

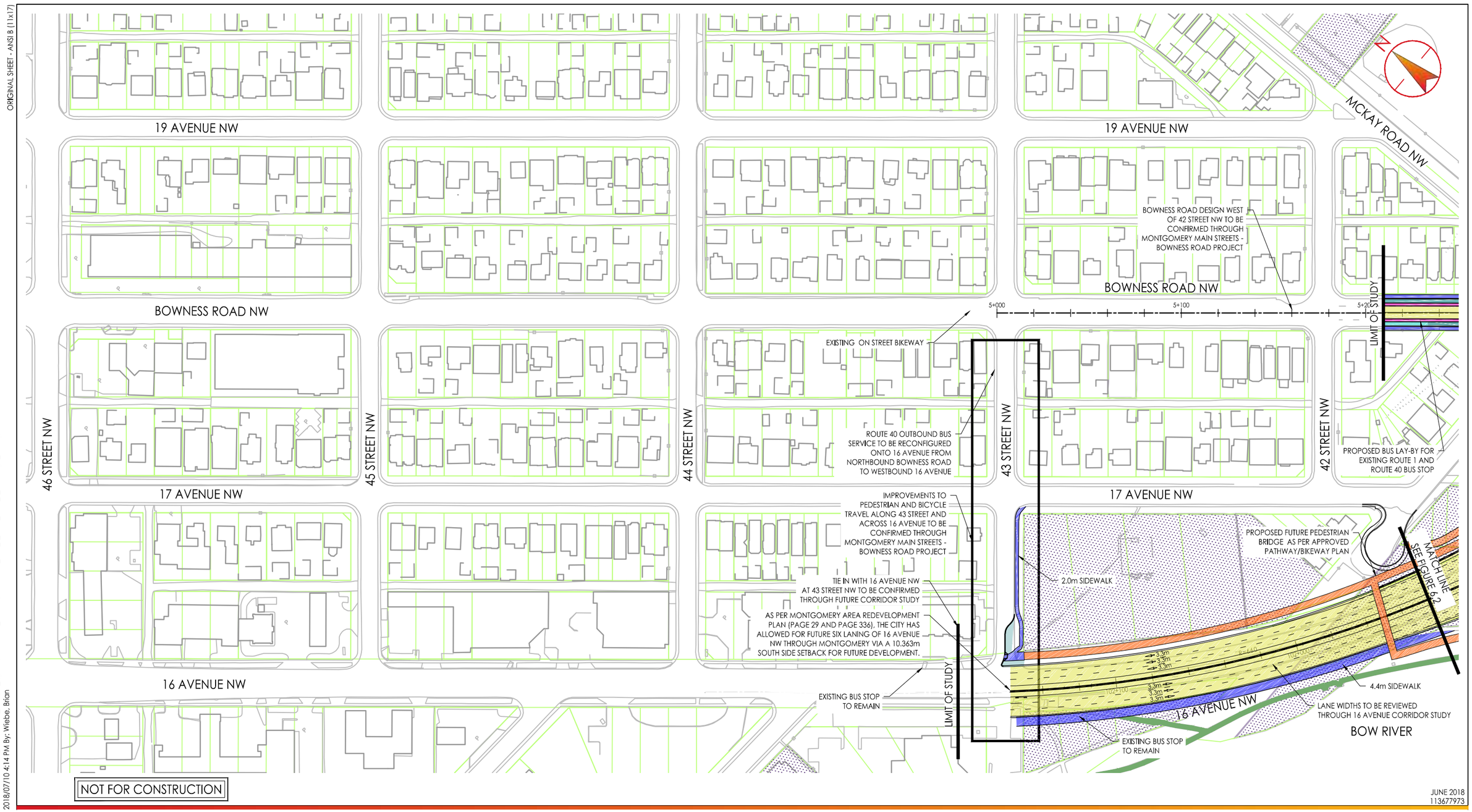
FINAL RECOMMENDED PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.0

Title
LONG TERM KEY PLAN

Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com



NOT FOR CONSTRUCTION

JUNE 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functionalReport\113677973_prel_JR_prop_plan_1_package_a.dwg
2018/07/10 4:14 PM By: Wiebe, Brian

ORIGINAL SHEET - ANSI B (11x17)

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

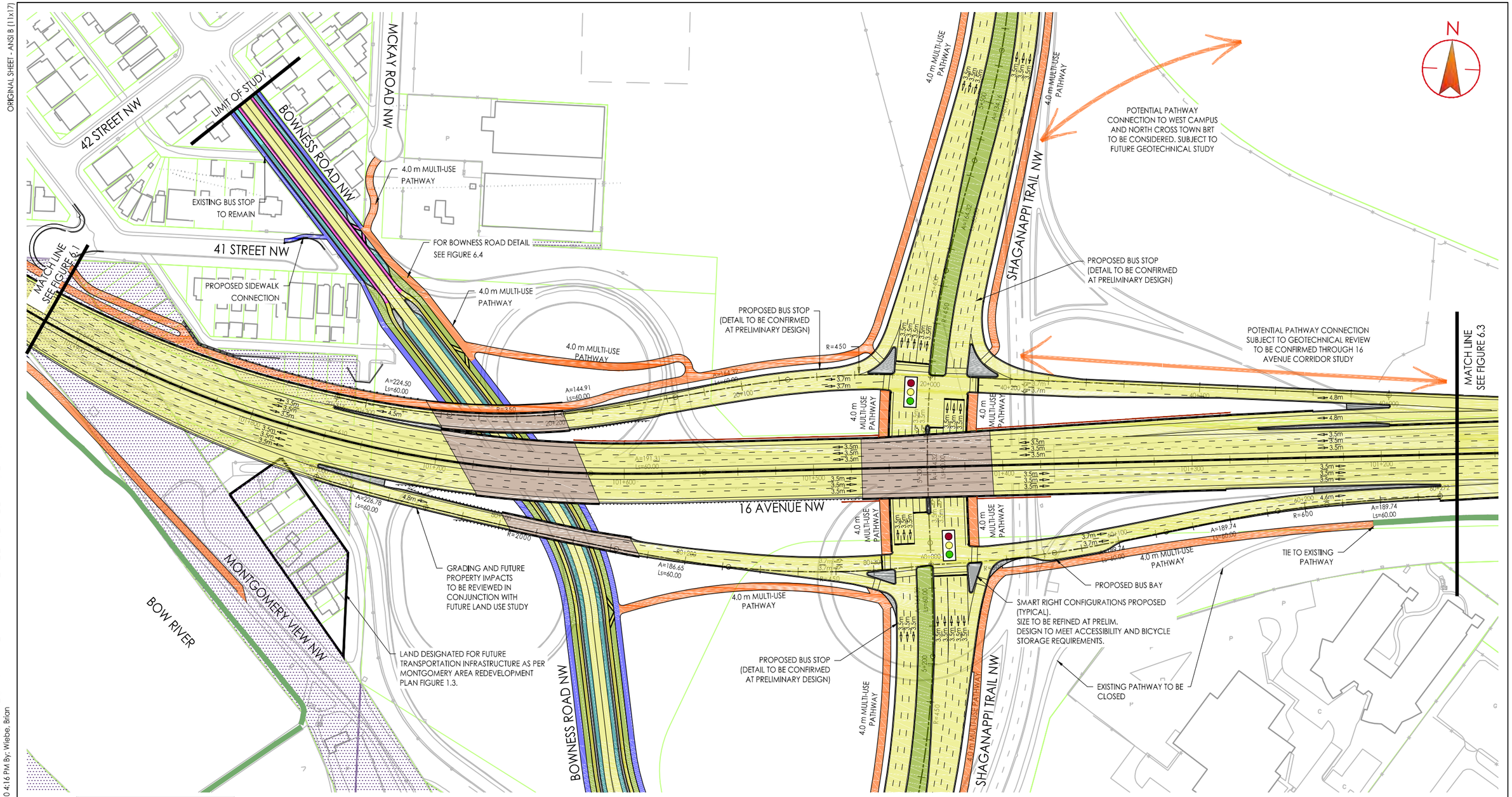
Scale: 0 10 20 30 40 50m

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.1

Title
RECOMMENDED LONG TERM PLAN
16 AVENUE NW

ORIGINAL SHEET - ANSI B (11x17)



NOT FOR CONSTRUCTION

June 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_ll_prop_plan_2_package_a.dwg
2018/07/10 4:16 PM By: Wiebe, Brian

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

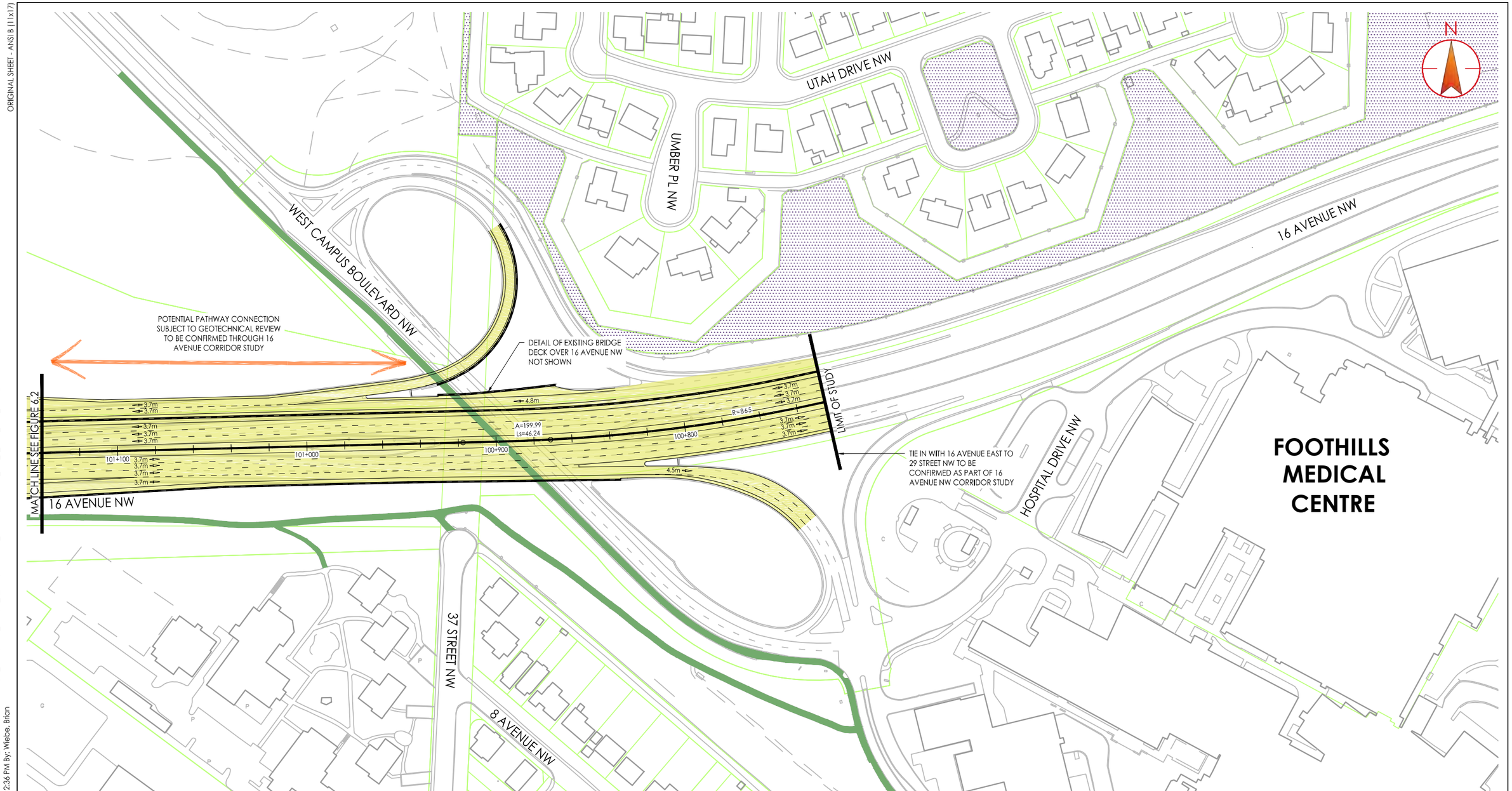
Scale: 0 10 20 30 40 50m

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.2

Title
RECOMMENDED LONG TERM PLAN
16 AVENUE NW

ORIGINAL SHEET - ANSI B (11x17)



FOOTHILLS MEDICAL CENTRE

NOT FOR CONSTRUCTION

June 2018
113677973

\\Cd1002-f04\shared_projects\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_lt_prop_plan_3.dwg
2018/07/10 2:36 PM By: Wiebe, Brian

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale: 0 10 20 30 40 50m

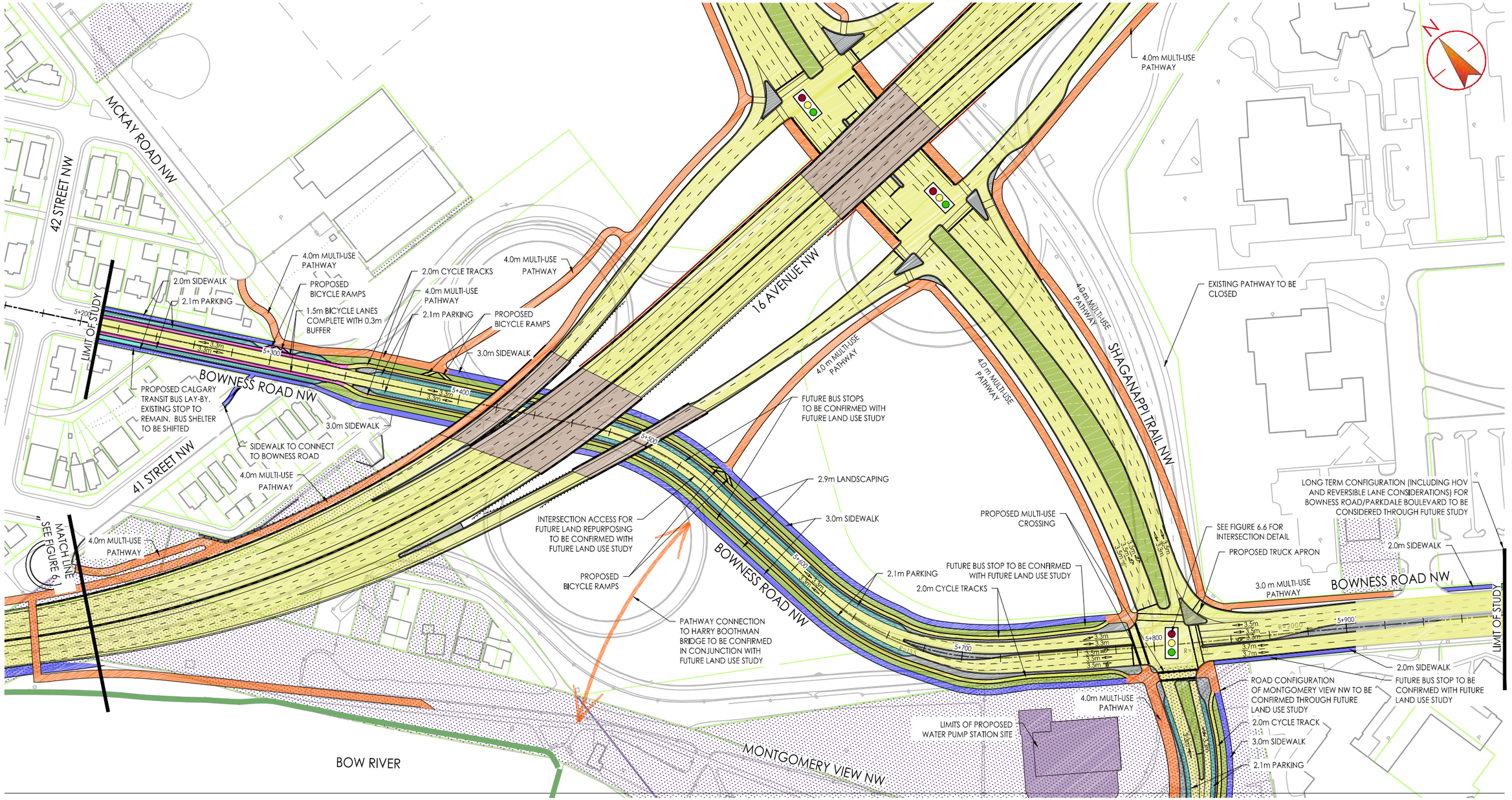
Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.3

Title
RECOMMENDED LONG TERM PLAN
16 AVENUE NW

ORIGINAL SHEET - ANSI B (11x17)

\\Cd1002-f04\shared_projects\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_lt_prop_plan_4.dwg
2018/07/10 2:41 PM By: Wiebe, Brian



NOT FOR CONSTRUCTION

June 2018
113677973

Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale:

0 10 20 30 40 50m

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.4

Title
RECOMMENDED LONG TERM PLAN BOWNESS ROAD NW

POTENTIAL PATHWAY CONNECTION TO WEST CAMPUS AND NORTH CROSS TOWN BRT TO BE CONSIDERED, SUBJECT TO FUTURE GEOTECHNICAL STUDY

POTENTIAL PATHWAY CONNECTION SUBJECT TO GEOTECHNICAL REVIEW TO BE CONFIRMED THROUGH 16 AVENUE CORRIDOR STUDY

4.0 m MULTI-USE PATHWAY

SHAGANAPPI TRAIL NW

TIE IN WITH APPROVED SHAGANAPPI TRAIL NORTH CORRIDOR STUDY

FUTURE BUS STOPS TO BE CONFIRMED WITH FUTURE LAND USE STUDY

EXISTING PATHWAY TO BE CLOSED

16 AVENUE NW

SEE FIGURE 6.6 FOR INTERSECTION DETAIL

BOWNESS ROAD NW

FOR BOWNESS ROAD DETAIL SEE FIGURE 6.4

LIMITS OF PROPOSED WATER PUMP STATION SITE

NOT FOR CONSTRUCTION

June 2018
113677973

Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale:

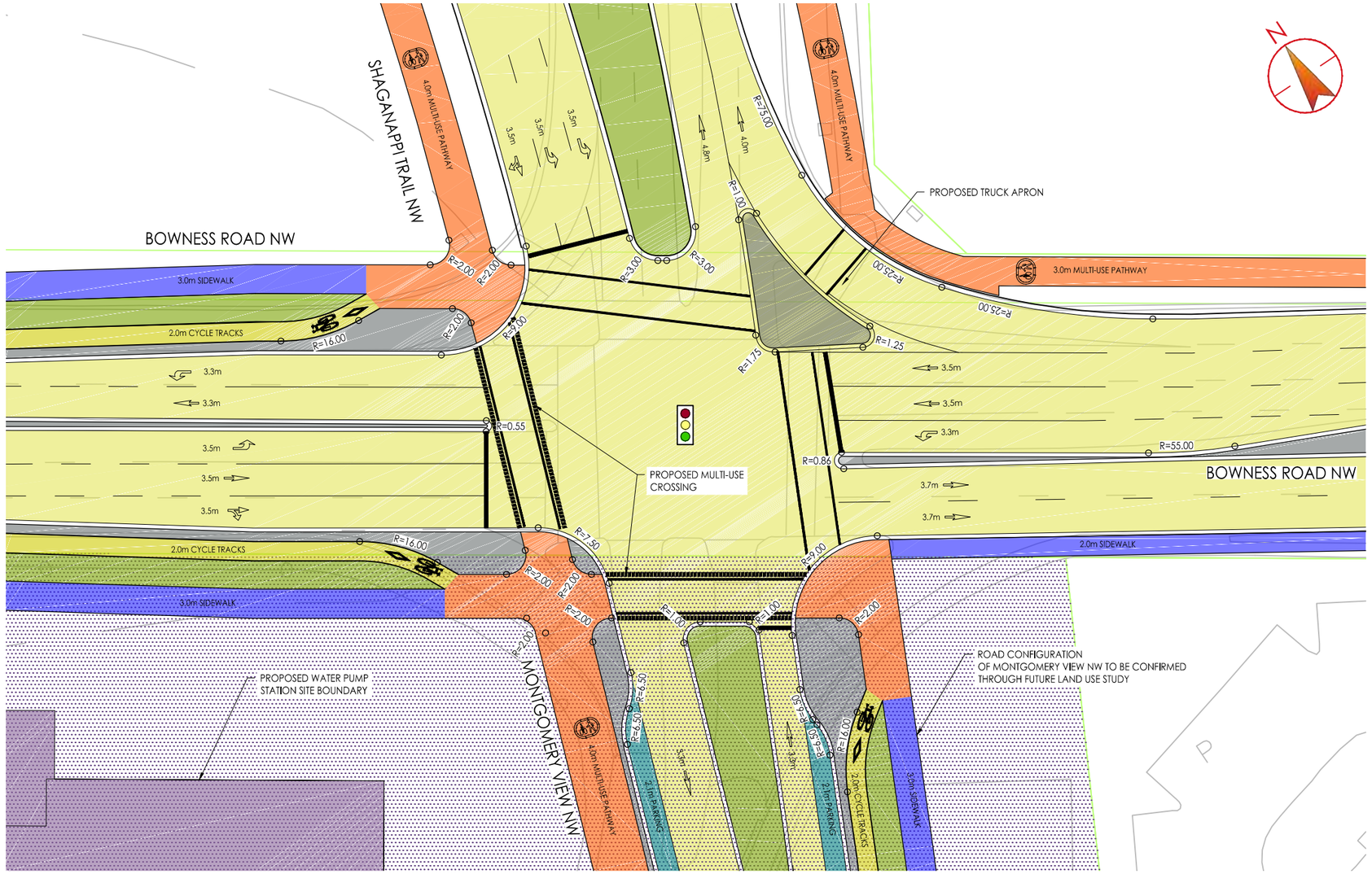
0 10 20 30 40 50m

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.5

Title
RECOMMENDED LONG TERM PLAN
SHAGANAPPI TRAIL NW

ORIGINAL SHEET - ANSI B (11x17)



BOWNESS ROAD NW AND SHAGANAPPI TRAIL NW
INTERSECTION DETAILS

NOT FOR CONSTRUCTION

JUNE 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_lt_intersection_plan_2.dwg
2018/07/10 3:34 PM By: Wiebe, Brian

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale: 0 2 5 10 15m

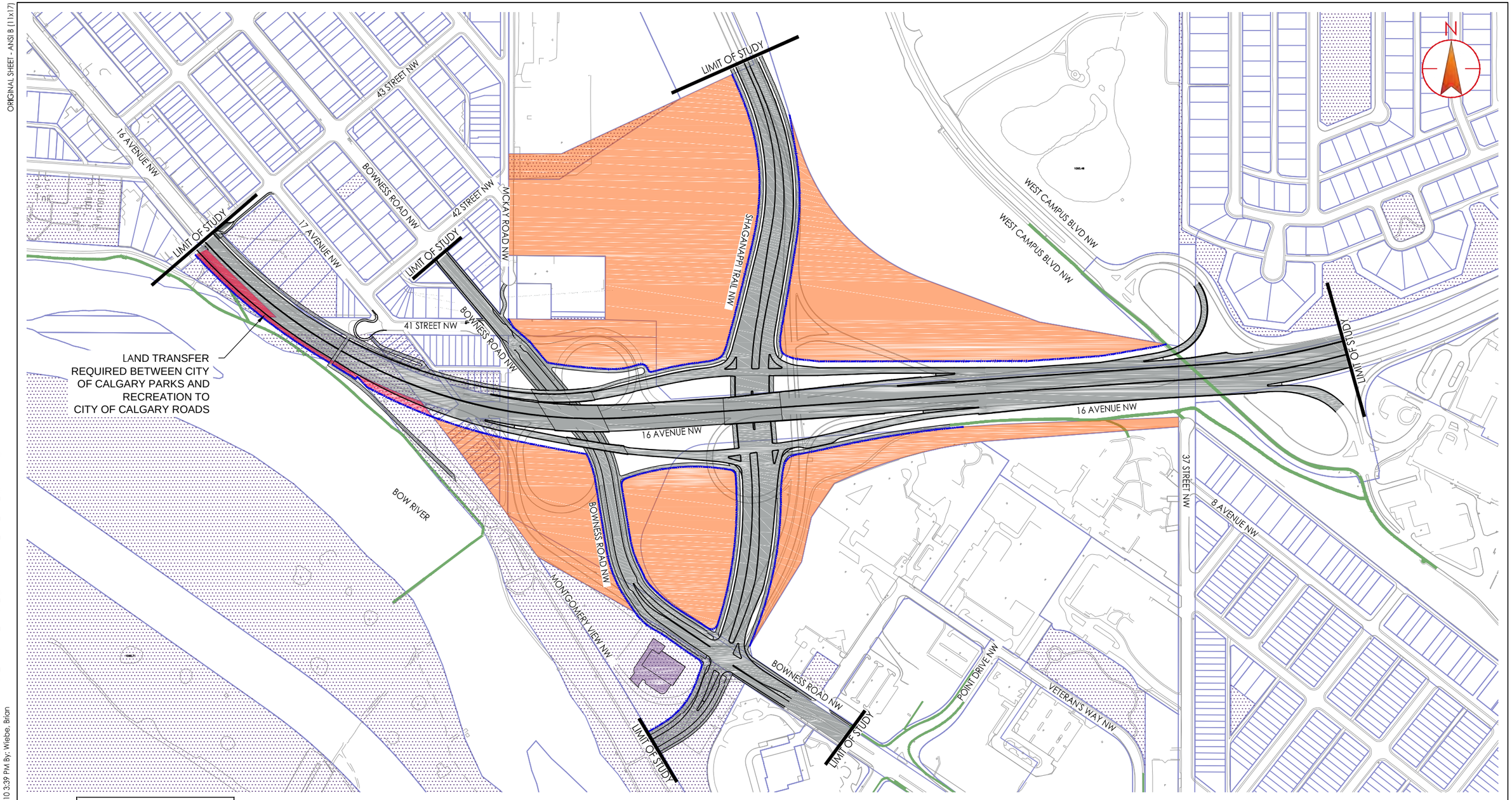
Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.6

Title
INTERSECTION DETAIL

LONG TERM PLAN BOWNESS ROAD NW AT SHAGANAPPI TRAIL NW

ORIGINAL SHEET - ANSI B (11x17)



NOT FOR CONSTRUCTION

June 2018
113677973

\\Cd1002-f04\shared_projects\113677973\07_cad\sheet_files\92_figure\113677973_land_avail_figure10.dwg
2018/07/10 3:39 PM By: Wiebe, Brian

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- PROPOSED LONG TERM TRANSPORTATION INFRASTRUCTURE
- CITY OWNED PROPERTY OUTSIDE ROAD ROW
- LAND NO LONGER REQUIRED FOR TRANSPORTATION INFRASTRUCTURE
- PROPOSED WATER PUMP STATION
- EXISTING PATHWAY / SIDEWALK
- PROPOSED LAND TRANSFER
- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE

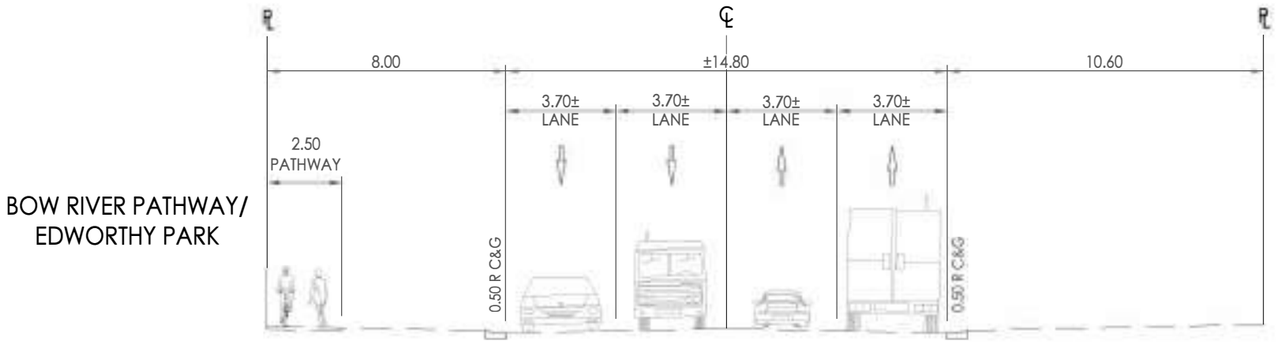
Scale:

0 20 50 100 150m

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
Fig. 6.7

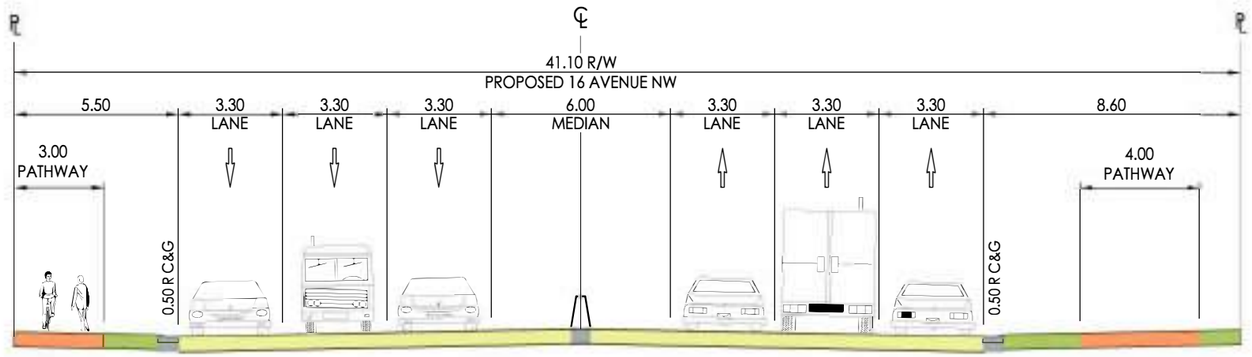
Title
LAND NO LONGER REQUIRED FOR TRANSPORTATION INFRASTRUCTURE - LONG TERM



BOW RIVER PATHWAY/
EDWORTHY PARK

GEORGE R GELL
PARK

16 AVENUE NW EXISTING
WEST PROJECT LIMIT
(43 STREET NW)



BOW RIVER PATHWAY/
EDWORTHY PARK

GEORGE R GELL
PARK

16 AVENUE NW LONG TERM
WEST PROJECT LIMIT
(43 STREET NW)

NOT FOR CONSTRUCTION

JUNE 2018
113677973

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale: NTS

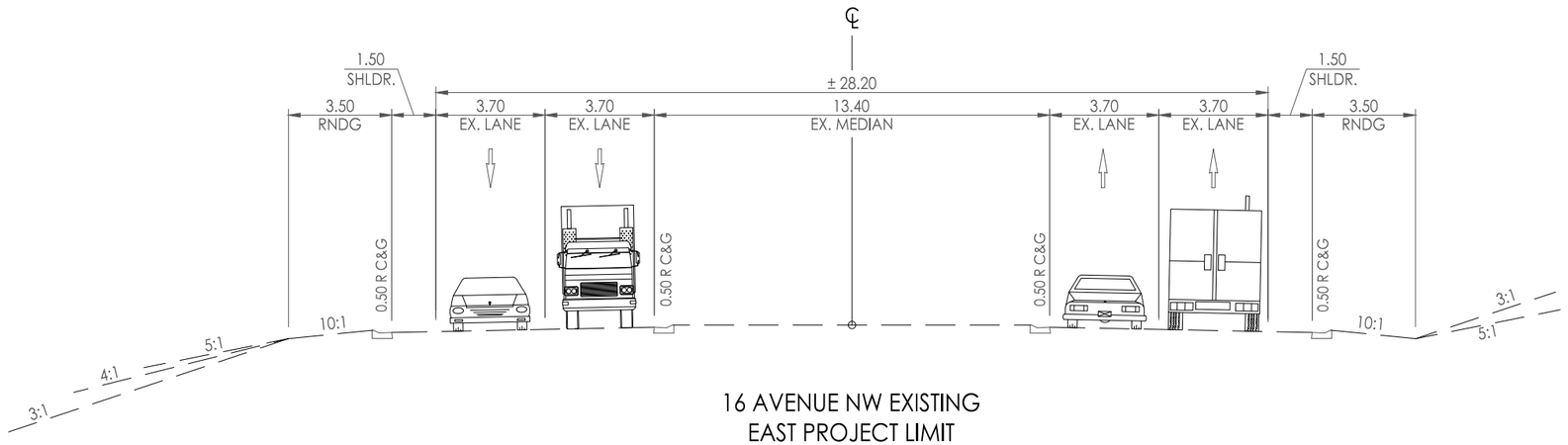
FINAL
RECOMMENDED
PLAN
MARCH 2018

Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

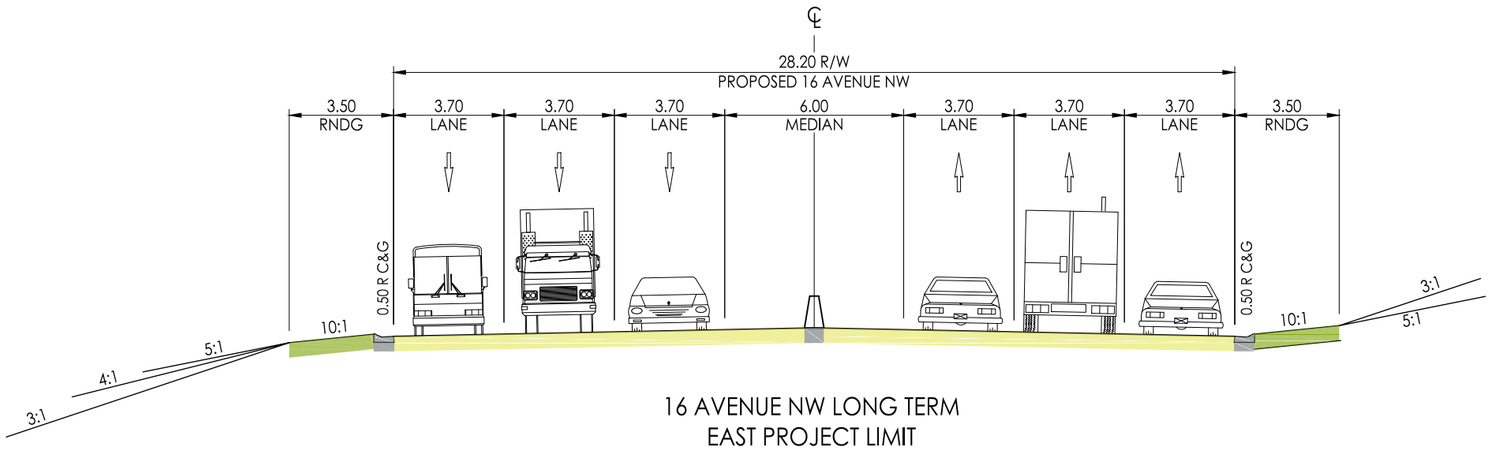
Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.7

Title
16 AVENUE NW LONG TERM TYPICAL SECTIONS - EXISTING & PROPOSED WEST PROJECT LIMIT



16 AVENUE NW EXISTING
EAST PROJECT LIMIT
(WEST CAMPUS BOULEVARD NW)



16 AVENUE NW LONG TERM
EAST PROJECT LIMIT
(WEST CAMPUS BOULEVARD NW)

NOT FOR CONSTRUCTION

NOTE: MAIN LINE CONFIGURATION ONLY
COLLECTOR DISTRIBUTOR AND RAMP LANES NOT SHOWN

JUNE 2018
113677973

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale: NTS

FINAL
RECOMMENDED
PLAN
MARCH 2018

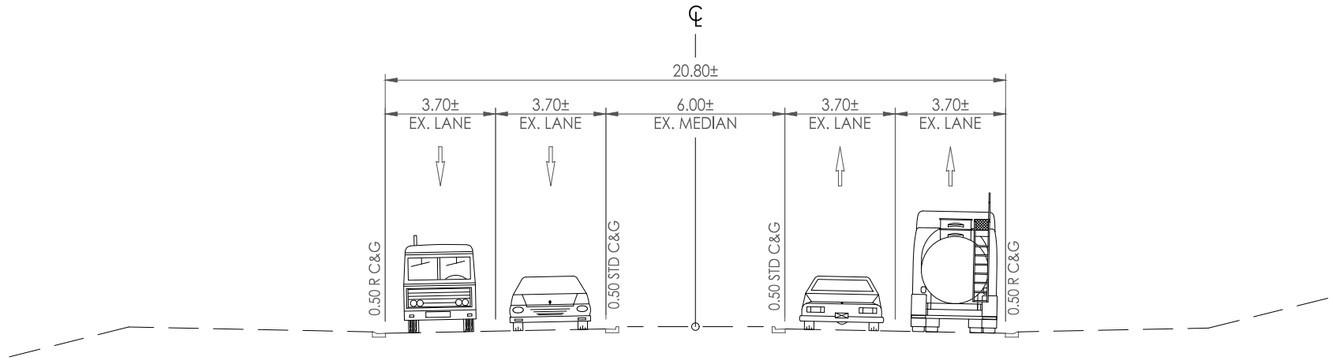
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

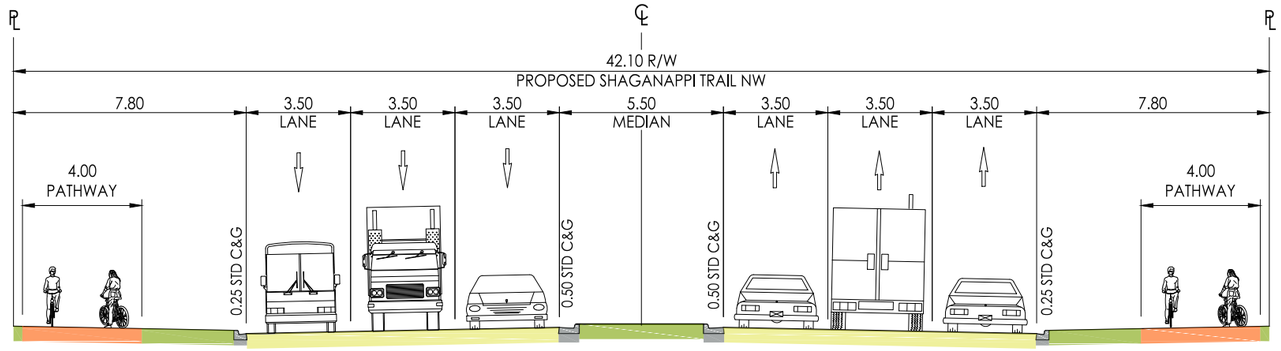
Figure No.
6.8

Title
16 AVENUE NW LONG TERM
TYPICAL SECTIONS - EXISTING & PROPOSED
EAST PROJECT LIMITS

ORIGINAL SHEET - ANSI B (11x17)



SHAGANAPPI TRAIL NW EXISTING
NORTH PROJECT LIMIT



SHAGANAPPI TRAIL NW LONG TERM
NORTH PROJECT LIMIT

NOT FOR CONSTRUCTION

JUNE 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_lt_tsec_2.dwg
2018/03/07 11:58 AM By: Bourbonnais, Keith

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale: NTS

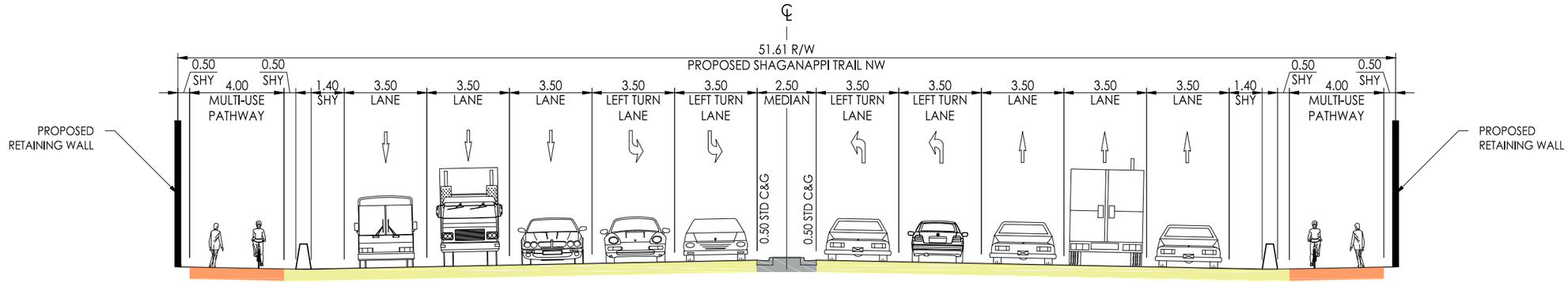
FINAL RECOMMENDED PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

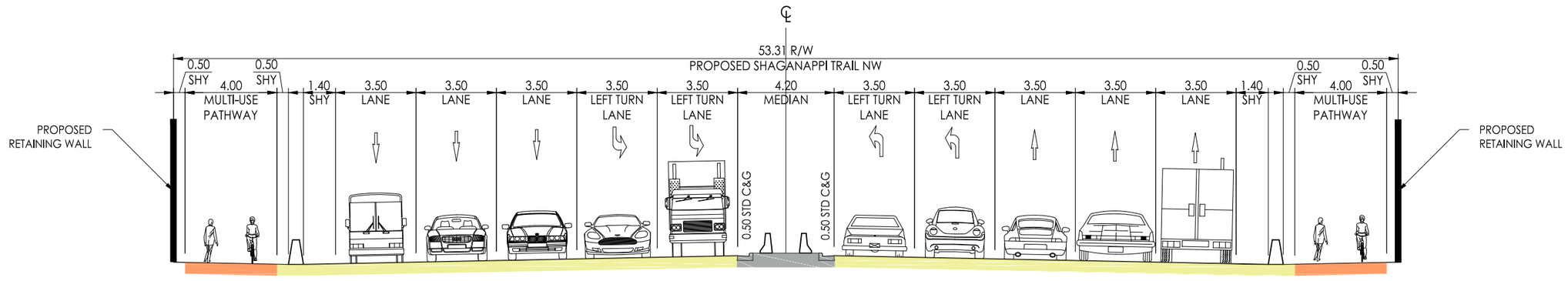
Figure No.
6.9

Title
SHAGANAPPI TRAIL NW LONG TERM
TYPICAL SECTIONS - EXISTING & PROPOSED
NORTH PROJECT LIMIT

ORIGINAL SHEET - ANSI B (11x17)



SHAGANAPPI TRAIL NW LONG TERM
AT INTERCHANGE BRIDGE STRUCTURE
NO CENTER PIER (SHOWN IN PLAN)



SHAGANAPPI TRAIL NW LONG TERM
AT INTERCHANGE BRIDGE STRUCTURE
WITH CENTER PIER (NOT SHOWN IN PLAN)

NOT FOR CONSTRUCTION

NOTE: EXISTING SHAGANAPPI TRAIL IS ON A DIFFERENT ALIGNMENT AT THIS LOCATION

JUNE 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_prel_JH_tsec_3.dwg
2018/03/07 11:58 AM By: Bourbonnais, Keith

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

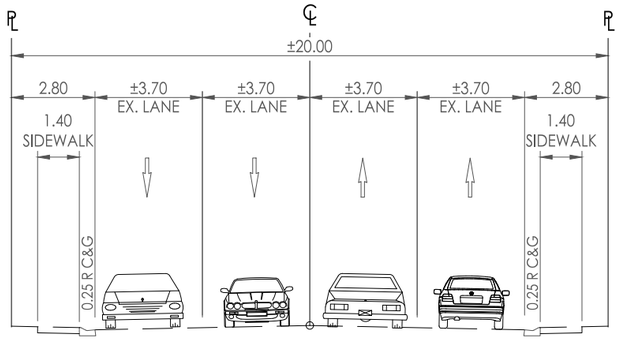
Scale: NTS

FINAL RECOMMENDED PLAN
MARCH 2018

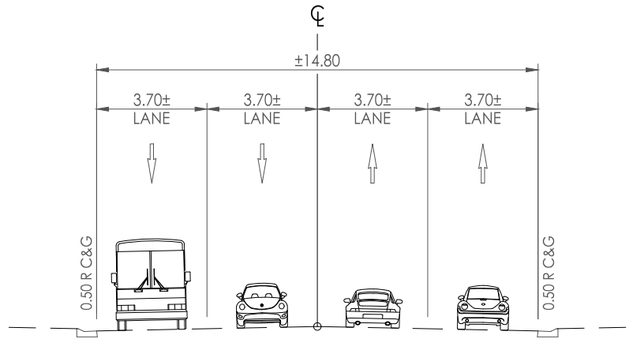
Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.10

Title
SHAGANAPPI TRAIL NW LONG TERM
TYPICAL SECTIONS - PROPOSED
INTERCHANGE BRIDGE STRUCTURE



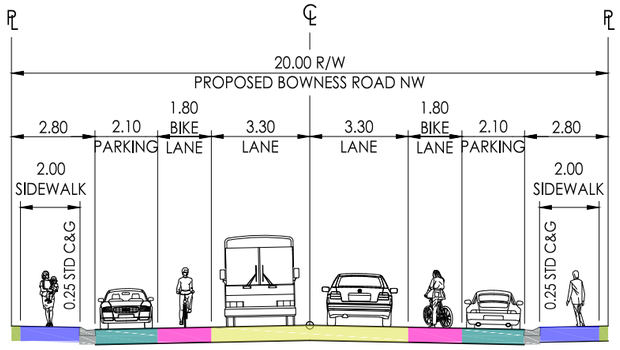
BOWNESS ROAD NW EXISTING
41 STREET NW - 42 STREET NW



BOWNESS ROAD NW EXISTING
SHAGANAPPI TRAIL NW - 16 AVENUE NW

EXISTING

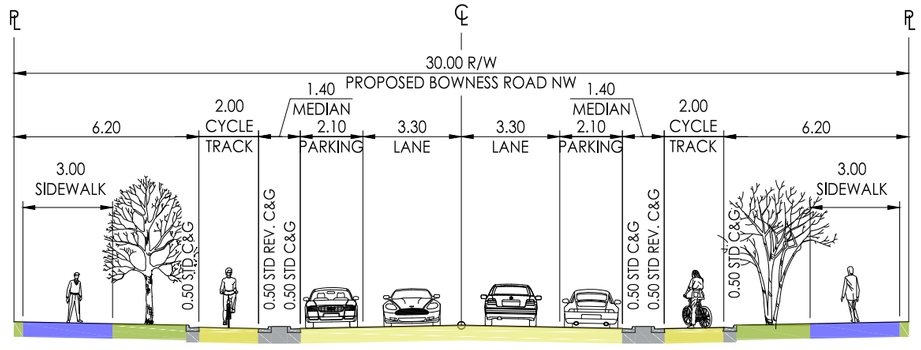
EXISTING



BOWNESS ROAD NW LONG TERM
41 STREET NW - 42 STREET NW

PROPOSED

PROPOSED



BOWNESS ROAD NW LONG TERM
SHAGANAPPI TRAIL NW - 16 AVENUE NW

NOT FOR CONSTRUCTION

JUNE 2018
113677973

Legend

- ULTIMATE ROADWAY
- PROPOSED BRIDGE DECK
- CITY OWNED PROPERTY
- PROPOSED CONCRETE MEDIAN / NOSING
- PROPOSED SIDEWALK
- PROPOSED MULTI-USE PATHWAY
- PROPOSED CYCLE TRACKS
- PROPOSED BICYCLE LANE
- PROPOSED PARKING LANE
- PROPOSED CURB EXTENSION
- PROPOSED LANDSCAPING
- PROPOSED WATER PUMP STATION
- PROPOSED RETAINING WALL
- PROPOSED RESERVED CALGARY TRANSIT BUS LAY-BY
- EXISTING PATHWAY / SIDEWALK
- EXISTING PROPERTY LINE
- EXISTING BUILDINGS
- PROPOSED TRAFFIC SIGNALS
- EXISTING TRAFFIC SIGNALS

Scale: NTS

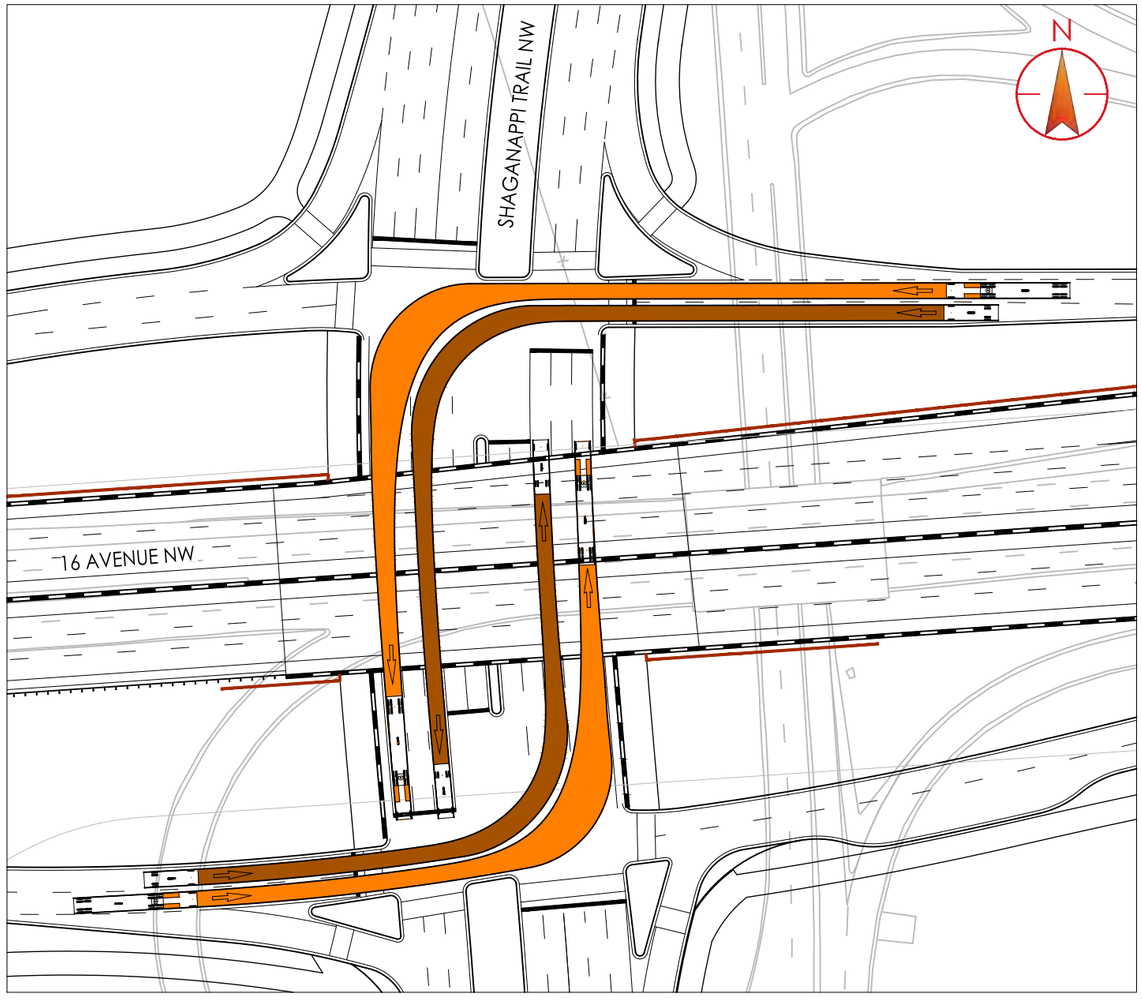
FINAL RECOMMENDED PLAN
MARCH 2018

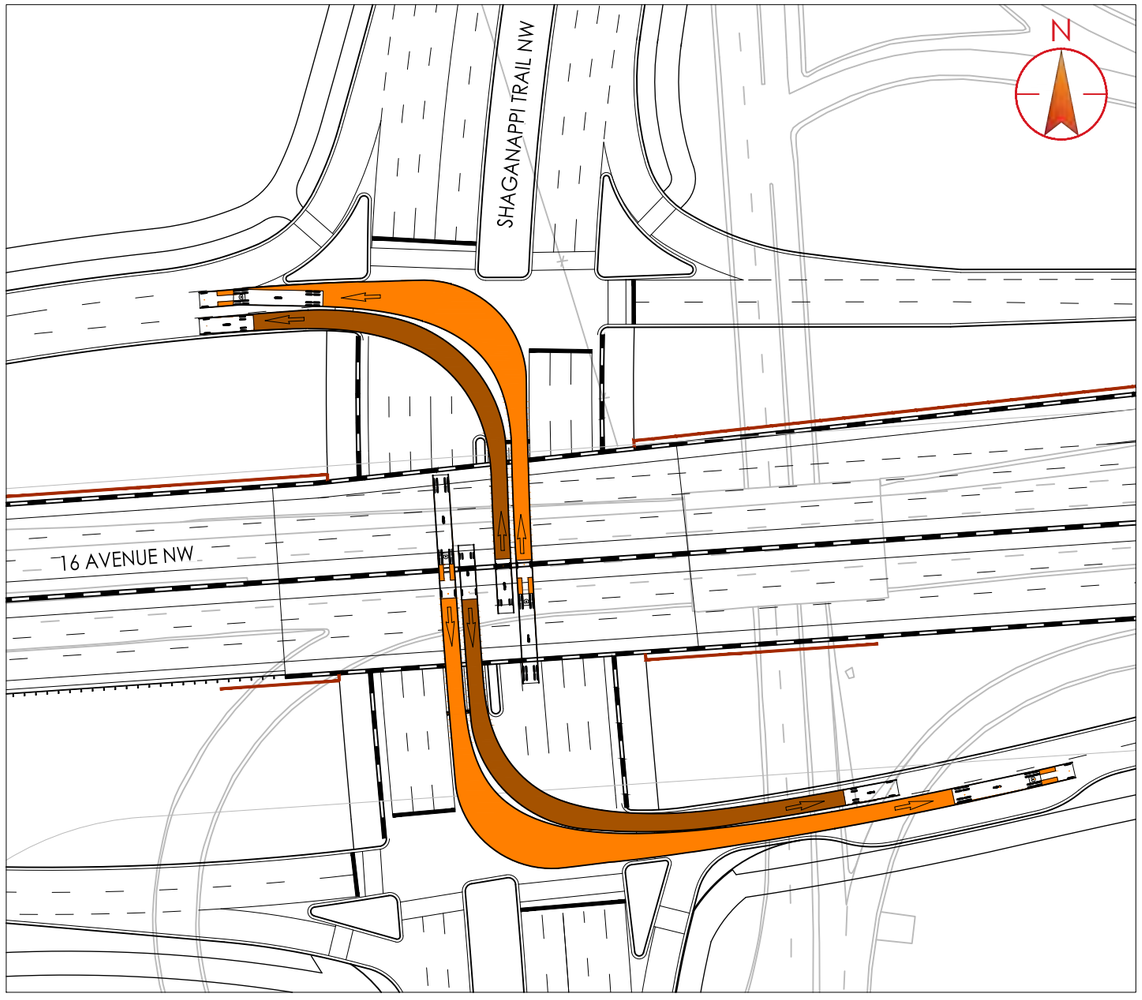
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

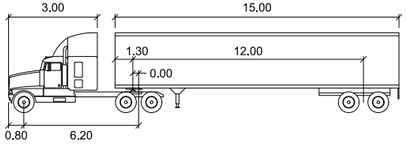
Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.11

Title
BOWNESS ROAD NW LONG TERM
TYPICAL SECTIONS

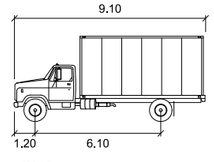






WB-19 meters

Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 28.9
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9 meters

Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

NOT FOR CONSTRUCTION

JUNE 2018
113677973

Legend

TURNING TEMPLATE WB-19

TURNING TEMPLATE SU-9

Scale: 0 5 10 20 30m

FINAL RECOMMENDED PLAN
MARCH 2018

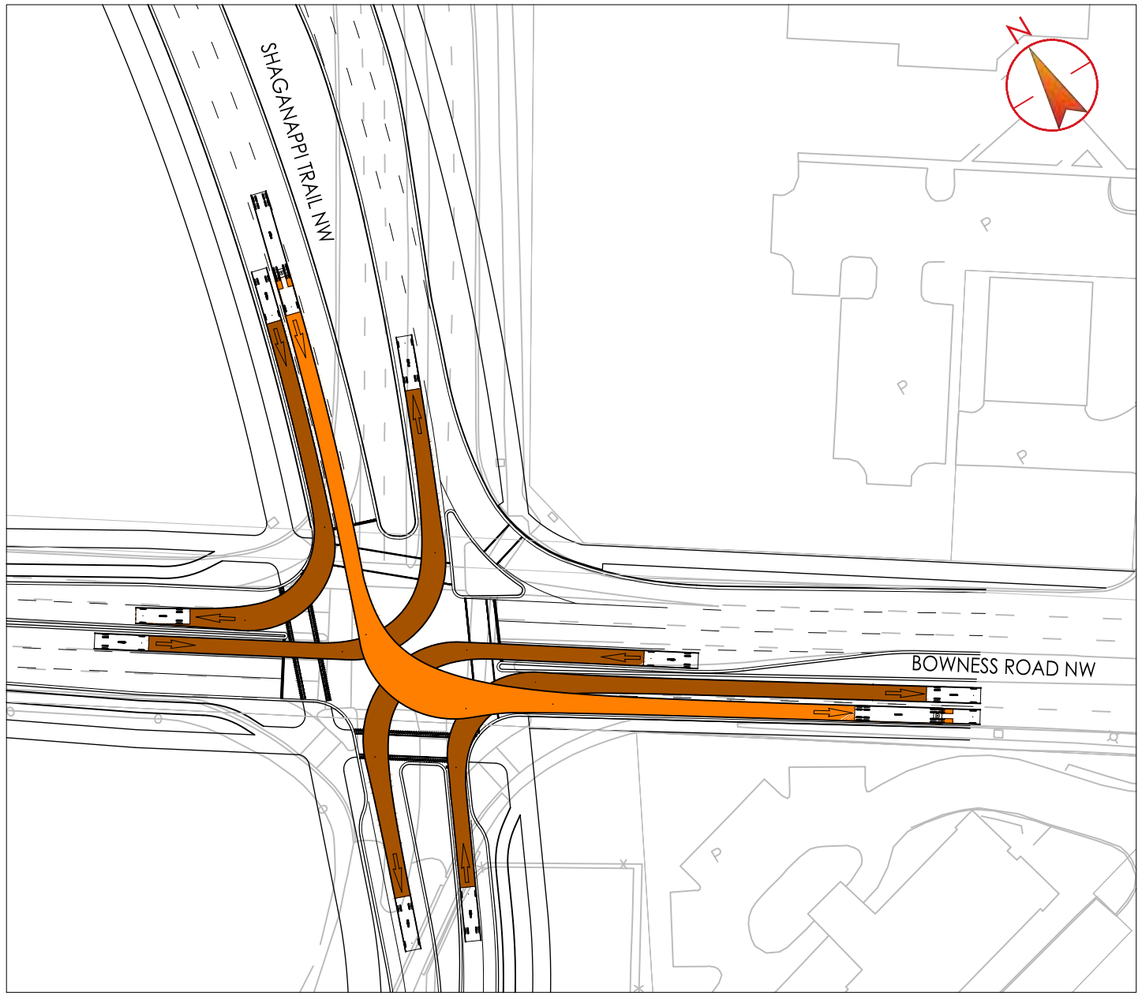
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

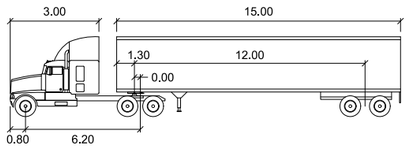
Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.12

Title
TURNING TEMPLATE
16 AVENUE NW AND SHAGANAPPI TRAIL NW

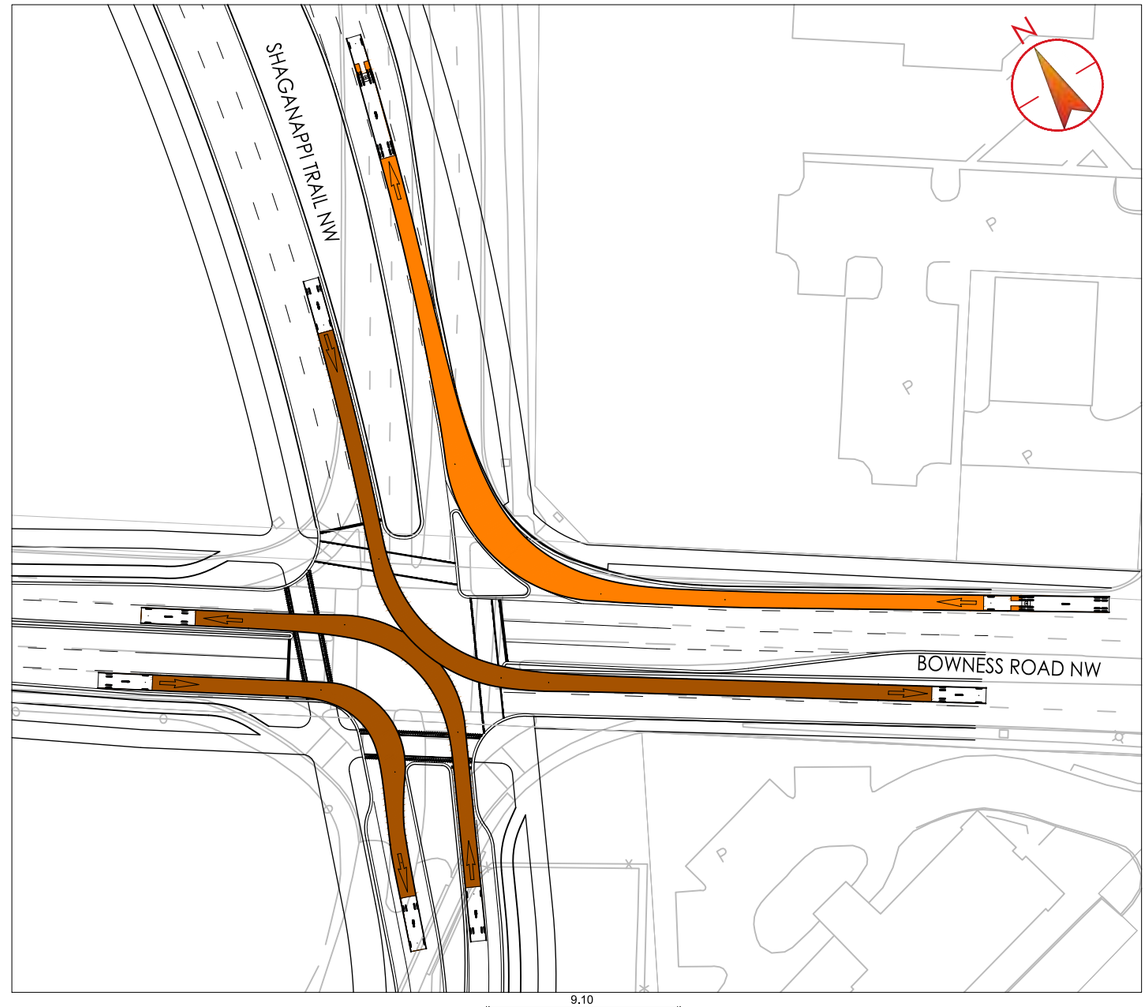
ORIGINAL SHEET - ANSI B (11X17)

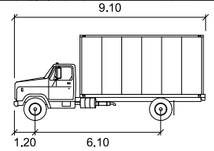




WB-19 meters

Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 28.9
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		





SU9 meters

Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

NOT FOR CONSTRUCTION

JUNE 2018
113677973

U:\113677973\07_cad\sheet_files\92_figure\functional_report\113677973_shag_bowns_interchange_turn.dwg
2018/03/07 11:57 AM By: Bourbonnais, Keith

Stantec

200-325 25th Street SE
Calgary AB
www.stantec.com

Legend

TURNING TEMPLATE WB-19
TURNING TEMPLATE SU-9

Scale: 0 5 10 20 30m

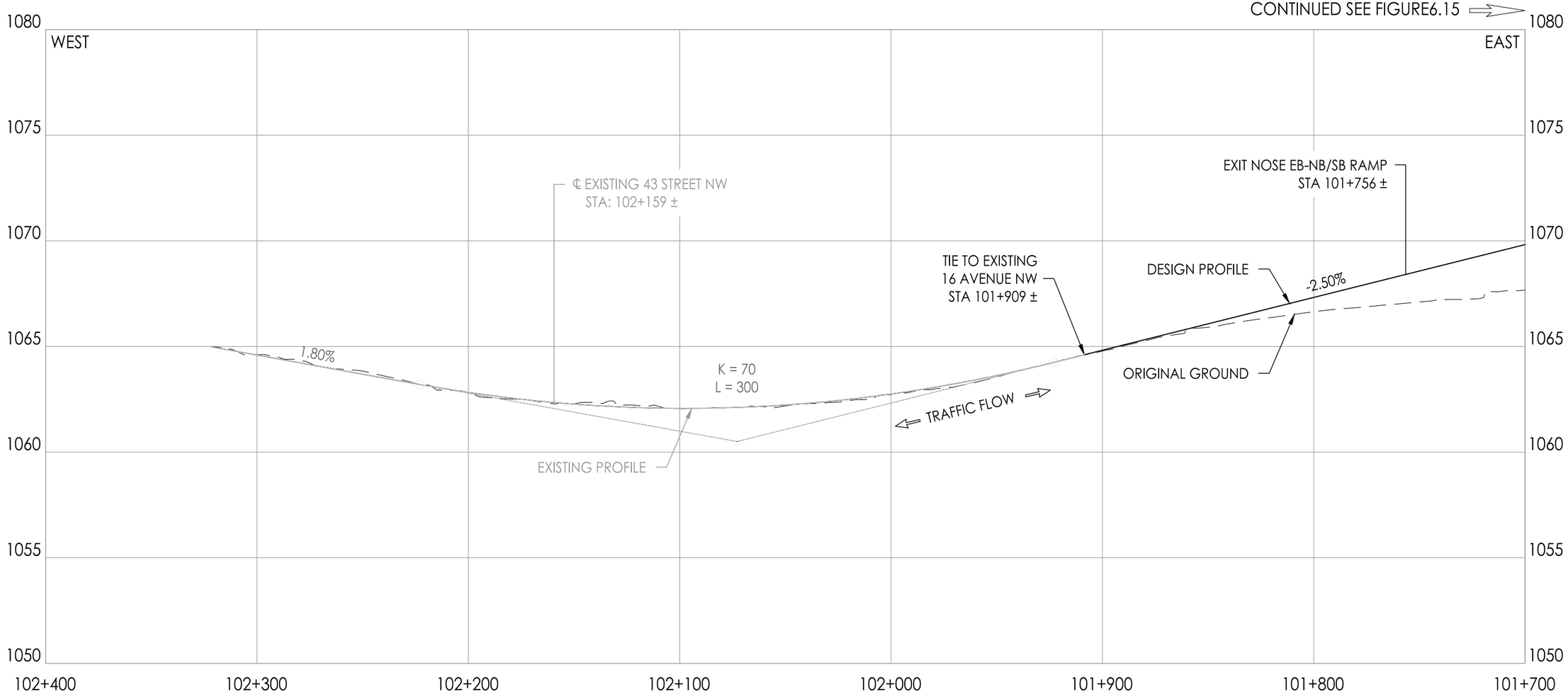
FINAL RECOMMENDED PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.13

Title
TURNING TEMPLATE
BOWNESS ROAD NW AND SHAGANAPPI TRAIL NW

CONTINUED SEE FIGURE6.15 ⇨



16 AVENUE NW

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

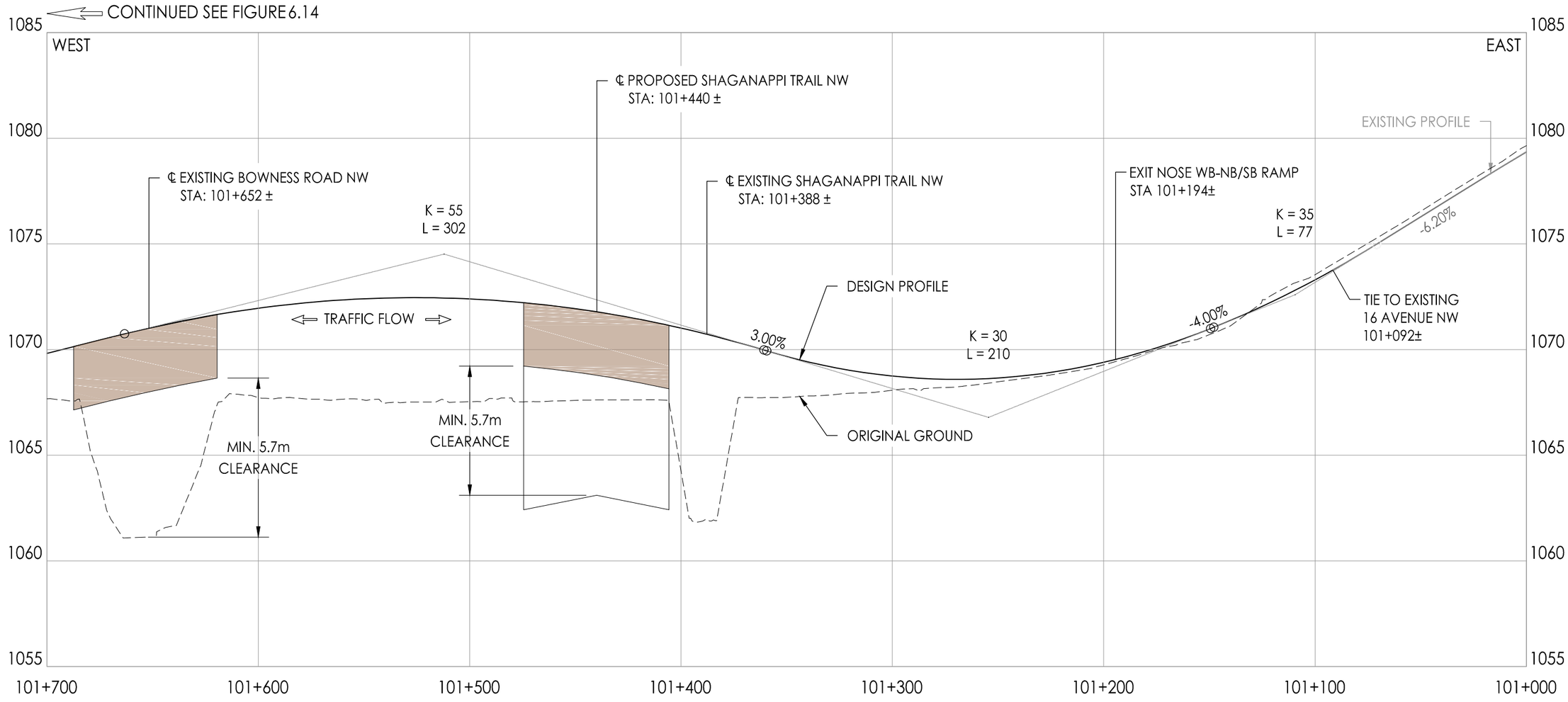
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.14

Title
16 AVENUE NW PROFILE



16 AVENUE NW

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

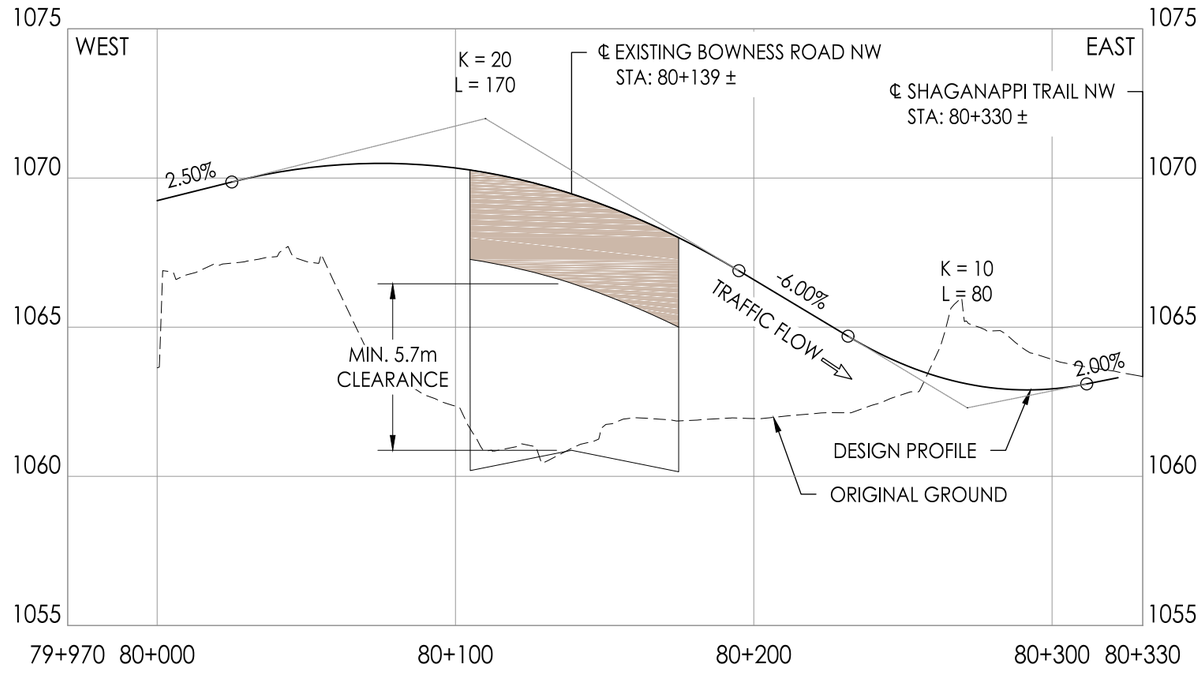
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

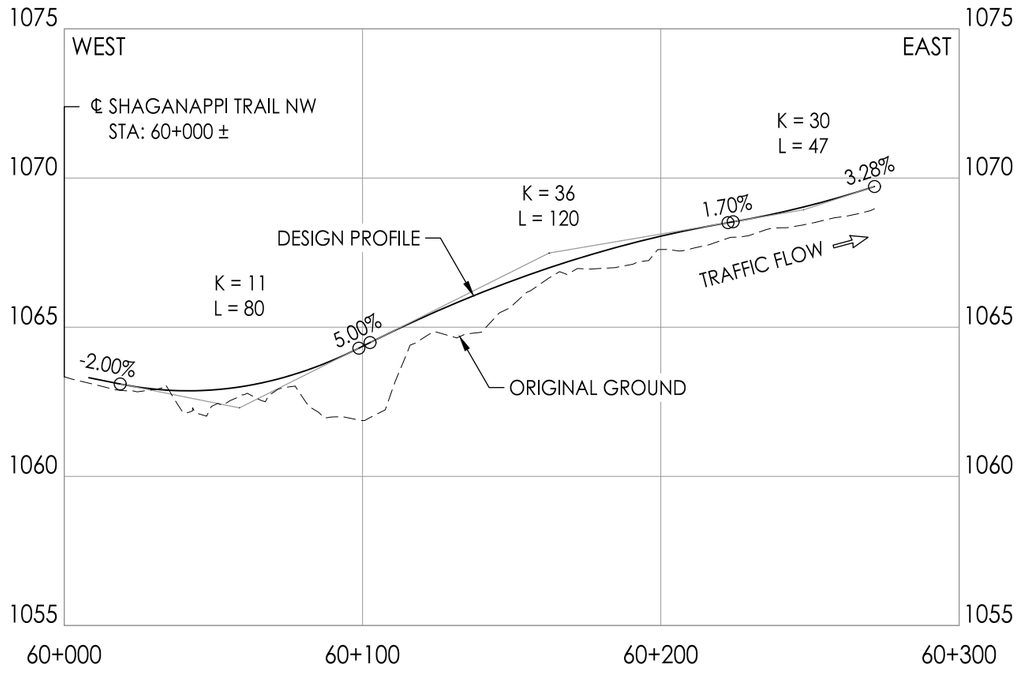
Figure No.
6.15

Title
16 AVENUE NW PROFILE



16 AVENUE NW EASTBOUND OFF RAMP

H 1:2000
V 1:200



16 AVENUE NW EASTBOUND ON RAMP

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

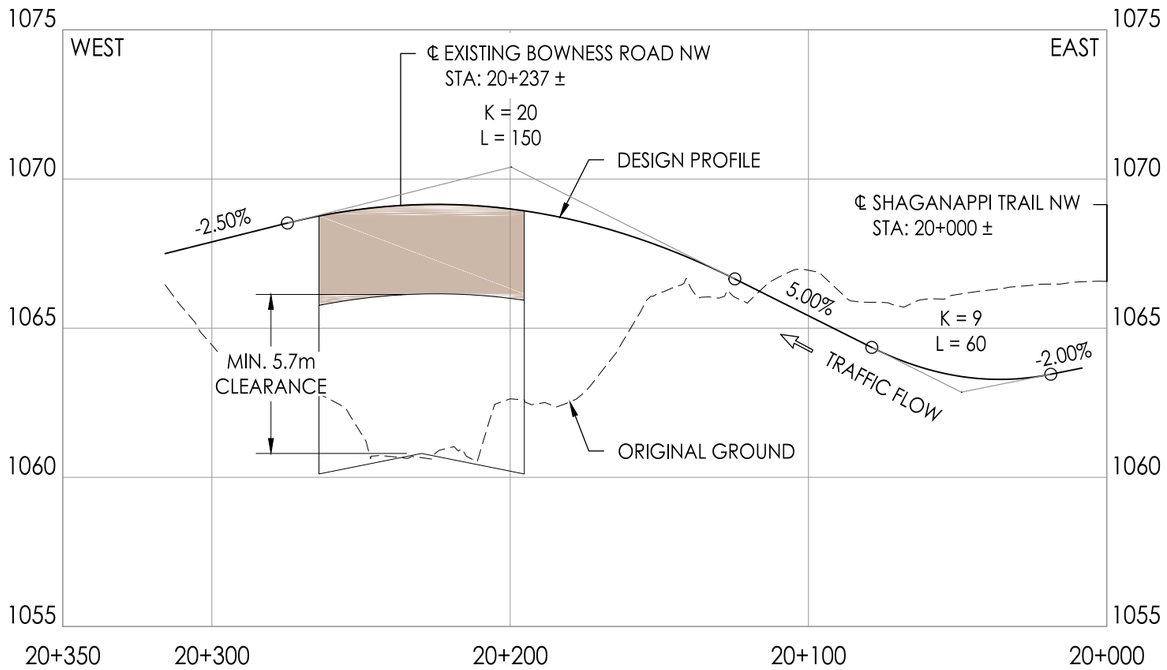
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

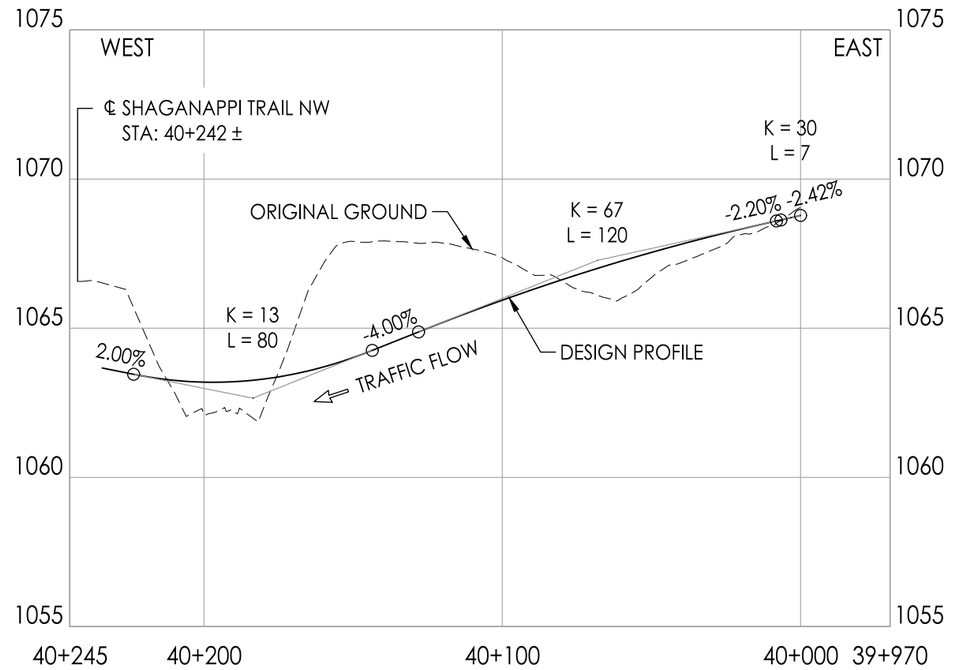
Figure No.
6.16

Title
16 AVENUE NW AND SHAGANAPPI TRAIL NW RAMP PROFILES
EAST BOUND RAMPS



16 AVENUE NW WESTBOUND ON RAMP

H 1:2000
V 1:200



16 AVENUE NW OFF RAMP

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

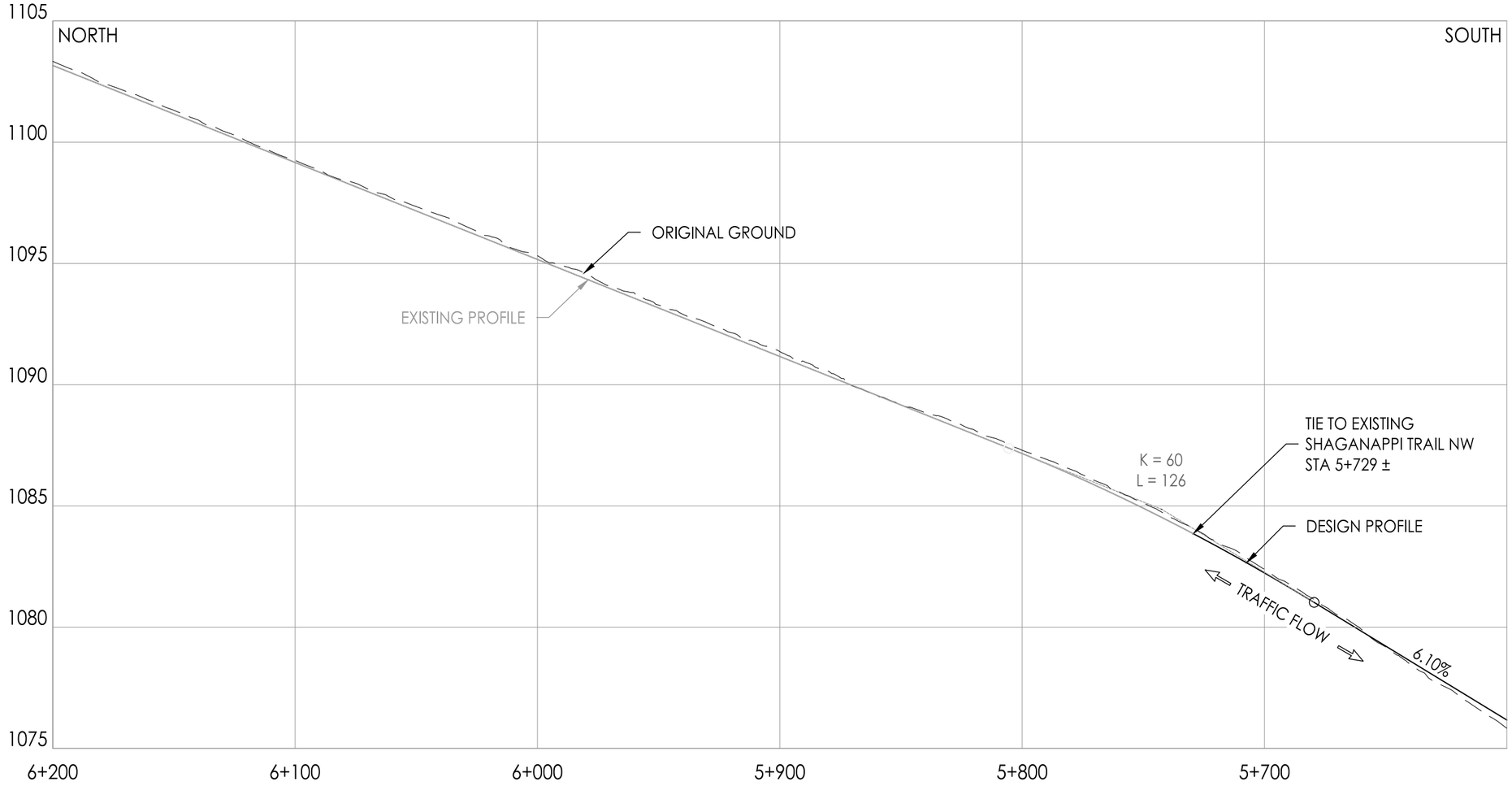
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.17

Title
16 AVENUE NW AND SHAGANAPPI TRAIL NW RAMP PROFILES
WEST BOUND RAMP



SHAGANAPPI TRAIL NW

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

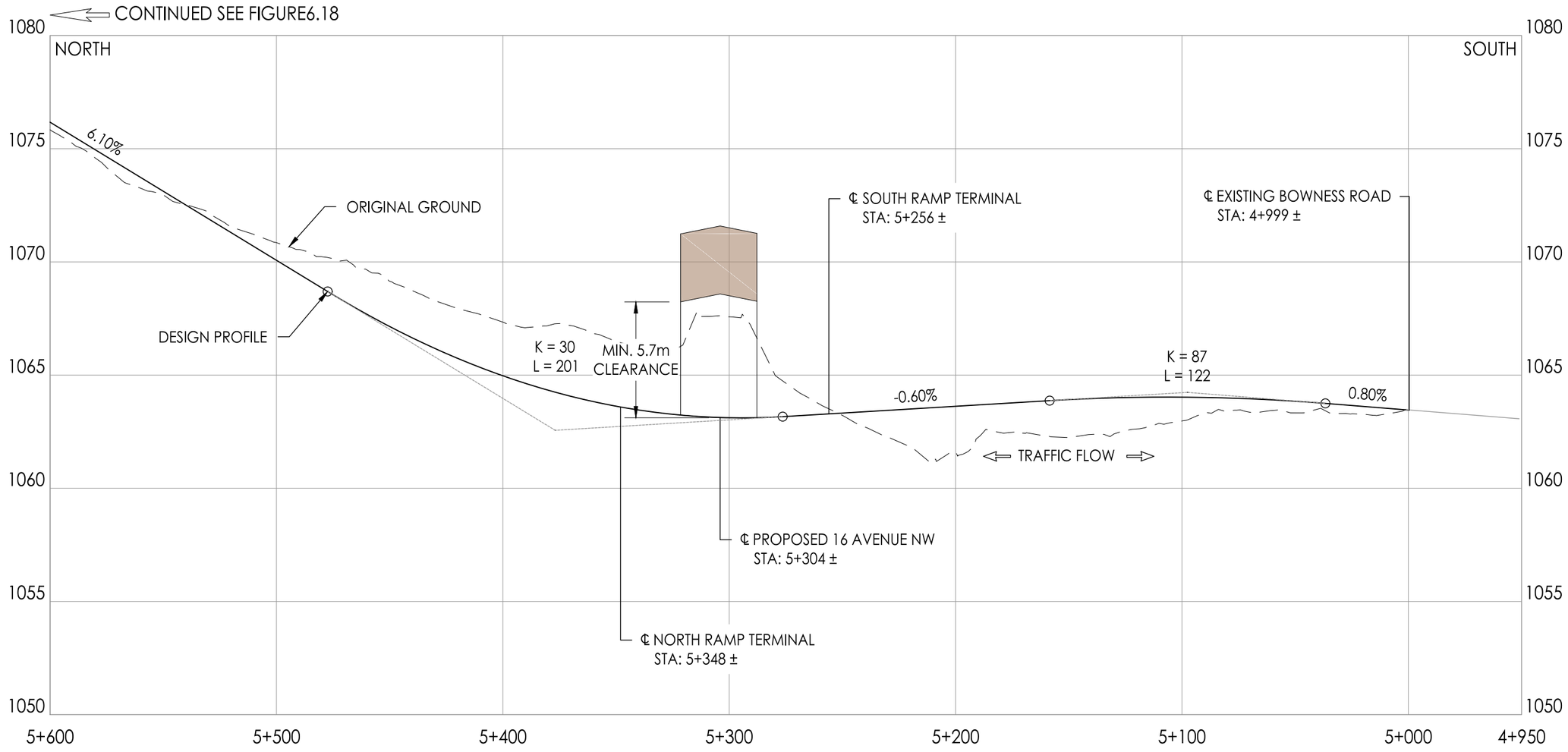
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.18

Title
SHAGANAPPI TRAIL NW PROFILE



SHAGANAPPI TRAIL NW

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

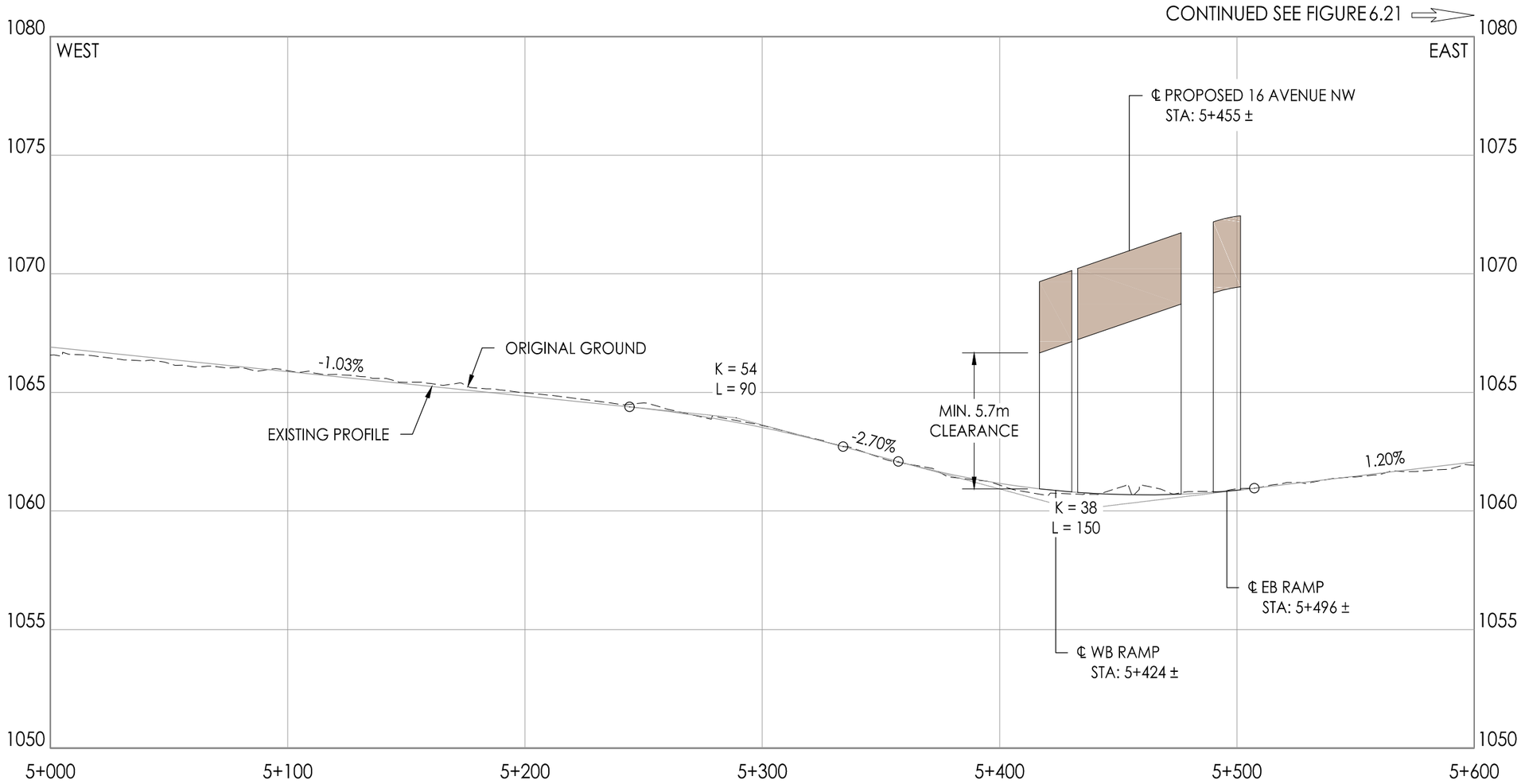
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.19

Title
SHAGANAPPI TRAIL NW PROFILE



EXISTING BOWNESS ROAD NW

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

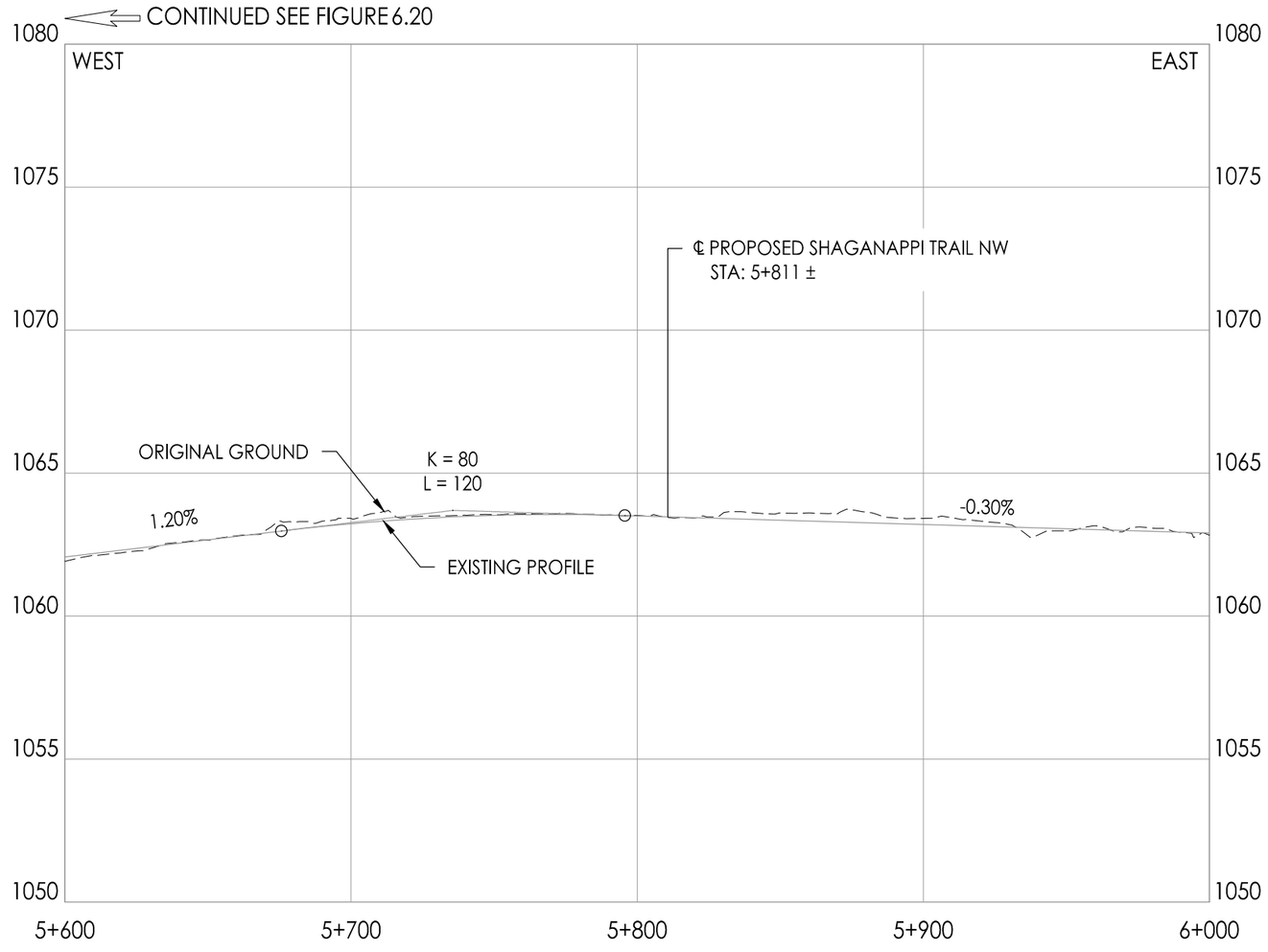
Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.20

Title
BOWNESS ROAD NW PROFILE



EXISTING BOWNESS ROAD NW

H 1:2000
V 1:200

NOT FOR CONSTRUCTION

JUNE 2018
113677973

Stantec
200-325 25th Street SE
Calgary AB
www.stantec.com

FINAL
RECOMMENDED
PLAN
MARCH 2018

Client/Project
THE CITY OF CALGARY
SOUTH SHAGANAPPI STUDY

Figure No.
6.21

Title
BOWNESS ROAD NW PROFILE

Appendix K LONG TERM CONCEPT TRAFFIC ANALYSIS

Stantec

Memo

To:	Madhuri Seera, P.Eng. Network Planning, City of Calgary	From:	David Thatcher, P.Eng. Stantec
File:	113677973	Date:	December 8, 2017

Reference: South Shaganappi Study – Transportation Analysis of Long Term Concept

INTRODUCTION

The purpose of this memo is to summarize the motor vehicle traffic analysis associated with the recommended long term concept; and review how this is related to the background and purpose of the study. This memo is organized into the following sections:

- **Background**. This section describes the transportation planning history for the study area, the project objectives set forth by the City, and a summary of the phases of work completed.
- **Preferred Concept**. This section provides a brief summary of the recommended concept.
- **Existing Conditions**. This section provides a summary of the existing motor vehicle traffic level of service within the study area for comparison purposes.
- **2048 Horizon Traffic Analysis**. This section summarizes the motor vehicle traffic analysis associated with the recommended concept.
- **2048 Horizon Sensitivity Analysis**. This section outlines a review of sensitivity for different diversions of traffic within the study area.
- **2048 Horizon Alternative Configurations**. This section summarizes potential options for the City to consider in the future dependent on how traffic volumes unfold in order to achieve desired levels of service for motor vehicles.

Please note that for simplicity, the City quadrant (NW) is not included in the road names referenced throughout this memo.

BACKGROUND

TRANSPORTATION PLANNING HISTORY

Shaganappi Trail serves as a vital link in Calgary's transportation network, providing connections to the Montgomery, Point McKay, Parkdale, Edworthy Park, and University Heights areas.

Historically, Shaganappi Trail was classified as an expressway (skeletal road) as per a 1970 Shaganappi Trail Functional Planning Study undertaken by The City of Calgary. The study recommended a major multi-level fully directional interchange at the junction of 16 Avenue, Bowness Road, Memorial Drive, and Shaganappi Trail. It also recommended that Shaganappi Trail be extended across the Bow River through Edworthy Park to connect to Sarcee Trail.

In 2009, Council approved the Calgary Transportation Plan (CTP). It reclassified Shaganappi Trail as an Arterial Street between Crowchild Trail and Bowness Road, and identified the corridor as a

primary route for transit, cycling and HOV (high occupancy vehicles). In addition, the CTP confirmed the previous 1995 Calgary Go Plan direction to eliminate consideration of a general purpose Shaganappi Trail river crossing through Edworthy Park to tie in with Sarcee Trail. This meant that Shaganappi Trail would no longer function as a north to south connector across the river.

A South Shaganappi Area Study Plan completed in 2011 recommended that a corridor study be undertaken as a result of the change in road classification provided by the 2009 Calgary Transportation Plan. A North Shaganappi Trail Corridor Study was undertaken and approved by Council in 2015. However, due to the complex nature at the south limit of the corridor, it did not address the tie in with 16 Avenue and Bowness Road . Therefore, the South Shaganappi Corridor Study was initiated in September 2015.

This study has worked with various stakeholders to determine the best means of addressing the challenges associated with the existing infrastructure and ensuring any recommendations meet the needs of the community.

STUDY OBJECTIVES

Through this study, both short-term and long-term recommendations that accommodate all modes of transportation and align with the CTP, the Municipal Development Plan, and adjacent community needs have been integrated.

Specifically, the study objectives set forth by The City at the commencement of the South Shaganappi Study were:

1. **Review and recommend infrastructure that aligns the future corridor plans for Shaganappi Trail with the CTP, the MDP, and adjacent land uses.**

2. **Identify what land will no longer be required for infrastructure.**

Six project accounts were developed based on community engagement and technical input. These accounts were utilized to evaluate and select the preferred concept option.

- Address safety for those who use and/or live by the corridor;
- Address accessibility across and throughout the corridor, reconnecting the adjacent communities of Montgomery and Parkdale;
- Accommodate all modes of transportation including walking, cycling, driving, HOV, and transit;
- Move people and goods in an efficient way, providing continuous traffic flow and a reduction in greenhouse gas emissions;
- Preserve and enhance land within the study area where there are opportunities; and
- Engage stakeholders and public, ensuring future designs meet the needs of the community.

The South Shaganappi Corridor Study Area is shown in **Figure 1** below.

Reference: South Shaganappi Study – Transportation Analysis of Long Term Concept

Figure 1: South Shaganappi Corridor Study - Study Area

PROJECT PROCESS

The study was divided into three Phases running from September 2015 to Winter 2017/2018 as summarized in **Figure 2**, detailed in **Figure 3** and described briefly below. A Community Advisory Group (CAG) was formed to help develop evaluation criteria and ensure community needs and interests were addressed and incorporated in the preferred concept.

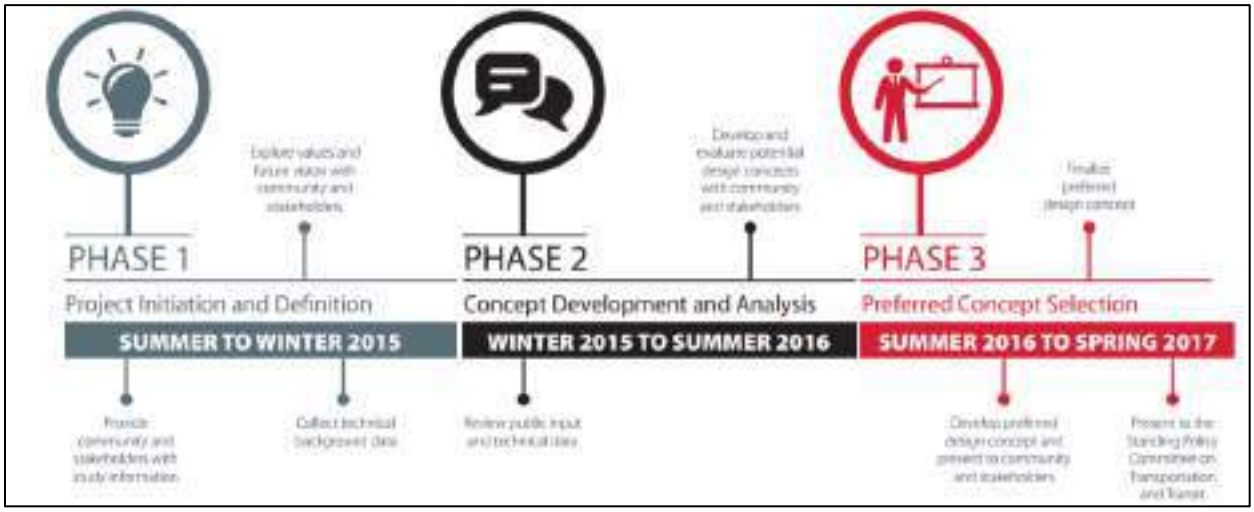


Figure 2: Schedule Flow Chart

Phase 1: Project Initiation and Definition

Phase 1 of the project provided area residents, businesses, and other stakeholders with an introduction to the study at an open house. Invited attendees were requested to provide their concerns, values, issues, and hopes for the study area. Information and input opportunities were also made available online. During this Phase, the CAG also had their first meeting. Input collected during this Phase was gathered and shared on The City's website. Available technical background data was also collected at this Phase.

Phase 2A: Concept Development

Phase 2 of the project involved reviewing public input and technical data gathered. Design Idea Workshops were held for adjacent communities and the general public to share ideas on changes to the study area. These workshops explored ways to achieve goals and objectives of the study and ideas were compiled in a "What We Heard" report available to the public. Design ideas, comments, and concerns captured in the workshop were reviewed by the project team where six common design elements were recognized. The study area was reviewed from a technical perspective during this stage, where five additional technical elements were identified. The CAG contributed to the review and refinement of design and technical elements. An online survey requesting feedback on the elements developed was conducted to gain an understanding of the community's vision.

During this Phase, five long-term recommendation concepts and a draft short-term recommendation were developed by the technical team using input from the engagement process. These concepts were presented to adjacent community residents and the public at public engagement opportunities and through online surveys. Feedback was gathered and presented to public in the "What We Heard" report.

Phase 2B: Concept Analysis

Short-term and long-term preliminary concepts developed using study objectives and community themes established in Phase 1 were evaluated at a public open house and through an online survey. Feedback was gathered and presented to the public in a "What We Heard" report and helped identify a set of draft recommended plans to be presented to Calgarians in Phase 3.

Phase 3A: Preferred Concept Selection

Draft short-term and long-term recommended concepts were reviewed with stakeholder groups during this phase. Calgarians were invited to provide final feedback on draft recommended plans through engagement opportunities. Review of public feedback, detailed technical analysis, and refinement of draft recommended plans were completed during this stage to select final recommended plans.

Phase 3B: Preferred Concept Finalization

Final short-term and long-term recommended plans are to be presented to the public followed by a final recommendation presented to Council for approval.

Reference: South Shaganappi Study – Transportation Analysis of Long Term Concept

PREFERRED CONCEPT

The tight urban diamond interchange was brought forth as the recommended concept in Phase 3A of the project as the outcome of a multiple account evaluation summarized in the South Shaganappi Study – Long Term Concept Evaluation Memo (February 10, 2017).

The preferred concept configuration is included as **Attachment A**. Some of the key elements of the preferred concept that are relevant to the analysis contained in this memo are the elimination of the eastbound ramp from 16 Avenue to Bowness Road and maintaining the split phase operations at the intersection of Shaganappi Trail and Bowness Road .

EXISTING CONDITIONS

The existing conditions within the study area have been documented in previous memos and has been included in this memo for comparison purposes. The analysis of the existing traffic volumes shown in **Figure 4** and the existing lane configurations graphically depicted in **Figure 5** were performed using Synchro 8. The summary of the existing conditions analysis is contained in **Table 1**.

2048 HORIZON – TRANSPORTATION ANALYSIS OF PREFERRED CONCEPT

During the concept development and evaluation process, a high level transportation analysis was conducted. The City's Forecasting division provided the 2039 forecast traffic volumes at that time. Adjustments were made to the 2039 forecast traffic volumes to better reflect development in West Campus and the Cancer Centre.

After the preferred concept was selected, the concept was refined and the transportation analysis was conducted in greater detail. During this refinement process, it came to our attention that the City's 2039 forecast model did not properly reflect the recommended improvements from the Crowchild Trail Corridor Study. Therefore, through discussions with the City and an extensive review of the City's forecast model assumptions, the 2048 horizon was used for the transportation analysis. The 2048 forecast traffic volumes provided by the City were modified to better reflect the West Campus development and the Calgary Cancer Centre. The AM and PM peak hour 2048 traffic volumes are shown in **Figure 6**. The results of the Synchro analysis are summarized in **Table 2**.

The detailed transportation analysis for the preferred tight urban diamond interchange concluded that a westbound free right turn and southbound free right turn should be included at the north interchange terminal to accommodate the anticipated demand identified in the 2048 forecast volumes. With these improvements in place, the north and south ramp terminals at the 16 Avenue / Shaganappi Trail interchange are generally expected to operate acceptably at the 2048 horizon.

However, the analysis indicates that the Shaganappi Trail/Bowness Road intersection is expected to experience operational deficencies at the 2048 horizon, with the lane configuration proposed in **Attachment A**. During the AM peak hour, the critical movement is the heavy southbound left turn movement, which is forecast to carry 1492 vph. This movement is expected to operate at a Level of Service (LOS) F with queues extending to approximately 311 metres which extends into the south ramp terminal intersection. During the PM peak hour, the westbound through and right, and the southbound left/through movements are expected to operate at LOS F with v/c ratios over 1.00.

2048 HORIZON – SENSITIVITY ANALYSIS OF DIVERSION TRAFFIC VOLUMES

In reviewing the 2048 forecast traffic volumes in comparison to the existing traffic volumes at the intersection of Shaganappi Trail and Bowness Road , we observed an approximately 25% increase in traffic volumes in the AM Peak period and a 29% increase in traffic in the PM Peak period. Recognizing that there are significant long term improvements planned for Crowchild Trail, we considered what would happen if more of the traffic traveled along 16 Avenue to Crowchild Trail rather than using Shaganappi Trail to Bowness Road .

We conducted an incremental sensitivity analysis at the Shaganappi Trail / Bowness Road intersection to determine how operations would improve if traffic diverted from the Shaganappi Trail-Bowness Road-Crowchild Trail route to Shaganappi Trail-16 Avenue-Crowchild Trail Route. The results of this analysis (at a variety of volume adjustments) are summarized in **Table 3**. **Figure 7** illustrates the anticipated queues at the Shaganappi Trail / Bowness Road intersection for the incremental sensitivity analysis. The results indicate that with a redistribution of the volumes by as little as 20%, the queues on the southbound movement at the intersection will no longer extend into the south interchange ramp terminal and the operations of the westbound right turn lane will improve.

2048 HORIZON – ALTERNATIVE CONFIGURATIONS

As noted earlier in this memo, the transportation analysis for the preferred concept with no diversion of traffic shows that the Shaganappi Trail / Bowness Road intersection is expected to experience operational deficiencies. Recognizing the potential for no diversion of traffic, we also considered several modifications that could be made to the preferred concept to address the operational deficiencies at the intersection of Shaganappi Trail and Bowness Road. Several of these modifications are not in line with the project accounts outlined at the outset of this memo, however we have included them in this analysis to demonstrate the options that have been evaluated. **Table 4** summarizes the results of the analysis for the alternative configurations at Shaganappi Trail / Bowness Road intersection described below.

<u>Remove South Leg of the Intersection</u>

This option relocates all-turns movements of the south leg of the Shaganappi Trail / Bowness Road intersection to the west of Shaganappi Trail along Bowness Road (essentially west of the existing parking lot on the south side of Bowness Road). The concept developed for this removal anticipates that a right-in/right-out could be maintained on the south leg of the existing intersection. Modifying the Shaganappi Trail / Bowness Road intersection to a T-intersection is expected to result in acceptable operations during the AM and PM peak hours. However, during the PM peak hour, the heavy free flow westbound right turn will continue to operate at a LOS F with a v/c ratio of 1.21.

<u>Maintain Eastbound Ramp from 16 Avenue to Bowness Road</u>

This option maintains the eastbound ramp from 16 Avenue to Bowness Road . With maintaining this ramp, the traffic volume for the southbound left turn at the Shaganappi Trail / Bowness Road intersection is reduced and is added to the eastbound through movement. With this ramp in place, the Shaganappi Trail / Bowness Road intersection is expected to operate slightly better with an overall intersection level of service E during the peak hours. During the AM peak hour, the eastbound through is expected to operate at a LOS F with a v/c ratio of 1.15 and the southbound

left turn is expected to operate at a LOS F. During the PM peak hour, the westbound free right turn will continue to operate at a LOS F with a v/c ratio of 1.23 and the southbound left is expected to operate at a LOS E with a v/c ratio of 1.01.

Lane Reversal Along Bowness Road

This option includes a lane reversal, providing three eastbound lanes during the AM peak hour only. With three eastbound lanes on Bowness Road , allows for a triple southbound left turn lane at the Shaganappi Trail / Bowness Road intersection. During the AM peak hour the intersection is expected to operate at an acceptable level of service. During the PM peak hour, the intersection will operate as per the preferred concept plan.

Summary of the Three Alternative Configurations

In summary, the three options evaluated above provide for better performance during the AM peak hour. During the PM peak hour, the free flow westbound right turn is the critical movement due to the heavy traffic volume of 1738 vph. The 95th percentile queues were also examined to determine if the southbound queues extend to the south ramp intersection at Shaganappi Trail / Bowness Road. The queues are graphically depicted in **Figure 8**. As shown in **Figure 8**, the T-intersection would significantly reduce the potential queuing at this intersection and is therefore the preferred modification to the recommended concept.

Reference: South Shaganappi Study – Transportation Analysis of Long Term Concept

SUMMARY

Based on the 2048 forecast traffic volumes provided for this study, the preferred interchange concept is anticipated to experience some operational deficiencies at the intersection of Shaganappi Trail and Bowness Road. Recognizing that there are significant long term improvements planned for Crowchild Trail, we considered what would happen if more of the traffic traveling along 16 Avenue to Crowchild Trail rather than using Shaganappi Trail to Bowness Road . With a diversion of as little as 20% from Shaganappi Trail to 16 Avenue, the intersections with in the study area are expected to operate at an acceptable level of service and with acceptable queues.

Should no diversion occur, we have considered several modifications to the preferred concept at the Shaganappi Trail / Bowness Road intersection to improve traffic operations. These alternative configurations were developed while being mindful of the overall project objectives. Should a modification to the preferred concept be required to accommodate the 2048 traffic volumes with no diversion, the best option that addresses the operational deficiencies at the Shaganappi Trail / Bowness Road intersection, is modifying the intersection to a T-intersection.

STANTEC CONSULTING LTD.

David J. Thatcher, P.Eng.
Senior Principal, Transportation
Phone: (403) 716-7981
Fax: (403) 716-8129
David.Thatcher@stantec.com

Attachment: Preferred Concept: Tight Urban Diamond

c. Arliss Szysky, Stantec Consulting Ltd.

Appendix L LONG TERM CONCEPT OPINION OF PROBABLE COST

Roadway							***Reference***
Interchange							
ACP	t	38299.32	$	125.00	$	4,787,400.00	*Interchange Spreadsheet*
GBC	t	87609.507	$	30.00	$	2,628,300.00	*Interchange Spreadsheet*
C&G	m	6097.78	$	100.00	$	609,800.00	*Interchange Spreadsheet*
Concrete Barrier	m	1747.91	$	250.00	$	437,000.00	*Interchange Spreadsheet*
Concrete Flatworks	LS	1	$	250,000.00	$	250,000.00	*Bowfort Interchange Preliminary OPC*
Pathway	m2	7500	$	40.00	$	300,000.00	*Calculated*
Bowness Road							
ACP	t	7003	$	125.00	$	875,400.00	*OPC Spreadsheet*
GBC	t	13423	$	30.00	$	402,700.00	*OPC Spreadsheet*
C&G	m	4328	$	100.00	$	432,800.00	*OPC Spreadsheet*
Concrete Flatworks	LS	1	$	863,905.00	$	863,900.00	*OPC Spreadsheet*
Pathway	m2	426	$	40.00	$	17,040.00	*OPC Spreadsheet*
43 Street							
C&G	m	42	$	100.00	$	4,200.00	*OPC Spreadsheet*
Concrete Flatworks	LS	1	$	41,201.00	$	41,200.00	*OPC Spreadsheet*
Earthworks							
Interchange							
Cut	m3	48600	$	10.00	$	486,000.00	*AutoCAD Drawing*
Import (1.2 Fill Factor)	m3	143000	$	20.00	$	2,860,000.00	*AutoCAD Drawing*
Bridges							
Shaganappi Trail	m2	2340	$	3,500.00	$	8,190,000.00	*AutoCAD Drawing*
Bowness Road	m2	2050	$	3,500.00	$	7,175,000.00	*AutoCAD Drawing*
NB/SB-WB Ramp	m2	600	$	3,500.00	$	2,100,000.00	*AutoCAD Drawing*
EB-NB/SB Ramp	m2	500	$	3,500.00	$	1,750,000.00	*AutoCAD Drawing*
43 Street Pedestrian Overpass	LS	1	$	10,000,000.00	$	10,000,000.00	*Structures Group: 90/Southland*
Retaining Walls							
West Bowness Road	m2	220	$	1,500.00	$	330,000.00	*AutoCAD Drawing*
East Shaganappi Trail	m2	500	$	1,500.00	$	750,000.00	*AutoCAD Drawing*
West Shaganappi Trail	m2	435	$	1,500.00	$	652,500.00	*AutoCAD Drawing*
North 16 Avenue	m2	80	$	1,500.00	$	120,000.00	*AutoCAD Drawing*
Other Interchange							
Storm Water	LS	1	$	5,000,000.00	$	5,000,000.00	*Bowfort Interchange Preliminary OPC*
Streetlighting	LS	1	$	2,500,000.00	$	2,500,000.00	*Bowfort Interchange Preliminary OPC*
Landscaping	LS	1	$	1,500,000.00	$	1,500,000.00	*Bowfort Interchange Preliminary OPC*
Removals	LS	1	$	3,000,000.00	$	3,000,000.00	*Bowfort Interchange Preliminary OPC*
Erosion and Sediment	LS	1	$	450,000.00	$	450,000.00	*Bowfort Interchange Preliminary OPC*
Guidesigns	ea	6	$	145,500.00	$	873,000.00	*Bowfort Interchange Preliminary OPC*
Other Roadways							
Bowness Road							
Shallow Utilities	LS	1	$	500,000.00	$	500,000.00	
Landscaping	LS	1	$	18,810.00	$	18,810.00	*OPC Spreadsheet*
Removals	LS	1	$	276,817.00	$	276,817.00	*OPC Spreadsheet*
Erosion and Sediment	LS	1	$	50,000.00	$	50,000.00	
43 Street							
Landscaping	LS	1	$	305.00	$	305.00	*OPC Spreadsheet*
Removals	LS	1	$	8,945.00	$	8,945.00	*OPC Spreadsheet*
				Subtotal	$	60,250,000.00	
				Contingency	$	18,070,000.00	
				Engineering / Testing	$	9,400,000.00	
				City Admin and Traffic Control	$	16,460,000.00	
				Total	**$**	**104,180,000.00**	

Does not include cost of land acquisition

Completed by:	MAB & AM 2017-05-24	
Contingency:	30%	
Engineering / Testing:	12%	*Bowfort Interchange Preliminary OPC*
City Administration and Traffic Control:	21%	*Bowfort Interchange Preliminary OPC*