

Intelligent Transportation Systems Study for the Edmonton and Calgary Ring Roads

Terms of Reference

Highway Policy and Planning Branch
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Edmonton, AB T6B 2X3



March 1, 2004

Background

Alberta Transportation has developed a strategic vision for implementing Intelligent Transportation Systems (ITS) to improve the safety, capacity, and efficiency of the provincial transportation system. The ITS Strategic Plan, dated September 2000, provides a vision for the future of ITS in Alberta's provincial highway system and outlines strategies for Alberta Transportation to develop and deploy these technologies. The ring roads in the cities of Edmonton and Calgary are top priority projects in Alberta, and they are integral components of the Trans-Canada Highway and the Trans-Canada Highway Yellowhead Route through the province. Deployment of ITS technologies will further enhance the safe and efficient operation of the ring roads in the two cities.

Edmonton Ring Road – Anthony Henday Drive

A major part of the Edmonton ring road, also known as Anthony Henday Drive (AHD), is located inside the city limits of Edmonton. By agreement with the City, Alberta Transportation is responsible for funding and developing AHD. AHD is part of Alberta Transportation's initiative to provide a high standard highway trade corridor linking Alberta to the United States and Mexico. In addition, the roadway forms an important part of Edmonton's overall transportation system and is included in the City's Transportation Master Plan, which addresses future transportation needs to the year 2020.

Growth in the Edmonton metropolitan area will reach a population of 1.17 million by 2020 with significant traffic growth at the same time. Construction of AHD will provide a bypass route around Edmonton and divert truck traffic to relieve congestion on existing urban routes. Upon completion, AHD is expected to carry as high as 40,000 vehicles per day at the heaviest travelled sections, based on 2010 forecasts. The segment of AHD from Highway 16 West to 45th Avenue is currently opened to traffic with a posted speed limit of 90 kilometres per hour. Current traffic on the existing section of AHD is about 32,400 vehicles per day.

Alberta Transportation is currently constructing the southwest section of AHD extending from 45th Avenue to Highway 2 South. This 4-lane divided road is proposed to be completed by fall 2006, and will tie with the southeast AHD to provide a complete south Edmonton ring road. Construction of the southeast AHD, from Highway 2 South to Highway 14, is anticipated to commence in 2004 and open for traffic in 2007. When the southeast AHD is complete, the projected traffic will range from 21,000 to 36,000 vehicles per day and grow at 2% to 3% annually. It is anticipated that the southeast ring road will carry approximately 5% trucks upon completion.

A functional planning study for the Edmonton north ring road was completed in 2001. Upon completion of the Edmonton south ring road and if funding is available, Alberta Transportation will continue to develop the north leg for a complete ring road system around Edmonton.

Calgary Ring Road

The Calgary ring road is a major component of the 1995 Calgary Transportation Plan's proposed skeletal road network and it is located inside the city limits of Calgary. By agreement with the City, Alberta Transportation is responsible for funding and developing the ring road.

Calgary's population is projected to reach 1.25 million by 2024 with considerable traffic growth during the same period. Completion of the ring road will provide a high-standard alternate route bypassing the city core. The existing section of the northwest ring (Stoney Trail) from Trans-Canada Highway West to County Hills Boulevard will be widened to a 4-lane divided standard. Current traffic on this existing section is about 34,000 vehicles per day with 5% trucks.

Alberta Transportation is planning to extend the northwest Stoney Trail from Country Hills Boulevard to Highway 2 North to accommodate increasing traffic demands from new developments in the area. Upon completion of the extension in 2007, the projected traffic on the extended section will range from 8,000 to 31,000 vehicles per day, depending on adjacent development progress. The traffic on Stoney Trail is expected to grow at about 4% annually and compose of about 5% trucks.

Alberta Transportation will continue to explore opportunities to construct other sections of the ring road, and continue negotiations with the City of Calgary and the Tsuu T'ina Nation to develop the proposed southwest connector road (Sarcee Trail Extension) through the First Nation land.

Future Ring Roads Development

The ring roads are located in the Transportation and Utility Corridors around the two cities. The province has purchased most of the rights-of-way, and most of the ring road alignment and configuration have been defined, except for the southwest connector road in Calgary.

Alberta Transportation will be issuing a Request for Proposals for delivering the southeast Anthony Henday Drive as a public-private partnership (P3) project. If this procurement model is proven to be successful, future development of other sections of the ring roads may use this delivery mechanism. Under the P3 arrangements, the successful contractor is responsible for the operation of the roadway for 30 years; therefore ITS implementation will have to be done in cooperation with the contractor.

Given the rapid development of the ring roads, Alberta Transportation is retaining a consultant to review opportunities for ITS applications on the existing and future sections of the Edmonton and Calgary ring roads, including major highway penetrators. This ITS study will identify immediate and long-term needs, explore ITS solutions, and integrate ITS in the design of future ring road development.

Study Objectives

Alberta Transportation has already developed a strategic plan for implementing ITS. The department's ITS Strategic Plan (<http://www.trans.gov.ab.ca/Content/doctype52/production/its01.htm>) identifies the overall mission, vision, and objectives for ITS development and outlines an action plan to deploy these technologies. This study will require the selected consultant to translate the departmental ITS vision into a set of functional plans and in some cases, detailed design specifications, for the identified ITS components. The consultant is expected to ensure compatibility with the Canada and US ITS Architectures and to identify any exceptions.

The objectives for Alberta Transportation are to:

- Enhance traffic safety and operations of existing and future sections of the Edmonton and Calgary ring roads, including major highway penetrators;
- Ensure opportunities exist to integrate solutions examined in this study with the cities' ITS strategic plans; and
- Develop and deploy ITS in a staged, coordinated, systematic, and cost-effective manner.

The ring roads are priority projects in Alberta. Construction of the ring roads is underway and will continue in the next few years. It is timely to explore opportunities for ITS applications so that they can be integrated with the planning and design of the roads in advance of construction.

The study will identify the needs and deployment opportunities for ITS technologies, including Weigh-In-Motion (WIM) scales, Automated Vehicle Identification (AVI), Dynamic Message Signs (DMS), Video Incident Detection Systems, Fixed Automated Spray Technology (FAST), Road Weather Information System (RWIS), and other ITS technologies for the Edmonton and Calgary ring roads.

The specific objectives of the study are to:

- Assess the immediate and future needs for traffic monitoring, and safety and operational improvements that can be addressed through ITS technologies;
- Analyze costs and benefits in adopting particular ITS systems that are relevant to the ring roads;
- Integrate ITS solutions with the planning and design of the ring roads;
- Develop a need- and technology-based strategy for monitoring and managing commercial vehicle operations on the ring roads; and
- Based on the above, develop an ITS plan for the Edmonton and Calgary ring roads that will address the immediate and long-term needs, and the staging options of ITS applications.

Study Scope

The study scope will include the entire ring roads in Edmonton and Calgary, and the major highway penetrators that are part of the National Highway System, as stated in the following table, and shown in the attached maps. The focus of the study is on the ring roads. However, it is important to take a strategic and regional approach to reviewing traffic patterns in the greater Calgary and Edmonton areas. The national highway penetrators also play an important role in connecting regional traffic with the ring roads. Together the ring roads and the national highway penetrators form an integrated urban and regional system to move people and goods through and around the Calgary and Edmonton metropolitan areas.

The study limits for the national highway penetrators identified in the table are somewhat arbitrary and stated as a guide. Although the study scope does not include all other highway penetrators, some of the major highway penetrators are listed in the follow table. The consultant should consider and identify locations for ITS deployment where it makes the most sense from a regional perspective, even if the locations fall outside of the study scope. As indicated in the following table, a majority of the ring roads are still undeveloped. The consultant will have to rely on available functional plans and traffic projections for the study.

Alberta Transportation recently developed a Traveller Information System Blueprint for the Highway 2 corridor between Calgary and Edmonton. The blueprint includes some sections of the ring roads and highway penetrators in the two cities. As part of the blueprint study, a RWIS plan has been developed for the installation of 70 RWIS stations on Alberta's National Highways. The consultant should review the blueprint and RWIS plan, and make further recommendations if necessary.

CITY OF EDMONTON				
Highway	From	To	Approximate Distance (km)	Status
Ring Road (Anthony Henday Drive)				
Southwest	Hwy 16 West	45 th Avenue	10	Existing
Southwest	45 th Avenue	Hwy 2 South	15	Completion by 2006
Southeast	Hwy 2 South	Hwy 14	11	Completion by 2007
Hwy 216 (East)	Hwy 14	Hwy 16	13	Existing
North	Hwy 16 West	Hwy 16 East	30	To be constructed
National Highway Penetrators				
Hwy 16 West	Ring Road	Hwy 60	6	Existing
Hwy 2 South	Ring Road	Hwy 19	11	Existing
Hwy 16 East	Ring Road	Hwy 21	7	Existing
Manning Freeway	Ring Road	Hwy 28A Junction	8	Existing
Hwy 28A	Manning Freeway	Hwy 37	3	Existing
Other Major Highway Penetrators				
Whitemud Drive West Extension, Highway 16A, St. Albert Trail, Highway 28, Sherwood Park Freeway, Highway 14, and Highway 814.				

CITY OF CALGARY				
Highway	From	To	Approximate Distance (km)	Status
Ring Road				
Northwest Stoney Tr.	Hwy 1 West	Country Hills Boulevard	7	Existing
Northwest Stoney Tr.	Country Hills Boulevard	Hwy 2 North	16	Completion by 2007
Northeast Stoney Tr.	Hwy 2 North	Hwy 1 East	18	To be constructed
Southeast	Hwy 1 East	Hwy 22X	18	To be constructed
Hwy 22X	East Ring Road	Southwest Connector Road	15	Existing
Southwest Connector Road	Hwy 22X	Hwy 8	14	Under negotiations with Tsuu T'ina Nation and the City of Calgary
Hwy 8	Sarcee Trail	Stoney Trail South Ext.	5	Existing
Stoney Tr. South Ext.	Hwy 8	Hwy 1 West	8	To be constructed
National Highway Penetrators				
Hwy 1 West	Ring Road	Hwy 22	16	Existing
Hwy 2 North	Ring Road	Hwy 566	4	Existing
Hwy 1 East	Ring Road	Hwy 1A Junction	9	Existing
Deerfoot South Ext. (Hwy 2)	Ring Road	Hwy 2A Junction	11	Existing
Other Major Highway Penetrators				
Highway 22X East and West Extensions, Highway 2A (Macleod Trail), Highway 8, Highway 1A West Extension (Crowchild Trail), Highway 1A East Extension (17 Avenue SE).				

Work Plan

1) Data Collection and Assessment

- Gather basic background information such as existing and projected collision and traffic statistics (raw collision data, traffic information, and all functional plans will be made available for the consultant).
- Review all existing relevant reports including the Highway 2 blueprint, RWIS plan, and the cities' ITS strategic plans.
- Consult and interview staff of Alberta Transportation and the two cities on current practices, safety and operational issues, and the needs for solutions. Hold discussions with the Alberta Motor Association concerning the road conditions reports on its web site.
- Identify relevant technologies that can be realistically implemented under the current technology regime and the department's budget constraints for the immediate and long terms.
- Address applicable standards for different subsystems and elements following the National Transportation Communications for ITS Protocol (NTCIP) standards for various ITS technologies.
- Identify best practices from elsewhere based on similar traffic, road, and weather characteristics.
- Estimate life-cycle costs and benefits of potential ITS applications. Costs include initial capital and ongoing maintenance and operating costs.
- Prepare and submit a Needs Assessment Report summarizing the findings of the above tasks and identifying the ITS requirements on the ring roads and the major highway penetrators.

2) Plan Development

- Develop a strategy on the dissemination of information to the public, emergency services, and road authorities via DMS, Internet, or other media, including policy and protocol for DMS messaging. Part of the strategy should include recommendations on telecommunications infrastructure and the application of wireless communications.
- Develop a strategy on monitoring and managing commercial vehicle operations.
- Perform a risk analysis for recommended technologies and strategies, and identify traffic safety and operation impacts and financial risks.
- Identify locations of the various ITS components on plans supplied by Alberta Transportation. These plans will address immediate (up to 5 years) and long-term (5-10 years) needs as identified in the Needs Assessment, and will recommend staging options for deployment. The recommendations will be based on life-cycle benefit-cost analyses. The focus should be on the immediate needs on the existing sections and sections to be constructed in the next few years.
- Identify opportunities to include ITS elements in the design and construction of the ring roads, such as underground conduits for future installations.
- Prepare detailed tender-ready specifications for ITS components that are recommended for immediate (up to 5 years) deployment.

- The study must, to a varying but adequate degree of detail, address the following individual ITS components. The consultant should explore opportunities for integrating these components and leveraging their capability to achieve practical and cost effective solutions. The recommended technology should be based on its effectiveness, maintenance, serviceability, durability, and conformance with the national ITS architecture.
 - Weigh-In-Motion / Virtual Weigh Stations / Automated Vehicle Identification
 - Dynamic Message Signs (permanent and portable)
 - Video Incident Detection Systems
 - Fixed Automated Spray Technology (FAST)
 - Road Weather Information System (RWIS)

Other technologies to be included in lesser details (the consultant may include as many ITS technologies as appropriate subject to relevancy and time/budget constraints): overheight warning/detection, speed management, traffic classification/counting, and ramp metering.

- Develop and present to the Steering Committee a draft final report detailing the results and recommendations of the above tasks.
- Make at least one formal presentation of the recommendations to Alberta Transportation's Management Committee.
- Finalize the report incorporating feedback from the Steering Committee and Management Committee.

Study Schedule and Deliverables

Deliverable/Milestone	Date Required
Circulate Draft Terms of Reference	February 3, 2004
Finalize Terms of Reference	March 1, 2004
Issue Call for Proposals	March 8, 2004
Closing Date for Proposals	March 31, 2004
Consultant Selection	April 16, 2004
Start Project	April 19, 2004
Final ITS Study	September 30, 2004

The consultant shall provide up to twenty copies of the final report, along with an electronic copy of the text files and drawings.

The consultant shall provide progress reports and review them with the Steering Committee at major milestones. The consultant is also expected to conduct interview meetings with staff of Alberta Transportation, the two cities, and the Alberta Motor Association to collect information for the Needs Assessment.

The progress reports shall be brief, succinct, and chart the identified work task progress, financial progress, and any action items requiring a decision from the Steering Committee.

Study Team

An internal department Steering Committee will manage the study, oversee the progress, and provide directions for the study.

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 ITS deployments, and working knowledge of hardware components that include WIM, DMS, Video Incident Detection Systems, FAST, and RWIS. The Consultant Team must also possess intimate knowledge of urban traffic and driver characteristics in Edmonton and Calgary, and the prevalent environmental and institutional issues. 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 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.

Consultant Selection Criteria

The following weightings will be used to evaluate all proposals:

- Clarity and Presentation 10%
- Study Comprehension 10%
- Costs 20%
- Methodology and Innovation 20%
- Study Team Qualifications and Experience 40%

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, diagrams, and figures or charts will not count toward the page count.

Proposal Submission Requirements

Proposals consisting of six (6) bound copies and one (1) unbound copy (suitable for photocopying) must be received by Alberta Transportation no later than 4:00 p.m., Wednesday, March 31, 2004 at the following address:

Mr. Allan Donovan, P. Eng.
Manager of Consultant Compliance and Performance
Program Management Branch
1st Floor, Twin Atria
4999 – 98 Avenue
Edmonton, Alberta
T6B 2X3

Contact Personnel

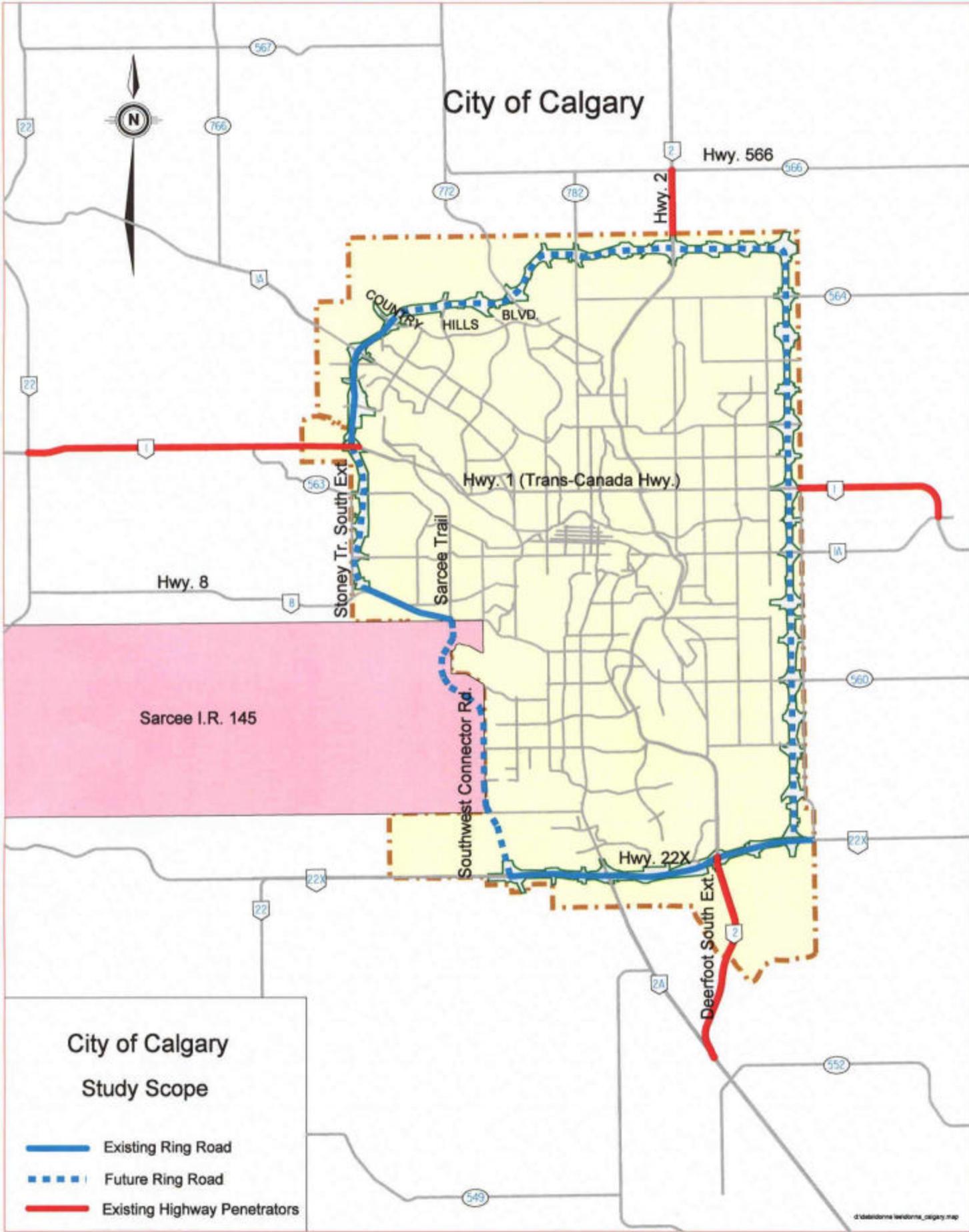
For questions related to the Terms of Reference, please contact:

Mr. Vince Wu, P.Eng. at Vince.Wu@gov.ab.ca or 780-415-0680

For questions related to the submission process, please contact:

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

City of Calgary



City of Calgary Study Scope

- Existing Ring Road
- Future Ring Road
- Existing Highway Penetrators