

Development of Priority Ranking Methodology and Process for Provincial Highway Infrastructure Investment in Saskatchewan

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ABSTRACT

Saskatchewan's economy is largely dependent on inter-provincial and international trade. Various bulk commodity movements are major part of highway transportation demand. Due to the province's land locked location, keeping transportation costs low is critical for the competitiveness of the provincial economy. Saskatchewan also needs a large roadway network to provide transportation service to its wide spread population and economic activities.

With the recent changes in Saskatchewan economy and transportation patterns, there has been a significant increase in truck traffic, which results in deterioration of many highways, especially for the non-structured Thin Membrane Surface (TMS) highways. There is also an increasing demand for rural highways to allow primary weight access to increase highway transportation efficiency for economic development. In order to most effectively use the limited funds, Saskatchewan Ministry of Highways and Infrastructure has developed a Rural Highway Strategy (RHS) and a Northern Transportation Strategy (NTS) to guide its capital investment on rural highways and roads in northern Saskatchewan.

Both RHS and NTS utilize a rational multiple factor evaluation method to prioritize the segmented highway sections for investment. This paper will describe the details of the strategy development, including factor selections and quantifications, as well as the determination of weighting for each factor. The paper will also introduce the process of priority ranking and implementation issues for the capital investment strategies. Some difficult policy and technical aspects such as those involving engineering data uses will also be discussed.

1. INTRODUCTION

Saskatchewan's economy is largely dependent on inter-provincial and international trade. Various bulk commodity movements are major part of highway transportation demand. Due to the province's land locked location, keeping transportation costs low is critical for the competitiveness of the provincial economy. Saskatchewan also needs a large roadway network to provide transportation service to its wide spread population and economic activities. The provincial roadway mileage per capita is among the highest in the world, which implies that only limited resources are available for roadway investment.

With the recent changes in Saskatchewan economy and transportation patterns, there has been a significant increase in truck traffic which has resulted in considerable deteriorations of many highways, especially for the non-structured Thin Membrane Surface (TMS) highways. There is also an increasing demand for rural highways to allow primary weight access to increase highway transportation efficiency for economic development. In response to the high demand, provincial investment in transportation infrastructure has significantly increased in recent years in Saskatchewan.

In order to most effectively use the limited infrastructure funds, transportation policy makers in Saskatchewan have faced great challenges to invest in a most strategic manner to maximize the social and economic benefits to the people of the province. As part of the efforts, Saskatchewan Ministry of Highways and Infrastructure (MHI) has developed a Rural Highway Strategy (RHS) and a Northern Transportation Strategy (NTS) to guide its capital investment on rural highways

and roads in northern Saskatchewan. These two strategies have greatly improved the decision-making process and the communications for highway capital investment in terms of both policy consistency and stakeholders' buy-in.

Both RHS and NTS utilize a rational multiple factor evaluation method to prioritize the segmented highway sections for investment. This paper will describe the details of the strategy development, including factor selections and quantifications, as well as the determination of weighting for each factor. The paper will also introduce the process of priority ranking and implementation issues for the capital investment strategies. Some difficult policy and technical aspects such as those involving engineering data uses will also be discussed in this paper.

2. HIGHWAY INFRASTRUCTURE IN SASKACHEWAN

Saskatchewan has a very large highway network. The provincial highways consist of 26,200 km of highways, of which 15,000 km are paved, 6,100 km have dust free but little structural strength thin membrane surface (TMS), 5,600 km are gravel roads, and another 171 km are ice roads. There are also more than 800 bridges and 62,000 culverts all across the province.

In this large provincial highway network, the highways are in various condition states and with different strength capabilities. Approximately, there are about 8,350 km of highways that are capable to handle primary weight year around, and another about 3,000 km of highway pavements that allow primary weight for 9 months a year. The rest of the highways, which is more than half of the total highway mileage, have no or little structure that can only technically handle secondary or restricted weight limit. Moreover, because of the limited funding in history, many of these aging highways have been in less ideal conditions. Figure 1 shows the current weight classification status of all the highways in Saskatchewan, where the dotted lines represent the vast kilometres of secondary weight or weight restricted highways.

3. DEVELOPMENT OF THE INVESTMENT STRATEGIES

In response to the current highway conditions and future transportation demands as a result of the province's economic development, Saskatchewan MHI developed the Rural Highway Strategy (RHS) in 2008 and Northern Transportation Strategy (NTS) in 2009 to guide the decision making in transportation infrastructure capital investment. The objectives of these two strategies are to develop a rational and consistent priority ranking methodology and a transparent and flexible process to assist the investment decision making.

3.1 THE RURAL HIGHWAY STRATEGY (RHS)

The RHS strategy was designed to strengthen the collector system in Saskatchewan highway system that feeds into the Gateway Corridors and also provide safe and quality access to communities. It aimed to ensure the Ministry invest the limited infrastructure funds to maximize economic and social benefits. The RHS would re-align the provincial highway system to meet transportation demands and public expectations by strategically upgrading high priority highway routes to be capable of handling primary weight. It would lower the cost of doing business in Saskatchewan, retain and attract economic development in rural communities, and improve safety and quality of life for rural residents.

As part of RHS, a Rural Highway Advisory Committee (RHAC) has been established to advise on the development and implementation of RHS. The RHAC assisted in identifying priority factors and determining weighting factors of the RHS prioritization methodology. In addition to MHI representatives and advisors, the committee also consists of the eight external member organizations, which include Saskatchewan Association of Rural Municipalities, Saskatchewan Urban Municipalities Association, Area Transportation Planning Committees, Saskatchewan Economic Development Association, Saskatchewan Chamber of Commerce, Tourism Saskatchewan, Enterprise Saskatchewan, and the resource industry.

3.2 THE NORTHERN TRANSPORTATION STRATEGY (NTS)

The NTS Strategy used a similar model as RHS to assist transportation infrastructure investment decision making in northern Saskatchewan. The northern Saskatchewan has quite different characteristics both geographically and demographically as compared to the rest of the province. It is featured with abundant natural resources such as uranium, gold, oil, gas, forestry, and tourism sites which present great economic potentials. It is also characterized with the mostly isolated population that is difficult to be served, and hard to provide labour supply for the economic development needs. Transportation infrastructure is one of the essential services to tie the northern opportunities together. However, the highways in northern Saskatchewan are underdeveloped. Some communities rely on seasonal roads that provide the only connection to the rest of the province. The NTS aimed to provide a priority ranking method to guide transportation investment in northern Saskatchewan with the consideration of all such unique characteristics.

Similarly to RHS, a Northern Transportation Advisory Committee (NTAC) has also been formed to advise on the development and implementation of NTS. The NTAC consists of representatives from 12 external stakeholder organizations including: Athabasca Transportation Planning Committee, Northwest Transportation Planning Committee, North Northeast Transportation Planning Committee, New North, Tourism Saskatchewan, Enterprise Saskatchewan, Mining Association of Saskatchewan, Canadian Association of Petroleum Producers, Council of Saskatchewan of Forest Industries, Sask. Aviation Council, Prince Albert Grand Council, and Meadow Lake Tribal Council, and representatives and advisors from the Ministry of Highways and Infrastructure.

The NTAC has played essential roles in priority factor selection and determination of weighting factors for the NTS's priority ranking methodology.

4. THE PRIORITY RANKING METHODOLOGY

4.1. HIGHWAY SEGMENTATION

There are about 8,000 km of secondary weight highways being assessed for upgrading priority ranking in RHS and another 3,000 km assessed in the NTS strategy. To assess the relative priority order of these highways, the first step was to segment these highways into smaller and yet reasonable sections. The factors considered during segmentation include intersections with other highways, connection to good sized communities, and significant changes in traffic volume from communities or from intersections. Some of the local inputs were also considered during

the segmentation process. For rural secondary weight highways in the scope of RHS, the approximately 8,000 km highways are segmented into about 250 reasonable segments. For the highways in the north, they are segmented into 54 relatively longer reasonable segments. The longer lengths are basically resulted from the unique geographic and demographic characteristics in northern Saskatchewan such as the remote and isolated communities and population, and much less intersecting roads.

4.2. PRIORITY FACTORS SELECTED IN RHS

Once the highways were segmented, the challenge was to develop a rational and consistent methodology that can objectively assess the investment priorities. It was decided to use a more commonly understood multi-factor evaluation method.

A critical component of the methodology is to select a set of representative and also quantifiable indicators to incorporate all relevant factor categories into evaluation. Such categories should at least include: transportation engineering economic analysis, safety assessment, economic significance of a highway section, and infrastructure cost. After extensive thinking and debates, six major categories are determined and introduced as the following.

Category 1. Engineering Economic Considerations

Engineering economic analyses can help answer if a highway upgrading project makes economical sense. In the RHS priority ranking method, benefit/cost ratio and net present value are chosen as the representative parameters.

- Benefit/cost ratio (B/C ratio).

Traditionally, the B/C ratio is one of the most commonly used engineering economic analyses. For this parameter, the determination of costs was relatively straightforward, generally referring to the construction and maintenance costs in highway engineering. But it is a little challenging to define the benefits. Typically, once a highway is improved, there will be savings on vehicle operation and travel time, and such savings are considered as benefits in this analysis. MicroBENCOST software is used to quantify such benefits on every highway segment, with a 20 year analysis period and 3% discount rate.

Since all highways under this policy framework would be upgraded from the existing secondary weight to primary weight standard, the additional payload allowed for commercial traffic will generate savings for truck haul. This truck haul savings is considered as benefits as well and hence included in the calculation of B/C ratio. The detailed method of quantifying such truck haul benefits can be found in another publication by the authors. (Liu et al, 2010)

- Net Present Value (NPV)

The B/C ratio can only reflect the relative return of a certain investment, but it does not show the size of a project. In other words, a small project may have a higher benefit/cost ratio as opposed to a large project, the benefits generated by such small projects may also be relatively small. In order to reflect this characteristic for highway projects, the NPV

value, which is defined as the difference between the present value of cash inflows and the present value of cash outflows, is used as another engineering economic indicator to analyze the profitability of a project. The benefit and cost values are the same as those used in B/C ratio analysis.

Category 2. Highway Function and Activity Level

Functions and activity level on a highway section are good indicators of the highway importance. In this category, traffic volumes, rural road functional classification, and the priority identified by the province's Area Transportation Planning Committees, are chosen as the representative indicators.

- **Traffic Volume**

Traffic volume reflects the user activity level and relative importance of a highway section; hence, it is also adopted in this policy development. To minimize the effect of temporal variations of traffic volume, the average value of the annual average daily traffic (AADT) of the latest two years is used in the assessment.

- **Rural Road Classification**

The Rural Road Classification (RRC) system is primarily a functional road classification system in Saskatchewan. The RRC system was developed as a joint effort by provincial and municipal governments in 1999. During the course of development, extensive consultations were conducted and many factors were considered. Some of the major factors include connections to population centers, service centers, health facilities, tourism sites, education facilities, border crossings, industrial sites, etc. The RRC reflects the functions that a highway section provides, the RRC is also chosen to be a factor in the analysis.

- **Priorities by Area Transportation Planning Committee**

The Area Transportation Planning Committees (ATPC) are established at the local level to look strategically at transportation issues and make recommendations to the Ministry based on social and economic goals of the area. These committees generally include representations from rural and urban municipalities in the area.

It is reasonable to believe that local ATPC committees should have better understanding of transportation needs in the local area. Hence, the local ATPCs are asked to develop their priorities as a factor to be considered in the overall assessment. The use of this factor will also help "buy-in" of the strategy by local stakeholders.

Category 3. Highway Safety Considerations

Generally the poor condition highways are not safe and upgrading of a highway section would improve the highway safety. Although it is difficult to establish a precise relationship between highway conditions and safety, not considering safety in rural and remote highway investment

decision-making will not be acceptable because there is a strong public perception that the poor road condition roads are not safe. Two factors commonly believed to be related to highway safety concerns are adopted to this highway safety category: highway section accident statistics and road condition.

- **Traffic Accident Statistics**

The accident statistics needs to be carefully used in the prioritization analysis since the traffic volume levels usually have a significant impact on highway collision levels. A higher traffic level will normally result in more collisions for the same type of highway facility, but this does not necessarily mean the high traffic volume road segment is more hazardous. To take traffic level into account, a relationship between traffic volume and collisions/km for all the similar type of highway sections in Saskatchewan was developed (Figure 2). It was assumed in the RHS assessment that a highway section with higher than expected accident rate is more in need of highway investment.

- **Road Condition**

It is believed poor condition highways are not safe; however, it is not easy to compare the highway conditions for non-structured highways, and between highways with different surface types.

For pavement highways, there are established systems to determine the condition state using the cracking, rutting, and IRI data. A highway in a poorer condition state will be given more points in the assessment process assuming poorer highway condition is relatively less safe therefore requires investment. For the non-structure Thin Membrane Surface (TMS) surface, a specific measurement called TMS Index was developed (see Liu et al 2010 for details) and used in the overall analysis. Effort was made to provide highway condition ratings for different type of surface. It was assumed that the best TMS surface would not be as good as the best pavement, and the best gravel road would not be as good as the best TMS. The road condition rating in NTS is given in Table 1 as example.

Highway condition is one of the most complained issue by the public, successful incorporation of this factor in the highway assessment process has made the strategy more acceptable to many stakeholders.

Category 4. Provincial Economic Activity

Many industries are dependent on highway transportation, and the importance of a highway section to the economy should be part of the factor to be considered in investment decision making process. But this is a difficult category to identify factors that reflect the highways relevancy to the economy. The following three factors were selected, two of them may be considered as innovative approaches.

- **Truck Traffic Volume**

The truck traffic is associated with commercial goods movement and thus it is a good indicator to reflect the economic activities on a highway. Therefore, the Annual Average Daily Truck Traffic (TAADT) is chosen as the indicator for economy activity. The average value of the TAADT during the latest two years is used to minimize the effect of temporal variations of truck traffic. There were concerns over some duplication of indicators such as AADT, TAADT, and engineering economic analysis. However, after extensive discussions, both RHAC and NTAC committees agreed that the use of these indicators is all necessary, and they do reflect different aspects of transportation infrastructure service to be satisfied by highway investment.

- Provincial Economic Priorities

From the beginning of the policy development, it was recognized that provincial economic development priority needs to be adequately considered. The engineering economic analysis is not sufficient to reflect the economic development needs for the province. As the transportation and infrastructure agency, we may not be in the best position to assess the provincial economic. Therefore, direct inputs from the provincial economic development agency Enterprise Saskatchewan, the third party that possess the necessary knowledge and expertise, has been sought to provide a priority rating for each assessed highway section. This rating is based on employment statistics in each municipality along a highway section, the particular employment from the manufacturing sector, and the planned major investment in the area.

- Tourism Priorities

Tourism is a major industry in Saskatchewan, and its development is very much dependent on transportation investment. Due to the unique feature of this industry, the economic value of a highway to a tourism site cannot be assessed the same way as other industries. For example, the tourism benefits cannot be necessarily reflected by truck traffic or local economical investment. Therefore, Tourism Saskatchewan has helped develop tourism priorities for the highways under consideration.

Category 5. Corridor Considerations

As mentioned before, all the highways are segmented into reasonable segments for priority assessment with the intention to program the high ranked sections for capital improvement. This process makes it possible that a long primary weight highway corridor can not be completed just because of a short un-upgraded section if it is ranked fairly low in the system.

Under such circumstance, the benefit of upgrading the short sections in the middle of an emerging corridor is obvious and should be considered from the whole corridor perspective. The corridor consideration factor is thus introduced.

With regard to how to quantify the corridor factor, the RHAC committee has agreed that if a corridor is likely in place, an additional bonus point can be assigned to the highway section to be upgraded based on its percentage in length to the whole corridor. The lower the percentage, the higher the bonus points will be assigned to the highway segment.

Category 6. Local Social Economic Activities and Partnership.

The factors considered in categories 1-5 are rational, objective, and comprehensive. However, these factors may still miss some local specific and unique situations. The Local Social Economic Activity factor is aimed to provide municipalities and stakeholders an opportunity to present their local information to be considered in the assessment. A guideline regarding how to prepare this presentation is posted on the Ministry's website. The RHAC will review all the presentations to ensure the transparency and fairness of the factor application.

The local communities and stakeholders are also encouraged to form various partnerships with the Ministry. Such partnerships will also be considered and be given bonus points in the overall assessment.

4.3. PRIORITY FACTORS SELECTED FOR NTS

The NTS is designed following a similar model to RHS, most of the factors selected therefore for RHS are also applicable to NTS. However, comparing with the transportation infrastructure requirements in southern Saskatchewan, many characteristics in northern Saskatchewan are so different that these unique characteristics have to be reflected by some unique factors in the investment decision making process.

4.3.1 The Population Factor

The unique geographical and demographical characteristics in northern Saskatchewan include remote and isolated populations, communities relying on single road linking to the rest of the province, and very long distance between these communities and any major urban centers that can provide comprehensive services. The northern economic activities and quality of life of the northern residents greatly depend on the transportation connection with the rest of the province.

In order to emphasize on such an important highway function that connects and serves the remote and isolated population in the north, the total population served by a highway section has been selected as an important parameter. It is reasonable to assume that if a highway section serves more population on a per kilometre basis, it would deserve upgrading sooner.

4.3.2 The Isolation Factor

Another parameter with special consideration for the northern communities is the isolation factor. This factor tries to address the remoteness of a community and its difficulty to access major service centers. It is assumed that a more remote and isolated community should deserve highway investment quicker to reduce the hardship of the journey. The isolation factor is therefore defined in such a way that the further away a community is located from major service centers, the more isolated the community will be considered, and more points will be given. If the highway happens to be a seasonal road, which makes the community even more isolated than just long distance, additional points will be given.

4.3.3 Special Considerations for Traffic Accident Data

It is also noticed during the strategy development that in rural areas, especially in remote and isolated areas in northern Saskatchewan, many minor collisions are not reported, which makes the safety comparison between highways not reliable. To take this into consideration, the NTS strategy only considers casualty collisions (which have high report rate) in the priority assessment.

The extensive industrial activities such as mining and exploration in northern Saskatchewan have resulted in high truck volumes on many highways, and the safety for truckers have become a major concern. The NTS has included an additional truck accident per kilometre factor in the analysis. Further, when dangerous goods (such as explosive and radioactive materials) or spill are involved in the accident, additional safety points would be also given to the corresponding highway section.

5. WEIGHTING SYSTEM FOR THE PRIORITY RANKING METHODOLOGY

With the completion of road segmentation, indicator selection and quantification, another major component in the multi-factor evaluation system is to determine the relative weightings for each category and each factor. The quantified indicators need to be multiplied by their corresponding weights, and the sum of all the weighted factors will provide the final composite score of each highway segment. This final score will ultimately shows the overall priority of the highway segment, and hence determine its relative priority ranking for investment.

There is no precise science for determining the indicator weightings. The literature shows that almost all the applications of similar evaluation techniques, including the multi-factor evaluation system and the analytic hierarchy process, the weighting scores were mainly obtained either through extensive structured discussions and debates among various interest groups, or through extensive structured consultations from senior engineers or experts. It is believed that a structured discussion and consultation process will certainly provide more reasonable weighting factors that reflect the general society's values on each factor.

The determination of weighting factors for the selected indicators in RHS and NTS was through extensive structured discussions in the respective advisory committees which consist of all major stakeholder groups and transportation professionals. The structured discussions were first to determine the relative importance of different categories in the selected priority ranking methodology, and relative weighting factors assigned to each category. After category weightings were determined, the relative importance of each indicator within each category was then determined and weighting factors were assigned to each indicator. To achieve a better balance between the economic and social indicators in the priority ranking method, the social and economic portion of each indicator are discussed and consensus was reached. The weighting factors were then adjusted to all indicators to reflect the agreed overall relative importance of social and economic factors. This structured approach would increase the work efficiency and minimize the potential confusion as compared to directly working on individual factors.

For the RHS, it was first agreed in the RHAC committee that the focus should be given more on the economic development than the social needs. Then, after extensive discussions, the total

weightings for each category, including Engineering Economics, Provincial Economic Activity, Highway Function and Activity Level, Safety Considerations, Corridor Considerations, and Local Social Economic Activities and Partnership, were established. The weighting details are given in Table 2, second column.

After the weightings for each category were determined, they were further broken down and distributed to the various factors within the category. However, since there are usually more than one factors in each category, the possible score combinations are large even if the individual weightings were rounded to 5. After a number of test drives and logical checking, the specifics of point assignments within each category are finalized by the RHAC committee and given in Table 2, forth column.

It is also to be noted that in Table 2, there are corresponding measurement values for the maximum or minimum points of each indicator. For the measurement values in between the extreme ones, a linear interpolation has been applied to calculate the appropriate point scores.

With regard to the determination of weighting scores for NTS, the process was similar to RHS. The major difference is that a consensus of the NTAC committee was reached that the social and economic weightings should be balanced to 50:50. The detailed weightings for NTS factors are given in Table 3.

6. PRIORITY RANKING OUTPUTS OF THE TWO STRATEGIES

After the extensive work of selecting the representative factors, quantifying the selected factors, and applying the corresponding weighting factors to all indicators, all the highway sections included in RHS and NTS are assessed and prioritized. As an example, the recent priority ranking results for RHS and NTS are shown in maps in Figure 3 and Figure 4, where the highest ranked highways are shown in thick red lines.

The priority ranking of both RHS and NTS strategies have provided the Ministry with an effective investment decision making tool that is rational, objective, and consistent. The process used to develop and implement these strategies is transparent and fair. These strategies make the Ministry's investment decision more strategic, consistent, and defensible. The highly ranked highway sections are included in the Ministry's Rolling Five-Year Capital Plan, which is updated annually. Through this process, Saskatchewan taxpayers will know what the provincial priorities are, and the local communities can also use this plan to guide their own growth planning. Further, the construction industry can as well utilize this plan to direct their business development.

7. CLOSING REMARKS

In response to the rapidly increasing transportation demands and also to the aging infrastructure, Saskatchewan Ministry of Highways and Infrastructure has developed a Rural Highway Strategy and a Northern Transportation Strategy to guide its infrastructure investment decision making.

The prioritization methodologies for both RHS and NTS are rational, fundamentally data driven, and objective. The process of the strategies is transparent, fair, and consistent. This multi-factor evaluation framework also has the ability to explicitly incorporate some subjective preferences

(such as the local transportation priorities) with the objective data to make it also flexible. These merits significantly help the general public and various stakeholders understand that every highway section is treated on a fair basis, and hence to build up the credibility and accountability of the government. Moreover, it also helps the communications with various stakeholders and general public about government investment decisions.

Both of the RHS and NTS strategies are updated annually by using the most updated information. In addition to the newly monitored data such as traffic volume, accidents and road conditions, the third parties can also actively provide their inputs to reflect the new opportunities and emerging needs. Further, the local communities can present their business cases and propose partnership agreements to be considered in the annual updates. Therefore, the RHS and NTS strategies are flexible and have the capability to adapt to the changing demands.

Great efforts have been made to obtain, manipulate, and apply various data to support the policy development. However, there are still many other issues that impede comprehensive analysis on specific highway sections. One of the issues that have been repeatedly raised by the public and stakeholders is how road conditions affect the traffic level. Many stakeholders believe quite reasonably that the poor road condition has resulted in the decrease of the traffic volume. However, it is difficult to quantify this effect. It depends on the options available to the road users and the conditions of the road. The issue is important to stakeholders because the traffic level plays a very important role in the prioritization process through the engineering economic analysis of the highway section. Further study may be necessary to find a way to take this effect into account.

REFERENCES

Liu, A., Hugg, H., and Liu B., 2010, Data Needs and Uses during the Development of Provincial Highway Transportation Strategies in Saskatchewan, submitted to the 8th International Transportation Specialty Conference at 2010 Canadian Society of Civil Engineering at Winnipeg

TABLES:

Table 1 Weighting for Road Conditions in NTS

	Score	Pavement Condition State	TMS Index	Gravel Road Condition State
Best	0	1		
	1	2	80	
	2	3	Linear Interpolation	
	3	4		
	4	5		
	5	6		1
	6	7		2
	7	8		3
	8		25	4
	9			5
Worst	10			6

Table 2 Weighting System for RHS Strategy

Category	Category Weighting	Factor	Maximum Weight	Corresponding Measurement Value	Minimum weight	Corresponding Measurement Value
Engineering Economic Considerations	30	B/C Ratio	15	Equals to or greater than 5	0	0
		NPV	15	+\$30M	0	-\$30M
Highway Function and Activity Level	30	Traffic Volume (AADT)	10	AADT = 1000 or more	0	AADT = 100 or less
		Rural Road Classification	15	Class 2 and higher	0	Class 5 or lower
		ATPC Priority	5	High	0	Not a priority
Highway Safety Considerations	20	Accident Statistics	10	200% more than expected	0	100% less than expected
		Road Condition	10	gravel road, or TMS Index<=25	0	Pavement highway with condition state 1 or 2
Provincial Economic Activity	20	Truck Traffic (TAADT)	10	TAADT = 100 or higher	0	TAADT = 20 or less
		Tourism Priority	5	High	0	Not a priority
		Provincial Economic Priority	5	High	0	Not a priority
Corridor Considerations	5	Corridor Factor	5	15% or less of the corridor length	0	60% or more of the corridor length
Local Social/Economic Activities	5	Local Social/Economic Activity Factor	5	Decision of the RHAC Committee	0	Decision of the RHAC Committee

Table 3 Weighting System for NTS Strategy

Category	Category Weighting	Factor	Maximum Weight	Corresponding Measurement Value	Minimum weight	Corresponding Measurement Value
Engineering Economic Considerations	20	B/C Ratio	10	Equals to or greater than 2	0	0
		NPV	10	+\$30 Million	0	-\$30 Million
Highway Function and Activity Level	30	Traffic Volume (AADT)	10	AADT = 600 or more	0	AADT = 0
		Rural Road Classification	10	Class 2 and higher	0	Class 5 or lower
		ATPC Priority	10	High	0	Not a priority
Highway Safety Considerations	30	Casualty Accident Statistics	10	200% more than expected	0	100% less than expected
		Truck Accident/km	8	≥ 0.3 truck accidents/km	0	No truck accident
		Dangerous Goods/Spill	2	≥ 0.1 dangerous goods or spill accidents/km	0	No dangerous goods or spill
		Road Condition	10	See Table 3	0	See table 3
Provincial Economic Activity	20	Truck Traffic (TAADT)	10	TAADT = 80 or higher	0	No truck traffic
		Tourism Priority	5	High	0	Not a priority
		Provincial Economic Priority	5	High	0	Not a priority
Community Access Consideration	40	Population Served / km	30	≥ 300 people / km	0	No people served by a highway
		Isolation	8	≥ 400 km from major service centers	0	0 km from major service centers
		Seasonal Road	2	If it is a seasonal road	0	If it is not a seasonal road
Local Social/Economic Activities	5	Local Social/Economic Activity Factor	5	Decision of the RHAC Committee	0	Decision of the RHAC Committee

FIGURES:

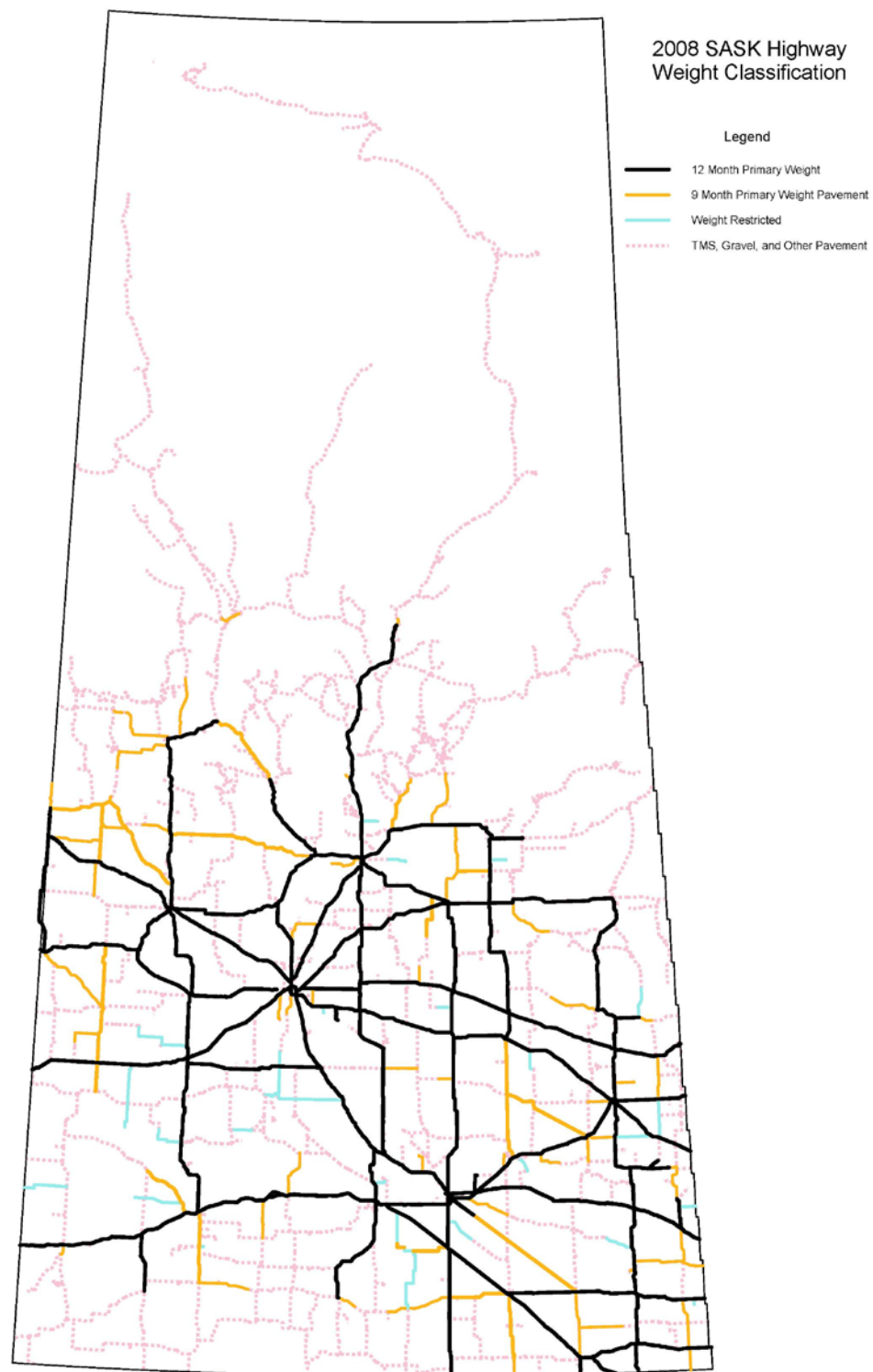


Figure 1 2008 SASK Highway Weight Classification Map

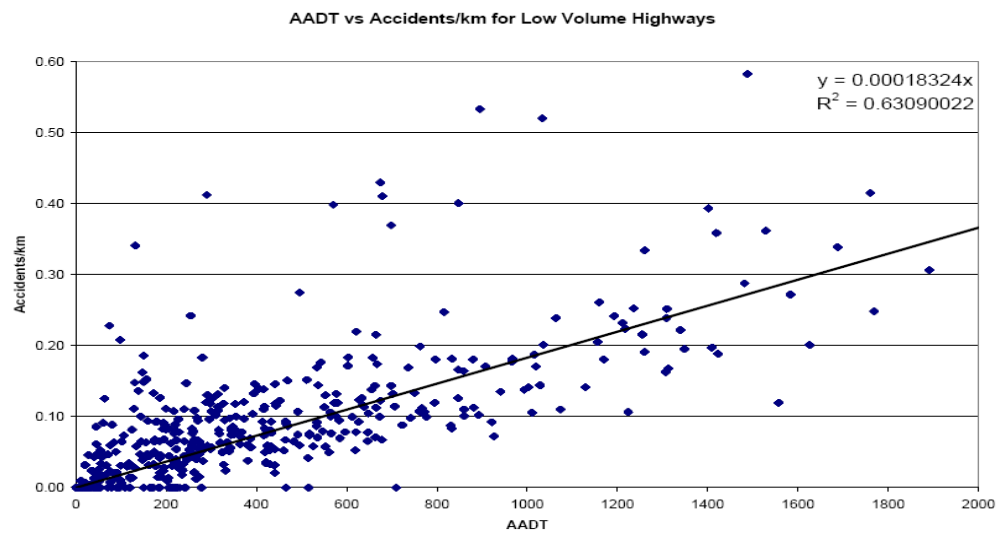


Figure 2 Traffic volume and collision/km relationship for rural highway sections in Saskatchewan

RHS Priority Ranking for Reasonable Highway Segments

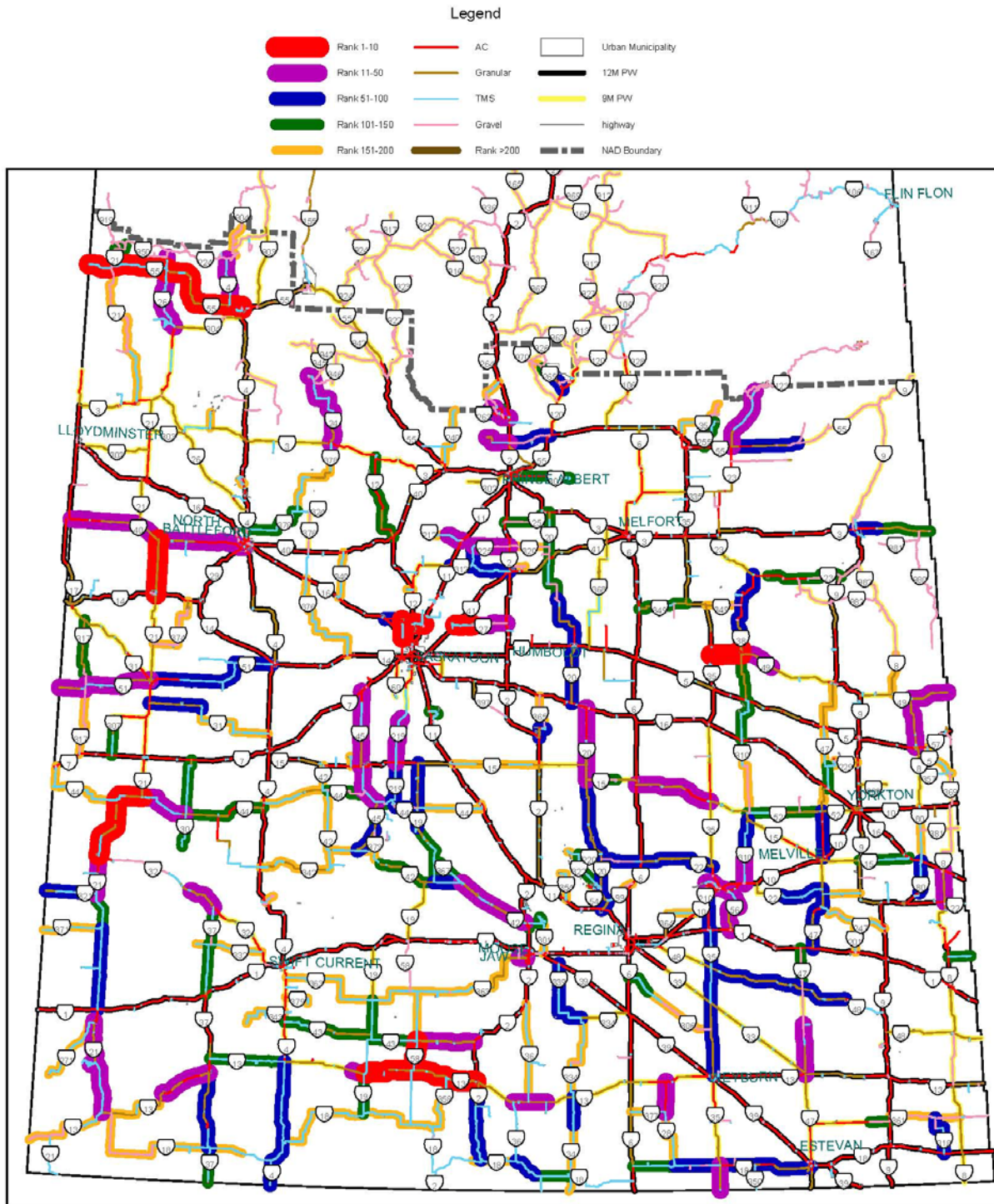


Figure 3 RHS Priority Ranking for Reasonable Highway Segments (2009)

Northern Transportation Strategy Priority Ranking for Reasonal Highway Segments (2010)

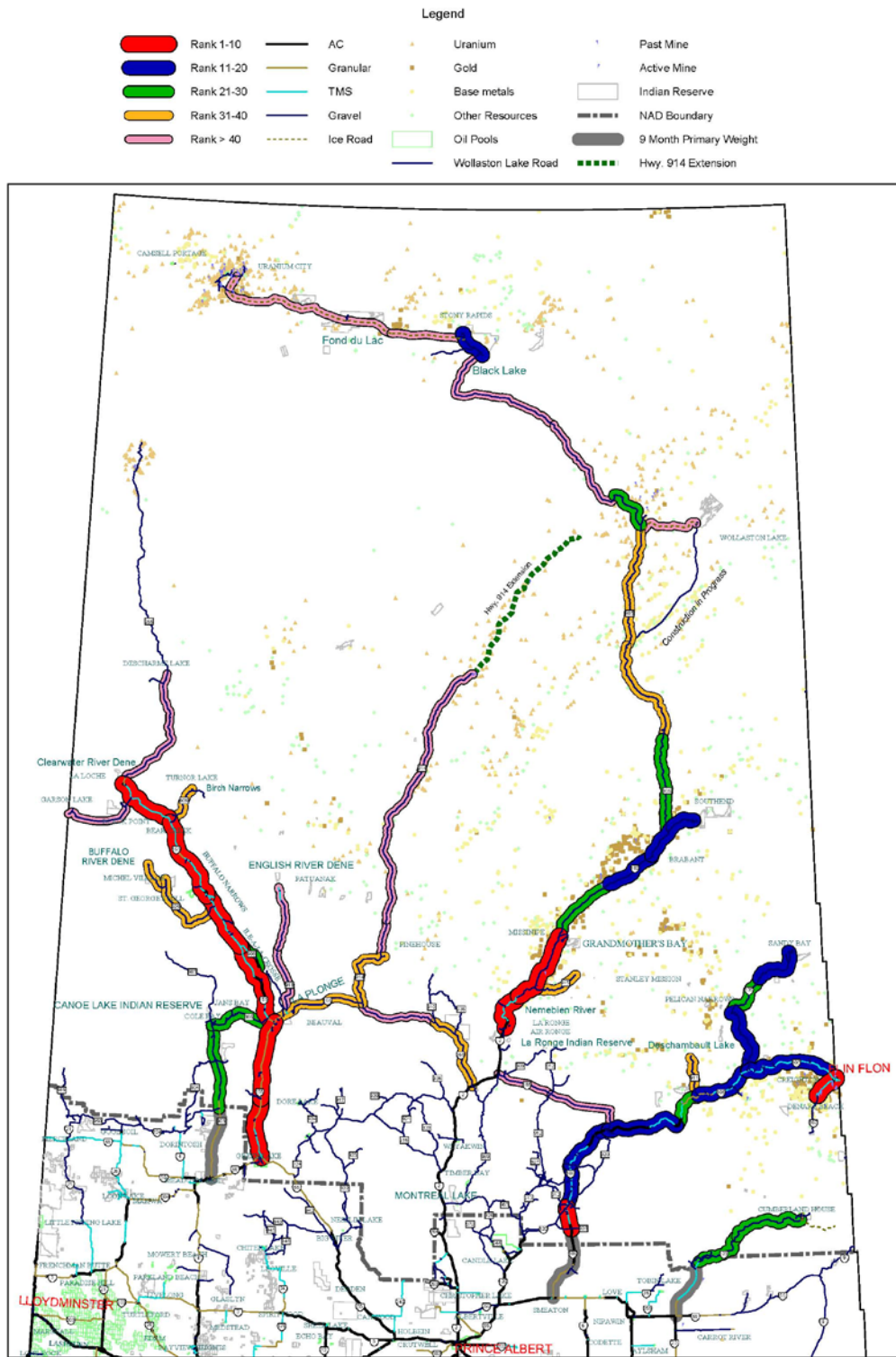


Figure 4 NTS Priority Ranking for Reasonable Highway Segments (2010)