

FINAL REPORT

Manitoba Intelligent Transportation Systems Strategic Plan

NOVEMBER 2003



INTRODUCTION

Manitoba's transportation network has seen greater demands on its infrastructure and operations over the last few years. These demands have intensified with developments that have impacted the provincial economy, such as the North America Free Trade Agreement, the rationalization of the railway network, ongoing changes in the economy, an increasing dependence on the U.S. market, and ongoing foreign trade.

The safe and efficient flow of passengers and freight within and across jurisdictions is highly dependent on the infrastructure, and the use of available technologies, and Manitoba is critical to the Canadian economy due to its strategic geographic location. Therefore, it is important for the province to have a seamless and accessible multi-modal transportation network.

The economy is centralized in the Capital region with over half of Manitoba's population residing in Winnipeg. Conversely, other areas of the Province are, in general, highly rural in nature and sparsely populated, characterized by an agricultural focus. Accordingly, many Provincial corridors carry relatively low traffic volumes. In Winnipeg, the overall road network is arterial-based. Across the province, roadway operation and maintenance budgets are being stretched in an effort to provide on-going management of the road conditions in a demanding climate.

The trucking industry is a major component of the economy and must remain competitive. Trucking accounts for nearly 90 percent of value-related land trade to and from Manitoba across the Manitoba-U.S. border. The Emerson-Pembina crossing is one of the three major border crossings on the western Canada-U.S. border. Tourism is also an important sector of Manitoba's economy.

Whereas the traditional development of transportation infrastructure focuses on physical infrastructure, there is an increasingly prominent role for information technology, including wireless communication and global positioning systems (GPS). It is recognized within the transportation industry that the application of Intelligent Transportation Systems (ITS) provides the opportunity to use advanced technologies to leverage the existing infrastructure to maximize safety and mobility. In the context of transportation in Manitoba, these ITS benefits would translate into:

- Improved timeliness and accuracy of transportation related data;
- Improved mobility for commercial vehicles within the region, across the U.S. border and within inter-modal transfer facilities;
- Improved road user safety, with a particular emphasis on early warning of inclement weather conditions, and potentially hazardous road conditions;
- Improved accessibility for tourism/recreational areas;
- Improved movement for general traffic, transit and emergency services vehicles in urban areas;
- Improved security and mobility at border crossings; and
- Enhancement of the overall economic prosperity of the province.

"Many recent transportation innovations involve ITS, a new and exciting field, where information processing, communication systems and sensing devices are combined and integrated in creative ways to make the transportation system work more effectively. Electronic tolling, transit smart cards, and centralized traffic management are examples of ITS in action."

- Transport Canada

PARTICIPATION

The Strategic Planning effort was led by a Project Steering Committee that included all divisions within Manitoba Transportation and Government Services.

The ITS strategic planning process employed in this project was founded on a “user needs based approach” that yields a practical and viable plan based on a solid understanding of the stakeholder needs, and the ability to effectively map them to the ITS solutions. A cornerstone of the project was an effective stakeholder consultation initiated at the outset of the Needs Assessment, and maintained through the identification of strategic projects in the Deployment Planning exercise.

The stakeholder consultation process included:

Website - A project web-site was created and maintained throughout the duration of the project to provide access to study background material relating to purpose and specific objectives;

Stakeholder Survey - Each stakeholder was requested to print and complete a questionnaire subsequent to reviewing the background information provided on the website. The survey format was structured to solicit information from each stakeholder on: mandate, roles, and responsibilities; potential linkages/connectivity that could form the basis for partnerships; ITS applications/initiatives that are currently being utilized or considered; operating needs including those that could potentially be addressed by ITS; and underlying funding and revenue generation opportunities.

User Services Workshop – The first of two workshops, attended by over 40 stakeholders, was used to establish and validate the user needs. A brainstorming and discussion session was undertaken to refine and augment the User Needs list. In addition, the stakeholders participated in a User Service prioritization exercise; and a breakout session to develop strategies and candidate projects for each of the key User Service bundles.

Deployment Workshop – The second workshop, attended by over 30 stakeholders, was undertaken to provide stakeholder input in defining and prioritizing deployment activities as input into the Deployment Program.

It should be recognized that it is intended that the stakeholder group will provide an ongoing role in realizing the project objectives.

NEEDS

Stakeholders who participated in the project identified 13 transportation needs that could be addressed through the implementation of ITS. The needs are:

Identified Transportation Needs	
Need	Description
1	Reduce collisions during adverse weather and/or road surface conditions
2	Reduce response times to hazardous materials spills
3	Improve traffic control and monitoring in Winnipeg
4	Improve incident notification and response in Winnipeg
5	Improve security and expedite border crossing inspection and clearance for commercial vehicles
6	Provide an improved system for the application of seasonal weight limits
7	Improve traveller information in rural areas
8	Reduce response time for incidents in Manitoba
9	Provide more convenient transit service
10	Improve efficiency of the permitting process
11	Reduce wildlife-vehicle collisions
12	Improve efficiency of truck inspection stations and roadside checks
13	More efficient data capture for the roadway system management



VISION

In developing the strategic plan, it is important to first set out an ITS vision for the next ten years...

“Over the coming ten years, technology performs a key role in improving the performance of transportation systems in the Province of Manitoba. Information technology is a driving force behind how people get to work, do business, and sell and transport goods.

Travel in rural Manitoba will be less troublesome. Systems will be in place to help drivers avoid adverse weather and road conditions, and wildlife collisions. All across the Province of Manitoba, road and weather information systems will collect real-time data on current conditions. The information will be made available to travellers through advance warning systems, and traveller information systems. In addition, road maintenance crews will use the timely information to efficiently maintain the road conditions at a safe level.

Despite the widespread deployment of safety systems, incidents will still occur, but in far fewer numbers. When an incident does occur, emergency services will automatically be contacted regarding the location of the incident. Emergency vehicle drivers will be able to select the fastest route to the incident site based upon real-time travel information.

Commerce will thrive in Province of Manitoba. Commercial vehicles will be able to apply for and pay for permits and tariffs electronically for travel within the Province and at all Manitoba-US border crossings. Security at the borders will also be improved, through the use of radio frequency identification tags for vehicles and smart cards, combined with biometric systems for driver identification. Electronic roadside inspection points check the condition of all commercial vehicles on major road facilities. They perform weigh-in-motion, and receive an electronic report from the commercial vehicle's operating system on the status of key systems.

The traffic management system in Winnipeg will continue to develop, providing more sophisticated traffic control, and incident management. These systems will provide critical information to support emergency response plans. With the availability of real-time traffic and operations data, personalized traveller information services will provide information on the best route and the estimated travel time.

The cities of Brandon and Winnipeg will join forces to implement sophisticated public transit systems. Transit riders will be able to determine precisely when the next transit vehicle will arrive. The improved service helps promote public transit as a viable alternative for commuters and recreational travellers. Electronic payment will also be a boon to public transit travel.

“ITS innovations can also promote the safety and security of the transportation system, relieve congestion and improve mobility, enhance economic productivity, reduce costs, and minimize the negative environmental impacts related to transportation”
- Transport Canada

USER SERVICES

In consideration of the input from the Needs Assessment, the proposed ITS solutions were based on the Canadian Architecture for Intelligent Transportation Systems. The User Services are suites of ITS approaches and technologies that define the needs that they address. They are grouped into eight User Service “bundles”. The following is a description of each User Service Bundle (in bold), with highlights of the sixteen User Services (in italics) determined to be most applicable to Manitoba.



Traveller Information Services consist of services designed to use advanced systems and technologies to manage information to help drivers decide when to drive and the route to drive, as well as opportunities to reserve rides and other traveller services. For the province, *Traveller Information* systems are applicable.

Traffic Management Services consist of advanced systems and technologies to improve the efficiency and operation of the existing surface transportation infrastructure and create safer conditions for travellers. Included in this bundle are *Traffic Control, Incident Management, Environmental Conditions Management, Operations and Maintenance, and Automated Dynamic Warning and Enforcement*.

Public Transport Services relate to services for urban, suburban and rural transit in fixed route, route deviation and demand-responsive modes and operated by bus, heavy rail, light rail, commuter rail and van or carpool or shared ride taxi. The most applicable User Service in this bundle is *Public Transport Management*.

Electronic Payment Services provide travellers with a common electronic payment medium for all transportation modes and services. The User Service identified as relevant to the province is *Electronic Payment Services*.

Commercial Vehicle Operations addresses freight movement and focuses on services which improve private sector fleet management and freight mobility, and which streamline government/regulatory functions. *Commercial Vehicle Electronic Clearance, Automated Roadside Safety Inspection, and Commercial Fleet Management* have potential applications in Manitoba.

Emergency Management Services contain user services that relate directly to the detection, notification and response to emergency and non-emergency incidents that take place on or adjacent to the roadway. *Emergency Vehicle Management* is particularly relevant to the province.

Vehicle Safety and Control Systems relate to the use of sensors in vehicles and roadways to diminish both the number and severity of collisions. *Infrastructure-Based Collision Avoidance* was considered to be important for Manitoba.

Information Warehousing Services include the gathering, fusion, and dissemination of weather and environmental data. It also includes the archiving and sharing of historical transportation data. *Weather and Environmental Data Management, and Archived Data Management*, has potential applications for the province.

This listing is not intended to be exclusive, and sub-services from other User Service areas could emerge as being relevant over time.

STRATEGIC ACTIONS TO RESOLVE BARRIERS

There are a number of actions to resolve barriers to the deployment of ITS in Manitoba:

- Work with the University of Manitoba, University of Winnipeg, Brandon University and community colleges to promote programs that emphasize skills appropriate for ITS. Foster co-op placements in IT and ITS programs to develop practical skill sets;
- Expand existing ITS partnership opportunities with the post-secondary institutions to draw on highly qualified people in academia and build upon the many advantages of “in-kind” resources from these entities;
- Convene Regional coordination meetings within the Province to facilitate the use of ITS;
- Educate purchasing agencies within the public sector owner/operators on the nature of the systems procurement process, and the distinguishing features relative to the conventional construction process;
- Pursue joint procurement by public agencies within the Province in order to employ common equipment specifications, and take advantage of economies of scale, e.g., Winnipeg and Manitoba Transportation and Government Services, Winnipeg and Brandon Transit, etc.;
- Promote greater involvement of Manitoba Transportation and Government Services staff with the National ARWIS working group;
- Continue to actively represent Manitoba’s interest within partnership initiatives such as the ITS/CVO Plan for the North America International Trade Corridor;
- Identify lead agencies, or joint ventures among peer agencies in order to take the initiative on multi-party, back office applications, such as that required for data warehousing/archiving and potentially electronic payment;
- Extend networking opportunities with neighbouring State and Provincial staff to evaluate potential partnering opportunities and build upon ITS initiatives undertaken in other jurisdictions. Traveller information and active seasonal weight limits are key ITS examples of initiatives that would span across jurisdictional boundaries.
- Identify and engage champions from the tourism and automobile industry associations (e.g., CAA membership services) and Provincial Ministry of Tourism in order to help realize opportunities with traveller information services; and
- Initiate early discussions regarding potential “early winner” projects, which could be candidates for consideration under Transport Canada’s Intelligent Transportation Systems (ITS) Deployment and Integration Plan, and Research Program.



STRATEGIC PROJECTS

The stakeholder consultation process produced 12 ITS Strategic Projects. The projects have been separated into two categories: high priority, and secondary priority:

High Priority

TI-1 Traveller Information System for Highway 75 and Highway 1

Provide real-time information on road/weather conditions and incident delays on Highway #75 between Winnipeg and Fargo, North Dakota, and Highway #1 between Winnipeg and Regina, Saskatchewan.

Estimated Cost: \$600,000 to \$1.2 million

TM-1 Traffic Signal System in Winnipeg

Expand current program to upgrade traffic signal controllers and vehicle detection, to optimize traffic operations in key areas of the city.

Estimated Cost: \$1.5 to \$3.0 million

TM-2 Manitoba ARWIS Program

Implement pilot project to install four Advanced Road and Weather Information System stations in the Winnipeg area.

Estimated Cost: \$250,000 to \$300,000

TM-3 Emergency Vehicle Pre-emption in Winnipeg

Implement Emergency Vehicle Priority in key areas of the city, in conjunction with the traffic signal system upgrade project.

Estimated Cost: \$300,000 for 40 intersections

CV-1 Expansion of Commercial Vehicle Enforcement (WIM and AVC)

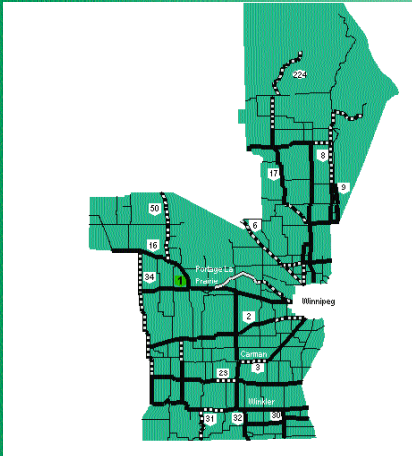
Assess the ability to use existing Weigh-in-Motion (WIM) stations, and Automatic Vehicle Classifiers (AVC), along with existing databases, and GPS on commercial vehicles, as a foundation to expand enforcement programs.

Estimated Cost: \$100,000 for study, and \$300,000 for integration

CV-2 On-Line Commercial Vehicle Credentials and Reporting

Support regional and corridor initiatives through the creation of a "one stop" central processing centre to receive, process and provide permits for the Province.

Estimated Cost: \$80,000 for study, and \$250,000 for deployment



STRATEGIC PROJECTS

IW-1 Automated Data Capture for Incident Reporting and Offences

Implement the Traffic Related Data Strategy (TREDS) system to provide an integrated database, and electronic forms for preparing collision reports, commercial vehicle inspections, offence notices, and impaired driving reports.

Estimated Cost: \$1.0 million

Secondary Priority

TM-4 Active Seasonal Roadway Weight Limits

Implement a dynamic system to identify seasonal weight limits for commercial vehicles based on the use of different technologies to monitor and forecast road surface conditions.

Estimated Cost: \$100,000 to \$200,000

TM-5 Work Zone Traffic Management

Develop a standardized package of ITS components, such as portable Dynamic Message Signs (DMS) and portable Highway Advisory Radio (HAR) transmitters, for work zone traffic management. This standard package will be available to be redeployed at different construction sites.

Estimated Cost: \$300,000 to \$500,000

PT-1 Transit Vehicle Management and Real-Time Schedule Information in Winnipeg

Assess the feasibility of implementing Automatic Vehicle Location (AVL) using GPS technology, along with Mobile Data Terminals, to provide improved transit vehicle management, and real-time schedule information.

Estimated Cost: \$300,000 to \$500,000 for pilot project, and \$2 million to \$4 million for full deployment

EP-1 Electronic Transit Fare Collection

Assess the feasibility of implementing Smart Card transit fare collection for Winnipeg Transit and Brandon Transit.

Estimated Cost: \$6.5 to \$7.0 million

VSC-1 Expansion of Active Advance Warning System

Deploy additional Active Advance Warning (AAW) devices at intersections and blind corners in rural Manitoba where collisions occur.

Estimated Cost: \$30,000 per intersection



STRATEGIC PROGRAM MANAGEMENT

The goal of the Action Plan for Ongoing Evaluation is to design a framework for the stewardship of the overall Manitoba ITS Strategic Plan.

The specific tasks include the:

- Establishment of a project tracking process;
- Provision of a resource group to make suggestions if a project is encountering difficulties; and
- Dissemination of information on the ITS activities to stakeholders in the Province of Manitoba.

The tools to be used to oversee the Action Plan include:

Establishment of a permanent Manitoba ITS Steering Committee

In order to maintain momentum and focus on the implementation of the Strategic Plan, it is extremely important to establish a permanent ITS Steering Committee. The members should meet via conference calls to discuss events which impact the plan, review the schedule, and review the project status reports.

On-going Engagement of Stakeholders

It is important to continue the stakeholder consultation efforts initiated through this project. The ITS stakeholder list should be used to disseminate information resulting from ITS Steering Committee meetings, project progress reports, and plan updates. The Manitoba ITS Website should be maintained as a means of providing a central contact point to post announcements, and seek input.

Strategic Project Evaluation

It is envisioned that the Manitoba ITS Strategic Plan be evaluated through collection of relevant “before” data, annual reviews of project progress, and a formal five-year update. The three components are outlined below:

Collection of “Before” Data

The Strategic Plan identifies general performance criteria for each User Service for future evaluation purposes. These criteria were carried forward and mapped against the strategic projects to provide a basis to determine data collection needs, specifically, the “before” data requirements.

Annual Review

As the implementation plan is built upon a start date of 2004, it is recommended that a yearly review of project progress be undertaken to identify deviations from the original scope or time frames. To assist in the timely and consistent review of the project progress by each lead jurisdiction, a common template should be developed.

STRATEGIC PROGRAM MANAGEMENT

Plan Update (Five Year Review)

It is recommended that a five year review of the Plan be undertaken to ensure that the Plan is a “living document” reflects the Province’s current needs, opportunities and objects, as they relate to ITS services. It is anticipated that the ITS Steering Committee would undertake a five year review of the plan, the scope of which would be determined at the time of its commissioning.