

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



TERMS OF REFERENCE

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Technical Standards Branch
Materials and Technical Services Section
2nd Floor, 4999-98 Ave
Edmonton, Alberta
T6B 2X3



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**ADVANCED TRAVELLER INFORMATION AND TRAFFIC MANAGEMENT
SYSTEMS BLUEPRINT FOR HWY 2 BETWEEN EDMONTON AND CALGARY**
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I. BACKGROUND

The Highway 2 Corridor

Highway 2 between Edmonton (metro area population: 944 000) and Calgary (metro: 953 000) is the heaviest travelled route within Alberta, with traffic reaching AADT¹ levels of 44 000 to 48 000 veh/d at the boundaries with the two cities and averaging 24 000 veh/d near the City of Red Deer (population: 65 000). At 260 km long, it is designed to a four-lane rural freeway standard and expanded to six-lane as it approaches Edmonton and Calgary. The current posted maximum speed limit is 110 km/h. During non-peak hours, the highway operates at the free flowing LOS “A,” and dropping to “B” during peak hours. Recently, the province has taken over two major urban portions at either end of the corridor – Deerfoot Trail in Calgary and the planned (portions yet-to-build) Anthony Henday Drive (AHD) in Edmonton. See included map. The Deerfoot Trail experiences 120 000 to 200 000 veh/d along its heaviest section and is operating near capacity. For the AHD, the predicted volumes will be 27 000 veh/d. There are a total of 68 existing or proposed interchanges along the corridor, of which 17 are on the Deerfoot Trail, 13 on the Anthony Henday Drive, and the remaining 38 along the rural segments.

Aside from serving the many intra-provincial trips between the communities along the corridor, Hwy 2 also makes up a significant portion of the CANAMEX North South Trade Corridor that links the rest of the province to the US and Mexico. A variety of traffic comprises Hwy 2 travel: commercial, commuters, tourists, business and pleasure, long haul and short trips. There are other primary highways paralleling Hwy 2, but they do not have as high design standards and lack the continuity and directness of Hwy 2. For the foreseeable future, alternate modes such as rail and air transportation cannot replace this highway’s accessibility, convenience and economy for many travellers and freight carriers.

As vital as Hwy 2 is to travellers’ mobility and the Alberta economy, it is also a vulnerable conduit subjected to inclement weather events and major incidents. Because of the length and the north-south orientation of Hwy 2, weather variability during the winter months is a common occurrence. Over the years, the police have had to temporarily close portions of the highway when a major winter storm struck. In the summer months, visibility problems arising from dust and smoke have also caused havoc on this high-speed corridor. Driver error and the inability to quickly adapt to these poor driving conditions have led to and will continue to lead to serious collisions. During incidents of a lengthy nature, the police are sometimes hampered by the lack of real-time communication tools to help them safely direct the traffic flow at the affected area. The department of Alberta Transportation (AT), as the owner, and the private road maintainers are interested in reducing these highway “breakdowns” proactively, and responding with greater expedience when they do occur. On a lesser scale, construction and maintenance activities on the highway can induce temporary congestion, which may also lead to driver frustration. While safety is a major issue for the rural segments, Deerfoot Trail’s traffic problems are also compounded by recurrent congestion.

For these safety and operational reasons, two changeable message signs (CMS) were installed on Hwy 2 in 1999, one for southbound traffic leaving Edmonton and one for northbound traffic leaving Calgary. AT also inherited two legacy CMS on Deerfoot Trail. The department is experiencing some pressure to add some CMS in the Red Deer area. However, before installing more CMS, the department recognizes the opportunity to investigate the need and feasibility to tie these CMS into a coordinated Intelligent Transportation Systems (ITS) network. Included in this list of potential ITS applications are Road Weather Information Systems (RWIS) stations, incident detection systems, traffic cameras, highway advisory radios (HAR), roadside call boxes and overheight warning/detection systems. The department will need a rational blueprint to address the problems and solutions, the type of technologies to invest in, where to locate them and the staging of them.

¹ Refer to the **List of Acronyms and Abbreviations** for various acronyms used throughout this document

Provincial Perspective

In addition to the special needs identified for Hwy 2, there is an opportunity to enhance winter maintenance operations through the use of RWIS technologies across the province. Recently, a working committee consisting of representatives from each province and territory has drafted a “Road Weather System for Canada” (RWSC) proposal to be reviewed by Transport Canada and Environment Canada. The main points are:

- Build a national network of RWIS stations in a co-ordinated consistent manner
- Federal and provincial governments to cost-share on capital and installation costs

The proposal states that Alberta may commit to installing a maximum of 70 stations over a number of years and that these stations will be strategically placed on the designated National Highway System (NHS), of which Hwy 2 is a significant portion. Therefore, an ITS development proposal for Hwy 2 will incorporate a wider outlook on the RWIS deployment.

II. STUDY OBJECTIVES

The department has already developed a high level strategic vision for implementing ITS². This study will require the selected Consultant to translate the departmental ITS vision into a set of functional plans and in some case, detailed designs, for the identified ITS components. **The Consultant is expected to ensure compatibility with the Canadian and US ITS Architectures and to identify any exceptions.** As well, the draft RWSC proposal that contains specific hardware and siting requirements will be made available to prospective consultants.

The objectives for the department are to:

- Enhance traffic safety and operations of Hwy 2 between Edmonton and Calgary, with the initial focus on the area near Red Deer
- Enhance traffic safety and operations, and reduce/control congestion on Deerfoot Trail within Calgary
- Enhance future traffic safety and operations of Anthony Henday Drive in Edmonton
- Ensure opportunities exist to integrate solutions examined in this Blueprint with the cities’ ITS plans
- Enhance winter maintenance performance on the designated National Highway System in Alberta
- Deploy ITS solutions in a cost-effective well-planned manner

The specific objectives of the study are to:

- Assess the immediate and future needs for safety and operational improvements that can be addressed through ITS technologies, and evaluate the effectiveness of existing ITS hardware such as CMS, emergency call boxes and overheight warning/detection
- Analyze the costs and benefits in adopting particular ITS systems that are relevant to the study corridor
- Develop a specific *long-term vision* that will guide the future advancement and deployment of Advanced Traveller and Traffic Management Systems for the Hwy 2 corridor
- Develop an *Advanced Traveller Information and Traffic Management Systems Blueprint for the Hwy 2 corridor* that will address the immediate (up to 5 years) and long-term needs (5-10 years), and the staging options. The Blueprint must include:
 - a functional plan to deploy an *incident management system* which will map out temporary detours on selected critical segments;
 - a functional plan to deploy a *rural traveller information system* throughout the rural portion that also ties into the *incident management system*;
 - a functional plan to deploy a *traffic management and urban traveller information system*; to alleviate recurrent and non-recurrent congestion, and incidents along the Deerfoot Trail;
 - a preliminary functional plan to deploy a *traffic management and urban traveller information system* in anticipation of traveller needs along the Anthony Henday Drive;

² <http://www.trans.gov.ab.ca/Content/doctype52/production/ITS%20Strategic%20Plan.pdf>

- a detailed plan for *RWIS deployment* including detailed equipment specifications for road and atmospheric sensors, and how to link to the proposed ITS systems;
 - detailed equipment specifications and standards for possible *smart work zone* deployment which may include portable CMS, HAR, speed management and other technologies;
 - detailed equipment specifications and standards, site-specific locations, and operation logistics for a coordinated CMS deployment to support the identified ITS systems;
 - detailed equipment specifications and standards for possible HAR and traffic camera deployment to support the identified ITS systems;
 - a communications infrastructure strategy that supports present and future ITS deployment;
 - a strategy to link up with the three major metropolitan areas' own ITS deployment (if any) and with the RCMP emergency highway closure plans;
 - a strategy to advise travellers through the use of the Internet and other means such as self-serve kiosks at roadside and off-road facilities, and alternative broadcasting media;
 - a strategy to incorporate the use of CMS and/or HAR for driver safety messages along with traveller information.
 - this Blueprint should not be limited to the identified ITS technologies, but may also capture at a high level, possible connections to other ITS technologies such as CVO systems, GPS/AVLS maintenance fleet tracking and other state-of-the-art systems that may affect the operations of Hwy 2.
- Recognizing that winter conditions are not confined to one specific corridor and that an effective RWIS deployment requires a network framework, this Blueprint will include a **province-wide RWIS Network Deployment Plan for Alberta's National Highway System**.

III. STUDY SCOPE

- Highway 2, rural divided roadway between the cities of Edmonton and Calgary, approximately 260 km
- Deerfoot Trail in the City of Calgary, from north city limits to the new extension connection with Hwy 2 at the south end, approximately 50 km
- Anthony Henday Drive in the City of Edmonton, from the Hwy 16 interchange at the north end to the connection with Gateway Boulevard at the south end, approximately 25 km
- A short section of the Gateway Boulevard that connects AHD with Hwy 2, and a short section of Yellowhead Trail that ties AHD into Hwy 16 (City of Edmonton is the road authority for the sections)
- Any other adjoining roadways including urban arterials that may be potentially influenced or impacted by the proposed ITS corridor development, should be identified for future review
- For the RWIS Network Deployment Plan, the NHS consists of approximately 3,400 km of roadways: Hwys 1, 2, 3, 4, 9, 16, 35, 43, 49 including portions through incorporated towns, villages and cities that are under the department's jurisdiction (see Figure 3)

IV. WORK PLAN

1) Phase 1 – Assessment

- Gather basic background information such as collision, traffic and critical events statistics (raw collision data, traffic information and all base maps will be made available for the Consultant)
- Consult and interview stakeholders on safety and operational issues, and the needs for solutions
- Take stock of existing ITS hardware inventory along the corridor and their current operational status (some information will come from Alberta Transportation and some from the City of Calgary)
- Identify relevant technologies that can be realistically implemented under the current technology regime and the department's budget constraints for the short and long terms
- Estimate costs and benefits of potential ITS applications
- Do not perform driver/traveller surveys

- Submit a Needs Assessment Summary Report that identifies the requirements for ATIS and ATMS
- At the same time, formulate and submit a detailed Work Plan with all the scheduled tasks for the next two phases (to be approved by the Project Steering Committee)

For the RWIS Plan development specifically:

- Gather information on existing RWIS equipment (City of Calgary and Alberta Transportation)
- Consult and interview the various maintenance contractors the department's regional staff, and local Environment Canada meteorologists for siting (field visits will be required) of the 70 stations or so, on maps to be provided by the department
- Gather information on existing weather/environmental stations in Alberta (Environment Canada, Alberta Environment, Alberta Agriculture, Alberta Sustainable Resources, etc.) and determine if they can be upgraded to a RWIS station

2) Phase 2 – Blueprint Development

- Identify and consult with the key stakeholders to be involved in the various deployment and operations
 - how will the responsibilities for various CMS, HAR, OWD, RWIS and traffic cameras be handled and by whom?
- Address legacy systems and interoperability issues
 - potential integration of existing CMS, HAR, OWD, and RWIS with new deployments
 - potential upgrades and future interoperability obstacles
- Identify the technological and physical elements needed
- Identify the logical, physical and communication interfaces needed
 - what road and office infrastructures including hardware, software and communications that identifies the requirements for ATIS and ATMS need to be implemented?
- Identify best practices from elsewhere based on similar traffic, road and weather characteristics
- Address applicable standards for the different subsystems and elements
 - NTCIP standards for CMS, traffic cameras, HAR and RWIS
 - National RWIS standards under discussion by the provincial/federal departments (RWSC)
- Address institutional and policy issues
 - existing road closure policies; inter-department coordination (fire, police, roads, EMS); detour design considerations
- Outline marketing, public information and driver education strategies
- Perform a risk analysis for recommended technologies and strategies
 - identify traffic safety impacts and financial risks
- Address all other issues not listed here that are relevant to accomplishing the study objectives

3) Phase 3 – Final Blueprint Report

(A) Common Components

The **Blueprint** will furnish **tender specifications** for these individual ITS components:

- i. **CMS (permanent and portable)**
 - recommended technology type, the rationale, estimated costs
 - number of lines, character size, characters per line, etc.
 - sign legibility, conspicuity and brightness
 - message list, and any graphics
 - communication requirements and transmission medium (fibre optics, radio, cellular, microwave, etc.)
 - remote access and controlling software; including Internet-based requirements
 - siting of new CMS locations; structures needed
 - any upgrading and/or replacement of existing equipment
 - maintenance, serviceability and durability

- the new ITE/AASHTO Traffic Management Data Dictionary standard, related NTCIP and other applicable standards
- detailed specifications and commissioning tests

ii. Traffic Cameras

- recommended camera technology type, the rationale, estimated costs
- colour versus black and white, resolution, zooming and tilt/pan capability
- video compression techniques, communication requirements and transmission medium (fibre optics, radio, cellular, microwave, etc.)
- remote access and controlling software; including Internet-based requirements
- opportunities to combine camera installations with other ITS structures such as existing and future RWIS stations, and with non-ITS structures
- lowering mechanism
- maintenance, serviceability and durability
- any relevant standards, detailed specifications and commissioning tests

iii. HAR (permanent and portable)

- recommended technology type, the rationale, estimated costs
- AM or FM carrier, availability of broadcast frequencies
- federal government approval process
- locations, housing of equipment, supplementary signing needed
- standard messages, update frequencies, operational process
- any relevant standards, detailed specifications and commissioning tests

Other technologies to be included at lesser details (the Consultant may include as many ITS technologies as appropriate subject to relevancy and time/budget constraints): *Incident Detection, Overheight Warning/Detection, Speed Management, Traffic Classification/Counting, Signal Enforcement and Ramp Metering.*

(B) Detailed Plans

The **Blueprint** must include adequate plan details showing the approximate locations of the various ITS components on base maps as supplied by AT. These Plans will address the immediate (up to 5 years) and long term needs (5-10 years) as identified in Phase 1, and will provide options for staging the deployment. The Consultant is encouraged to present to the Project Steering Committee for considerations alternative solutions that will achieve the stated objectives:

i. Incident Management System Functional Plan for Hwy 2

- Costs and benefits; risk analysis
- Link to the *rural traveller information dissemination system*
- A set of plans for emergency detour layout and management along the main highway and the connecting roads
- Type of CMS, HAR, traffic cameras, traffic classification/counting, incident detection sensors speed management, and any other components needed
- How to upgrade and integrate the OWD
- Siting of CMS and other components and the optimal staging of implementation
- Layout of messages on the CMS
- Message templates for CMS and HAR operations
- IEEE-SA's new ITS Data Registry and the IEEE 1512 "Common Incident Management Message Sets for Use by Emergency Management Centres" should be reviewed for relevancy
- How to integrate the proposed system with RCMP's road closure policy
- Procedures, roles and responsibilities for all stakeholders involved
- Flow of command and coordination of efforts during a major incident
- Will the system have Internet-based capability?
- Do we need to consider the "Mayday/E911" system under development in the US?

- ii. Rural Traveller Information Functional Plan for Hwy 2**
- Costs and benefits; risk analysis
 - Link to the *incident management system* and the *urban traveller information systems*
 - Type of CMS, HAR, traffic cameras and any other components needed
 - Siting of CMS and other components and their optimal staging
 - Layout of messages on the CMS
 - Message templates for CMS and HAR operations
 - Identify alternate methods of disseminating real-time road/weather information for pre-trip planning purposes - such as via the Internet, kiosks and alternative broadcasting media
 - Interaction with the future *RWIS network*
 - Procedures, roles and responsibilities for all stakeholders involved
 - Flow of command to activate/change messages and to coordinate these messages across all the CMS
 - Should we continue (and integrate) or cease call box services?
 - How do we incorporate driver safety messages into the traveller information stream; how frequently should they be displayed? What issues should we consider in making our policies?
 - Do we need a traffic management centre to handle the *incident* and *traveller information systems*?
 - Do we need to consider a similar US “511” traveller information hotline in the plan development?
- iii. RWIS Network Deployment Plan for the NHS, including Hwy 2**
- Costs and benefits; risk analysis
 - Link to the *rural and urban traveller information systems*: identify best-suited means to communicate timely weather-related road conditions to drivers through CMS, HAR, broadcast media, internet-based maps, “web-cams” or self-serve kiosks
 - Understand how Alberta’s current outsourced maintenance works and the level of service concepts; identify how to integrate RWIS technologies into maintenance practices; address anti-icing strategies in details
 - Address possible links to Environment Canada, US FORTELL or any third-party weather forecasting services
 - Evaluate and recommend specific sites for new stations based on meteorological/environmental assessments and winter maintenance practices
 - Address legacy system interoperability, integration and upgrade issues (City of Calgary); evaluate the “test” RWIS station near Lethbridge and review the “Bow River Bridge RWIS Feasibility Assessment” report
 - Identify communication standards and protocols needed such as NTCIP-ESS
 - Identify office equipment and communication requirements, computer server storage needs, software issues, and recommend any immediate/future upgrade needs
 - For each RWIS station, identify a list of specific equipment, specify the types and number of road and weather sensors (including any visibility sensors), and any ancillary equipment including traffic camera and monitoring hardware; identify FAST applications for candidate bridge structures; provide all relevant applicable equipment standards
 - Draw up possible staging scenarios for the installations over a number of years
 - Address any operation issues for the department and its partners in winter maintenance
 - Identify suitable vendors and prepare **tender specification documents**
 - Identify system commissioning tests; perform quality controls and acceptance testing
- iv. Traffic Management & Urban Traveller Information Functional Plan for Deerfoot Trail**
- Costs and benefits; risk analysis
 - Link to the *rural traveller information system*, and the *RWIS network*
 - Include a traffic incident management and emergency detour plans for selected critical sections of Deerfoot Trail (similar to the *incident management system* plan for Hwy 2)

- How to alleviate driver frustration during congestion periods?
- How to inform enroute drivers of real-time traffic and road/weather data, and provide navigation advisories?
- Identify methods to estimate possible impacts on the city's network from implementing this system (modeling techniques?)
- Siting of CMS, traffic cameras and other components and their optimal staging
- Layout of messages on the CMS
- Message templates for CMS and HAR operations
- How to integrate/incorporate legacy and new RWIS stations
- Identify alternate methods of disseminating real-time road/weather information for pre-trip planning purposes - such as via the Internet, kiosks at roadside and off-road facilities, and alternative broadcasting media
- Procedures, roles and responsibilities for all stakeholders involved
- Flow of command to activate/change messages and to coordinate these messages across all the CMS
- How to integrate proposed systems with the City's fire, police, traffic and EMS management?
- Identify opportunities to integrate or link with the City of Calgary's ITS plans
- Should we continue (and integrate) or cease call box services?
- Should we consider ramp metering?
- Do we need to consider the proposed US "511" traveller information hotline in the current plan development?

v. ***Traffic Management & Urban Traveller Information Preliminary Functional Plan for Anthony Henday Drive***

- Costs and benefits; risk analysis
- Link to the *rural traveller information system*, and the *RWIS Network*
- Red light signal enforcement systems for major at-grade intersections
- Identify opportunities to include ITS elements during the construction of AHD such as RWIS stations on new bridge sites
- Identify opportunities to integrate or link with the City of Edmonton's ITS plans
- Similar to the plan for Deerfoot Trail with the major difference that this will be for a much longer term future, should contain higher level details (less design-oriented), and has the flexibility to include innovative technologies not considered viable in the immediate future such as in-vehicle information/warning systems

vi. ***Smart Work Zone Deployment Plan for Hwy 2***

- Costs and benefits; risk analysis
- Link to the *incident management system* and the *traveller information systems* as needed
- For both rural highway and Deerfoot Trail operations
- Type of portable CMS, HAR, and any other components needed
- Layout of messages on the CMS
- Message templates for CMS and HAR operations
- Identify speed monitoring and management tools appropriate for high speed corridors
- Feed into any real-time pre-trip traffic information - such as via the Internet, kiosks at roadside and off-road facilities, and alternative broadcasting media
- Procedures, roles and responsibilities for all stakeholders involved
- Flow of command to activate/change messages and to coordinate with other permanent CMS

V. STUDY SCHEDULE AND DELIVERABLES

DELIVERABLE/ MILESTONE	DATE REQUIRED	SUBMIT BY	REVIEW BY
Terms of Reference	April 30, 2002	Project Coordinator	Project Steering Committee Selected stakeholders
<i>Call-for-Proposal</i>	<i>May 7, 2002</i>		
Study Proposal	June 5, 2002	Consultant	Project Steering Committee Consultant Selection Committee
<i>Consultant Selection</i>	<i>June 20, 2002</i>		
Needs Assessment Summary Report	September 24, 2002	Consultant	Project Steering Committee All stakeholders
ITS Work Plan	September 24, 2002	Consultant	Project Steering Committee
Preliminary ITS Blueprint Report	January 14, 2003	Consultant	Project Steering Committee
Final ITS Blueprint Report	March 18, 2003	Consultant	Project Steering Committee All stakeholders
<i>Study Closure</i>	<i>April, 2003</i>		

The Consultant shall provide up to twenty copies of all the reports, along with an electronic copy of the text files and drawings.

In addition to the above deliverables, the Consultant is expected to provide **Progress Reports** at approximately two-month intervals from study initiation. These Reports shall be brief, succinct and chart the identified work task progress, financial progress and any action items requiring a decision from the Project Steering Committee. The Consultant will be required to hold progress review meetings with the project steering committee at major milestones. Furthermore, the Consultant will make **two formal presentations** of the final report - one for the department's executives and one for the Stakeholders involved.

VI. STUDY TEAM

1) Alberta Transportation

An internal department *Project Steering Committee* will oversee the progress and guide the directions of the Study. The Committee will designate a *Project Coordinator* to directly liaison with the Consultant on a day-to-day basis. The Committee, with assistance from the Project Coordinator, will:

- Select the Consultant for this Study
- Review and approve any deliverables
- Provide any relevant background information, including design drawings and files, background reports, and existing inventories
- Provide guidance on any functional and staging options as they arise
- Ensure all Study objectives are met on schedule
- Approve any changes as requested
- Make the final approval of the Consultant's performance in fulfilling the contract

2) Stakeholders

The list of possible Stakeholders must include:

- Department staff and units responsible for relevant aspects of the Study
- Contracted maintenance forces that will be affected
- Police services that will be affected
- Cities of Edmonton, Leduc, Red Deer, Airdrie and Calgary (may include different organization units from each city; may include regional authorities)
- Alberta Motor Transport Association
- Alberta Motor Association
- Alberta Environment
- Environment Canada
- Local university researchers
- The Consultant may identify additional Stakeholders not listed here

3) Consultant Team

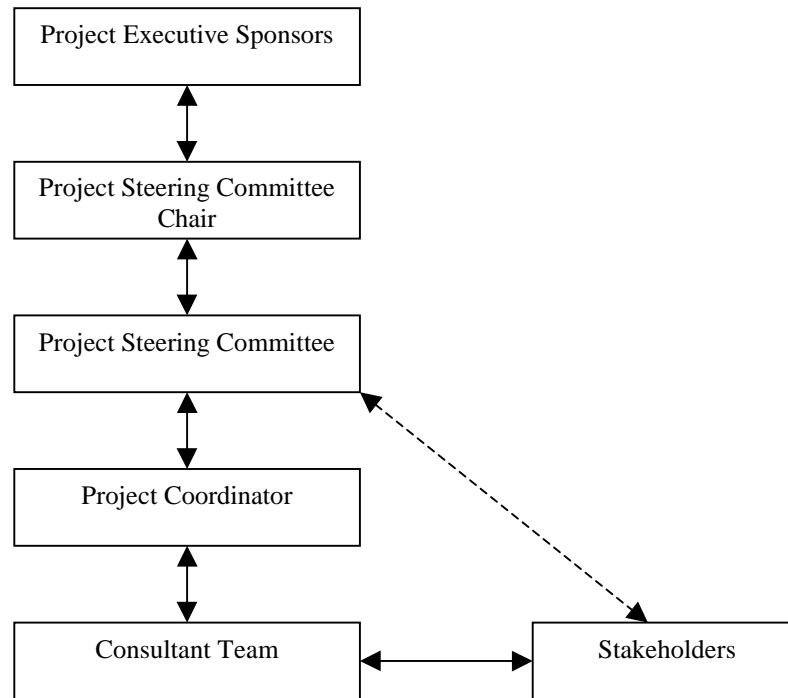
The Consultant Team must comprise transportation professionals specializing in ITS applications, with a thorough understanding of the Canadian and US ITS Architectures, practical experiences in urban/rural traffic management and incident management, and working knowledge of hardware components that include CMS, HAR, and CCTV. Additionally, the Team will include expertise and specific experiences in RWIS planning, procurement and installation. The firm must demonstrate their experience in working on complex studies, and dealing with a large institution under policy/institutional constraints.

The Consultant Team must include at least one Alberta-based professional or firm who has relevant transportation engineering/planning expertise, intimate knowledge of the provincial highway system, its traffic and driver characteristics, and the prevalent environmental and institutional issues. The Alberta-based professional/firm should be able to make significant contributions to the Study.

The Consultant Team must be an independent firm(s) that has no direct or indirect affiliations (financial or otherwise) with an ITS product manufacturer/vendor, and must disclose any associations that may affect the impartiality of the Study outcome.

A list of pre-qualified consultants who have worked for Alberta Transportation in the past can be found in <http://www.trans.gov.ab.ca/Content/doctype29/production/preq197x.pdf>. However, this list is not intended to be exhaustive and does not account for many Alberta-based professionals who do not regularly bid on department projects.

Project Management Structure Diagram



VII. CONSULTANT SELECTION CRITERIA

The following weightings will be used to evaluate all proposals

- Clarity and Presentation 10%
- Study Comprehension 10%
- Costs 20%
- Study Team Qualifications and Experience 30%
- Methodology and Innovation 30%

The main body including any appendices of the Proposal shall be no longer than sixteen pages (single-sided). Demerit points will be assessed for proposals exceeding this limit. The letter of submittal, resumes, and any diagrams, figures or charts will not count toward the page count.

VIII. MISCELLANEOUS

1) Briefing Session

If needed, a briefing session will be scheduled prior to the Study Proposal submission deadline, and all interested consultants shall be notified as to the exact location and time. Therefore, it will be important for prospective consultants to express their intent in a *letter of interest* to the department as soon as possible to ensure the consultants receive all updates to this Request promptly.

2) Contact Personnel

For the Study Terms of Reference, please contact:

Mr. Allan Lo, P.Eng. at allan.lo@gov.ab.ca or 780-415-1021

For the submission process, please contact:

Mr. Allan Donovan, P.Eng. at allan.donovan@gov.ab.ca or 780-422-4202.

LIST OF ACRONYMS AND ABBREVIATIONS

AADT – Average Annual Daily Traffic

AASHTO – American Association of State Highway and Transportation Officials

AHD – Anthony Henday Drive

ATIS – Advanced Traveller Information Systems

ATMS – Advanced Traffic Management Systems

CANAMEX - CANada, AMerica, MEXico highway corridor

CCTV – Closed Circuit Television

CMS – Changeable Message Signs, variants include Variable Message Signs (VMS) and Dynamic Message Signs (DMS)

CVO – Commercial Vehicle Operations

EMS – Emergency Medical Services

FAST – Fixed Anti-icing Spray Technology

GPS/AVLS – Global Positioning System/Automatic Vehicle Location System

HAR – Highway Advisory Radio

Hwy – Highway

IEEE-SA – Institute of Electrical and Electronics Engineers - Standards Association

ITE – Institute of Transportation Engineers

ITS – Intelligent Transportation Systems

km/h – Kilometre per Hour

LOS – Level of Service

NHS – National Highway System

NTCIP – National Transportation Communications for ITS Protocol
(ESS) – Environmental Sensing Station, subset of NTCIP

OWD – Overheight Warning/Detection Systems

RCMP – Royal Canadian Mounted Police

RWIS – Road Weather Information Systems

RWSC – Road Weather Information System for Canada

veh/d – vehicles per day