

1 Overall Strategy

1.1 *Departmental Mission and Mandate*

Alberta Infrastructure's mission is to "contribute to Alberta's economic prosperity and quality of life through the provision of necessary, effective and safe infrastructure for all Albertans (Infrastructure Business Plan 1999-2000 to 2001-02)." The department's role in the government has expanded when former departments of Transportation and Utilities, and Public Works, Supply and Services merged along with School Facilities into one Alberta Infrastructure.

The four core businesses that will guide the department in achieving its mandate are:

- To improve road, driver and vehicle safety;
- To provide government facilities and road infrastructure;
- To manage central services to all government departments;
- To influence national and international policy in rail, air, passenger, ports/marine, and border crossing services.

1.2 *Strategic Research Direction*

Our research mission is to support the department's core businesses through application of innovative technologies and policy research. While technology development is still an essential component in the department's research programs, policy research helps to define the external sectors that will affect our department's business and goals, and provide long-term visions for the planning process. These may be national and international in scope and may encompass all sectors of transportation and infrastructure.

With the incorporation of policy research and other infrastructure/building research from the previous separate departments, our annual research budget will be at or over the \$1M level.

1.3 *List of Research Programs*

- Policy Research
- Infrastructure
- Safety
- Intelligent Transportation
- Technology Transfer

1.4 *Research Revenue Budget*

1.4.1 Summary R&D Budget by Revenue Source

Revenue Source	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
General Revenue Fund	1441*	1271	903	801	749
Other Prov. Govern.	21	21	50	50	50
Federal Government	143	107	55	50	50
Industry	95	90	20	15	0
Other	0	84	40	10	0
Total R&D	1700	1573	1068	926	849

*All financial numbers are expressed in \$000's unless otherwise noted.

1.5 *Research Expenditure Budget*

1.5.1 Research Expenditure by Program

Research Programs	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
Policy	419	673	174	189	199
Infrastructure	425	510	372	252	215
Safety	278	210	350	300	245
Intelligent Transportation	540	130	70	70	70
Technology Transfer	38	50	102	115	120
Total	1700	1573	1068	926	849

1.5.2 Research Expenditure by Research Theme

R&D Theme		1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
Health of Albertans		278	210	350	300	245
R&D Infrastructure						
Provincial Infrastructure		1422	1363	718	626	604
Sustainable Resource	Climate Change					
	Energy					
	Agricult.					
	Forestry					
	Environ. Quality					
Resource Value-added	Fossil Carbon					
	Agricult.					
	Forestry					
Enabling Technology	ICT					
	Biotech.					
	Adv. Mat.					
Total		1700	1573	1068	926	849

1.6 Personnel Allocation

	1998/99	1999/00	2000/01	2001/02	2002/03
R&D Performers	2.0 [#]	1.0	1.5	1.5	1.5
R&D Administration	5.0	5.0	4.0	4.0	4.0

[#] In person-year.

2 Research Program Descriptions

2.1 Policy Research

2.1.1 *Description*

Policy research touches many aspects of the department's goals and has a diverse scope of objectives:

- develop broad transportation modal knowledge to support policy development;
- research specific issues and concerns for executive management;
- promote the importance of transportation as a key economic driver;
- develop innovative approaches to transportation issues (e.g. funding);
- influence national and international transportation policies;
- include all modes such as air, ground, rail, marine, pipeline and telecommunication.

Research studies are performed internally and through participation in external projects and support of agencies such as the Western Canadian Corridors and Gateways Initiative (WCCGI), the Western Transportation Advisory Council (WESTAC), Transportation Association of Canada (TAC), and the Van Horne Institute (VHI). For the most part, the Policy Research falls under the "Provincial Infrastructure" theme, although some policy issues deal with "Sustainable Resource" elements. Program delivery is split almost 80/20 between extramural and intramural resources, respectively.

2.1.2 *Outputs*

Completed initiatives (1998/1999 or 1999/2000)

- Accessible Taxi Evaluation: to determine what's needed for viable operation economically and technically.
- Alberta Fuel Price Elasticity Study: to gather specifics on Alberta consumer responsiveness to fuel price changes.
- Introduction of the new provincial Railway Act.
- The McKenzie report on Grain Handling and Transportation.

Current major initiatives

- Redraft railway regulations with safety and economic principles in mind.
- Active participation in Provincial/Federal/Stakeholder committees and research on Grain Handling and Transportation issues that include parallel processor ports, highways and railcars.
- Platooning and headway study: establish pattern of behaviour by drivers of heavy trucks versus general population (including average speed, speed distribution and following distances).

- Long combination vehicle (LCV) safety study in conjunction with the National Roadside Survey (NRS): report on safety, productivity and intermodal competition aspects of LCVs, establish freight traffic compositions and origin destination information throughout Alberta. This is in support of the goals to promote the Canamex corridor and the harmonization of commercial vehicle weights and dimensions.
- Western Canadian Corridors and Gateways Initiative (WCCGI): provide secretariat for this initiative which has the long-term goal of sustaining key transportation corridors and gateways for the western region, and to access off-shore markets.
- Work with Alberta Economic Development Agency (AEDA) on the Alberta Aviation Study - to identify strategies and approaches for the cities of Calgary and Edmonton to service the needs of passengers and air cargo shippers.
- Prototype Accessible Taxi Vehicle currently being tested in Calgary with potential application across Alberta.
- Contribute to WESTAC/VHI's "Moving Forward" paper designed to increase awareness of transportation issues and to highlight the importance of transportation to Canada.
- Participate in Climate Change initiatives including the first phase development of greenhouse gas (GHG) mitigation measures for the transportation sector, and working with the Alberta Government Voluntary Challenge Registry (as part of the overall Alberta Government Action Plan).
- Develop "Alberta's Transportation Advantage" paper.

Potential initiatives

- Prepare submissions for federal review of the Canadian Transportation Act (CTA).
- National Climate Change Measures Analysis in conjunction with Climate Change Central.
- Contribute to railway regulations on highway crossings and abandonment.

2.1.3 Impacts

The impacts of policy research are varied: provide stakeholder input to policy development and planning; modernization of regulations under the Railway Act; broaden knowledge base of truck safety; improved accessible taxi service for all Albertans. The ultimate goal is to influence different levels of governments in establishing responsive legislation, regulations and policies to facilitate economic growth.

2.1.4 Performance Measures

This is the first year to incorporate policy research into the Plan. Performance measures are to be developed.

2.1.5 Resources

Summary of the Policy Program by Revenue Source

Revenue Source	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
General Revenue Fund	394	520	174	189	199
Other Prov. Govern.	2	21	0	0	0
Federal Government	3	67	0	0	0
Industry	20	52	0	0	0
Other	0	13	0	0	0
Total R&D	419	673	174	189	199

2.1.6 Program Leverage

- The LCV & NRS study was funded jointly by Alberta Infrastructure and the federal government through the WEPA program (\$60,000 each).
- We matched AEDA's \$15,000 funding for their hiring of a consultant to work on the Alberta Aviation Strategy.
- Any pilot/prototype projects run by Advisory Committee on Barrier Free Transportation (ACBFT) must be funded as partnerships with interested communities and associations (e.g. Accessible Taxi Study is funded \$10,500 each by AI, Calgary Transit and Calgary Handibus Association).
- WESTAC/VHI memberships from the province, other agencies and governments, and the private sector help provide funding and support of broad range transportation activities and studies.
- Provided \$7,500 seed money for WESTAC/VHI "Moving Forward" paper, which was supplemented by other governments and private sector grants.

2.2 Infrastructure

2.2.1 Description

The primary objective of the Infrastructure Research Program is to support the department's mandate of providing a cost-effective and safe infrastructure system, and at the same time, maintain the department's position as a "knowledgeable owner." With amalgamation of the former Public Works department, this year's Infrastructure Program will incorporate building research as well.

As indicated by the degree of leveraging in many of the projects, the Infrastructure Research Program is founded on partnerships among the builders, designers, maintenance contractors, and researchers. In some cases, the research projects may have a wide reaching scope that links with other Canadian provinces or American states. There is no other equivalent infrastructure research being performed by other Alberta provincial departments. This Program forms a major part of the "Provincial Infrastructure" research theme. The Program will be delivered mainly through extramural resources (over 80%).

2.2.2 Outputs

- Cost Effective Open Office Plan Environment (COPE) study being carried out by the National Research Council (NRC) and co-funded by all the provinces.
- Establishing scientific rationales for harmonizing seasonal weight restrictions and applying technologies to monitor subsurface conditions.
- Environmental assessments and mitigation measures to counter-balance disturbances from major infrastructure projects; applications of recycled products.
- Application of new pavement materials/systems such as Superpave and new maintenance strategies; development of a new mix type guide for pavements and verification of performance graded asphalts.
- Application of innovative bridge materials such as fibre reinforced polymer and a high-load monitoring system.
- Renewed efforts in determining the benefits of a GPS tracking system for snowplows.

It is expected that the research will be successful in discovering innovations in these areas; however, the hurdle will be to implement the solutions successfully.

2.2.3 Impacts

Expected benefits for Albertans include reduced costs for highway and building construction and maintenance, and preservation of current levels of service in light of escalating demands.

2.2.4 Performance Measures

- Funding leverage ratio of total value of research to actual department spending.
- Adoption of new technologies or products:
 - Use of tire floatation for unpaved roads*
 - Superpave mix design*
 - GPS inventory datalogging (Focus Corporation Ltd., Edmonton, Alberta)*
 - Guidelines for mitigating disturbance of fish habitat*
 - Recycled plastic guardrail posts (Amity Plastics Ltd., Clyde, Alberta)*

Performance Measures	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
Funding Leverage Ratio	1.2:1	1.5:1	2:1	2:1	2:1
Adoption of Innovation	5	5	5	5	5

2.2.5 Resources

Summary of the Infrastructure Program by Revenue Source

Revenue Source	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
General Revenue Fund	407	401	342	252	215
Other Prov. Govern.	0	0	0	0	0
Federal Government	0	30	0	0	0
Industry	18	18	0	0	0
Other	0	61	30	0	0
Total R&D	425	510	372	252	215

2.2.6 Program Leverage

- The new COPE initiative will cost \$2M over three years – NRC is contributing \$1M with all the provinces and the private industry making up the other half.
- The final five-year phase of the C-SHRP (Strategic Highway Research Program) will cost the department \$165,000 in direct contributions, and another \$100,000 this year to install weigh-in-motion equipment at selected sites.
- The “Harmonization” project will see the three prairie provinces and the federal government sharing equally the \$120,000 research cost (\$30,000 from Alberta).

2.3 Safety

2.3.1 *Description*

Under this program, projects were specifically initiated based on safety-related issues. As well as addressing a key department mandate, the Safety Research Program also deals with the “Health of Albertans” theme. Reducing the number of casualties from collisions will assist in lowering health costs and raising the quality of life in Alberta.

Ongoing research work includes finding cost-effective solutions to wildlife-vehicle collisions, specialized vehicle safety study, a driver attitudes and behaviour study, and a better system to collect and analyze traffic safety data. New research started this fiscal year are the log truck configuration study and the newly created “fatigue management” team to examine fatigue-related issues for heavy vehicle drivers. A large proportion of the work will be performed extramurally by consultants (over 80%), with internal staff providing managerial and administrative support.

2.3.2 *Outputs*

- A new log truck configuration study to determine the best configurations for economic and safety reasons.
- A new collaboration between Workers Compensation Board, Transport Canada, Alberta trucking Industry Safety Association and the department to develop and field-test a comprehensive fatigue management program.
- Confirm or refute the effectiveness of certain wildlife safety products such as the “deer reflector” and salt-licking deterrent chemicals.
- Evaluate performance of rumble strips and recommend adoption of standard practices for usage of rumble strips.
- Integrating GPS, mobile communication and “smart” software to streamline the collection of traffic safety data and to increase the accuracy of collision and driver records.
- Better understanding of driver attitudes and behaviour leading to roadway improvements and enhanced driving standards, regulations and enforcement.

There are some risks to achieving all of the outputs due to a multitude of uncontrollable factors such as human and environmental factors being involved in any one collision.

2.3.3 Impacts

Even small reductions in collisions may be translated into substantial socio-economic benefits for all road users. Based on the department's current method of assessing collision costs, each fatal collision is valued at over \$1M, and each injury collision, in excess of \$100,000. Other potential impacts include preserving wildlife, increasing safety for road construction workers, and improving productivity for the police.

2.3.4 Performance Measures

In line with the department's overall safety mandate, the performance measure for the Safety Research program is undergoing review and will be implemented in next Plan.

2.3.5 Resources

Summary of the Safety Program by Revenue Source

Revenue Source	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
General Revenue Fund	182	175	215	175	145
Other Prov. Govern.	19	0	50	50	50
Federal Government	20	5	55	50	50
Industry	57	20	20	15	0
Other	0	10	10	10	0
Total R&D	278	210	350	300	245

2.3.6 Program Leverage

- The Fatigue Management Program's pilot project will cost around \$150,000 over two years – the department are committed to roughly 1/3 of the total, with the remainder coming from Workers' Compensation Board and the private industry.
- For the Traffic Safety Data project, the financial needs have been estimated to be as high as \$20M over the course of the project (lasting for at least five years). A unique funding arrangement will need to be developed.
- The log truck study has industry and two research organizations – Centre for Transportation Engineering and Planning (C-TEP) and Forest Engineering Research Institute of Canada (FERIC) as partners. The department will have contributed \$45,000 towards the \$130,000 two-part study in three years.

2.4 Intelligent Transportation

2.4.1 Description

Intelligent Transportation System (ITS), sometimes known as “smart car/smart road” is a label for a suite of technologies being developed to increase the capacity, efficiency and safety of the different elements that comprise transportation - users, vehicles, and infrastructures. Currently, the department is taking steps to identify ITS opportunities for Alberta Infrastructure and draft a strategic plan accordingly. It will encompass technologies and systems such as intelligent weigh stations for trucks, intelligent border crossings, and advanced traffic management and traveller information systems.

This Program is also part of the “Provincial Infrastructure” theme, and will be delivered extramurally (80%) by vendors and consultants.

2.4.2 Outputs

- An Alberta ITS Strategic Plan (immediate).
- A network of smart weigh stations along the North-South Trade Corridor (future).
- Intelligent border crossing points (future).
- Deployment of smart sensors, changeable message signs and radio broadcast stations (future).

ITS technologies are becoming increasingly important in North America as evident by the proliferation of major ITS projects in the neighbouring states and in the eastern provinces. The department is acquiring the experience and knowledge of implementing these “smart” technologies. There are some risks in implementing the new technologies because of technical, economical and regulatory constraints. Application of ITS will support the growth of this industry sector in Alberta and in Canada.

2.4.3 Impacts

Reducing time delays for the transport carriers without compromising safety will give the Alberta-based export industry another advantage to compete globally. The positive impacts of a healthy robust export economy will propagate through to other businesses and ultimately, benefit Alberta citizens as a whole.

By promoting the benefits of compliance, the system will over time reduce the number of overloaded trucks; thereby, extending the life expectancy of the road infrastructure. For the general driving public, the benefits will be to influence the drivers’ travel patterns through knowledge of potential problems.

2.4.4 Performance Measures

- Percentage of non-compliant commercial vehicles to the total number of vehicles checked during random roadside inspections.

Performance Measures	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
Non-compliance	30%	30%	30%	30%	30%

2.4.5 Resources

Summary of the Intelligent Transportation Program by Revenue Source

Revenue Source	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
General Revenue Fund	420	125	70	70	70
Other Prov. Govern.	0	0	0	0	0
Federal Government	120	5	0	0	0
Industry	0	0	0	0	0
Other	0	0	0	0	0
Total R&D	540	130	70	70	70

2.4.6 Program Leverage

- Under the first WEPA agreement signed between the federal and provincial governments, \$125,000 has been leveraged from the federal government for the ITS-CVO project in 1998/99.

2.5 Technology Transfer

2.5.1 *Description*

The newly created public-private concept, Centre for Transportation Engineering and Planning (C-TEP), was formed specifically through this initiative to facilitate exchange of knowledge and expertise. As the Centre continues to grow with new partners and expand its role to sponsoring needed research work, we will continue to lend our support.

We will use all media - workshops, videoconferencing, electronic messaging, and the Internet to stimulate communications and exchange of ideas with staff, consultants and researchers. This initiative supports the many elements of research being carried out under the "Provincial Infrastructure" theme. The department will be funding the Centre and other extramural efforts through this Program (90% extramural).

2.5.2 *Outputs*

- A centre (C-TEP) to coordinate research of mutual interests and benefits, and to act as a clearinghouse for disseminating research findings and technology transfer.
- A Web-based database of the department's research projects and reports.

The success of this Program will largely depend on the amount of co-operation and partnering put in by all stakeholders. The Centre may be able to help with future commercialization of products/services discovered through new research.

2.5.3 *Impacts*

Indirect socio-economic benefits to the province include strengthening the positions of Alberta firms among their global peers who are also engaged in transportation engineering.

Collaboration with the private industry will avoid duplications and generate a better use of resources at a lower cost to the public. Another desirable impact emanating from the Centre is the attraction of new talents into the field of transportation engineering, for the advancement of the profession in Alberta.

2.5.4 *Performance Measures*

- Number of C-TEP workshops/courses set up each year
 - Class B BIM Bridge Inspection Course*
 - HEC - RAS River Hydraulics Modeling*
 - Pavement Design Guide Course*
 - Road Safety Audit Course*

Short Course in Highway Design
Traffic Management Video Seminar

- Number of new research projects generated through C-TEP
Cracking from Restrained Concrete Shrinkage
Log Truck Configuration Study
Microscopic Traffic Simulation on the Deerfoot Trail Corridor
Rehabilitation of Reinforced Concrete Bridge Girders
Wildlife Reflector Study
- Number of products/technologies/ideas exchanged or transferred
Newly established measure to be implemented

Performance Measures	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
Number of C-TEP Workshops/Courses	4	6	8	10	12
Number of C-TEP Research Projects	1	4	6	8	10
Number of Products/ Ideas Transferred	-	-	2	4	6

2.5.5 Resources

Summary of the Technology Transfer Program by Revenue Source

Revenue Source	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
General Revenue Fund	38	50	102	115	120
Other Prov. Govern.	0	0	0	0	0
Federal Government	0	0	0	0	0
Industry	0	0	0	0	0
Other	0	0	0	0	0
Total R&D	38	50	102	115	120

2.5.6 Program Leverage

- The Centre's funding is actually a pool of leveraged funds made available through various partners: the private industry is expected to contribute \$238,000 over the next three years; the cities and universities \$69,000; the department \$287,000. Additionally, ASRA has

provided a one-time seed grant of \$600,000 in 1999/2000. Matching funding is being sought from the Natural Sciences and Engineering Research Council (NSERC) for research projects.

3 Related Scientific Activities

Under the Related Scientific Activities category, the bulk of the budget will be spent on “Technical Surveys” which include:

- Quality assurance material testing,
- Pavement condition surveys,
- Collision analyses,
- Transportation planning studies,
- Preparation of aerial photographs and highway maps,
- Gathering of Geographical Information System (GIS) data,
- Various site and building facility investigations.

The other major expenditure falls under the “Special Services & Studies” category:

- Special environmental and archaeological assessments for affected land corridors,
- In the coming three years, up to \$5.5M will be spent on a special one-time province-wide school evaluation study.

3.1 Natural Science Summary RSA Budget

Related Scientific Activities	1998/99 Actual	1999/00 Estimate	2000/01 Proposed	2001/02 Proposed	2002/03 Proposed
Education Support	0	0	0	0	0
Technical Surveys	3804	3699	3700	3700	3700
Information Services	0	0	0	0	0
Special Services & Studies	1126	3009	4000	1500	1200
Museum Services	0	0	0	0	0
Administration of Ext. RSA	285	380	400	300	300
Total	5215	7088	8100	5500	5200