

Executive Summary

Prince Albert is Saskatchewan's "Gateway to the North": one of the key economic centres of the province. Saskatchewan's economy is largely dependent on exports; therefore transportation costs have a significant impact on competitiveness. There has been a significant modal shift in the transportation of bulk commodities from rail to road, resulting in significant increases in truck traffic and highlighting the importance of the road network. Currently the Diefenbaker Bridge is the only bridge crossing of the North Saskatchewan River for over 120 kilometers in either direction. The Highway 2 and Highway 11 route is a critical National Highway System corridor for providing goods and services to the north. This corridor is twinned from Regina to Saskatoon and currently is in the process of being twinned from Saskatoon to Prince Albert.

In September 2011 the Diefenbaker Bridge had a major girder failure. The initial findings indicated that one of its girders underwent a brittle fracture, referred to as Constraint Induced Failure (CIF). CIF is largely non-detectable and can result in unplanned loss of service, costly repair, concern regarding the safety of the structure and the potential loss of life. Due to the emergence of the fracture, a load restriction of 15 tonnes was placed on the structure to ensure safety. This load restriction had a considerable effect on the kinds of vehicles that were able to move across the bridge. Repairs have been effected which should allow this structure to attain its typical 75 year primary weight capable service life, which means it will be in service for primary weight trucks for another 25 years. The business case analysis for the second bridge crossing was guided by these assumptions in regard to the future capacity of the Diefenbaker Bridge.

The Diefenbaker Bridge in Prince Albert is the primary link that connects the southern part of the province to the north. With no other crossing, heavy truck traffic had to be rerouted – adding a significant cost for the businesses in and around Prince Albert in terms of losses or added expenses – following the discovery of the failure and the subsequent traffic and load restrictions imposed for public safety reasons and to permit the repairs to the structure.

These events elevated the need to carefully assess the case for a second bridge in the Prince Albert area. In 2011 following the fracture, representatives from the Ministry of Highways and Infrastructure met with representatives from the City of Prince Albert to discuss the issue of a second bridge river crossing. The outcome of the meeting was an agreement to work collaboratively on a study to review the need and benefits for an additional river crossing in close proximity to the east city limits of Prince Albert. In May 2012 the Ministry of Highways and Infrastructure (MHI), in partnership with the City of Prince Albert, the Rural Municipality of Buckland and the Rural Municipality of Prince Albert commissioned Stantec Consulting Limited (Stantec) in conjunction with McNair Business Development Incorporated (McNair) to undertake a study investigating the economic benefits of a second bridge in the Prince Albert vicinity for the region as well as the province of Saskatchewan. The study area for the additional river crossing was defined as "in close proximity to the east urban city limits of Prince Albert and west of the Highway 55/Highway 376 intersection.

The original study objectives as defined in the Terms of Reference remained consistent as detailed below. However as the study evolved, the scope of the assignment was expanded to address the issues and concerns raised over the course of the consultations with the stakeholders from the Prince Albert Area communities and businesses as well as those of the agencies responsible for the infrastructure associated with the movement of goods and people. The three tangible outputs of the study included:

- A preliminary recommendation for bridge location;
- The integration of the proposed crossings with the existing municipal and provincial transportation systems; and
- A business case identifying and quantifying key considerations.

The first part of this study was defining and evaluating planning-level locations for a second river crossing in the Prince Albert vicinity, all east of the urban developed area. The investigation included:

- A review of historical studies;
- A desktop review of Lidar survey information;
- A desktop geotechnical review;
- A desktop heritage review;
- An environmental pre-screening assessment;
- A desktop analysis of the right-of-way requirements;
- A review of the existing municipal plans for land-use and development; and
- Consultations with the project partners, as well as identified stakeholders and advisors.

Once the bridge crossing locations had been defined, the integration of these with the existing municipal and provincial transportation systems including an assessment of interdependence and desirable scheduling of key intersections and roadways associated with the second river crossing followed.

Through these processes, the business case was being identified and quantified based on the following:

- Costs associated with construction and operation of a second bridge and the associated roadway (system planning level);
- Costs incurred by citizens and businesses as a result of the 2011 structural issues with the Diefenbaker Bridge; and,
- Economic benefits and expected outcomes, including the quantification of freight movement efficiency improvements the increased load-carrying capacity of a new bridge would bring, as opposed to the existing Diefenbaker Bridge.

PRELIMINARY BRIDGE LOCATIONS/ROUTE ALIGNMENTS

In locating a potential bridge site, several factors were considered including:

- Width of the watercourse (narrower is better);
- Tangential reach of the river (reduced degradation or aggradation);
- Free of mid-stream islands or sand bars; and,
- Presence of rock outcrops or other areas of stable valley walls.

For this project, there are limited locations in close proximity to the City that display reasonable conditions for a new bridge, especially considering the extent of existing development in the area. The preliminary investigations identified three locations for a river crossing. It is expected that any of these sites will require river protection works (guidebanks) to ensure the integrity of the abutment fills for the bridge structure. These include:

Bridge Location/Alignment 1 is located 5.3 km downstream of the 2008 recommended bridge site (Bridge Location 3), directly east of the airport. In this location, the alignment of the river migrates from being along the south bank to the north bank, constrained only by the ancient valley walls and not the shallow river banks. This site is directly north of Rabbit Island where the bed width is about 340 metres. From a review of the historical air photos it appears that the river width has narrowed by about 120 metres due to sedimentation of the left / west bank. It is expected that a bridge in this location would be in the order of 445 metres in length (assuming 2:1 headslopes). A preliminary review of possible gradelines on the structure indicates either a tangential slope of 0.5 percent rising to the north or a long crest curve vertical alignment may be suitable. The orientation of this crossing is NW-SE due to the alignment of the North Saskatchewan River. On the east side of the watercourse is a large flood plain area, similar to the land where the airport is located. On the east side of the river, the existing ground elevation is between 422 metres and 425 metres whereas west of the river the natural ground is between 418 metres and 427 metres. The ancient river banks are about 900 and 1,400 metres from the current north and south river edges, respectively.

Bridge Location/Alignment 2 is located another 2.3 km further downstream of Bridge Location 1. At this site, the river is tight against the north ancient valley walls and the large flood plain described previously is directly to the south. The bed width of the river at this site is about 310 metres. The elevation at the top of the north bank is 440 metres. It is expected that a bridge in this location would be in the order of 425 metres in length (assuming 2:1 headslopes). To the south of the watercourse is a wide flood plain, as wide as 2,000metres, with elevations as described previously. A preliminary review of possible gradelines on the structure indicates a tangential slope of 1.3 percent rising to the north is possible.

Of all the recommended routes/river crossings from the previous transportation studies, only one met the basic criteria defined in the Terms of Reference for this study. Identified as Alignment 3, this location was first proposed in the 2008 study which investigated several alignments both west and east of the municipal limits of the City of Prince Albert. This alignment, close to the City, has a short extra travel distance from those at of the other proposed crossings and, therefore, has the potential for

greater use by local residents. Reviewing this alignment indicated that this route could potentially impact nine existing developed properties directly (within the proposed right-of-way), with an additional eleven developed properties indirectly (within 40 metres of the proposed right-of-way). If interchanges were to be constructed in the above noted locations, an additional five developed properties could be affected. This routing was eliminated from the business case analysis given there were characteristics which were considered problematic:

- Directly east of the proposed Highway 2/11 junction, the route traverses through two parcels of land having First Nation status (as per Map 1, Prince Albert Planning District – Official Community Plan by Crosby Hanna & Associates (09/12/02)).
- The proposed routing appears to directly impact the J.W. Oliver Pollution Control Centre (Waste Water Treatment Plant).
- The proposed external route compromises future long-term expansion plans of the Prince Albert Airport, specifically the westward extension of the runway as per the Prince Albert Municipal Airport Master Plan (Figure 8-1, February 2009).
- Numerous residential properties (east and north of the City) are impacted by the proposed routing.

All three options were assessed based on the following criteria:

- Route length;
- Route length through water areas;
- Possible impacts to airport expansion;
- Impact to conservation areas;
- Tree clearing areas;
- River flood plain embankment;
- Potential interchanges;
- Unique interchanges;
- Assumed bridge length;
- River crossing angle;
- Railway crossings;
- Impacted First Nation Status Land; and,
- Development impacts.

In selecting optional routes, the study included a geotechnical review, a heritage review, and an environmental review.

KEY FINDINGS

- The first step of this current study was to identify alternative suitable locations for a new bridge on the North Saskatchewan River east of the Prince Albert Municipal Airport. Three river crossings and route corridors were investigated including one from the 2008 Prince Albert Area Transportation Planning Study, Final Report. This route recommended in the 2008 study was added to the two bridge river crossings and corridors for review and analysis. These locations were about 5.3km and 7.6km downstream of the previously recommended bridge crossing.
- Two alignment routes were developed that would connect to Highway 2 south and north of the City of Prince Albert via the identified river crossings. The proposed alignments would require 32.9km or 37.0km on new highway construction.
- Both alignment concepts were developed based on a capacity for a phased construction program. Both alignments, if implemented in phases, have varied benefits from those defined when only considering the ultimate alignment. As such, multiple scenarios for the future alignment are good from a planning perspective. If the decision is to be based only with consideration for the ultimate, then Alignment 1 would be the preferred option. However, if only assessing the first phase of the two alternatives, then Alignment 2 - Phase 1 may prove to be the most cost effective with the future option of extending it to connect to Highway 376 as defined in Alignment 2 - Phase 2 (to Highway 376).
- The economy and social well-being of Prince Albert and area and northern Saskatchewan are inextricably linked to the reliability of the Diefenbaker Bridge and the connecting provincial highway system. This transportation network provides critical access to medical, educational and emergency services. It also supports a growing and thriving northern tourist industry and a vital supply line for northern residents, businesses, and resource companies.
- The vehicle weight and over-width restrictions on the Diefenbaker Bridge that commenced on August 30, 2011, have cost the provincial economy in the order of \$14.2 million over the first six months of restrictions on the bridge. This cost resulted from delays on the bridge, rerouting of trucks, and/or hauling at reduced weights and were incurred by a wide range of bridge users, including businesses, tourists, trucking companies and area residents. School boards, homebuilders, sanitation firms, municipal fire services, and others were also impacted. If a second bridge can prevent future economic losses equivalent or greater than the proposed construction cost, then it could be stated that the project is economically beneficial.
- There is strong support for a second bridge among resource companies and transporters, as well as area residents who attended the open house in Prince Albert.
- Traffic projections estimate that annual traffic on the Diefenbaker Bridge will reach 8.5 million crossings in 2025 and 9.2 million crossings in 2040. This is within the capacity of the bridge. Based on traffic division scenarios to a second bridge, it is estimated a second bridge would experience annual trips between 1.5 million and 587,000 by 2025. The Diefenbaker Bridge traffic would subsequently drop from about 8.5 million by 2025 to between 7.9 million and 6.9 million crossings annually. Based on these projections, a second bridge would be underutilized.

Moreover, the lack of existing and unforeseen congestion on the Diefenbaker Bridge suggests a second bridge would have a minor impact, if any, on freight movement efficiency, traffic delays or harmful emissions.

- The construction of the Alignment 1 project would generate about \$49.0 million in government revenues between 2012 and 2017, with the Federal Government collecting \$33.6 million, \$10.3 million going to Provincial Government coffers and the remaining \$5.1 million to local municipalities. The other construction benefits for the provincial economy are the creation of an estimated 1,398 person-years of construction employment and a cumulative impact of \$114 million on the provincial gross domestic product.
- A second option, Alignment 2 - Ultimate, was developed. The probable cost estimate for this option was \$154.3 million.
- A third option was evaluated. This alignment was assessed based on various criteria similar to that applied for the other options. This potential river crossing was discarded due to many characteristics being problematic. As such, no opinion of probable cost was prepared for this proposed alignment.
- The study looked at phased construction thereby significantly reducing the implementation cost in the short-term. The construction of the Alternative 1 river crossing would be undertaken in two stages with the first stage running from the south connection at Highway 2 northerly to a new interchange at Highway 55. The probable cost for this first phase would be approximately \$120 million for both the bridge and the connecting roadway network. No maintenance costs have been included in the analysis as part of this study. It is estimated that the project would have a total government fiscal impact of \$38.9 million of which \$26.6 million would be federal, \$8.2 million provincial, and \$4.1 million municipal. Furthermore the construction would also create 1,110 years of construction employment within the province and add a cumulative \$90 million impact on the provincial gross domestic product of which \$63.3 million would be to the Prince Albert region.
- Based on information provided by the Saskatchewan Ministry of Highways & Infrastructure, the annual maintenance costs have been estimated at approximately \$11.5K per kilometre of two-lane rural highway. Based on the two alignments proposed in this study that would amount to \$375K per year for Alignment 1 Ultimate and \$420K per year for Alignment 2 - Ultimate. If assessing the staged alignments then Alignment 1 Phase 1 would be \$245K per year and \$255K per year for Alignment 2 Phase 1. These figures only include the maintenance/operational costs for the new roadway alignments and do not include any maintenance and/or operational costs for the new bridge.
- While the actual volume of movements of dangerous goods traveling along 2nd Avenue West and over the Diefenbaker Bridge was not identified in this report, the consultants are confident the number is more than 5,000 loads annually. There were no dangerous goods collisions between 2009 and 2011 on 2nd Avenue West or the bridge.
- Transportation of dangerous goods (hazardous materials) in Canada by road is a provincial responsibility. In Saskatchewan the federal transportation of dangerous goods act and regulations has been adopted in whole via provincial legislation. This includes the guidelines for emergency

response plans. The study also found that whereas it is not the most desirable of scenarios, Prince Albert was no different than the other fifteen cities in the province with respect to the transportation of hazardous materials transported through its urban areas.

- In 2010, Prince Albert had 1.63 collisions for every 100 population. This was much lower than Saskatoon with 2.31 accidents per 100 population and Regina and Moose Jaw with 2.54 and 2.02, respectively. Logically the construction of a second bridge should reduce accidents in Prince Albert, but some of these accidents would likely be transferred to the second bridge.
- The concerns for the existing structure are not with its current and long-term capacity but rather with its functionality and service levels to 2040 and beyond. Only through the defined rehabilitation and maintenance program can this be achieved and, even then, there is always a possibility of a need for emergency repairs to the structure.
- Should the decision be made to proceed with a second bridge river crossing it was agreed that the City of Prince Albert and the Saskatchewan Ministry of Highways and Infrastructure would have to begin negotiations for a new agreement under the Urban Highway Connector Program (UHCP) such that responsibility for funding each asset including 2nd Avenue West north and south of the Diefenbaker Bridge, the existing structure and the new highway & bridge.
- The Saskatchewan Ministry of Highways and Infrastructure confirmed their on-going commitment to the current Urban Highway Connector Program (UHCP) agreement for the maintenance and operation of both ends of 2nd Avenue West through the City of Prince Albert and the Diefenbaker Bridge.

COMMUNICATION AND ENGAGEMENT PLANNING

A number of stakeholders were identified throughout this study. Key issues that emerged from the stakeholder and public engagement included safety, structural integrity, reliability, and location/routing.

Communications that should be considered going forward should highlight the following:

1. A second bridge is not currently warranted based on the findings of this study.
2. The Province and City have a firm commitment to adhere and implement all the maintenance requirements thereby assuring the Diefenbaker Bridge remains structurally sound for the remainder of its design life expectancy of twenty five years.
3. Traffic volumes and type, including servicing the growing industrial and agricultural development will not exceed the capacity of the existing bridge in the foreseeable future.
4. Key factors which would precipitate the development of a second bridge should be identified.

Aboriginal Engagement

Our study examined First Nation Reserve and Treaty Land Entitlement lands that may be impacted or located in close proximity to the development as well as Crown Lands in proximity to each of the routes. The report provides a brief review of historic land use within the area including the

identification of lands with potential significance to Métis heritage and identity. This information will serve as background work to future engagement. All recommendations are based on an understanding of accepted frameworks, standards, and best practices for conducting Aboriginal Engagement in the province of Saskatchewan.

A number of First Nations and Métis Locals to be contacted and included in the consultations should the decision to proceed with a second river crossing would include but not be limited to:

- Prince Albert Grand Council;
- Saskatoon Tribal Council;
- Métis Western Region II; and
- Métis Northern Region I.

It will be determined at that time if traditional land use and occupancy information is available regarding the development footprint for those stakeholders wishing to be consulted and whether the data can be made available and at what cost. If this data has not been collected, Traditional Land Use and Occupancy Studies may be required for the successful completion of consultations.

Public Open House

Recognizing the importance of communicating and engaging with the public a Public Open House was held on Tuesday, July 31st, 2012 in Prince Albert at the Forestry Centre. Approximately 100 members of the public attended, 68 of whom completed feedback forms.