Development of the Highway Hierarchy for Preservation of Provincial Highways in Saskatchewan

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ABSTRACT

Saskatchewan Ministry of Highways and Infrastructure has been working to develop a preservation policy that will be integrated with broad provincial goals and objectives, and that can strategically guide and explain the investment on highway preservation. Saskatchewan has a large provincial highway network. It is commonly understood that not all highways have the same level of importance in supporting economic and social activities. It is necessary to establish preservation priorities to provide a safe and efficient highway system using limited resources. A proper highway hierarchy for preservation will ensure that important highways are preserved to an appropriate level under limited funding and the province gets value for the money invested in preservation.

Principles and applications of highway hierarchy system have been reviewed. It is found that highways are often classified into different hierarchical systems for different purposes. Although all transportation agencies have a highway functional classification system, it is often not used directly for priority setting of highway preservation program and network performance measurement. This paper describes a study to develop the highway hierarchy for preservation (HHP) in Saskatchewan. Principles of the hierarchy development were established and they include that the hierarchy shall be determined mainly by highway functions and facility utilization rate. A range of specific criteria are used to generate HHP options. Extensive evaluation on network traffic, inventory, current services, and pros and cons for each option were conducted. The chosen HHP has modified existing functional classification system by incorporating traffic thresholds, considering single access and auxiliary lanes, and current preservation practices etc. The HHP is used in the development of level of preservation services for provincial highways.

INTRODUCTION

Saskatchewan has a large provincial highway network that is critical to provincial social and economic development. The highway network faces major challenges as commercial traffic continues to increase, public expectation on transportation services becomes higher, and the infrastructure is aging. The limited infrastructure preservation funding needs to be rationally prioritized and service objectives defined in order to best preserve the infrastructure asset to meet the growing transportation demand and to effectively communicate to public/stakeholders to manage public expectations. The Saskatchewan Ministry of Highways and Infrastructure has been working on a preservation policy that will be integrated with broad provincial goals and objectives and that can strategically guide and explain highway preservation investment.

It is commonly understood that not all highways have the same level of importance in supporting economic and social development in the province. It is therefore necessary to establish preservation priorities to provide a safe and efficient highway system under limited resources. A highway hierarchical system, which is suitable for highway preservation and investment, is a critical part of the effort to rationally prioritize preservation program.

The principles and applications of highway classification system in literature and transportation agencies have been reviewed, focusing on the use of highway hierarchy for preservation. This

paper describes the study to develop the highway hierarchy for preservation (HHP) in Saskatchewan. The principal criteria to develop the highway hierarchy for preservation are highway function (reflecting relative importance of the highway) and the facility utilization rate (reflecting rationalized preservation needs and relative importance of the highway). The identified options of HHP categorize the provincial highways into several groups based on mainly the principal criteria. A proper HHP will ensure that important roads are preserved to an appropriate condition under the limited funding and therefore the province gets value for the money invested in highway preservation. More specifically, the assessment and development of a highway hierarchy for preservation is intended to achieve the following objectives:

- Clearly defined principles and process to select or establish a highway hierarchy for preservation that will help priority setting of highway system preservation investments and will be used to define preservation level of service

- Select/or develop a highway hierarchical system for preservation that reflects
  - the relative importance of each highway subgroup in provincial social and economic development, and
  - each highway subgroup's rationalized needs for preservation service. High facility utilization rate will result in high infrastructure consumption, and therefore should require more preservation efforts.

LITERATURE AND JURISDICTION REVIEW OF HIGHWAY HIERARCHY

Principles and Purposes of Highway Functional Classification System

Traditionally, highways have been orderly classified into different categories according to their respective functions in terms of service they provide to the public. Each road type performs a particular service in facilitating vehicle travel between origin and destination. The highway classification system establishes a hierarchy of roads that provides for the gradation in function from access to mobility (1), as shown in Figure 1. In a typical highway functional classification system, the roadways are first described as "rural" and "urban" roads depending on land use of the area in which the roads are located. And then, the roadways are normally classified as arterials, collectors, and locals. This functional classification facilitates the systematic development of highways and the logical assignment of highway responsibilities among different jurisdictions (2). Typically, the classification is used to guide roadway functional planning and geometric design.

Jurisdiction Review of Highway Hierarchy for Preservation

Literature review shows that every transportation agency has a highway functional classification system. However, the functional classification system is not the only highway classification system in most of agencies. Many agencies use different classification systems for different purposes. Some agencies use classification system specifically developed for corridor analysis, roadside management, access control, and highway system preservation and performance measurement purposes. For example:

- In Ontario, in addition to highway functional classification, highways are also classified into 13 categories that define administrative and financial responsibility; and five categories that provide policy guidelines for land access; and three categories that assist in establishing funding requirement, service standards and service expansion (3).

- In Alberta, in addition to its "Service Classification" (functional) system, Alberta has an administrative highway classification, and a highway classification system for roadside management, and a newly developed "Design Classification " system (4).

- In North Dakota, apart from a functional classification system, North Dakota in recent years has classified all state highways in five Highway Performance Classification System (HPCS) categories (5): Interstate, Interregional System, State Corridor, District Corridor, and District Collector.

In all reviewed highway agencies, the common approach for highway hierarchy for preservation seems to be a formal hierarchy for preservation priority setting. However, there are different approaches for the hierarchy. The highway functional classification system is not widely used for highway preservation priority setting and performance measurement.

A few highway agencies use the highway functional classification as the hierarchy system for priority setting of their highway preservation program (such as Manitoba (6) and Ontario), while some agencies do not use any classification system, instead they only use traffic volume levels in preservation priority setting (such as Alberta (7), and Utah (8)). As examples, the rehab plan of pavement preservation in Ontario is based on functional classification of the highway and PCI (pavement condition index) of the pavement, while the selection of pavement preservation treatments in Alberta is purely based on AADT levels and International Roughness Index (IRI) of the pavement, see the following summary:

Alberta pavement treatment triggers	
AADT	**IRI trigger (mm/m)**
< 400	3.0
400 – 1500	2.6
1501 – 6,000	2.3
6,001 – 8,000	2.1
>8,000	1.9

Ontario pavement rehab triggers	
Functional classification	**Pavement rehab trigger PCI**
Freeway	PCI ≤ 65
Arterial	PCI ≤ 55
Collector	PCI ≤ 50
Local	PCI ≤ 45

It seems a large majority of highway agencies use the traffic level and some form of highway functional characteristics to define their highway hierarchy for preservation priority setting and highway performance measurement. The traffic level is used in defining highway hierarchy for preservation priority setting to ensure putting resources into routes that serve the most people, and functional elements will help ensure important corridors are preserved to acceptable levels of service. For example:

- North Dakota has established the targeted levels for highway service for the five Highway Performance Classification System (HPCS) categories (9). Load restrictions, ride/distress conditions, bridge sufficiency, and safety are all specified for each HPCS sub-group.

- In North Carolina, "*Make Our Infrastructure Last Longer*" has been identified as one of the Organizational Performance Measures, and the measurement targets has also been established for three tiers of highway: Statewide Tier, Regional Tier, and Sub-regional Tier. This tiered approach is considered an effective strategy for making decisions on investments based on use and function being served by transportation component (8).

- AUSTROADS believes that the budget constraint in highway agencies has resulted in development of appropriate level of service for different classes of road. The processes are based on the concept of intervention levels and response times (10). It suggested the road geometrics and usage be used as main criteria for road classification and no more than 10 categories and sub-categories should be used in road hierarchy for easy understanding by the public.

It should be mentioned that the level of service for winter road maintenance is a different issue, and almost all agencies use mainly traffic volume to define winter road level of services.

PROVINCIAL RURAL ROAD AND HIGHWAY SYSTEM IN SASKATCHEWAN

Saskatchewan's provincial highways consist of 26,300 km maintained highway length, which includes about 3,880 km of National Highway System (NHS). There are currently several ways to classify the provincial highway system. All of these classification systems have the characteristics of a hierarchy. They are all useful for different purposes.

Since 2000, Saskatchewan's official rural road functional classification system has been Rural Road Classification (RRC) system that categorizes both provincial highways and rural municipal roads into seven classes (11). The RRC considers linking population centers of certain sizes, health care facilities, service centers, inter-provincial and international travel routes, and industrial and property access, etc. Provincial highways are categorized within Class 1 to Class 5. The RRC system generally reflects the relative importance of each highway hierarchy to provincial social and economic development. The RRC system had also gone through extensive consultation with external stakeholders. One of the options of the highway classification system for the preservation policy will certainly be the RRC.

However, existing highway sections' utilization rate and travel demand were not included in the RRC criteria. As a result, the RRC system does not always categorize higher utilized highway sections in the higher class. This may be fine with a highway functional classification system, however it is questionable if the functional classification is directly suitable to be used in a hierarchy for highway preservation purpose.

In addition to RRC, Saskatchewan Ministry of Highways and Infrastructure also use a functional classification system in highway design, functional planning, and traffic operations assessment. This system classifies all highways into Major Arterial, Minor Arterial, Collector and Local based on the character of services they provide (12).

The Saskatchewan highway network is managed by different allowable axle/gross vehicle weight limits to protect highway pavements and bridge infrastructure and to support economic growth. These weight classes also have hierarchy character due to its ability to withstand the truck loads. Highways allowing primary weight year-round are the best quality structured pavements. 9-month primary weight highways are normally structured pavements or gravel roads. Secondary weight highways are predominated by low quality dust-free road surfaces such as Thin Membrane Surface (TMS), low quality pavements, and gravel roads. There are also weight restricted highways due to various reasons. Weight classification system is used for providing public service related to freight movement and business development.

Highways can also be categorized by their surface types, such as asphalt concrete, granular with double seal, TMS, and gravel. These different surface types provide very different service levels to the public, and they also require different preservation strategies and treatments.

DEVELOPMENT OF HIGHWAY HIERARCHY FOR PRESERVATION (HHP)

Engineers and managers in the Ministry understand the reality of a large provincial highway network and limited tax base to fund the system. It has been recognized that not all highways have the same level of importance to the province's social and economic development. There were efforts in the Ministry to define a hierarchy for highway system management as part of the Ministry's strategic planning process. However, due to various reasons a provincial highway hierarchy for preservation had not been formalized.

Highway hierarchy for preservation (HHP) will help to prioritize the preservation program. The HHP development has to provide the basis to determine relative importance of the highway to provincial social and economic development and the rationalized needs for preservation. A good HHP for preservation policy will ensure that important roads are preserved to an appropriate condition under the limited funding.

Major Principles Identified For HHP Development

A Working Team was established in the Ministry to develop HHP. After extensive review and discussion, following major principles and assumptions have been identified for defining HHP:

- HHP must help prioritize the preservation program on the basis of
  - relative importance of the highway (reflected by road functions and utilization), and
  - rationalized preservation needs (indicated by highway's utilization rate - traffic)
- current functional classification RRC has correctly reflected functions of rural roads
- highway sections near major urban centers require more attention to reflect the major urban centers' roles as regional economic engine and general service centers

- HHP should be relatively stable and have flexibility to reflect future changes

The RRC is the official functional classification system in the province, and had a set of clear criteria for each class of roads, it is therefore considered as one of the most important factors. It should be noted that traffic and truck traffic are not among the criteria for RRC classification. The traffic and truck traffic volume are the facility utilization rate and are the best indicators to reflect a highway's rationalized needs for preservation. The facility utilization rate is also more closely related to social and economic development activities in the province. Highway preservation priorities may be set to balance the need for infrastructure condition between facility utilization and the functions of highway sections.

The reasons to pay more attention to highway sections near major urban centers are that these highway sections directly support the agglomeration economies, the ability of urban centers in attracting and facilitating economic development in urban areas. The agglomeration economies mold transportation demand in and around urban centers and in between urban centers and economic regions, and as a result transportation demands are more concentrated on these highway sections. Transportation services facilitate the movement of goods into and out of areas of production, commuting labor to and from work, and between other urban centers and nearby rural communities. It exploits both scale economies and network effects (13). Paying more attention to these highways in preservation policy will serve high trafficked highway sections better and at the same time facilitate the functions of major economic centers.

Highway Hierarchy for Preservation Option Development and Assessment

Using the above principles and assumptions, four highway hierarchy for preservation options were generated considering mainly highway functions and facility utilization rate.

Highway Hierarchy for Preservation Option 1 (HHPO-1): to directly adopt the existing Rural Road Classification (RRC) system

There are many advantages for directly adopting RRC as HHP. The RRC system was developed by the joint effort of provincial and municipal governments through extensive consultations and has been the official rural road functional classification system in the province. The RRC system does generally reflect the relative importance of each highway class to the province. However, the RRC criteria do not include traffic levels, which is facility utilization rate reflecting the highway section's rationalized needs for preservation and also indicating relative importance of the highway section. The RRC also does not consider other principles identified for HHP development.

Highway Hierarchy for Preservation Option 2 (HHPO-2): modified RRC by adding traffic thresholds and considering National Highway System (NHS)

Because the facility utilization rate is considered a critical factor of highway hierarchy for preservation and the RRC does not consider it, the effort was focused on the incorporation of traffic and truck traffic volume on highway sections to the hierarchy. Following are a list of factors considered in development of other options (14):

- National Highway System (NHS) and RRC levels
- Traffic and truck traffic levels
- Annual international border crossing traffic
- Major city connections
- Auxiliary roads and lanes,
- Single access to communities, and
- Network continuity

To establish traffic thresholds for each hierarchy level, traffic volume represented by AADT and daily truck traffic (TAADT) at each control section of the highways were analyzed. The traffic volume was used as a reference starting point to develop the HHP options for the highway network assuming the higher traffic volume highway sections are normally more important to the province and also require more preservation efforts. The RRC is then used to make sure the higher functional class highway sections are not left in a too low category.

To determine an acceptable starting scenario, a cluster analysis of AADT was performed by plotting a ranked AADT from high to low for all control sections on vertical axis and corresponding ranking of the control section on horizontal axis. The corresponding TAADT for each control section then was also plotted on the same chart. Figure 2 shows ranked AADT plot for all mainlane highway control sections, and corresponding TAADT.

A vertical cut-off line was drawn in a transition point where the ranked AADT curve had a sharp drop in slope to divide the entire network into groups. The remaining highway control sections were then plotted in the similar chart and further divided. This process arbitrarily and preliminarily divided the highways into several groups. Based on the transition regions in the traffic ranking plot, AADT levels for all highways are mapped in Figure 3.

The main advantage of HHPO-2 is that the facility utilization rate in terms of traffic volume has been specifically considered in the process. The option puts the NHS in a more prominent position and RRC is a very important criterion for this option, which makes the option generally reflecting the function of the highway sections. The main disadvantage of HHPO-2 is that the option is not widely consulted with stakeholders as RRC. The option also does not consider some reasonable current practices of existing preservation activities.

Highway Hierarchy for Preservation Option 3 (HHPO-3): modified RRC by adding traffic thresholds and considering RRC 1

The HHPO-3 is not very different from the HHPO-2. The same process of ranked traffic plot of highway control sections and the same set of criteria are used to generate HHPO-3. The only major difference between the HHPO-2 and HHPO-3 is that the top level is different for the two options. All RRC Class 1 highways are grouped in the top level in HHPO-3 in addition to the highway sections that meet the traffic threshold. The advantages and disadvantages for HHPO-3 are similar to those for HHPO-2.

Highway Hierarchy for Preservation Option 4 (HHPO-4): modified RRC by adding traffic and truck thresholds, and considering other important factors

HHPO-4 option is based on similar conceptual thinking of HHPO-2 and HHPO-3 and further considers the current levels of preservation activities on different groups of highways and other factors. It is assumed that the current level of preservation activity on different highway sub-groups is generally reasonable for dealing with the large highway network under the limited budget level. Although there is no official documentation on different grouping of highways, these different levels of preservation service have been established gradually after years of trial and error to reflect the different levels of importance of highways and surface types. For example, twinned NHS is generally given more attention than 2-lane NHS, and primary weight pavements are generally preserved to a higher standard, etc.

The HHPO-4 focused on further split the top tier highway group and low level highway groups by using mainly traffic and truck volume thresholds. Maps with different AADT and TAADT levels were drafted to help establish the traffic thresholds to split the top tier highways. The use of a higher traffic and truck traffic thresholds (AADT $\geq$ 5000, and TAADT $\geq$ 1000) clearly helps separate the twinned highways from the rest of the highway sections in the top tier.

To consider those with low volumes but important highways in various areas, HHPO-4 adopts a single access criterion. A single access highway is defined as the only road access to a community. If a single access highway (mainlane) is in Hierarchy 3 or lower by other criteria, it will be moved up one level.

HHPO-4 also breaks up control sections near major urban centers to identify the logical terminal points for providing higher service levels to those very high trafficked sections. It is assumed that the significant changes in traffic and truck traffic levels will indicate the logical terminal points for a highway section in a particular hierarchy.

After initial assignment of a highway hierarchy, a network continuity check is performed visually on a preliminary hierarchy map to ensure reasonable highway sections will not be categorized in different hierarchies due to small differences on two sides of a threshold. Table 1 summarizes HHPO-4 highway length in each hierarchy comparing to RRC.

Advantages of HHPO-4 include specific consideration of using facility utilization rate in terms of traffic and truck traffic volume. The RRC is still a very important criterion for this option, which makes the modified hierarchy generally reflect the function of the highway sections. To some extent, this option has considered and reflected some non-written current preservation practices in terms of different service levels for different groups of highways. These current practices are generally sensitive to the top traffic level highways, highway surface types, and the highways with moderate traffic in low volume categories of highways. These practices should be viewed as the collective wisdom of professionals over the years by trial and error to best serve the public and preserve the highway asset under the limits of the available budget.

Incorporation of factors such as single access highways, breaking up control sections near major urban centers by traffic levels, different ways to incorporate non-mainlane highways in the hierarchy system, etc. have addressed the problems identified for the RRC system. The separation of lower hierarchy highways by traffic and RRC will ensure that moderately

trafficked low volume highways will be given priority in preservation comparing to very low volume highway sections.

Non-Mainlane Highway

Apart from mainlane highways, MHI also has a significant amount of non-mainlane highways. The types of non-mainlane highways under MHI's jurisdiction include many types of auxiliary roads, range from roads attached to the mainlane highways near communities (Ramps, Loops, Frontage Roads, Service Roads etc.), at sites (Scale, Loadometer, Turnouts), to separate roads such as access roads and roads in recreation facilities. These roads are almost 10% of total highway inventory.

It is reasonable to assume that the non-mainlane highway sections generally have less significance to the provincial transportation system than the corresponding mainlane highway sections. The current RRC system does not differentiate the mainlane and non-mainlane. This is why the non-mainlane highway sections are assessed separately for the three non-RRC options. These non-mainlane highway sections can be easily incorporated into one of the mainlane highway hierarchy respectively.

It should be noted that among the approximate 2,100 km of non-mainlane highways, most do not have traffic count, which does not necessarily mean that the traffic volumes on these sections are lower than the sections counted. AADT, RRC class, and the type of non-mainlane facilities are used to assign a hierarchy to these sections. If a non-mainlane highway meet the general traffic criteria for a hierarchy, it will be treated the same as a mainlane highway. Otherwise, different types of Non-mainlane highways are treated differently. The highway ramps will follow their mainlane highway's hierarchy, and other non-mainlane highways are generally incorporated into a lower hierarchy than their RRC level would indicate.

OPTION EVALUATION OF HIGHWAY HIERARCHY FOR PRESERVATION

Evaluation of options of highway hierarchy for preservation first compares how options follow the established principles, and their major advantages and disadvantages of each option. Some quantifiable indicators are then calculated to compare the options. A sensitivity analysis is conducted to the chosen option to assess the impact of traffic growth.

Comparing HHP Options by Major Principles and Factors

All options are compared by identified major principles and evaluation factors. The option 4 seems to be best in most of the major evaluation factor comparisons. After extensive discussions, it was decided that the RRC modified mainly by adding traffic thresholds is better suited for the Ministry's preservation policy. The option 4 is the best option based on all evaluated factors (14). The major principles and factors used in evaluation are following:

- Highway functions
- Traffic level, and truck traffic
- Corridor concept

- Highway sections near major urban centers
- Main lane and non-main lane treatment
- Identification of the top hierarchy
- Separation of lower hierarchies
- Single access roadway consideration
- Reflection to current actual preservation practices
- Flexibility of the hierarchy uses
- Consultation and easiness of communications

A sensitivity analysis of the option-4 AADT criterion shows that the highway hierarchy for preservation will be relatively stable in the next 15 years if the traffic on the highway network is going to grow at the growth rates determined by historical traffic data analysis (14).

Evaluation of HHP Options by Quantifiable Indicators

As part of the evaluation, some quantitative indicators were calculated and used to summarize and compare the proposed options of highway hierarchy for preservation. The calculation shows that all options can generally categorize the high traffic highway sections into higher hierarchies, and the higher hierarchy highways serve the majority of the traffic travel, population and employment in the province. The major differences between options are the top hierarchies and lower hierarchies, and highway sections near the major urban centers, single access roads, and non-main lane roadways. It is therefore difficult to use these indicators to detect the differences and to evaluate the options. Nonetheless, these indicators provide clear pictures for all options that the higher hierarchy highways are significantly more important to provincial social and economic development.

Table 2 provides a description and the length of each hierarchy and their corresponding range of traffic in terms of AADT for the chosen HHP. The average per km vehicle cost is also calculated for each hierarchy (14). The vehicle cost includes all vehicle operating costs plus the time costs of vehicle users. These cost estimates are based on data from Transport Canada Full Costs Investigation studies (15, 16). Although the cost is an estimate and it is dependent on traffic volume, this new information provides a useful tool to communicate to the public on priority decision-making for highway preservation investment and defining level of service for different highways. As the data in Table 2 shows that vehicle costs to users on the highest hierarchy is more than 100 times of the costs on the lowest hierarchy. The fact that the road users spend much more on some highway sections than on others is useful information to be used to justify a better level of service in terms of highway preservation.

Table 3 shows the cumulative percentages of major indicators for a hierarchy and higher levels for the chosen HHP. The table clearly indicates that the higher hierarchy highways provide much higher values to provincial social and economic development interests.

SUMMARIES AND IMPLEMENTATION

Following summaries and conclusions can be drawn from the study:

- Most transportation agencies use more than one highway classification system in highway system management. All transportation agencies have a highway functional classification system. However, the functional classification is not widely used directly for priority setting of highway preservation program and system performance measurement.

- All reviewed transportation agencies use a stated highway hierarchy for preservation priority setting or system performance measurement. Most reviewed agencies seem to use a combined traffic levels and functional class as major factors to define a hierarchy for priority setting of highway preservation and performance measurement.

- Currently, there are several ways to classify the provincial highway system in the Ministry. All of these classifications have the characteristics of a hierarchy. They are all useful for different purposes, but not suitable directly as the hierarchy for prioritizing highway preservation.

- The identified main principles for highway hierarchy development of prioritizing preservation program on the basis of relative importance of the highway and rationalized preservation needs are rational and logical.

- The chosen HHP option followed the identified principles for highway hierarchy development, considered other major factors such as highway sections near the major urban centers, single access roads, and non-main lane roadways, corridor continuity, etc. The chosen HHP option is also relatively stable.

The Ministry is currently in the process of implementing the chosen HHP in its preservation policy development. A regular review process will be established to make the HHP flexible and adaptive to the changing transportation demands.

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Table 1 Highway length in km, the chosen HHPO vs. RRC levels

Hierarchy	RRC1 (including NHS)	RRC2	RRC3	RRC4	RRC5	Length (km)	%
1A	2,927	11	39	3.67	1.45	2,983	11.30%
1B	2,268	123	43		3.61	2,438	9.24%
2	16	4,834	648	20	0.34	5,519	20.91%
3		244	4,939	782	0.87	5,967	22.61%
4			39	2,313	680	3,032	11.49%
5			0.11	4,086	111	4,197	15.90%
6					2,260	2,260	8.56%
Total	**5,212**	**5,213**	**5,709**	**7,205**	**3,056**	**26,397**	**100%**

Table 2 Hierarchy description and major indicators for the chosen HHP option

Hierarchy	Hierarchy Description	Length (km)	Vehicle costs ($/year/km)	AADT	
				Min	Max
1A	Top National and international corridors + highest traffic sections	2,983.42	813,567	1,059	28,156
1B	Major arterials connecting cities, inter-provincial routes + high traffic sections near cities	2,438.30	481,077	688	4,300
2	Minor arterials connecting major routes and medium population centers	5,519.23	191,550	101	2,810
3	Major collectors feeding arterials, and major interregional routes	5,967.35	114,208	38	2,217
4	Interregional routes and relatively high volume local roads	3,032.23	67,819	20	1,950
5	Local roads provide access to community and other destinations	4,197.47	31,073	5	610
6	Local access roads	2,259.68	7,916	5	240
Total		**26,397.67**			

Table 3 The chosen HHP's cumulative percentages for major indicators

Hierarchy	Length (km)	Cumulative percentages for the hierarchy and higher				
		Length	Travel	Truck Travel	Population Served	Employees Connected
1A	2,983.42	11.30	38.92	48.62	58.15	68.81
1B	2,438.30	20.54	60.18	68.89	71.51	82.42
2	5,519.23	41.45	80.29	85.07	86.02	91.99
3	5,967.35	64.06	93.43	95.02	95.10	97.17
4	3,032.23	75.55	97.42	97.81	97.80	99.05
5	4,197.47	91.45	99.70	99.74	99.74	99.98
6	2,259.68	100	100	100	100	100
Total	26,397.67					

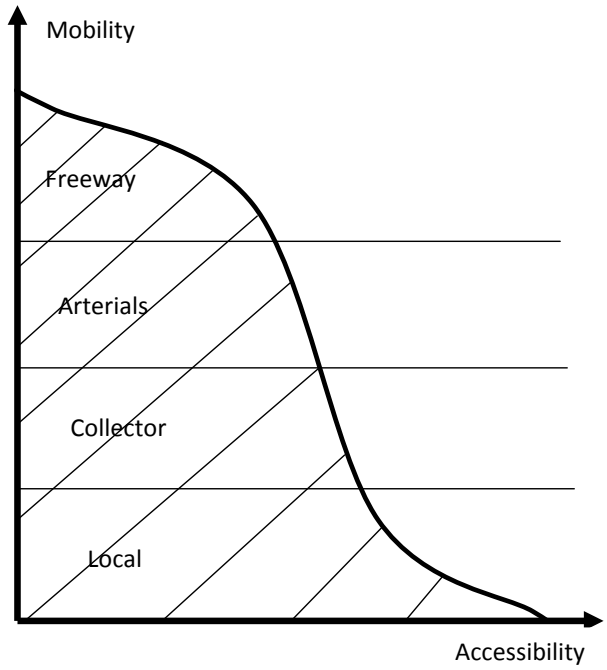

Figure 1 Highway function relationship mobility vs. access

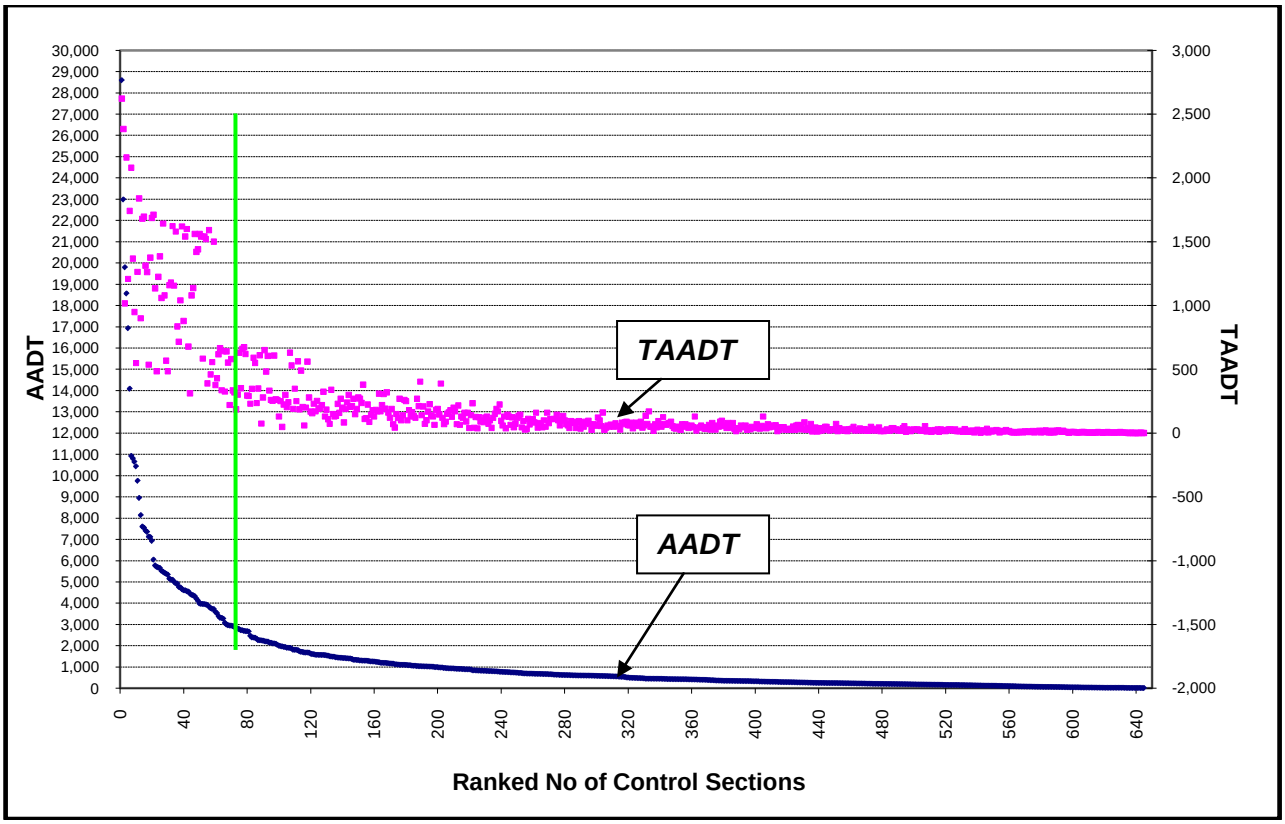

Figure 2 Ranked AADT plot for all mainlane highway control sections and corresponding TAADT

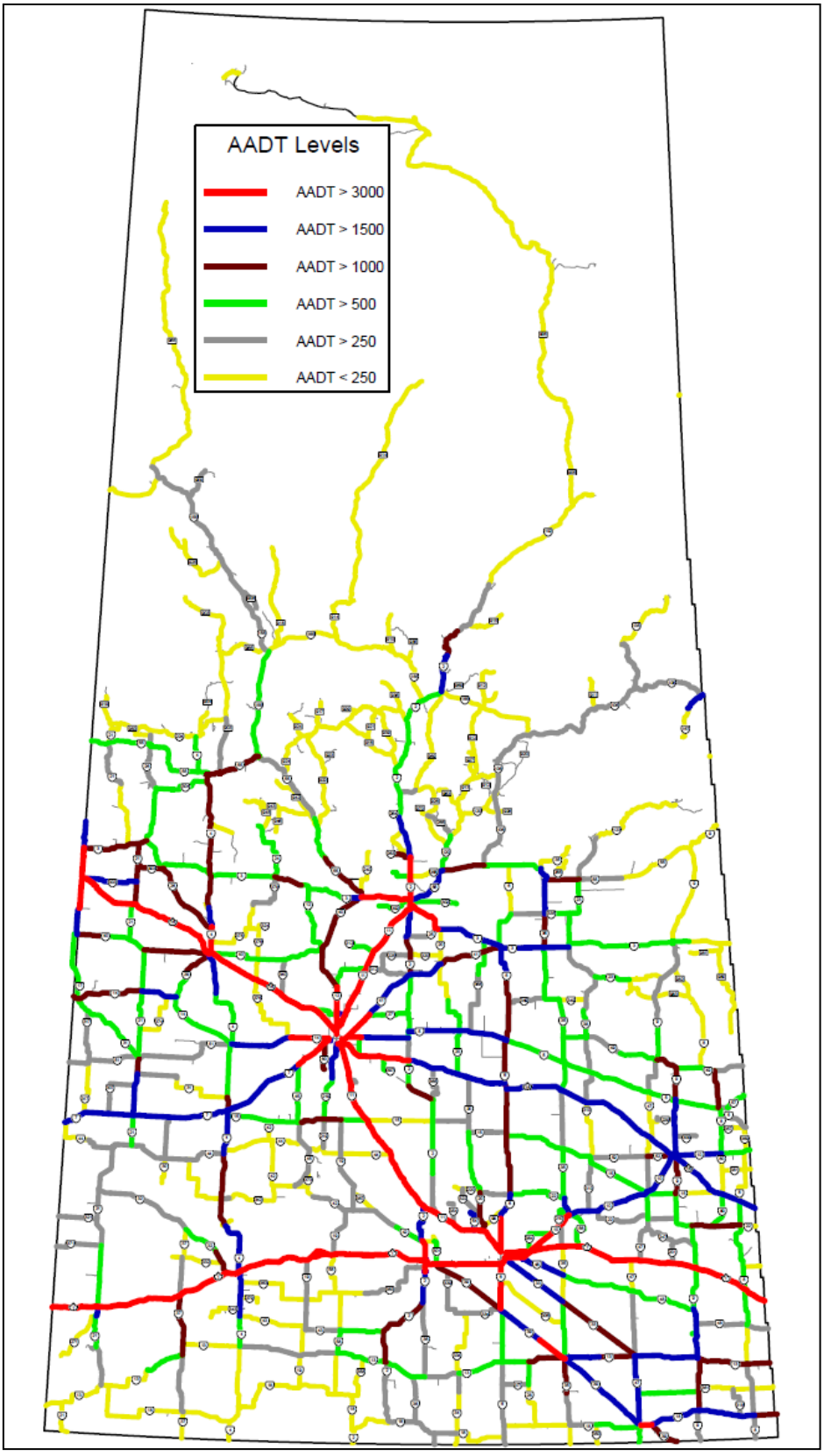

Figure 3 AADT levels for all highways

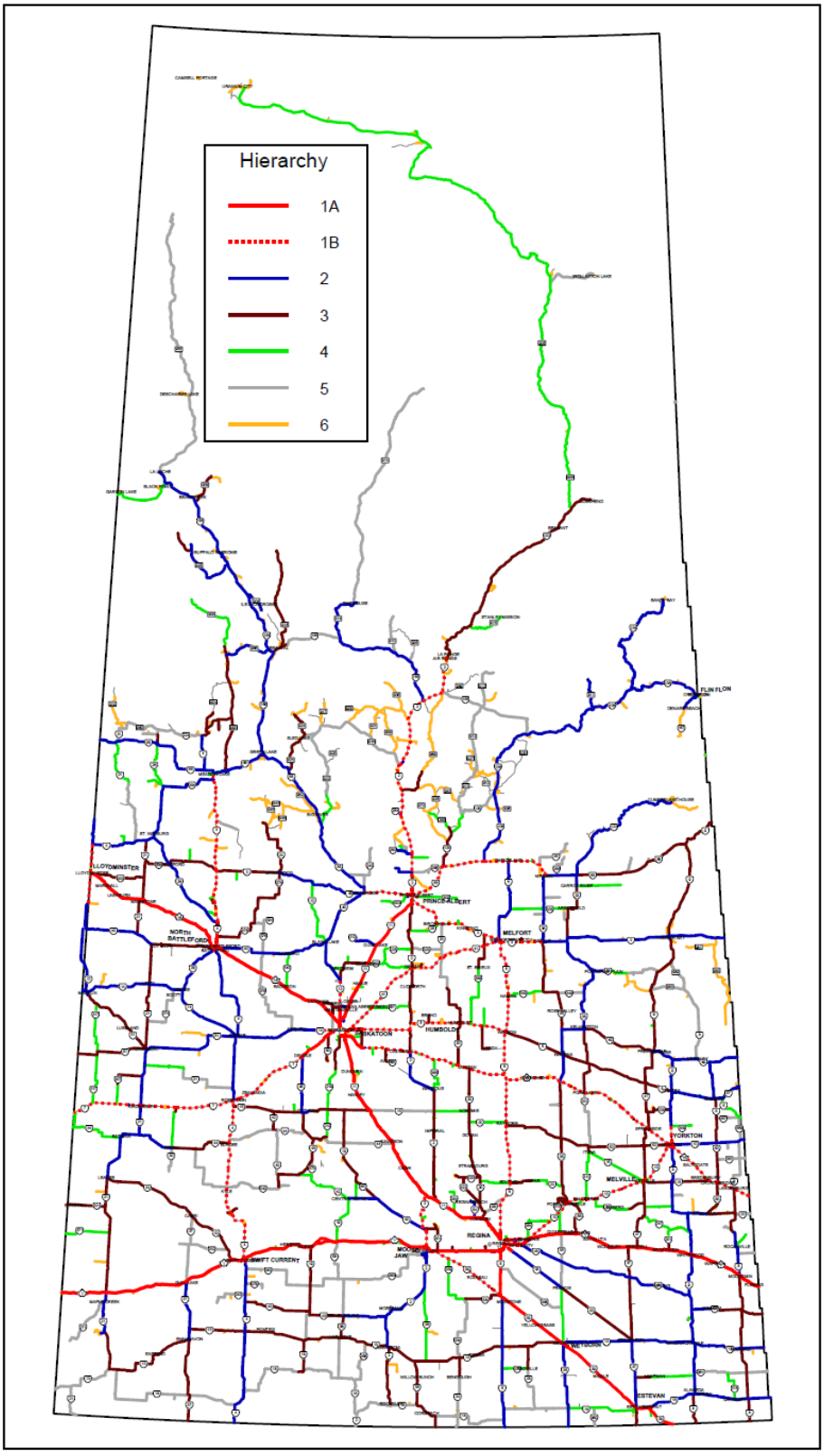

Figure 4 Map of the Chosen Option of Highway Hierarchy for Preservation