

**ITS BLUEPRINT
FOR
ADVANCED TRAVELLER INFORMATION
AND
TRAFFIC MANAGEMENT SYSTEMS
FOR
HIGHWAY 2 BETWEEN EDMONTON AND CALGARY**

SUMMARY REPORT

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DELSCAN

In association with
Infrastructure Systems Limited
Earth Tech Canada
Mark F. Pinet Associates limited
Western Ergonomics, Inc.

INTRODUCTION

In response to continuous demand for safe and efficient flow of goods and people, Alberta Transportation has developed a high level vision (ITS Strategic Plan) for implementing Intelligent Transportation Systems (ITS). Highway 2 between Edmonton and Calgary has been identified in the Strategic Plan as a priority corridor to serve as a testbed for ITS initiatives.

In response to the Strategic Plan, Alberta Transportation initiated a project to study the needs and develop plans for advanced transportation technologies along the Highway 2 corridor between Edmonton and Calgary. The intent of this project is to translate the departmental ITS vision into a “blueprint” for ITS deployment in the Highway 2 corridor. These technologies are potential tools to help monitor and manage traffic flow, detect and clear incidents and provide travellers with real-time information on traffic congestion and road conditions.

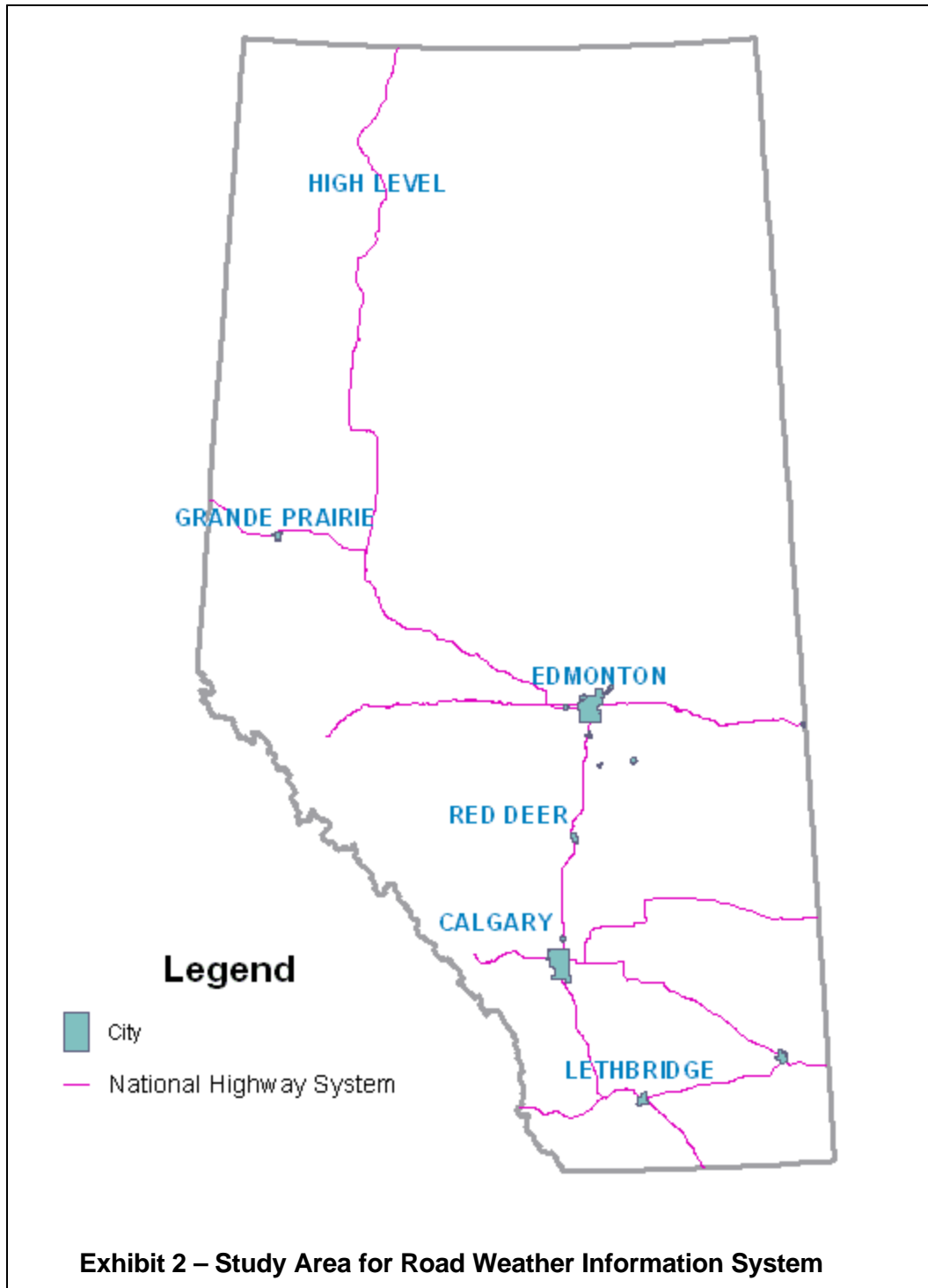
The objectives of Alberta Transportation in conducting this project are to enhance safety and operations in the corridor, ensure opportunities exist to integrate identified solutions with adjacent municipal ITS plans and deploy ITS solutions in a cost-effective well-planned manner.

The portion of Highway 2 that is included within this project includes:

- Highway 2 (rural divided freeway) between Edmonton and Calgary, approximately 260 km;
- Deerfoot Trail in the City of Calgary from the north city limits to the connection to Highway 2 (including the new section) in the south end, approximately 50 km; and
- Anthony Henday Drive in the City of Edmonton from Highway 16 interchange (north end) to Gateway Boulevard (south end), including short sections of Gateway Boulevard and Yellowhead Trail to the city limits, approximately 25 km.

For the road weather information system component, the study area includes Alberta’s National Highway System which consists of Highways 1, 2, 3, 4, 9, 16, 35, 43 and 49 (excluding highways within the National Parks); approximately 3,400 km of roadway. It should be noted that the study area for RWIS portion of the Blueprint includes Highway 2 only between Edmonton (junction with Highway 16) in the north and its junction with Highway 3 in the south.





STAKEHOLDER CONSULTATION

The stakeholder consultation program was the first major activity of the project and one of the most important since the information gathered formed a baseline reference for subsequent activities. Constructive involvement from all key stakeholders was considered to be vital to the development of an effective plan and implementation program for the project. Obtaining meaningful input from stakeholders does however have its challenges. Many stakeholders have divergent views and opinions on the needs and priorities of the study area, while others may have limited awareness of ITS. The consultation program provided an opportunity to help individuals and agencies with a low awareness of ITS understand what ITS can do for them. It also brings these people together and provides a forum for discussion where divergent views can be discussed and common interests identified with the intent of developing a blueprint for ITS that is coordinated and integrated across multiple jurisdictions.

Approach

The consultation program was based on a three-phase approach:

- Identification of stakeholders agencies and initial contact;
- Two workshops as the study progressed to present study findings and recommendations and allow stakeholders to provide input; and
- Project website to provide broad access to information about the project and allow stakeholders to provide input.

Stakeholders

The stakeholders were subdivided into five organizational groups with different areas of interest, roles and responsibilities. The identified stakeholder groups included:

- Alberta Transportation/Government Departments;
- Municipal;
- Maintenance / Meteorological;
- Emergency Services; and
- Users.

In all a total of 45 agencies were contacted and in excess of 50 stakeholder interviews conducted. The workshops were also well attended with an average of 23 stakeholders being represented at each. Additional details of the stakeholder agencies contacted is included in **Appendix A**.

Additional details on the stakeholders, the consultation process and the materials used in the consultation program are contained in the Needs Assessment report as well as in the associated supporting documents contained in Volume 2.

NEEDS

Data Analysis

Recent traffic and safety data from Highway 2 between Edmonton and Calgary were reviewed to identify problems, their extent and provide insight into the types of ITS applications that would be most relevant. From a review of these data, the needs of the Highway 2 corridor between Edmonton and Calgary can be summarized as follows:

- High traffic volumes and related congestion (Level of Service C to D) are prevalent during peak periods in the Deerfoot Trail. Over the longer term, with continued growth forecast and no new alternate routes within the foreseeable future, the level of service will likely continue to degrade.
- Suburban sections of the corridor (e.g. Airdrie to Calgary, Leduc to Edmonton, Anthony Henday Drive) experience limited congestion in peak hours. This congestion is likely to increase over the longer term as volumes continue to increase. Incidents or any lane closures will have a significant impact in these sections of the corridor, particularly during peak hours.
- The majority of the Highway 2 corridor is rural in nature and carries relatively light traffic volumes (traffic volumes of 15,000 to 30,000 vehicles per day). Congestion is not prevalent with levels of service of A to B provided during peak traffic flow.
- Commercial vehicles make up a significant portion of the vehicle stream and their needs should be taken into account in any initiative proposed for the corridor.
- Highway 2 is not considered a safety deficient corridor due to its relatively low collision rate. The frequency of collisions in the corridor is however considered to be significant with over 800 collisions occurring in the rural section between Edmonton and Calgary in year 2000. Weather-related collisions and animal hits are two primary factors that contribute to a significant number of these collisions. In the Deerfoot Trail, over 560 collisions occurred in year 2000 with approximately 70% of these collisions being rear-end and side-swipe collisions reflecting the congested conditions of this segment of the corridor.
- Agencies responsible for road maintenance and incident response identified bridge decks (especially over river courses) and grades (e.g. coulees, Antler Hill, etc.) as primary locations of collisions during winter months.
- Closures of Highway 2 are a frequent occurrence (4 to 6 times a year). There is a need for a mechanism that allows the highway to be closed safely, efficiently and in a location that provides travellers the option of turning around or seeking food and/or accommodation nearby.

Stakeholder Input

The decoding of stakeholders' interviews revealed that there are some common themes in the various issues and needs, which can be used to identify relevant functional areas of ITS applications. These common themes have been used to cluster needs into the following general functional areas:

- Road Condition & Traffic Information
- Incident Management
- Road and Weather Information Systems

- Traffic Control and Management
- Work Zone Safety
- Commercial Vehicle Operations
- Inter-Agency Coordination
- Data Collection / Management

Most stakeholders identified both their needs from a user perspective as well as provided suggestions with respect to equipment or system related requirements that they perceive would help to satisfy their need. For each of the eight categories listed above, the stakeholder needs are presented in terms of users needs and system/equipment related requirements. **Table 1** summarizes the user needs and related system requirements that were identified by the stakeholders.

In summary, a review of the ITS needs and the project stakeholders that identified them provides the following observations:

- The primary needs of the majority of ITS users for this project are focused in the areas of road condition and traffic information, incident management and road weather information systems.
- Data collection / management and inter-agency coordination are key aspects that support the above primary needs. The sharing of information electronically and coordination between agencies is a particularly strong theme in the needs identified.
- Commercial vehicle operations, congestion management and work zone safety have special needs requirements, but appear to be less of a priority among the stakeholders.
- There is a clear need to provide timely and accurate information to the motorists about road and traffic conditions on Highway 2, including information about scheduled events (e.g., road closures due to maintenance) as well as about incidents and inclement weather. This need for information and the ability to have it easily accessible is a major focus of the majority of project stakeholders.
- There is a common opinion among the majority of stakeholders that the existing equipment and data can be better utilized to provide information to the traveller.
- Traffic management to address congestion and provide incident management is necessary in the urbanized sections of Highway 2 such as the Deerfoot Trail and to a lesser extent, Anthony Henday Drive. Coordination and/or integration with other local urban traffic signal control applications is also important.
- Road weather information systems and commercial vehicle operations applications should be seen from the broader perspective with a need for an inter-provincial and international network.
- There is an overall desire for integrated, efficient and effective ITS applications based on proven and compatible technologies.

Table 1 – Summary of Stakeholders Needs

Functional Area	User Needs	System Requirements/Components
Road Condition & Traffic Information	More accurate & real-time information on road conditions, weather & incidents	<ul style="list-style-type: none"> • Use existing DMS more regularly • Install more permanent DMS in the Highway 2 corridor • Use of Highway Advisory Radio (HAR), roadside kiosks, pagers, telephone service, Internet, etc.;
	Wider dissemination and easier access to traveller information	
	Improve sharing of traveller information data between agencies	<ul style="list-style-type: none"> • Use of Highway Advisory Radio (HAR), roadside kiosks, pagers, telephone service, Internet, etc.;
Incident Management	Timely detection & accurate information on incident location	<ul style="list-style-type: none"> • Dissemination of incident site video images to emergency services dispatch • Numbering of exit ramps • Use of mileage markers • Fog detection systems • Wildlife detection systems • Truck rollover monitoring systems on ramps
	Coordination, control & monitoring of lane closures	<ul style="list-style-type: none"> • Design of alternate routes and development of implementation procedures • Coordination with maintenance contractors to provide assistance • Use of permanent and portable DMS • Lane control and queue management during lane closures
	Ability to close the highway at a location that is safe and convenient	<ul style="list-style-type: none"> • Install more permanent DMS
	Protection of incident site & safety of personnel	<ul style="list-style-type: none"> • Training of emergency services staff • Coordination with maintenance contractors to provide assistance in lane closures • Use of permanent and portable DMS • Lane control and queue management during lane closures

Functional Area	User Needs	System Requirements/Components
	Knowledge of hazardous materials & atmospheric conditions at dangerous goods spill locations	<ul style="list-style-type: none"> • Real-time data on existing atmospheric conditions • Tracking of dangerous goods movements
Road & Weather Information Systems	Knowledge of existing atmospheric & road conditions	<ul style="list-style-type: none"> • Real-time data on existing conditions at strategic locations and the ability to access this data from a remote location; • Strategic locations for RWIS sites include both problem locations and trigger sites (i.e. sites that are representative of the surrounding road network)
	Ability to forecast atmospheric, visibility & pavement conditions	
Traffic Control & Mgmt.	Improve safety	<ul style="list-style-type: none"> • Use of variable speed limits during congested periods in the Deerfoot Trail; • Use of ramp metering on the Deerfoot Trail to avoid congestion at high volume entrance ramps; • Use of traffic responsive control of traffic signals at ramp terminals to avoid queue back ups onto the Deerfoot Trail; • Coordination of traffic signals in the Anthony Henday corridor (Phase 1); • Integration of AT traffic signals into municipal signal systems (e.g. Calgary, Red Deer and Edmonton); • Central control and monitoring of AT traffic signals on potential alternate routes (e.g. Highway 2A); • Use of HOV and/or reversible lanes in the Deerfoot Trail
	Maximize capacity of existing infrastructure	
	Minimize impacts of recurrent congestion	
	Minimize number of stops & reduce travel time in major corridors	
Work Zone Safety	Protection & safety of site personnel	<ul style="list-style-type: none"> • Improved speed management and enforcement; • Use of portable DMS
	Improved traveller information	
Commercial Vehicle Operations	Minimize infrastructure damage due to over height and overweight loads	<ul style="list-style-type: none"> • Wider deployment of high load warning system and ability to identify offending vehicle; • More efficient method of monitoring and enforcing commercial vehicle weight, dimension and driver regulations (e.g. weigh in motion, electronic license plates, etc.);
	Minimize delays at commercial vehicle inspection stations	<ul style="list-style-type: none"> • More efficient method of monitoring and enforcing commercial vehicle weight, dimension and driver regulations (e.g. weigh in motion, electronic license plates, etc.);
	Compatibility & interoperability with other provinces and states	<ul style="list-style-type: none"> • Sharing of CVO safety and maintenance records with other provinces, states and agencies (e.g. Coordination and Information Centre);

Functional Area	User Needs	System Requirements/Components
Inter-agency Coordination	Coordination, control & monitoring of lane closures	<ul style="list-style-type: none"> • Establish a protocol and warrant system for the use of the DMS and related messages and notify all agencies; • Use of common radio channels for emergency communications between agencies; • Coordination of response activities, route diversions, etc. in the event of incidents (e.g. incident control centre); • Improved sharing/exchange of information (e.g. lane closure, weather, incident, road condition, traffic data, CCTV images, etc.) between agencies (e.g. police, fire, ambulance, vehicle inspection stations, airports, municipalities, tourism, fleet managers, users, etc.);
	Improve sharing of traveller information data between agencies	<ul style="list-style-type: none"> • Improved sharing/exchange of information (e.g. lane closure, weather, incident, road condition, traffic data, CCTV images, etc.) between agencies (e.g. police, fire, ambulance, vehicle inspection stations, airports, municipalities, tourism, fleet managers, users, etc.);
Data Collection/Management	Improve sharing of traveller information data between agencies	<ul style="list-style-type: none"> • Utilize permanent count stations to collect real-time traffic data (e.g. volume, occupancy, etc.), monitor speeds and disseminate information through a web-based interface; • Improve incident reporting procedures with more accurate location data (using GPS receivers in emergency vehicles) and electronic transfer of MVA reports to a provincial incident database; • Link data to existing road asset database (TIMS) / GIS system; • Maintain a web-based provincial database for commercial vehicle monitoring and regulation enforcement (e.g. driver records, vehicle records, etc.); • Maintain a database of pavement conditions, atmospheric data, residual de-icing chemical, etc for management of maintenance contracts, liability/risk issues, correlation of collision data, etc.; • Automated process for monitoring maintenance contracts (e.g. use of GPS to track maintenance vehicles, maintain records of application of sand and salt, application rates, time of application, etc.);
	Maximize access to information and data	
	Minimize costs through development of partnerships	

ITS BLUEPRINT

In the development of the ITS Blueprint for Highway 2, the direction and pace of the plan and the framework for its development were established based on both strategic and tactical considerations. The strategic considerations were first utilized to set the direction of the ITS Blueprint. The tactical considerations were then used in the development of the details of the program and its implementation schedule.

The development of the ITS Blueprint and the staging of the various projects was based on three time periods, namely immediate term (0 to 2 years), short term (3 to 5 years) and medium to long term (6 to 10 years). For the immediate term, many of the projects selected for implementation are those where the need is the greatest and the largest benefit can be attained. The recommendations of the ITS Blueprint for Highway 2 are illustrated on **Exhibits 3, 4 and 5**.

Strategic and Tactical Considerations

Strategic Considerations

- Stakeholder needs and related user services are addressed;
- ITS components, particularly those that overlap multiple applications are deployed first (enabling components); and
- Results of data analysis and relative priorities based on analytical approach.

Tactical Considerations

- Needs and Priorities: Addressing specific needs and priorities that are perceived to be a significant problem, the need to provide “early winner” projects that can be implemented with minimal effort and cost and the requirement to clearly demonstrate the benefits of ITS;
- Funding: Availability of capital is always an important consideration requiring a careful balance between needs, priorities, technology elements and the related costs (both capital and operating) to find a realistic implementation program;
- Technology: Technology has a significant impact on both cost and technological risk. The implementation program must recognize maturity of available technologies as well as trends in development and allow a migration of technology over time; and
- Legacy Systems: Compatibility with legacy systems and the need to integrate these existing systems and field components. The legacy systems represent a significant investment and the implementation program must maximizing their use as integral components of the ITS Blueprint.

Immediate Term (0 to 2 Years)

Within the immediate term the focus is on projects that can be implemented quickly, easily, at minimal cost and can address in an effective manner, the more urgent needs that have been identified. These are termed “early winners” and are a very important aspect of the ITS Blueprint as they demonstrate the benefits of ITS and serve to gain future support and funding for the ongoing implementation of the plan. As a result the immediate term focuses on projects that maximize the use of existing infrastructure and utilize technologies that are mature, proven and available “off the shelf”.

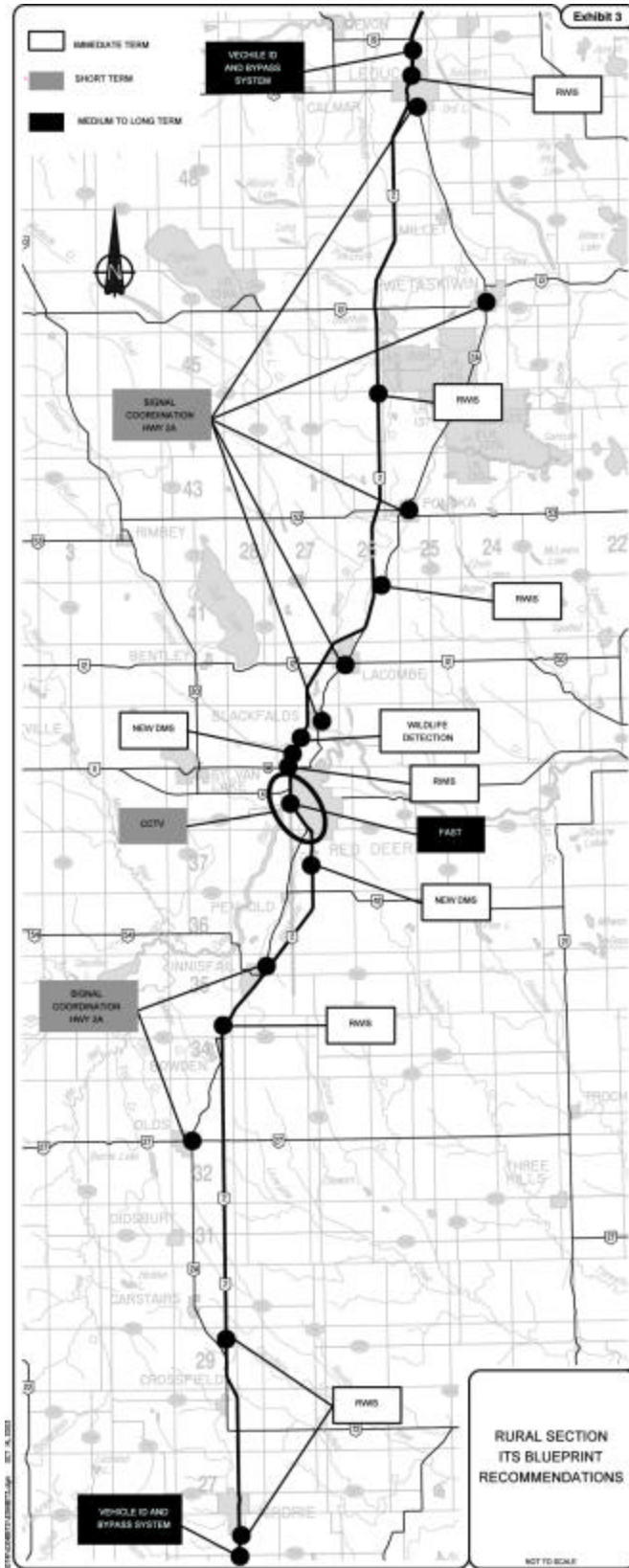
ITS Blueprint Immediate Term

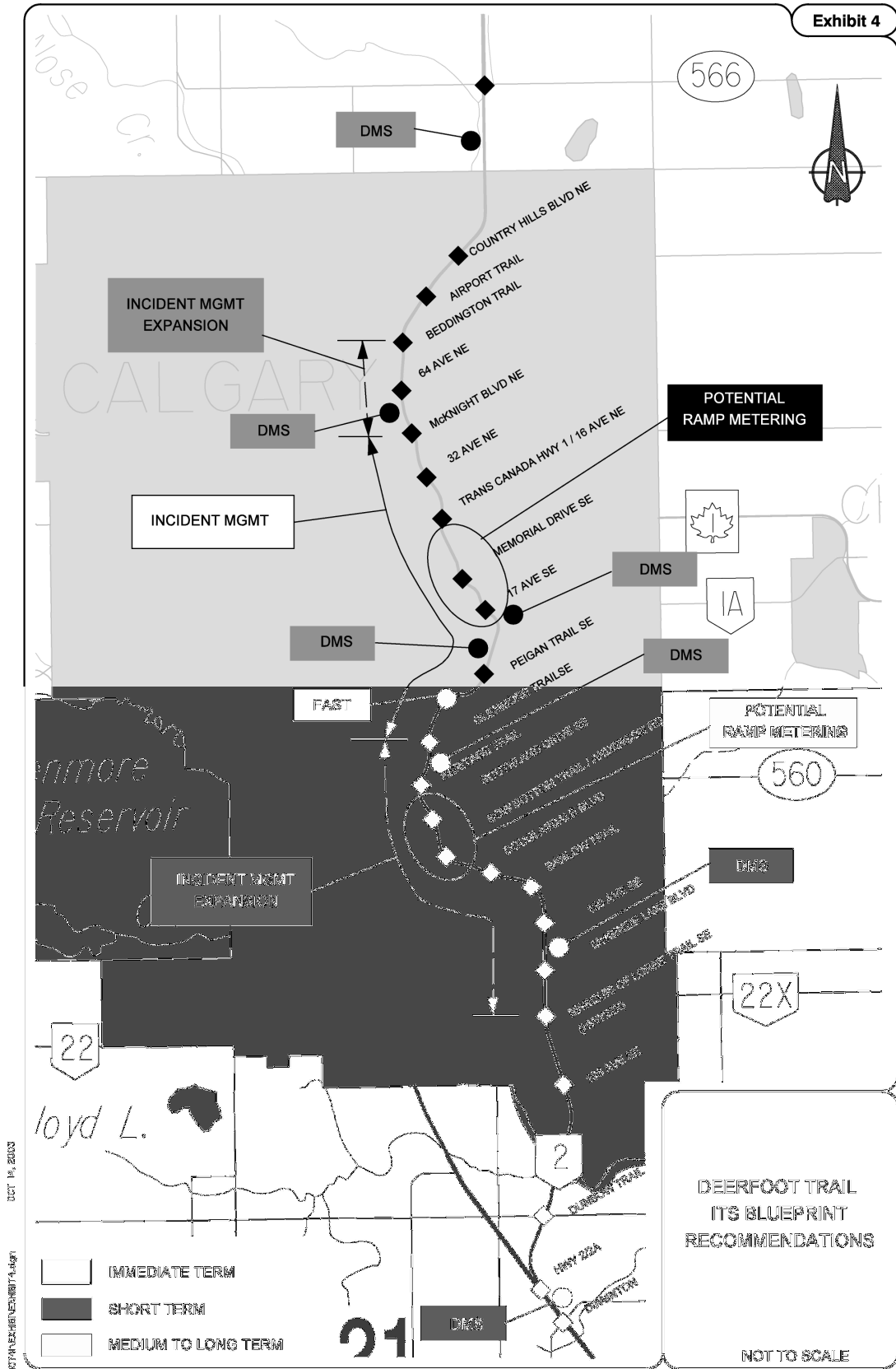
Areas of focus:

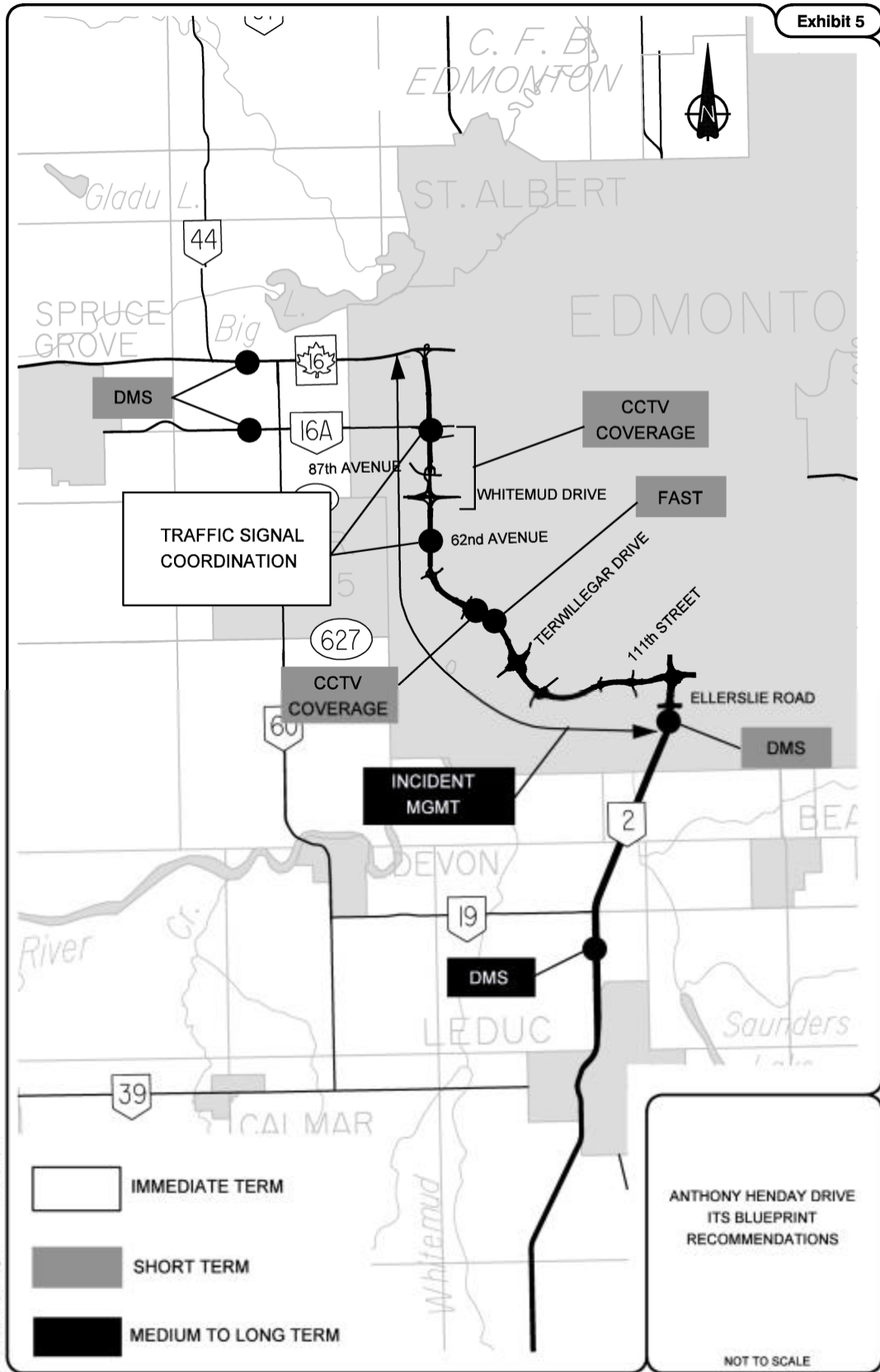
- Road Condition & Traffic Information;
- Road Weather Information; and
- Incident Management.

Minor initiatives:

- Traffic Control & Management
- Work Zone Safety; and
- Commercial Vehicle Operations







The needs analysis identified that more information with respect to road conditions, weather, incidents and congestion within the Highway 2 corridor should be available. The information should be timely, accurate and easily accessible to the traveller as well as a wide variety of interested parties. The approach for the immediate term is to focus on the collection and assembly of accurate and timely information through the development of a traveller information database. The information is disseminated by making better use of existing infrastructure. Due to the long linear nature of the corridor, dissemination focuses on the use of the Internet as the medium through which accurate



and timely traveller information is provided to the media (e.g. commercial radio). Use of existing dynamic message signs (DMS) in the corridor is also enhanced through the traveller information database and the deployment of additional DMS is recommended in the Red Deer area to improve dissemination of road and weather condition information, particularly in the event of a highway closure.

Road weather information (RWIS) is an area that was identified within the needs assessment by the various stakeholders and one that the Province of Alberta has been planning to implement for a number of years due to the increasing sensitivity to the use of de-icing chemicals and their impact on the roadside environment. The province currently has a plan to deploy approximately 70 RWIS sites throughout the province on a staged basis. In the immediate term the focus is on the installation of RWIS stations in high priority areas. RWIS deployment will also be an asset to the initiatives included within Road Condition and Traffic Information due to their ability to improve road maintenance staff's knowledge of existing atmospheric and surface conditions. Fixed Automated Spray Technology (FAST) is also included within the immediate timeframe of the RWIS program as a pilot test of the technology and to demonstrate its benefits. Recommended location is on the Calf Robe Bridge (Deerfoot Trail) to manage the frequent frost events that occur and reduce the frequency of weather-related collisions on this structure over the Bow River.



Incident management is an area of ITS where significant benefits can be realized, particularly in high volume corridors. Early detection and quick response to an incident is the key. In the immediate term the focus in incident management is to set the groundwork for a more ambitious program in the short term. This groundwork includes the set-up of a call-in centre for the Deerfoot Trail in Calgary providing motorists a free cellular number to call to report incidents, with the intent of being able to reduce detection and response time to minor incidents that do not normally get reported but can have a significant impact on carrying capacity of the facility, particularly during peak periods. Deployment of CCTV coverage at key locations in the corridor for verification purposes supplemented with vehicle detection stations to monitor traffic flow is also recommended. The vehicle detection station data will help operators identify problem areas and serve as a valuable source of information for the traveller information database. These initiatives in incident management will require close coordination and cooperation with the City of Calgary, particularly with respect to the operation of the call-in centre. In the rural section of the corridor, incident management initiatives are recommended through the pilot test of an animal detection and motorist warning system in an effort to reduce the number of animal hits in the area.

The immediate term also includes minor initiatives in the areas of:

- Traffic Control and Management through improvements in traffic signal coordination and operation. Specific areas include City of Calgary streets adjacent to the Deerfoot Trail to reduce off-ramp queuing and proposed signalized intersections on Anthony Henday Drive;
- Work Zone Safety through the use of portable dynamic message signs in select construction zones to test their effectiveness and assess their impact on current operation; and
- Commercial Vehicle Operations in improvements in data collection on the number, frequency and time of occurrence of overweight loads.

Short Term (3 to 5 Years)

In this second stage of the ITS Blueprint, new initiatives in Incident Management and Road Condition and Traffic Information become the focus involving the deployment of new field equipment and systems to provide more automation and improve efficiency in the detection of incidents and collection and dissemination of traveller information. Expansion of initiatives in Road Weather Information, Traffic Control and Management and Work Zone Safety continues as well with a significant investment in the area of RWIS.

ITS Blueprint Short Term

Areas of focus:

- Incident Management;
- Road Condition & Traffic Information; and
- Road Weather Information.

Minor initiatives:

- Traffic Control & Management and
- Work Zone Safety.

Incident Management is improved in the short term with several initiatives recommended throughout the Highway 2 corridor. In the Calgary area, the call-in centre initiative from the immediate term is expanded to include a more active role through the expansion of CCTV coverage and vehicle detection stations throughout the length of the Deerfoot Trail as well as implementation of automated incident detection algorithms to monitor traffic flow and provide alarms to operators in the event of unusual conditions. In the Edmonton and Red Deer areas the call-in centre concept is expanded to include sections of Highway 2 and Anthony Henday Drive. CCTV is recommended as part of the call-in centre concept at strategic locations where communications can be achieved cost-effectively. The experience gained in operating the call-in centre in the Calgary area in the immediate term will assist in locating the field equipment as well as in the set-up of operational policies and procedures for the Red Deer and Edmonton areas.



Road Condition and Traffic Information is a major focus of the short term with the provision of more automation in the entry and dissemination of traveller information. This includes:

- Expansion of the central database to allow direct input of traveller information by each of the agencies involved;
- Access to CCTV images and vehicle detection data from the Deerfoot Trail's Incident Management system;

- Automated recommendation of DMS message content;
- Implementation of a voice activated telephone call-in traveller information service; and
- Deployment of additional DMS in Deerfoot Trail and on Anthony Henday Drive to complement existing signs and support the Incident Management system described above.

In the area of RWIS, the short term includes a continuation of the RWIS program across the province with additional stations, another FAST system in the Edmonton area and the use of GPS and other sensors on the snow plow fleet as a pilot test in automating surface condition detection and reporting. The short term also includes initiatives in Traffic Control and Management with implementation of a central control and monitoring systems for traffic signals on Highway 2A and in Work Zone Safety with the addition of portable DMS systems to detect traffic flow conditions and provide automated messages for motorist advisory.

Medium to Long Term (6 to 10 Years)

In the medium to long term the emphasis of the ITS Blueprint is the continued expansion of the program initiatives developed to date with emphasis in the testing and application of more advanced technologies and expansion of coverage in the areas of Incident Management, Traffic Control and Management and RWIS.

In Incident Management, additional research in automated incident detection in the Deerfoot Trail is recommended with the potential to test new technologies and incident detection algorithms to improve the detection rate and reduce false calls. Deployment of CCTV and automated incident detection is also recommended for Anthony Henday Drive in Edmonton as traffic volumes on this facility increase.

ITS Blueprint Medium to Long Term

Areas of focus:

- Incident Management;
- Traffic Control & Management; and
- Road Weather Information.

Minor initiatives:

- Commercial Vehicle Operations;
- Road Condition & Traffic Information



In the area of Traffic Control and Management, ramp metering in the Deerfoot Trail is recommended and potentially in the Anthony Henday Drive corridor, depending on traffic growth. Lane control and variable speed limits in the Deerfoot Trail are also identified as potential applications to improve the operational efficiency and safety of this high volume corridor, recognizing that they are technologies that will be expensive to implement and require legislative changes.

For Road Weather Information Systems, the emphasis is on the pilot test of software algorithms in maintenance decision support systems that help road maintenance staff to assess the impact of different de-icing chemicals and maintenance strategies. Additional FAST systems are also included in the long term for major river crossings in the rural portion of the Highway 2 corridor.

It is also recommended that the province investigate weigh-in-motion as the technology improves in performance and reliability and deploy this technology at a minimum of one

location in the Highway 2 corridor. In the area of Road Condition and Traffic Information, the emphasis in the long term is in the area of public education and development of partnerships with value added resellers or information service providers to improve the dissemination of traveller information through a variety of personal and in-vehicle devices.

BENEFIT/COST ANALYSIS

COSTS

The costs associated with the ITS Blueprint have been estimated on an order of magnitude basis. These costs have been generated using experience gained in other recent ITS related-projects implemented within Canada. Costs for the medium to long term (6 to 10 years) have not been identified due to the uncertainty of the technology involved and the associated costs.

It should be noted that as the program builds, the recurring costs increase significantly as the capital expenditures and investment in ITS accumulate. This is a critical factor and one that must be recognized from the outset in order to ensure the necessary funds are allocated to properly operate and maintain the ITS program as proposed.

Highway 2 ITS Blueprint Costs

Overall, the ITS Blueprint for the Highway 2 corridor represents a capital expenditure of approximately \$ 21.1 million over 5 years. This expenditure is distributed as follows:

- 45% Deerfoot Trail;
- 10% Rural Section;
- 10% Anthony Henday Drive; and
- 35% Road Weather Information Systems.

With operating and maintenance costs included, the ITS program represents an annual expenditure of approximately \$ 5.5 million annually.

BENEFITS

A benefit / cost analysis was conducted to provide an indication of the potential value of the various ITS initiatives proposed in the ITS Blueprint for Highway 2. It is intended as a high level analysis and as such it provides an analysis of the benefits and costs associated with various initiatives or groupings of projects by geographic section of the study area. It also includes only those projects that are recommended for the short and medium terms.

The quantifiable benefits used in the analysis include the following benefits:

- Incident Management
 - Vehicle delays, fuel consumption and vehicle emissions
 - Collision reductions
- Road Weather Information Systems
 - Collision reductions
- Commercial Vehicle Operations
 - Savings in bridge repair costs

Table 2 – Benefit / Cost Ratios by ITS Program

Component	Benefit / Cost Ratio
ATMS/ATIS Initiatives	
Deerfoot Trail	7:1
Rural Section	3:1
Anthony Henday Dr.	3:1
Road Weather Information	
Rural Section	5:1
Fixed Automated Spray	
Deerfoot Trail	3:1
Anthony Henday Dr.	3:1

A review of **Table 2** indicates that the ITS projects proposed within the Deerfoot Trail portion of the study corridor have a very high benefit to cost ratio, largely due to the high traffic volumes using the corridor and the resultant vehicle delay benefits that result from any improvement in traffic operations. While this is a very strong indication of the benefits of ITS in high volume corridors, the prioritization of projects will also depend on other needs of the corridor and related projects.

SUPPORTING THE ITS BLUEPRINT

Traffic Management Centre

Typically, a traffic management centre (TMC) is considered to be one of the fundamental building blocks of an ITS strategic plan, serving as the focal point for regional traffic management initiatives and acting as the catalyst in developing strong inter-agency relationships.

For the ITS Blueprint for Highway 2 there is a need for a TMC, however in this case the study area is a long linear corridor covering a length of 300 kilometres with a wide diversity of ITS applications and density of field equipment. The role of a TMC will therefore vary depending on the area of influence. From an overall perspective of the corridor, the role of a TMC would include:

Currently Alberta Transportation's CIC provides the role of the TMC, monitoring and controlling the operation of the province's four DMS within the Highway 2 corridor. This is an effective approach since it provides monitoring and control of the DMS using existing staff and facilities that operate 24 hours a day, 7 days a week. In the immediate term, with the addition of two more signs in the Red Deer area and the implementation of a road condition and traffic information database, the increase in workload for CIC operators is considered to be marginal and the continued use of the CIC for DMS control is recommended.

Role of the Traffic Management Centre

- Control and monitoring of traffic control devices (e.g. traffic signals, dynamic message signs, speed advisory, etc.);
- Monitoring of traffic operations and identification of problem areas and incidents (e.g. CCTV images, vehicle detector data, etc.);
- Receipt of calls from the public and emergency response personnel (e.g. 911, police, fire ambulance, etc.) to report minor incidents and traffic problems;
- Distribution of traffic and incident information for incident management (e.g. coordination of emergency response) and traveller information purposes;
- Implementation of traffic response plans to manage traffic in the event of an incident (planned, unplanned, weather, collision, etc.). Traffic response plans can vary widely depending on the needs and would include selection of DMS message sets, alteration of ramp metering rates, change of signal timing plans, etc.;
- Management of the systems and field equipment (administration, maintenance and operation); and
- Providing leadership in institutional aspects through such activities as system research and development, development of regional traffic management strategies and fostering inter-agency coordination and cooperation.

Beyond the immediate term the number of DMS will increase significantly with a large increase in the Calgary Region in the short term and in the Edmonton area in the medium to long term. This expansion of the DMS system is anticipated to significantly increase operator workload in the CIC. In addition, in each of the Calgary, Red Deer and Edmonton areas incident management and traffic control initiatives are proposed. These initiatives will have a significant impact on traffic and the local transportation network and to operate these initiatives effectively, a local control centre will be required to monitor traffic conditions, manage incidents, implement traffic response plans and coordinate their actions with the local jurisdictions. This coordination with the local jurisdiction and the potential increase in workload for the CIC operator indicates the use of regional traffic management centres is the best approach for the implementation of ITS within the Highway 2 corridor.



For these reasons, the recommendation is the implementation of a regional traffic management centre in each of Calgary, Edmonton and Red Deer. Staging of their implementation would be gradual with the City of Calgary's occurring in the short term, coincident with the implementation of incident management initiatives on the Deerfoot Trail. Regional centres in Edmonton and in Red Deer would follow with the implementation of incident management in each of these areas.

The regional centres can be operated in partnership with each of the cities with the centre taking on the role of traffic management responsibilities on both provincial highways and the city road network. This provides the opportunity to maximize efficiency of staff and allows for better coordination of traffic management strategies on a regional basis.

Inter-Agency Coordination and Cooperation

Inter-agency coordination is a common theme that was raised in the discussions with the majority of stakeholders. The stakeholders recognize the benefits of such a partnership approach and appear to be eager to put policies and procedures in place to bring a more coordinated approach to their daily operations. Inter-agency coordination is also a significant focus within many of the initiatives described above and is considered to be one of the founding principles of the ITS Blueprint.

The primary focus of inter-agency coordination is in the sharing of information and infrastructure in order to achieve each agency's goals as quickly and efficiently as possible. Examples of how this approach can benefit all agencies involved include:

- The sharing of road and traffic condition information not only to the road user and information service providers for dissemination, but also to such agencies as police, emergency services, municipalities, fleet managers/dispatchers, airports, etc. to help to improve the efficiency of their operations. Use of the Internet as a dissemination tool will be very valuable in getting this information to these various agencies in an effective manner.
- The sharing of information with other non-road transportation related government agencies (e.g. weather information, airline schedules, tourist related information, etc.). This can be accommodated through the use of the Internet traveller information site and the provision of "hot links" to other agencies' sites.
- The development of partnerships with other agencies for the sharing of data and joint use of infrastructure. Examples of this include the formation of a partnership between Alberta Transportation, Alberta Environment and Alberta Agriculture in the area of RWIS to share data, field equipment and communications infrastructure, use of RWIS station infrastructure to collect other data (e.g. volume, vehicle classification, speed, video images, etc.), location of DMS to provide motorist advisory of conditions on both provincial highways and municipal roads, etc.

The opportunities presented above present an overview of the importance of the data collected within the many systems that are contemplated within the Highway 2 corridor.

Some will be directly under the control of Alberta Transportation while others will require close cooperation between agencies. The most important aspect of this data sharing is to recognize the potential, maintain close working relationships with the various agencies and to use open systems standards in the design of the various systems.

Partnership Development

There are a wide variety of agencies considered to be potential partners in the implementation and operation of the initiatives identified in the ITS Blueprint for Highway 2. Development of these partnerships will require significant effort on the part of Alberta Transportation in the area of interagency coordination and cooperation. The ITS Blueprint study initiated dialogue with these agencies and generated substantial interest among them. The momentum generated during the study should be capitalized on by continuing discussions, developing relationships, identifying areas of common interest and initiating discussions that will eventually lead to the formation of partnerships. It is important that these discussions be initiated now and the recommendations of the ITS Blueprint be brought forward for implementation to maintain the momentum generated by the ITS Blueprint and reinforce to the potential partners that Alberta Transportation is serious in their ITS program.

Next Steps

Suggested tasks For Alberta Transportation to foster interagency coordination and the formulation of partnerships include:

- Designate an ITS Champion within Alberta Transportation: To successfully develop and implement ITS, Alberta Transportation need an ITS champion. Responsibilities would include identification of projects, development of partnerships and coordination with both internal departments and external agencies.
- Develop a Working Committee with Interested Municipalities: Currently the cities of Edmonton, Calgary and Red Deer along with representatives of Alberta Transportation meet regularly to discuss their ITS related projects and plans. This should be continued on a formal basis (and perhaps widened to include more municipalities) to allow an exchange of information and identify areas where joint project development or sharing of resources may be of benefit.
- Actively Participate in Municipal Projects: The cities of Edmonton and Calgary have active ITS programs. The provincial highway network is an integral part of these cities' road networks. Alberta Transportation should directly participate with these municipalities in the planning and implementation of ITS projects, actively explore areas of common interest and jointly pursue initiatives of common interest.
- Formulate Operational Committees: Incident management and traveller information both involve the coordination of a wide variety of agencies, each with their own areas of responsibility, policies and procedures. Regular meetings with these agencies are recommended to discuss operational issues and identify how they can better work together, share information and help each other to achieve their common goals.

Marketing And Awareness

Marketing and increasing the awareness of ITS, its applications and the associated benefits is necessary from two perspectives, internally within Alberta Transportation and externally with the general public.

Internally ITS must be "mainstreamed" to make more staff at both the executive and technical levels aware of ITS, the technologies involved, its applications and the associated benefits so that potential applications of ITS are considered in the planning and design of all infrastructure projects. Even if ITS is not required until some point in

the future, provisions included in the planning and design of infrastructure projects can significantly reduce implementation costs when the need does arise. This internal marketing of ITS is best achieved through two initiatives:

- Conduct of internal seminars for both executive and technical staff as new projects and ITS initiatives are completed to keep all staff well informed of the ITS initiatives and its impacts; and
- Inclusion of ITS design considerations in all of Alberta Transportation's infrastructure projects. The inclusion of ITS design considerations can be achieved from a variety of approaches ranging from the inclusion of Alberta Transportation's ITS champion in the review of infrastructure projects to a more formal review process of all infrastructure projects that includes specific ITS considerations.

Externally, increasing the public's awareness of ITS, the information that it provides and where and how it can be accessed significantly increases the potential benefits of ITS. The most effective way to achieve this is through the involvement of the media in traveller information initiatives and allowing them to freely access and distribute the available information. Involvement of the media throughout the planning, design and implementation process will place the information more in the "public eye", allow the media to promote the initiatives through the resulting exposure of media coverage and ultimately result in a better product due to the input provided from a wider audience.

Increasing awareness of Alberta Transportation's ITS program will also naturally occur in the technical community as a result of the active involvement of Alberta Transportation's ITS champion in the activities of the local municipalities. It is anticipated that this individual will also participate in professional conferences, presentation of technical papers and public speaking events.

CONCLUSIONS

The ITS Blueprint for the Highway 2 corridor between Edmonton and Calgary sets out the direction, pace and priorities of investments in the application of “smart” roadway technology. It is a plan based on the transportation needs and priorities of the corridor, as identified by the project stakeholders. It is also a plan that will significantly expand management capabilities both in terms of traffic management and road maintenance as well as provide methods of meaningfully communicating valuable traveller information to the road users.

The ITS Blueprint requires an estimated capital investment of \$ 21 million dollars over the next 5 years. In return, it provides significant benefits in terms of a safer, more reliable and more efficient highway corridor. Given the significant role Highway 2 plays in the provincial highway network and as a key link in the CANAMEX North South Trade Corridor, the ITS Blueprint is considered to be a high priority and an essential ingredient in maintaining Alberta’s long-term economic viability.

APPENDIX A – LIST OF STAKEHOLDERS

Stakeholder Agency
Alberta Transportation/Gov't Departments
Maintenance Operations
Technical Standards Branch
Driver Safety, Research & Traffic Safety
Transportation Policy & Planning
Transportation & Civil Engineering
Highway Policy & Planning
Coordination and Information Centre
Public Affairs
Inspection Services
Municipal Programs
North/South Trade Corridor
Highway Asset Management
Materials & Technical Services
Consultant to Alberta Transportation
Alberta Municipal Affairs
Alberta Economic Development (Tourism)
Alberta Solicitor General
Alberta Safety Council
Municipal
City of Edmonton
City of Leduc
City of Red Deer
City of Calgary
City of Airdrie
Alberta Assoc. of Municipal Districts & Counties
Alberta Urban Municipalities Association
Maintenance/Meteorological
City of Calgary
Alberta Agriculture
Alberta Environment
Meteorological Services of Canada
AT Maintenance Inspectors
Maintenance Contractors (ARHCA)
Ledcor Alberta Limited
TSM
LaPrairie Group
Alberta Highway Services
Volker Stevin Contracting Ltd.
Carmacks Enterprises Limited
Emergency Services
RCMP
City of Calgary Fire Dept.
City of Calgary Police
City of Edmonton Emergency Response
City of Edmonton Fire Dept.
City of Edmonton Police
City of Red Deer Fire Dept.
City of Airdrie EMS
Users
Calgary Airport Authority

Stakeholder Agency
Alberta Motor Transport Association
Alberta Motor Association
Greyhound Canada
Red Arrow