

Trans-Canada Highway and Bowfort Road NW Interchange

Amendment to the 2007 Transportation Planning Study
FINAL REPORT UPDATE - EXECUTIVE SUMMARY



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Executive Summary

1.0 Project Overview

The City of Calgary (The City) and Trinity Development Group (Trinity) have entered into an agreement to revisit the Transportation Planning Study for the Trans Canada Highway (TCH) and Bowfort Road NW Interchange completed by ISL Engineering and Land Services in 2007 (the 2007 Study). This 2007 Study was presented to Council and its recommendations were approved to proceed to the next phases of design and construction.

Trinity is in the planning stages of developing the Winsport East Lands into a 48 acre large scale, high density, and fully integrated multi-use community and have submitted a development application for the project. The development lands are located on the south side of the TCH, between Sarcee Trail NW and Bowfort Road NW. This proposed development, currently referred to as Trinity Hills, includes plans to integrate the existing Canada Olympic Drive and will maintain the access it provides to Canada Olympic Park and all of its facilities.

Since completion of the 2007 Study, plans for the development of lands along TCH west of Bowfort Road (and West of Stoney Trail) have necessitated upgrades to the transportation network in west Calgary. Alberta Transportation (AT) has recently initiated the final stage of the Calgary Ring Road program which will involve design and construction of the South and West segments. The West segment will include the addition of a fourth leg to the existing systems interchange at TCH / Stoney Trail, a service interchange at TCH / Valley Ridge Boulevard, and will include the construction of the 'basket-weave' ramp connection from eastbound TCH to Bowfort Road. The planned developments in west Calgary along with the proposed Trinity development have advanced the need to upgrade the TCH / Bowfort Road intersection to a full movement interchange.

The previously recommended "tight diamond" interchange configuration as shown in **Exhibit ES1**, developed and recommended in the 2007 Study provided an adequate level of service for the existing land uses, background traffic growth, and other anticipated area developments at that time. The current Trinity Hills development application is proposing higher density land uses than previously anticipated as part of its new plan.

Several interchange configurations in addition to the "tight diamond" were investigated and concept level plans and details were compiled into a separate Design Brief for discussion with The City. The evaluation determined that a 'single point urban interchange' (SPUI) as shown in **Exhibit ES2**, provided the highest overall value. This conclusion and the supporting documentation was presented to The City, and the SPUI configuration was subsequently supported and carried forward to the next stage of design - Functional Design.

The SPUI configuration does not represent a material change from the "tight diamond" configuration recommended in the 2007 Study and approved by City Council, and therefore, in accordance with City practice, does not necessitate a new Transportation Planning Study. The general configuration, footprint and land area required to accommodate the revised configuration is very similar in scope and extent to the 2007 approved concept and therefore, as agreed by The City, the requirement for an extensive public engagement process has been reduced to providing an update to the private stakeholders and the general public.

The intent of this Study update is to document the process and analyses to support the recommendation that the SPUI configuration be adopted as the approved functional design concept to be progressed into the next stages of preliminary engineering, detailed design and construction. This includes review and approval by The City stakeholder groups,

Managers, Directors and City Council, and the engagement and support of external key stakeholders and the general public

2.0 Land Use

The land uses have not changed significantly since the 2007 Study although planning for area developments has progressed. On the North side of the TCH, the proposed Greenbriar development in the vacant land area northwest of the interchange has obtained land use approval for a commercial and residential mixed use plan. This development can only proceed when the TCH & Bowfort Road interchange is constructed along with improvement to the sewer system. The Greenwood Village Mobile Home Park is still in place with a change proposed to its principal access, Juniper Drive. This road is proposed to be closed in the future when this main access will be rerouted via the future Greenbriar Boulevard and the development.

On the south side of the TCH, the principal change is the application made by the Trinity Development Group which proposes a mixed use development in the area previously referred to as the Winsport East Lands. This development application proposes a higher density development with an increase in proposed building area and population. At the time of this Study update, the development application had been made and was awaiting review and approval for an amendment to the existing Area Structure Plan.

3.0 Traffic Analysis and Forecasting

3.1 *EXISTING TRAFFIC*

The existing traffic volumes within the study area were obtained from The City of Calgary's Traffic Data Division. The traffic data included counts at 16 Avenue NW (TCH)/Bowfort Road NW (October 2013), Bowfort Road NW/Bowridge Drive NW (July 2008), 83 Street NW/33 Avenue NW (August 2005) and 83 Street NW/34 Avenue NW (April 2012).

Traffic counts showed that the existing average daily traffic volume on the TCH are approximately 55,000 vehicles per day (vpd) west of Bowfort Road and 56,000 vpd east of Bowfort. The traffic on TCH is mostly comprised of commuter traffic to and from the downtown core, with a 70/30 inbound split in the AM peak period and a 60/40 outbound split in the PM peak period. Canada Olympic Drive is currently carrying approximately 8,000 vpd, with most traffic coming to and from the east and west of TCH. The AM peak period volumes are comparatively lighter than the PM peak period volumes. The daily volumes on Bowfort Road (north of TCH) are approximately 12,000 vpd and the daily volumes on 83 Street NW are approximately 6,000 vpd.

3.2 *TRAFFIC FORECASTING*

The City undertook a separate traffic forecast run within their Regional Transportation Model (RTM) that included consideration of development in the surrounding area to 2029 and 2039. Only the 2039 horizon was analyzed as it represented the larger of the two forecast data sets. As well, specific consideration was given to the western COP lands as controlled by Winsport, and as currently approved within their 2011 ASP, and as reflected in the approved 2010 DA Watt TIA.

3.3 TRAFFIC ANALYSIS

Based on the 2.5 million square foot baseline used as a basis for analysis in this study, the proposed Trinity Hills development is expected to produce approximately 2,455 total trips during the weekday AM peak hour and approximately 3,560 total trips during the weekday PM peak hour. Although not assessed as part of the TIA scope, it is noted that Saturday peak hour volumes are expected to be in the order of 3658 vehicles, thus very similar to the weekday PM peak hour.

The analysis of the post-development traffic volumes was completed for The 2039 horizon year based on forecasts of background traffic provided by The City, plus the site generated traffic noted above, and with due consideration of the traffic associated with the approved Winsport ASP as reflected in the 2010 DAW TIA. Based on the detail capacity analyses, the study intersections are generally expected to operate within acceptable capacity parameters in 2039 horizon.

The Bowfort Road NW and Canada Olympic Drive roundabout is shown to have significant 95th percentile queues during the PM peak hour in the eastbound direction as well as a LOS D/E. However, the eastbound queue will be contained on site and is not expected to impact the external road network.

The East Bowfort roundabout is expected to have an eastbound right queue of in the AM peak hour; a review of video simulation confirmed that it is unlikely to create significant operational issues.

The analysis completed as part of this study did not include right-in right-out access from the Bowfort Road and TCH interchange. The inclusions of the right-in right-outs would improve overall road operations and would serve to decrease the overall queues at this location.

Analysis for freeway segments confirmed that all locations exhibit a LOS D or better. The most critical locations expected to operate with some delays during the PM peak hour are at the Bowfort Road Northwest on-ramp and along the TCH (westbound) under Sarcee Trail.

4.0 Roadway Classification and Design Standards

The Bowfort Road and TCH interchange concepts have been designed in accordance with current standards provided by the City of Calgary 2012 Design Guidelines for Subdivision Servicing, the City of Calgary's 2011 Interim Complete Streets Guide, and by the Transportation Association of Canadian (TAC) Geometric Design Guide for Canadian Roads.

Table ES1 below summarizes each major roadway location, classification, and design speed.

Table ES 1:

Roadway	City of Calgary Classification	Design Speed
Trans-Canada Highway	Skeletal	80km/h
Interchange Ramps	N/A	70km/h
Bowfort Road	Local Arterial	50km/h
83rd Street NW	Collector	50km/h

5.0 Concept Plans and Evaluation

5.1 INTERCHANGE OPTIONS

The 2007 Study considered and evaluated several interchange configurations and recommended a “tight diamond” interchange as the optimal configuration at this location. The revised forecasts for traffic volumes and travel patterns led to reconsideration of several interchange configurations evaluated during the 2007 Study. Of these previous options, the SPUI configuration was identified as the most appropriate for reconsideration based on the new traffic demands. The SPUI's similarity to the approved configuration presented no material change to the form and function and therefore would not necessitate a full formal process to gain City and public approval of the revised concept.

Two additional concepts were developed as part of a separate exercise undertaken by the development application team for evaluation and consideration: an ‘elevated rotary’ configuration, **Exhibit ES3**, and a diamond with two roundabout intersections referred to as a “dogbone”, **Exhibit ES4**. These options are further detailed by Urban Systems in the November 2013 “Trans Canada Highway and Bowfort Road NW Interchange Concept Evaluation” Design Brief. The approved “tight diamond”, the SPUI, the elevated rotary, and the diamond with the roundabouts were evaluated as part of this previous design brief.

5.2 RECOMMENDED INTERCHANGE

The SPUI was evaluated as the most appropriate configuration. The City of Calgary supported the SPUI configuration as the best fit option to suit the particular environment, address the existing constraints, and accommodate the future and development generated traffic volumes. The SPUI configuration was not deemed to be materially different from the council approved ‘tight diamond’ interchange configuration. Therefore, public consultation scope could be limited.

The SPUI configuration provided the highest overall value based on its capacity to handle the forecast traffic volumes and patterns, access and connection compatibility with both the existing and proposed surrounding area developments, cost, constructability, and compact footprint.

USL and Trinity recommended that the SPUI be carried forward to functional design; The City of Calgary supported USL and Trinity's recommendation and functional planning proceeded for the SPUI interchange configuration at the TCH and Bowfort Road.

6.0 Roadway Plans

The TCH corridor upgrades and the construction of a new interchange at Bowfort Road are envisioned to be completed in a three stage process. These stages are similar to what was presented in the 2007 Study, with the key difference being the timing of each stage. These three key stages are:

6.1 STAGE 1: BOWFORT ROAD INTERCHANGE

This is the first stage proposed for the implementation of the interchange, which upon completion, will comprise the grade separation of the TCH and Bowfort Road, the completion of the ultimate bridge structure, all ramps, and all ultimate upgrades to Bowfort Road and 83rd Street. The construction limits of the TCH will tie to the existing highway on both the east and west ends.

Future TCH lanes will be realigned to the south and reconstructed at a revised profile grade to go under the Bowfort Road bridge structure. The eastbound and westbound TCH lanes will tie into the existing TCH alignment approximately 650m both east and west of Bowfort Road. The TCH profile is compatible with Alberta Transportation's design for the TCH-Stoney Trail interchange ultimate highway centerline and the northbound to eastbound/eastbound exit basket-weave ramp profile without the need for major centerline adjustments.

This stage is anticipated to be a short term implementation and will remain in place until the Stoney Trail West Ring Road, including the eastbound Bowfort Road basket-weave structure and all ramp connections is opened to the public. Stage 1 is illustrated in **Exhibit ES5**.

6.2 STAGE 2: STONEY TRAIL SOUTHWEST RING ROAD

During this stage, additional roadway construction is required between the TCH – Bowfort Road interchange and TCH – Stoney Trail interchanges to provide continuity of lanes to and from the next stage of upgrades at the Stoney Trail interchange. This includes the eastbound TCH to Bowfort Road basket-weave bridge structure, additional lanes on the eastbound TCH west of Bowfort Road to accommodate the basket-weave, and movements coming from the new connection to the south.

Stage 2 will be implemented as part of the Stoney Trail West Ring Road construction program which has been approved for Construction by the Province with an anticipated opening date of 2020. Stage 2 is illustrated in **Exhibit ES6**.

6.3 STAGE 3: ULTIMATE CONDITION

The ultimate TCH corridor east of the Bowfort Road interchange has not been explored in detail during this study as any corridor improvement options are contingent on the future improvement plans for the TCH / Sarcee Trail Interchange. It has been acknowledged by The City of Calgary and the design team that the historical Calts94 Trans-Canada Highway Corridor Planning Study completed in 1984 is no longer relevant as it pertains to the Sarcee Trail Interchange. The development of any ultimate concepts at Sarcee Trail is not within the scope of this report update.

6.4 BOWFORT ROAD NW AND ADJACENT BUSINESS ACCESS

The road network north of the TCH travels through a very confined area based on property, existing businesses, and their infrastructure and challenging topography. The proposed roadway designs have been adjusted to reflect comments received during the previous public consultation process which pertained to concerns about impacts to business access and property impact. Solutions were explored in the interest of minimizing the cross-section to reduce these impacts.

Access has been a focus in this study for both sides of the TCH with the proposed development on the south side of the TCH, and all the existing businesses along Bowfort Road and Bowridge Crescent to the north. It was understood from the previous public engagement feedback that effective and convenient access was a concern among all business owners and that the configuration proposed in the 2007 Study was not desirable from an access perspective. The goal of this update was to provide reasonable direct access to each business owner in a configuration with as little change to their current condition and without compromising traffic operations and the safety of all users. A plan identifying the proposed access locations and movements for the North side of the TCH is shown on **Exhibit ES7**.

On the south side of the highway, directly adjacent to the proposed Trinity Hills development, the design proposes two right-out exits directly to the interchange ramps. There is also a U-turn movement provided on the west side of the Bowfort Road bridge structure. Both right-outs, while not specifically required to achieve an acceptable level of service for the surrounding road network, do provide a convenience for direct egress from the development site without having to travel through the main roundabout within the development, south of the interchange. These right-outs can also provide additional capacity to access the interchange during special events. As each exit is an entry stop condition, the safety of any ramp traffic will not be impacted by normal use of these exits.

7.0 Property Acquisition

The recommended interchange plans will require property acquisition and protection at all stages of implementation. The City of Calgary has acquired a number of parcels on both sides of the Trans-Canada Highway over the past two decades however the adjacent commercial land to the north has generally developed without the necessary property acquisition to accommodate the previously approved interchange plan. Development Permits and the area developments have also generally not recognized long-term access management requirements on Bowfort Road, which will now need to be addressed with the area business community. The revised design and subsequent property impact recognizes these more recent developments that have taken place and aims to reduce the impact to these parcels and businesses.

A project property plan for the north side of the TCH, showing existing and required lands, is provided on **Exhibit ES8**. The total land required from all land owners on the north side of the highway is 0.132 ha or 0.326 acres.

The parcels to the south side of the highway will be integrated into the Trinity Development Outline Plan. A separate land exchange program is under development as part of the development application, the details for which are not finalized or presented in this study update. These parcels are identified on **Exhibit ES9**. The approximate land areas required, the ownership details, and relevant notes are also illustrated on the Exhibit.

8.0 Structural Planning

The recommended Single Point Urban Interchange (SPUI) plan will carry Bowfort Road NW (two through lanes and two left turn lanes in each direction) and Trans-Canada Highway ramps (two left turn lanes in each direction and one U-turn lane from EB TCH) over the Trans-Canada Highway at the location of the existing at-grade intersection. Pedestrian connections will also be provided on the east side of Bowfort Road. A preliminary bridge concept for the overpass has been developed for the purpose of roadway planning and cost estimating.

The structure consists of a two span bridge (approximately 18m-21m) and retaining wall structures at the head slopes of both abutments. With conventional abutment construction, rock anchor tiebacks will be required to stabilize the abutment piles behind the retaining walls. Other options may be evaluated to eliminate the rock anchor tiebacks such as a rigid frame bridge.

The crossing is at an approximate 84° skew, which is reflective of the independent constraints governing the Bowfort Road and Trans Canada Highway alignments. Bowfort Road is on tangent at the bridge location, however with the Trans-Canada Highway ramps and U-turn lane carried on the bridge, the outside edge of the bridge deck will be curved in plan. The bridge will also need to accommodate pedestrian access on the east side of Bowfort Road. A 2.5 m clear sidewalk connection has been proposed on the east side of Bowfort Road which would subsequently connect to the regional pathway system. The total bridge width will vary from 53.8m to 70.6m.

9.0 Stormwater Drainage, Utilities, Geotechnical and Environmental Planning

The stormwater management plan and drainage strategy, utility, geotechnical and environmental impacts are materially unchanged from the previous study, therefore all applicable recommendations pertaining to the above made in the 2007 Study have been reviewed and acknowledged. A summary of the key findings and noted revisions to this plan are detailed in the main report body.

10.0 Cost Estimates

The scope and limits of the cost estimate are based on the Stage 1 Opening Day design. GST is not included in this estimate as it is a no net cost item to The City of Calgary. Land costs are not included in these estimates as they are dependent on the individual negotiations to be undertaken by Corporate Properties during the future stages of design. An order of magnitude cost estimate was prepared and is summarized in **Table ES2**:

Table ES2:

Item	Description	Amount (\$)
1	General Requirements	4,250,000
2	Removals	3,000,000
3	Grading	4,100,000
4	Storm Drainage	3,100,000
5	Utilities	3,100,000
6	Pavement Structure	8,500,000
7	Concrete	3,200,000
8	Electrical & Signing	2,300,000
9	Landscaping & Fencing	1,750,000
10	Structures	14,800,000
11	Other	450,000
Construction subtotal		48,550,000
Contingencies (15%)		7,200,000
Engineering & Construction Management (30%)		14,500,000
Engineering and Contingency Subtotal		21,700,000
Project Total (Excluding Land Costs)		70,250,000

11.0 Public Engagement

The public engagement strategy for the TCH and Bowfort Road interchange Transportation Planning Study Update involved interaction with and communication between several key stakeholders, including land/business owners, community associations and the general public. The process endeavored to engage and inform the interested parties of the revisions to the design, changes to the development plans in the area and the revised timing for the design and construction of the interchange. The strategy included the following:

- May 28th Private Stakeholder Presentation

Trans Canada Highway and Bowfort Road
N.W. Interchange Functional Planning
Study Update - Executive Summary

- June 9th presentation to the Valley Ridge Community Planning Association
- June 11th presentation to the Bowness Community Planning Association

Due to the accelerated timeline relating to the implementation of this project, the public engagement process has not been fully completed at the time of this Study update's writing. All private stakeholder groups have been engaged and given the opportunity to provide feedback and input for any changes or revisions required to the current plan. Final public information sessions, planned for June 24th and June 26th have not yet been held.

Feedback received to date has indicated general support of the project by the private stakeholder groups and therefore, major objections from the general public relating specifically to the interchange are not expected at this time. Should this public information session return any critical feedback or objections that would alter the current plan, an amendment to this study shall be submitted to identify what that feedback was and how it was addressed including any changes required to the this study update.

12.0 Project Implementation

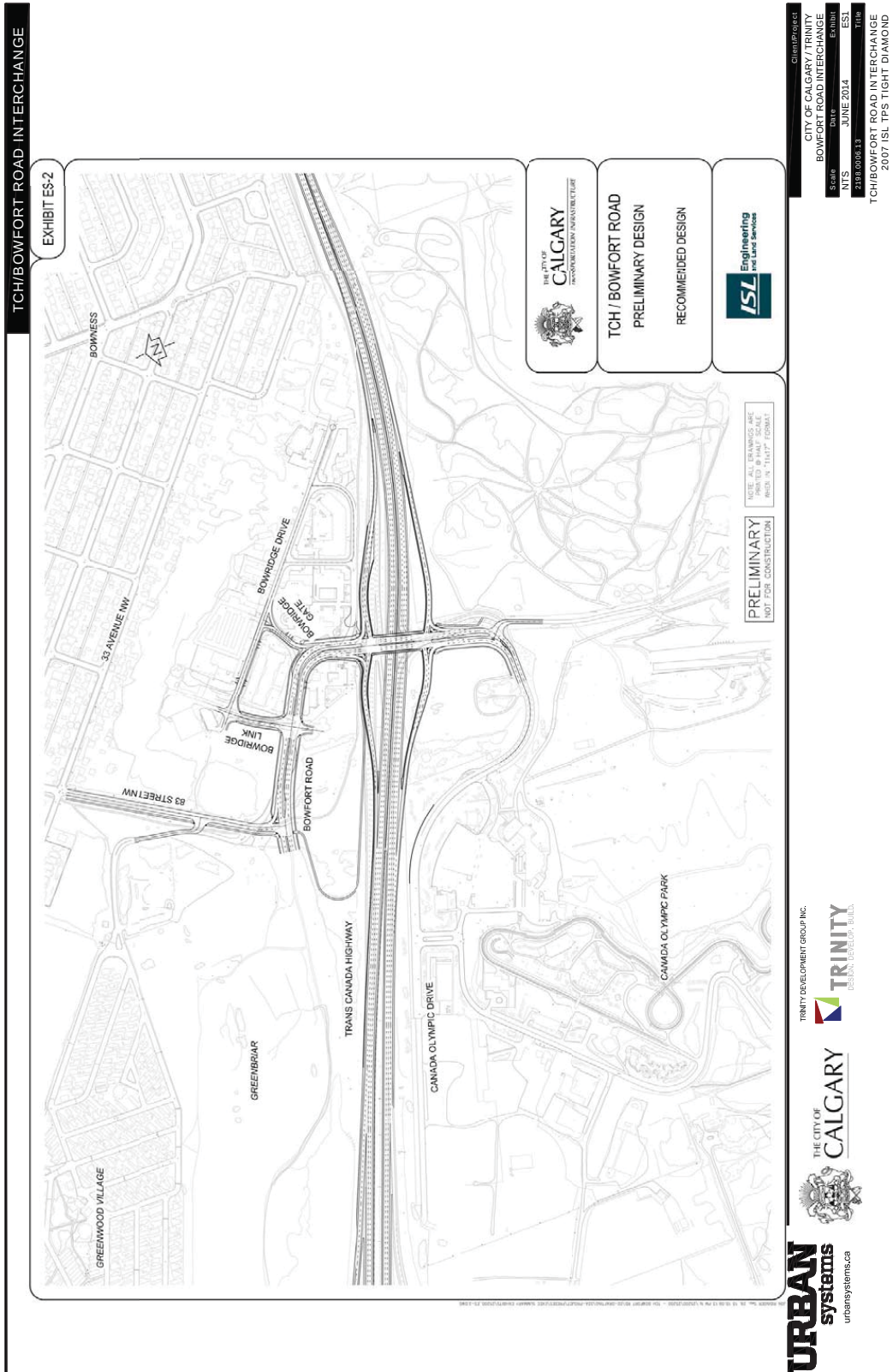
The update to the transportation planning study is the most recent step towards completing the construction and opening of this facility. **Table ES3** below summarizes the key milestones and timelines anticipated for the implementation of the interchange. Final details of the construction delivery are still under consideration, therefore the table considers the timing as it would relate to a conventional design, tender, construction model.

Table ES3:

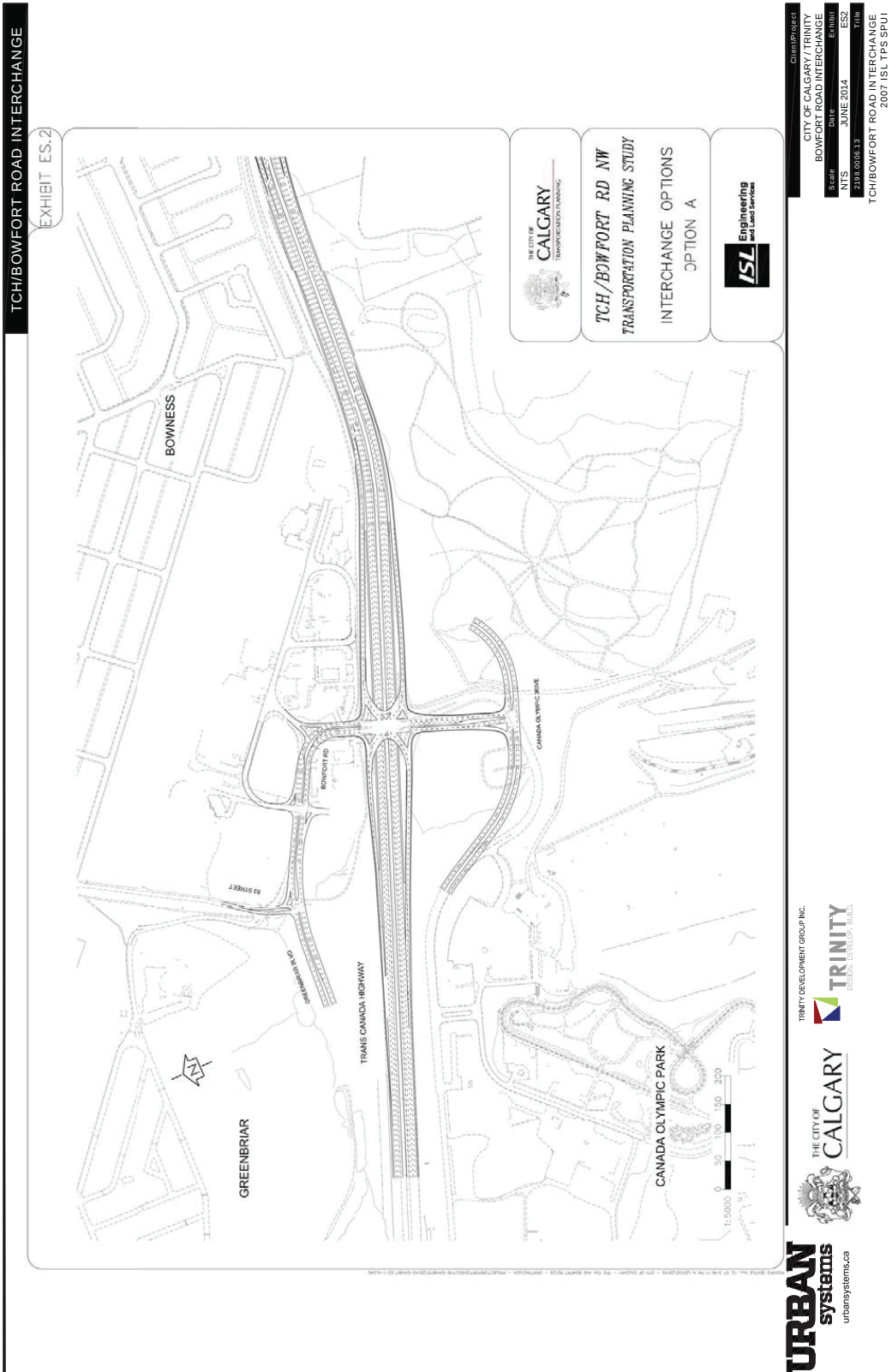
Activity	Timing
Submission of TPS Update	June 19, 2014
Completion of Public Engagement Process	July 11, 2014
T & T Committee Reading	July 18, 2014
Council Reading*	July 28, 2014
Preliminary Engineering	August – October 2014
Land Acquisition	August 2014 – August 2015
Detailed Design	November 2014 – May 2015
Tender	July 2015
Construction	August 2015 – August 2016
Final Acceptance	August 2018
Construction of Stoney Trail and Basket-weave connection	Tentative Completion 2020

*all activity timelines following this event are pending approval

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TCH/BOWFORT ROAD INTERCHANGE

BOWCLIFFE CR NW

TRANS CANADA HWY

ULTIMATE DESIGN

BOWFORT RD

BOWRIDGE DR

BOWRIDGE CR

BOWRIDGE LI

BOWRIDGE RD

BOWRIDGE CR

BOWFORT RD

83 ST NW

LIMIT OF STUDY

CANADA OLYMPIC DR 1

CANADA OLYMPIC DR 2

ON SITE RD

SE RAMP

NW RAMP

SW RAMP

ULTIMATE DESIGN

TRANS CANADA HWY

0 15 30m

NOTE: ALL MOVEMENTS WB-20

ROADWAY DESIGN SPEEDS	
TRANS CANADA HWY	100 km/h
ALL RAMP	70 km/h
83 ST NW	50 km/h
BOWFORT RD	50 km/h
POTARY	40 km/h

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THE CITY OF CALGARY

**CITY OF CALGARY/ TRINITY
BOWFORT ROAD INTERCHANGE**
Scale: 1:3000
Date: JUNE 2014
Title: TCH/BOWFORT ROAD INTERCHANGE ROTARY PLAN VIEW

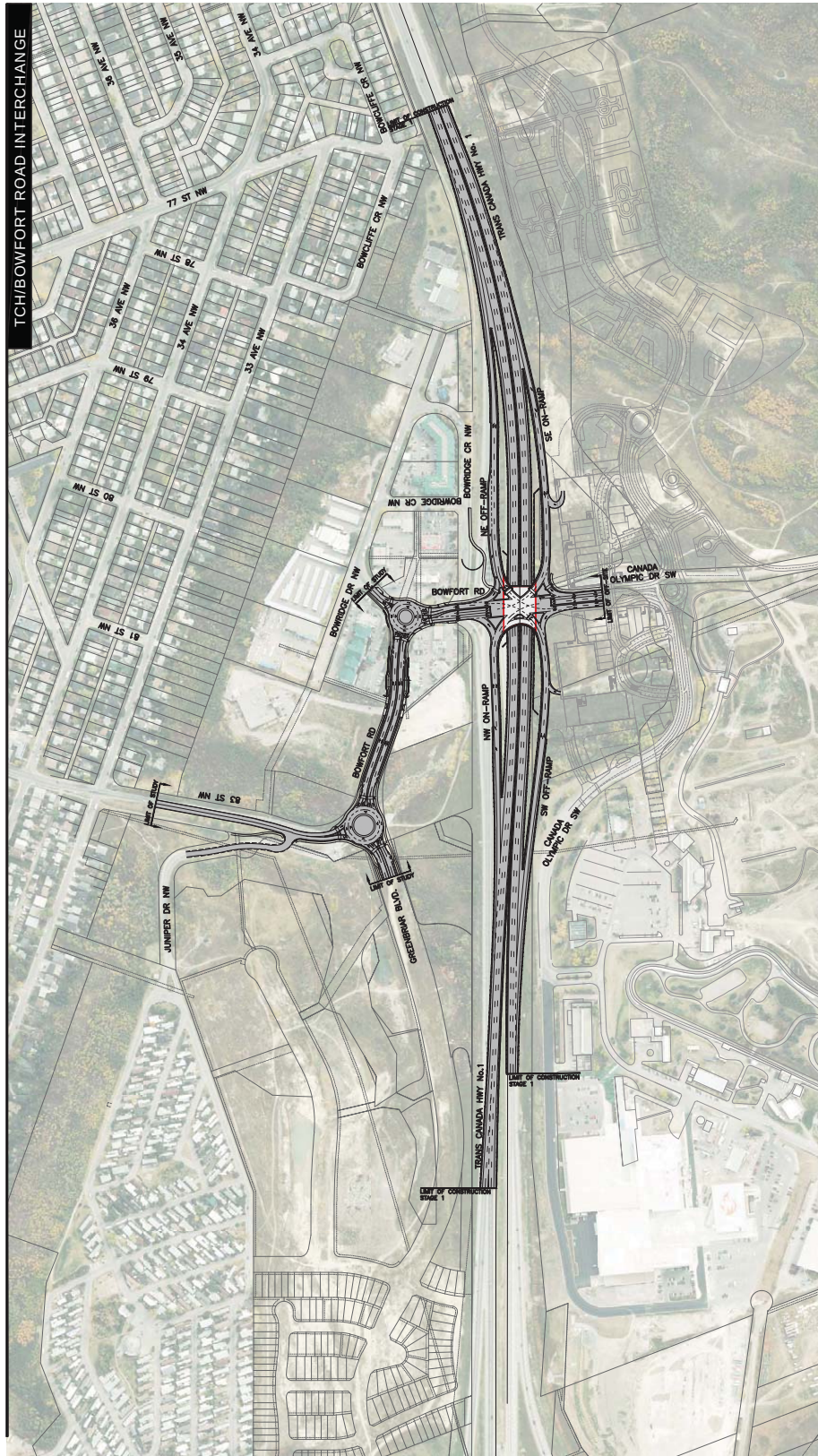
ROADWAY DESIGN SPEEDS	
TRANS CANADA HWY	100 km/h
ALL RAMP	70 km/h
83 ST NW	50 km/h
BOWFORT RD	50 km/h

NOTE: ALL MOVEMENTS WB-20

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BOWFORT ROAD INTERCHANGE
Scale: 1:3000
DATE: JUNE 2014
Title: TCH/BOWFORT ROAD INTERCHANGE DOGBONE PLAN VIEW

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Client/Project
CITY OF CALGARY / TRINITY
BOWFORT ROAD INTERCHANGE
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Date
JUNE 2014
Exhibit
ESS
Title
TCH/BOWFORT ROAD INTERCHANGE
RECOMMENDED CONCEPT



This aerial map illustrates the proposed TCH/Bowfort Road Interchange. The map shows the intersection of Bowfort Road and Trans Canada Highway (TCH). Key features include:

- Proposed Interchange:** A large, multi-level interchange structure is shown, with ramps for both directions of travel on Bowfort Road.
- Existing Infrastructure:** The map shows existing roads, including Bowfort Road, Canada Olympic Drive, and Trans Canada Highway. It also shows the location of the TCH station and the proposed interchange structure.
- Labels:** Various road names are labeled, including Bowfort Rd, Canada Olympic Dr, Trans Canada Hwy, and others. The map also shows the location of the TCH station and the proposed interchange structure.
- Scale:** A scale bar is provided, indicating distances in meters and kilometers.
- Orientation:** A north arrow is located in the top right corner of the map.

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ROADWAY DESIGN SPEEDS	
TRANS CANADA HWY	80 km/h
ALL RAMPS	70 km/h
83 ST NW	50 km/h



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TCH/BOWFORT ROAD INTERCHANGE

INTERCHANGE CONCEPT PLAN - STAGE 2, SWRR OPENING DAY

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