



Intelligent Transportation Systems (ITS) Strategic Plan

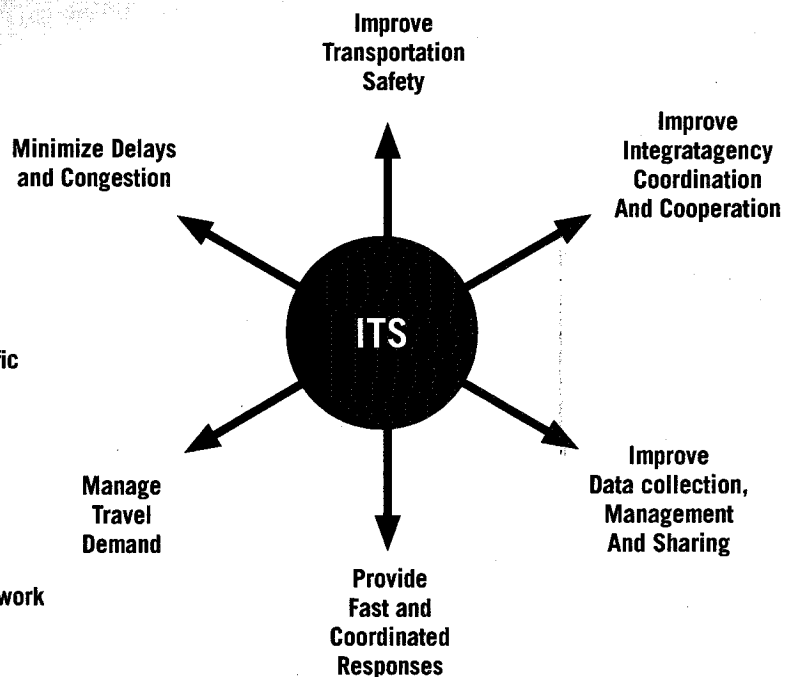
Executive Summary



Introduction

Intelligent Transportation System (ITS) technologies provide a tool to monitor traffic conditions, manage traffic flow, manage congestion, and provide alternate route information to travellers resulting in saved lives, time and money.

This ITS Strategic Plan provides the framework for using technology to help manage congestion, for the next 10 years.





Intelligent Transportation Systems (ITS) Strategic Plan

Executive Summary

Creating a Plan

ITS strategic plans identify opportunities and associated deployment plans that take into consideration the input of relevant stakeholders. The ITS Strategic Plan for York Region is consistent in terms of scope and outcome with other efforts across Canada and worldwide. The basic approach in developing ITS strategic plans, and applied to the Region of York needs, is to:

1. Establish a coalition of interested and impacted stakeholders;
2. Identify surface transportation needs and conduct opportunities analysis to address those needs;
3. Develop an ITS Architecture, defining functionality and interfaces between key technologies and systems; and
4. Define a deployment program that phases implementation over a realistic timeframe.

Coalition Building



The overall objectives of the coalition building plan were: to identify and contact key stakeholders for participation in the study; to ensure that the Region has up-to-date ITS inventory information; and to collect information from a variety of stakeholders to assess the needs for ITS on a Region-wide basis. At the beginning of the project, stakeholders were contacted to complete a stakeholder questionnaire. In addition, two workshops were held to address specific aspects of the strategic plan: a user needs stakeholder workshop was conducted on September 8, 2006 and an ITS Architecture workshop was held on December 13, 2006. Exhibit 1 lists the stakeholders who provided input to the strategic plan, through completing the stakeholder questionnaire, participating in interviews, and/or participating in the stakeholder workshops.

INTERNAL AGENCIES

- Transportation and Works
- Planning & Development Services
- Information Technology
- York Region Transit
- York Region Police
- Emergency Medical Services
- York Region Rapid Transit Corporation
- Central York Fire Department
- City of Vaughan
- Town of Richmond Hill
- Town of Markham

EXTERNAL AGENCIES

- Ministry of Transportation, Ontario (MTO)
- City of Toronto
- Toronto Transit Commission
- Durham Region
- Peel Region
- City of Brampton
- City of Mississauga
- GO Transit
- 407 ETR
- Greater Toronto Airports Authority
- CN Rail
- Smart Commute 404-7

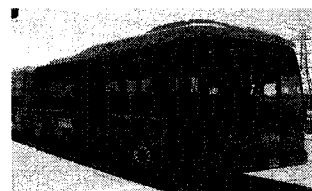
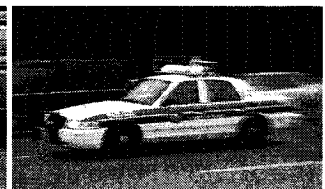
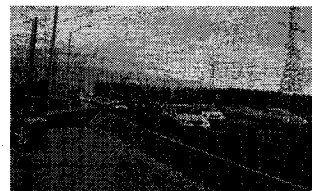


Intelligent Transportation Systems (ITS) Strategic Plan Executive Summary

Needs Identification

Based on a review of key documents, including but not limited to the York Region Transportation Master Plan and the York Region Traffic Control Signal System Evaluation, and supplemented by stakeholder input, Exhibit 2 presents the identified transportation needs.

NEED	DESCRIPTION
1	Better management of planned road disruptions
2	Better enforcement of traffic regulations
3	Improved transportation system safety
4	Improved availability of real-time traveller information
5	More real-time transportation systems data
6	Increased travel demand management
7	Improved incident management and response
8	Improved management of Region transportation fleet assets via technology
9	Transit service coordination with other agencies
10	Improved transit security





Architecture Development

The development of an ITS architecture for York Region, based on the Canadian ITS architecture, provides a unified framework to guide the co-ordinated deployment of ITS programs within the public and private sectors. Now that the York Region ITS architecture has been established, it can be used in the future to describe the physical components, the data flows within and between systems, and to help establish the requirements for any new systems, as shown in Exhibit 3.

- Arterial and freeway traffic management and control: Signal systems that adapt to conditions on the road and provide priority to transit vehicles so as to minimize person-delay. Incidents are identified automatically and in a timely manner thus reducing response times;
- Improved response to incidents: Emergency services that respond to incident calls using real-time travel information and vehicle-based dynamic route guidance, hazardous material information included in the incident alerts, traffic management systems that implement traffic plans to clear the route of traffic;
- Personalized and advanced traveller information services: systems to provide information on the best route and estimated travel time, available through various media and portable devices; and
- Transit management systems: Transit service that operates safely, efficiently and effectively through the application of smart technologies, providing a high level of service to customers including access to traveller information at home, en route and at work, electronic payment tools and integration of transit services.

Example Market Package: APTS1 Transit Vehicle Tracking

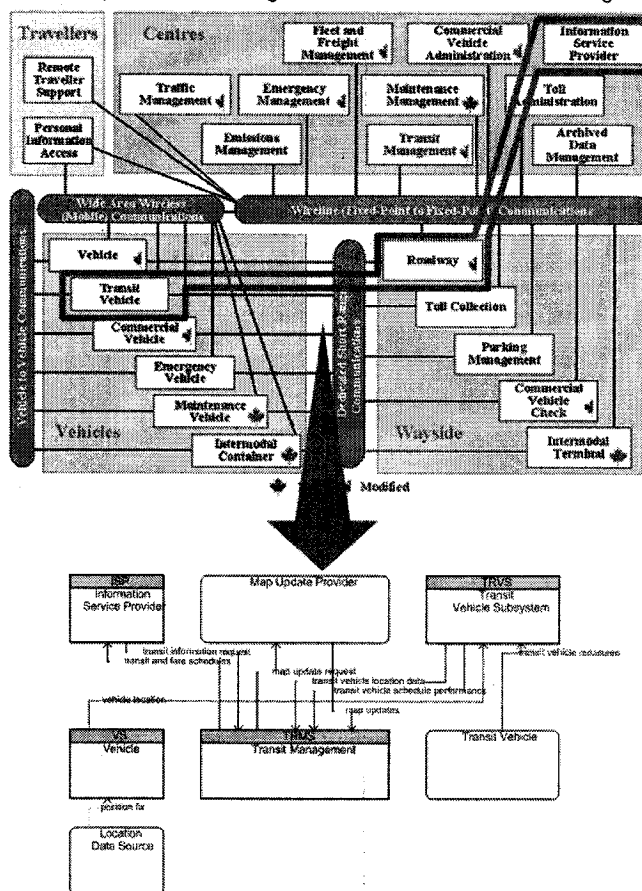


Exhibit 3 – Mapping the ITS Architecture



Intelligent Transportation Systems (ITS) Strategic Plan

Executive Summary

Deployment Program

One of the primary outputs of the ITS strategic plan is a compilation of projects to address regional transportation needs, as identified at the outset of the project. The emphasis is on "managing congestion". The projects are given a designation based on user services specified in the Canadian ITS architecture, and arbitrarily listed sequentially within those groupings, as shown in Exhibit 4.

Deployment Plan

As shown in Exhibit 5, the ITS strategic plan provides a deployment plan that phases the design and implementation of the projects over a ten-year timeframe.

Reviewing the project profiles, in conjunction with the deployment schedule, reveals the following:

- The projects need to be coordinated with existing ITS projects and planned ITS projects by York Region Transit;
- The timing of projects may be modified as funding opportunities become available;
- The emphasis of the short term projects is to begin providing better access to traveller information and to make improvements to traffic management capabilities in key corridors; and
- Many of the projects require co-ordination and/or interfaces with Ministry of Transportation/Provincial Government facilities, and therefore Ministry staff would need to provide support for the proposed projects.

To deal with the issues, York Region may wish to establish an ITS implementation committee. Depending on the agenda and the active projects, representatives from affected agencies would be invited to participate and to provide input and resources as required.

PROJECT TYPE	PROJECT NAME	ESTIMATED CAPITAL COSTS	ESTIMATED ANNUAL OPERATING COSTS
TI	Telephone Traveller Information	\$700,000	\$100,000
TM	Web Traveller Information	\$300,000	\$80,000
	Travel Demand Management Website	\$200,000	\$50,000
	Traffic Management for Highway 400 Closures	\$800,000	\$50,000
	Highway 7 / Highway 404 Traffic Management System	\$1,600,000	\$100,000
	Highway 7 / Highway 400 Traffic Management System	\$1,600,000	\$100,000
	Highway 7 / Highway 48 Traffic Management System	\$1,100,000	\$100,000
	ITS Support of Enforcement	\$1,200,000	\$100,000
	Traffic Signal Control System and Communications Design	\$5,300,000	\$500,000
	Area-wide Traffic Signal Control	\$1,100,000	\$100,000
	ITS Virtual Data Warehouse	\$300,000	\$10,000
T	Transit Video Survey Tool	\$100,000	\$10,000
EM	Roads Integrated Operations	\$1,700,000	\$200,000

TI – Traveller Information TM – Traffic Management T – Transit EM – Emergency Management

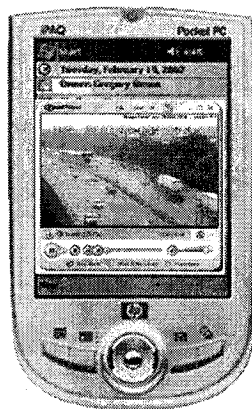
Exhibit 4 – Summary of Proposed New ITS Projects



Intelligent Transportation Systems (ITS) Strategic Plan Executive Summary

TI – Traveller Information

Through the use of ITS, an informed traveller is an empowered traveller. Traveller information provides real-time interactive request/response systems and information systems to the traveller. Typically, the traveller can obtain current information regarding traffic conditions, road conditions, transit services, carpooling, and parking facilities.



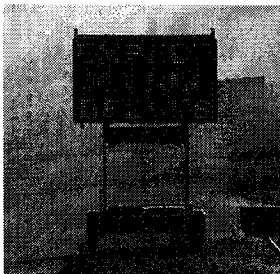
T – Transit

ITS can help make public transit a much more attractive mode of travel. York Region Transit is in the process of installing security cameras on the buses. This will provide an opportunity to use the recorded video to monitor traffic conditions during various times of the day and take appropriate measures to address traffic congestion. The ITS Strategic Plan also takes into account the various on-going ITS transit projects.

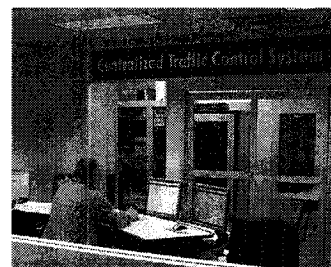


TM – Traffic Management

ITS are capable of far more than just operating traffic signals. Today's advanced traffic management systems are used to improve the efficiency and operation of the existing surface transportation arterial roads and highways and create safer conditions for travellers. This can include traffic signal control strategies, dynamic message signs, road weather information systems, and automated enforcement systems. ITS links these together to better manage traffic flow.



EM – Emergency Management



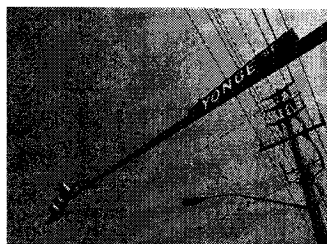
ITS can provide essential support to emergency planning and response activities. York Region has established an Emergency Operations Centre (EOC). A project has been identified to integrate the Roads branch operations to provide traffic management functions that support emergency responses. For instance, co-ordination between the emergency services dispatch functions and the traffic signal system group supports emergency response to traffic incidents and transit operations.



Intelligent Transportation Systems (ITS) Strategic Plan Executive Summary

PROJECTS	TIME FRAME		
	SHORT TERM 2008-2011	MEDIUM TERM 2012-2014	LONG TERM 2015-2018
Telephone Traveller Information			
Web Traveller Information			
Travel Demand Management Website			
Traffic Management for Highway 400 Closures			
Highway 7 / Highway 404 Traffic Management System			
Highway 7 / Highway 400 Traffic Management System			
Highway 7 / Highway 48 Traffic Management System			
ITS Support of Enforcement			
Traffic Signal Control System and Communications Design			
Area-wide Traffic Signal Control			
ITS Virtual Data Warehouse			
Transit Video Survey Tool			
Roads Integrated Operations			

Exhibit 5 - Project Schedule





Intelligent Transportation Systems (ITS) Strategic Plan

Executive Summary

Telephone Traveller Information

This project involves designing and deploying a system through which pre-trip and en route travel conditions can be accessed over the telephone, including:

- Real-time and static traffic information, including temporary or long-term road closures, flow and incident information;
- Real-time and static transit information, including service delays, schedule and fare information, service announcements (some static information presently available through York Region Transit (YRT) call centre system), trip planning, etc.;
- Other relevant traveller information, including weather updates and public service announcements; and
- Public feedback on programmes.

Web Traveller Information

This project involves development of an internet-based system to disseminate pre-trip planning and real-time information regarding transit and traffic conditions to the general public. Information delivered would parallel that provided through the proposed 511 system (Project No. TI-1).

Travel Demand Management Website

Building on the existing Smart Commute 404-7 association, this project involves expanding the ability of the Smart Commute 404-7 Association to match drivers with alternative transportation means within targeted areas. The main tools to be expanded include website capabilities and outreach or marketing efforts to reach new employers/employees.

- Review and improve on existing website.
- Review and improve on existing outreach and marketing initiatives to reach targeted area.

Traffic Management for Highway 400 Closures

Highway 400 is the main transportation corridor that covers 30 km through the western portion of York Region (YR), from Steeles Avenue in the south to Highway 9 in the north. Within YR, Highway 400 has eight arterial interchanges and one freeway-to-freeway interchange.

This project is to consider the implementation of Intelligent Transportation Systems (ITS) components to provide traffic management for the arterial traffic network during closures of all, or part of Highway 400.

Highway 7 / Highway 404 Traffic Management System

York Region (YR) plans to implement a 41 km, 2-lane median-transitway along Highway 7. In the vicinity of Highway 404, the transitway will be implemented through a very tightly constrained section of Highway 7. Given the entrance and exit ramps connecting to Highway 404, an incident along this portion of Highway 7 or the adjacent Highway 404 could have a severe impact on traffic flow along Highway 7. Quick detection and removal of an incident is imperative to maintain traffic flow in the area. This project is to consider the implementation of ITS components to provide micro level traffic management for a 6 km section of the corridor, Bayview Avenue to Warden Avenue.

Highway 7 / Highway 400 Traffic Management System

York Region (YR) plans to extend Applewood Crescent over Highway 400, just north of Highway 7. It is expected that the new crossing will relieve some of the transportation pressures on Highway 7 and hopefully allow for the implementation of the 2-lane median-transit Rapidway along Highway 7. With traffic volumes and congestion levels already high on Highway 7, it is expected that the implementation of Intelligent Transportation Systems (ITS) components on Highway 7, in advance of the completion of the new overpass, will help relieve congestion until the new overpass is completed. If designed appropriately,



Intelligent Transportation Systems (ITS) Strategic Plan

Executive Summary

the ITS components could also be instrumental in relieving congestion during the construction of the Rapidway. Given the entrance and exit ramps connecting to Highway 400, an incident along this portion of Highway 7 or the adjacent Highway 400 could have a severe impact on traffic flow along Highway 7. Quick detection and removal of an incident is imperative to maintain traffic flow in the area. This project is to consider the implementation of ITS components to provide micro level traffic management for a 6 km section of the corridor, Pine Valley Drive to Keele Street.

Highway 7 / Highway 48 Traffic Management System

With the implementation of the Markham bypass proceeding in stages, road improvements for various east-west links to the bypass are required. Highway 7, between Ninth Line and the Markham Bypass, has been upgraded from a 2-lane road with rural cross section to a 4-lane road with an urban cross section. Other links will require capacity improvement in the future but will experience increasing levels of congestion in the meantime. The implementation of Intelligent Transportation Systems (ITS) components on these unimproved links could be used to assist in managing the existing capacity. This project is to consider the implementation of ITS components to provide micro level traffic management within the area bounded by 9th Line to the west, 16th Avenue to the north, the York / Durham Line to the east and Highway 407 to the south.

ITS Support of Enforcement

This project lays the groundwork towards developing an appropriate role for Intelligent Transportation Systems (ITS) in the area of enforcement and requires two approaches and ultimately four stages to complete implementation.

Traffic Signal Control System and Communications Design

Central Traffic Control System (CTCS), the current traffic signal system in York Region (YR), has been in place for several years. While functioning well the system is not National

Transportation Communications for ITS Protocol (NTCIP) compliant. An NTCIP compliant signal system requires a robust wire line and wireless communication system. A detailed communication design is required to support traffic signal control, and other Intelligent Transportation Systems (ITS) initiatives in the Region. A key objective of the communications system is to support NTCIP as a communication protocol for ITS. The use of NTCIP will facilitate inter-changeability (e.g. multiple brands of controllers on a communication channel) and interoperability (e.g. dissimilar devices, traffic controller and Dynamic Message Signs (DMS) controller on a common channel).

Area-wide Traffic Signal Control

York Region (YR) has coordinated traffic signals at jurisdictional boundaries (e.g. City of Toronto) by synchronizing the time clocks for both traffic signal systems. While this approach works well for day-to-day operations, it is functionally limited. Ideally traffic analysts would have access to traffic signal timing from both jurisdictions (to confirm current operations) and monitoring capabilities to check operations. This functionality is available through a Centre-to-centre (C2C) interface.

Traffic signal operation becomes more complex across jurisdictional boundaries when considering transit signal priority (TSP), emergency vehicle pre-emption and traffic responsive/traffic adaptive control. C2C, area wide traffic control provides a viable solution.

Area-wide signal control includes integrating systems internal to YR, such as the York Region Transit (YRT) management, Management System operated by the Ministry of Transportation of Ontario (COMPASS) and YR Police Computer Aided Dispatch / Automated Vehicle Locator (CAD / AVL). This integration is required to support daily operations (e.g. TSP), and provide traveller information and incident response.



Intelligent Transportation Systems (ITS) Strategic Plan Executive Summary

ITS Virtual Data Warehouse

This project is to plan for and develop the requirements of a data warehouse for York Region (YR), where data can be archived and easily retrieved. This conceptual project will wait on the development of several other projects before implementation. The implementation of a data warehouse will consolidate the processes and systems used to archived data, make data retrieval easier and allow the owner to more properly asses the value of the archived data.

Subsequent phases of the project will coincide with the initiation of other projects that require data warehousing. Each project will fine tune the data warehouse requirements and begin to look at technical aspects of the eventual warehouse.

Transit Video Survey Tool

This project involves the deployment of security cameras on-board buses and at key transit stops/terminals, as well as developing appropriate links to allow the information collected to be made available for traffic studies. The project would consist of two distinct phases. Phase 1, already underway, would involve design and deployment of security cameras on-board buses and at key terminals. The on-board camera installation includes one forward-mounted camera capturing traffic in front of the bus. Phase 2 would involve expanding the system software to allow for automated extraction and distribution of the forward-facing camera along identified routes. This video would be made available to the Roads group for use in traffic/safety studies.

Roads Integrated Operations

York Region (YR) has an emergency command and operations centre located in the Bales Drive office. The purpose of this project is to work with the Emergency Management (EM) Department to define the functions that can support emergency response.