APPENDIX B

MUNICIPAL DISTRICT
BONNYVILLE NO. 87

Bridges Status Report

MD Bridges & Bridge Sized Culverts

Supplemental:

Utilization and Levels of Service Review

PREPARED BY:

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Document Control Sheet

Document Revision	Date	Revision Details
0	September 11, 2023	Bridges Status Report – Utilization and Levels of Service Review

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Background

On March 14, 2023, administration presented a status report on the MD's inventory of bridges and bridge sized culverts to Council. In this presentation, information was provided regarding the condition and age distribution of its bridge inventory and how many bridges in the MD were approaching the end of their service life.

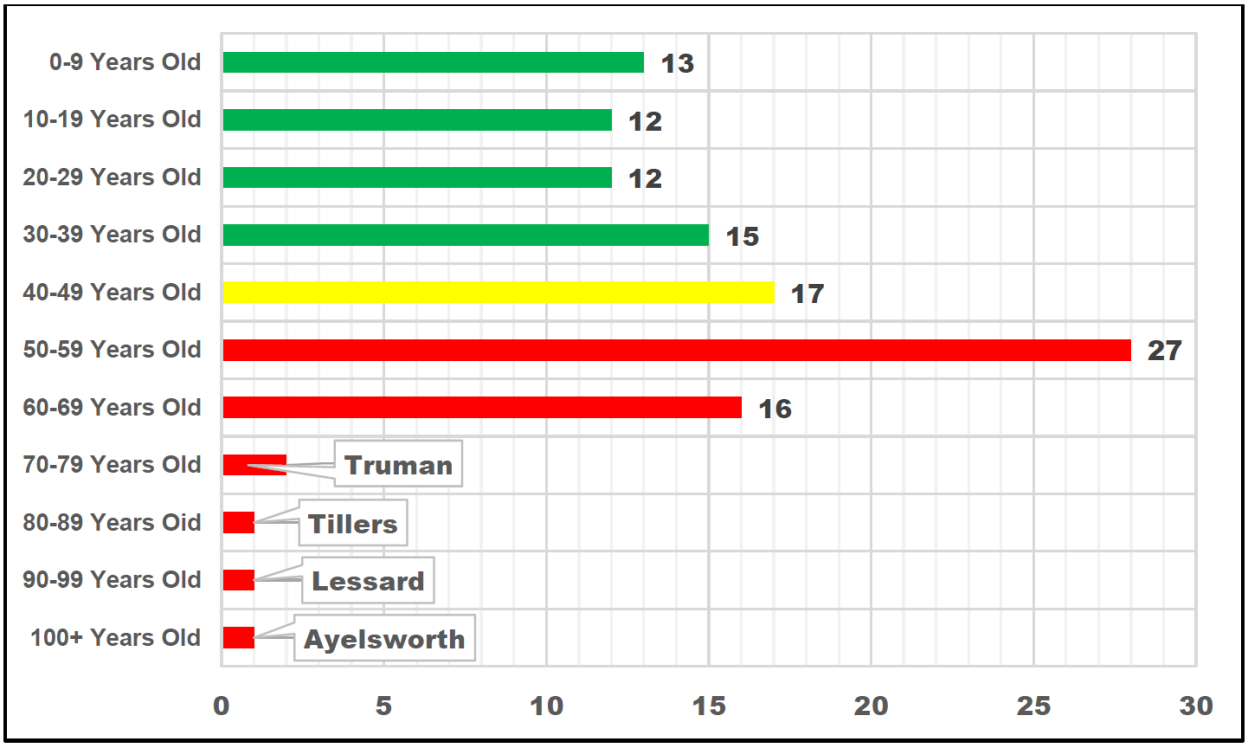


Figure 1 – Age of MD Bridges and Bridge-sized Culverts (from Bridges Status Report)

Using recent bridge construction costs and the estimated replacement dates shown in recent bridge inspection reports, 10-, 25-, 50- and 75-year cost forecasts were also provided in the Bridges Status Report to assist in financial planning.

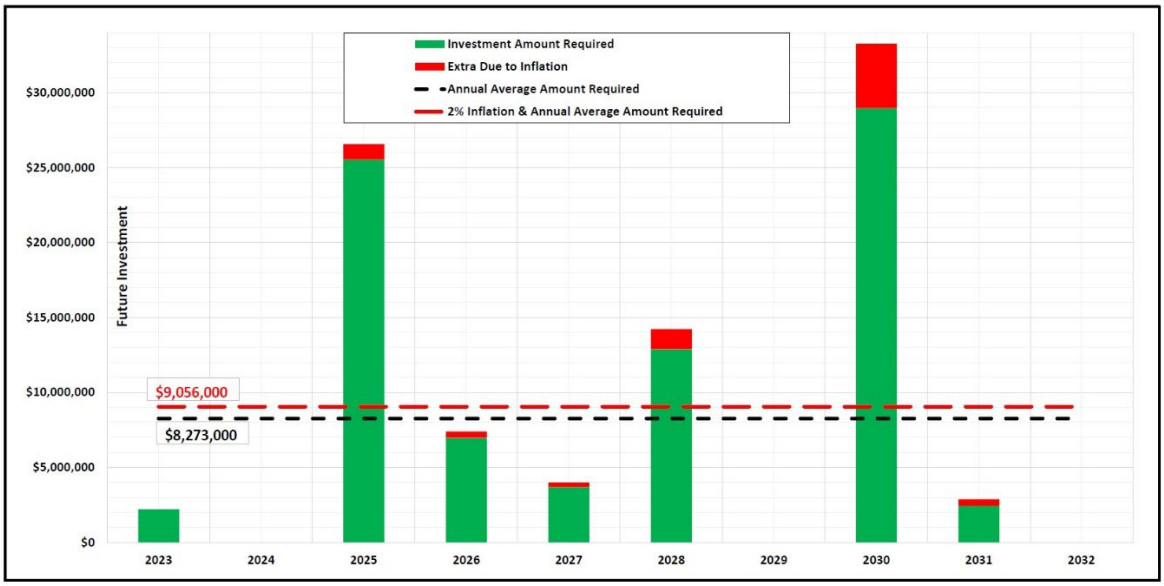


Figure 2 – 10-Year Cost Forecast (from Bridges Status Report)

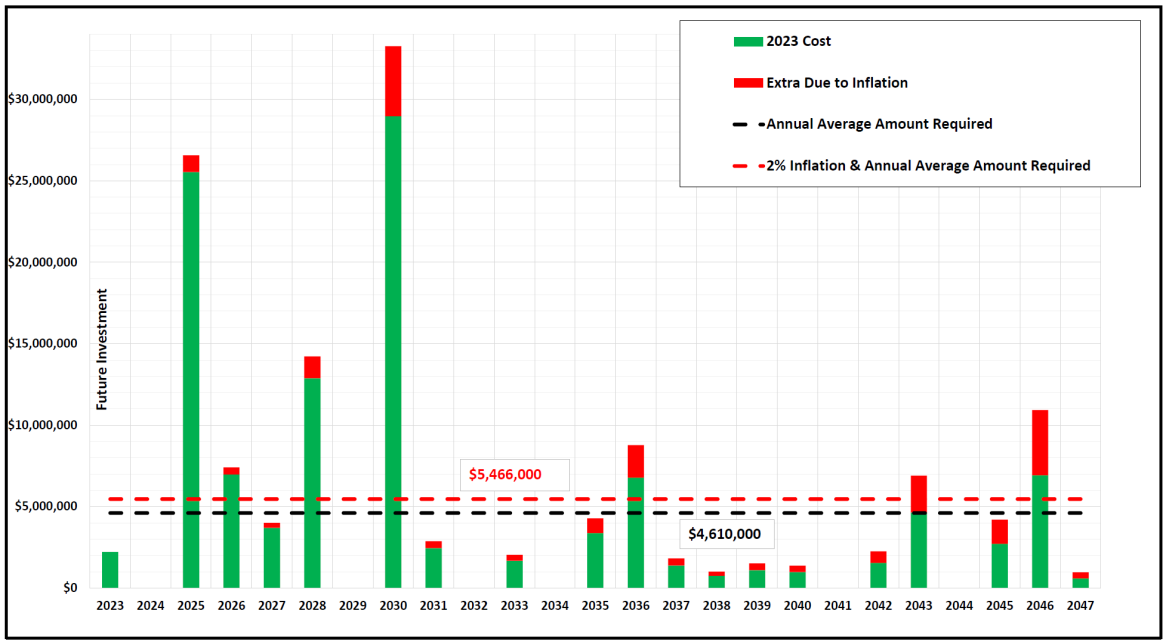


Figure 3 – 25-Year Cost Forecast (from Bridges Status Report)

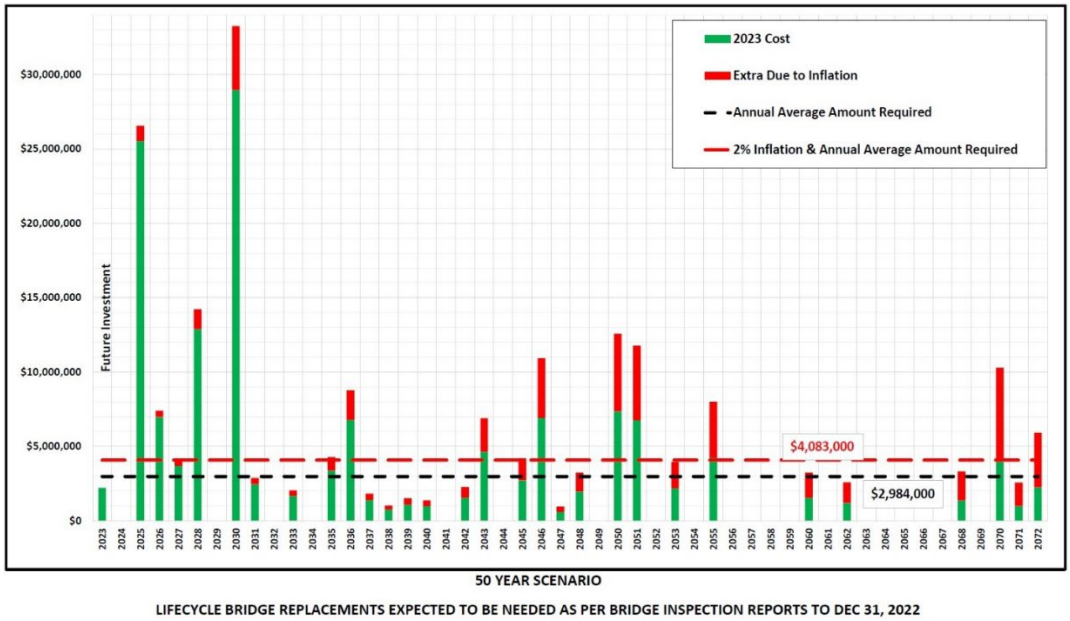


Figure 4 – 50-Year Cost Forecast (from Bridges Status Report)

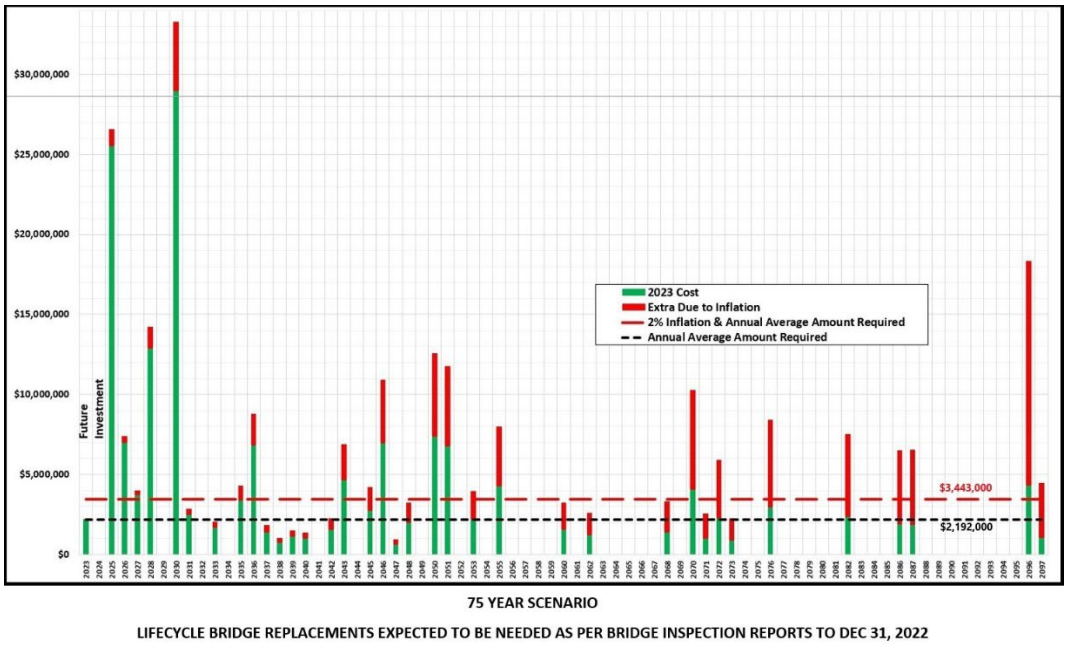


Figure 5 – 75-Year Cost Forecast (from Bridges Status Report)

Due to the number of bridge structures expected to need replacement in the short term and the overall forecasted costs attached to those replacements, administration was asked to provide information so Council could review the current levels of service the MD is providing and consider bridge decommissioning as a cost saving measure.

1. End of Life Options

When a bridge reaches the end of its service life there will often be a period where service can be maintained through more frequent and costly inspections and the acceptance of a higher level of risk that an emergent issue will develop that may remove the bridge from service. But a point will usually be reached where the repairs needed to maintain service on a deteriorating bridge structure will be inefficient from a lifecycle costing perspective and these types of stopgap repairs should not be relied upon as a substitute for responsible management of the inventory. Once this point has been reached, one of the following options should be considered.

1.1 Bridge Replacement with an Equivalent Structure

When a bridge structure is replaced, it will be brought to the current code requirements for load carrying capacity, geometry, design life, durability, hydraulic opening, fish passage, etc., but otherwise it will be the functional equivalent of the original structure.

1.2 Bridge Replacement with an Updated Structure

Since bridges have long life spans, they are often upgraded and changed when they get replaced with a vision of the future in mind. Extra lanes or shoulders can be added for traffic, or sidewalks can be added for pedestrian or cycle use. The bridge could also be re-aligned or moved to a better location to serve future needs. It is much cheaper to plan for these upgrades when a bridge is replaced as opposed to trying to make these changes after the fact. When replacing a 75-year bridge structure in 2023, it is recommended to consider the expected needs of 2043.

1.3 Bridge Rehabilitation

Bridge rehabilitation involves replacing those bridge elements that have reached the end of their service lives while salvaging those that have significant life left. Bridge rehabilitation can have the following advantages over replacement:

- Lower initial capital cost
- Reduced time of construction and service disruption
- Reduced scope of work
- Provides life extension when replacement will be costly and/or difficult.

Bridge rehabilitation has the following disadvantages when compared to replacement:

- Shorter expected service life.
- Higher maintenance requirements.
- While initial capital costs are usually lower, long-term costs in maintaining the crossing may be higher, which can lead to inefficient decision making and deferral of costs to future generations.

- Bridge rehabilitation often doesn't address functional issues such as load restrictions, insufficient hydraulic openings, scour susceptibility, narrow (or single) lane widths, poor alignment, wrong location, etc.
- Can be a missed opportunity to update infrastructure to modern needs, diverting resources towards the needs of 50-100 years ago.

When performing a bridge assessment, a bridge engineer will usually provide a comparison of rehabilitation and replacement options, as well as a recommendation as to which they think is best to fit the customers needs.

With many of the bridges that are coming up for replacement in the MD being small modular concrete girder bridges with no deck and creosote timber substructures, it is expected that replacement will likely be the more efficient option most of the time as both the concrete girders and the creosote substructures will be reaching the end of their service lives at roughly the same time. While possible, major rehabilitation work on these bridges will likely not have enough value to justify the cost.

Rehabilitation may be a cost competitive option for some of the Beaver River truss bridges because the structural steel lasts much longer than the timber elements and may have significant life remaining. However, when comparing the costs of rehab versus replacement on century old truss bridges, the MD should be mindful that it is not comparing equivalent end products. These old bridges were originally built to provide land access for development but were not designed or intended to serve present day needs. While there likely is some sentimental attachment to them, they may currently be barriers to economic activity due to their load carrying capacity, geometry, and location. Current and future needs should be considered before any significant investment in a 100-year-old bridge structure.

1.4 Bridge Replacement with a Downgraded Crossing

There are some jurisdictions that have installed low level crossings as a cheaper alternative to bridges where 100% access is not required. In the MD of Bonnyville, some of the expected challenges in considering low level crossings would be high water tables and silty soil conditions in the area affecting the stability of creek bases, sediment contamination and environmental requirements making it difficult to get approvals, as well as the amount of time these crossings would be out of service during water events. Low level crossings are also only usually suitable for very low traffic volumes so may only be worth looking at in a few cases; they tend to be more common in arid climates and mountainous regions. Another possible downgrade in some situations to save on initial cost would be to reduce the high-water event that is being designed for and accepting the erosion damage and service disruptions that happen during flood events – this is currently being considered in some low traffic situations.

1.5 Bridge Decommissioning

It is reasonable to expect that the reasons for replacing bridge crossings in 2023 will be different than they were when the structures were first built. Some existing bridge structures may not be worth replacing based on their current utilization so could possibly be decommissioned instead.

2. Bridge Decommissioning Process

Permanent bridge closures are covered by section 22 of the Municipal Government Act. While it is reasonable for the MD to close a road or bridge temporarily if a public safety issue has developed, without going through a more formal closure process the expectation is that the infrastructure will be re-opened within a reasonable time frame once the issue has been addressed.

To execute a permanent road or bridge closure, it is expected that the decommissioning process will involve as a minimum; public notifications, the passing of a bylaw, public hearings, approval by the Minister of Transportation, and as well as possible compensation to landowners if there have been any significant land devaluations related to the closure.

3. Cost-Benefit Review and Prioritization of Bridge Replacement Projects

In considering whether to replace or decommission old bridges, it is important to be able to understand the benefits that these assets are currently providing to our ratepayers so those benefits can be compared to our expected costs in replacing those structures. For the purposes of this report, bridges that are showing as likely needing replacement within the next 10 years have been reviewed. Two of the primary benefits of rural local road bridges have been considered in this report:

- Land access for use and development
- Shortened travel distances between people and places.

3.1 Information Collected

While there is no established method of quantifying the benefits of bridge replacement projects to compare the relative value of those projects, the following information was collected by MD staff for the purpose of making these comparisons:

- A traffic count was taken at each of the 56 bridges that inspection reports have suggested are approaching the end of their service life (within 10 years) using one of the MD's radar traffic counters. The information obtained was the average daily traffic (ADT) and average daily truck traffic (ADTT) crossing each of these bridges, typically over a 3-to-7-day period.
- The length of the shortest reasonable alternative travel route around each bridge was measured on a map. (Shortest reasonable road length between bridge ends without crossing the bridge)
- A rough forecasted replacement cost was estimated, based on a comparison with previous projects. (Class 5 estimate – typically within -50%/+100% accuracy most times)
- A high-level review of typical land values with the MD's tax assessor took place to establish a likely portion of land and property value that was associated with having bridge access. These numbers were used to establish user value where a bridge was an only access.
    - Developed property values with bridge access were estimated to be roughly equivalent to their tax assessed values. There were no developments without bridge access – it was

assumed that without bridge access, most developments would have minimal residual value.

- Cleared agricultural land with bridge access was estimated to have a rough average value of approximately $400K per quarter based on comparisons with similar properties. There were no cleared agricultural lands without bridge access – it was assumed that without bridge access any cleared agricultural would revert to a brushed state due to a lack of use and maintenance. Note that tax assessments for these types of lands are not based on land value, but utilization of the land, so they cannot be used for evaluation.
- Brushed (grazing) land with bridge access was estimated to have a rough average value of approximately $250K per quarter based on comparisons with similar properties.
- Brushed land without bridge access was estimated to have a rough average value of approximately $125K per quarter based on comparisons with similar properties. It was assumed that this would be the residual land value any time bridge access was removed from a land or property.

3.2 Assumptions Made

To perform the cost-benefit evaluations, the following assumptions were made:

- On average, each current user of a bridge will need to drive an additional distance equal to 1/3 of the closest reasonable driving distance between bridge ends should the bridge be closed.
- Detouring vehicles on local roads drive an average speed of 60 km/hr.
- The average operating cost of a detouring vehicle is $0.60/km.
- The average operating cost of a detouring truck (6m+ long) is $1/km.
- The average value of time for a detouring vehicle is $20/hr.
- The average value of time for a detouring truck (6m+ long) is $40/hr.
- Derelict bridges can be left in place with closure costs being negligible, resulting in a net cost/savings of 100% when considering bridge replacements/closures.
- Bridge culverts will need to be dug out and the waterways re-established, resulting in a net cost/savings of only 50% when considering bridge culvert replacements/closures.
- Average daily truck traffic counts (6m+ vehicles) will jump to 10% of ADT if/when load restrictions over the Beaver River are removed.
- There will be no requirements for compensation if a bridge is closed where there is reasonable alternate access for land and property owners. MD expects that the legal risk of this kind of compensation is low – a hypothetical loss in land value related to a bridge closure would need to be demonstrated through legal means, which would be difficult to do when there was reasonable alternate access provided. As long as a fair and reasoned bridge decommissioning process is followed, It is expected that most compensations of this nature would be optional.
- There will be compensation required for any land devaluations related to bridge closures where no alternate access is available.

3.3 Items not Considered

The following factors were not considered in the cost-benefit calculations:

- The carbon footprint / environmental costs of the increased distances being driven when a bridge is closed.
- Agricultural users not being able to reasonably drive an alternative route when a bridge is closed due to the slow speeds of some equipment or the unsuitability of those alternate routes.
- While the removal of load restrictions during major bridge replacements was considered, the increased utilization of bridges resulting from other replacement upgrades were not. (Larger equipment being able to cross wider structures, increased use of bridges due to better locations, etc)

3.4 Cost-Benefit Calculations

Abbreviations:

- ADT = Average Daily Traffic (Average number of vehicles crossing bridge per day)
- ADTT = Average Daily Truck Traffic (Average number of 6m+ vehicles crossing bridge per day)
- Dist. = Closest reasonable alternate route around the bridge, as measured between bridge ends
- RD = Annual reduced travel distance attributable to a bridge crossing (all vehicles)
- RTD = Annual reduced trucking distance attributable to a bridge crossing (6m+ vehicles – an additional $0.40/km in operating costs and an additional $20/hr in time value were applied for the distances being travelled by these kinds of vehicles as they were already counted in the RD distances)

Calculations Performed: (Alternate Route Available)

- RD = ADT x Dist/3 x 365
- RTD = ADTT x Dist/3 x 365
- Annual User Value = (RD x $.060/km) + (RD/60km/hr x $20/hr) + (RTD x $0.40/km) + (RTD/60km/hr x $20/hr)
- Benefit/Cost Ratio (Bridge) = Annual User Value / Annuitized Replacement Cost
- Benefit/Cost Ratio (Bridge Culvert) = Annual User Value / (Annuitized Replace Cost x 50%)

Calculations Performed: (No Alternate Route Available)

- Annual User Value = (Estimated value of accessed properties with bridge access – Estimated value of accessed properties assuming no bridge access) / expected life of bridge
- Benefit/Cost Ratio (Bridge) = Annual User Value / Annuitized Replace Cost
- Benefit/Cost Ratio (Bridge Culvert) = Annual User Value / (Annuitized Replace Cost x 50%)

It should be noted that the Benefit Cost Ratios (BCR) that are being produced can be used for an initial comparison between bridges and the development of a draft priority list. However, there are likely factors not fully captured by the analysis. The numbers would be subject to revision as better and more accurate information becomes available.

Note that a landowner map has been included with each bridge information sheet in Appendix B for the purposes of identifying the benefits that individual landowners may be receiving beyond what has been captured through this analysis.

3.5 Replacement Priority / Closure Candidate Categories

Once a Benefit-Cost ratio was calculated, MD bridges were separated into 1 of 4 categories that will help identify priorities for replacement as well as candidates for closure within its bridge replacement program. This should help optimize available resources for replacing bridges as well as ensuring responsible end-of-life management processes when resources fall short.

Table 1 – Replacement Priority Categories

Replacement Priority Category	Description	Primary User Benefit	Calculated Benefit/Cost Ratio
A	Low Value Replacement / Low Impact Closure	Shortened Travel Distances - Alternate Route(s) Available to Users	0.0 – 2.0
B	Medium Value Replacement / Medium Impact Closure	Shortened Travel Distances - Alternate Route(s) Available to Users	2.1 – 4.0
C	High Value Replacement / High Impact Closure	Shortened Travel Distances - Alternate Route(s) Available to Users	>4.0
D	Only Access Bridge	Property/Land Access - No alternate route(s) available	Any

3.6 Replacement Priority / Closure Candidate Summaries

See Appendix A for maps showing 56 MD bridge structures that were identified in bridge inspection reports as likely needing replacement within the next 10 years, colour coded by the replacement priority category.

See Appendix B for a list of bridge structures that were identified in bridge inspection reports as likely needing replacement within the next 10 years, ranked by calculated benefit-cost ratio, as well as bridge information sheets showing more details about how each bridge was assessed.

4 Cost Saving Summaries – Bridge and Bridge Culvert Decommissioning

Figures 6 and 7 show an overall summary of the forecasted savings that would be realized by closing bridges within the various closure categories and cost-benefit thresholds that were established in this review.

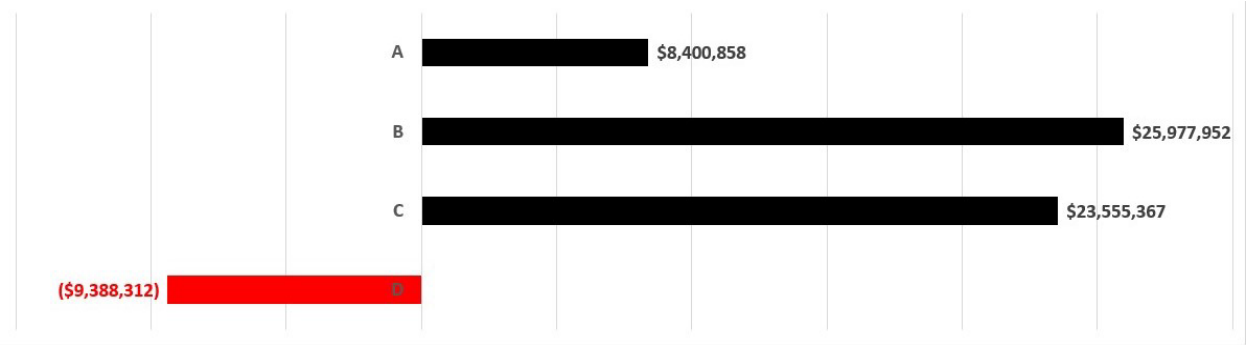


Figure 6 – 10-Year Bridge Decommissioning Savings by Closure Category

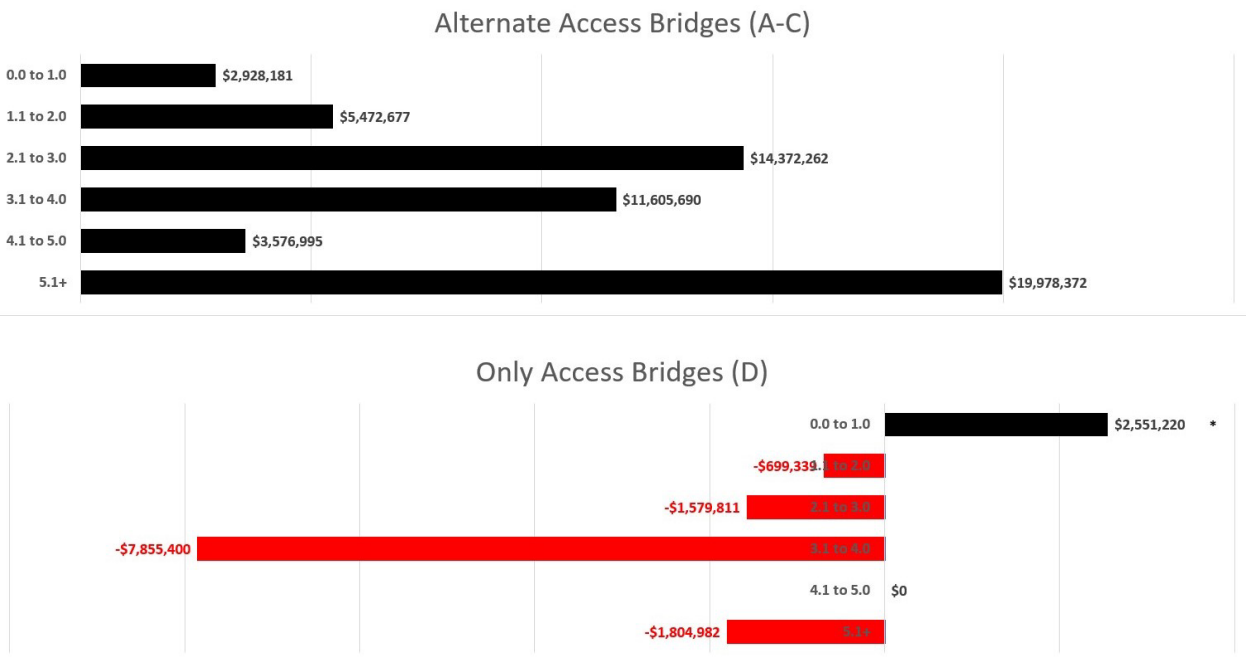


Figure 7 – 10-Year Bridge Decommissioning Savings by Benefit/Cost Ratio

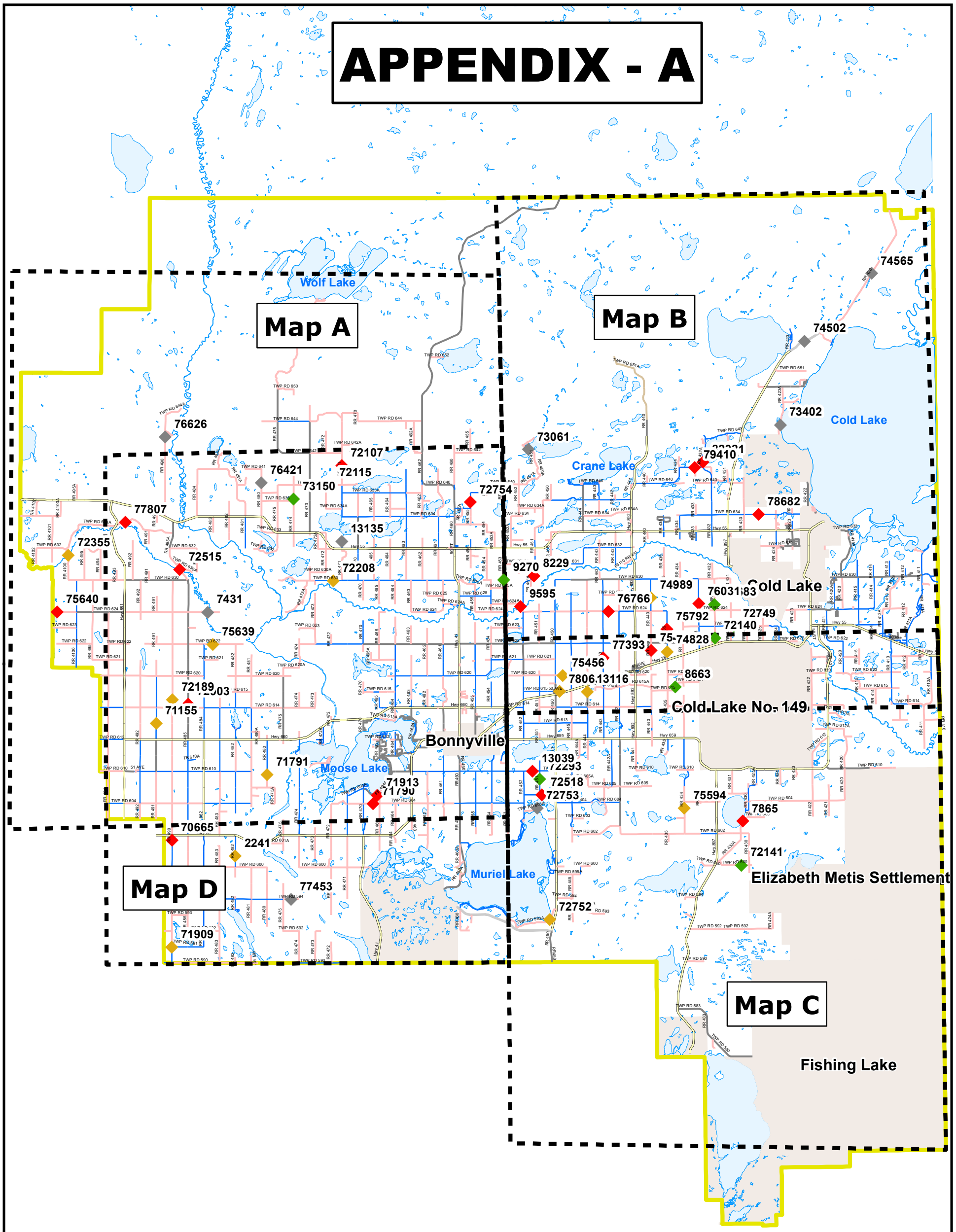
5 Conclusion

In theory, many local road bridges within the MD could be closed without impacting land access as there are alternate accesses available in most cases. However, the reliance that MD residents and industry have on these bridges and the connectivity they provide may make this solution untenable. Having a transportation network able to facilitate the efficient movement of goods, services, equipment, and people is one of the foundations of a healthy economy and investing in the MD's transportation network is an investment in the future.

However, the decision to build many of these bridges was originally made in a post wartime economy when there were new tax revenue streams and a focus on infrastructure. The situation today is not the same as there are many competing priorities.

The decision to invest in bridges when there are so many competing budgetary needs is a difficult one, and one that can only be made at the political level. The contents of this report are intended to inform and facilitate the discussion on what the MD's service levels should be for infrastructure spending going forward and what resource streams will be needed to pay for it.

APPENDIX - A



MD of Bonnyville No. 87
2023 Bridge Structures Approaching the End of Serviceable Life (10 Years)

Replacement Priority Category

- <2 Low Value Replacement - Low Impact Closure (A)
- 2-4 Medium Value Replacement - Medium Impact Closure (B)
- >4 High Value Replacement - High Impact Closure (C)
- Only Access Replacement (D)

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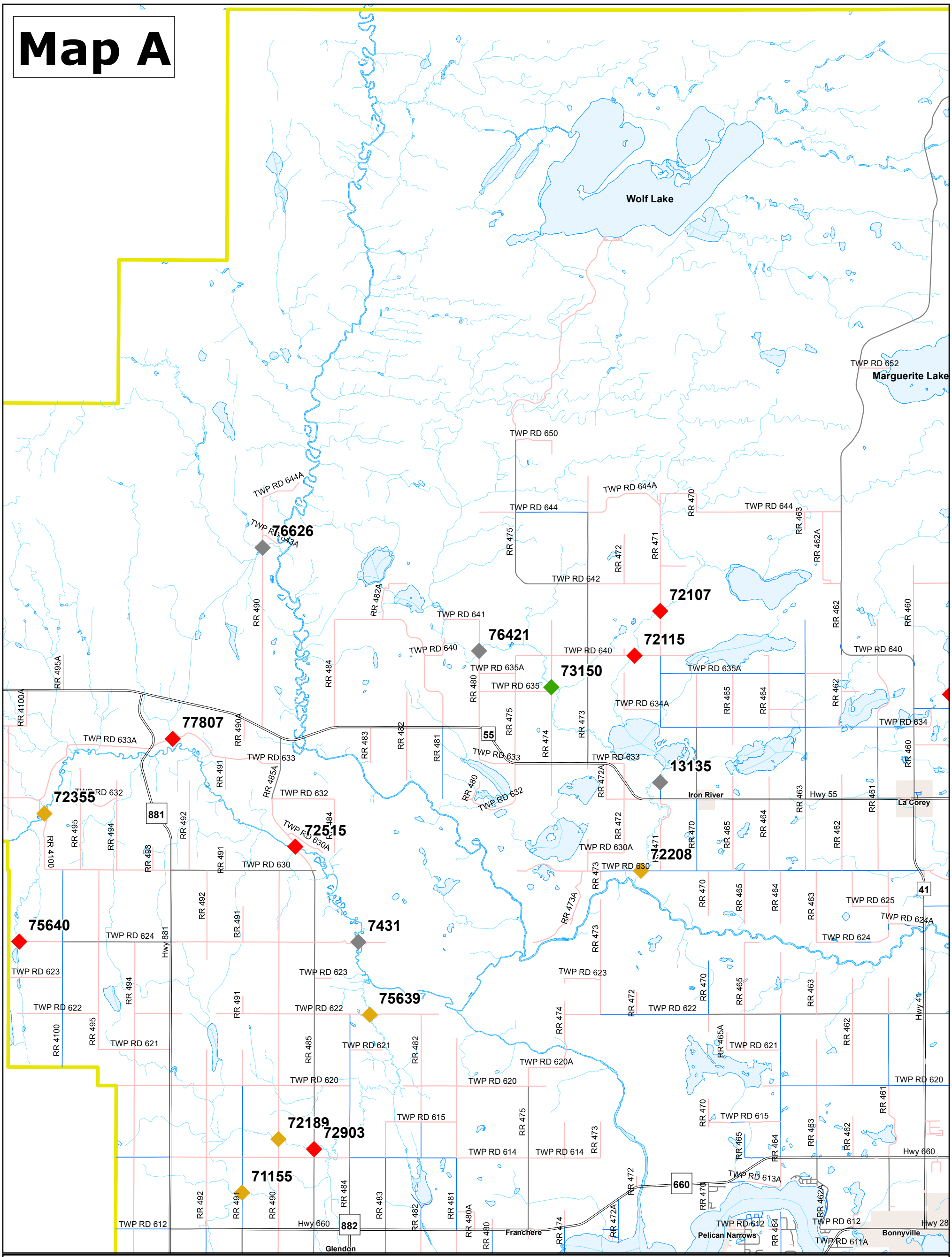
Map A



MD of Bonnyville No. 87
2023 Bridge Structures Approaching the End of Serviceable Life (10 Years)

Replacement Priority Category

- <2 Low Value Replacement - Low Impact Closure (A)
- 2-4 Medium Value Replacement - Medium Impact Closure (B)
- >4 High Value Replacement - High Impact Closure (C)
- Only Access Replacement (D)

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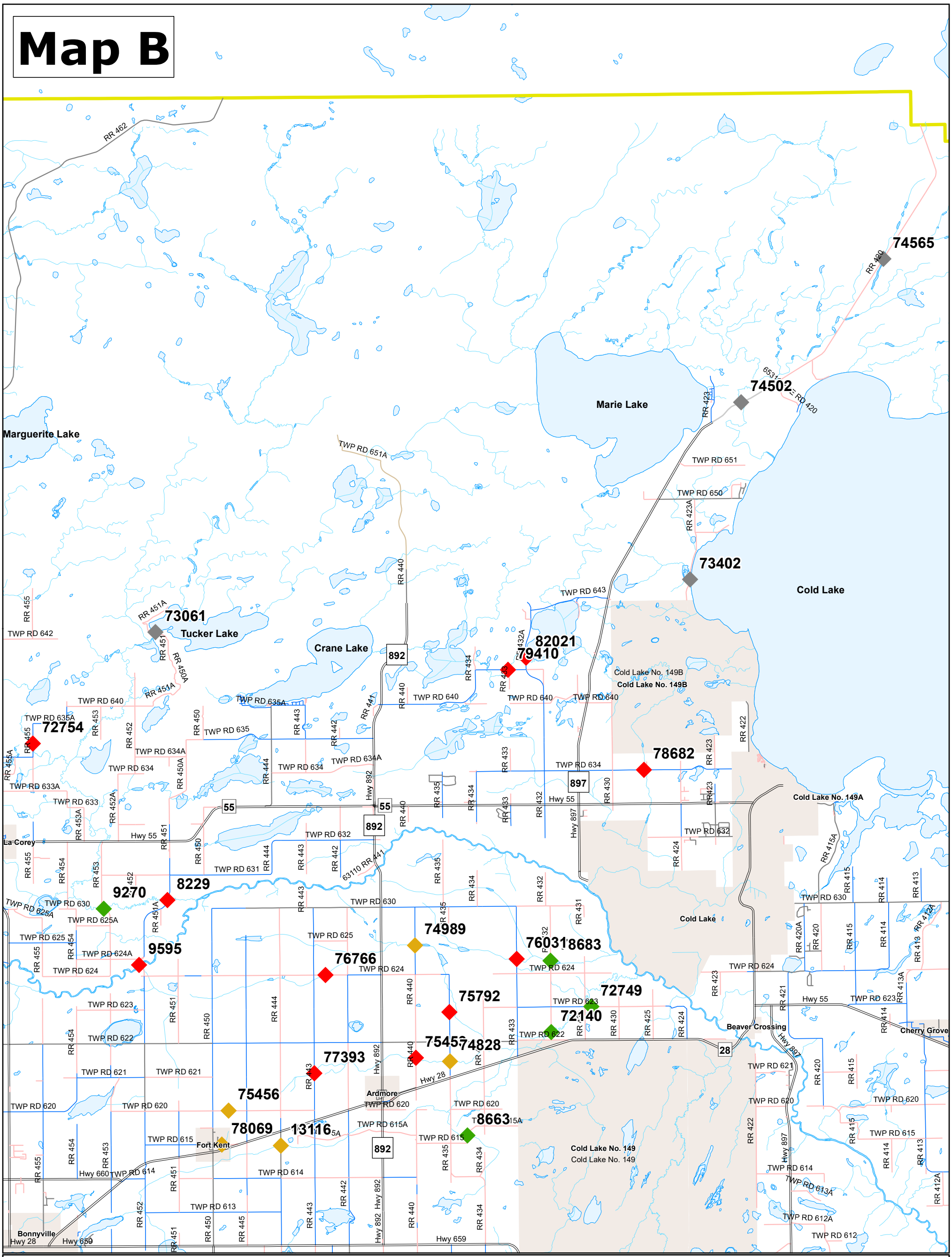
Map B



MD of Bonnyville No. 87
2023 Bridge Structures Approaching the End of Serviceable Life (10 Years)

Replacement Priority Category

- <2 Low Value Replacement - Low Impact Closure (A)
- 2-4 Medium Value Replacement - Medium Impact Closure (B)
- >4 High Value Replacement - High Impact Closure (C)
- Only Access Replacement (D)

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Map C

MD of Bonnyville No. 87
2023 Bridge Structures Approaching the End of Serviceable Life (10 Years)

Replacement Priority Category

- <2 Low Value Replacement - Low Impact Closure (A)
- 2-4 Medium Value Replacement - Medium Impact Closure (B)
- >4 High Value Replacement - High Impact Closure (C)
- Only Access Replacement (D)

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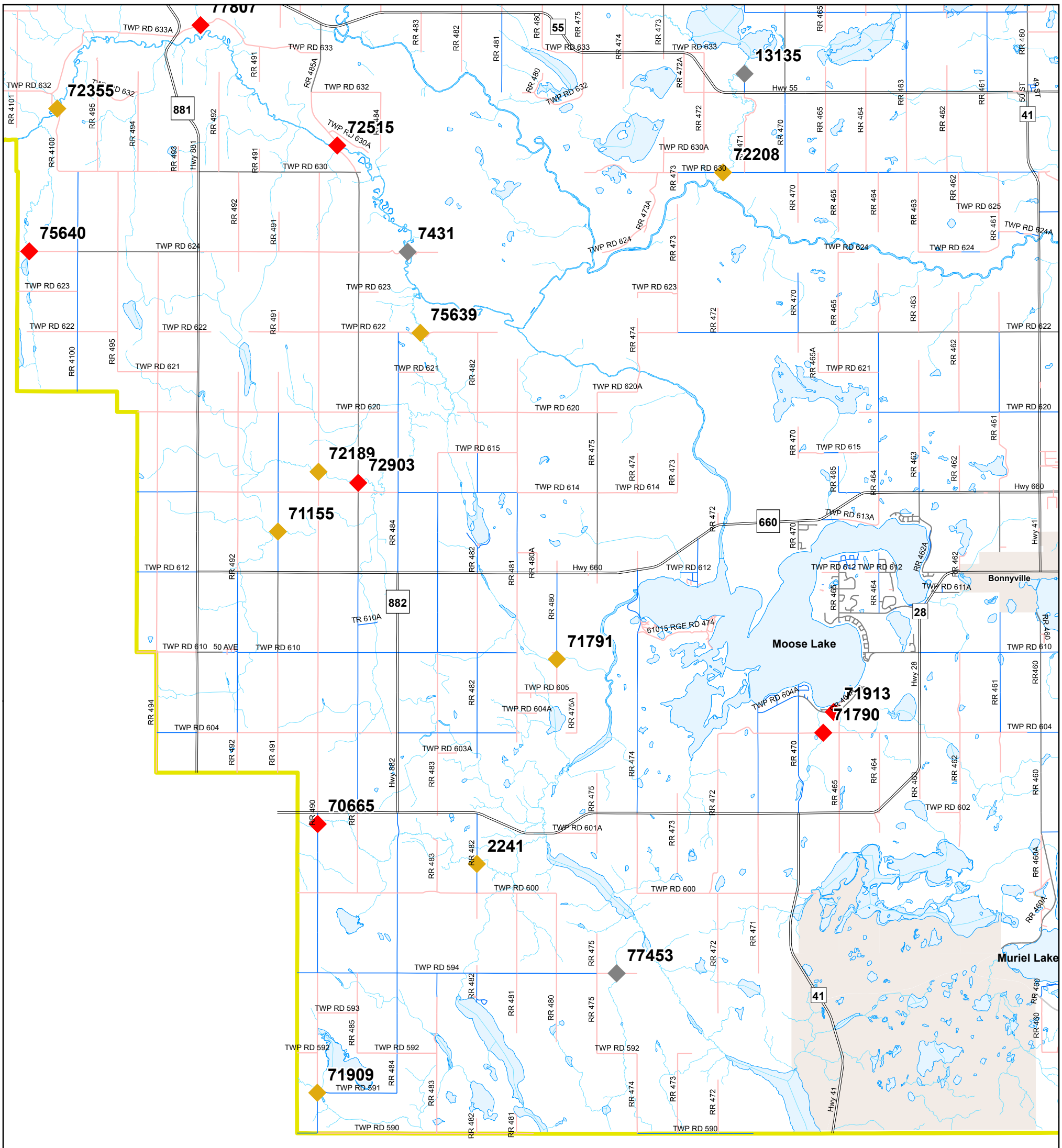

Map D

MD of Bonnyville No. 87
2023 Bridge Structures Approaching the End of Serviceable Life (10 Years)

Replacement Priority Category

- <2 Low Value Replacement - Low Impact Closure (A)
- 2-4 Medium Value Replacement - Medium Impact Closure (B)
- >4 High Value Replacement - High Impact Closure (C)
- Only Access Replacement (D)

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APPENDIX B – MD BRIDGES APPROACHING END OF SERVICEABLE LIFE

(Bridge inspection reports estimate replacement likely needed within 10 years)

MD of Bonnyville **Bridge Structures Approaching End of Serviceable Life (10 Years)**						
Bridge File	**Type**	**Road**	**Reference**	**Bridge Replacement**		**Estimated Closure Net Savings**
				Benefit/Cost Ratio (BCR)	**Priority Category**	
72141	Culvert	TWP 600	W RR 430	0.3	A	$643,809
72293	Bridge	RR 451	S of Twp 610	0.5	A	$1,091,693
73150	Bridge	RR 474	N TWP 635	0.7	A	$1,192,679
72140	Bridge	RR 432	N TWP 622	1.1	A	$947,699
8663	Culvert	RR 434A	N TWP 615	1.3	A	$272,378
9270	Culvert	RR 453	TWP 630	1.6	A	$1,564,216
78683	Bridge	RR 432	N TWP 624	1.8	A	$1,118,744
72749	Bridge	TWP 623	E RR 431	1.8	A	$1,569,639
75456	Bridge	TWP 620	W RR 445	2.1	B	$749,862
72355	Bridge	RR 4100	S of Twp 632	2.1	B	$4,283,963
13116	Bridge	RR 444	S TWP 615	2.2	B	$1,164,143
2241	Culvert	RR 482	N TWP 600	2.3	B	$1,716,345
74989	Bridge	RR 440	S TWP 630	2.3	B	$882,166
75594	Culvert	RR 434	S TWP 604	2.4	B	$421,310
71909	Culvert	RR 490	S TWP 591	2.6	B	$1,862,351
75639	Bridge	Twp 622	E of RR 484	2.8	B	$1,430,476
71791	Culvert	RR 480	S TWP 610	2.9	B	$553,942
72189	Bridge	RR 490	N TWP 614	3.0	B	$766,607
72752	Bridge	TWP 593A	W HWY 657	3.2	B	$1,053,620
74828	Bridge	RR 435	S TWP 622	3.5	B	$678,702
71155	Bridge	RR 491	N HWY 660	3.6	B	$907,120
78069	Bridge	TWP 613	E FORT KENT	3.6	B	$782,039
72515	Bridge	RR 485A	N of Twp 630	4.0	B	$8,184,210
72518	Bridge	TWP 604A	E RR 451	4.2	C	$782,039
71790	Culvert	TWP 604	W RR 465	4.5	C	$257,523
70665	Culvert	RR 490	S HWY 28	4.7	C	$1,423,806
72107	Bridge	RR 471	N TWP 640	5.0	C	$1,113,627
9595	Bridge	RR 452	N of Twp 624	5.1	C	$9,111,181
76766	Culvert	TWP 624	E RR 443	5.2	C	$197,012
75792	Culvert	RR 435	N TWP 622	5.4	C	$233,247
72208	Culvert	TWP 630	W RR 471	5.6	C	$541,097
75640	Bridge	Twp 624	W of RR 4100	5.8	C	$736,644
75453	Bridge	RR 440	S TWP 622	6.5	C	$678,702
76031	Bridge	RR 433	N of Twp 624	8.2	C	$1,046,857
7865	Culvert	RR 430	N TWP 602	12.2	C	$405,031

Bridge File	Type	Road	Reference	Bridge Replacement		Estimated Closure Net Savings
				Benefit/Cost Ratio (BCR)	Priority Category	
72754	Bridge	RR 455	N TWP 634A	12.2	C	$782,039
72903	Bridge	RR 485	N TWP 614	12.8	C	$846,916
8229	Bridge	RR 452A	N TWP 630	13.2	C	$1,418,858
82021	Culvert	RR 432A	N of Twp 641	15.8	C	$438,054
72115	Bridge	TWP 640	E RR 472	24.6	C	$1,091,693
78682	Culvert	TWP 634	W RR 425	26.2	C	$1,485,411
77807	Culvert	Twp 633A	E of Hwy 881	30.5	C	$377,840
77393	Culvert	RR 443	N TWP 620	31.4	C	$225,599
79410	Culvert	TWP 641	W RR 433	49.0	C	$445,467
71913	Culvert	TWP 604A	W RR 465	57.9	C	$171,682
13039	Culvert	TWP 610	W RR 451	98.3	C	$286,137
7431	Bridge	TWP 624	E RR 485	0.3	D	$2,376,807
76626	Culvert	RR 490	S of Twp 643A	0.9	D	$174,413
73061	Bridge	RR 450A	N TWP 641	1.1	D	**-$88,391**
13135	Bridge	RR 471	N HWY 55	1.6	D	**-$372,221**
77453	Culvert	TWP 594	E RR 475	1.6	D	**-$238,728**
76421	Bridge	RR 480	N TWP 635A	2.6	D	**-$1,579,811**
72753	Culvert	TWP 603A	W RR 451	3.8	D	**-$476,560**
74502	Culvert	RR 420	N TWP 651	4.0	D	**-$7,378,840**
73402	Culvert	RR 423A	S TWP 650	11.1	D	**-$1,804,982**
74565	Culvert	RR 420	N TWP 651	Not calculated	D	**Not calculated**

A	Low Value Replacement – Low Impact Closure
B	Medium Value Replacement – Medium Impact Closure
C	High Value Replacement – High Impact Closure
D	Only Access

BF72141 closure would impact:

-average 2 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 11km added travel distance
-assumed average 3.7km added travel distance (max/3)

<u>Estimated Annual User Value</u>

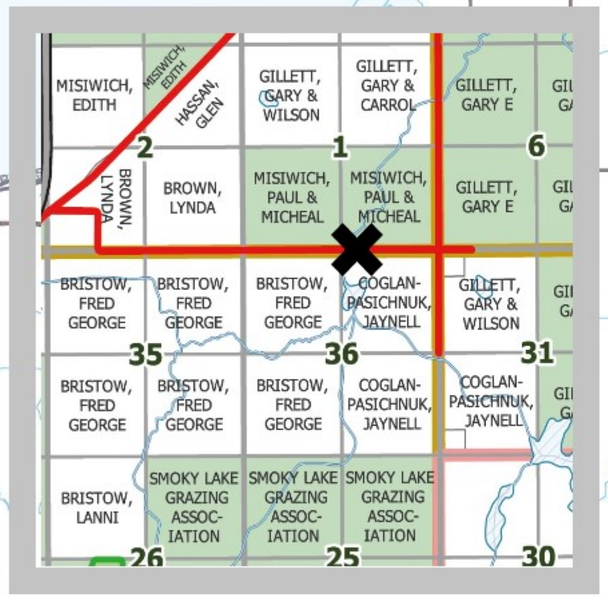
Total annual:
-2677km reduced travel distance
-45 hours reduced travel time
-1338km reduced trucking distance
-22 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $3480
Annuitized 2023 Bridge Culvert Replacement Cost = $22,419

Shallow (<6m) 2.7m Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $1,287,617
Projected 2030 Closure/Removal Cost (2% infl) = $643,809

Category A Closure Candidate
Closure Net Savings: $643,809



BF72141 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 0.3 (0.2)

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE

Kilometres

BF72293 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 0.5

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE

BF72293 closure would impact:

-average 7 vehicles/day
-average 0 trucks/day

Resulting in:

-maximum 8km added travel distance
-assumed average 2.7km added travel distance (max/3)

Estimated Annual User Value

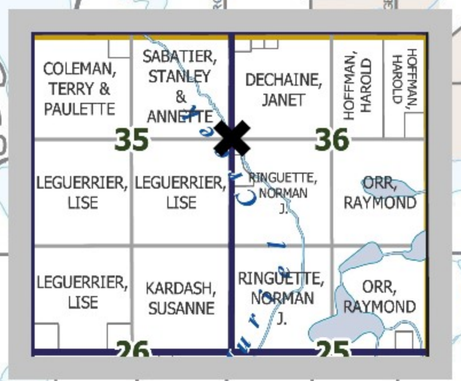
Total annual:
-6935km reduced travel distance
-116 hours reduced travel time
-0km reduced trucking distance
-0 hours reduced trucking time

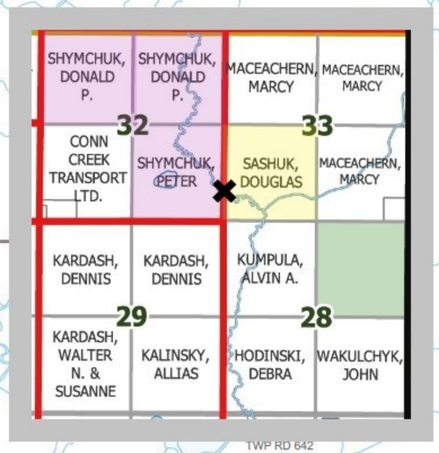
Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $6,359
Annuitized 2023 Bridge Replacement Cost = $13,779

Single Span Bridge:
Projected 2026 Replacement Cost (2% infl) = $1,096,694
Estimated Closure Cost = $5000 ($175,000 – optional 2026 bridge removal)

Category A Closure Candidate
Closure net savings: $1,091,694 ($921,694 including bridge removal)





BF73150 closure would impact:

-average 16 vehicles/day
-average 1 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-11,680km reduced travel distance
-195 hours reduced travel time
-730km reduced trucking distance
-12 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $11,437
Annuitized 2023 Bridge Replacement Cost = $15,390

Single Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $1,197,679
Estimated Closure Cost = $5000 ($165,000 – optional 2025 bridge removal)

Category A Closure Candidate
Closure net savings: $1,192,679 ($1,027,679 including bridge removal)

BF73150 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 0.7

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE

BF72140 closure would impact:

-average 18 vehicles/day
-average 2 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-13,140km reduced travel distance
-219 hours reduced travel time
-1460km reduced trucking distance
-24 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

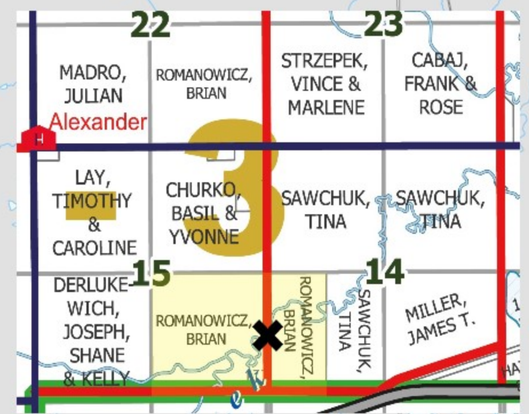
Estimated 2023 Annual User Value = $13,335
Annuitized 2023 Bridge Replacement Cost = $12,209

Single Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $952,699
Estimated Closure Cost = $5000 ($172,000 – optional 2025 bridge removal)

Category A Closure Candidate
Closure net savings: $947,699 ($780,699 including bridge removal)

BF72140 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.1

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE



BF8663 closure would impact:

-average 9 vehicles/day
-average 0 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-6570km reduced travel distance
-110 hours reduced travel time
-0km reduced trucking distance
-0 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

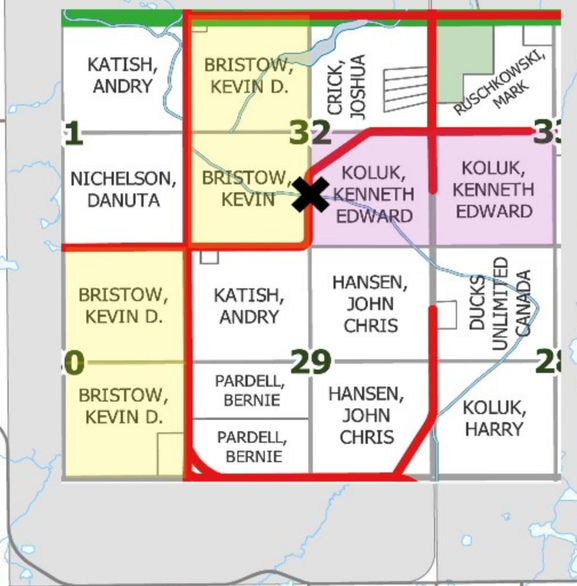
Estimated 2023 Annual User Value = $6132
Annuitized 2023 Bridge Culvert Replacement Cost = $9485

Shallow (<6m) 1.5m Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $544,789
Projected 2030 Closure/Removal Cost (2% infl) = $272,395

Category A Closure Candidate
Closure Net Savings: $272,395

BF8663 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.3 (0.6)

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE



BF9270 closure would impact:

-average 31 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 12km added travel distance
-assumed average 4km added travel distance (max/3)

<u>Estimated Annual User Value</u>

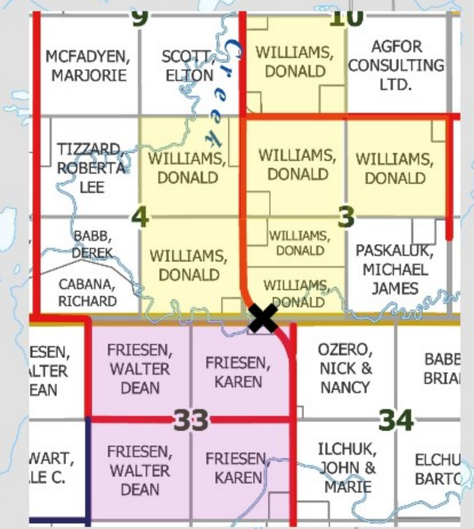
Total annual:
-45,260km reduced travel distance
-754 hours reduced travel time
-1460km reduced trucking distance
-24 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $43,313
Annuitized 2023 Bridge Culvert Replacement Cost = $54,470

Shallow (<6m) 4.3m Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $3,128,433
Projected 2030 Closure/Removal Cost (2% infl) = $1,564,217

Category A Closure Candidate
Net Savings: $1,564,217



BF9270 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.6 (0.8)

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE

BF78683 closure would impact:

-average 19 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-23,117km reduced travel distance
-385 hours reduced travel time
-1216km reduced trucking distance
-20 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $22,468
Annuitized 2023 Bridge Replacement Cost = $12,788

Single Span Bridge:
Projected 2031 Replacement Cost (2% infl) = $1,123,744
Estimated Closure Cost = $5000 ($185,000 – optional 2031 bridge removal)

Category A Closure Candidate
Closure net savings: $1,118,744 ($938,744 including bridge removal)

BF78683 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.8

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE

BF72749 closure would impact:

-average 51 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

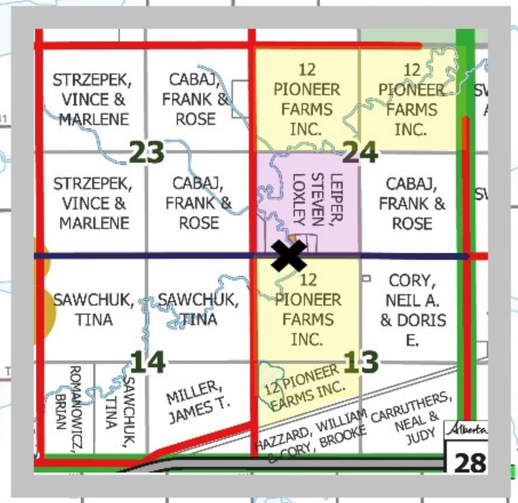
Total annual:
-37,230km reduced travel distance
-621 hours reduced travel time
-2190km reduced trucking distance
-37 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $36,354
Annuitized 2023 Bridge Replacement Cost = $20,180

Three Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $1,574,639
Estimated Closure Cost = $5000 ($200,000 – optional 2025 bridge removal)

Category A Closure Candidate
Closure net savings: $1,569,639 ($1,369,639 including bridge removal)



BF72749 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.8

A: LOW VALUE REPLACEMENT - LOW IMPACT CLOSURE

BF75456 closure would impact:

-average 25 vehicles/day
-average 2 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-18,250km reduced travel distance
-304 hours reduced travel time
-1460km reduced trucking distance
-24 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

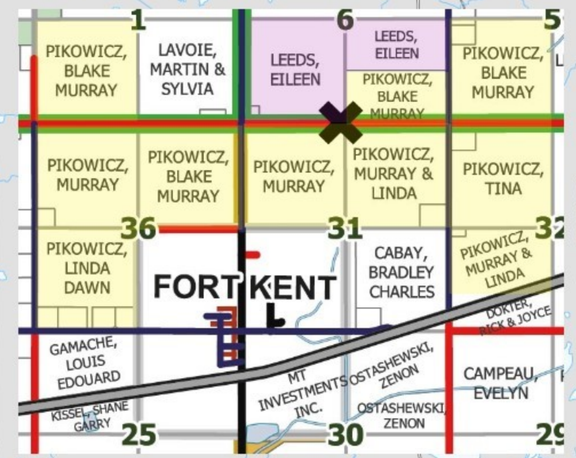
Estimated 2023 Annual User Value = $18,104
Annuitized 2023 Bridge Replacement Cost = $8762

Single Span Bridge:
Projected 2030 Replacement Cost (2% infl) = $754,862
Estimated Closure Cost = $5000 ($165,000 – optional 2030 bridge removal)

Closure net savings: $749,862 ($589,862 including bridge removal)

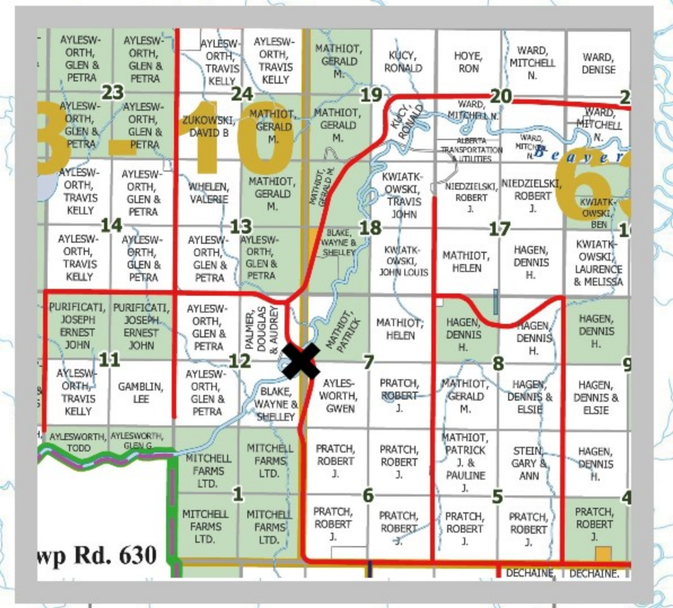
BF 75456 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.1

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE



BF72355 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.1

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE



BF72355 closure would impact:

-average 36 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 22km added travel distance
-assumed average 7.3km added travel distance (max/3)

It is also expected that individual landowners would be significantly impacted as the bridge is between lands they own and work.

<u>Estimated Annual User Value</u>

Total annual:
-96,360km reduced travel distance
-1606 hours reduced travel time
-2555km reduced trucking distance (9198km at 10% ADT)
-43 hours reduced trucking time (153 hours at 10% ADT)

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost
Truck traffic increase to 10% ADT when load restriction removed.

Estimated 2023 Annual User Value = $91,899 ($102,942: trucks at 10% ADT)
Annuitized 2023 Bridge Replacement Cost = $49,784

Beaver River Truss:
Projected 2030 Replacement Cost (2% infl) = $4,288,963
Estimated Closure Cost = $5000 ($460,000 – optional 2030 bridge removal)

Category B Closure Candidate
Closure net savings: $4,283,963 ($3,883,963 including bridge removal)

BF13116 closure would impact:

-average 41 vehicles/day
-average 1 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-29,930km reduced travel distance
-499 hours reduced travel time
-730km reduced trucking distance
-12 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

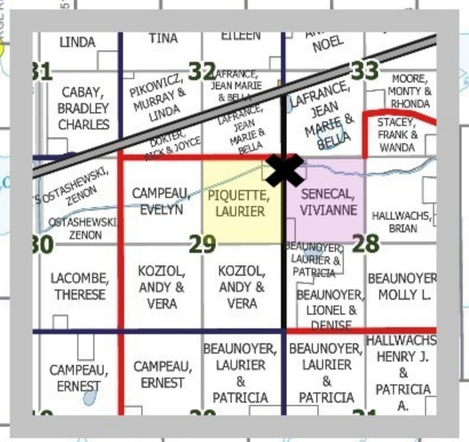
Estimated 2023 Annual User Value = $28,470
Annuitized 2023 Bridge Replacement Cost = $12,788

Single Span Bridge:
Projected 2033 Replacement Cost (2% infl) = $1,169,144
Estimated Closure Cost = $5000 ($195,000 – optional 2033 bridge removal)

Category B Closure Candidate
Closure net savings: $1,164,144 ($974,144 including bridge removal)

BF13116 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.2

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE



BF2241 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.3 (1.1)

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE

BF2241 closure would impact:

-average 44 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 13km added travel distance
-assumed average 4.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

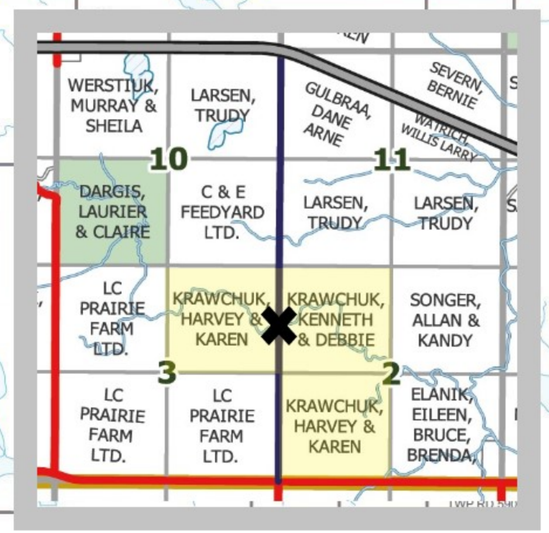
Total annual:
-69,593km reduced travel distance
-1160 hours reduced travel time
-4745km reduced trucking distance
-79 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $68,433
Annuitized 2023 Bridge Culvert Replacement Cost = $59,767

Deep (6m+) 3m Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $3,432,690
Projected 2030 Closure/Removal Cost (2% infl) = $1,716,345

Category B Closure Candidate
Net Savings: $1,716,345



BF74989 closure would impact:

-average 20 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

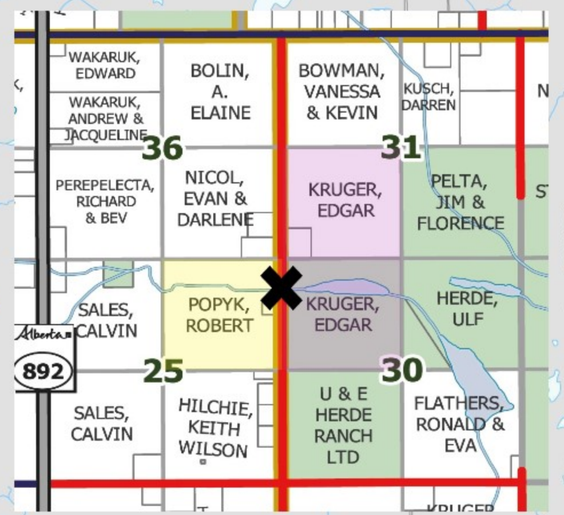
Total annual:
-24,445km reduced travel distance
-408 hours reduced travel time
-365km reduced trucking distance
-6 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $23,603
Annuitized 2023 Bridge Replacement Cost = $10,096

Single Span Bridge:
Projected 2031 Replacement Cost (2% infl) = $887,166
Estimated Closure Cost = $5000 ($185,000 – optional 2031 bridge removal)

Category B Closure Candidate
Closure net savings: $882,166 ($697,166 including bridge removal)



BF74989 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.3

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE

BF75594 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.4 (1.2)

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE

BF75594 closure would impact:

-average 12 vehicles/day
-average 0 trucks/day

Resulting in:

-maximum 13km added travel distance
-assumed average 4.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

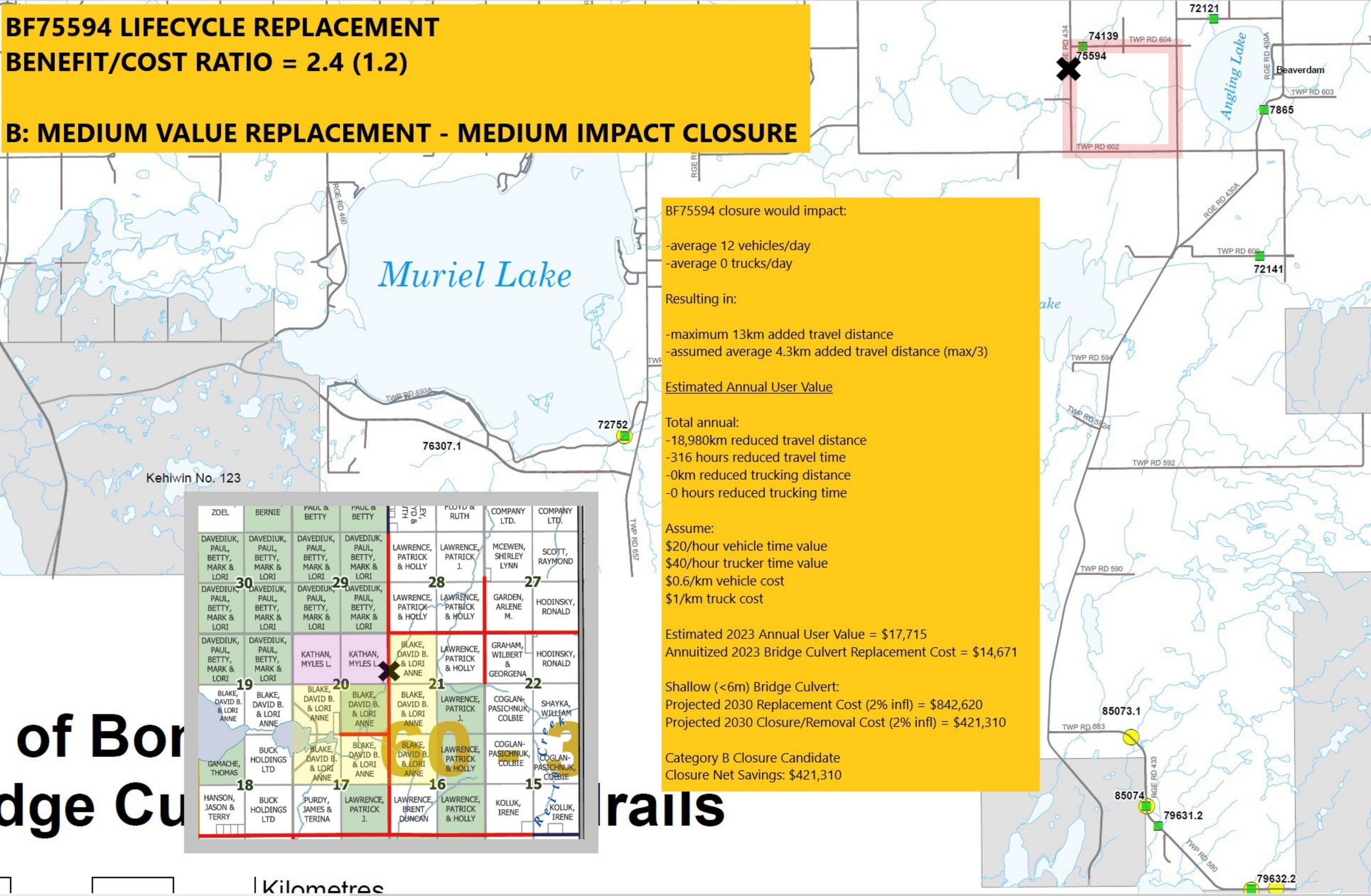
Total annual:
-18,980km reduced travel distance
-316 hours reduced travel time
-0km reduced trucking distance
-0 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $17,715
Annuitized 2023 Bridge Culvert Replacement Cost = $14,671

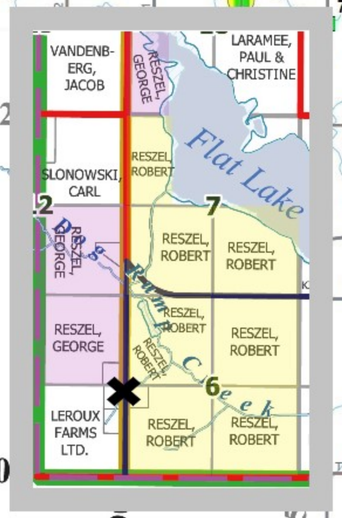
Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $842,620
Projected 2030 Closure/Removal Cost (2% infl) = $421,310

Category B Closure Candidate
Closure Net Savings: $421,310



BF71909 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.6 (1.3)

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE



BF71909 closure would impact:

-average 76 vehicles/day
-average 6 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-92,345km reduced travel distance
-1539 hours reduced travel time
-7300km reduced trucking distance
-122 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $91,656
Annuitized 2023 Bridge Culvert Replacement Cost = $71,601

Deep (6m+) 2.7m Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $3,724,702
Projected 2030 Closure/Removal Cost (2% infl) = $1,862,351

Category B Closure Candidate
Closure Net Savings: $1,862,351

ST PAUL COUNTY

Moose Lake

Muriel Lake

Glendon

BF75639 closure would impact:

-average 21 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 19km added travel distance
-assumed average 6.3km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-48,290km reduced travel distance
-805 hours reduced travel time
-6935km reduced trucking distance
-116 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

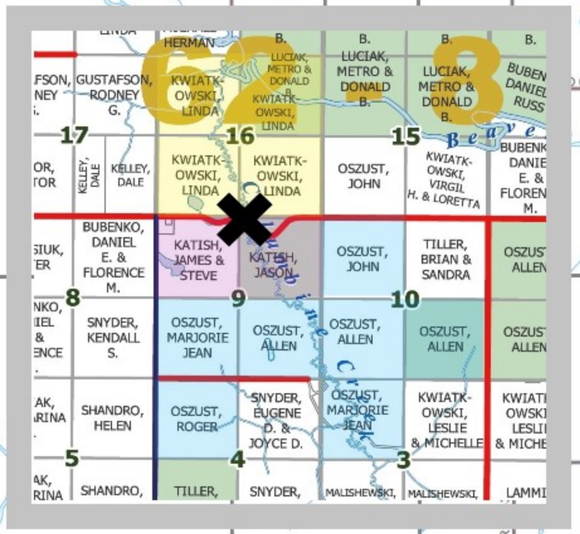
Estimated 2023 Annual User Value = $47,004
Annuitized 2023 Bridge Replacement Cost = $16,662

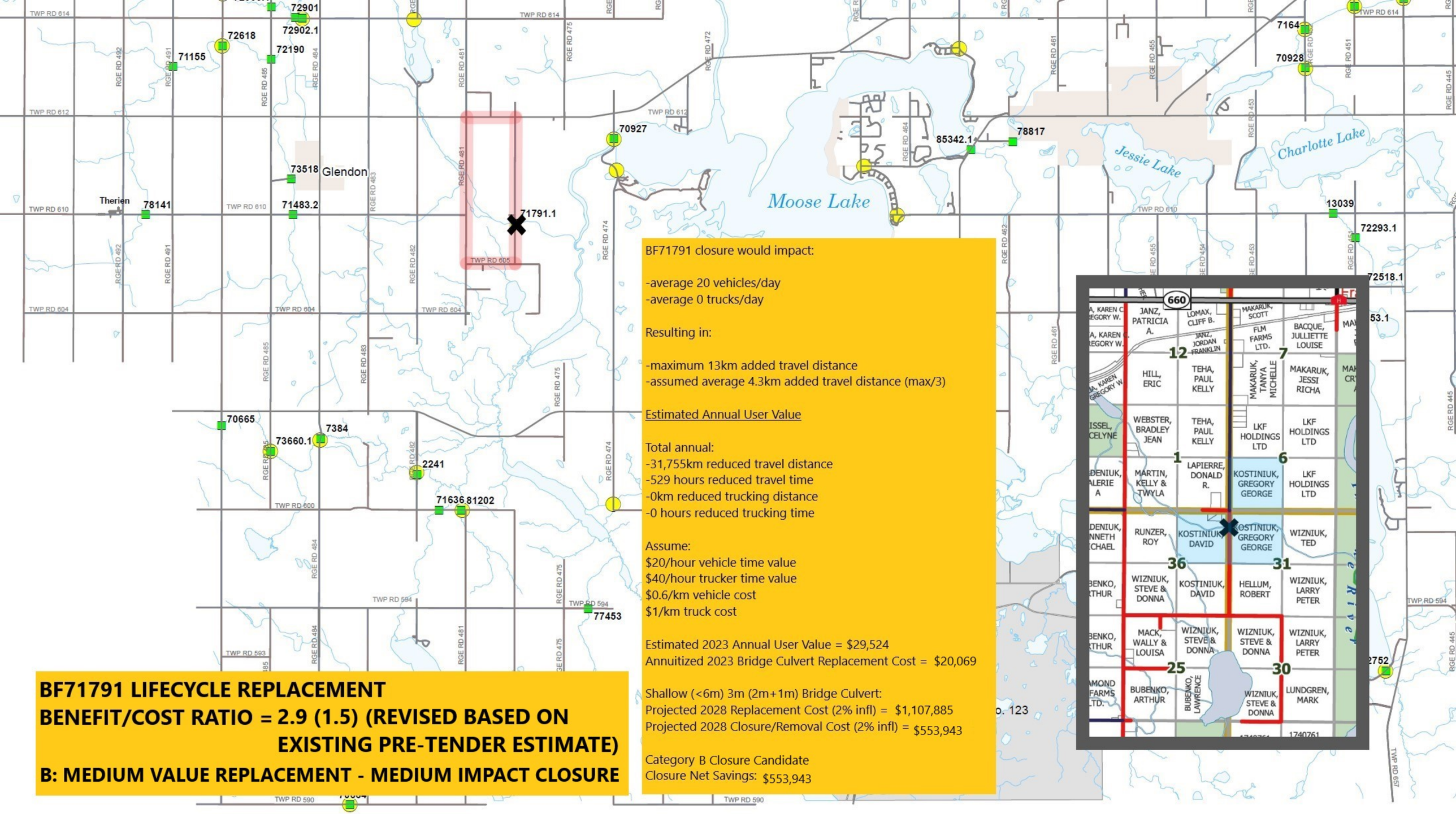
Single Span Bridge:
Projected 2030 Replacement Cost (2% infl) = $1,435,476
Estimated Closure Cost = $5000 ($190,000 – optional 2030 bridge removal)

Category B Closure Candidate
Closure Net Savings: $1,430,476 ($1,245,476 if bridge removed)

BF75639 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.8

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE




BF71791 closure would impact:
-average 20 vehicles/day
-average 0 trucks/day
Resulting in:
-maximum 13km added travel distance
-assumed average 4.3km added travel distance (max/3)
Estimated Annual User Value
Total annual:
-31,755km reduced travel distance
-529 hours reduced travel time
-0km reduced trucking distance
-0 hours reduced trucking time
Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost
Estimated 2023 Annual User Value = $29,524
Annuitized 2023 Bridge Culvert Replacement Cost = $20,069
Shallow (<6m) 3m (2m+1m) Bridge Culvert:
Projected 2028 Replacement Cost (2% infl) = $1,107,885
Projected 2028 Closure/Removal Cost (2% infl) = $553,943
Category B Closure Candidate
Closure Net Savings: $553,943
BF71791 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.9 (1.5) (REVISED BASED ON EXISTING PRE-TENDER ESTIMATE)
B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE
71791.1
Moose Lake
Jessie Lake
Charlotte Lake
Glendon
Therien
TWP RD 614
TWP RD 612
TWP RD 610
TWP RD 605
TWP RD 604
TWP RD 600
TWP RD 594
TWP RD 593
TWP RD 590
RGE RD 492
RGE RD 491
RGE RD 485
RGE RD 484
RGE RD 483
RGE RD 482
RGE RD 481
RGE RD 475
RGE RD 474
RGE RD 472
RGE RD 464
RGE RD 462
RGE RD 461
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12
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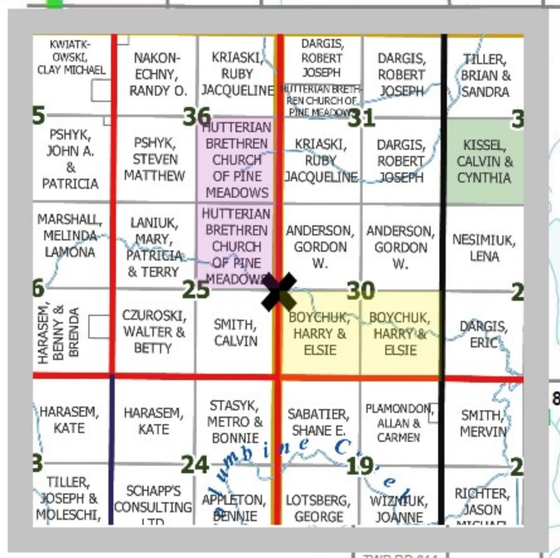
1
6
36
31
25
30
JANZ, PATRICIA A.
LOMAX, CLIFF B.
JANZ, JORDAN FRANKLIN
MAKARUK, SCOTT
FLM FARMS LTD.
BACQUE, JULLIETTE LOUISE
HILL, ERIC
TEHA, PAUL KELLY
MAKARUK, TANYA MICHELLE
MAKARUK, JESSI RICHA
WEBSTER, BRADLEY JEAN
LKF HOLDINGS LTD
MARTIN, KELLY & TWYLA
LAPIERRE, DONALD R.
KOSTINIUK, GREGORY GEORGE
RUNZER, ROY
KOSTINIUK, DAVID
WIZNIUK, TED
WIZNIUK, STEVE & DONNA
HELLUM, ROBERT
WIZNIUK, LARRY PETER
MACK, WALLY & LOUISA
BUBENKO, ARTHUR
BUBENKO, LAWRENCE
LUNDGREN, MARK
1740761



BF72189 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 3.0

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE

BF72189 closure would impact:

-average 22 vehicles/day
-average 5 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

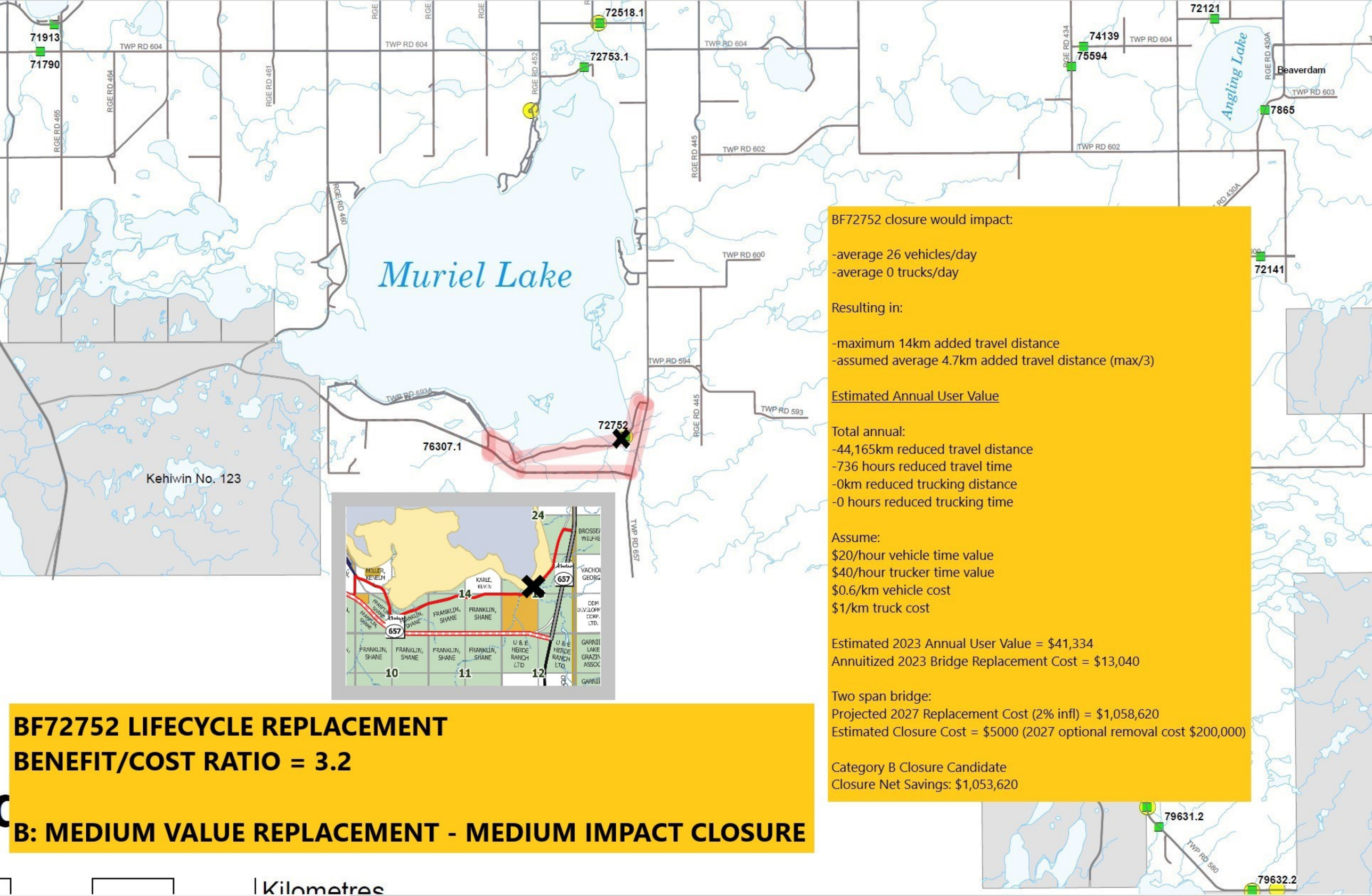
Total annual:
-26,645km reduced travel distance
-444 hours reduced travel time
-6205km reduced trucking distance
-103 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $29,443
Annuitized 2023 Bridge Replacement Cost = $9,889

Single Span Bridge:
Projected 2027 Replacement Cost (2% infl) = $802,779
Estimated Closure Cost = $5000 ($178,000 – optional 2027 bridge removal)

Category B Closure Candidate
Closure net savings: $797,779 ($624,779 including bridge removal)



BF72752 closure would impact:

-average 26 vehicles/day
-average 0 trucks/day

Resulting in:

-maximum 14km added travel distance
-assumed average 4.7km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-44,165km reduced travel distance
-736 hours reduced travel time
-0km reduced trucking distance
-0 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

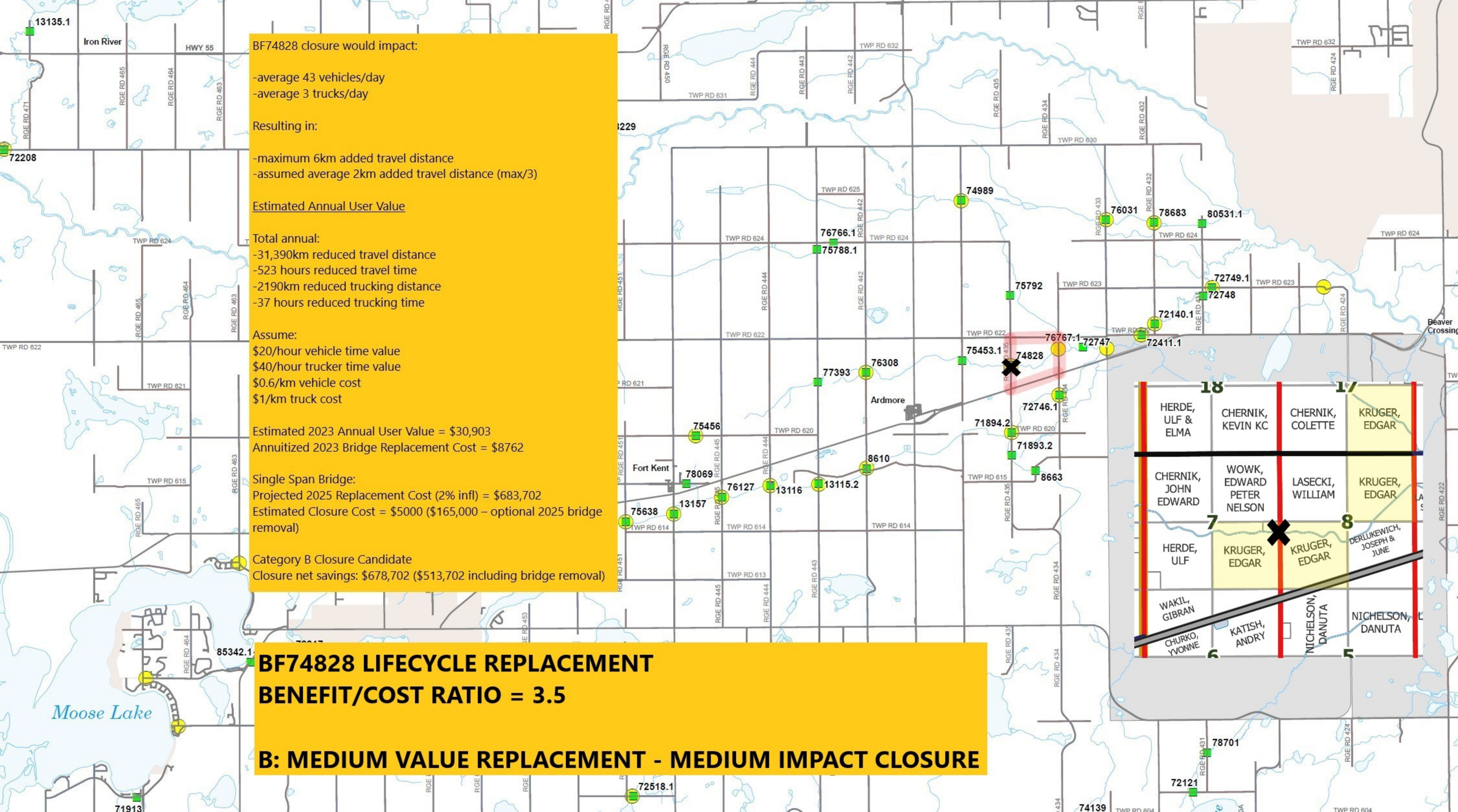
Estimated 2023 Annual User Value = $41,334
Annuitized 2023 Bridge Replacement Cost = $13,040

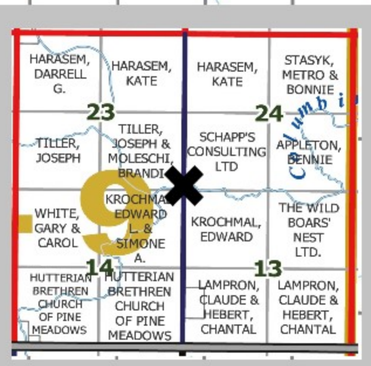
Two span bridge:
Projected 2027 Replacement Cost (2% infl) = $1,058,620
Estimated Closure Cost = $5000 (2027 optional removal cost $200,000)

Category B Closure Candidate
Closure Net Savings: $1,053,620

BF72752 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 3.2

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE


BF74828 closure would impact:
-average 43 vehicles/day
-average 3 trucks/day
Resulting in:
-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)
Estimated Annual User Value
Total annual:
-31,390km reduced travel distance
-523 hours reduced travel time
-2190km reduced trucking distance
-37 hours reduced trucking time
Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost
Estimated 2023 Annual User Value = $30,903
Annuitized 2023 Bridge Replacement Cost = $8762
Single Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $683,702
Estimated Closure Cost = $5000 ($165,000 – optional 2025 bridge removal)
Category B Closure Candidate
Closure net savings: $678,702 ($513,702 including bridge removal)
BF74828 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 3.5
B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE
Iron River
HWY 55
Ardmore
Fort Kent
Moose Lake
Beaver Crossing
13135.1
72208
74989
76031
78683
80531.1
76766.1
75788.1
75792
72749.1
72748
72140.1
72411.1
76767.1
72747
75453.1
74828
77393
76308
72746.1
71894.2
71893.2
8663
8610
13115.2
13116
76127
78069
75456
13157
75638
85342.1
71913
72518.1
78701
72121
74139
18
17
HERDE, ULF & ELMA
CHERNIK, KEVIN KC
CHERNIK, COLETTE
KRUGER, EDGAR
CHERNIK, JOHN EDWARD
WOWK, EDWARD PETER NELSON
LASECKI, WILLIAM
KRUGER, EDGAR
7
8
HERDE, ULF
KRUGER, EDGAR
KRUGER, EDGAR
DERLUKEWICH, JOSEPH & JUNE
WAKIL, GIBRAN
CHURKO, YVONNE
KATISH, ANDRY
NICHELSON, DANUTA
NICHELSON, DANUTA
6
5



BF71155 closure would impact:

-average 33 vehicles/day
-average 2 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-40,150km reduced travel distance
-669 hours reduced travel time
-2555km reduced trucking distance
-43 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $39,258
Annuitized 2023 Bridge Replacement Cost = $11,015

Single Span Bridge:
Projected 2028 Replacement Cost (2% infl) = $912,120
Estimated Closure Cost = $5000 ($182,000 – optional 2028 bridge removal)

Category B Closure Candidate
Closure Net Savings: $907,120 ($730,120 if bridge removed)

BF71155 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 3.6

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE

BF78069 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 3.6

B: MEDIUM VALUE REPLACEMENT - MEDIUM IMPACT CLOSURE

BF78069 closure would impact:

-average 103 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 3km added travel distance
-assumed average 1km added travel distance (max/3)

Estimated Annual User Value

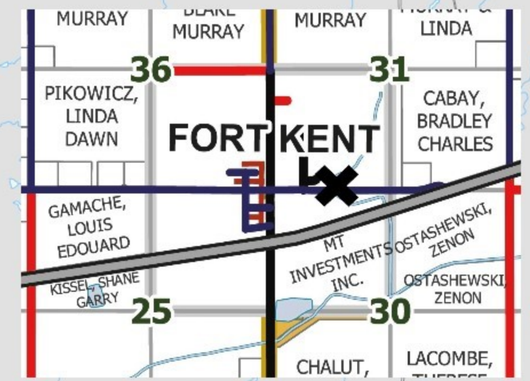
Total annual:
-37,595km reduced travel distance
-627 hours reduced travel time
-1095km reduced trucking distance
-18 hours reduced trucking time

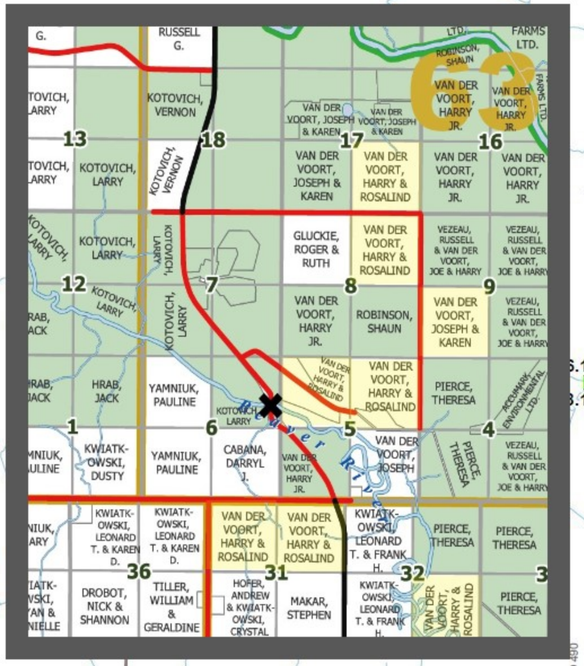
Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $35,892
Annuitized 2023 Bridge Replacement Cost = $9,889

Single Span Bridge:
Projected 2026 Replacement Cost (2% infl) = $787,039
Estimated Closure Cost = $5000 ($165,000 – optional 2026 bridge removal)

Category B Closure Candidate
Closure net savings: $782,039 ($622,039 including bridge removal)





BF72515 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 4.0

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF72515 closure would impact:

-average 100 vehicles/day
-average 6 trucks/day

Resulting in:

-maximum 30km added travel distance
-assumed average 10km added travel distance (max/3)

Estimated Annual User Value

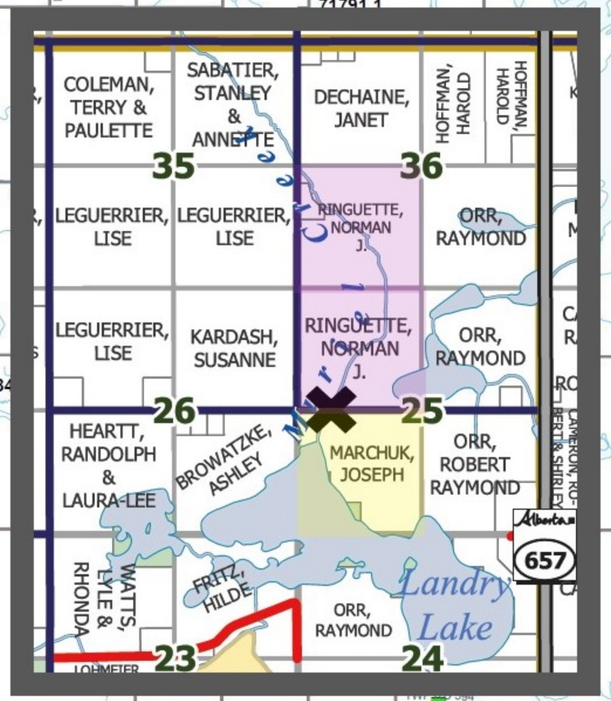
Total annual:
-365,000km reduced travel distance
-6083 hours reduced travel time
-21,900km reduced trucking distance (36,500km at 10% ADT)
-365 hours reduced trucking time (608 hours at 10% ADT)

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost
Truck traffic increase to 10% ADT if/when load restriction removed.

Estimated 2023 Annual User Value = $356,727 ($381,047: trucks at 10% ADT)
Annuitized 2023 Bridge Replacement Cost = $95,056

Beaver River Truss Bridge:
Projected 2030 Replacement Cost (2% infl) = $8,189,210
Estimated Closure Cost = $5000
Estimated Derelict Structure Removal Cost (Optional) =$460,000

-Closure not recommended
-Closure net savings: $8,184,210 ($7,724,210 including bridge removal)



BF72518 closure would impact:

-average 44 vehicles/day
-average 2 trucks/day

Resulting in:

-maximum 8km added travel distance
-assumed average 2.7km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-42,705km reduced travel distance
-712 hours reduced travel time
-1825km reduced trucking distance
-30 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $41,399
Annuitized 2023 Bridge Replacement Cost = $9,889

Single Span Bridge:
Projected 2027 Replacement Cost (2% infl) = $802,801
Estimated Closure Cost = $5000 ($160,000 – optional 2027 bridge removal)

Closure not Recommended
Closure net savings: $797,801 ($637,801 including bridge removal)

BF72518 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 4.2

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF71790 closure would impact:

-average 29 vehicles/day
-average 1 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-21,170km reduced travel distance
-353 hours reduced travel time
-730km reduced trucking distance
-12 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

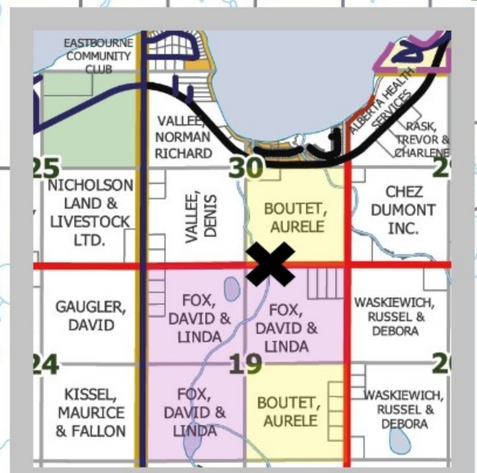
Estimated 2023 Annual User Value = $20,294
Annuitized 2023 Bridge Culvert Replacement Cost = $8,968

Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $515,047
Projected 2030 Closure/Removal Cost (2% infl) = $257,524

-Closure Net Savings: $257,524

BF71790 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 4.5 (2.3)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF70665 closure would impact:

-average 91 vehicles/day
-average 14 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-110,717km reduced travel distance
-1845 hours reduced travel time
-17,033km reduced trucking distance
-284 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

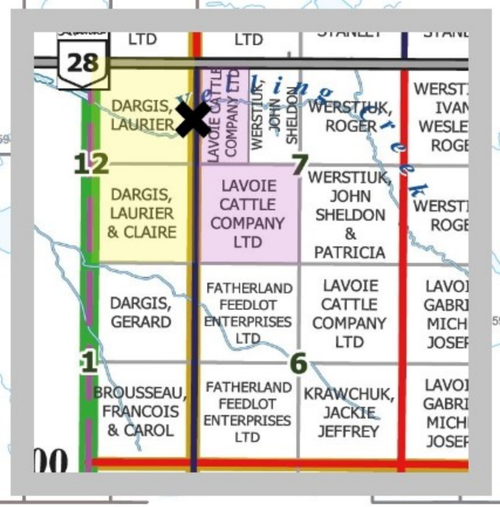
Estimated 2023 Annual User Value = $115,827
Annuitized 2023 Bridge Culvert Replacement Cost = $49,580

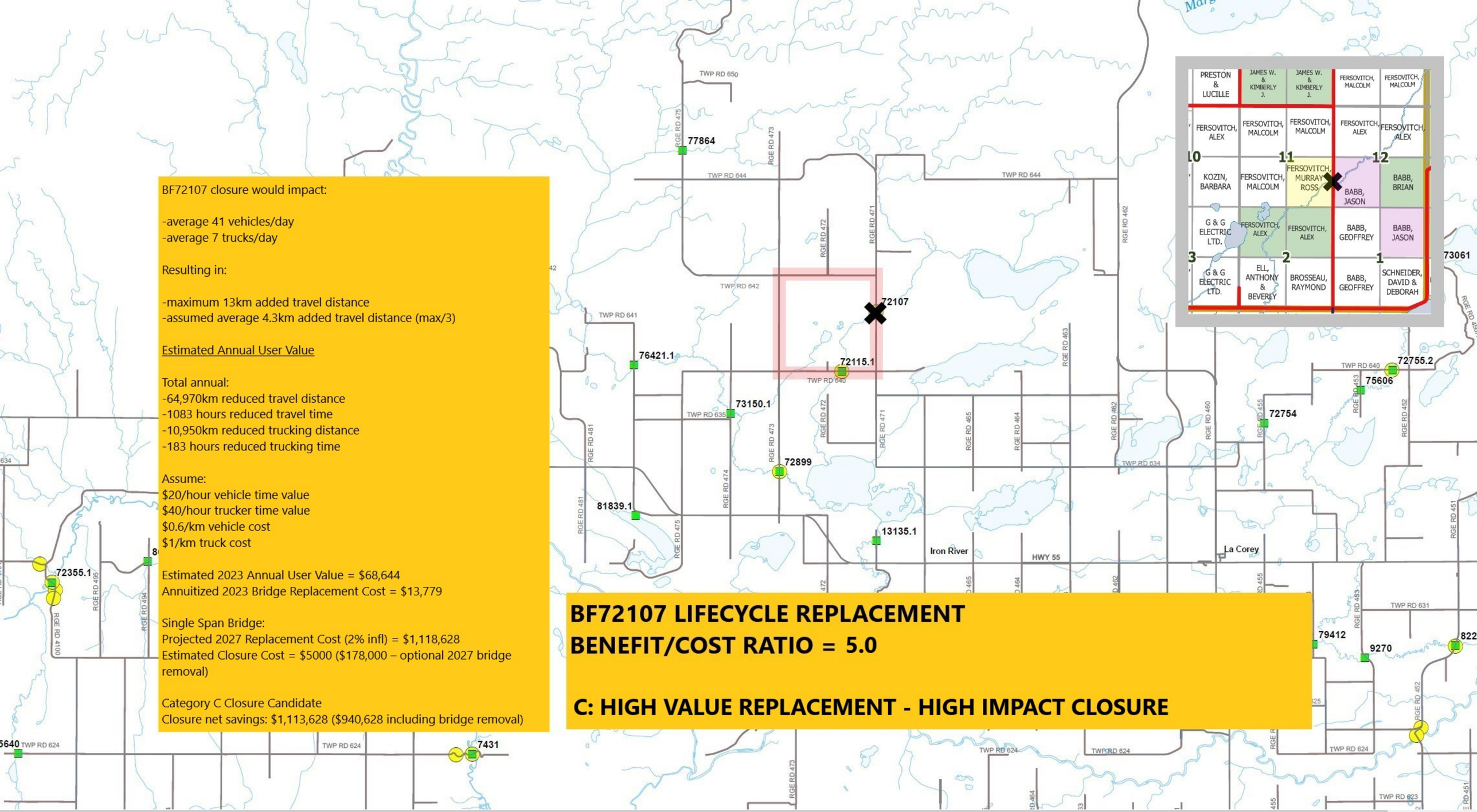
Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $2,847,612
Projected 2030 Closure/Removal Cost (2% infl) = $1,423,806

-Closure Net Savings: $1,423,806

BF70665 LIFECYCLE REPLACMENT
BENEFIT/COST RATIO = 4.7 (2.3)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE




BF72107 closure would impact:
-average 41 vehicles/day
-average 7 trucks/day
Resulting in:
-maximum 13km added travel distance
-assumed average 4.3km added travel distance (max/3)
Estimated Annual User Value
Total annual:
-64,970km reduced travel distance
-1083 hours reduced travel time
-10,950km reduced trucking distance
-183 hours reduced trucking time
Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost
Estimated 2023 Annual User Value = $68,644
Annuitized 2023 Bridge Replacement Cost = $13,779
Single Span Bridge:
Projected 2027 Replacement Cost (2% infl) = $1,118,628
Estimated Closure Cost = $5000 ($178,000 – optional 2027 bridge removal)
Category C Closure Candidate
Closure net savings: $1,113,628 ($940,628 including bridge removal)
BF72107 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 5.0
C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE
PRESTON & LUCILLE
JAMES W. & KIMBERLY J.
JAMES W. & KIMBERLY J.
FERSOVITCH, MALCOLM
FERSOVITCH, MALCOLM
FERSOVITCH, ALEX
FERSOVITCH, MALCOLM
FERSOVITCH, MALCOLM
FERSOVITCH, ALEX
FERSOVITCH, ALEX
10
11
12
KOZIN, BARBARA
FERSOVITCH, MALCOLM
FERSOVITCH, MURRAY ROSS
BABB, JASON
BABB, BRIAN
G & G ELECTRIC LTD.
FERSOVITCH, ALEX
FERSOVITCH, ALEX
BABB, GEOFFREY
BABB, JASON
3
2
1
G & G ELECTRIC LTD.
ELL, ANTHONY & BEVERLY
BROSSEAU, RAYMOND
BABB, GEOFFREY
SCHNEIDER, DAVID & DEBORAH
73061
TWP RD 650
TWP RD 644
TWP RD 642
TWP RD 641
TWP RD 640
TWP RD 635
TWP RD 634
TWP RD 631
TWP RD 624
TWP RD 623
RGE RD 475
RGE RD 473
RGE RD 472
RGE RD 471
RGE RD 481
RGE RD 474
RGE RD 465
RGE RD 464
RGE RD 463
RGE RD 462
RGE RD 460
RGE RD 455
RGE RD 453
RGE RD 452
RGE RD 451
RGE RD 495
RGE RD 494
RGE RD 4100
77864
72107
76421.1
72115.1
73150.1
72899
81839.1
13135.1
72355.1
72755.2
75606
72754
79412
9270
7431
Iron River
HWY 55
La Corey

BF9595 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 5.1

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF9595 closure would impact:

-average 225 vehicles/day
-average 15 trucks/day

Resulting in:

-maximum 24km added travel distance
-assumed average 8km added travel distance (max/3)

Estimated Annual User Value
(Current bridge)

Total annual:
-657,000km reduced travel distance
-10,950 hours reduced travel time
-43,800km reduced trucking distance (65,700km at 10% ADT)
-730 hours reduced trucking time (1095 hours at 10% ADT)

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost
Truck traffic increase to 10% ADT if/when load restriction removed

Estimated 2023 Annual User Value = $645,320 ($681,820: Trucks at 10% ADT)
Annuitized 2023 Bridge Replacement Cost = $134,200

Beaver River Truss Bridge:
Projected 2035 Replacement Cost (2% infl) = $12,764,854
Estimated Closure Cost = $5000
Estimated Derelict Structure Removal Cost (Optional) =$500,000

-Closure not recommended unless a relocated crossing has been built.
-Closure net savings: $12,264,854
-Consider relocating future river crossing to better service users and reduce construction costs – the current location does not appear to be optimal due to the existing road geometry and misalignment with existing development/transportation corridors.

Recommend considering the relocation of this river crossing when the bridge is replaced:
-More suitable site (approaches not so steep)
-Better alignment with future desired development and transportation corridors

BF76766 closure would impact:

-average 24 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-17,520km reduced travel distance
-292 hours reduced travel time
-2190km reduced trucking distance
-37 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

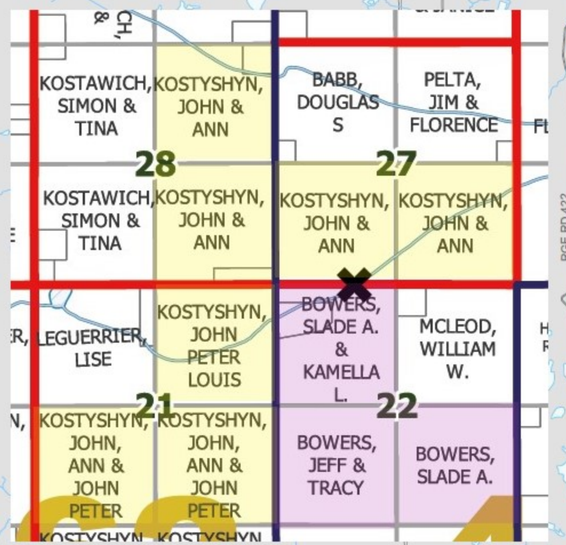
Estimated 2023 Annual User Value = $17,958
Annuitized 2023 Bridge Culvert Replacement Cost = $6,860

Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $394,024
Projected 2030 Closure/Removal Cost (2% infl) = $197,012

Closure not recommended
Closure Net Savings: $197,012

BF76766 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 5.2 (2.6)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF75792 closure would impact:

-average 35 vehicles/day
-average 1 truck/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-25,550km reduced travel distance
-425 hours reduced travel time
-730km reduced trucking distance
-12 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

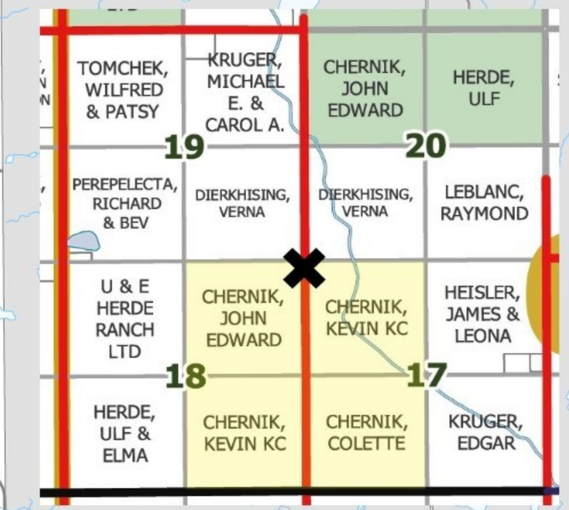
Estimated 2023 Annual User Value = $24,382
Annuitized 2023 Bridge Culvert Replacement Cost = $8968

Shallow (<6m) Bridge Culvert:
Projected 2025 Replacement Cost (2% infl) = $466,494
Projected 2025 Closure/Removal Cost (2% infl) = $233,247

Category C Closure Candidate
Closure Net Savings: $233,247

BF75792 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 5.4 (2.7)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF72208 closure would impact:

-average 18 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 13km added travel distance
-assumed average 4.3km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-28,470km reduced travel distance
-78 hours reduced travel time
-4745km reduced trucking distance
-79 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $30,052
Annuitized 2023 Bridge Culvert Replacement Cost = $20,803*

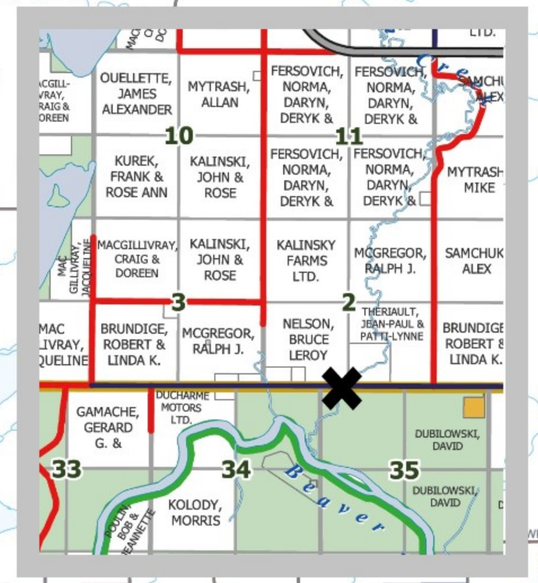
***Note that 75% provincial grant funding for culvert replacement is in place for BF72208 to facilitate fish passage.**

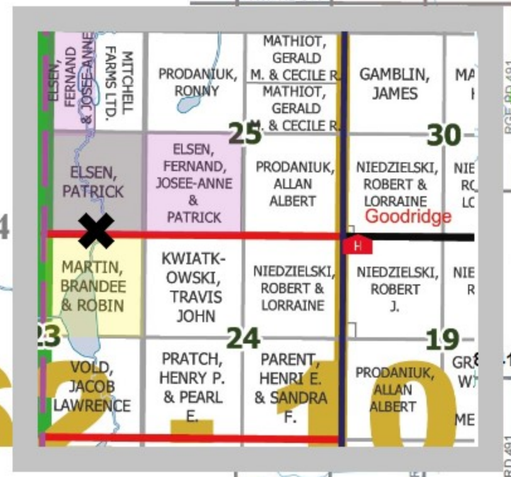
Deep (6m+) Bridge Culvert:
Projected 2025 Replacement Cost (2% infl) = $1,040,172
Net 2025 Replacement Cost (2% infl) = $260,043
Projected 2025 Closure/Removal Cost (2% infl) = $520,086

-Closure Net Savings: $0

BF72208 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = *5.6 (2.8)(1.4)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE





BF75640 closure would impact:

-average 47 vehicles/day
-average 4 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-57,183km reduced travel distance
-953 hours reduced travel time
-4867km reduced trucking distance
-81 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $56,940
Annuitized 2023 Bridge Replacement Cost = $9,889

Single Span Bridge:
Projected 2023 Replacement Cost (2% infl) = $741,644
Estimated Closure Cost = $5000 ($160,000 – optional 2023 bridge removal)

Closure Not Recommended
Closure net savings: $736,644 ($576,644 including bridge removal)

BF75640 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 5.8

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF75453 closure would impact:

-average 59 vehicles/day
-average 5 trucks/day

Resulting in:

-maximum 8km added travel distance
-assumed average 2.7km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-57,305km reduced travel distance
-955 hours reduced travel time
-4745km reduced trucking distance
-79 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

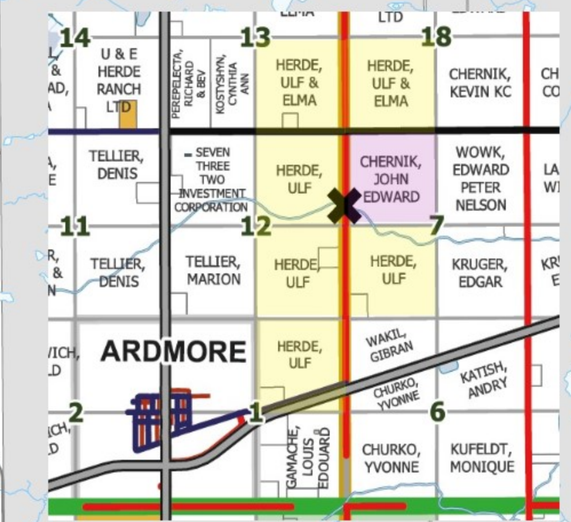
Estimated 2023 Annual User Value = $57,167
Annuitized 2023 Bridge Replacement Cost = $8762

Single Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $683,702
Estimated Closure Cost = $5000 ($165,000 – optional 2025 bridge removal)

Closure not Recommended.
Closure net savings: $678,702 ($513,702 including bridge removal)

BF75453 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 6.5

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF76031 closure would impact:

-average 83 vehicles/day
-average 6 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-100,983km reduced travel distance
-1683 hours reduced travel time
-7300km reduced trucking distance
-122 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

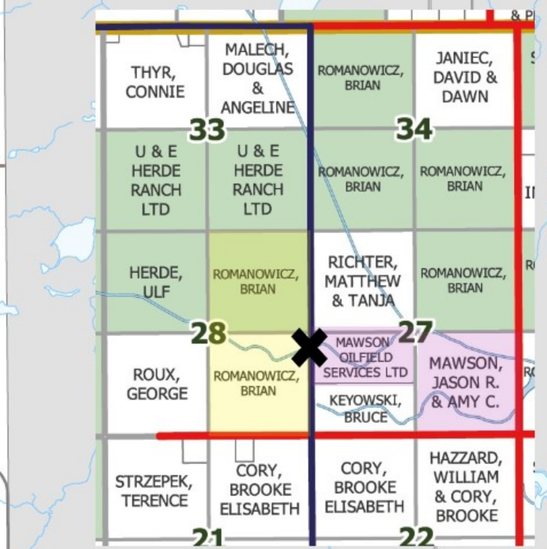
Estimated 2023 Annual User Value = $99,604
Annuitized 2023 Bridge Replacement Cost = $12,209

Single Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $952,699
Estimated Closure Cost = $5000 ($165,000 – optional 2025 bridge removal)

Closure Not Recommended
Closure net savings: $947,699 ($787,699 including bridge removal)

BF76031 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 8.2

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF7865 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 12.2 (6.1)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF7865 closure would impact:

-average 55 vehicles/day
-average 6 trucks/day

Resulting in:

-maximum 14km added travel distance
-assumed average 4.7km added travel distance (max/3)

<u>Estimated Annual User Value</u>

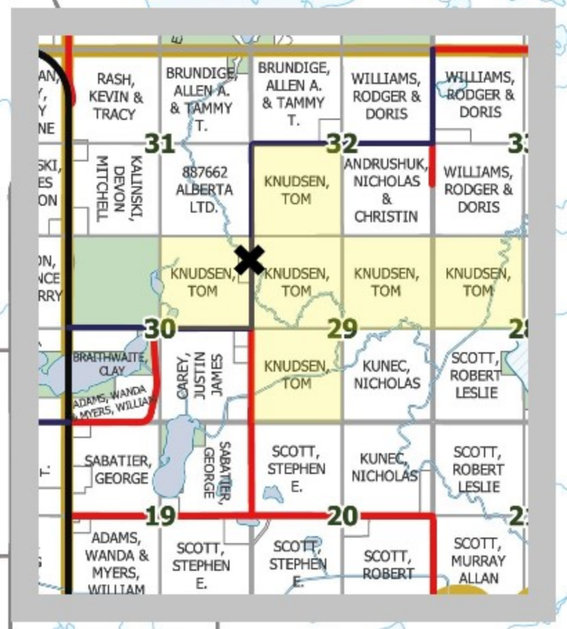
Total annual:
-93,805km reduced travel distance
-1563 hours reduced travel time
-10,220km reduced trucking distance
-170 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $94,932
Annuitized 2023 Bridge Culvert Replacement Cost = $15,572

Shallow (<6m) 4.3m Bridge Culvert:
Projected 2027 Replacement Cost (2% infl) = $842,788
Projected 2027 Closure/Removal Cost (2% infl) = $421,394

-Closure not recommended.
-Closure Net Savings: $421,394



BF72754 closure would impact:

-average 46 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 22km added travel distance
-assumed average 7.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-123,127km reduced travel distance
-2052 hours reduced travel time
-8030km reduced trucking distance
-134 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

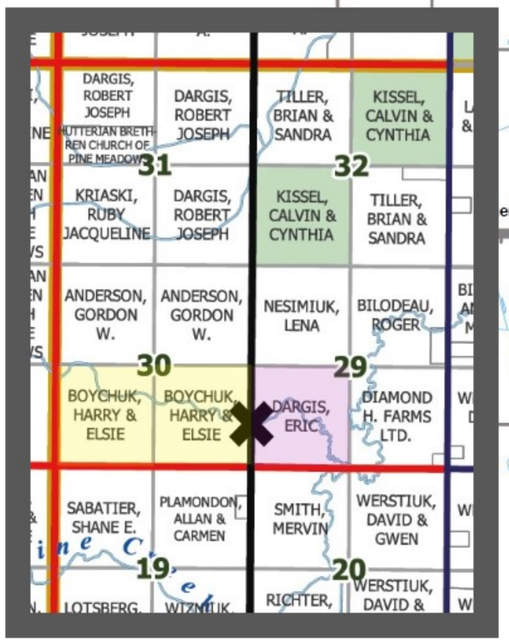
Estimated 2023 Annual User Value = $120,807
Annuitized 2023 Bridge Replacement Cost = $9889

Single Span Bridge:
Projected 2026 Replacement Cost (2% infl) = $787,039
Estimated Closure Cost = $5000 ($165,000 – optional 2026 bridge removal)

Closure net savings: $782,039 ($622,039 including bridge removal)

BF72754 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 12.2

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF72903 closure would impact:

-average 102 vehicles/day
-average 12 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-124,100km reduced travel distance
-2068 hours reduced travel time
-14,600km reduced trucking distance
-243 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

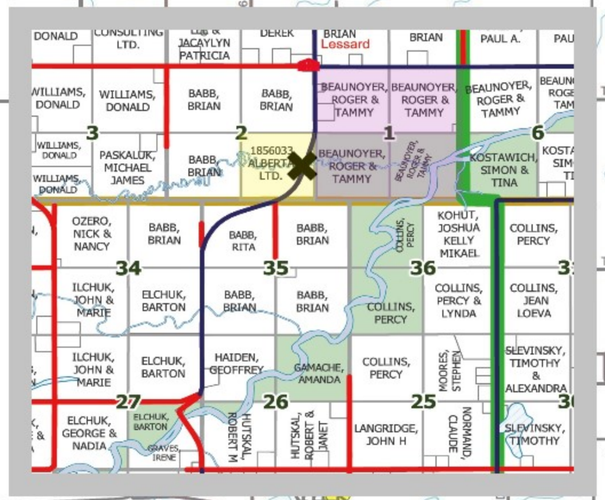
Estimated 2023 Annual User Value = $126,533
Annuitized 2023 Bridge Replacement Cost = $9,889

Single Span Bridge:
Projected 2030 Replacement Cost (2% infl) = $851,916
Estimated Closure Cost = $5000 ($185,000 – optional 2030 bridge removal)

Closure not Recommended.
Closure net savings: $846,916 ($661,916 including bridge removal)

BF72903 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 12.8

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF8229 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 13.2

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE
(BASED ON RIVER CROSSING REMAINING AT LESSARD RD)

BF8229 closure would impact:

-average 145 vehicles/day
-average 8 trucks/day

Resulting in:

-maximum 14km added travel distance
-assumed average 4.7km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-246,983km reduced travel distance
-4116 hours reduced travel time
-13,626km reduced trucking distance
-227 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $240,511
Annuitized 2023 Bridge Replacement Cost = $18,248

Three Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $1,423,858
Estimated Closure Cost = $5000
Estimated Derelict Structure Removal Cost (Optional) =$200,000

Closure not recommended unless combined with Lessard Bridge closure.
Closure net savings: $1,418,858

BF82021 closure would impact:

-average 69 vehicles/day
-average 3 trucks/day

Resulting in:

-maximum 14km added travel distance
-assumed average 4.7km added travel distance (max/3)

<u>Estimated Annual User Value</u>

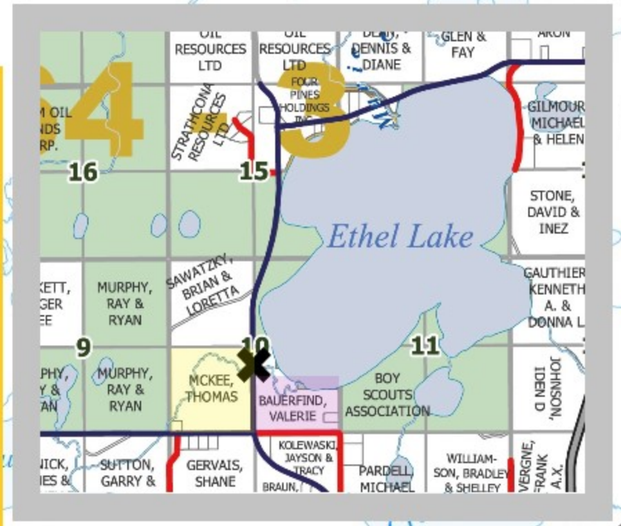
Total annual:
-117,530km reduced travel distance
-1959 hours reduced travel time
-5110km reduced trucking distance
-85 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $113,442
Annuitized 2023 Bridge Culvert Replacement Cost = $14,374

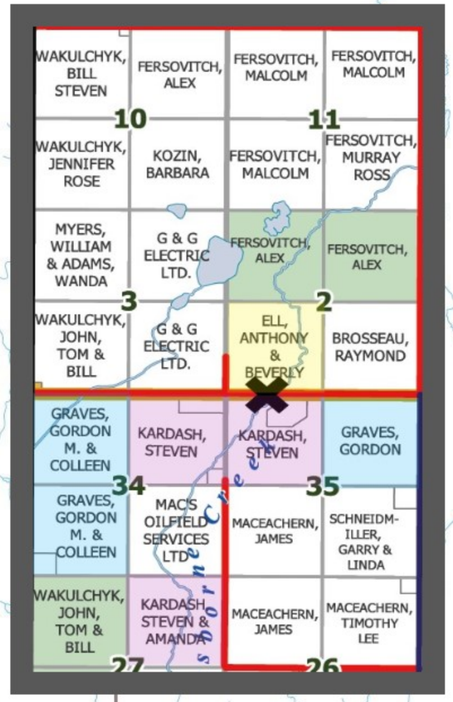
Shallow (<6m) Bridge Culvert:
Projected 2033 Replacement Cost (2% infl) = $876,108
Projected 2033 Closure/Removal Cost (2% infl) = $438,054

-Closure not recommended.
-Closure Net Savings: $438,054



BF82021 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 15.8 (7.9)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF72115 closure would impact:

-average 215 vehicles/day
-average 19 trucks/day

Resulting in:

-maximum 13km added travel distance
-assumed average 4.3km added travel distance (max/3)

Estimated Annual User Value

Total annual:
-340,180km reduced travel distance
-5670 hours reduced travel time
-29,930km reduced trucking distance
-499 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $339,426
Annuitized 2023 Bridge Replacement Cost = $13,779

Single Span Bridge:
Projected 2027 Replacement Cost (2% infl) = $1,118,628
Estimated Closure Cost = $5000 ($178,000 – optional 2027 bridge removal)

Closure Not Recommended
Closure net savings: $1,113,628 ($940,628 including bridge removal)

BF72115 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 24.6

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF78682 closure would impact:

-average 567 vehicles/day
-average 37 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

<u>Estimated Annual User Value</u>

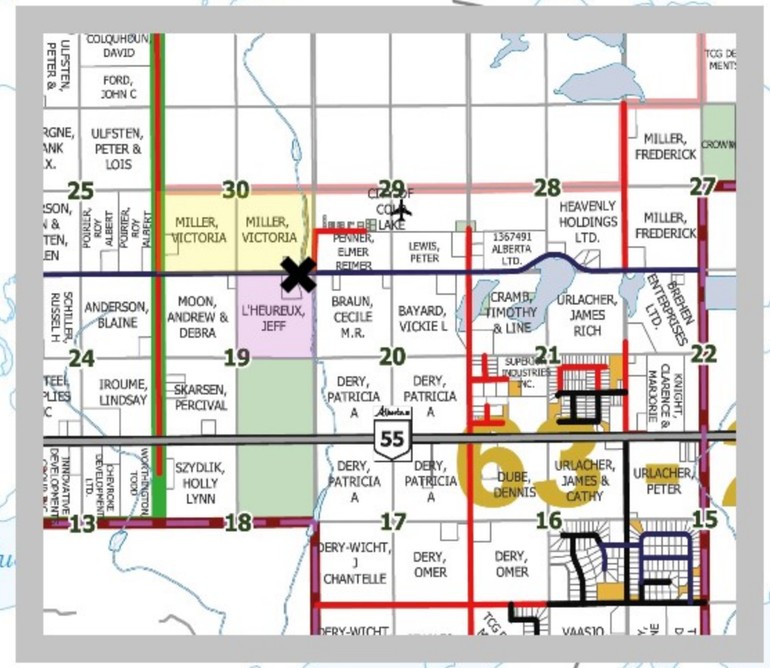
Total annual:
-689,850km reduced travel distance
-11,498 hours reduced travel time
-45,017km reduced trucking distance
-750 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $676,872
Annuitized 2023 Bridge Culvert Replacement Cost = $51,726

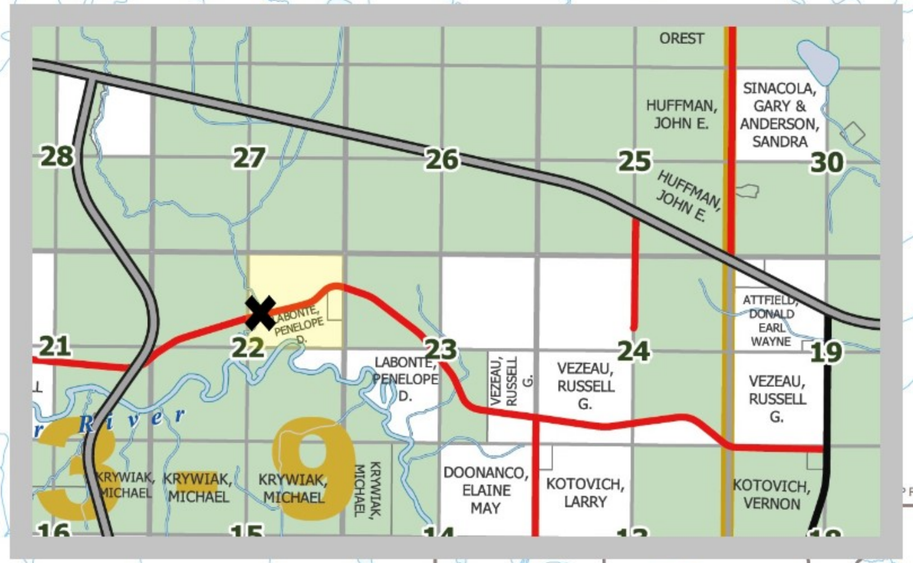
Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $2,970,823
Projected 2030 Closure/Removal Cost (2% infl) = $1,485,412

-Closure not recommended.
-Closure Net Savings: $1,485,412



BF78682 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 26.2 (13.1)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF77807 closure would impact:

-average 110 vehicles/day
-average 6 trucks/day

Resulting in:

-maximum 17km added travel distance
-assumed average 5.7km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-227,517km reduced travel distance
-3792 hours reduced travel time
-12,410km reduced trucking distance
-207 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $221,450
Annuitized 2023 Bridge Culvert Replacement Cost = $14,527

Shallow (<6m) Bridge Culvert:
Projected 2027 Replacement Cost (2% infl) = $755,680
Projected 2027 Closure/Removal Cost (2% infl) = $377,840

-Closure not recommended.
-Closure Net Savings: $377,840

BF77807 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 30.5 (15.2)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF77393 closure would impact:

-average 113 vehicles/day
-average 9 trucks/day

Resulting in:

-maximum 10km added travel distance
-assumed average 3.3km added travel distance (max/3)

Estimated Annual User Value

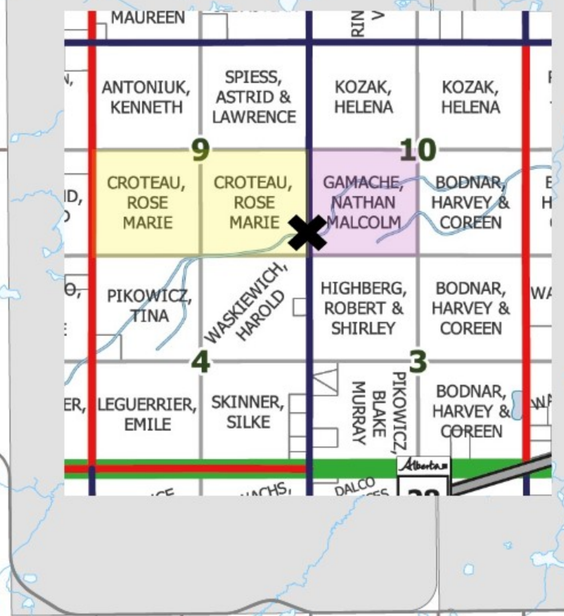
Total annual:
-137,483km reduced travel distance
-2291 hours reduced travel time
-10,950km reduced trucking distance
-183 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $136,348
Annuitized 2023 Bridge Culvert Replacement Cost = $8,674

Shallow (<6m) 4.3m Bridge Culvert:
Projected 2027 Replacement Cost (2% infl) = $451,199
Projected 2027 Closure/Removal Cost (2% infl) = $225,600

-Closure not recommended.
-Closure Net Savings: $225,600



BF 77393 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 31.4 (15.7)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF79410 closure would impact:

-average 110 vehicles/day
-average 7 trucks/day

Resulting in:

-maximum 29km added travel distance
-assumed average 9.7km added travel distance (max/3)

<u>Estimated Annual User Value</u>

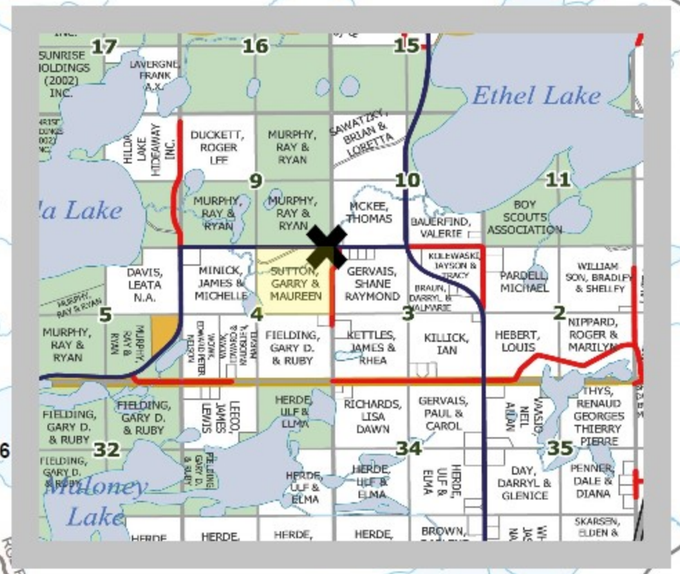
Total annual:
-388,117km reduced travel distance
-6469 hours reduced travel time
-24,698km reduced trucking distance
-412 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $380,354
Annuitized 2023 Bridge Culvert Replacement Cost = $15,512

Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $890,934
Projected 2030 Closure/Removal Cost (2% infl) = $445,467

-Closure not recommended.
-Closure Net Savings: $445,467



BF79410 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 49.0 (24.5)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF71913 closure would impact:

-average 246 vehicles/day
-average 10 trucks/day

Resulting in:

-maximum 6km added travel distance
-assumed average 2km added travel distance (max/3)

<u>Estimated Annual User Value</u>

Total annual:
-179,580km reduced travel distance
-2993 hours reduced travel time
-7300km reduced trucking distance
-122 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

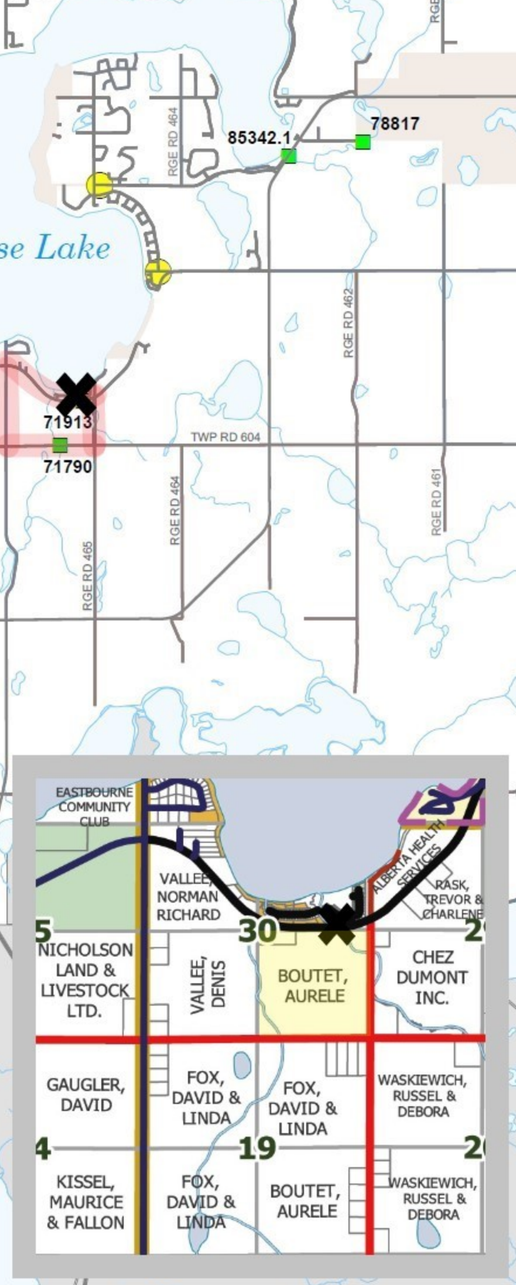
Estimated 2023 Annual User Value = $172,961
Annuitized 2023 Bridge Culvert Replacement Cost = $5978

Shallow (<6m) Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $343,365
Projected 2030 Closure/Removal Cost (2% infl) = $171,683

-Closure Net Savings: $171,683

BF71913 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 57.9 (28.9)

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE



BF13039 closure would impact:

-average 498 vehicles/day
-average 52 trucks/day*

Resulting in:

-maximum 8km added travel distance
-assumed average 2.7km added travel distance (max/3)

*Note that Twp 610 between RR 460 and Hwy 657 currently has a year-round 75% road ban. If this road is ever upgraded and the road ban removed, it is expected that traffic counts and user value will increase.

<u>Estimated Annual User Value</u>

Total annual:
-490,779km reduced travel distance
-8180 hours reduced travel time
-51,246km reduced trucking distance
-854 hours reduced trucking time

Assume:
$20/hour vehicle time value
$40/hour trucker time value
$0.6/km vehicle cost
$1/km truck cost

Estimated 2023 Annual User Value = $489,522
Annuitized 2023 Bridge Culvert Replacement Cost = $9,964

Shallow (<6m) 1.5m Bridge Culvert:
Projected 2030 Replacement Cost (2% infl) = $572,274
Projected 2030 Closure/Removal Cost (2% infl) = $286,137

-Closure not recommended.
-Closure Net Savings: $286,137
-Recommend replacing bridge culvert before or during any future Twp 610 road upgrade to avoid increased costs and damage to new asphalt.

BF13039 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 49.1

C: HIGH VALUE REPLACEMENT - HIGH IMPACT CLOSURE

BF7431 closure would impact:

-1 residence
-only ROW access to 1 developed residential property east of the Beaver River (48322 Twp Rd 624 – 2022 tax assessed value = $283,890)

-only ROW access to 5 largely undeveloped quarters east of the Beaver River with a likely land value of around $1.25M

-secondary light vehicle access to wellsites on east side of Beaver River

<u>Estimated Annual User Value</u>

2022 tax assessed value of residence inflated to 2023 = $300,000
50% of undeveloped land value associated with bridge access = $625,000
Annuitized for life of bridge = $12,333

Estimated 2023 Annual User Value = $12,333
Annuitized 2023 Bridge Replacement Cost = $42,379

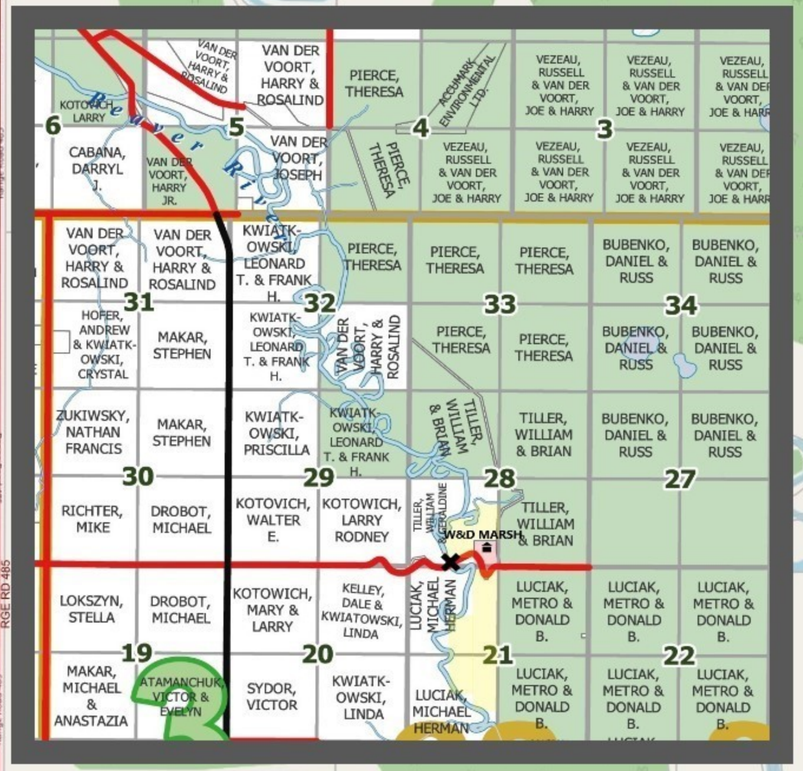
Beaver River Truss:
Projected 2025 Replacement Cost (2% infl) = $3,306,807
Estimated Closure Cost = $5000 ($300,000 – optional 2025 bridge removal)
Compensation assuming full cost of residence plus 50% of undeveloped land value = $925,000

Category D – Only Access Bridge
Closure net savings: $2,376,807

BF7431 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = 0.3

D: ONLY ACCESS

"The Jungle" - composed of a network of CNRL leases and gated wellsite access roads. While emergency access would exist through this area during dry conditions (subject to CNRL permission), the cost of providing and maintaining a permanent MD access road to the residence is estimated to be higher than the cost of the bridge.



BF76626 closure would impact:

-only ROW access to 2 developed residential properties north of creek:

64311 Rge Rd 490 (1 Cabin)
64413 Rge Rd 490 (2 Houses, 4 cabins, misc. structures)

-only ROW access to 0.9 agricultural quarters north of creek

-only ROW access to 2 undeveloped quarters north of creek

-only access to crown land, including 2 possible pad sites visible in aerial photographs

<u>Estimated Annual User Value</u>

Tax assessed value of accessed residences inflated to 2023 = $753,125
Likely agricultural land value associated with having bridge access = $247,500
50% of likely undeveloped land value associated with having bridge access = $250,000

Annuitized for life of bridge culvert = $25,013

Estimated 2023 Annual User Value = $25,013
Annuitized 2023 Bridge Replacement Cost = $53,714

Deep (6m+) Bridge Culvert:
Projected 2025 Replacement Cost (2% infl) = $2,850,076
Estimated Closure Cost = $1,425,038
Compensation assuming full cost of residences and partial reduction in agricultural and undeveloped land value = $1,250,625

Category D – Only Access Bridge
Closure net savings: $174,413

BF76626 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = 0.9 (0.5)

D: ONLY ACCESS

BF73061 closure would impact:

-only ROW access to 2 developed residential properties north of creek:

64304 Rge Rd 451A (2 Cabins, utility building, misc. structures)
SE-26-64-5-4 (2 Cabins, 2 Storage Buildings, misc. structures)

-only ROW access to 2 undeveloped residential properties north of creek

64303 Rge Rd 451A
SW-25-64-5-4

-only ROW access to 3 undeveloped agricultural quarters north of creek

<u>Estimated Annual User Value</u>

Tax assessed value of accessed residences inflated to 2023 = $572,000
50% of likely undeveloped land value associated with having bridge access = $528,903

Annuitized for life of bridge = $14,679

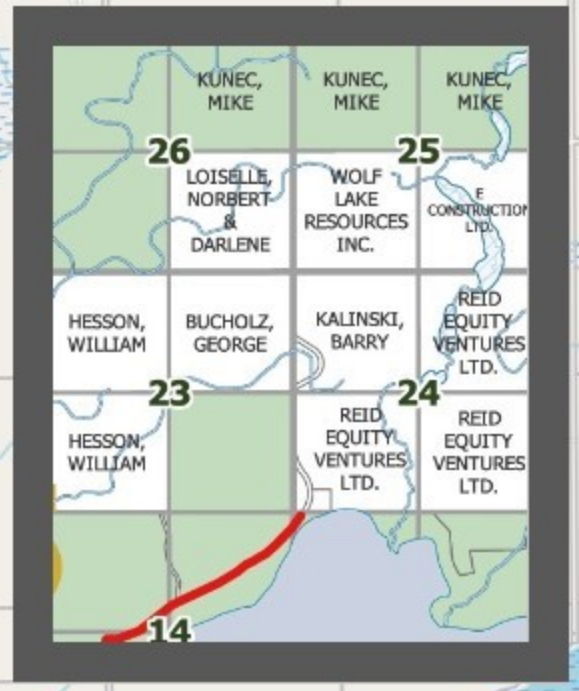
Estimated 2023 Annual User Value = $14,679
Annuitized 2023 Bridge Replacement Cost = $13,040

Three Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $1,017,512
Estimated Closure Cost = $5000 ($200,000 – optional 2025 bridge removal)
Compensation assuming full cost of residences and 50% reduction in undeveloped land value = $1,100,903

Category D – Only Access Bridge
Closure net savings: **-$88,391**

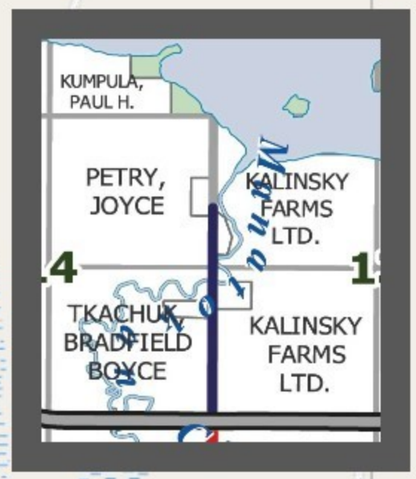
BF73061 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = 1.1

D: ONLY ACCESS



BF13135 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.6

D: ONLY ACCESS



BF13135 closure would impact:

-only ROW access to 3 residential properties north of Manotokan Creek:
- 63218 Rge Rd 471
- 63222 Rge Rd 471
- 63221 Rge Rd 471

-only ROW access to 1 agricultural quarter north of Manotokan Creek

<u>Estimated Annual User Value</u>

Tax assessed value of accessed residences inflated to 2023= $895,000
Likely agricultural land value associated with having bridge access = $275,000

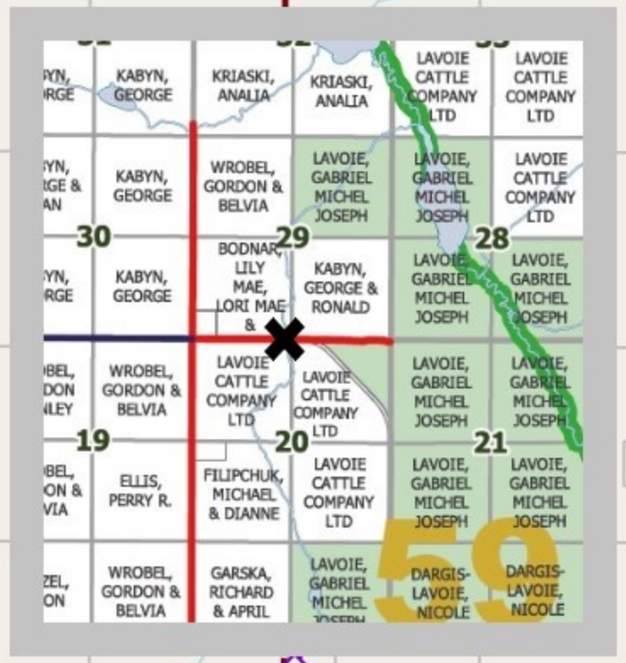
Annuitized for life of bridge = $15,600

Estimated 2023 Annual User Value = $15,600
Annuitized 2023 Bridge Replacement Cost = $9,889

Single Span Bridge:
Projected 2027 Replacement Cost (2% infl) = $802,779
Estimated Closure Cost = $5000 ($165,000 – optional 2027 bridge removal)
Compensation assuming full cost of residences and reduction in agricultural land value from $400,000 to $125,000 (agricultural quarter with bridge access to undeveloped quarter with no bridge access) = $1,170,000

Category D – Only Access Bridge
Closure net savings: **-$372,221**

500 yd
500 m



BF77453 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 1.6 (0.8)

D: ONLY ACCESS

BF77453 closure would impact:

-Direct ROW access to 3 agricultural quarters east of the creek with a likely combined value of around $1M
-Direct ROW access to 2 undeveloped quarters east of the creek with a likely combined value of around $500K

<u>Estimated Annual User Value</u>

Likely land value of accessed properties =$1,500,000
50% of value associated with ROW access = $750,000
Annuitized for life of bridge culvert = $15,000

Estimated 2023 Annual User Value = $15,000
Annuitized 2023 Bridge Culvert Replacement Cost = $18,893

Shallow (<6m) Bridge Culvert:
Projected 2027 Replacement Cost (2% infl) = $1,022,544
Estimated Closure Cost = $511,272
Compensation assuming a 50% loss in property values = $750,000

Category D – Only Access Bridge
Closure net savings: **-$238,728**

71636 -1
81202 -1
77453 -1
TWP RD 594
RGE RD 481
RGE RD 480
RGE RD 475
1 Mi
1 Km

BF76421 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 2.6

D: ONLY ACCESS

BF76421 closure would impact:

-ROW access to approximately 6 agricultural quarters north of the creek with a likely combined value of around $2.4M
-ROW access to approximately 8 undeveloped quarters north of the creek with a likely combined value of around $2M
-ROW access to approximately 12 pad sites visible in aerial photographs

<u>Estimated Annual User Value</u>

$275K x 6 quarters - agricultural land value associated with having bridge access =$1,650,000
50% of undeveloped land value associated with having bridge access = $1,000,000
Annuitized for life of bridge = $35,333

Estimated 2023 Annual User Value = $35,333
Annuitized 2023 Bridge Replacement Cost = $13,779

Single Span Bridge:
Projected 2025 Replacement Cost (2% infl) = $1,075,189
Estimated Closure Cost = $5000 (optional bridge removal = ~ $160,000)
Compensation assuming a reduction in agricultural land values from $400,000 to $125,000 (agricultural quarter with bridge access to undeveloped quarter with no bridge access) and a 50% reduction in undeveloped land value due to losing bridge access = $2,650,000

Category D – Only Access Bridge
Closure net savings: **-$1,579,811**

BF72753 closure would impact:

-only ROW access to 1 residential property east of creek:

60316 RR 451 (4 cabins, 1 manufactured home, 3 garages)

-Only ROW access to 1.4 agricultural quarters:

NW-24-60-5-4
NE-23-60-5-4

<u>Estimated Annual User Value</u>

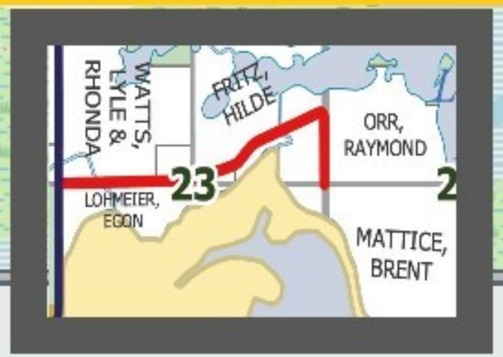
Tax assessed value of accessed residences inflated to 2023 = $270,000
Likely agricultural land value associated with having bridge access = $385,000

Annuitized for life of bridge culvert = $13,100

Estimated 2023 Annual User Value = $13,100
Annuitized 2023 Bridge Culvert Replacement Cost = $6860

Shallow (<6m) Bridge Culvert:
Projected 2025 Replacement Cost (2% infl) = $356,880
Estimated Closure Cost = $178,440
Compensation assuming full cost of residences and reduction in agricultural land value from $560,000 to $175,000 (1.4 agricultural quarters with bridge access converted to undeveloped quarters with no bridge access) = $655,000

Category D – Only Access Bridge
Closure net savings: **-$476,560**



BF72753 LIFECYCLE REPLACEMENT
BENEFIT/COST RATIO = 3.8 (1.9)

D: ONLY ACCESS

BF74502 closure would impact:

-only ROW access to 20+ residential properties:

Total combined 2021 tax assessed value over $6,000,000

-only access to Cold Lake Air Weapons Range
-only access to Cold Lake Provincial Park (North)

Estimated Annual User Value

2021 tax assessed value of accessed properties over $6,000,000
2022 inflation = 6.43%
2023 inflation (assumed) = 6.5%
Annuitized for life of bridge culvert = over $136,000

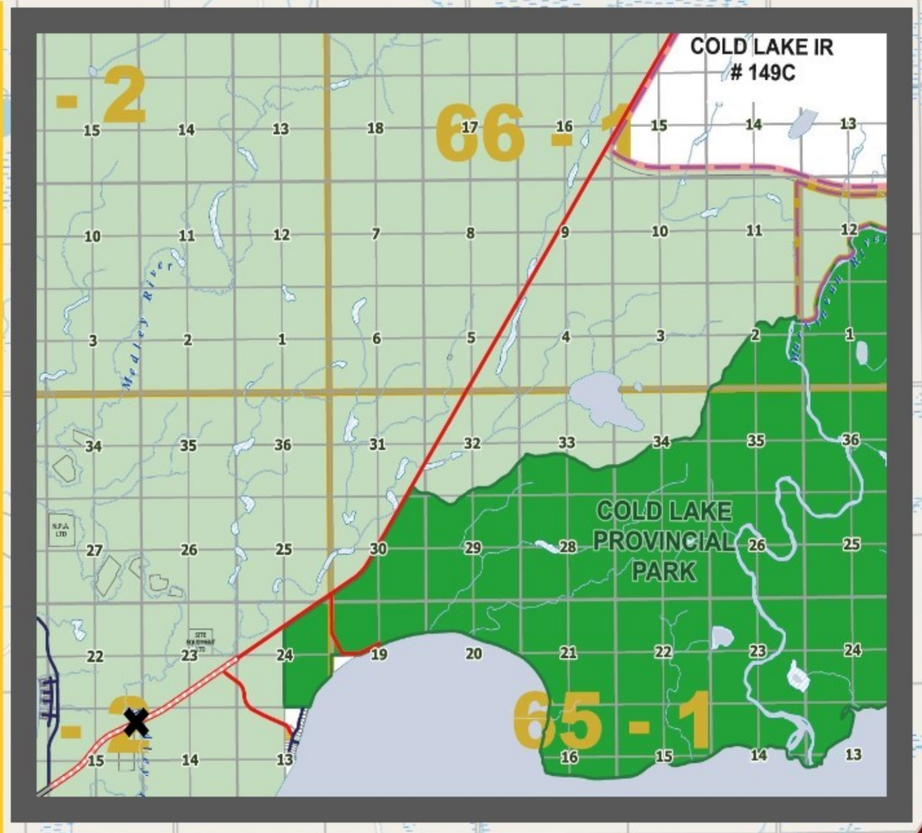
Estimated 2023 Annual User Value = over $136,000
Annuitized 2023 Bridge Replacement Cost = $100,775

Shallow (<6m) Bridge Culvert:
Projected 2025 Replacement Cost (2% infl) = $5,242,320
(Note that our class 5 cost forecast for this structure seems high – a class 4 estimate will probably come in lower when establishing a project budget)
Estimated Closure/Removal Cost = $2,621,160
Likely Purchase Price of Affected Properties = Unknown (tax assessments can be low)

Category D – Only Access Bridge
Closure net savings: $2,621,160 – any required legal costs and/or compensations for access removal

BF74502 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = *2.4 (1.2)

D: ONLY ACCESS



COLD LAKE AIR WEAPONS RANGE

74865 -1

COLD LAKE FIRST NATIONS

74864 -1

COLD LAKE PROVINCIAL PARK

74502 -1

54.640500, -109.984820

1 Mi
1 Km

BF73402 closure would impact:

-only ROW access to 5 residential properties south of creek:

1 - 64301 Rge Rd 423A (2021 tax assessed value = $249,560)
(1 House, 2 Garages)
2 – 64301 Rge Rd 423A (2021 tax assessed value = $215,200)
(Vacant Land - Lakefront)
3 – 64301 Rge Rd 423A (2021 tax assessed value = $262,600)
(1 Warehouse, 1 Garage)
4 – 64301 Rge Rd 423A (2021 tax assessed value = $429,430)
(1 House, 2 Garages)
5 – 64301 Rge Rd 423A (2021 tax assessed value = $599,810)
(1 House, 1 Garage)

Total combined 2021 tax assessed value = $1,756,600

<u>Estimated Annual User Value</u>

2021 tax assessed value of accessed properties= $1,756,600
2022 inflation = 6.43%
2023 inflation (assumed) = 6.5%
Annuitized for life of bridge culvert = $39,821

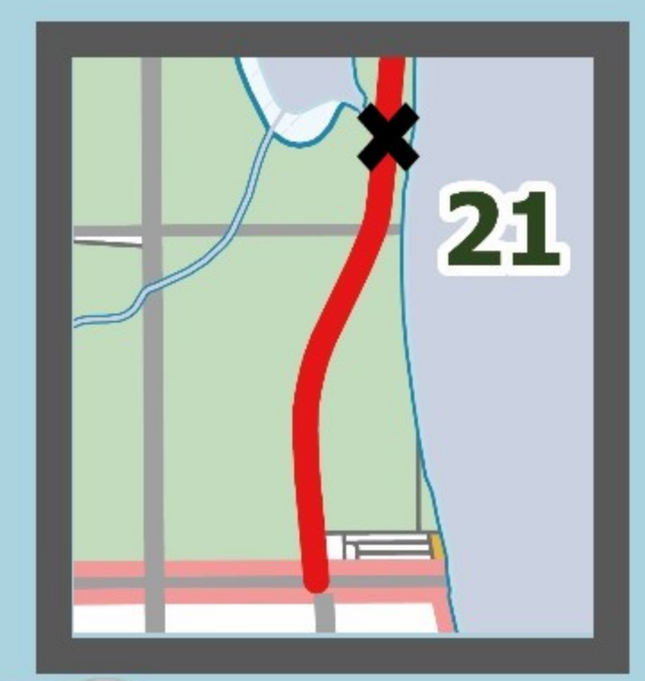
Estimated 2023 Annual User Value = $39,821
Annuitized 2023 Bridge Replacement Cost = $7154

Shallow (<6m) Bridge Culvert:
Projected 2025 Replacement Cost (2% infl) = $372,175
Estimated Closure/Removal Cost = $186,088
Likely Purchase Price of Affected Properties = Unknown (tax assessments can be low)

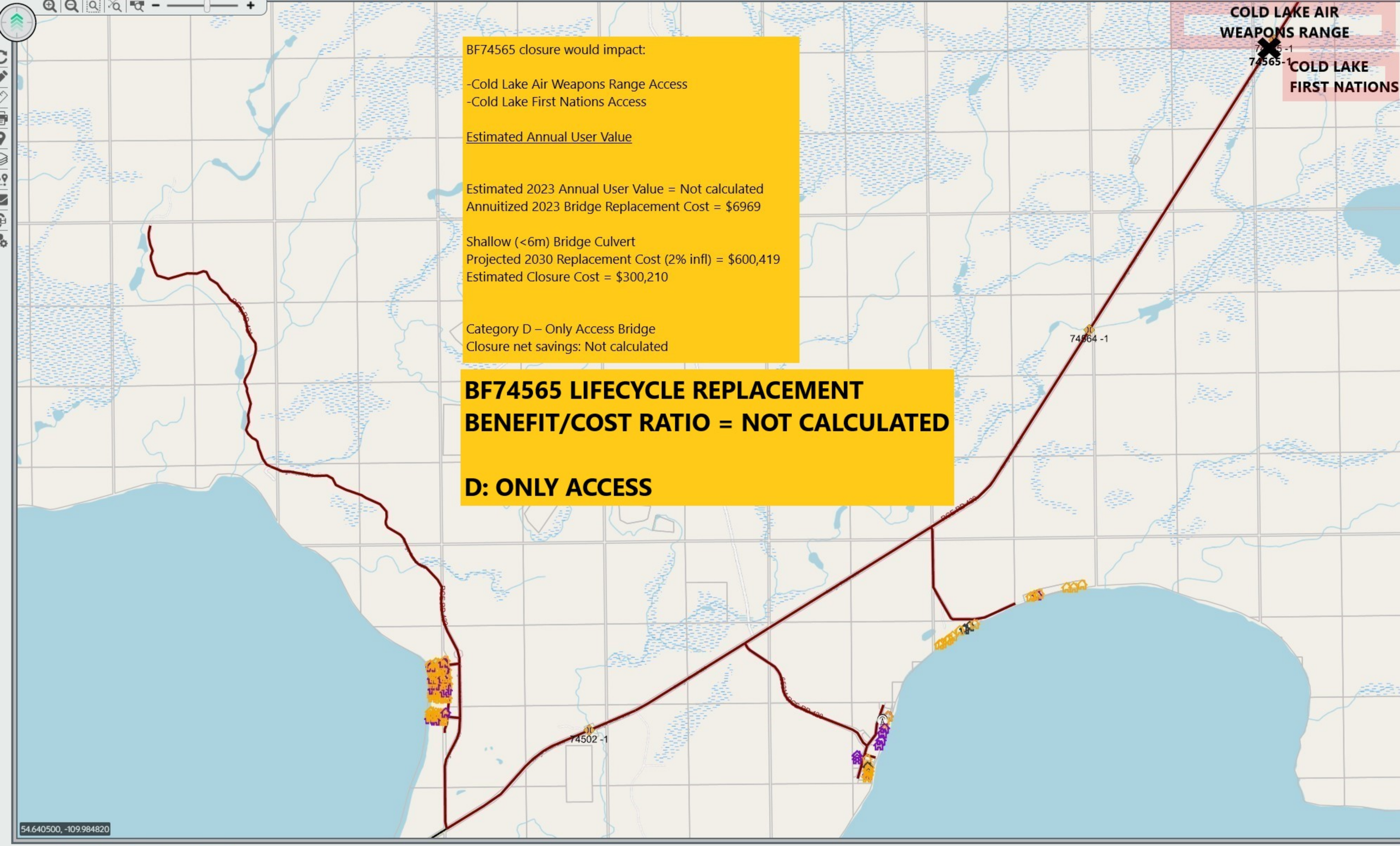
Category D – Only Access Bridge
Closure net savings: $186,088 – any required legal costs and/or compensations for access removal

BF73402 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = 11.1 (5.6)

D: ONLY ACCESS



TWP RD 650
Private
HWY 897
TWP RD 643
73402 -1
COLD LAKE INDIAN RESERVE #149B
1 Mi
1 Km



BF74565 closure would impact:

-Cold Lake Air Weapons Range Access
-Cold Lake First Nations Access

Estimated Annual User Value

Estimated 2023 Annual User Value = Not calculated
Annuitized 2023 Bridge Replacement Cost = $6969

Shallow (<6m) Bridge Culvert
Projected 2030 Replacement Cost (2% infl) = $600,419
Estimated Closure Cost = $300,210

Category D – Only Access Bridge
Closure net savings: Not calculated

BF74565 LIFECYCLE REPLACEMENT BENEFIT/COST RATIO = NOT CALCULATED

D: ONLY ACCESS

1 Mi
1 Km