

EXECUTIVE SUMMARY

The purpose of this study is to develop functional plans for the twinning of approximately 40 km of Highway 2, from north of Morinville to north of Clyde. The discontinuity of Highway 2 at the crossing of Highway 18 (near Clyde) has long been an issue, both from an operations and safety standpoint. This report presents staging plans to eventually develop a continuous highway alignment for Highway 2. In addition, this study evaluates potential interim safety and capacity improvements that may delay the need for twinning. The report includes an access management plan to support the twinning of Highway 2, and interchange configuration plans.

Highway 2 will be designated to a RAD-412.4-120 standard with 40m centerline spacing. At major intersections the centerline spacing will be increased to 55m to accommodate Long Combination Vehicles (LCVs), as well as providing opportunity of staged Highway 2 crossing. In terms of vertical profile, it is expected that new construction will match the existing gradeline.

Based on Alberta Transportation's Average Annual Daily Traffic (AADT) records, the existing traffic (2010) on Highway 2 is between 3240 to 6800 vpd (vehicles per day) depending on location. Based on traffic projections for the 20 year horizon, the existing roadway south of the Legal access (Highway 651) is expected to operate at a Level of Service (LOS) D and at LOS C to the north.

In preparation for twinning, an evaluation of the side of widening was conducted. The following recommendations were given for the side of widening:

- From the south limit of the project to Riopel Road (Township Road 564): widen on west side.
- From Riopel Road to the curve north of Highway 651: widen on west side.
- Between the curves north of Highway 651: widen on east side.
- From second curve north of Highway 651 to the curves at Township Road 590: widen on west side.
- From Township Road 590 to Clyde Corner (Highway 18): widen on east side.
- From Highway 18 to the north limit of the project: twin along a new alignment.

The side of widening will be transferred from west to east via transitions through existing curves. The radii of these curves can be improved in the process.

At the south end of the project, there are existing substandard reverse curves to the north of Morinville that are recommended to be improved to R1200 at a cost of \$7.9 Million.

It is anticipated that signals will be warranted at the intersection of Highway 2 and Highway 651 (Legal access) within 8 years, at the west junction of Highway 2 and Highway 18 within 2 years, and at the east junction of Highway 2 and Highway 18 within 16 years.

The proposed interim improvements at the intersection of Highway 2 and Highway 651 include:

- All redundant accesses to Highway 2 are to be removed, with access only via Highway 651 and service roads.
- The depressed median on Highway 651 at the east approach is to provide separation between left turning vehicles from the north and left turning vehicles from the east, while still locating the stop line in its typical location.
- The directional depressed island in the southeast quadrant is to provide a divergent path for east turning traffic from the south, allowing a stopped vehicle the ability to see along turning vehicles and view mainline traffic.

Considering that the intersection at Highway 2 and Highway 18 is in a relatively isolated location and signals are not safe, roundabouts have been proposed as an interim solution. Signals in rural, isolated environments are unexpected, resulting in inappropriate driver behaviour, including speeding, running red lights, abrupt stopping, and disobeying the control when there is no traffic. Roundabout control provides the physical layout to make drivers slow down, while signals do not. The higher the speed at the intersection, the more severe collisions; hence the roundabout option is more appropriate than signals. Ultimately, it is anticipated that interchanges will be built at both Highway 651 and Highway 18.

Historically, the intersections of Highway 2 and Highway 651, and of Highway 2 and Highway 18 have higher than average collision rates.

Along the existing alignment of Highway 2, there are three existing bridge structures: at Little Egg Creek (B.F. 00665, Highway 2:36 km 18.397), at the Redwater River (B.F. 01219, Highway 2:36 km 37.721), and at Hay Creek (B.F. 08684, Highway 2:36 km 43.757). Each of these structures will need to be modified as part of the twinning upgrades, but based on the life and the condition of these structures, it is likely that replacement prior to twinning would be required. As part of the long term strategy, construction of two new structures at the interchanges of Highway 651 and Highway 18 are proposed.

In terms of access management, Highway 2, classified here as a rural arterial, requires a minimum intersection spacing of 1,600m. Access to land parcels and the local road network would be provided via frontage roads at 1,600m intervals. The proposed access management plans were presented to the public at Open Houses and are considered as a twinning stage access management plan.

Recent changes to provincial legislation now require that upon opening a freeway interchange facility, all at-grade accesses to the highway within 4 km be closed. Alternate access management plans have been prepared based on these requirements and are included as the long term access management in this report.

Thurber Engineering Ltd. (Thurber), as part of their Geotechnical report, identified a number of water-filled dugouts within the proposed alignment. These will need to be removed, stripped, and filled a minimum of one year, before construction.

Thurber also notes that several gas stations, both in operation and shut down, are located in the immediate area of the highway. Environmental assessments of these locations may be required to confirm that the sites and neighbouring highway right-of-way are not contaminated with hydrocarbons.

Spencer Environmental Management Services Ltd. (Spencer Environmental) was retained to complete an Environmental Assessment for the project. One species of note is the uncommon America Sweetflag (*Acorus Americanus*), also referred to as ratroot. If the population of ratroot will be disturbed by the project, the proponent may want to consider transplanting or harvesting some of these plants in conjunction with local botanists and native groups.

Vegetation clearing must be avoided during the restricted clearing period of April 15 to July 31. Compensation for removed wetlands will be required at a minimum replacement ratio of 3:1 and preferably as close to the site of loss as possible.

All waterbodies crossed by the proposed road are subject to a restricted activity period from April 16 to July 31, during which no in-stream work is to be conducted without approval from the provincial government.

In conclusion, Spencer Environmental's report notes that "Considering the previously disturbed and agricultural landscape of the project area, few adverse environmental impacts are expected to result from the proposed twinning project. Most of these adverse impacts can be reduced to negligible assuming implementation of best management practices and recommended mitigation measures."

The Archaeology Group was retained to complete a Historical Resources Overview of the project area and recommends that no further work is needed for this study and a Historical Resources Impact Assessment is not required.

Typical rural drainage will be appropriate for the project. Due to the lack of relief for much of the length of Highway 2, the frequency of drainage pickups in the center median will need to be increased and should be judiciously reviewed to avoid excess median depths. Minimum Alberta Transportation standards for longitudinal ditch gradients should be maintained to reduce the potential for standing water "ponding." Existing drainage patterns are to be retained whenever possible and should only be modified where dictated by constraints.

A preliminary utility search noted 37 pipelines in the project area, including 19 that have their own right-of-way. Products carried include natural gas, carbon dioxide, and sour gas.

Public Open Houses were held in November 2009 and June 2010 in both Legal and Clyde. Concerns were expressed but the project was generally supported. Prior to the

Open Houses, presentations were made to local authorities that included Sturgeon County, Westlock County, the Town of Legal, and the Village of Clyde.

It is anticipated that the warrants for twinning Highway 2 will be reached progressively from the south to north. The estimated costs for twinning from the south end of the project, just north of Morinville, through to Highway 651 (Legal access) are \$48.7 Million; and from Highway 651 to Highway 18 (Clyde access) are \$68.1 Million.

The preliminary cost of the interchange at Highway 2 and Highway 651 and the associated access management is estimated at \$20.4 Million, and may be required in 20 year horizon.

Realignment of Highway 2 from Highway 18 to the north would occur only if there was a need for the interchange at Highway 2 and Highway 18. The estimated cost of the realignment and interchange construction is estimated at \$60.8 Million.

Immediate stage improvements at the existing at-grade intersection of Highway 2 and Highway 651 to address current safety issues are estimated at a cost of \$400,000.

The conversion of the two Highway 2/Highway 18 (Clyde Corner) and Highway 2 /Highway 18 (access to Clyde) intersections to roundabouts is estimated at a cost of \$8.6 Million.

Additional costs have been added to the First Stage Improvements. These costs include the replacement of three structures, at the noted bridges, and are assumed to be required prior to the twinning of Highway 2.

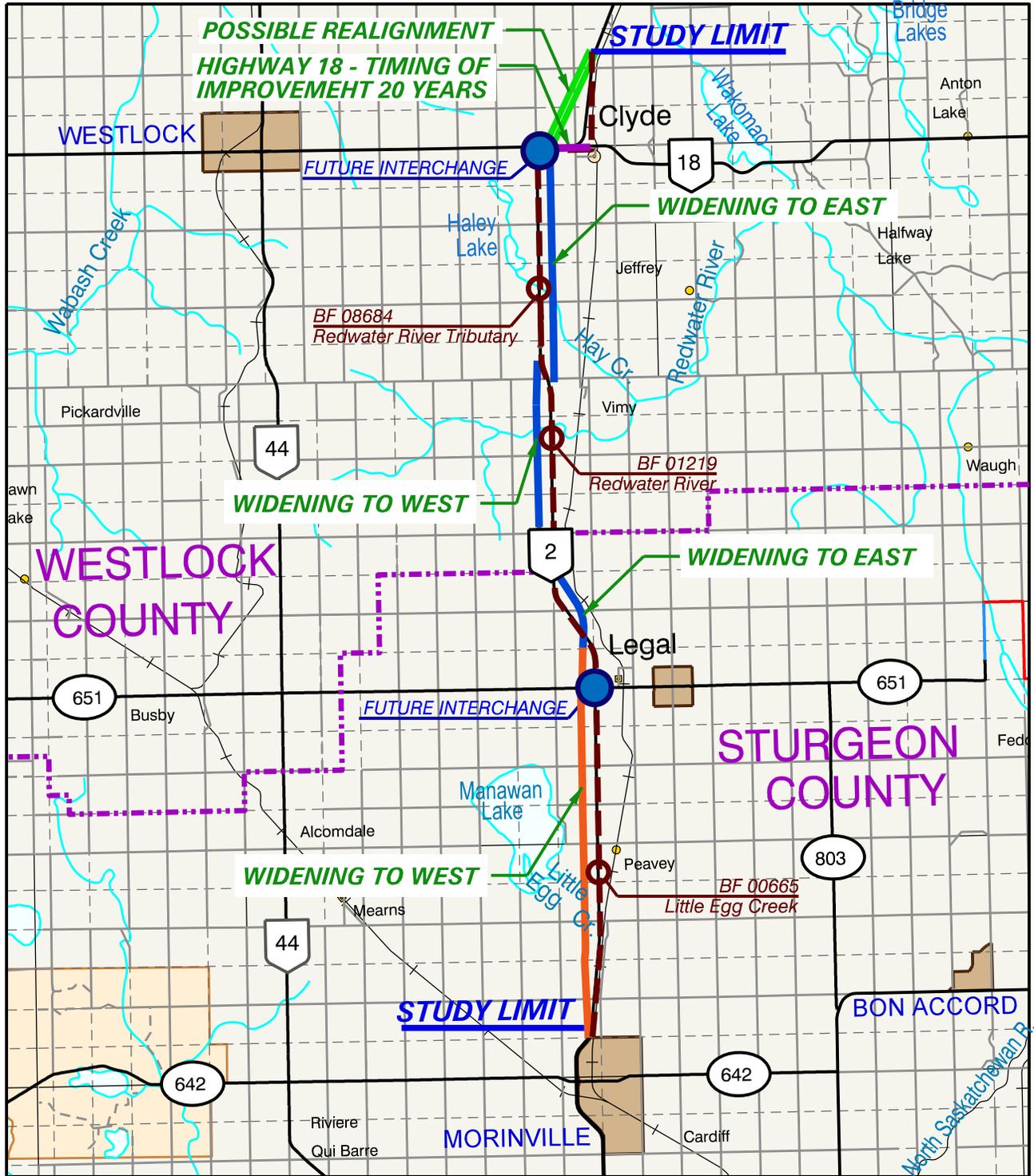
A summary of the Preliminary Cost Estimates are shown in **Table ES**.

Highway 2:36, 2:38
From North of Morinville to North of Highway 18
Functional Planning Study

Table ES

COST ESTIMATE SUMMARY

Construction Stage	Estimated Cost (2010 dollars)	Timing of Construction (Approx. Year)
First Stage Improvements		
Intersection at Highway 2/651	\$400,000	8 years
Roundabout at Highway 2/18 West Junction	\$4,300,000	2 years
Roundabout at Highway 2/18 East Junction	\$4,300,000	18 years
Structures Replacement Prior to Twinning	\$3,100,000	2012-2019
Sub-total:	<u>\$12,100,000</u>	
Twinning Morinville to N. of Legal		15-17 years
North of Morinville Curve Revision (including Right of Way)	\$6,200,000	
Road works	\$36,900,000	
Property Impacts (Right of Way and Damages)	\$5,600,000	
Sub-total:	<u>\$48,700,000</u>	
Twinning From N. of Legal to Highway 18		30 years
Road works	\$65,100,000	
Property Impacts (Right of Way and Damages)	\$3,000,000	
Sub-total:	<u>\$68,100,000</u>	
Highway 2/651 Interchange at Legal Access		20 Years
Interchange with Required Service Roads	\$20,400,000	
Sub-total:	<u>\$20,400,000</u>	
Highway 2 Bypass at Highway 18 and Interchange		50-70 years
Highway 2 Bypass	\$42,400,000	
Bypass and Interchange with Required Service Roads	\$17,700,000	
Property Impacts (Right of Way and Damages)	\$700,000	
Sub-total:	<u>\$60,800,000</u>	
Grand Total (rounded)	<u>\$211,000,000</u>	



LEGEND:

- EXISTING ALIGNMENT
- TIMING OF IMPROVEMENT 15-18 YEARS
- TIMING OF IMPROVEMENT 30-40 YEARS
- TIMING OF IMPROVEMENT 70 YEARS