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Banff Highway Project

(East Gate to km 13)

Report of
the Environmental
Assessment Panel



Government
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PANEL REPORTS

TO THE MINISTER OF THE ENVIRONMENT ON THE PANEL PROJECTS

1. Nuclear Power Station at Point Lepreau, New Brunswick.
(May 1975)
2. Hydro Electric Power Project, Wreck Cove, Cape Breton Island,
Nova Scotia. (August 1976)
3. Alaska Highway Gas Pipeline Project, Yukon Territory.
(Interim report, August 1977)
4. Eldorado Uranium Refinery Proposal, Port Granby, Ontario.
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5. Shawkwak Highway Project, Yukon Territory - British Columbia.
(June 1978)
6. Eastern Arctic Offshore Drilling - South Davis Strait Project.
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7. Lancaster Sound Offshore Drilling Project
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8. Eldorado Hexafluoride Uranium Refinery, Ontario (February, 1979)
9. Roberts Bank Port Expansion, British Columbia (March, 1979)
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Environmental
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Panel



October 1979

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Government
of Canada

Gouvernement
du Canada

Environmental
Assessment Review

Examen des évaluations
environnementales

The Honourable John Fraser, P.C., M.P.
Minister of the Environment
Ottawa, Ontario

Dear Minister,

In accordance with the Federal Environmental Assessment and Review Process the Banff Highway Environmental Assessment Panel has completed a review of Public Works Canada's proposed modifications to the Trans-Canada Highway from the East Gate of Banff National Park to km 13, near Banff townsite. We are pleased to submit the Panel's report for your consideration.

The Panel has evaluated the project and considers it a viable and environmentally acceptable proposal, provided certain conditions, outlined in the report, are met.

Respectfully yours,

J. S. Klenavic
Chairman
Banff Highway
Environmental Assessment Panel

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Executive Summary



This report is the result of the review by an Environmental Assessment Panel of a proposal by Public Works Canada to upgrade 13 kilometres of the Trans-Canada Highway (TCH) in Banff National Park to provide a four-lane, limited access, divided highway. In accordance with the Environmental Assessment and Review Process the proposal, together with a second stage that would continue this upgrading to km 27, was referred by Public Works to the Federal Environmental Assessment Review Office in May, 1978. A separate review will be required before conclusions can be reached for the km 13 to 27 stage.

The proposed twinning starts at the Park's East Gate (km 0) and would parallel and incorporate the existing two-lane highway, terminating at km 13 just before the Banff townsite traffic circle. In February 1979, Public Works issued an Environmental Impact Statement for the twinning of the TCH from km 0 to km 13. The Panel solicited comments from the public and from technical agencies and, in June 1979, held public meetings in Calgary and Banff. After carefully considering the information presented, the Panel reached a number of conclusions and has formulated certain recommendations which are contained in this report.

During deliberations the Panel considered issues such as the need for the project, possible alternatives, the environmental impact of the project, park planning and social considerations. In addition the question of responsibility for mitigation measures was examined.

The Panel concluded that the need for additional highway capacity had been clearly demonstrated and there were no viable alternatives that would reduce environmental impacts compared to the proposed project.

The Panel agreed with the many intervenors who identified present traffic constraints on the TCH, such as the traffic circle and the East Gate, and has made recommendations for improvements. The question of energy conservation was examined and recommendations on use of public transportation and posted speed limits have also been made.

The conclusion of the Panel is that the project can be constructed and operated with acceptable environmental disturbance and no significant residual environmental impact.

As a condition to proceeding, recommendations have been made by the Panel concerning mitigation of specific impacts. The more important of these include under/overpasses and fences to eliminate ungulate kills on the highway, requirements to enhance fisheries habitat, mitigation measures for sensitive terrain and vegetation, and procedures to ensure that an aesthetically pleasing highway is constructed. The Panel made recommendations covering the coordination and implementation measures necessary during design and construction. Further recommendations were also made for consideration by appropriate authorities.

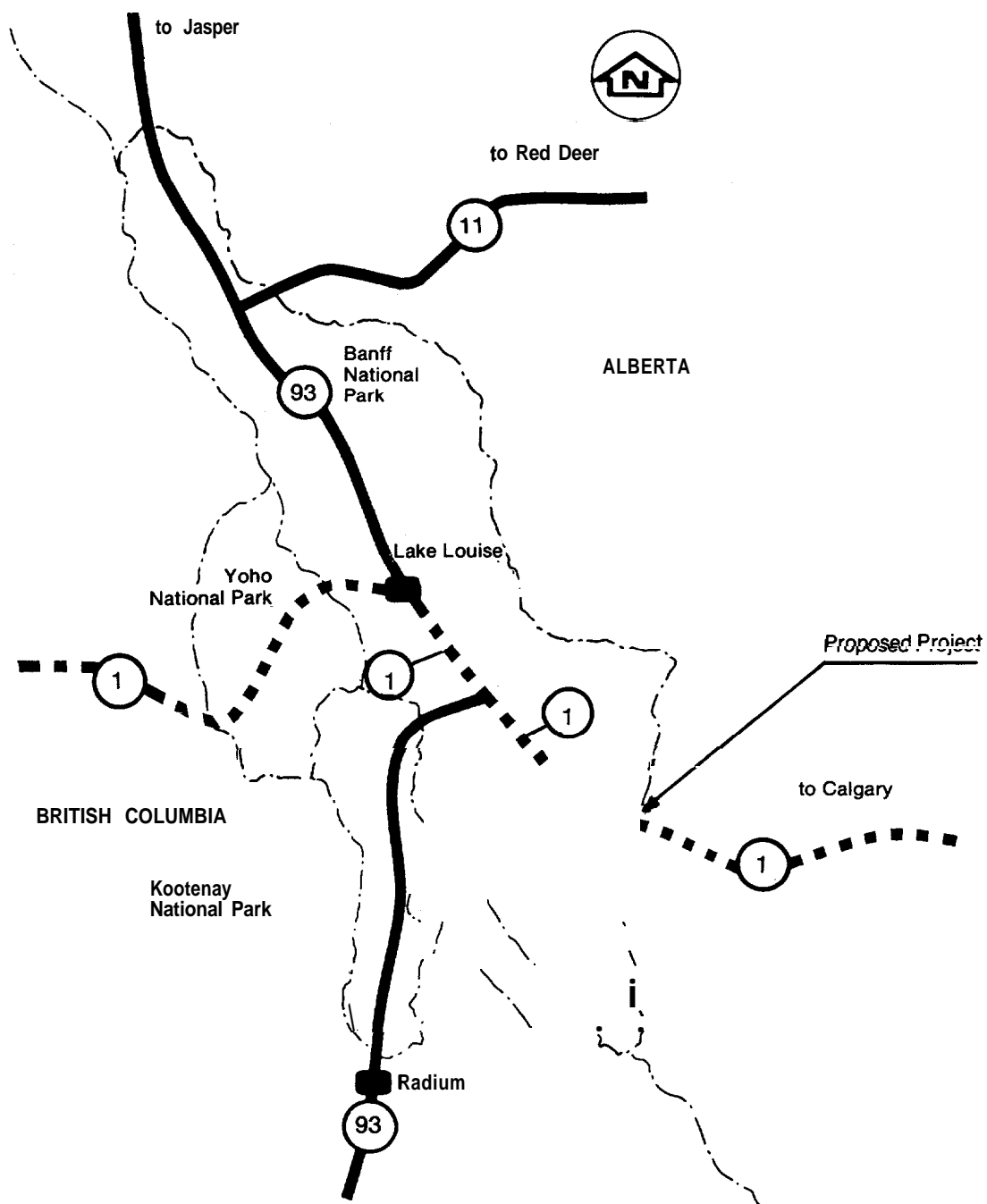
With regard to planning and social issues the Panel concluded that the proposal is compatible with Park plans and policies as well as those of other jurisdictions. It is considered that the proposed project and associated construction activities will not cause significant negative social impacts.

An opportunity exists to build this section of the TCH with minimum environmental damage and maximization of the visual resource so as to produce a Canadian example of design excellence. The Panel recommends that twinning of km 0 to 13 be allowed to proceed provided the conditions contained in this report are met.

Chapter 1

Project and Review Perspective





TRANS-CANADA HIGHWAY ALIGNMENT
THROUGH BANFF NATIONAL PARK
(Route ①)

1.1 Introduction

The Trans-Canada Highway (TCH) presently passes through Banff National Park as a two-lane highway. Because of increased usage, the federal department of Public Works (Public Works Canada) has proposed improvements to the highway to eventually provide four lanes on the section between the Park's eastern boundary (km 0) and km 27 at the Sunshine turn-off.

In May 1978, this twinning proposal was referred by the proponent, Public Works Canada, to the Federal Environmental Assessment Review Office for a formal review under the Environmental Assessment and Review Process (EARP).

A Panel was appointed to review the environmental consequences of the project and, in September 1978, issued Guidelines for the preparation of an Environmental Impact Statement (EIS). In late February 1979 the Panel received from Public Works an EIS entitled "Proposed Improvements to the Trans-Canada Highway in Banff National Park, East Gate to km 13".

In accordance with EARP directives and the policies of the Federal Environmental Assessment Review Office responsible for EARP's administration, public and government agency participation in the Panel's review was solicited and public meetings were held in June 1979. This report to the Minister of Environment is the result of the Panel's review of the km 0 to 13 stage and associated facilities.

An EIS has not been presented to date for the km 13 to 27 stage. A separate review by the Panel would be required to reach conclusions and make recommendations on that portion of the project.

1.2 Project Setting

The TCH was built under authority of the Trans-Canada Highway Act which provided for general standards for its design and construction. Public Works was the department responsible for administration of this Act, and, as the federal government's construction agency, completed the TCH within the boundaries of Banff National Park in 1960.

The TCH in Banff National Park is presently a paved, two-lane highway meeting the standards set out under the authority of the Trans-Canada Highway Act. It stretches some 80 kilometres from the Park's Eastern Gate, near Canmore, Alberta, to Yoho National Park in British Columbia. The highway also provides for access to Jasper National Park to the north and Kootenay National Park to the south (see Figure 1). Thus it serves as an entranceway into Canada's Rocky Mountain Parks and also as an integral part of the major east-west interprovincial highway route.

In 1885 following construction of the CP Rail line across Canada the federal government set aside a 26 square kilometre area of the Rocky Mountains, including Banff Hot Springs. Over the years the area of the Park has changed and today Banff National Park covers 6,358 square kilometres including part of the Bow Valley through which both the railway and the TCH pass.

The Bow Valley has been an important place for man's activity. Archaeological evidence indicates the presence of prehistoric people. Modern man, however, has left more tangible evidence of his presence. In addition to Banff townsites the remains of coal mines and settlements

are apparent along with an abandoned bungalow camp and picnic sites.

Facilities, such as the Cascade hydro-electric power plant and penstocks, the highway, railway and air strip, which were developed years ago are still in service (see Figure 2). Timber was harvested until the 1920's and grazing was permitted until the 1930's. These facilities and activities, and the many fires which have occurred in the area, have resulted in extensive changes to the landscape over the past 100 years.

Banff National Park is administered by Parks Canada* under authority of the National Parks Act. Section 4 of this Act states "the Parks are hereby dedicated to the people of Canada for their benefit, education and enjoyment, subject to the provisions of this Act and the Regulations, and such Parks shall be maintained and made use of so as to leave them unimpaired for the enjoyment of future generations."

The unusual situation of having a road of national importance running through a National Park is the subject of a National Parks policy which "accepts, as one of the facts of economic life, that transportation routes through the Mountain Parks are required in the national interest".

* Parks Canada was transferred from the Department of Indian and Northern Affairs to the Department of the Environment in June 1979. As each organization had prepared separate reviews for this project, throughout this report Environment Canada should be taken to mean the Department of Environment prior to June 1979 (i.e. excluding Parks Canada).

While new construction on the TCH within the Park remains the responsibility of Public Works, Parks Canada operates and maintains the highway. Any highway modifications proposed by Public Works are reviewed by Parks Canada as a matter of policy to ensure that the spirit of the National Parks Act is maintained.

1.3 Project Background

The concept of twinning the highway in Banff National Park has had a relatively long and somewhat turbulent history. Initial studies commenced as early as 1963 and during the next eight years proposals were made to twin the TCH for a distance of 120 kilometres through Banff and Yoho National Parks, and of 75 km (from km 0 to the Banff Jasper Highway junction). These studies however were done at a time when environmental considerations had a smaller role than they do today.

Environmental studies were carried out between 1971 and 1975. At this time Parks Canada conducted a public participation program on the proposal. Environmental groups strongly opposed the project and this opposition was noted by Parks Canada. At about this time there was also worldwide concern over oil shortages. With 1975 showing a decrease in traffic over 1974 consideration of twinning the highway was shelved.

After 1975 traffic growth resumed. Public Works recommenced studies and, in 1978, completed an Initial Environmental Evaluation (IEE) from km 0 to 13 providing information on various twinning alignment alternatives and their environmental effects.

The modifications proposed by Public Works to the TCH in Banff National Park

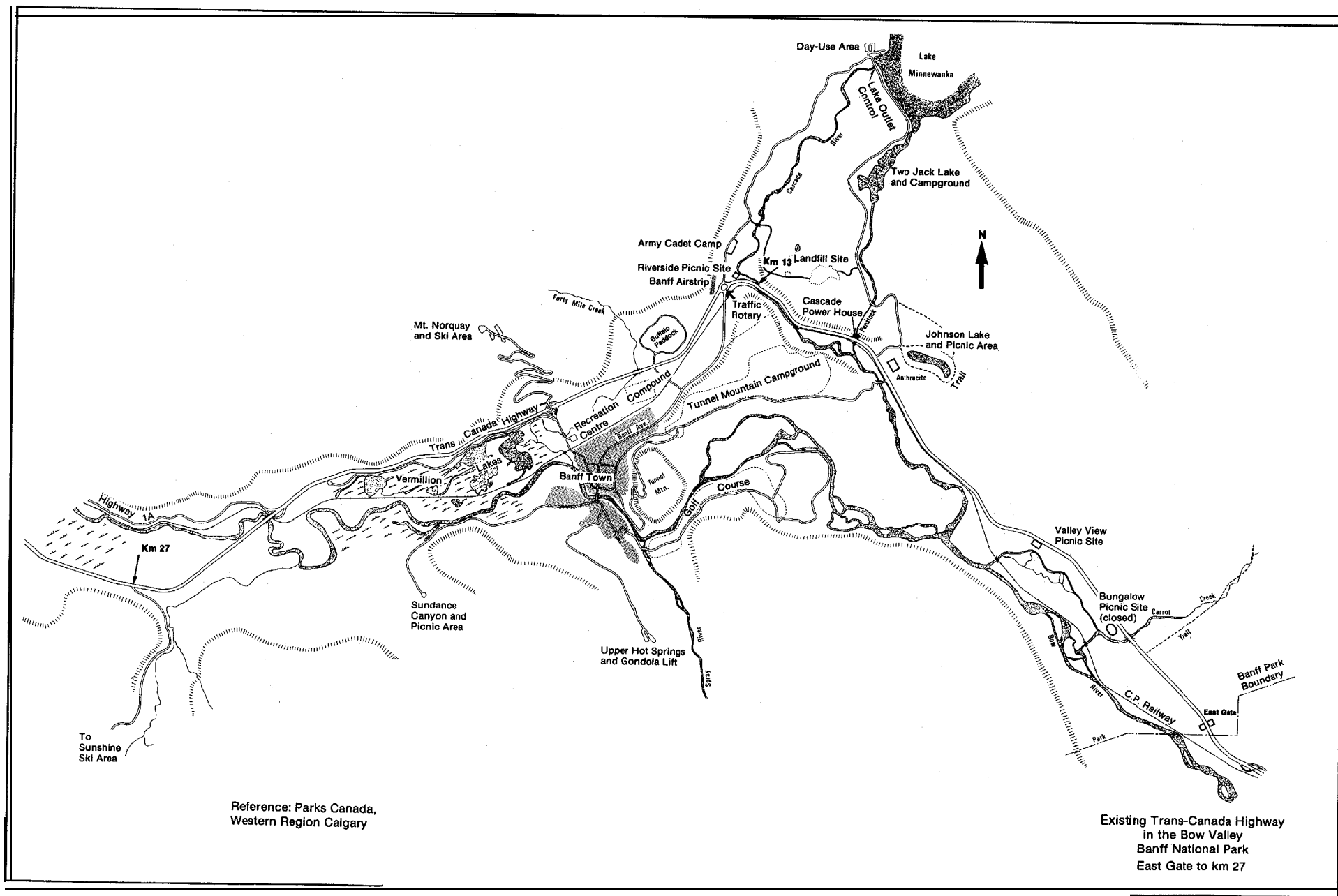


Figure 2

would eventually result in twinning the highway between the Park's East Gate and km 27 near the Sunshine Village Ski area access. No proposal has been submitted by Public Works for any modifications beyond km 27. The twinning would result in a four-lane, limited access, divided highway.

The twinning alignment currently proposed from km 0 to 13 was developed by Public Works during preparation of its EIS in 1978/79.

1.4 Project Description

The section that is the subject of the present review starts at the Park's eastern boundary and continues for 13 km along the Bow River Valley towards Banff townsite. Directly associated projects would be new accesses to Two Jack Lake and Tunnel Mountain with closure of the present access roads near km 10.

After km 13 the highway would start its transition into an interchange or intersection to replace the existing Banff townsite traffic rotary. While Public Works provided sketches of alternative configurations for the interchange, detailed consideration of the replacement for the rotary would be included in a separate review of the km 13 to 27 stage.

The alignment proposed by Public Works closely follows the existing highway route and would have the same design criteria. Figures 6A, 6B (Appendix H) show this proposal. Varying median widths between the divided east and west bound lanes would be used. While the detailed alignment and design is subject to adjustment the new proposed highway is described as having over 8 km of wide, treed median between opposing lanes. The

median proposed for a further 3 km would be grassed and of minimum width. The remaining portion of the highway would be separated by a raised concrete barrier. The various median types are shown in Figure 3.

The only change proposed at the Park Gate would be removal of one of the present buildings to make way for the new east-bound lanes. The Valley View picnic site would become accessible to east-bound traffic only.

1.5 Environmental Review Process

1.5.1 Referral

The responsibility of the Minister of the Environment to ensure that new federal projects are assessed for potential adverse effects on the environment is cited in the Government Organization Act of 1979.

The Environmental Assessment and Review Process (EARP) was established by Cabinet in December 1973 to ensure that:

- environmental effects are taken into account early in the planning of new federal projects, programs and activities;
- an environmental assessment is conducted for all projects which may have an adverse effect on the environment before commitments or irrevocable decisions are made, and those which may have significant adverse effects are referred to the Minister of the Environment for formal review, and
- the results of these assessments are used in planning, decision-making and implementation.

PROPOSED IMPROVEMENTS — TRANS-CANADA HIGHWAY

TYPICAL CROSS-SECTIONS

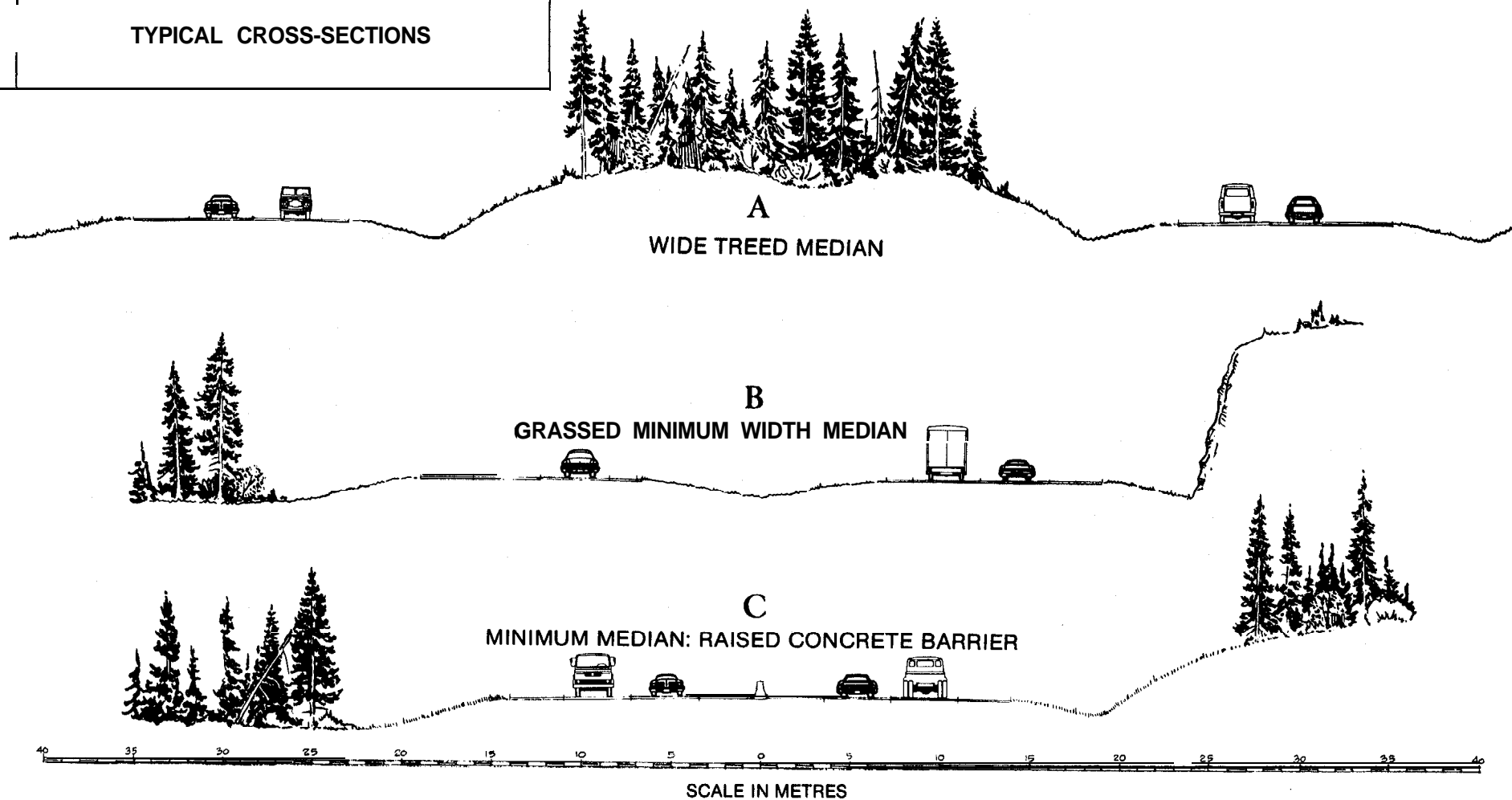


Figure 3

An IEE, such as was completed for this project in 1978, is an integral part of EARP providing information on the significance of environmental effects so that a proponent can judge whether a formal review of the project is desirable. An additional criterion is the magnitude of public concern.

In May 1978, with the concurrence of the Minister of Indian and Northern Affairs, Public Works requested a formal review of a specific implementation proposal for modifications to the TCH.

1.5.2 Environmental Assessment Panel

In accordance with EARP directives experts were appointed to the Panel to review the environmental consequences and evaluate the significance of the project. The composition of the Banff Highway Panel is as follows:

Mr. John Klenavic (Panel Chairman)
Federal Environmental Assessment and
Review Office
Hull

Mr. Wyman Binks
Professional Engineer
Ottawa

Dr. Roger Edwards
Environment Canada
Edmonton

Mr. James Hartley
Parks Canada
Calgary

Dr. William Ross
Faculty of Environmental Design
University of Calgary
Calgary

Biographies of Panel members are contained in Appendix A.

The Panel was assisted throughout the review by the Executive Secretary, Mr. P.J. Paradine.

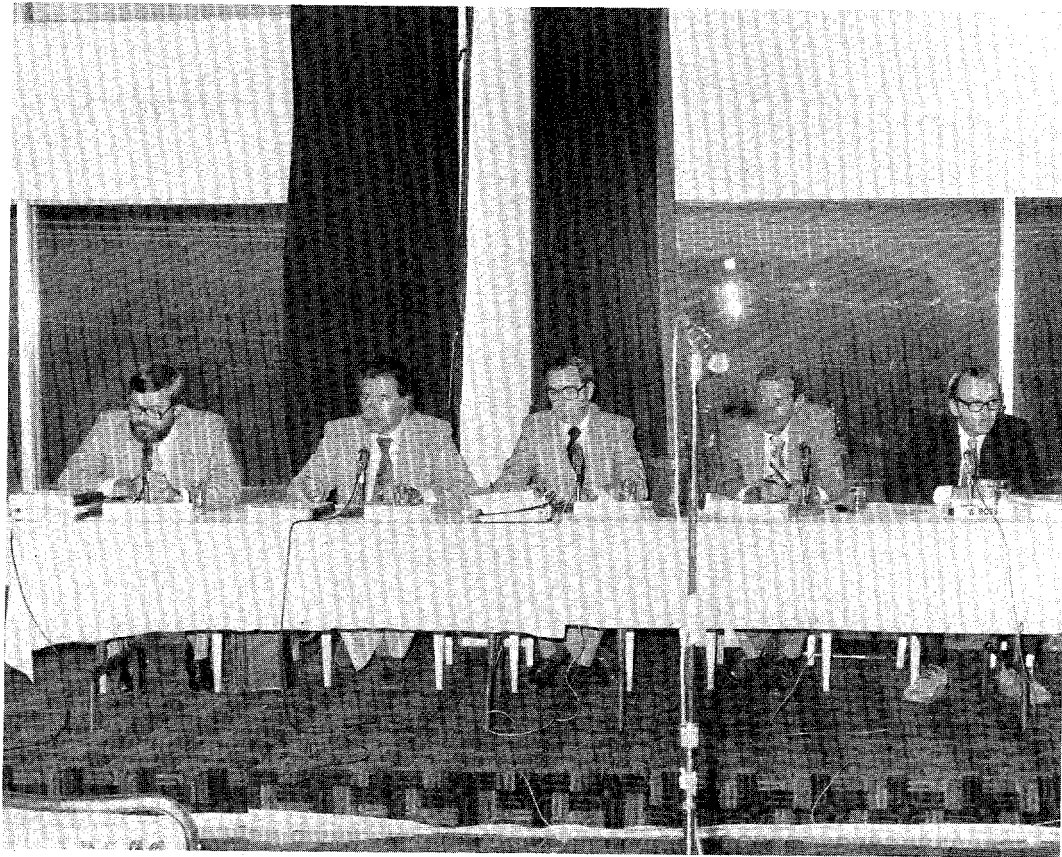
1.5.3 Public Information and Participation

The Panel Secretariat attempted to ensure that all persons and organizations having an interest in the project received the necessary information to assist them in making their views known to the Panel.

In the fall of 1978, public information kits containing guidelines for preparation of an EIS, biographies of Panel members, information on EARP and the nature of the Panel review were distributed to potentially interested parties. Afterwards a series of meetings were held with groups and agencies who expressed interest, to explain the nature of the review. As a result of requests made during these contacts, copies of previous studies were made available for review pending receipt of the EIS.

The EIS was completed by Public Works in late February 1979. Copies were made available by the Panel Secretariat to interested members of the public and government agencies who had been identified as a result of the earlier contacts.

Comments on the EIS and on the project were also solicited through media advertisements throughout Alberta and notice of the public review was mailed to householders in Banff, Canmore and Lake Louise. Copies of the EIS were placed in viewing centres and summaries of the EIS sent directly to interested parties. A total of 15 written submissions were received and distributed to interested parties prior to the public meetings.





In late May 1979 the proponent held its own information sessions in Calgary and Banff to explain the project to the general public. Brochures explaining the project and the review were distributed and comments solicited. Information from Public Works was also handed out at the Park's East Gate during May. This produced a number of comments and further requests for information on the project.

1.5.4 Public Meetings

Public meetings on the proposal were scheduled by the Panel to hear discussions on issues related to the project. This allowed the Panel to obtain further information on potential impacts of the project. Notices of the meetings, as well as procedures and schedules were advertised and mailed to interested parties.

Afternoon and evening sessions were held in Calgary on June 12, 13, and 14, 1979 and in Banff on June 19, 20, and 21, 1979. Sessions were devoted to the project as a whole; transportation analysis; impact on fish and wildlife, and their habitat; general impact on park environment; impact on area communities and planning; and socio-economic issues. The final session was allotted to participants to present closing statements summarizing their position concerning the project, taking into account information presented by others during the meetings. With the exception of the final session, the Panel, proponent, other intervenors, and the audience had the opportunity for a question-and-answer period after each presentation, and to make short statements concerning presentations made.

Public Works Canada, as the proponent, was represented throughout the meetings

by senior departmental officials and by the private consultants that had prepared the EIS. An official of the US Forest Service also made a presentation at the request of the proponent. Representatives of the media were present throughout the public meetings.

Other agencies providing representatives for all sessions or for a specific issue included those from municipal, provincial and federal governments. Representatives of environmental, transportation and business groups also made presentations as did other individuals interested in the project. A list of those making presentations is contained in Appendix B.

A total of more than forty written submissions were received by the Panel from intervenors. All written submissions received are listed in Appendix B. In addition, the proponent tabled further information including two addenda to the EIS on the matter of associated projects, and on proposals to mitigate wildlife and erosion problems. A compilation of comments from the proponent's public information program questionnaire was also tabled.

In all, over fifty presentations were heard by the Panel. Transcripts of the proceedings (1000 pages) are available through the Federal Environmental Assessment Review Office.

With the EIS, the review comments, the oral and written briefs submitted at the public meetings, and other information tabled or obtained from the questions and answers, the Panel acquired a thorough understanding of the diversity of viewpoints and complexity of issues relating to the potential impacts of the proposal.



Chapter 2

Issues and Impacts



We support improvements to the highway that are essential in the national interest or that would facilitate or improve the quality of visitation to the Park. Parks Canada's concerns are related to its obligations to preserve National Parks in Canada unimpaired for the benefit, education and enjoyment of present and future generations.

P. Lange
Parks Canada
Banff

We are faced with two realities. The section of highway involved is part of a national transportation corridor; and it occurs within part of a national system of protected heritaag lands. Both realities create their own management imperatives and objectives. But, we believe that these objectives need not be mutually exclusive, and in fact, we believe, somewhat idealistically perhaps, that these objectives could be more readily and jointly realized through an enlightened and co-operative approach at the bureaucratic and political levels. Those charged with establishing and maintaining a viable national transportation system must deal with the reality of National Parks on route and recognize that these are Canada's special places in which landscape values, wildlife values, and values related to human perception of the natural environment are weighted more heavily than in areas outside of the Parks. Those charged with maintaining the integrity of those National Park values must deal with the reality of a Trans-Canada Highway which serves national transportation purposes.

M McIvor
Federation of
Alberta
Naturalists
Banff

The AWA recommends that the Environmental Assessment and Review Process Panel recognize the proposal for twinning of the Number 1 Highway through Banff National Park for what it is, an ego trip for nineteenth century road engineers and a blatant rip-off of a National Park for a small group of business interests and a jet-set international tourist trade.

R. Sloan
Alberta
Wilderness
Association
Calgary

Regarding the priority of the proposed improvement, vis-i-vis the primary highway system, I'd like to refer to the Pacific Rim Highway Access Study. This study shows the primary highway systems of Manitoba, Saskatchewan and Alberta operating within acceptable to high levels of sevice and geometric standards. The main congestion problems occur on the Trans-Canada Highway in British Columbia and on a portion of the Trans-Canada Highway in Banff National Park. In particular, that portion of the Trans-Canada between Banff townsite and the Park East Gate. This section displayed the highest traffic volumes of any two-lane section evaluated. These traffic volumes create congestion levels that stand in sharp contrast to the levels of service provided by the Prairie network and most of the British Columbia network.

R. Barton
Transport Canada
Ottawa

2.1 Introduction

During the public meetings on the highway proposal, the Panel heard concerns ranging from the broad issues of interprovincial transportation and National Park values to specific environmental impacts.

Prior to and during the public meetings, comments were received from intervenors maintaining that the EIS was deficient, particularly in justification of the project, including consideration of alternatives and the effect of recreational and other developments external to the Park. Information on wildlife, and the impact the project could have on wildlife was considered to be inadequate by several groups and agencies.

Statements that the project was overdue and that action was necessary to eliminate traffic congestion were presented to the Panel, both directly and in the form of replies to the information brochure issued by Public Works. In some cases, graphic descriptions of peak period delays were provided. References were also made to the role of the TCH as an interprovincial transportation route.

Additional information was presented or tabled by the proponent and intervenors during the public meetings. (See Appendix C.) This included a significant change to the project proposal by Public Works to provide mitigation of the impact of the highway upon wildlife. In addition there was detailed discussion during the sessions which clarified intervenors concerns and allowed presentation of counter-viewpoints.

Considerable interest was expressed in improvements beyond km 13. Many intervenors disagreed fundamentally with

the concept of a review without immediate consideration of the stage from km 13 to 27. Other commentators maintained that twinning should be continued beyond km 27.

Many intervenors in their briefs at the public meetings identified an inherent conflict between the role of the Bow Valley as both a transportation route and an important component within a National Park.

Some intervenors gave priority to the need for conservation and expressed concern that the proposed project would not allow users to enjoy a park experience. Others considered that transportation needs should be given priority over park conservation. Some maintained that a better park experience would be obtained if traffic congestion and attendant air pollution were relieved.

Many participants emphasized the need for special measures to protect the Park while providing a road within its boundaries and noted that standard transportation designs might require some reconsideration if an optimum solution was to be achieved. Suggestions were made to lower the posted speed limit.

The proponent noted that the highway through Banff National Park was Canada's major east-west vehicle route and stated that the objective was to provide a functional, safe and environmentally acceptable highway to meet present and future transportation demands. Some intervenors were not convinced that the solution presented by Public Works was the best choice to satisfy both park and transportation needs.

Many intervenors requested more information on alternatives to the addition of

two more highway lanes before being willing to consider this option. Others provided detailed design suggestions which they felt would be more in keeping with park values. It was suggested that the conflict could be resolved by removing the transportation corridor from the Park or providing new Park land to compensate for that lost to any highway expansion.

The specific issues of greatest concern are discussed in the following sections.

2.2 Project Need and Alternatives

More presentations expressed concern about this issue than any other.

The proponent presented the need for the project primarily in terms of acceptable levels of service on rural highways, in accordance with standard practices across Canada. Information was provided on past, present and future projected volumes of traffic. Reference was made to the degrees of congestion presently experienced at various peak periods and the increased frequency of these occurrences if twinning were not to proceed. Technical information on traffic analysis and levels of service is included in Appendix D.

The proponent maintained that the traffic volume at which twinning should have taken place has already passed and that presently traffic at peak hours was operating under unstable conditions with stop-and-go traffic in extreme cases, such as during long weekends. Because of continuing traffic growth, Public Works predicted a rapid increase in the number of weekends on which the worst conditions would be reached and contended that these conditions would not be compatible with a park experience or desirable service on

the TCH. The difference in level of service between the two-lane highway in the Park and the four-lane highway east of the Gate was noted in a brief from the Alberta Minister of Transportation on behalf of the Province.

The applicability of freeway standards within a Park was questioned and Public Works' approach was challenged by intervenors on a number of grounds. A limited access highway was felt by some to ignore the needs of visitors to sight-see and linger, in favour of through traffic. It was noted by others that two lanes in the same direction allows drivers to go at the speed they want. Examples were quoted of highway projects in the United States where standards were adjusted to optimize transportation and environmental requirements. The capacity calculations for the highway were also challenged and the effect of increased highway capacity aggravating the present problems of crowding within the Park was raised.

The cost-effectiveness of the project was also discussed at the public meetings. Designing for peak flows was criticized on economic grounds. Some presentations used the value of travellers' and commercial vehicles' time to demonstrate cost benefits. The Panel was advised that under normal provincial investment standards km 0 to 13 would already have been twinned. Alberta Transportation stated that twinning normally takes place, in the case of a provincial project, before an average daily volume of 6,000 vehicles is exceeded and that the TCH was operating in 1978 at over 7,000 on an annual average daily basis.

Transportation agencies including Transport Canada and Alberta Transportation supported the traffic analysis of the proponent as conservative and

So I maintain and the Club maintains that's hardly worth spending nine million dollars or perhaps twenty million dollars by the time it's completed, for something that's going to fizzle out in seventeen years. Even accepting the arguments of the proponent, they mention around about the turn of the century for this thing to saturate. So we're still only looking at twenty years or so before nine to ten million, twenty million dollars is gone down the drain. Complete misuse of taxpayers' money.

P. Vermeulen
Sierra Club
Calgary

...the overriding concern in this matter is the need for improvements to the major east/west transportation artery to which there are no practical alternatives.

D. Brownie
Calgary
Transportation
Authority

It is regrettable that we have a transportation corridor of national importance through Banff National Park. However, we are faced with the fact that we have and also with the fact that the traffic, both road and rail, using this corridor, is essentially neither divertable to an alternative route, such as Crowsnest, Yellowhead or a hypothetical Howse Pass route, or divertable to an alternative mode such as from car or truck to bus or rail.

R. James
N. P. A. C.
Calgary

We feel that the degradation of the Park ecological system with the significant loss of National Park values is a high price to pay in terms of what we gain in return, that is, a road system designed for the convenience and expediency of high speed vehicles, impatient and often thoughtless drivers who are unwilling to adapt themselves to the natural values and philosophy of Banff National Park.

E. Patterson
Canmore

The planned roadway improvements are necessary and the question before us is really its environmental impact. Although the study does outline the implications of redeveloping the Trans-Canada Highway from the Banff Gate to the Banff townsite, it is the opinion of the Alberta Motor Association representing some 310,000 members in the Province of Alberta, that the proposed four-lane, divided highway would be safer for all users with benefits outweighing the disadvantages. We feel that the proposal would reduce the number of animal-vehicle accidents, would provide lower levels of automobile-caused pollution, provide motorists with a greater opportunity to view the scenery that we have by having a wider field of view and minimal concern for on-coming traffic. As with all projects of this nature, there has to be some tradeoffs between necessities and the aesthetic values that we have. However, with sound planning and management the identifiable environmental impacts should be minimal, and the economic and safety benefits substantial.

M. Colledge
Alberta Motor
Association
Edmonton

illustrated their points by drawing many comparisons with levels of service outside the Park. Information was presented by Transport Canada that the East Gate to Banff townsite stretch of highway experienced the heaviest volumes of any two-lane rural section on the western primary highway system. It was noted that the provinces of Alberta and British Columbia have undertaken or are undertaking improvements to other constrictions on the TCH and that the section in question was the most seriously congested part of the interurban TCH in comparison with areas beyond km 13 or outside the Park.

The nature of the traffic travelling the highway was also the subject of much debate with references to the effect of the predominance of Calgarians, the numbers passing through to British Columbia on long weekends (75% of summer peak traffic), the mix of passenger and recreational vehicles and commercial trucks, and the number of peak hours in summer as opposed to winter. The diversions to driver concentration as a result of the Park setting and the consequent interruptions to traffic were also mentioned.

The projections of traffic growth made by Public Works ranged from the historical rate of 5.5% to a low of 2% per annum, the latter based in part upon the potential effect of large Alberta recreational developments outside the Park. The possibilities of limitation of growth rates as a result of a number of other factors, including energy conservation, non-availability of fuel and modal shifts were the subject of several briefs. The appropriateness of the use of exponential growth rate projections was also questioned.

In 1975 at the time of the world oil supply restriction there was a decrease

in number of vehicles entering the Park as compared to the previous year. Since that time more energy-efficient automobiles have been developed and the proponent was of the opinion that with smaller cars energy conservation would have no effect on the growth rate in the short or mid-term time frame. Arguments were advanced that fuel shortages would accelerate the trend to smaller cars or that people would save fuel for a vacation. Counter-arguments were made that energy shortages or conservation would reduce the forecast number of vehicles on the road and result in more use of public transportation.

Greater use of public transportation was an option advanced by many groups and evidence was produced to show that the public transportation share of the Canadian vacation market is increasing. Many intervenors foresaw the combined impact of these factors producing a long-term trend to less automobile use and it was suggested that the need for further improvements to the highway in the future was not demonstrated. Even with the combination of all these factors the proponent and some intervenors maintained that the immediate problem of traffic congestion would not be resolved.

The information on alternatives other than twinning that are contained in the EIS was considered to be insufficient by some intervenors who were unconvinced that Public Works' proposal was the best answer. The proponent contended that the option of building a parkway would not provide sufficient capacity and would result in similar or greater environmental impacts. In addition, constructing a new highway route through a different pass inside or outside the Park either would result in even greater environmental impact, or was discarded because of

engineering difficulties and long time-frames for project completion.

Enforcing or encouraging use of other existing highway routes across the mountains was regarded by Public Works as unworkable. This latter viewpoint was generally supported and evidence that the importance of the TCH is increasing as an Alberta-British Columbia transportation link was presented.

The alternative of different management of the highway through less drastic improvement was discussed in detail at the public meetings. Reference was made to present constrictions such as the Park's East Gate and the traffic circle and the effect that spot improvements in these areas could have in alleviating congestion. The proponent maintained that these improvements would result in an additional 150 vehicles per hour (or about 10%) increase in capacity for the present two lanes. Suggestions for other systems of management of the present highway such as three lanes, either with various devices to delineate the reversal of flow in the middle lane at peak periods, or as a passing lane, were made. Public Works regarded these options as either undesirable in a park situation because of the unsightly overhead signs or barriers required, or unsafe if no barriers were used.

Some evidence was received by the Panel on the increasing number of multiple vehicle accidents; as well as the vehicle-animal accidents that are discussed in section 2.4. While the evidence that the accident rate is the result of congestion was disputed, the increased safety of a four-lane divided highway was not challenged.

It was also pointed out that shortages of fuels and increased fuel prices are resulting in smaller and less powerful automobiles. For the same reason trucks are becoming more energy-efficient and are also increasing in size with the easing of weight restrictions. These changes, coupled with the increased use of recreation vehicles, result in more difficult and less safe driving conditions due to the relative inability to manoeuvre, especially on a two-lane road.

It is clear to the Panel that present levels of congestion on this section of the TCH have become sufficiently serious that a remedy is warranted. Moreover, by conventionally accepted standards, this congestion has been present for several years and the situation continues to deteriorate.

While some spot improvements (such as eliminating the bottlenecks at the Banff rotary and East Gate) could measurably improve these conditions, such improvements would only restore the conditions which existed two or three years ago. While this would certainly be beneficial, it would not nearly be sufficient to meet acceptable standards of service on the TCH. The prospect of diverting traffic to other existing roads is not considered by the Panel to be a feasible or reasonable solution. Alternatives such as a three-lane highway, a parkway or a new route through the mountains have significant disadvantages.

Increased use of public transportation, mainly buses and trains, is one alternative which has significant future prospects, especially for winter use. The winter traffic is more dominated by a

few destinations - the ski areas - and public transportation is well suited for such use. Increased use of public transportation is, however, quite unlikely to reduce traffic volumes to levels which could reasonably be handled on the existing highway, partly because of the time required to affect this shift in modes but more importantly because of the already excessive summer traffic volumes. In summer much of the traffic is not destined for Banff Park and even Banff traffic is not likely to be going to a common destination. Thus, for summer traffic the public transportation alternatives are both less acceptable and less effective at reducing highway traffic.

The Panel recommends that Parks Canada investigate means of encouraging public transportation modes at the expense of automobile use, especially for ski-related traffic. Such a recommendation can be justified by the national benefits of energy conservation, by the increased safety, and by the prospects of reduced future congestion problems for that component of traffic which is currently growing most quickly.

Analysis of the need for twinning the highway is complicated by the fact that traffic volumes are not static but are changing. Accurate forecasting of traffic levels requires assumptions about fuel cost and availability, levels of demand for tourism in and out of Banff National Park, and demand for through traffic (both passenger and freight). While detailed assumptions may vary, it is the Panel's view that any conventional forecast will result in growing traffic volumes, at least in the short term. Thus the current levels of congestion are not expected to be alleviated over time and in fact are very likely to become more severe in the future.

The only prospect which, in the view of the Panel, might alter this conclusion would be a serious and persistent fuel shortage. This could well reduce the number of trips and induce rapid shifts to public transport to such an extent that the remaining traffic volumes could be accommodated on the existing road. While such an event is possible it is, in the short term, unlikely and the Panel deems it inadvisable to base policy on such a prospect.

For these reasons the Panel has concluded that a need exists and has been demonstrated for four-laning of the TCH from km 0 to 13. The next aspect is to determine whether the residual environmental impacts of twinning the highway are so severe that they outweigh the need.

2.3 Fisheries and Hydrology

The water resources of the Bow Valley in Banff National Park have undergone a number of modifications in past years. These included realignment of the Bow River with construction of the CP Rail track, damming of the Cascade River and diversion of water through Two Jack Lake and along a canal to the Cascade power plant and realignment of Chinaman Creek due to highway construction. The fish resources of the area have been manipulated by Parks Canada fish stocking practices and further modified by angling pressure.

The proposed twinning would cross Carrot Creek, Duthill Creek East, Duthill Creek West, Chinaman Creek and the Cascade River. The Panel is satisfied that construction of the necessary crossings of the Carrot Creek, Duthill Creek East, Duthill Creek West and the Cascade River will not pose extraordinary environmental



. . .there's a major program on the West Coast called the Salmonid Enhancement Program which does specifically that, it builds streams for fish and creates good habitat for them. So the knowledge is pretty well demonstrated there.

C. Hatfield
Public Works
Consultant

problems and can, with care, be completed with negligible residual impact. Careful design and construction techniques will prevent siltation and sedimentation of surface waters. It was noted, however, that further studies to define fish use and hydrology are required before final design and construction schedules can be completed.

Construction of the highway in the vicinity of Chinaman Creek will necessitate extensive realignment of this watercourse as well as modifications to the hydrology of springs which feed into it. It was noted that Chinaman Creek was by far the most productive of the fish-supporting streams of the area which would be crossed by the proposed highway. There are some indications that the water quality of Chinaman Creek is impaired by the long-abandoned Anthracite slag piles which wash into the watercourse. The proponent made a commitment to carry out certain remedial work to correct existing problems, including those due to the slag piles and abandoned culverts along this watercourse.

The proposed reconstruction of Chinaman Creek will require careful design and execution. The Panel is satisfied that the necessary expertise and technology exists to develop a new creek alignment with enhanced fish habitat and that the proponent was committed to rehabilitating the disturbed portion of the Creek to a productive level.

Fisheries expertise should be involved in planning necessary further studies, and review and approval of detailed design, to ensure that adequate attention is given to these concerns.

2.4 Wildlife

The majority of intervenors' comments on the environmental impact of the project centred on its effect on wildlife. Concerns as to the impact of the proposed project on wildlife focused primarily on road kills of ungulates. Road kills of bears and the action of the highway as a barrier to small mammals were also raised as lesser concerns.

The Panel was informed that there were at least 110 deer, elk and moose killed on the TCH within the Park during 1978; a significantly larger number than in previous years. Information was presented to show that a disproportionately large percentage of these road kills took place on the km 0 to 13 stretch.

It was noted that the Bow River Valley is good winter range *and* that the highway verges are especially attractive to ungulates. It was suggested that creation of new winter range away from the highway would lessen animal mortality. However highway verge habitat is not considered critical to maintenance of herds at present population levels, since other winter habitat is under-utilized.

Evidence was presented to show that for at least two species the road kills are having a significant effect. The number of elk and moose killed is close to the maximum predicted number of surplus animals in terms of net productivity. Thus further increases in the mortality rate would have a negative effect on the population size. Indeed the current number of highway kills may be too high to maintain present population levels. While less information is available about deer populations the impact of highway



It is known, as a result of our work, that 970 wildlife accidents have occurred in the Banff Park since 1964, and of these 780 were moose, elk, mule deer, white-tailed deer and big horn sheep. We divided the sections of roadway through Banfi Park into four pieces to illustrate the areas of greatest concern. The East Gate to the traffic circle accounted for 45 percent of all of these animals killed, the area under consideration...In 1978 the cost to vehicle repairs as a result of collisions with wildlife was \$96,744, and that works out to a cost per vehicle per accident of \$717.

B. Leeson
Parks Canada
Calgary

kills is also believed to be significant; 61 deer were killed on the TCH in the Park in 1978.

Concern was also expressed about human safety and vehicle damage resulting from animal-vehicle collisions. The cost of vehicle repairs was estimated at \$717 per accident. Evidence presented indicated that experiments with mitigation measures have only been attempted in the past few years. Parks Canada's own experiments with reflection devices have not been successful. Intervenor at the meetings, including Parks Canada, considered that effective mitigation would be required whether or not twinning went ahead.

The proponent's initial contention was that the impact of twinning the highway on road-kills was uncertain and that further studies of potential mitigation measures were necessary before firm recommendations could be made. However, at the public meetings presentations were made by the proponent and others on the effective use of animal underpasses and overpasses. A commitment was made by the proponent to install four underpasses including two at existing bridges. In line with the recommendations of the proponent's consultant these would be wide clear-span structures rather than constricted culverts. It was considered by the proponent and some intervenors that, if underpasses are to be used successfully, fencing along both sides of the full 13 km stretch of highway would be necessary.

Submissions were also made on the number of underpasses that would be required, the design details necessary to encourage animals to use underpasses and overpasses and the strength of the fence that would be required. Estimates of the cost of the mitigation measures varied. A figure

of \$2.3 million was provided by Public Works for its proposal. Parks Canada made additional proposals that would increase the cost to approximately \$5 million.

A degree of unanimity developed among participants at the public meeting that the only way to resolve the problem of wildlife kills was to isolate the highway. Some concerns were expressed at the aesthetics of a fence along a highway in a National Park, but most groups that intervened felt this was essential to the success of the concept and that without this the underpasses were not worthwhile.

Public Works was also prepared to monitor the systems effectiveness for the first year after construction but expected Parks Canada to continue this function thereafter.

The Panel concluded that underpasses, or overpasses depending on site conditions, together with fencing along both sides of the highway should be incorporated in the design. This not only would provide complete protection for large mammals but also would virtually eliminate vehicle/animal accidents. It would in fact be a major safety factor for this section of highway. The Panel also was of the opinion that the number of under/overpasses would have to be resolved between Parks Canada and Public Works and the type and location of fencing would require approval of Parks Canada.

The Panel concluded that monitoring of the systems effectiveness is essential and that, to ensure continuity, this role should be assumed from the beginning by Parks Canada. The Panel also concluded that the fencing should be installed as soon as practicable during the construction phase.

It was also noted by the Panel that there is a need for an overall management plan for large mammals in the Park and that this plan should consider the establishment of new habitats when and where necessary. The Panel therefore concluded that with effective mitigation, twinning of the highway would have a very positive impact on large mammal populations. The Panel also concluded that the residual impact of the project on other wildlife species would be minimal.

2.5 Terrain, Vegetation and Aesthetics

A number of related issues are collectively discussed in this section. These include, the effect of the project on the montane zone, management of ungulate habitat, rare or endangered plant species, extent of sidehill cuts, balanced cut and fill, revegetation and aesthetic considerations.

The montane zone is limited to approximately 116 of the 6358 square kilometres in Banff National Park, occurring principally as the warmer and drier valley bottoms. It is subject to intensive human use including Banff townsite and the present TCH. While not common the montane zone does occur in other locations such as Jasper National Park.

The proposed twinning is estimated to require another 0.5 square kilometres of this zone to which must be added the areas required for the new accesses to Two Jack Lake and Tunnel Mountain. The montane zone consists of forests (including douglas fir stands) grasslands and wetlands, glacial till slopes and alluvial fans. There will be some disturbance to these areas which cannot be avoided if twinning takes place.

The Panel heard evidence concerning the value of the various parts of the montane zone as wildlife habitat and on the diversity of vegetation present. Of particular importance as overwintering range are the forest areas interspersed with grasslands and shrubs which are found on the north side of the Bow Valley. Concern was expressed as to the loss of habitat and plans were advanced by Parks Canada and the Canadian Wildlife Service to clear other forested areas away from the road alignments to increase habitats for winter use by ungulates. It is noted that, due in part to highway mortality, ungulate winter range is not at carrying capacity at the present time. A reduction in mortality, through fewer highway kills, may lead to expansion of ungulate populations to the extent that winter range may become limiting.

Discussion also took place on the possibility of finding rare or endangered species of plants along the new route. The proponent maintained that studies of the particular types of plant communities present along the proposed right-of-way showed little likelihood of encountering rare or endangered plant communities. Some intervenors maintained that this did not provide assurances that rare or endangered plants were not present. The proponent outlined plans for more detailed studies at the design stage followed by detailed mitigative measures such as avoidance or salvaging of plants for relocation or interpretative uses elsewhere in the Park. It was noted that ideal conditions for field study would occur only during late spring and/or summer.

Evidence was presented on the erosion problems, particularly with regard to aesthetics, existant along the highway as

a result of previous practices. The need for rehabilitation was emphasized. As part of the new twinning project Public Works stated its intention to repair the existing areas, including rounding-off and revegetating slopes.

The Panel heard concerns as to the effects of the large cuts into the hill sides required to provide fill material for roadway construction. It was noted that the proponent proposed no new borrow pits in the Park. Current proposals for balanced cut and fill include a surplus of material ($65\ 000\text{m}^3$) which, if suitable, would be stockpiled. The use of narrower medians in order to reduce the magnitude of side-hill cuts was proposed and is discussed in section 2.6.

While no new borrow pits will be developed within the Park, it is important to distinguish between "borrow" material used for the sub-grade (as fill to support the road) and gravel used as a base for the highway or for mixing with asphalt. Some gravel is proposed to be extracted from the Cascade river pit within the Park. The final decision on other gravel sources is not yet made. The environmental and aesthetic impact of gravel pits can be considerable and so special care must be taken. The Panel noted the necessity for the proponent to gain the prior approval of Parks Canada for any such sources within the Park.

The difficulties of revegetation given the dry conditions and the particular soils along the right-of-way were emphasized. It was determined that techniques and materials did or would exist to deal with these problems, but that high-order design and careful construction would be necessary.

Many intervenors commented on the aesthetics of the proposed twinning. Reference was made to examples and procedures which are available to achieve high quality aesthetic design. The proponents stated that landscaping for visual effects would be part of the design stage rather than being considered in detail during assessment.

Examination of the visual aspects of the highway covered the views of drivers, passengers and on-lookers. The proponent maintained that visual aspects had been one of the reasons for the choice of this alignment rather than a route alongside the railway (km 0 to 7). Use of separated lanes of traffic at different grades as proposed will minimize viewing of cars in on-coming lanes. The proponent maintained that artificial structures such as divider medians at constricted locations and fencing as wildlife barriers could be integrated into the design.

Visual analysis techniques and landscaping possibilities along the highway were discussed. A variety of measures, at an estimated value of 5% of the construction cost and including selective cutting of trees, rounding and benching of slopes, are to be delineated at the design stage. Apart from the aesthetic benefits some of these measures will also be of value in erosion control.

The Panel concluded that although the total amount of montane zone protected within Canada's National Parks is limited, the small area required for twinning was not of such significance as to preclude construction of the project. The final design for the highway should avoid ungulate winter range where possible and additional winter range should be developed as necessary to

We are very concerned about the destruction of such large areas of varied habitat in the current design. We recognize the engineering response to aesthetics and the park experience is well intentioned. But we feel strongly that there can be no park experience at 100 kilometres per hour, just as there can be none at level E at 50 kilometres per hour. In addition, the current design calls for much more cutting and filling and borrowing of material than is necessary in our view and invades two important and uncommon wetland areas... The Bow Valley Naturalists support the mitigating measures of fencing the Trans-Canada Highway and providing overpasses and underpasses to facilitate natural wildlife movement. We feel that these measures should be implemented regardless of whether or not the highway is twinned. Fencing should be situated so as to minimize the loss of habitat. We feel that the preservation of animal and plant populations and habitat must be given priority even over aesthetics.

G. Wilkie
Bow Valley
Naturalists
Banff

We would favour a divided highway rather than four lanes divided with the centre barrier. We believe that those are not visually acceptable for the Park. We have concerns about vortexes that are created around them by moving traffic, and also blowing snow tends to blow over the top of them right at window height of the average automobile, and snow removal and blowing snow are difficulties with them as well.

R. Drinnan
Alberta Trucking
Association
Calgary

While areas impacted by the proposed project may not represent a large proportion of the total montane zone in the Park, the portion of the important montane zone usable to ungulates may be important. A loss of even a few hectares of southerly oriented semi-open areas could remove a significant portion of the best ungulate winter range. The total areal extent of these areas in the Valley relative to those to be impacted by the proposed highway is not known and should be ascertained.

G. McKinnon
Fisheries &
Oceans Canada
Winnipeg

Great care must be taken to assure the highway is aesthetically pleasing to look at and unobtrusive to its surroundings. The scar on the backside of Sulphur Mountain is a monument to bad planning. The giant cuts on the north side of the highway just inside the East Park Gate and again at Carrot Creek are examples of former planning by Public Works, both of which are unsightly and unnecessary. Once committed, such blunders leave lasting scars.

G. White
Banff/Lake Louise
Chamber of
Commerce

compensate for any large mammal population increase and habitat loss due to the project.

The Panel further considers that after completion of additional studies to determine if rare or endangered plant species are present along the proposed right-of-way (as recommended by Environment Canada and Parks Canada), plans should be made to ensure avoidance or salvage.

Rehabilitation and revegetation, though difficult, could be achieved by diligent effort and an aesthetically acceptable highway could be completed. The design phase of the project would require a concerted effort on the part of Public Works and the approving agencies to develop a design which reflects the sensitivities of the area. Special attention will need to be given to the extension of cuts to provide balancing fill material and to the aesthetic impact of the proposed fence.

2.6 Related Environmental Issues (including median widths)

Varying median widths between the divided east and west-bound lanes were proposed by the proponent. For aesthetic and safety reasons a wide treed median has been used by Public Works wherever possible. A minimum depressed median or raised concrete barrier is proposed where space does not permit the wider median (see Figure 3).

It was suggested that the narrower medians might be more extensively used in order to minimize terrain impacts (such as sidehill cuts or use of wetlands in the right-of-way) or to avoid springs in the vicinity of Chinaman Creek. It was the contention of Public Works that many of the springs feeding Chinaman Creek could not really be avoided in any case

and that adequate measures can be taken to let the springs continue to feed Chinaman Creek. With respect to the sidehill cuts, the proponent noted that grade separation (placing the west-bound lane higher than the east-bound lane) was used to minimize the magnitude of many of the cuts.

The Panel is convinced that the medians proposed by Public Works are acceptable and that minor changes can be made at the detailed design stage. This is, of course, contingent upon adequate rehabilitation being provided for the sidehill cuts and other terrain disturbance.

The environmental impact of two extra highway lanes, as proposed, is in many ways the same as would result from two lanes of parkway. Although alternative routings for an additional two lanes were considered by the proponent in the EIS no suggestions were made during the public review that any of the other routes would have lesser environmental impact. The effectiveness with which the proposed underpasses and fences can be used to isolate both the proposed and the nearby existing highway is however a clear environmental benefit of the proponent's proposal in comparison with a parkway or other options.

2.7 Planning and Socio-Economic Issues

Some intervenors were of the opinion that the project had not been fitted into an overall planning context and that the EIS was therefore deficient. A particular concern was expressed regarding the effect the twinning project could have in increasing pressure for expansion of services in the Park and plans for the future of the Park in general.

The geographic boundaries that various parties saw as an appropriate area for

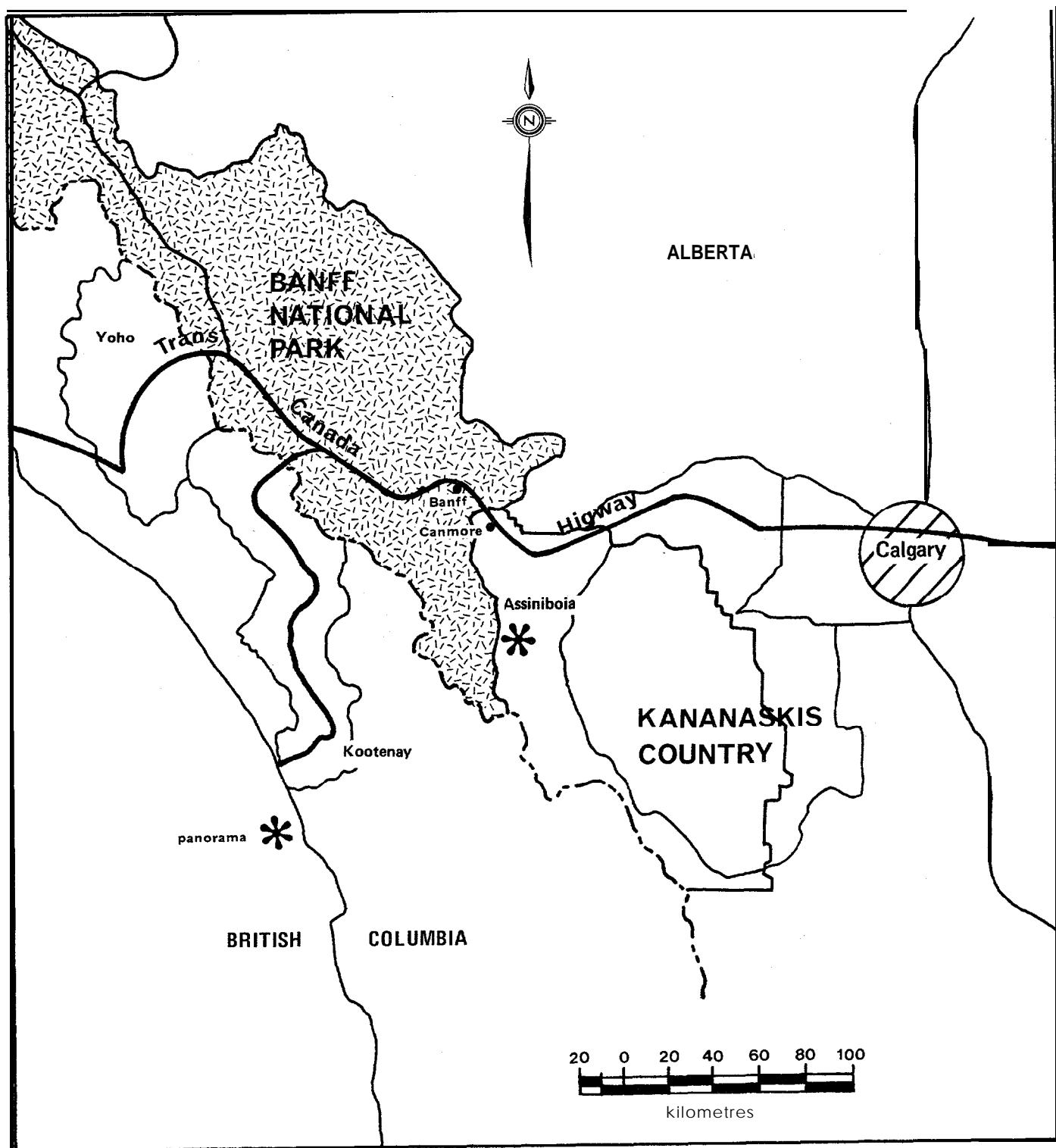


Figure 4 Recreational Developments Near Banff National Park

Like the building of the CPR, the Trans-Canada Highway was conceived and implemented as an instrument of national policy. It is accepted, both federally and provincially, that transportation policy be designed to achieve broad social and economic objectives. This includes, among other things, goals to achieve overall efficiency of the highway system and to ensure optimization of services from all modes of transport. Transportation then is utilitarian in concept, which does not serve itself, but *our* social and economic goals.

Hon. H. Kroeger
Minister of
Transportation
Alberta

. . .essentially it gets back to the old Parks Canada intention of trying to provide essential goods and services, which means restaurants and accommodation and this sort of thing, and we would like to see development which does go ahead to be related to that. . . .and we realize that we can't stop it entirely, but we do want to manage it.

R. Kirby
Parks Canada
Calgary

Thus while the proponent asserts that the regional tourist will be deterred away by congestion in Banff, the provincial government plans to attract them away. Either scenario suggests that Kananaskis Country has the potential for significant impact on the Trans-Canada Highway congestion in Banff National Park.

J. Rouse
Parks Canada
Calgary

. . .much has been said concerning the impact of the Kananaskis development as possibly reducing traffic within the Park, both in the EIS and during these hearings, but nowhere have I heard mentioned of the Panorama development proposed for the Columbia Valley near Invermere west of here, which can only serve to increase traffic through Banff, especially at the already congested periods.

J. Peatfield
Banff

intensive planning were variable. The relationship of the proposed project with major Alberta recreational developments outside the Park and impacts on the town of Canmore were raised as subjects needing consideration. Others extended the planning boundary to include recreational areas and developments in British Columbia. The proponent referred to the project in terms of interprovincial and national transportation needs and maintained that there was no direct relationship with projects planned by others apart from allowing for a normal growth in tourism by reducing congestion.

Some intervenors maintained that benefits for tourism should not be used to justify the project. The proponent agreed and pointed out that this was not a major consideration in the need to twin. The Banff business interest groups stated that normal growth would take place whether or not the project proceeded. The Panel was advised that present facilities are taxed to capacity at peak times of the year. It was also advised that Parks Canada's policy is to accept development that provides essential services for visitors.

The proposed extra two lanes are located within a zone designated by Parks Canada for high intensity use. Although there is no management plan for the area containing km 0 to 13, a Parks Canada initial inventory of Park resources for this area indicates that the opportunity for on-site interpretative uses within this zone is limited. No day use or interpretation areas are planned, and former picnic areas along the present highway have been closed in recent years because of maintenance costs and traffic safety problems.

Although one interest group contended that the project should not proceed until a total master plan had been developed, Parks Canada stated that the lack of such a plan was not of sufficient importance to delay consideration of the proposed project.

A major provincial recreational development underway, Kananaskis Country, (see Figure 4) was cited by many intervenors as a potential source of relief to traffic congestion problems on the Banff Highway. Kananaskis is in proximity to Banff and will help to meet the increasing demand for outdoor recreation resulting from a growing population, particularly in Calgary. By the late 1980's, a wide range of recreational facilities and accommodation, including more campsites than are presently found in Banff National Park, is planned. Other recreational developments in Alberta, such as the Assiniboia project at Spray Lakes, are proposed and may have a potential effect on the use of Banff National Park and therefore may influence the traffic on the TCH.

No marketing projections or definite statistics were presented to the Panel to indicate quantitatively the effect these developments might have on the utilization of Banff National Park. The proponent presented a scenario to demonstrate that the effect of Kananaskis Country would be only to slow traffic growth since at summer peak periods approximately 75% of vehicles are passing through to British Columbia. In addition the proponent maintained that many Albertans had British Columbian property investments while large recreational developments underway in British Columbia, such as the Panorama ski area,

would attract more Albertans and hence increase traffic on the TCH.

The economic justification for the project was addressed at the public meetings. The Panel was informed by the proponent and transportation agencies that, using techniques commonly used elsewhere in North America for highway projects, a high benefit/cost ratio could be demonstrated for the proposed project by including a value for travel time, operating and accident costs. Some reservations were expressed concerning the applicability of benefit-cost methodology to roads in National Parks because of intangible social implications and difficulties in determining the value of vacation travel time.

The economic importance of the highway to truckers was also examined. Information on the increasing use of the TCH by trucks for interprovincial freight was presented. The volume of trucks on the road in comparison to other vehicles is very low, especially at peak periods, and an estimate of the cost of future congestion on through trips of \$3.50 per truck was presented to the Panel.

Most information presented on the social effect of the project related to the frustration caused by congestion on the highway. The safety aspect was also mentioned.

Due to limitation of accommodation in Banff for workers and visitors, the town of Canmore is growing to meet these needs. Planning by the Town and the Calgary Regional Planning Commission is taking into account the spill-over effect from Banff. No information was presented to indicate that the proposed project would have an adverse impact on Canmore. The Panel noted, however, that the

construction camps could have a social impact on local communities, such as Canmore, and that local officials must be consulted in siting of these facilities.

Certain archaeological and historic sites are known to exist in the area of the proposed project and the proponent has proposed studies to salvage data and artifacts. However, there were no interventions on this topic during the Panel's review.

The Panel could find no evidence to illustrate that the proposal contravenes current national, provincial, regional or Park plans and policies and concluded that there was no reason to delay the project until future intensive planning at any or all of these levels is completed. Also, no data were presented to convince the Panel that the future development of recreational and investment opportunities in Kananaskis Country, or other Alberta recreational developments, would draw sufficient traffic from the Park to reduce the demand to a desirable level on the existing highway. In addition, no major concerns were identified which would lead the Panel to believe that the negative social impacts of the project would be significant, for society in general or the local communities in particular.

2.8 Other Issues

During the public review considerable interest was expressed in a number of matters associated with the proposed km 0 to 13 twinning. These associated subjects include the posted speed limit on the highway, the East Gate, twinning beyond km 13, including the Banff townsite traffic circle, and access roads to Tunnel Mountain and Two Jack Lake.

The posted speed on the TCH in Banff National Park was frequently raised as an issue. Many residents of Banff suggested that the current km 0 to 13 speed limit of 100 km/h should be lowered. The reasons given included safety (both for people and, secondarily, for wildlife), the benefits of energy conservation, and the role of National Parks as special places which would be better appreciated at a lower speed.

The Panel believes that a maximum speed limit of 90 km/h on the TCH, and other roads in the Park presently having higher speed limits, should be considered by Parks Canada.

Many comments on the impact of the East Gate on traffic were made at the public meetings. Intervenor maintained that improvements to the Gate were required because of traffic congestion at that point. Some commentors felt that such improvements were of higher priority than twinning.

Although many intervenors complained of long line-ups the present influence of the Gate on west-bound traffic was considered by the proponent's traffic consultants to be beneficial to some extent because it evened out the traffic funnelling from two lanes to one. Some commentors recommended an 'express' lane at the Gate to permit through traffic (which does not require a visitor vehicle permit) to enter the Park without stopping.

While there is no requirement for east-bound vehicles to stop at the Gate, traffic has to slow down while passing between two buildings. This causes traffic back-ups. Public Works in its EIS has recommended a routing of the two east-bound lanes that would require removal of one of the buildings. Some

mention was made at the public meetings of the desirability of maintaining the existing buildings because of their heritage value.

The proponent presented additional information at the public meetings which indicated that the effect of the East Gate is to reduce the maximum capacity of the present system by 150 vehicles per hour, and that even without the Gate the capacity of the highway could not be extended beyond 1700 vehicles per hour.

The Panel concluded that while changes at the Park's East Gate are necessary, the improvements would not negate the need for twinning.

Considerable concern was expressed that the current proposal stops at km 13, just east of the Banff townsite traffic circle. The circle, which was identified as a weak link in the existing highway, is not a part of the current proposal but is an associated project which will be addressed in the review of the km 13 to 27 stage. It was argued that this was an unacceptable procedure and that approval of this project would have only minimal benefits since one of the weakest links of the TCH would still remain.

While stating that an interchange would be an element in the km 13 to 27 proposal, Public Works presented details for an at-grade signalised intersection. It was claimed that, while such an intersection was less desirable than an interchange, it would certainly do a much better job of handling traffic than the circle. Moreover, since the intersection could in fact be accommodated within the area currently used by the circle, it was argued that there would be no additional environmental impacts associated with the intersection.



. . .the interchanges could be built now and the East Gate improvements could be done now, and then the twinning could proceed afterwards to fit into the interchanges that were built...

. . .while we didn't take a firm position on it, it seemed to me that the feeling was that if proper interchanges, if proper changes were made, then the twinning could proceed afterwards, but to build a four-lane highway between the East Gate and the traffic circle, I think you're just building a holding tank for the problems that exist at those two points, and the traffic would just pile into those four lanes, you know, and stagnate there. I mean they'd be hitting there four abreast, instead of two abreast.

G. Leroy
Banff Advisor)
Council



The Panel agreed with the intervenors that should the twinning be done to km 13, something must also be done to the traffic circle or else the congestion problem will not be adequately addressed. The evidence presented by Public Works demonstrated that this can be done, and in an environmentally acceptable way.

Considerable concern was also expressed about the fact that the twinning is being proposed in two phases (km 0-13 and km 13-27) rather than as a single project. Intervenors maintained that approval for twinning km 0 to 13 would support the argument for twinning km 13 to 27. Public Works stated that twinning of km 0 to 13 in itself would be a viable project, although they believed that twinning is warranted through to km 27.

With the exception of the short section from km 13 to the traffic circle, as noted above, the Panel finds no objection to the two phase approach to this twinning. Both traffic levels and environmental concerns are different on the two sections. While it could have been done as a single project, separating the project into two sections is an acceptable approach and the Panel is convinced that this will not prejudice any future reviews.

Public Works proposal for km 0 to 13 includes construction of new access roads to Two Jack Lake and Tunnel Mountain, with closure of the present accesses from the TCH near km 10. Some concern was expressed about the environmental impact of these new access roads, especially Two Jack Lake road, since its location was uncertain. (Three alternative routings were presented by Public Works.) Banff residents requested that the current

access road from the Tunnel Mountain campground be left open to the TCH in order to avoid the need for disruptive traffic through the townsite. It was noted that this would make more difficult the effective fencing of the highway to control wildlife movement.

Given these fencing difficulties and noting that the proposed Tunnel Mountain access road does not go through Banff townsite, the Panel sees no need to retain the access road near km 10.

The detailed siting of the new Two Jack Lake road is of importance and care will be required to properly select the right alternative. This should have been done prior to preparation of the EIS. However, the road is not a major one and the Panel is convinced that the selection can be made in such a way as to minimize the environmental impact.

2.9 Responsibility for mitigating measures

During the public meetings discussions took place on various methods of ensuring that mitigation measures are implemented during both the design and construction phases.

In spite of the existence of a Parks Canada-Public Works Steering Committee for this project it is clear to the Panel that effective communication between these two agencies has not taken place. The Panel believes that not only would it be in the interests of the two agencies to improve this situation but also a better and more environmentally appropriate road design would result from such improved communications.

Parks Canada provided information on the committees used for implementation of environmental conditions for twinning of the CP Rail line in Banff National Park. A Supervisory Committee of Canadian Transport Commission, Parks Canada, Environment Canada and CP Rail representatives gives overall supervision and resolves major problems. A Working Committee consisting of Parks Canada, CP Rail and the contractor and sub-contractor meets as frequently as required to resolve site problems. The system is considered effective by Parks Canada.

Public Works emphasized that they had successfully performed work on behalf of Parks Canada for many years and that review and approval processes and reporting and monitoring procedures had been developed. Public Works suggested that the Steering Committee chaired by Parks Canada be used for all review and approvals processing for the proposed TCH twinning. All plans would be subject to the approval of Parks Canada.

Public involvement at the design stage was mentioned as an ingredient in the successful resolution of difficulties encountered in situations in the United States where highways passed through areas with scenic qualities and recreational potential. Parks Canada advised that they were receptive to public participation as a matter of policy.

Many intervenors noted that there is a need to recognize that the Park is a special place and that a challenge exists to produce a sensitive design to reflect this. The Panel concluded that most of the environmental issues could be resolved during the design process. The care required to ensure that the

design meets expectations implies a somewhat lengthier review and approval stage than is normally encountered with a highway project. The Panel concluded, however, that careful design and review is essential to ensure that the concerns raised at the public meetings are properly addressed.

A number of potential problems during the construction stage, such as air pollution through burning of waste or asphalt plant emissions, were also raised. The need for environmental inspection of construction work was mentioned by intervenors, including Parks Canada. Parks Canada considered that, as the party responsible for the Park's resources, it has the responsibility for environmental protection.

'There is a need to clearly delineate responsibilities between government agencies to permit effective communications and to ensure that the project takes place in an environmentally acceptable manner. Coordination through a committee with representation from agencies having responsibilities in the Park is required to ensure that decisions affecting or resulting from the project are carefully considered beforehand. There is also a need for close inspection and surveillance of construction operations to ensure all activities are carried out in accordance with good environmental practice so as to protect and enhance Park values.

A suitably constituted Committee would serve as a mechanism to ensure that highway design and construction meets the high environmental and aesthetic standards necessary in the Park. Membership would therefore include representatives from Public Works, Parks Canada and the Environmental Protection Service of

It is very nice when we are funding a project to work with Public Works in harmony and work very closely, seeking approvals and we have a very good rapport. I'm very happy with them. However, when the funding is being provided by another department or another agency, it puts us in a completely different perspective and I was reassured somewhat last Tuesday evening when Public Works categorically stated that they would liaise closely with Parks Canada and ensure that we were in agreement with what was being done because there could be a tendency here where Parks Canada is not the funding agency, to ignore our concerns or not to consider them fully. And once again, I would like Public Works' confirmation and assurance that all work that is done in the Park crosses through our office, passes through our office and receives our concurrence.

L. Blight
Parks Canada
Calgary

...I certainly can respond to that and will do so most positively and affirmatively. You have our assurance and I might even go further to let you fund it if you wish.

D. Reid
Public Works
Ottawa

However, in the National Park situation, where the preservation of natural and aesthetic values for the benefit of the people of Canada is really the Parks guiding policy, the presence of an environmental inspector should be imperative, even if there were no critical areas.

J. Mitchell
Calgary

Better communication between, the proponent and Parks Canada in the past may have negated the need for much of the criticism we have made of the EIS. We continue to be available to communicate and to assist within the limits of our resources. Should approval be granted for the project to proceed at any time, we feel there are measures that would be necessary to ensure that public interests from the Parks as well as the traffic points of view are well cared for in implementation.

P. Lange
Parks Canada
Banff

In fact I'd like to go further and perhaps extend a challenge to the Department of Public Works to this effect, that the Trans-Canada Highway can perhaps become a Canadian example of design of excellence, where the objective is to minimize environmental damage and to maximize the visual resource...

A. Werner
Alberta
Transportation
Edmonton

...and I accept the challenge to make this the finest example of environmental design on a highway in the world, and I hope we can do that. I hope we will have the opportunity to do that.

D. Reid
Public Works
Ottawa

Environment Canada, and others by invitation. The Committee would facilitate design approval, ensure that studies and mitigation measures meet requirements, and be responsible for developing any public information and input at this stage of the process and during construction. However the structure of the Committee and likely frequency of its meetings are not such that the role of environmental inspection could be handled at this level.

The designation of a suitably qualified person, having sole responsibilities as Environmental Coordinator for the project and reporting to the Public Works Project Manager would allow day-to-day contact for Park Wardens and other inspectors. The major responsibility of this position would be to ensure that all environmental requirements are adhered to by the contractors. Reports by the Environmental Coordinator would advise

the Committee on matters relating to the degree to which environmental requirements are being met during construction operations. The Environmental Coordinator should be designated early enough to ensure a full understanding of the requirements and standards of good environmental practices established by Parks Canada, Environment Canada, and other agencies.

In order to ensure that the contractors are fully aware of environmental practices and aesthetic design requirements, before submitting bids, the proponent should ensure that pre-tender briefings are held for prospective bidders. The proponent should also regularly brief contractors during construction operations on on-going environmental and aesthetic requirements so as to be assured of contractors full support and commitment to observing good environmental practices.

Chapter 3

Summary of Major Conclusions



The Panel reached a number of conclusions, many of which were considered of major importance and are listed in this chapter.

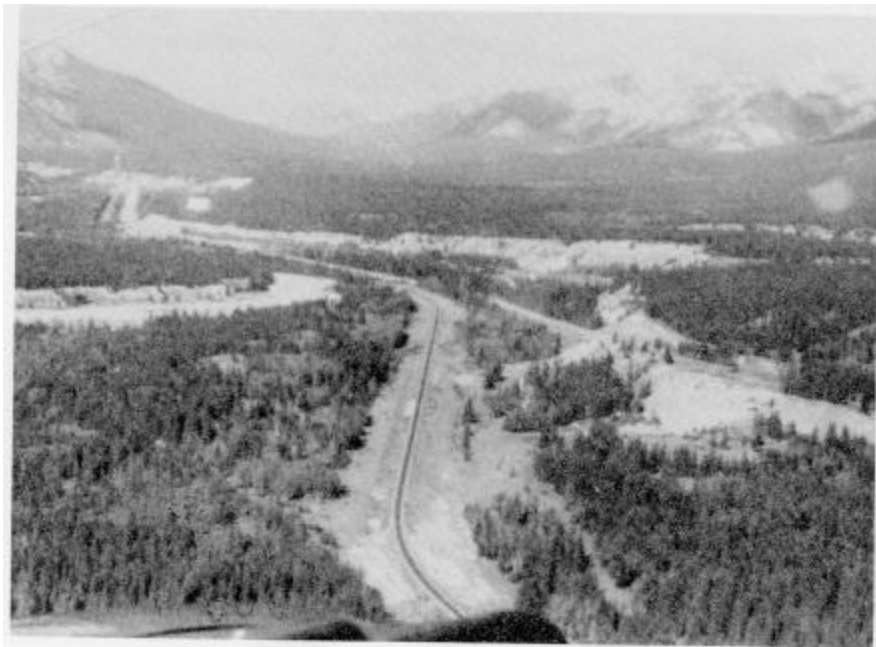
The Panel concluded that:

1. The need for twinning the TCH in Banff National Park from km 0 to 13 has been demonstrated.
2. Should this project proceed and the adjoining section (km 13 to 27) be rejected or delayed, it would be imperative that the four-lane section be extended to a suitable intersection to replace the existing traffic circle at approximately km 13.5.
3. There are no viable alternatives to the twinning proposal that would meet both the need and the environmental requirements.
4. The use of public transportation should be encouraged in Banff National Park.
5. Careful design and construction techniques are required to prevent siltation and sedimentation of surface waters during the construction phase.
6. The realignment of Chinaman Creek can be completed successfully and techniques are available to produce an enhanced fish habitat in the new portion of the creek.
7. Further site specific studies on fisheries and hydrology are required before detailed design can proceed.
8. The high mortality of ungulates on the km 0 to 13 section of the TCH is unacceptable particularly in a National Park situation.
9. The construction of under/overpasses and fencing would virtually eliminate ungulate highway mortality.
10. Further study is required to determine the number and locations of under/overpasses and location and type of fencing.
11. Highway traffic safety would be enhanced by isolating ungulates from the highway.
12. Monitoring of the effectiveness of the under/overpasses and fence structures will be necessary.
13. Ungulate populations in the National Park will increase as a result of the proposed project and mitigation measures.
14. New habitat away from the highway may be required to compensate for ungulate population increases and habitat loss due to construction and fencing.
15. Consideration of the requirement for new habitat should be done in the context of a management plan for large mammals in the Park.
16. The area of montane zone required for twinning is not of such significance as to preclude construction of the project.
17. Further study of vegetation is necessary to determine if there are any rare or endangered species in the right-of-way.
18. Rehabilitation and revegetation of disturbed terrain, while difficult, can be accomplished satisfactorily.

19. Rehabilitation and revegetation of existing cut slopes and abandoned road-beds is required.
20. The balanced cut and fill concept proposed by Public Works is, in principle, acceptable from an environmental point of view. During the detailed design stage any residual problems relating to the extent of cuts or to provision of fill material can be resolved.
21. The need for an aesthetically pleasing highway in a National Park is clear. Visual analysis and landscaping techniques and expertise should be applied at the design stage to meet the high standards required in this sensitive area.
22. The combination of the three median types proposed by Public Works is generally acceptable and reflects a reasonable balance between aesthetics, safety, environmental considerations and the physical availability of space for the highway.
23. The proposal to twin km 0 to 13 of the TCH in Banff National Park is compatible with current national, provincial, regional and Park plans and policies.
24. Kananaskis Country and other Alberta recreational developments will not negate the need for the project. The reduction in traffic resulting from the new recreational opportunities will be more than offset by an increase in the traffic demand created by through trips and population growth in Alberta.
25. The proposed project and the associated construction activities will not cause significant negative societal impacts.
26. A reduction in the posted speed limits on the TCH, and other roads in the Park, to a maximum of 90 km/h, will be beneficial.
27. Modifications should be made at the Park's East Gate to improve traffic flow.
28. There is a need to clearly delineate responsibilities between government agencies to allow the project to take place in an environmentally acceptable manner. A Committee with representation from agencies having responsibilities in the Park is required to ensure that decisions affecting or resulting from the project are carefully considered beforehand.
29. There is a need for close inspection and surveillance of construction operations to ensure all activities are carried out in accordance with good environmental practice to protect and enhance Park values.

Chapter 4

OVERALL CONCLUSIONS



After careful review of all information provided, the Panel concludes that:

1. The need for additional highway capacity has been clearly demonstrated,
2. There are no viable alternatives to the project as proposed that would reduce negative environmental impacts,
3. The proposal is compatible with national, provincial, regional and Park plans and policies,
4. The proposed project can be constructed and operated with acceptable environmental disturbance, and
5. The residual overall environmental impact of the proposed project will not be significantly detrimental.

The Panel therefore concludes that the project to twin the TCH from km 0 to 13 may be allowed to proceed, subject to certain conditions outlined in the first recommendation in the next Chapter.

The main conditions of approval relate to the requirement for under/overpasses and fencing to isolate the highway from ungulates. There will also be a requirement to relocate Chinaman Creek. There is an overriding need to ensure that the project results in an environmentally acceptable and aesthetically pleasing highway, consistent with Park values. Innovative techniques and careful attention to design and construction operations will be required to ensure that this is accomplished. The Panel is confident that this can be done.

Chapter 5

Recommendations



5.1 The Panel recommends that the project be allowed to proceed, subject to the conditions indicated hereunder:

- (1) Underpasses, of the type proposed by Public Works, or overpasses, be installed to permit movement of animals across the highway without interfering with highway traffic.
- (2) Fencing be installed to eliminate ungulate movement onto the 13 km of highway.
- (3) Chinaman Creek be realigned in such a manner as to preserve or enhance its value as fisheries habitat.
- (4) The best possible state-of-the-art techniques be utilized to ensure that design features result in an aesthetically pleasing highway. Such matters as type of fencing and proximity to the highway must not only serve their intended purpose (to keep ungulates off the highway) but also meet high aesthetic standards to preserve park enjoyment for visitors.
- (5) Revegetation of areas disturbed by the project be carried out in order to restore them to a state consistent with both condition (4) and the need to minimize erosion problems.
- (6) Rehabilitation of disturbances created by former highway construction be carried out. This would include rehabilitation and modification of existing cuts and fills and abandoned road-beds, consistent with condition (4).

(7) If rare and endangered species of vegetation exist along the right-of-way, appropriate mitigation measures such as removal to another site, salvage for interpretation, or alteration of highway alignment be utilized.

(8) A Committee be constituted as a mechanism to ensure that highway design and construction meet the high environmental and aesthetic standards necessary in the Park. Membership would include representatives from Public Works Canada, Parks Canada and the Environmental Protection Service of Environment Canada, and others by invitation. Its terms of reference should include matters relating to:

(i) facilitating design approvals,

(ii) environmental standards and practices,

(iii) aesthetic standards,

(iv) further studies and resulting mitigation requirements,

(v) special environmental conditions in contracts,

(vi) ensuring that the conditions contained in recommendation 5.1 of this report are implemented.

(9) The Committee referred to in condition (8) also be responsible for ensuring the implementation of those studies and mitigation and enhancement measures that were

identified by the proponent in the EIS and at the public meetings, consistent with condition (4) above.

- (10) Certain studies be conducted prior to final design or site work. These would include studies related to the realignment of Chinaman Creek, determination of whether rare or endangered species of vegetation exist along the right-of-way and others as determined by the Committee.
- (11) That the proponent designate a suitably qualified person, reporting to the Project Manager, with sole responsibilities as Environmental Coordinator for the project. Such a person will serve as the day-to-day contact for Park Wardens and other inspectors and ensure that construction operations are carried out by the contractors using good environmental practices and in accordance with the agreements reached by the Committee. The Environmental Coordinator should regularly submit reports to the Committee on matters related to the degree to which environmental requirements are being met during construction operations.
- (12) The twinned highway be extended to a suitable intersection to replace the existing traffic rotary at approximately km 13.5, in the event of non-approval of, or a significant delay in, twinning the highway from km 13 to 27.

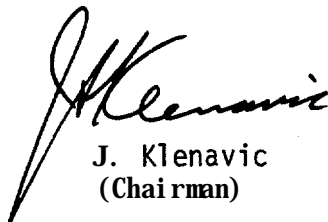
5.2 The Panel also makes the following recommendations:

- (1) That the proponent hold pre-tender briefings for prospective contract bidders to ensure that they are fully aware of environmental and aesthetic requirements before submitting bids.
- (2) That the proponent regularly brief contractors during construction concerning environmental and aesthetic requirements
- (3) That Parks Canada develop and implement a wildlife management plan which may include development of ungulate habitat in areas away from the highway.
- (4) That Parks Canada actively promote the use of public transportation for visitors both to and from, and within, the Park.
- (5) That the existing access roads to Two Jack Lake and Tunnel Mountain be closed.
- (6) That Parks Canada evaluate the effectiveness of under/overpasses and fencing to mitigate vehicle-animal kills, for possible utilization of similar techniques in other areas of Canada and elsewhere.
- (7) That special efforts be made by all parties to ensure effective communications in order to allow the project to be designed and constructed in an environmentally acceptable and aesthetically pleasing manner.
- (8) That in connection with the future review of the second phase of the twinning project (km 13 to 27) the proponent and his consultants

actively seek information, relevant to the environmental impacts associated with the proposed twinning, from Parks Canada, and that Parks Canada officials make every effort to ensure that the proponent has access to Parks Canada's scientific or technical studies and reports that may have a bearing on the proposed project and its potential impacts.

- (9) that Parks Canada review the operation of the East Gate and that such changes in this facility as are necessary and possible to reduce congestion be reflected in the final design of the proposed twinning project.
- (10) That Parks Canada consider reducing the posted speed limits on the TCH, and other roads in the Park to not more than 90 km/h.

BANFF HIGHWAY PROJECT
ENVIRONMENTAL ASSESSMENT PANEL




J. Klenavic
(Chairman)




W. Binks



J. Hartley



R. Edwards



W. Ross

Appendices

APPENDIX A- PANEL MEMBERS BIOGRAPHIES

Mr. John S. Klenavic, Chairman

Born in St. Catharines, Ontario, Mr. Klenavic was educated in Ontario, British Columbia and Manitoba, receiving his degree in Chemical Engineering from Queen's University, Kingston, Ontario. Following military service, he worked as quality control chemist in Toronto and, in 1973, was appointed Acting Director, Environmental Emergency Branch, Environmental Protection Service, Fisheries and Environment Canada. Mr. Klenavic is currently Associate Executive Chairman for the Federal Environmental Assessment Review Office, the office responsible for the administration of the Federal Environmental Assessment and Review Process. Mr. Klenavic is a member of the Association of Professional Engineers of Ontario.

Mr. Wyman R. Binks

Mr. Binks graduated from Queen's University in 1-940 with a B.Sc. in Civil Engineering.

After commissioned service with the RCAF, he joined the Department of Highways of Ontario as a soils and research engineer.

In 1951, he entered the Trans-Canada Highway Division of the Federal Public Service where he was involved in all phases of highway planning, design, construction, operations and management until his retirement in 1977 as Director of Transportation, Public Works Canada. Major projects included the Trans-Canada, the Banff-Jasper, the Mackenzie, the Dempster and the Alaska Highways.

As a dual responsibility with his highway functions, he was appointed Director of Environmental Co-ordination for Public Works Canada (1975-76). Mr. Binks is a member of the Association of Professional Engineers of Ontario.

Dr. Roger G.W. Edwards

Dr. Edwards graduated with a B.Sc. Degree in Agriculture and subsequently obtained his Ph.D. degree in Botany from the University of Alberta, Edmonton in 1972.

Since that time he has held a number of positions as a biologist with the Environmental Protection Service of the Department of the Environment and is currently Manager, Environmental Conservation Program, Alberta District Office.

As an ecological protection biologist, Dr. Edwards has co-ordinated the reviews of many proposed projects in the prairie provinces and the Northwest Territories including several linear transmission proposals.

He has also directed research work on the environmental impact of various construction activities including highway projects.

Mr. James E. Hartley

Mr. Hartley obtained his Bachelor's degree from the College of Agriculture, University of Saskatchewan and subsequently in 1963 a Master's degree in Community and Regional Planning from U.B.C. From 1963 to 1971 he held a number of progressively more responsible positions as a planner with regional governments in Alberta and Ontario. Since 1971 he has been with Parks Canada's western region and is currently Chief of Management Planning.

Mr. Hartley has served as a member of a commission established to select a site for Alberta's third university and as Chairman of a Task Force examining CN relocation in Jasper National Park.

Dr. William A. Ross

Dr. Ross graduated with a B.Sc. Degree (Manitoba) and subsequently obtained a Ph.D. in Physics from Stanford in 1970.

After doing post-doctoral research work at McGill University, Dr. Ross joined the Faculty of Environmental Design, University of Calgary, in 1973.

Since that time he has been working extensively in the field of environmental science with particular interest in environmental management and energy conservation. He has served as Director, Environmental Science Program, University of Calgary.

Dr. Ross has lectured on various aspects of environmental sciences including environmental impact assessment. He has also directed environmental research and published numerous papers.

APPENDIX B — PARTICIPANTS IN PUBLIC REVIEW

1. Presentations to the Panel at the Public Meetings

A. Groups

- 1 Alberta Motor Association (A. M. A.)
- 2 Alberta Trucking Association
- 3 Alberta Wilderness Association (A. W. A.)
- 4 Banff Advisory Council
- 5 Banff/Lake Louise Chamber of Commerce
- 6 Bow Valley Naturalists
- 7 Calgary Transportation Authority
- 8 Canmore Master Brief Committee
- 9 Federation of Alberta Naturalists (F. A. N.)
- 10 National and Provincial Parks Association of Canada (N. P. P. A. C.)
- 11 Sierra Club of Western Canada

B. Government Agencies

- 1 Alberta Transportation
- 2 Environment Canada and Fisheries & Oceans Canada
- 3 Parks Canada
- 4 Public Works Canada (proponent)
- 5 Transport Canada

C. Individuals

- R. Barton (B. 5)
L. Blight (B. 3)
W. Bowes (B. 4 consultant)
D. Brownie (A. 7)
Mr. Buckley
H. Buckmaster
L. Carson
D. Cockerton (A. 10)
M. Colledge (A. 1)
S. Constable (B. 4 consultant)
D. Cunningham
R. Drinnan (A. 2)

Individuals (cont'd)

- H. Dutz (B. 5)
H. Etter (B. 4 consultant)
E. Finkle (A. 2)
V. Geist
C. Hatfield (B. 4 consultant)
W. Holland (B. 2)
J. Holroyd (B. 2/3)
N. Huculak (8. 4)
R. Jakimchuk (8. 4 consultant)
R. James (A. 10)
Mr. Kernahan
F. Kimball (B. 4)
R. Kirby (B. 3)
P. Lange (B. 3)
B. Leeson (B. 3)
G. Leroy (A. 4)
A. Macpherson (B. 2)
K. McCourt (B. 4 consultant)
M. McIvor (A. 9)
G. McKinnon (B. 2)
J. Mitchell
G. Morgan (B. 4 consultant)
L. Paterson (B. 4 consultant)
E. Patterson (A. 8)
S. Peake
J. Peatfield
D. Pike
D. Reid (8. 4)
J. Rouse (B. 3)
G. Scotter (B. 2)
Mr. Shmyka
R. Sloan (A. 3)
G. Staple (B. 4 consultant)
C. Surrendi
E. Telfer (B. 2)
P. Vermeulen (A. 11)
L. Ward (U. S. Forest Service)
A. Werner (B. 1)
C. White (A. 5)
P. White
G. Wilkie (A. 6)
P. Wilkinson

2 Written briefs received by the Panel

A Groups

- 1 Alberta Motor Association
- 2 Alberta Trucking Association
- 3 Alberta Wilderness Association
(2)
- 4 Banff Advisory Council
- 5 Banff/Lake Louise Chamber of
Commerce
- 6 Bow Valley Naturalists
- 7 Calgary Hotel Association
- 8 Calgary Transportation Authority
(2)
- 9 Canmore Master Brief Committee
- 10 Federation of Alberta Naturalists
(2)
- 11 National and Provincial Parks
Association of Canada (2)
- 12 Sierra Club of Western Canada
(2)

B Government Agencies

- 1 Alberta Environment including
comments of
 - (i) Alberta Transportation
 - (ii) Alberta Municipal Affairs
 - (iii) Alberta Public Lands &
Wildlife
- 2 Alberta Recreation & Parks
- 3 Environment Canada and Fisheries
and Oceans Canada
- 4 Parks Canada (7)
- 5 Public Works Canada (proponent)
- 6 Transport Canada (4)

C Individuals

- 1 H. Buckmaster
- 2 E. Blackman
- 3 L. Gabert
- 4 V. Geist
- 5 D. Hamer
- 6 R. Kelly
- 7 Hon. H. Kroeger, Minister of
Transportation, Alberta
- 8 J. Mitchell
- 9 M. Nicks
- 10 A. Samek
- 11 R. Stockden
- 12 C. Simpson
- 13 P. Thompson

APPENDIX C — BIBLIOGRAPHY

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Mile 0 - 7.8 Banff National Park
July 1972 - (Lombard North) prepared for
Public Works

Computer Pilot Study
TCH Banff National Park
Environmental Impact Study
1972 - (Lombard North) prepared for
Public Works

Environmental Impact Study of Twinning
TCH Banff National Park
1975 - (Lombard North) prepared for
Public Works

Initial Environmental Evaluation
Proposed Improvements to TCH
Banff National Park Mile 0 - 7.8
1978 - (Lombard North) prepared for
Public Works

Pacific Rim Highway Access Study
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Transport Canada

Guidelines for the Preparation of an
Environmental Impact Statement for
Improvements to the Trans-Canada Highway
in Banff National Park, September, 1978,
issued by the Banff Highway Environmental
Assessment Panel.

Environmental Impact Statement for
Proposed Improvements to the Trans-Canada
Highway in Banff National Park, East Gate
to km 13, February 1979 prepared by
Thurber Consultants Ltd. and issued by
Public Works

Compendium of Briefs Presented to the
Environmental Assessment Panel on the
Proposed Twinning of the Trans-Canada in
Banff National Park (km 0 to 13), and
Addendum, May 1979, issued by the Panel
Secretariat.

Compendium of Written Submissions and
Briefs Submitted to the Panel during and
after the Public Meetings on the Banff
Highway Project, July 1979, prepared by
the Panel Secretariat.

Transcripts of public meetings held in
Calgary (June 12, 13, & 14, 1979) and
Banff (June 19, 20 & 21, 1979).

Compendium of documents tabled by Public
Works at the Banff Highway public
meetings, June 1979 including:

- Opening and Closing Day Statements
- Mail-in returns from Public Works
information brochure
- Responses 1-19 to May 1979 Compendium
of Briefs
- Addendum #1 to EIS covering environ-
mental impact of access roads
- Addendum #2 to EIS covering mitigation
measures for wildlife and rehabilita-
tion of terrain
- Comments on Rationalization of TCH
Capacity

- Recommendations by consultants to Public Works on ungulate vehicular problems
- Response to Parks Canada list of deficiencies on traffic analysis
- Report on Recreational Travel Impact

Paper entitled The Impact of Highway and Railroad Mortality on the Ungulate Populations in the Bow Valley, Banff National Park, G. Holroyd, Environment Canada, June 1979

Design Reports for Glenwood Canyon, tabled by Parks Canada

Map of Ungulate Trails and Crossing Areas along TCH & CPR, April 1979, tabled by Parks Canada

Visual Design Workbook, Alberta Transportation, tabled by Parks Canada

Book on Visual Resource Management, Alberta Transportation, tabled by Parks Canada

Design Booklet, Vail Pass Colorado, tabled by Public Works and Parks Canada

Extract from Institute of Transportation Journal, Jan. 1979, referring to Glenwood Canyon and Vail Pass, tabled by D. Cockerton, N. P. P. A. C.

Extract from Traffic Safety, May 1979, entitled Deer on the Highway, tabled by M. Colledge, Alberta Motor Association

Letter of January 17, 1979 from the Alberta Institute of Pedology, concerning rare vascular plants in Banff National Park, tabled by W. Holland, Environment Canada

Booklet entitled Parks Canada Policy, dated 1979, and tabled by P. Lange, Parks Superintendent, Banff National Park.

APPENDIX D - TRAFFIC ANALYSIS AND LEVELS OF SERVICE

The Panel was advised by various transportation agencies that the standard used by most highway jurisdictions in Canada to judge the requirement for twinning of a rural highway is to not have more than some number of peak hours per year (typically 30 or 100) exceeding a level of Service "C". This level is defined in the EIS as stable flow and was estimated by the proponent in the EIS as a maximum of 900 vehicles per hour (vph) flowing on a two-lane highway (two-way flow). Operating speeds under these conditions are quoted in the EIS as 2/3 to 3/4 of the design speed.

The four-laning of the TCH to the Park's east boundary was completed by Alberta in the late 1960's when the highway was approaching more than 30 hours per annum at greater than level "C". A chart (Figure 5) was used by Public Works during the public meetings to demonstrate the changes in level of service on the TCH in the Park since that time.

The level of service "D" shown on the chart is described in the EIS as having increased accident probabilities with sudden variations in traffic speed; dependant upon driver behaviour. The estimated mid-point of level of service "D" of 1200 vph is described by Parks Canada as the point beyond which traffic conditions generally deteriorate on the TCH in Banff National Park.

In the EIS, level of service "E" is described as unstable flow with high accident potential and is shown on the chart as extending from the maximum of level of service "D" to the theoretical maximum volume of a two-lane highway. When level of service "E" is exceeded the proponent considers that stop-and-go conditions prevail and the volume of

traffic able to pass along the highway actually decreases.

The theoretical maximum volume of traffic able to use a two-lane rural roadway was estimated by the proponent's consultant as approximately 2 000 passenger vph. However because of features such as roadway and vehicle performance characteristics a more conservative theoretical maximum of 1 700 vph was estimated by Public Works and Transport Canada in their analysis of the TCH in Banff National Park. (It is assumed that actual maximum varies up and down according to factors such as vehicle mix or weather).

In the particular case of the section of road under study the effect of the East Gate, the traffic rotary and the Tunnel Mountain and Two Jack Lake access roads was estimated by Public Works to further reduce the theoretical maximum by 150 vph to an assumed figure of 1 550. Parks Canada's observations on site indicated that beyond 1 600 vph breakdown of traffic flows were likely.

The proponent advised that in preparing this chart it was assumed that all possible improvements such as replacing the traffic rotary and improving the East Gate had already been taken into account so as to be able to plot the theoretical maximum of a two-lane highway at various levels of service.

This point was emphasized by Public Works as important in considering the present level of service at which the road is operating and the results of potential improvements that might be made. The maximum volume of a four-lane highway is also given on the chart as 3 500 vph at level of service "C".

**TRANS-CANADA HIGHWAY
BANFF NATIONAL PARK — TRAFFIC VOLUMES
ANTHRACITE (km 10)**

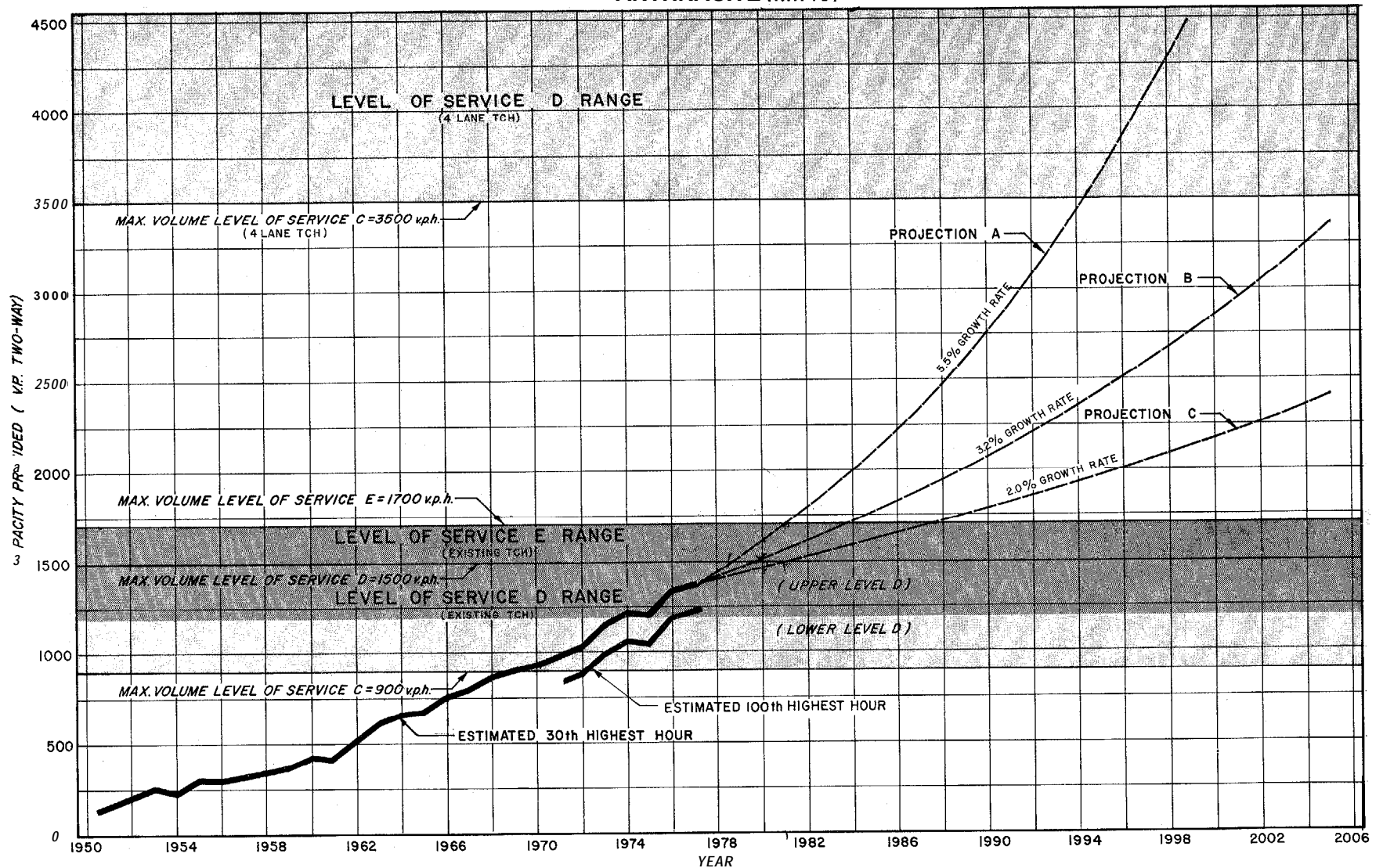


Figure 5

APPENDIX E - GLOSSARY OF TERMS

- | | |
|--|--|
| <p>limited access highway - a highway where the right of access from abutting property is controlled by public authority</p> <p>montane zone - a biogeoclimatic zone found in relatively dry locations in certain valleys of the Rocky Mountains and surrounding areas and containing distinctive vegetation features</p> | <p>traffic rotary or circle - a circular arrangement placed at the intersection of two or more roads to facilitate the passage of vehicles from one road to another (see photo section 2.8)</p> <p>ungulate - a hoofed mammal including, in the study area, white-tail and mule deer, elk and m o o s e</p> <p>verge - a vegetated area bordering a highway</p> |
|--|--|

APPENDIX F — ACKNOWLEDGEMENTS

The Panel wishes to express its appreciation to those who contributed to the public review of the project. In particular all who participated in the public meetings or provided briefs to the Panel are thanked for their efforts.

A special note of thanks is extended to Parks Canada staff for their co-operation in ensuring that the Park-using public received information on the review and for their general assistance to the Panel Secretariat.

The Panel would also like to thank the administrative and secretarial support staff of the Federal Environmental Assessment Review Office who assisted in the preparation of this Panel report.

Photo credits are due to the people listed below:

R. Diotte (Public Works)
R. Dore (Parks Canada)
S. Latour (FEARO)
S. Moore (Parks Canada)
P. Paradine (FEARO)
J. Santa Lucia (The Banff Studio)
G. Toffon (Parks Canada)

GUIDELINES FOR THE PREPARATION
OF AN ENVIRONMENTAL IMPACT STATEMENT

FOR

IMPROVEMENTS TO THE
TRANSCANADA HIGHWAY
IN BANFF NATIONAL PARK

ENVIRONMENTAL ASSESSMENT PANEL
OTTAWA, CANADA
SEPTEMBER, 1978

GUIDELINES FOR PREPARATION OF AN
ENVIRONMENTAL IMPACT STATEMENT FOR
PROPOSED IMPROVEMENTS TO THE TRANS-CANADA HIGHWAY
IN BANFF NATIONAL PARK

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INTRODUCTION

The Environmental Assessment and Review Policy of the Government of Canada requires that proposed projects initiated or funded by the federal government or with federal lands involved, and which are likely to have significant adverse environmental effects, be submitted to an Environmental Assessment Panel for review prior to the issuance of the necessary authorities to proceed. The Panel, reporting to the Minister of the Environment, reviews an Environmental Impact Statement (EIS) prepared by or for the Proponent of the project, and is submitted by an Initiator department.

These guidelines have been prepared in order that the environmental impact of the proposed twinning of the Trans-Canada Highway in Banff National Park can be determined. The Initiator and proponent for this project is the Department of Public Works.

The Initiator and Proponent are expected to observe the intent rather than the letter of the guidelines and to make every effort to identify and describe all environmental impacts likely to arise from the Project, even for those situations not explicitly identified in these guidelines. Any changes or major deviations from these guidelines are to be approved by the Environmental Assessment Panel prior to implementation.

It should be recognized that the EIS and its review by the public and technical agencies provides the Panel with a pool of information as a basis for its Report. It is possible that these guidelines include matters which, in the judgement of the proponent, are not relevant or significant to the project or to the study area. This should be so indicated in the EIS. The public and technical agencies will have the opportunity to comment upon this judgement and the Panel may subsequently require additional information from the proponent before proceeding with its Report.

Sections 1.0 through 7.0 outline the content of the EIS the Panel wishes to receive. Section 1.0 calls for an Overview Summary, suitable for review by executives, the media and the public. It will capture in brief the possible environmental impacts of the Project and the efforts that will be made to identify and quantify, avoid and mitigate them. Sections 2.0 and 3.0 outline the basic information requirements for the Project itself, from initiation to abandonment. Section 4.0 outlines existing environmental features including current use of resources.

Section 5.0 calls for the identification of likely environmental impacts resulting from the Project activities as well as measures proposed to avoid, mitigate or counteract the undesirable consequences. Section 6.0 requires the identification, and quantification where possible, of residual impacts remaining after all mitigating measures have been taken. An assessment should be made of their significance and of any information deficiencies that may affect the validity of the EIS. The Appendices, Section 7.0, outline references, data, and source information used to support the development and preparation of the EIS.

1. OVERVIEW SUMMARY

The overview summary should be written in such a manner as to allow reviewers to focus immediately on items of concern. It should be written in terms understandable by the general public and in a format that allows it to be extracted directly for publication by the media as required, or for use by senior executives requiring a quick appraisal of the situation.

The overview summary should briefly describe the project, the probable measures recommended by the Initiator and the significance of the residual unmitigated environmental impacts. Any aspects of the development which might raise public concern should be clearly described. The summary should also identify data gaps or knowledge deficiencies, and the limitations which these deficiencies impose on the Environmental Impact Statement.

2. THE PROJECT SETTING

The details of the project setting shall cover the identification of the proponent (Department of Public Works), the Initiating Department of the Federal Government (Department of Public Works), and the initiators consultants or agents. In addition, this section shall describe the objective of the project, its justification alternatives, and details of how this project fits into other general planning for the surrounding area.

2.1. Declaration & Objectives

The Initiator must be identified and take responsibility for statements and judgments in the EIS. The Initiator's agent for carrying out the assessment must be identified, complete with qualifications and references. The objective of the project must be clearly stated.

2.2. The Need

The Initiator must provide the justification for:

- a) the demand for the project;
- b) the location of the project at the proposed site; and
- c) the timing, with respect to demand, for the project and related projects.

The Initiator must clearly describe the relationship of the proposed project to publicly adopted policy and plans, such as federal, provincial, and regional.

The section should include demand forecast curves, a description of existing and historic demands and the location of the demand. Pertinent timing, routing and vehicle mix factors associated with the demand should be discussed.

2.3. Alternatives

The Initiator must provide a description of all practicable alternatives to the Trans Canada Highway twinning under study. The description should include those alternatives which were rejected and should give sufficient detail to allow the reviewer to comparatively evaluate the costs, benefits and environmental risks of all considerations.

Thus, the alternatives to be considered must include, alternative routes and configurations, alternative modes of transportation, the no-development alternative, and the postponement alternative.

2.4. Associated Projects

The Initiator should include in this section, the relationship of the project to other existing or proposed projects (perhaps not controlled directly by the Initiator) or as a component of larger plans or programs. If the project under review will have the effect of accelerating or otherwise stimulating these other projects, then the environmental effects of this alteration should be described (i.e. secondary roads, new visitor use areas, etc.).

3. THE PROPOSAL

All alternatives not discarded in 2.3. above must be described under each heading which follows. The factors common to all alternative means of completing the proposal may be discussed first, followed by a description of the factors peculiar to individual alternatives.

3.1. General Layout

The Initiator should provide a suitable scale map showing the proposed alignment in relation to other rights of way (eg. CPR Calgary Power Transmission Lines, oil and gas pipelines, easily recognizable geographic features (eg. Carrot Creek, Cascade River, Calgary Power Cascade Plant, Tunnel Mountain Campground) and human settlements such as Banff Townsite, within the Project area.

In addition, the Initiator should provide descriptions illustrated with suitable scale contour maps providing relevant information on, as well as the detailed location of, all project facilities, temporary and permanent existing and proposed transport and transmission systems and routes (including proposed right of ways & structures) proposed construction camps, borrow and waste disposal areas, water and fuel supply areas, other ancillary facilities. Environmentally sensitive areas should also be marked on the maps.

The Initiator should describe, using diagrams where necessary:

- a) the clearing boundaries, roadway alignment, profile, cross-sections and construction materials, width of right-of-way, drainage, structures and stream crossings (include access roads). The design standards used should be described in relation to safety and other specific requirements. The possibilities for variance of design standards should be explained by outlining the effects of potential changes and listing minimums where applicable.
- b) typical designs of parts of the project which would be environmentally significant i.e.
 - erosion control measures (bank stabilization, retention of wind-breaks, rip-rap protection, drainage structures, revegetation etc.);
 - watercourse crossings will be used along the route;
 - the criteria to be used in deciding the type of watercourse crossing;
 - others as determined by the Initiator;
 - cross-overs/tunnels for animals;
 - barriers to keep animals off highway;
 - structures and areas with major visual impact.

3.2. Pre-construction Details

The Initiator should describe:

- a) nature and extent and timing of right-of-way surveys;
- b) extent and timing of clearing and method(s) of disposal of accumulated materials, e.g. timber, slash overburden etc.

3.3. Construction Details

The following items should be outlined:

- a) the time for construction of each major part of the proposal and the intended construction schedule;
- b) the construction methods to be used and particularly those which could have a deleterious effect on the environment such as clearing stream crossings, exposure to erosion during earth removal, blasting or seismic disturbance, disposal of waste and surplus materials and possible alternative construction method(s) to the one(s) proposed which may prove to be less economical but provide less impact;
- c) borrow sites for local construction materials, such as sand, gravel, rock and fill material, etc.; their removal volumes involved, transportation techniques and physical characteristics expected after contract completion; sources and quantities of water for road-bed and other construction uses;
- d) location and other details of access roads, increased use of existing roads and other transportation facilities;
- e) location, size, duration and services (eg. water supply, water sources and waste disposal) of construction camps, operational camps;
- f) interruption to natural physical processes in terms of timing and other pertinent variables (e.g. stream flows);
- g) any effluents and emissions (e.g. water, air and noise), in terms of quantity and characteristics caused or attributable to construction or construction camps.
- g) Plans for handling problems created for highway users (including Park visitors) during construction.

3.4 Operation and Maintenance

Describe timing and procedural details of:

- a) types of expected maintenance under normal conditions;
- b) quantities of herbicides, pesticides, dust suppression chemicals, salt and other materials to be applied;
- c) monitoring and contingency plans to correct problems along the route.

3.5. Abandonment

Describe the abandonment and rehabilitation procedures:

- a) life expectancy of the project;
- b) abandonment plans for temporary roads, borrow pits, bridges and culverts, campsites and ancillary facilities;
- c) restoration of existing routes where they are abandoned as a result of reconstruction;
- d) closure, revegetation, and/or alternative use plans for the route and right-of-way when its useful life is completed;
- e) upgrading of temporary roads as permanent access to park areas.

4. DESCRIPTION OF EXISTING ENVIRONMENT AND RESOURCE USE

Section 4.0 should describe the natural environment in the Project Area as it exists prior to Project development with emphasis being placed on those components that are of particular significance.

Where knowledge gaps exist, these should be noted. A qualitative and quantitative description of present resource use should also be included. Maps of appropriate scale, graphs and charts should be included in each subsection to illustrate resource, and environmental information. It should consider the immediate environmental and ancillary areas that may be affected.

The intent of this Section is twofold. The first is to provide the context or baseline description of the natural environment in the Project Area to identify critical areas and to establish a baseline against which the effects, if any, of possible environmental impact can be measured. Secondly, emphasis should be placed on determining the extent and importance of ecological interrelationships. With this information, the proponent should attempt to predict how major natural or man-made changes in the environment could affect the distribution and abundance of various species or groups of species. It is recognized that this integrative approach to ecology is still in its infancy so that the development of definite predictive systems models is not expected.

4.1. Climate

The location of the recording station(s) should be noted along with the historic climatic conditions that prevail in the vicinity of the proposed transportation pathway. The long-term means, extremes, and frequency of occurrence for parameters of significance to the various phases of the project should be provided (e.g. freeze-up dates, hazardous weather conditions, etc.);

4.2. Terrain

The information should be presented on maps of sufficiently large scale.

- a) topography (with contours), landforms, surficial geology, bedrock geology, major soil types;
- b) an indication of material stability;
- c) recognized or anticipated areas of instability (landslides, mudflows, snowslides, earthquake zones, etc.);
- d) special, sensitive, or unique geological or landform features.

4.3. Hydrology

Describe important parameters of ground and surface waters:

- a) physical, chemical and biological parameters (e.g. temperature, flow rate, water table height, physical and chemical stratification, river and lake levels, fish food likely to be affected by transportation route development; the normal seasonal variations and expected maxima and minima of these parameters;
- b) quality, supply, present and proposed use of surface and ground waters;
- c) fluviological data: peak and minimum flow dates and levels, design discharge, monthly velocity means, historic channel movement;
- d) describe duration and extent of ice cover.

4.4. Flora

Describe the plant life in the corridor area:

- a) map biogeoclimatic zones and forest cover; describe forest stand structure, maturity;
- b) describe plant communities within the proposed corridor by species and common names; indicate relative abundance of species, importance to man, and importance to native fauna as habitat and food;
- c) identify undisturbed, rare or unique vegetation; plant life of special economic, historic, social, or scenic value.

4.5. Fauna

Describe:

- a) relative seasonal abundance and distribution within the area of development, of those species of fish, amphibians, reptiles, birds and mammals considered to be of significance with respect to sport, commercial, scientific, ecological or aesthetic value (listed by common and scientific names); distribution of non-vertebrate species considered to be important as food for the above-mentioned species;

- b) rare or endangered species which may be affected by the corridor;
- c) fish migration routing and timing and locations of spawning beds and nursery areas at and downstream from watercourse crossings;
- d) waterfowl migration routes and nesting area, timing and location;
- e) areas critical to the life cycles of wildlife, browsing and migration pathways of big game animals, fur bearers, or other economically valuable species; calving areas near project;
- f) fishing activities and catches.

4.6. People

Describe:

- a) the social, economic and cultural setting of the area;
- b) population distribution (including seasonal fluctuations if relevant), communities, employment, facilities and housing, within the area likely to be affected by the development;
- c) discuss the housing requirements for the expected work force involved in the project;
- d) attitude of the local population, highway users, Park visitors and others toward the development.
- e) the relationship of the existing highway to current uses of Banff National Park.

4.7 Land - Water Resource Uses

This section shall include:

- a) an inventory of present and potential land water resource, uses;
- b) any official plans for the area pertaining to land, water or resource use;
- c) present and potential conflicts or restrictions in terms of existing land use patterns;

- d) where appropriate, land ownership should be addressed;
- e) historical archaeological and paleontological information on the area;
- f) level and value of the recreational and scenic uses;
- g) any other information seen to be of consequence.

5. ENVIRONMENTAL IMPACTS AND MITIGATING MEASURES

The discussion should describe and compare the expected environmental impacts of the alternatives with emphasis on those actions which are likely to cause major environmental disruptions. The assessment of short and long term potential impacts should be made on the basis of information collected from existing sources supplemented by field data. Where factual data is unavailable or of questionable quality, the report should clearly state that the predicted effect(s) was based on subjective judgement and that knowledge gaps exist. Impacts should be considered for the pre-construction, construction, operation, and abandonment phases of the project.

The impacts should be categorized as direct or indirect - those that arise directly from the proposed project, such as interruption of fish migration due to a stream crossing, and those that arise because of secondary activities induced by the project, such as increased fishing pressure following improved access to an area. The Initiator should consider and discuss all potential environmental impacts in the area to be affected by the project in terms which shall include, where appropriate, but not necessarily be restricted to, the topics identified in the following sections. Options and measures available to avoid, minimize, or mitigate harmful effects or to enhance beneficial effects should be investigated and discussed under each topic. General mitigation considerations might involve changes in route, design, scheduling, or operations.

Summarize

Concerns raised and options and measures available to alleviate those concerns;

Major concerns for detailed discussion in the following section;

Plans for surveillance and monitoring.

5.1. Climatology

Discuss the local changes in climate and air quality that may occur as a result of the project and their impact on items 4.2 to 4.7.

5.2. Terrain

The potential impact of the proposed project on the terrain should be discussed including:

- a) geological stability (land slides, avalanches and other mass movements);
- b) slope stability and erosion resulting from the removal of surficial material during construction and operation or other causes;
- c) unique land forms;
- d) cuts, fills, tunnels and other terrain modifications
- e) quarrying, borrow pits and surplus material disposal.

5.3. Hydrology

The potential impact of the project on both ground and surface water should be discussed including alterations of quality and quantity and flora, fauna and use effects.

- a) interruption to river flows and changes in lake levels;
- b) changes in drainage patterns including encroachment onto flood-plains;
- c) changes in surface and groundwater quality;
- d) effects of floods or destructive storms;
- e) migration of stream channels, ice jams, icing upstream ponding, streambed scouring, backwater curves;
- f) channel or velocity changes and obstructions during construction or operation;

- g) introduction of sediments, suspended solids slash, hazardous materials or contaminants during construction or operation.

5.4 Fauna

The potential interference with fauna populations (fish, wildlife and waterfowl and others) should be discussed including:

- a) impact of routing on migration pathways, browsing areas and other areas used by animals
- b) animal collisions
- c) interface with humans
- d) rare and endangered species
- e) wildlife harassment
- f) noise problems

5.5 Flora

The potential impact of the project on Flora should be discussed together with effects on fauna including:

- a) loss or modification of habitats in general;
- b) changes to sensitive habitats such as those of rare and endangered species, breeding or staging grounds for waterfowl, big game, fur bearers or others, feeding and spawning grounds of fish, wet lands and marshes frequented by migratory birds;
- c) schedules and procedures of herbicide and pesticide use, type and quantity of chemicals, their expected persistence, toxicity and mobility in the environment;
- d) proposed cuttings through forest;
- e) removal of buffer zones close to water bodies.

5.6 People

Discuss: the direct or indirect effects of location and construction of the proposed project both within the immediate area and elsewhere including:

- a) the impacts on economic activity;
- b) the changes in quality of lifestyles which may be caused by construction or operation of the project, including experiences that a visitor expects to obtain in a National Park;
- c) how the population size, composition, and distribution in the area both permanent and temporary, might change as a result of direct or indirect consequences of the project in the construction and operating phases, and the implications of the changes;

5.7 Land, Water & Resource Use

Discuss the impact of the proposed project on present and future land, water, and resource use including:

- a) changes, conflicts or restrictions in uses, official plans or ownership and overtaking of facilities with particular reference to Banff National Park;
- b) changes in aesthetic and/or recreational opportunities which may be caused by the construction or operation of the project, items such as additional noise and visual aspects should be included in this section;
- c) effect on archaeological, historic, and scenic sites prior to and during the construction phase and procedures designed for the preservation of such sites;
- d) temporary restrictions on land use during construction, effects on local traffic patterns.

6. RESIDUAL IMPACTS

The environmental impacts that remain after all practical mitigating measures have been incorporated into the proposals should be discussed in terms of the nature, extent and duration of all such impacts on the environment and the implications, to international, national, regional, local and site-specific interests.

ANNEXES

The annexes to the E.I.S. should include:

- an annotated list of references cited - i.e. documentation;
- copies of reports developed from studies associated with the evaluation;
- supplementary pictorial displays.

Appendix H

Maps of Trans-Canada Highway
Banff National Park
East Gate to Km 13



Figure 6B