Solutions for Highway Operators Accounting for Cyclists and Pedestrians: a Manitoba Approach

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Abstract

Manitobans are cycling and walking on provincial highways, and this is not always safe. While active transportation (AT) on highways presents multifaceted safety concerns, it is legal to walk or cycle on all provincial highways in Manitoba. Highway rights-of-way may be the only available public corridors that connect people to where they want to go. Highways are not conventionally designed for AT purposes. Nevertheless, highway operators have a role to play in ensuring the safety of all highway users and enhancing the wellbeing of citizens.

It is with this lens that Manitoba Infrastructure developed the AT Policy and Planning Guide to respond to the following questions:

- How can a highway operator cost-effectively account for AT safety?
- Under what circumstances should a highway operator consider AT?
- What are appropriate AT investments for a highway operator?

The outcome of the policy and planning guide development process was to outline the role of Manitoba Infrastructure in addressing AT on provincial highways, and to guide Manitoba Infrastructure's decision-making process when considering AT users and AT needs, in relation to the provincial highway network.

The following summarizes the policy:

- Local governments and/or trail organizations are primarily responsible for the ownership and maintenance of local AT facilities, which includes design, construction, operation, maintenance, funding, liability, and stewardship. MI maintains on-highway AT-related facilities, in order to protect highway safety and operations.
- Public transportation, including AT, is an appropriate use of provincial highway rights-of-way, if facilities are appropriately located.
- MI will work with local governments and trail developers to ensure that AT facilities are well planned and designed to protect highway safety and operations.
- Where there is significant demand for AT on provincial highways, as interregional and/or interprovincial corridors and connections, MI has a responsibility to:
    - reasonably improve safety and usability
    - partner with local governments and/or trail organizations to facilitate development of AT facilities

The resulting planning guide presents a three step approach to considering AT, where Manitoba Infrastructure: 1) reviews if there is AT activity at a location, based on an AT trigger map; 2) prioritizes AT activity, given current and latent demands; and 3) determines the appropriate investment. As a further component of the AT Policy and Planning Guide, Manitoba Infrastructure is publishing maps to inform the public about the AT safety implications of various provincial highways.

1 Introduction

The need for an AT policy and planning guide resulted from Manitoba Infrastructure's priority for safety on the provincial highway network. Manitoba's provincial highway network is predominantly set in a low density, rural setting. Although there is a low overall AT demand, there are locations with noteworthy AT traffic near First Nation communities, urban areas, recreational areas, and trail networks – this activity is legal on all provincial highways, as written in the Highways and Transportation Act.

Policy work undertaken by federal/provincial groups suggests that there is no one-size-fits-all approach to AT policy. Jurisdictions are incorporating local contexts into planning and policy development. It is the Manitoba context that informed the development of Manitoba Infrastructure's AT Policy and Planning Guide, and continues to direct its implementation.

Manitoba Infrastructure's AT Policy and Planning Guide was directed by extensive consultations across the department, involving staff experts in policy, planning, engineering, construction and maintenance/operations. As a result, the policy and planning guide directly supports Manitoba Infrastructure's AT-related decision-making processes, by focusing Manitoba Infrastructure's attention on locations with the highest AT demand, and further prioritizes these locations for AT safety solutions. With limited data and a limited budget, Manitoba Infrastructure' AT policy and planning guide demonstrates an innovative approach.

This paper summarizes the development process and outcomes of Manitoba Infrastructure's AT Policy and Planning Guide. First, the spectrum of AT users and the importance of AT is outlined, providing a foundation for the policy and planning guide. The various Manitoba interest groups with a stake in AT are then given, showing that AT is a shared interest. The paper then summarizes Manitoba Infrastructure's policy development process, which drew from the insights of internal staff. Manitoba Infrastructure's AT Policy and Planning Guide is then outlined, creating a basis for department decision making. Lastly, this paper introduces mapping resources for public use, which outline safety conditions on the provincial highway network.

2 Active Transportation Users

AT users represent a broad cross-section of the public, and, as a result, have varying needs and skill levels. This section provides an overview of AT user demographics considered in the development of the AT Policy and Planning Guide. Table 1 summarizes the various types of AT users (informed by Geller, 2006; and MTO, 2013). The type of user informs the appropriate type of facility constructed by the infrastructure provider, and the type of facility used by an AT user.

Table 1 - Active transportation users

Mode	Age and Ability	Comfort Level	Trip Type
• Pedestrians • Cyclists • Small wheeled users • Other AT users	• Adults • Children • Seniors • People with mobility challenges	• Daring and persistent • Determined and enthusiastic • Interested and cautious • Wary and inexperienced	• Utilitarian trips • Recreational trips • Touring trips

2.1 Mode

AT is typically defined as a non-motorized means of transportation. Pedestrians, cyclists, and small-wheel users are the dominant users considered in AT planning and design, yet additional types may be accommodated. Manitoba's seasons provide different AT possibilities; these conditions and users have unique needs. Various AT user types are listed below.

- **Pedestrians:** walkers, runners, hikers
- **Cyclists:** commuter bikers, mountain bikers, road bikers, recreational bikers
- **Small-wheel users:** stroller users, wheelchair users, in-line skaters, roller skaters, skateboarders, scooter users
- **Other AT users:** cross-country skiers, snowshoers, watercraft users

This policy focuses on pedestrians and cyclists, as this represents the primary AT modes; incorporating small-wheel users with pedestrian facilities is possible when appropriate design measures are taken, such as paved surfaces.

2.2 Age and Ability

The age and ability of an AT user influences the user's experience level, the distance the user will travel, and the types of facilities the user will seek out.

- **Adults** are more likely to travel longer distances for utilitarian, recreational and touring trips and their desired level of comfort or challenge influences their choice of AT facility.
- **Children, seniors, and people with mobility challenges** tend to travel shorter distances, which may be less than 1 km to over 5 km, for utilitarian (e.g. to school, a friend's home, or a grocery store) or recreational purposes. Low traffic volume roads, residential streets, or AT facilities with high separation from motor vehicles are needed, as physical abilities and judgement may be lacking. Snow clearing and other forms of maintenance are particularly important for these users, as they may rely on walkers, wheelchairs and strollers to reach their daily services and amenities – the lack of these facilities may create barriers.

AT users present a wide variety of speed, cognitive ability, comfort level and trip types that must all be considered by infrastructure providers.

2.3 Comfort Level

The comfort level of an AT user influences their willingness to accept risk when using AT, particularly their openness to using highways. For example, a daring and persistent pedestrian may walk along a narrow highway to reach a nearby municipality, while a wary and inexperienced pedestrian would not use this facility.

- **Daring and persistent:** these are determined AT users who prefer direct routes for travel efficiency, regardless of the corridor's safety for AT. These users also prefer paved surfaces, and they may use the highway travel lanes instead of gravel facilities. Daring and persistent AT users also may use high traffic volume and high speed corridors, due to a lack of alternative transportation options and corridors.

- **Determined and enthusiastic:** these are keen AT users who appreciate roads with lower traffic volumes and speeds, as well as designated AT facilities on high traffic volume and speed corridors. Determined and enthusiastic AT users may use higher traffic volume and speed corridors without AT facilities, if there are no alternatives or if the alternative is not sufficiently direct.
- **Interested and cautious:** these people are hesitant to use AT, and are particularly adverse to high traffic volumes and speeds. Low traffic volume and speed corridors or separated AT facilities are their preference, as comfort is most important to these users.
- **Wary and inexperienced**: these individuals are generally unlikely to use AT modes at all. Separated AT facilities, local streets, or collector streets will accommodate these users on occasions when they do use AT for recreational purposes.

Manitoba's highways are primarily used for AT by the daring and persistent. In addition, some determined and enthusiastic users will venture out onto the highway network. However, the interested and cautious users are less likely to feel comfortable on such facilities. It should be noted that if the goal is to increase AT uptake, the interested and cautious group represents the largest potential for increasing AT as a means of transportation. Safe, separated and paved AT facilities are likely to be used by the daring and persistent, determined and enthusiastic, and interested and cautious.

2.4 Trip Types

The purpose of a trip influences how the facility is used and its sufficiency for the user. For example, a touring cyclist may desire to use a highway shoulder because it is the most direct route; however, a recreational cyclist may prefer a meandering road with low traffic volumes and speeds.

- **Utilitarian trips** are for the purpose of arriving at a destination, and typically involve commuting to work or running errands. Route directness, with minimal restrictions (traffic signals or overcrowded facilities), is desired. AT facilities are generally appreciated for utilitarian trips, but a direct route without AT facilities may be chosen due to efficiency. AT users who travel for utilitarian purposes may rely on AT year-round, during the day time and night time.
- **Recreational trips** prioritize the quality of trip experience. Scenery, social interactions, comfort and enjoyment characterize these trips. Roadways with high traffic volumes and speeds are typically avoided. A recreational trip occurs over a period of one day or less.
- **Touring trips** are longer than one day or involve long-distance exercise trips. Trips typically cross regional or provincial boundaries, and may include one-way or circuit trips. Additional amenities, such as restaurants, resting facilities and accommodations support these multiday trips. Route directness and scenery are also important. Touring trips are the most likely to use highways for travel, regardless of alternative facilities. However, The Great Trail (a.k.a. Trans Canada Trail) is also used for multiday touring trips, when travel efficiency is not a priority. The chosen facility type is largely dependent on the users' age and ability, as well as comfort level.

All trip types may occur on Manitoba highways.

3 Why Active Transportation?

AT is an important transportation option for people of all ages, abilities and incomes. Improving AT options for commuting, healthy living, recreation and touring will provide benefits to society – cost-effectively maximizing these benefits requires a strategic approach by multiple interest groups.

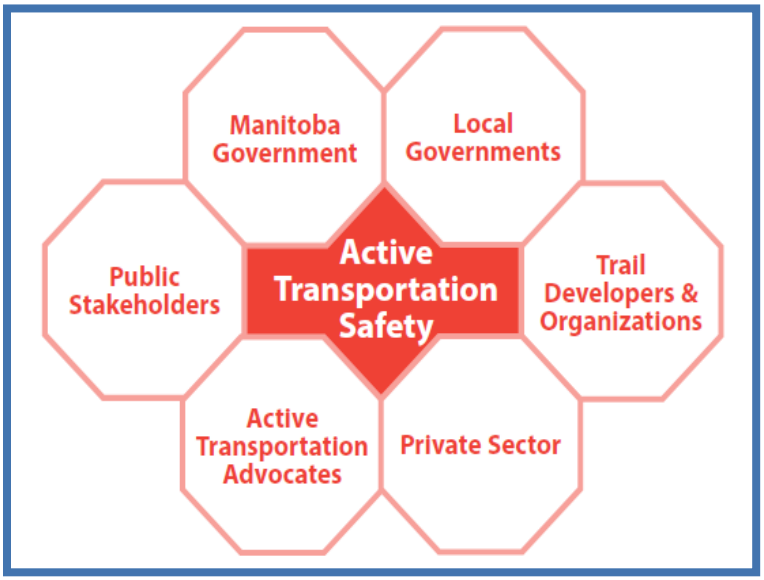
Table 2 – Active transportation benefits

Safety	AT users are particularly vulnerable to injury. It is a top priority to ensure the safety of all transportation system users.
Infrastructure	AT is a way to reduce congestion on roads and highways; thereby reducing wear-and-tear and extending the life of infrastructure
Accessibility	AT is a viable and accessible transportation option for all Manitobans, especially those that do not have direct access to a personal motor vehicle.
Healthy Lifestyles	Financially, the health-related benefits of AT outweigh the exposure to injury and pollution by approximately 12 times (based on a daily commute of 5 kilometres) (Rable and Nazelle, 2012).
Environment	AT, as an alternative to passenger vehicles, emits no harmful emissions and consumes very little energy.

4 Active Transportation Safety is a Shared Responsibility

Supporting and promoting AT as a safe, viable and healthy mode of transportation involves multiple sectors, jurisdictions and interest groups, as shown in Figure 1. Collaboration and coordination among these various groups is critical to safely and effectively facilitating AT.

Figure 1 – Active transportation safety is a shared responsibility



Manitoba Government: In addition to Manitoba Infrastructure, numerous provincial departments and agencies have a role in facilitating AT in Manitoba, including: Manitoba Public Insurance; Manitoba Municipal Relations; Manitoba Sustainable Development; Manitoba Health, Seniors and Active Living; Manitoba Education and Training; Manitoba Indigenous and Northern Relations; and Manitoba Intergovernmental Affairs. AT resources provided by the Manitoba Government include the *Active Transportation Planning Guide for Manitoba Municipalities* (Manitoba Government 2016), and the *Guidelines for the Construction of Recreational Trails on or in Proximity to a Departmental Road* (Manitoba Government, 2002).

Local Governments: Most AT trips are short (i.e. less than 5 km), primarily local in nature and concentrated in urban areas, making municipalities best placed to plan, develop and operate AT facilities and networks in local areas.

Trail Developers and Organizations: Numerous organizations within Manitoba plan develop and operate trails for recreational use. To ensure safe, enjoyable trail experiences, trail developers should make efforts to develop facilities that provide separation from motor vehicles, wherever practical.

Private Sector: The private sector also has a role in partnering with trail developers and governments. These partnerships have the potential to improve the experiences of AT users by supporting trail development and operation, and ensuring appropriate goods and services are available to AT users.

Active Transportation Advocacy Groups: Collaboration with AT advocacy groups can result in valuable partnerships to identify priorities and promote safe practices for all users.

Public Stakeholders: AT is a transportation option for people of all ages, abilities and incomes. The public has an important role in ensuring their own safety by seeking out the necessary information on AT facility conditions in order to make good route planning decisions.

5 Policy and Planning Guide Development Methodology

Over the policy development process, the Transportation Systems Planning and Development Branch consulted extensively across the department, involving staff experts in policy, planning, engineering, construction and maintenance/operations. The goal of the consultative strategy was to identify the range of AT related departmental practices, decision-making processes and concerns of staff in their daily practices.

A daylong workshop initiated the consultation process. It was the first time that all transportation opinion leaders from across the department sat down together to develop a shared understanding of how AT affects peoples' lives in Manitoba, and the work of Manitoba Infrastructure. The workshop developed a shared perspective on AT and a framework emerged to advance the policy.

Over the next year, the Transportation Systems Planning and Development Branch consulted the department with focused group meetings, one-on-one interviews and site visits across each region in the province. Each region had unique perspectives related to AT based on local conditions. A few key themes emerged:

- AT use on highways is a safety concern, though not in all locations.

- There is incomplete information on the prevalence of AT across the provincial highway network.
- Manitoba Infrastructure currently invests funds in AT; however this investment is inconsistently applied across Manitoba.
- All practice areas of the department are impacted by AT in different ways. A one-size-fits-all policy will be ineffective.
- A simple decision-making tool would enable consistent practices.

The department was clear on what was needed: **policy and guidance that provides a consistent, transparent and strategic framework for considering active transportation in Manitoba Infrastructure's capital construction, maintenance and stewardship practices in locations with the highest active transportation demands**. The result of the consultation process was the AT Policy and Planning Guide, which is a tool to support departmental decision-making during operational, maintenance and stewardship practices.

6 Manitoba's Active Transportation Policy

The overall AT policy is that MI will:

- reasonably improve AT safety and usability when capital projects correspond to areas with high AT demand, based on level of risk and cost benefit analysis
- partner with local governments and/or trail organizations to facilitate development of AT facilities

7 Active Transportation Planning Guide

The following sections provide a standardized three-step approach to guide MI decision-making related to AT users, as outlined in Figure 2. The approach includes considering the AT demand, assessing the level of priority and identifying an appropriate solution.

Figure 2 – Active transportation planning guide process

7.1 Step 1: Review Manitoba Active Transportation Trigger Map Review

The majority of the highway network sees little cycling and pedestrian traffic. Observation reveals that AT activity is prevalent in specific locations. The highest active transportation use along highways is in the vicinity of First Nation communities, urban areas, recreational areas (including parks, campgrounds, cottage communities, and other recreational services and amenities), and trail networks (including The Great Trail).

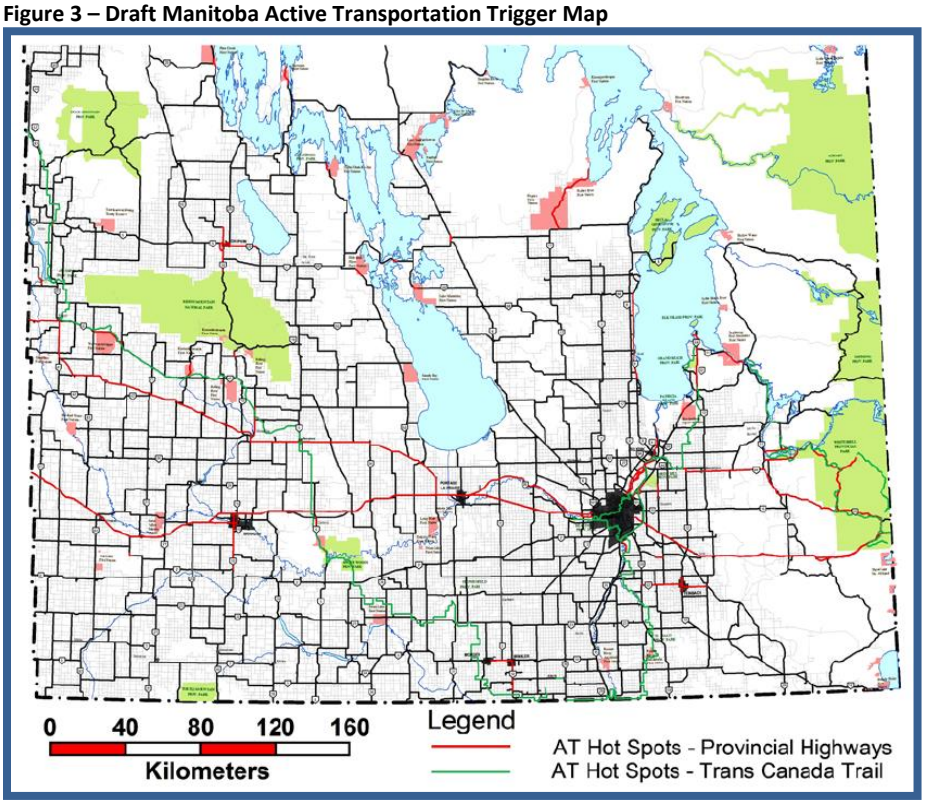
To support planning, the department developed a map of known AT hot spots, entitled Manitoba Active Transportation Trigger Map (see Figure 3), intended as a starting point for departmental decision-making on AT. If a Manitoba Infrastructure capital, maintenance or stewardship practice corresponds to ahot spot, a consistent and appropriate departmental response is triggered.

The Manitoba Active Transportation Trigger Map indicates the location of AT hot spots based on:

- observations from field staff
- locations of existing AT facilities
- locations with high AT collision frequency
- municipal/community development plans
- proximity to potentially high-use areas
- structures in urban areas

The Manitoba Active Transportation Trigger Map is currently based on anecdotal information. Manitoba Infrastructure is developing a data collection strategy to inform future revisions of the map.

Figure 3 – Draft Manitoba Active Transportation Trigger Map

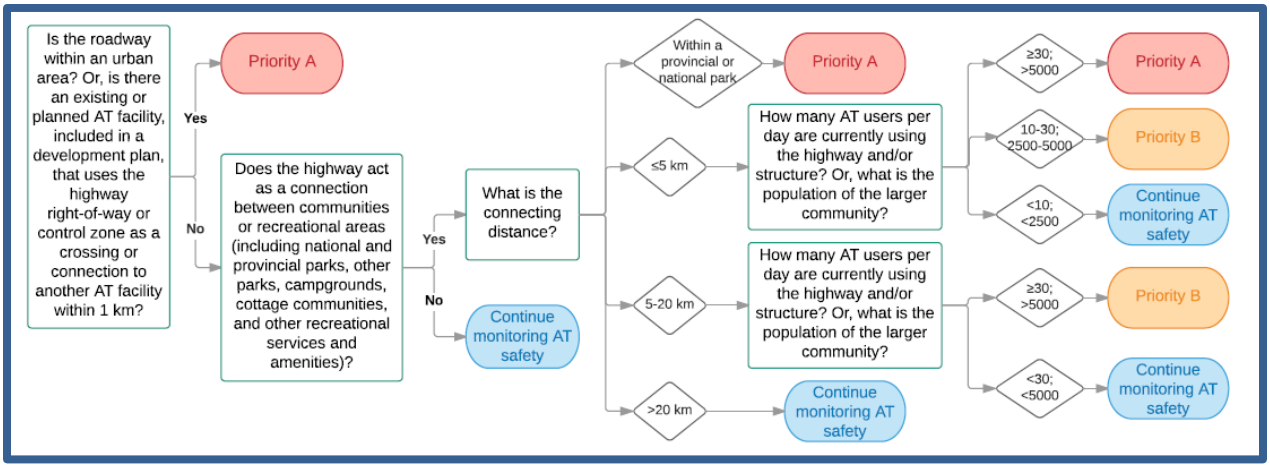


7.2 Step 2: Active Transportation Corridor Priority

When a capital, maintenance or stewardship practice is in a location triggered as an AT hot spot, the department can further assess the priority of a treatment response based on level of risk. Hot spot areas with higher risks to AT safety are classified as Priority A and areas with lower risks to AT safety are classified as Priority B. A decision-tree (see Figure 4) depicts the risk-assessment process. AT demand and local conditions determine the level of risk. In summary:

- Priority A corridors have higher AT use or are connected to communities or recreational areas with higher populations, which are likely to generate relatively high volumes of AT traffic. Priority A corridors typically correspond to a connection distance of 5 km or less, which means these corridors are likely to be used by children, seniors and people with mobility challenges.
- Priority B corridors have lower AT use or are connected to communities or recreational areas with lower populations, which are likely to generate relatively moderate AT traffic. Priority B corridors typically correspond to a connection distance of 5 to 20 km, which means these corridors are likely to be used predominantly by adults, due to the longer connecting distance.
- Non-priority corridors have no significant AT use, but may be monitored if it is anticipated that AT use may increase in the future.

Figure 4 – Identifying active transportation priority based on level of risk



7.3 Step 3: Active Transportation Solutions

When a departmental project is in an AT hot spot and is Priority A or Priority B, the department considers actions to improve AT safety, as a part of the project. The department considers available funding, potential partnerships and cost-benefit. Table 3 provides suggested solutions to consider as a part of the project.

Table 3 – Active transportation solutions for operators' consideration

Project Type	Solutions for operators' consideration (based on cost-benefit)
Roadway	• Providing right-of-way for a separated facility • Paving shoulders • Reducing/eliminating chip seals on shoulders
Structures	• Supporting a lighted designated AT structure (not under the jurisdiction of MI) • Constructing lighted AT facilities on both sides of MI structure • Constructing lighted AT facility on one side, with an increased shy distance on the other side, of MI structure • Increasing shy distances on both sides of MI structure
Intersections	• Installing crosswalks and signals • Supporting the development of AT overpass, where reasonable
Roadway or structure project that conflicts with an existing AT facility or creates an increased barrier to AT	• Relocating AT facilities • Improving AT crossings of highway
Maintenance	• Increasing shoulder sweeping frequency • Increasing snow clearing priority

By following this three-step process, Manitoba Infrastructure is able to make consistent AT-related decisions everyday, while focusing resources in those locations with the highest AT demands. The policy response considers a range of practices within design, construction, operation, maintenance, funding, liability and stewardship.

8 Public Active Transportation Route Planning Maps

As a component of the AT Policy and Planning Guide, Manitoba Infrastructure is providing safety information and maps on the Manitoba 511 website to inform AT users, traveling at an interregional and interprovincial scale. While the Manitoba Government, local governments, trail developers and organizations, and the private sector have a role in providing infrastructure, the public has a role in choosing appropriate facilities and routes for their mode of choice, age and ability, comfort level and trip purpose.

Figure 5 - Draft safety information provided to active transportation users on the Manitoba 511 websiteFigure 5 outlines the information given to the public, as an introduction to the maps. AT users are first encouraged to review alternatives to highways, including trails and municipal roads. If provincial highways are required for trips, AT users are then encouraged to choose routes with lower speeds, lower traffic volumes, paved shoulders and minimum constrained sections (e.g. narrow bridges). Maps outlining these conditions to the public are provided on the Manitoba 511 website. These maps are intended to aid AT users in their route selection process, and improve highway safety for all road users.

Figure 5 - Draft safety information provided to active transportation users on the Manitoba 511 website

Safety for Cyclists and Pedestrians on Manitoba Highways

Although it is legal to do so, cycling and walking are not recommended on the provincial highway network due to high speed and high volumes of traffic, including large trucks. Cyclists and pedestrians are particularly vulnerable when involved in collisions with motor vehicles. The use of designated cycling and walking facilities, such as sidewalks and trails, or low traffic volume and low speed roads, are recommended for cyclist and pedestrian use.

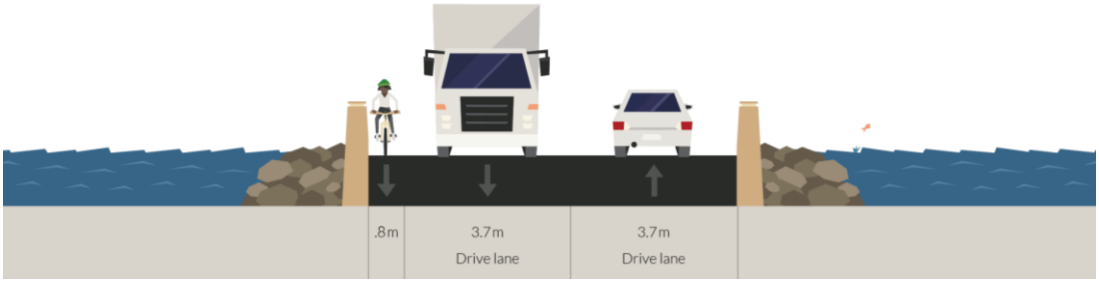
However, it is recognized that cycling and walking are beneficial to the health and wellbeing of people and the environment. Furthermore, it is recognized that alternative cycling and walking facilities may not be available to provide connections for cyclists and pedestrians. As a result, cyclists and pedestrians often choose to use provincial highways.

The maps provided herein are intended to improve the safety awareness of cyclists and pedestrians who choose to use the provincial highway network and to aid in their decisions with respect to planning and selecting a route.

The Trans Canada Trail and other trails are separated trails. In some cases, the trail may run adjacent to a provincial highway; however, in these instances there will be a separated trail either in the ditch or on the backslopes of the highway. Where trails cross the highway, please ensure it is safe to cross before proceeding.

Please note that the following conditions increase the vulnerability of cyclists and pedestrians to collisions with motor vehicles and should be considered when planning and selecting a route:

- Most provincial highways operate at posted speeds between approximately 90 and 110 km/h; at these high speeds, cyclists and pedestrians are even more vulnerable in the case of a collision. In such cases, reaction times are reduced and collision impacts are more severe.
- Highways with higher traffic volumes present a greater risk to cyclists and pedestrians than highways with low traffic volumes. Note that the traffic volumes shown on the maps are daily averages – the actual traffic volume at a given time may vary significantly throughout the day, week, or year. For example, certain highways have the highest traffic volumes on weekends in the summer, while lower traffic volumes occur in the winter on a weekday. A highway traffic volume of more than 3000 vehicles per day translates to at least two vehicles per minute. However, during peak seasons and times (for example, beach traffic on a summer Sunday afternoon), vehicles per minute could increase considerably.
- Paved shoulders provide space for cyclists and pedestrians, while allowing motor vehicles to pass; however, paved shoulders do not protect cyclists and pedestrians from errant vehicles and the natural swaying of large trucks. For cycling and walking, paved shoulders greater than 1.2 m are preferable to narrower shoulders.
- Cyclists and pedestrians should be aware of traffic and shoulder conditions on constrained bridges and structures. Constrained structures include bridges, overpasses, and other structures that have a shoulder of less than 1.2 m and do not have a sidewalk. On constrained structures, there is no safe refuge for cyclists and pedestrians, creating additional risk for all highway users (see image below).



Constrained bridge – shoulders are from 0 m to 1.1 m, and do not provide a refuge for cyclists or pedestrians.

- Visit Manitoba 511 (http://manitoba511.ca/en/) to identify other conditions that impact cyclists and pedestrians' safety, such as weather and construction activity
- **Although steps were taken to ensure the accuracy of these maps, not all conditions are reflected. In the case a discrepancy is found, please contact Manitoba 511.**

9 Conclusion

This paper provides an innovative example for other jurisdictions on how highway operators can incorporate pedestrians and cyclists in their planning processes and improve AT safety, with limited data and budgets.

Manitoba Infrastructure's AT policy and planning guide informs AT-related decision-making processes by:

- focusing Manitoba Infrastructure's attention on locations with the highest AT demand, through the use of the Manitoba Active Transportation Trigger Map
- prioritizing these locations for AT safety solutions
- outlining solutions for improving safety
- informing the public about safety considerations on provincial highways

The policy and planning development process demonstrates the importance of developing policies and planning tools for AT in collaboration with operational field staff, as operational field staff are directly impacted by AT uses and are some of the first people to observe the success or failure of a decision.

Going forward, Manitoba Infrastructure will focus on releasing the maps to inform safe cycling and walking route planning, developing a data collection strategy, engaging additional stakeholders and updating applicable internal documents. The AT Policy and Planning Guide is a working document – adjustments are expected throughout the implementation process, and as government priorities evolve.

The role of provincial highways departments in active transportation is developing across Canada. Each jurisdiction faces a different set of risks and local contexts that make public policy development a complex task. The common theme for all is the importance of ensuring public safety for all road users.

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11 Tables

12 Figures

Figure 3 – Draft Manitoba Active Transportation Trigger Map