



**Highway 3:10 and 3:12 Functional
Planning Study – West of Burdett
to West of Taber**

R - 1220

Final - Executive Summary

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Executive Summary

PROJECT OVERVIEW AND BACKGROUND

Highway 3 is part of Canada's National Highway System (NHS), moving people, goods and services interprovincially and internationally. The corridor provides a primary connection between southern Alberta to provinces east and west and is one of only three continuous east-west routes through Alberta. In 1987, the National Highway System (NHS) was established to recognize the importance of highway transportation on the Canadian economy. As part of the NHS, Highway 3 has been classified as a "core route". To achieve NHS standards, Highway 3, from the British Columbia border to Medicine Hat, will need to be upgraded to a, 90 km/h operating speed under free flow conditions. As such, Alberta Government has designated Highway 3 as a freeway with access via interchanges only.

The Alberta Government has retained Stantec Consulting Ltd. to complete a planning study for the future twinning of Highway 3 from the Town of Taber to west of the Hamlet of Burdett. The purpose of this study is to identify staged options to upgrade the highway to a twinned freeway corridor and identify future interchange locations.

This study was administered by Alberta Transportation, Southern Region, with input and direction provided by a Project Review Committee (PRC). The PRC was comprised of members from Alberta Transportation, the MD of Taber, Town of Taber, County of Forty Mile, Village of Barnwell and Stantec.

EXISTING CONDITIONS

The existing Highway 3 is a rural, two-lane undivided highway that generally parallels the Canadian Pacific Railway (CPR). Within the study area, Highway 3 is located directly south of the CPR; however, in the vicinity of Purple Springs, the CPR diverges north from Highway 3 for a short section.

Highway 3 passes through or adjacent to a number of communities, including the Town of Taber, Purple Springs and Grassy Lake. The portion of Highway 3 located in the Town of Taber is a 4-lane divided urban highway and includes a mix of signalized and unsignalized intersections. West of Taber, Highway 3 transitions to a two-lane undivided highway with several field accesses and private driveways located between public access roads.

Three other provincial highways intersect with Highway 3 within the study area:

- **Highway 864** - Located north of Highway 3 on the west boundary of the Town of Taber. North of Taber, Highway 864 crosses the Old Man River and connects to Highway 524 west of Vauxhall.
- **Highway 36** - A north/south highway, which runs a from Highway 4 (near the US Border – Coutts border crossing) to Lac La Biche and is designated as a high-load corridor for eastern Alberta. Highway 36 links to most of the province's major east-west highways providing access to Highway 63 and Fort McMurray. Highway 36 is discontinuous at Highway 3 in Taber and utilizes a section of Highway 3 to connect Highway 36 South (S) west of Taber and Highway 36 North (N) east of Taber.
- **Highway 877** - Located south of Highway 3 at Grassy Lake.



EXISTING TRAFFIC FORECASTING AND ANALYSIS

Existing traffic volumes on Highway 3 running through the Town of Taber are in the order of 9,000 to 10,000 vehicle per day (vpd). To the east of Highway 36 North, Highway 3 currently carries approximately 3,000 to 5,000 vpd on the two-lane undivided highway for the remainder of the study area, including through Grassy Lake. Over the last 10 years, the corridor has experienced slightly lower than typical growth rates.

Based on the 20-year (2037) forecasted volumes, all segments of Highway 3 in the Town of Taber and Grassy Lake will operate acceptably through the 2037 horizon, with the sections east of Taber operating at LOS C in the 2027 horizon due to the two-lane cross section. As a four-lane divided highway, Highway 3 could function as-is for the foreseeable future and other parameters such as safety, economic benefits of a freeway and available funding would likely drive the upgrading of the Highway 3 corridor.

A review of the existing collision data identified four intersections in the Town of Taber that are experiencing a higher number of collisions. The higher collisions in this section of Highway 3 is likely a result of the number of intersections located in close proximity to each other, as well as several direct development accesses increasing the number of conflicts between the through and turning vehicles. Collision in this area through Taber are mitigated by the lower operating speed and the presence of a median that restricts a number of the movements.

A review of the traffic analysis, existing intersection geometry and collision data identify that no highway improvements are recommended for the 2027 horizon including highway twinning or intersection upgrades. However, Alberta Transportation recently completed a safety and operations review that included an access review of the intersections through Taber and identified minor intersection improvement and access closures.

PRELIMINARY ASSESSMENTS

Desktop Environmental and Historical Resources Constraints

A desktop evaluation was conducted for the overall study area to identify environmental constraints. A summary of the potential environmental constraints in the study area confirmed that no major or unexpected environmental issues are anticipated. Environmental constraints such as wetlands, wildlife and historical resources are key issues and will be identified and addressed further on the recommended option to provide best management practices and mitigation measures.

Geotechnical Desktop Review

A geotechnical desktop review was conducted for the overall study area to identify potential areas of geotechnical concerns that may impact the alignment options. Based on a review of the study area, the local topography relatively flat and as such no slope stability issues are expected. No major geotechnical constraints were identified in the desktop review that would impact the ultimate freeway alignment.



DESIGN CRITERIA

All improvements on Highway 3 have been developed to a 130 km/h design speed using a four-lane divided highway with a 40 m centerline spacing. The cross-section ultimately allows flexibility for the roadway to be upgraded to a six or eight lane divided highway, if ever required. Interim widening to 55 m has been recommended at Highway 36 and Highway 877, ensuring longer storage for Long Combination Vehicles (double tractor trailers and the like) at the key intersections, particularly the other provincial highways at the pre-freeway stage. This interim widening is readily accommodated within the footprint of the future interchanges, with no additional land requirements.

FREEWAY ROUTING OPTIONS

Prior to the development of the realignment options, a high-level routing concept assessment was completed to identify the general routing for the alignment options in the Grassy Lake and Taber areas. Based on this initial review, routing Highway 3 to the south side of Taber and Grassy Lake is the preferred option. Realigning Highway 3 to the north would require multiple skewed CPR grade separations and does not provide good connectivity to the roadway network. Upgrading the existing Highway 3 through Taber and Grassy Lake would have severe impacts to the communities resulting in limited opportunities for vehicles and pedestrians to connect across the highway, creating a physical barrier through the communities.

NETWORK AND ACCESS REVIEW

In 2006, Alberta Transportation completed the Freeway Corridor Management study for Highway 3 between Medicine Hat and the British Columbia border. This study identified future interchange locations along Highway 3 as well as areas for future study, where the existing alignment is inadequate to meet freeway standards. Within this study area, future interchanges include:

- Near Highway 879/ Bow Island (east of Grassy Lake, outside east study limit);
- Highway 877 (near Grassy Lake);
- Range Road 151 (near Purple Spring);
- Near Taber (subject to further study); and
- Range Road 175 (near Barnwell, outside east study limit).

These access locations were designated by Order in Council (O.C. 587) on November 2009.

Due to the urbanized area around Taber, additional analysis with the realignment options is needed to consider the future interchange configurations and locations based on provincial and local connectivity and desirable interchange spacing requirements. Interchange locations for the area around Taber will be considered as part of the development and analyzed as part of the alignment options for this study.

For this study, it is recommended that interchanges be configured as spread diamonds to protect the right-of-way for future potential loop ramps, with the ramp junctions spaced to accommodate loop ramps in any of the four quadrants. However, in the urbanized area of Taber interchange configurations will need to be confirmed to take into considerations access to the Town.



ALIGNMENT OPTIONS

Based the recommendations from the routing assess, alignment options were developed with input from the Project Review Committee (PRC) and presented at a Value Planning Session for further review and input. Four alignment options were developed for the section at Grassy Lake, and two west options and three east options were developed for the section at Taber.

Grassy Lake Options

Four realignment options were developed for the section at Grassy Lake that minimized the impact on irrigated lands and reduced the number of fragmented parcels. Three of the options south of Grassy Lake developed include an interchange located at Highway 877, while the fourth option proposed a realignment of Highway 877 and a new interchange to the east, to allow industrial traffic to access the highway without travelling through Grassy Lake as shown in **Figure E.1**.

Taber Options

For the realignment south of Taber, two west realignment options and three east realignment options were developed to minimize the impacts to irrigated lands, utilities, developments, and reduce the number of fragmented parcels. Either of the west options could be combined with any of the east options, and all combinations include an interchange located at Highway 36 South, as shown in **Figure E.2**.



HIGHWAY 3:10 AND 3:12 FUNCTIONAL PLANNING STUDY – WEST OF BURDETT TO WEST OF TABER



Figure E.1 – Grassy Lake Realignment Options



HIGHWAY 3:10 AND 3:12 FUNCTIONAL PLANNING STUDY – WEST OF BURDETT TO WEST OF TABER

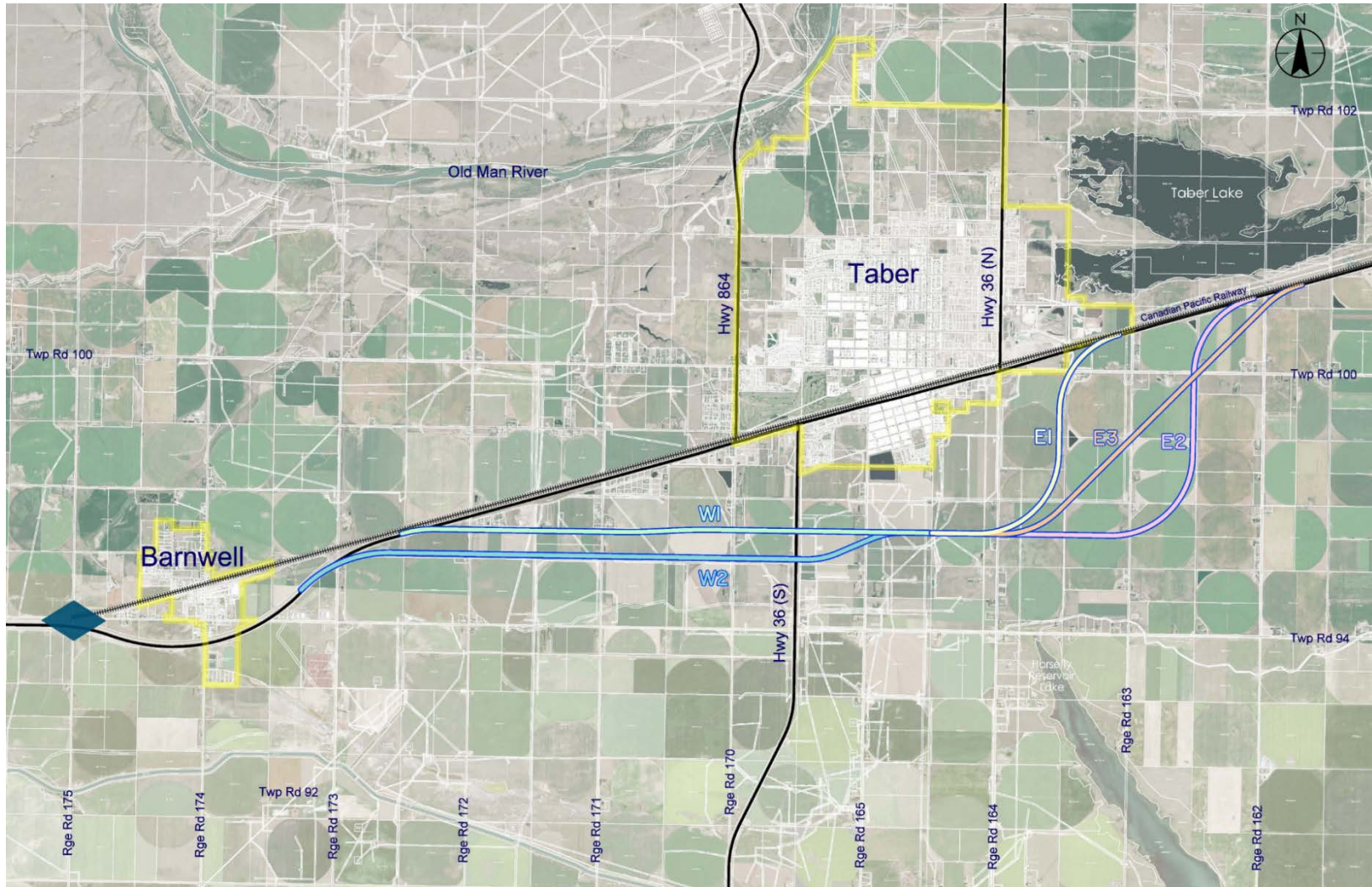


Figure E.2 – Taber Realignment Options



MULTIPLE ACCOUNT EVALUATION (MAE)

As part of the study, a Multiple Account Evaluation (MAE) was conducted to evaluate the shortlisted realignment and access options. The objective of the MAE was to identify the preferred Highway 3 alignment and primary access locations through group discussion and consensus-building based on the scoring of each option against the criteria. The criteria used was group into five accounts: financial, environmental, user benefits, community sustainability and economy, and included more detailed performance criteria for the Grassy Lake and Taber within each of these accounts.

Prior to the MAE Workshop, a preliminary evaluation of the options against these criteria was completed by the Stantec team to serve as a starting point for discussions at the MAE workshop. At the MAE workshop, the initial scoring was presented, and the options were discussed and reevaluated based on a score from 1 to 5 (1 = very poor and 5 = very good) based on the panel's discussion.

Grassy Lake MAE Evaluation

Initially, four alignment options were developed for the Grassy Lake realignment. However, upon discussion at the MAE session, Option 3 was determined to not be a feasible and the panel agreed that Option 3 would not be carried through the MAE process. Option 2 was also identified as unfeasible and was also removed from evaluation. Additionally, a minor modification to Option 2B and the evaluation continued with Option 1 and "Option 2B-*modified*" as illustrated in **Figure E.3**.





Figure E.3 – Revised Grassy Lake Options



Based on the MAE scoring, shown on **Table E.1**, the Community Sustainability account was identified as the most critical and differentiating account, and Option 2B-*Modified* was identified the preferred alignment for the Grassy Lake section.

Table E.1 - Grassy Lake MAE Scoring

Description		Option 1	Option 2B- <i>modified</i>
Financial			
	Preliminary Construction Estimate	3	3
	Maintenance Costs	3	3
	Constructability	3	3
Potential Environmental & Historical Impacts			
	Wildlife	3	3
	Historical Resources	3	3
User Benefits/Customer Service			
	Road User Cost	3	3
	Network Connectivity	3	3
	Safety/ Driver Comfort	3	3
Community Sustainability			
	Development Impacts (impacted farmstead/buildings)	1	4
	Agricultural Impacts of Irrigated Parcels	4	5
	Community Access	2	4
	Noise	3	3
	Impact to Proposed Solar Project	5	5
Economy			
	Access to Regional Agriculture Destinations	3	4
OVERALL SCORE		42	49

Taber West MAE Evaluation

Two alignment options were presented for the Taber West realignment. Based on the MAE scoring shown on **Table E.2**, the Community Sustainability account was identified as the most critical and differentiating account, and Option W2 was determined to be the preferred alignment for the Taber West section.



Table E.2 - Taber West MAE Scoring

Description		W1	W2
Financial			
	Preliminary Construction Estimate	3	5
	Maintenance Costs	3	3
	Constructability	3	3
Potential Environmental & Historical Impacts			
	Wildlife	3	3
	Historical Resources	3	3
User Benefits/Customer Service			
	Road User Cost	2	3
	Network Connectivity	3	5
	Safety/ Driver Comfort	5	5
Community Sustainability			
	Development Impacts (impacted farmstead/buildings)	1	4
	Agricultural Impacts of Irrigated Parcels	3	4
	Accommodate Urban Growth / Land Use Planning	3	4
	Community Access	2	5
	Noise	3	4
Economy			
	Local Tourism and Economic Development	1	2
OVERALL SCORE		38	53

Taber East MAE Evaluation

Three alignment options were presented for the Taber East realignment and similar to the previous evaluations, The Community Sustainability account was identified as the most critical and differentiating account. Through discussion, the panel identified that the criteria regarding the loss of irrigated land did not sufficiently capture the impacts and was replaced with the two new criteria. Based on the MAE scoring, shown on **Table E.3**, Option E1 was identified as the preferred alignment for the Taber East section.



Table E.3 - Taber East MAE Scoring

Description		Option E1	Option E2	Option E3
Financial				
	Preliminary Construction Estimate	3	3	4
	Maintenance Costs	4	3	3
	Constructability	3	3	3
Potential Environmental & Historical Impacts				
	Wildlife	3	3	3
	Historical Resources	4	3	3
User Benefits/Customer Service				
	Road User Cost	3	2	2
	Network Connectivity	3	3	3
	Safety/ Driver Comfort	4	4	5
Community Sustainability				
	Development Impacts (impacted farmstead/buildings)	2	3	3
	Loss of Irrigatable Acres	2	1	2
	Severance Impacting Irrigation	3	2	1
	Accommodate Urban Growth / Land Use Planning	4	2	3
	Community Access	3	3	3
	Noise	3	3	3
Economy				
	Local Tourism and Economic Development	4	1	1
OVERALL SCORE		48	39	42

ULTIMATE STAGE RECOMMENDATIONS

At the ultimate stage, Highway 3 can accommodate an eight-lane freeway corridor with full access management. Although eight lanes are not warranted based on traffic volumes, Alberta Transportation’s standard freeway cross sections allows this as an option to maintain future flexibility for the facility to expand. **Figure E.4** illustrates the ultimate stage recommended plan.

At a planning stage, all interchanges have been configured as spread diamonds to protect the right-of-way for potential future loop ramps. Traffic analysis was completed on single lane ramp intersections at the 40-year (2058) horizon to identify intersection requirements for the ramp terminals. Based on the traffic analysis, all interchange ramp junctions are projected to operate at acceptable levels as stop-controlled intersection in the 2058 horizon.



HIGHWAY 3:10 AND 3:12 FUNCTIONAL PLANNING STUDY – WEST OF BURDETT TO WEST OF TABER



Figure E.4 - Recommended Alignment



INTERIM STAGE RECOMMENDATIONS

Highway 3 could operate for a considerable time as a divided arterial highway with a four-lane cross section and interim at-grade intersections. As such, the following interim stages have been proposed based on improvement triggers such as level of service, perceived safety concerns (i.e. passing opportunity), economic benefits of a freeway, Provincial priorities and available funding.

- **Stage 1:** Upgrade the existing Highway 3 alignment with intersection improvements as needed.
- **Stage 2:** Twin the existing Highway 3 alignment to the south, beginning east of Taber, with a 4-lane realignment around Grassy Lake. At this time highway access will be limited to public intersections only (1.6 km spacing), with no direct property or field access to the highway.
- **Stage 3:** Four-lane realignment around Taber, including the Highway 3 Flyover

Interim Stage 1

At Stage 1, Highway 3 will remain a two-lane cross-section and no formal access management will be implemented; therefore, traffic volumes will increase based on background growth alone. Based on the traffic analysis for the 2038 horizon, it is recommended that the intersection of Highway 3 and Range Road 150 be upgrade from a Type I intersections to a Type III d intersection. No other highway improvements are recommended at this stage.

Interim Stage 2

When Highway 3 is twinned (Stage 2), it is anticipated that all existing field accesses, private driveways, and canal accesses on Highway 3 will require closure. Access to Highway 3 will be provided at Range Road/Township Road intersections based on the following considerations:

- The intersection must not be located on a horizontal curve or within close proximity of the end of a horizontal curve;
- The intersection angle is between 70° and 90°;
- There is at least 1.6 km spacing at-grade intersections; and
- Any minor realignment of the intersection to address the above criteria does not directly impact any existing development thereby requiring buyout of the property.

In total 19 at-grade intersections will remain open to Highway 3, east of Taber within the study area. With the closures of existing accesses, alternate access to properties is provided using a system of fronting service roads, existing local roads, and private roadway extensions. No additional intersections improvements are recommended though Taber at the stage.

Interim Stage 3

Based on level of service, it is anticipated that Highway 3 will continue to operate acceptably through the Town of Taber beyond the 2037 horizon. Any required upgrades to Highway 3 through Taber would likely be triggered by other parameters such as safety, major developments, economic benefits of a freeway, Provincial priorities and available funding. The realignment of Taber will include construction of the Highway 3 Flyover, and three at-grade intersections will remain open, including Highway 36.



As a staging option prior to the construction of the Highway 3 Flyover, east of Taber, the highway realignment may be tied into the existing highway alignment via an at-grade roundabout. Preliminary analysis confirmed that a roundabout would operate at a LOS B in both peak hours, with all movements at LOS B or better, at the 2058 horizon. A 55 m inscribe diameter has been proposed that will safely allow a WB-21 and farm equipment travel through the roundabout.

ENVIRONMENTAL EVALUATION

The conclusion of this EE is that the adverse environmental effects associated with Project activities can be mitigated using a combination of standard and Project-specific environmental protection measures. Given the preliminary nature of this work and the anticipated Project schedule, detailed, Project-specific environmental protection measures have not been prepared.

ROAD SAFETY AUDIT (RSA)

A planning level Road Safety Audit (RSA) was completed and focused on the safety performance of design elements including horizontal and vertical alignment; cross-sections (clear zones and drainage); traffic operations (driver expectations); and the interchange layout and operations. No design exceptions were presented to the RSA Team as they were not warranted.

The RSA highlighted numerous safety benefits of the recommended alignment, including

- Safety benefits within the communities of Taber and Grassy Lake by removing truck traffic, reducing traffic congestion and increasing internal traffic travel time; and
- Safety benefits of the diamond interchange configuration driver familiarity and expectancy, exit/entrances on the right and one exit per direction of travel.

Several of the observations from the RSA have been addressed by meeting the design standards in the recommended plans.

UTILITIES

A preliminary review of existing utilities was performed to identify impacts in the study area, such as power, telecommunication, water and gas pipelines. Most gas pipelines in the study area are located south of the Town of Taber; however, there is extensive irrigation infrastructure in the study area managed by St. Mary River Irrigation District (SMRID) and Taber Irrigation District (TID) via a series of canals and pipelines. There is a concentration of north/south open irrigation canals located southeast of Taber along the quarter section lines.

PUBLIC CONSULTATION

As part of this study, public consultation was completed in 4 phases, including three open house, direct one-one-one discussion with directly impacted landowners prior to the third open house and a final presentation to the MD of Taber and the Town of Taber Councils. Between the three open houses, a total of 322 people attended, and 169 surveys were returned. Landowner meetings were conducted prior to last open house. In total, 77 landowners were invited to meet one on one with the planning team, of which 15 meetings were conducted and six additional landowners identified themselves at the open house.



Overall, no significant issues arose from either open house or landowner meetings that would preclude the implementation of the recommended plan.

Presentations were made on September 9 and 10, 2019 to the councils of the Town of Taber and the MD of Taber, seeking their endorsement of the recommended improvement strategy. Following the presentations, the MD of Taber issued a letter supporting the recommended alignment and stressed the importance of a good transportation network to agriculture and the oil and gas industry in the area. At the time of this report, endorsement had not been received from The Town of Taber.

STORMWATER MANAGEMENT PLAN

A conceptual drainage plan was developed for the initial and ultimate stage recommended improvements for Highway 3. The proposed drainage for the interchanges assumes a moderate amount of storage in the four quadrants connected by culverts and ditches where applicable. The preference will be to have stormwater storage outside the right-of-way so additional land has been included in the right-of-way to account for this.

The proposed alignment will change the existing drainage patterns in some locations, particularly south of the town of Taber. In particular, Range Road 172 corresponds with a local low point along the proposed Highway 3 alignment. The approximate area of the catchment tributary south of the proposed alignment draining toward Range Road 172 is 422 ha, with an additional 35.7 ha contributed by the highway. The peak flow from this area under proposed conditions is 1198 L/s and will be conveyed north in the Range Road 172 west ditch. Improvements to the ditch may be required to provide sufficient conveyance capacity or which additional right-of-way may be necessary. It is recommended that an additional 10^m width of right-of-way on the west side of Range Road 172 be provided for this purpose.

Additionally, there is an existing drainage issue at the south of the Town of Taber, near Range Road 165/50 Street. Under existing conditions, the flow rate and volume of water from upstream areas causes flooding issues near Heritage Drive and Hackney Drive. The proposed Highway 3 alignment will intercept a portion of the runoff and convey it east away from the Town, providing a net benefit and reducing its impact. Assessment of the impact to the existing irrigation structures and drainage conveyances is included in the drainage report.

OPINION OF PROBABLE COST

Opinions of probable cost (OPC) were prepared for the staged interim and ultimate plans based on Alberta Transportations published 2019 construction unit rates and include 25% engineering 20% contingency. These costs are found in **Table E.4**.



Table E.4 – Opinion of Probable Cost

	Cost
Interim Stage 1	\$ 0.450 M
Interim Stage 2	\$ 147.8 M
Interim Stage 3	\$109.7 M
INTERIM STAGE TOTAL	\$ 258.0 M
Ultimate Stage	
ULTIMATE STAGE TOTAL	\$ 153.8 M
Property Assessment	\$ 51.6 M
TOTAL	\$ 463.4 M
Optional Highway 3 Flyover Roundabout	\$ 3.9 M
(Alternative to Interim Stage 3 Flyover)	

