

THE TRANS-CANADA HIGHWAY IN

BANFF NATIONAL PARK

By

Stephen G. Rimek

January, 1990

Submitted to the

Faculty of Graduate Studies

University of Manitoba

in partial fulfillment of the

Masters degree in Arts

(Geography)



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BY

STEPHEN G. RIMEK

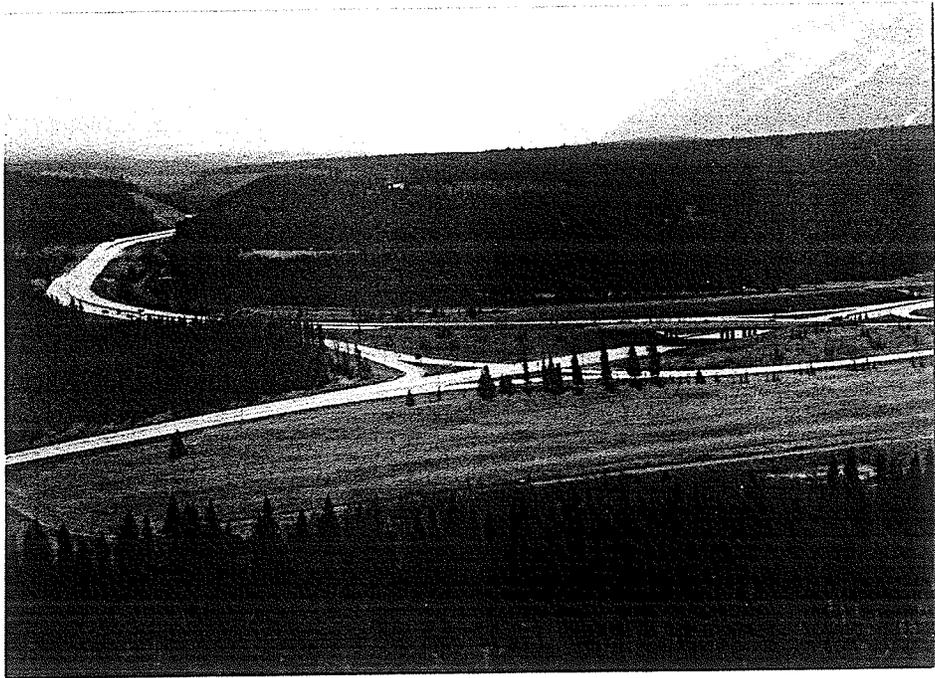
A thesis submitted to the Faculty of Graduate Studies of
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of the degree of

MASTER OF ARTS

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Abstract

The purpose of this study is to examine the improvement of the Trans-Canada Highway through Banff National Park. Between 1980 and 1986, construction on this section of roadway increased traffic capacity and safety for vehicles. Because of its setting, this project underwent a high degree of planning and environmental scrutiny. This venture brought to question the relationship between our modern society and the natural environment which we choose to protect. How park policies were adapted to this scheme will be examined. In addition, certain assumptions made by current policy makers shall be evaluated. For example, the word natural is often used, but what does it really mean? Are human beings really a divine species or merely glorified beasts? It is evident that Canadians have perfected micro-environmentalism; that is concern and protection for nature on the small scale. However, such respect seems limited to 'park' areas. Other regions deemed not environmentally sensitive are given lesser or no protection at all. And finally, mega-environmental problems, such as those caused by the continued use of fossil fuels remain unaddressed.

Acknowledgements

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Prologue

As this preamble is written, there are currently about 5.160 billion human beings on this planet. Someone writing in 1976 would have been accompanied by about 4.040 billion souls. In 1950 the population of this planet stood at approximately 2.500 billion. In less than 40 years the human species has more than doubled its numbers.

If one wishes to find the underlying reason behind the human conflict with our natural environment, a conflict which leads to a degraded planet, one needs to look no further than counting our numbers. Rainforest depletion, species extinction, desertification, ozone depletion, topsoil erosion, pollution, the greenhouse effect and acid rain have all become matters of concern. Yes, technology and economic growth 'religion' also contribute to the degradation of our environment, but these components use population growth to fuel their function.

Finally, I would question the merits of micro-environmentalism, such as that displayed in this improvement project. How useful is all of the study and care put into what amounts to be a small fraction of this planet's surface? This question is asked in the context of the very little care which is put into large areas of our planet. Could the human resources used in this project be better used in the solving of macro-environmental problems? Fossil fuel burning, population growth and the de-vegetation of this planet are much more

serious problems which could use more attention. These problems have the potential to envelope and smother all of the small scale success stories which we achieve.

This thesis will put this project in perspective to the planet on which we all live. Any project should not be viewed in isolation. The effects of this project are felt beyond the boundaries of its location.

Introduction

The area which this thesis will examine is the part of Banff National Park indicated in figure 1.1. In particular, the section to be studied is the corridor in which the Trans-Canada Highway runs through the park between the east gate, (km 0), and the Sunshine road turnoff, (km 27). Figure 1.2 indicates the alignment of the road between these two points. Areas outside of this study area will be discussed as they relate to this project.

Canada's population has almost doubled since 1951. Figure 1.3 gives population statistics for Canada, Alberta, and Calgary.

	Population statistics		Figure 1.3
	Canada	Alberta	Calgary
1951	14,009,429	939,501	142,315
1956	16,080,791	1,123,116	201,022
1961	18,238,247	1,331,944	279,062
1966	20,014,880	1,463,203	330,575
1971	21,568,311	1,627,874	403,319
1976	22,992,604	1,838,037	469,917
1981	24,343,181	2,237,724	592,743
1986	25,354,064	2,375,278	671,300

Source- Canada- A Portrait, 52nd edition, Statistics Canada, 1989.

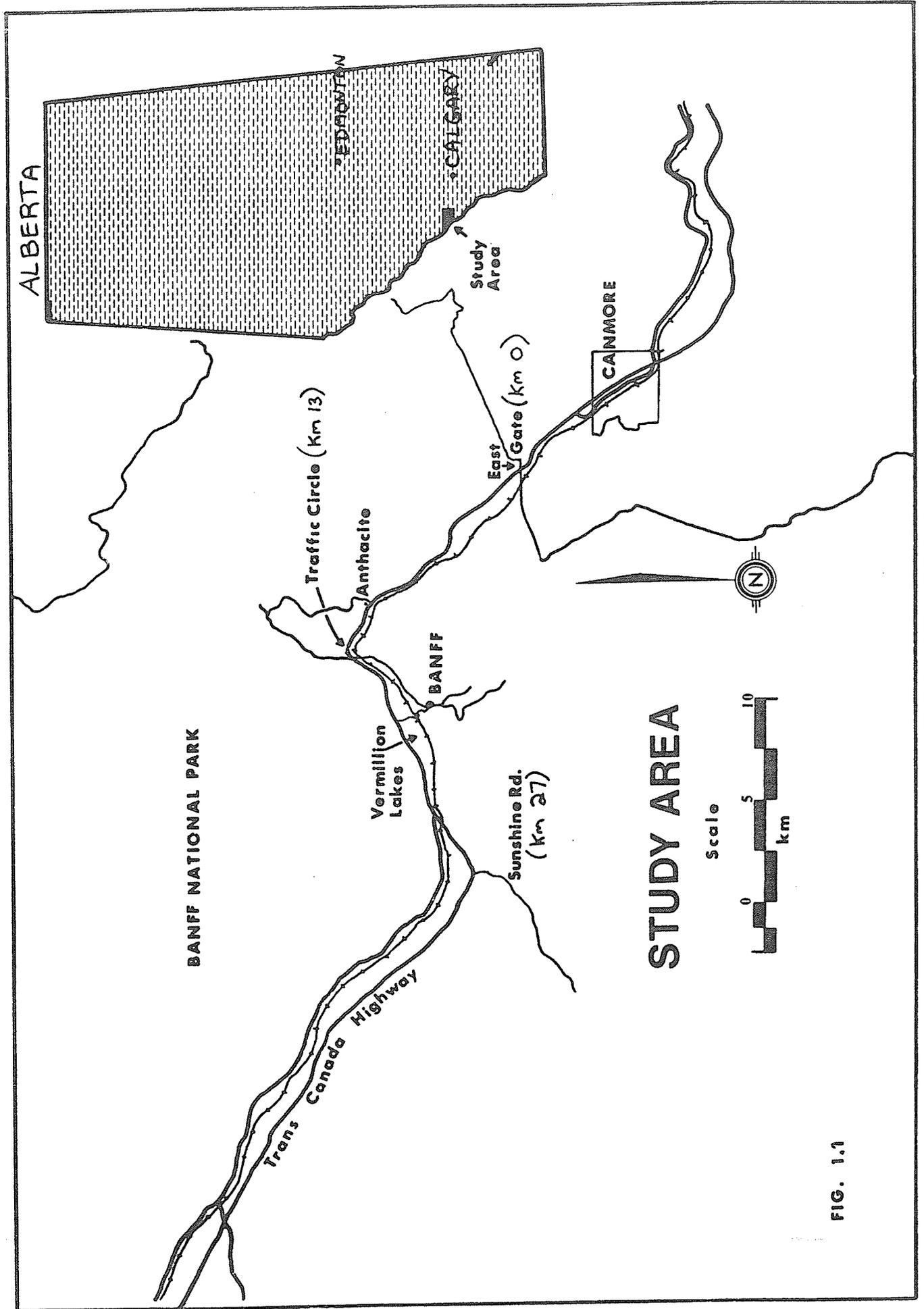
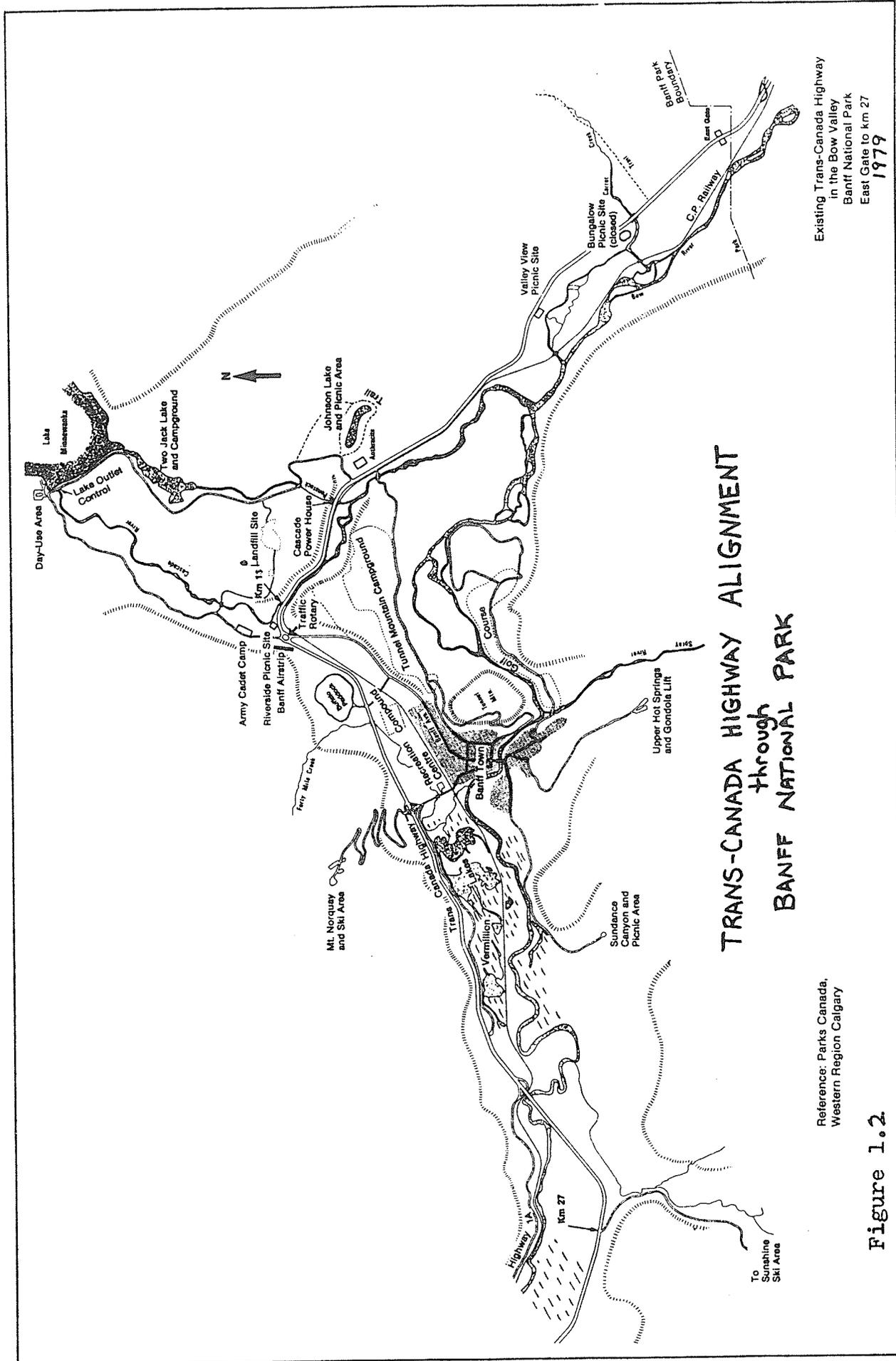


FIG. 1.1

Adapted from U. of Calgary, A Review of the Banff Highway Project, 1984.



TRANS-CANADA HIGHWAY ALIGNMENT
through
BANFF NATIONAL PARK

Reference: Parks Canada,
 Western Region Calgary

Existing Trans-Canada Highway
 in the Bow Valley
 Banff National Park
 East Gate to km 27
 1979

Figure 1.2

Adapted from Dept. of Public Works, Proposed Improvements, 1979.

Population growth rates were much higher in Alberta than for the rest of the country. In particular, growth in Calgary was quite rapid especially between 1976 and 1981. This period coincided with a high level of economic growth and individual affluence in the region. Population growth with its economic implications was important to the Banff study region primarily because of its close proximity. Banff townsite is located 110 kilometers from Calgary, about one hour's drive away. The swell of people in Calgary directly related to the increased usage of Banff National Park as a recreational area. In addition to this local usage, population growth in Canada as a whole encouraged further usage of the National Transportation Corridor in this area.

Banff National Park is part of the federal system of National Parks. Therefore, unlike other sections of the Trans-Canada Highway which are under provincial jurisdiction, the part of the highway within park boundaries is under federal control. Parks Canada is the government body which manages land in the National Park system. However, Public Works Canada is the federal body which undertakes construction on federal lands. Public Works Canada were the proponents for this highway improvement project. At the conclusion of construction, highway maintenance becomes the responsibility of Parks Canada.

Many policies of Parks Canada would seem to be in conflict with the undertaking of a project like this. However, this thesis will show that this project was adaptable to park policies and, in fact, Parks

Canada did a commendable job in influencing the construction and completion of a highway with state of the art environmental features. This praise is of course tempered by the fact that we continue to use vehicles on our highways which burn fossil fuels. No project that perpetuates the use of old, irresponsible technologies can be deemed good for this planet. This is more of a fault of society than the highway itself. We could have efficient electric cars running on this and every highway in this country, but we don't. Technology exists for the generation of abundant amounts of electricity from non fossil fuel sources. Perhaps not enough to keep all of the superfluous gadgets going which we have today, but enough to retain comfortable lives.

To continue the discussion, this thesis will look at the merits of many of the policies which Parks Canada must implement. Our society envisions many ideas for administration and implementation by the created bureaucracy, Parks Canada. However, society continues to demand high levels of 'use' from the very environment which it seeks to protect. This hypocrisy puts Parks Canada into an untenable position during many program discussions and in the implimentation of its mandate.

It should be noted that the new official name for Parks Canada is the Canadian Parks Service. This change was made in 1988. Since this new name was adopted after the completion of this project, and since all reference materials use the old name, this thesis will use Parks Canada to avoid confusion.

2. Project Inception

2.1 Background

Banff National Park was established in 1885 as Canada's first park covering 26 square kilometers. The park area was increased through time and now encompasses 6358 square kilometers. Established following the construction of the Canadian Pacific rail line, the park was able to attract people by this new easy access route. In fact, early proponents of the park idea were connected to the railroad owners who saw this as a way to increase railway usage. The Banff area was to become a prime tourism destination for affluent people in the late 19th and early 20th centuries.

The railway was to remain the main transportation route into the park until after World War I. The period after the war coincided with a period of greater wealth for Canadians as a whole. More people were able to buy luxury items such as the now affordable automobiles which were being mass produced for the North American market. In the early 1930's a paved access road was completed within the park to connect Banff to the provincial road system. The period after World War II would bring in an era of even greater automobile ownership and usage.

In response to rise of the automobile era, the Federal Government passed the Trans-Canada Highway Act in 1949. The purpose of this legislation was to assist and encourage construction of a national

highway from coast to coast which conformed to certain minimum standards deemed necessary for fast, efficient road travel in Canada. The highway was to be a two-lane facility, however, certain portions such as those adjacent to urban areas would require multi-lane facilities.

In 1950 an agreement was signed between the provincial and federal governments to designate the location of the highway. Provincial approval was necessary for this project since highways fall under their jurisdiction as granted by the British North America Act of 1867. Portions of highway through National Parks fall under federal jurisdiction since these lands are ceded by the provinces when parks are created.

Alberta and British Columbia designated sections of highway which made Banff National Park the only feasible route for the new Trans-Canada corridor. A lower grade paved road already existed in the park and the environmental consequences of upgrading this route to highway standards was not a priority in 1950.

Completion of the new Trans-Canada highway through the park was achieved in 1960. The road runs 80 kilometers from the park's eastern entrance near Canmore to the park boundary at Kicking Horse Pass located just past Lake Louise.

By the mid 1960's volumes were already of such a magnitude that consideration was given to increasing, (also known as twinning), the highway to 4 lanes in certain sections. Early studies did not give a

high priority to environmental aspects related to the proposed expansion. These studies were mainly interested in feasibility and technical aspects related to construction. Twinning was deemed feasible but the project did not proceed at that time. At the same time, however, the Alberta government did proceed with the twinning of the Trans-Canada highway between Calgary and the park boundary. Initiated in 1966, this multi-lane facility was completed in 1971.

Environmental studies were initiated in the early 1970's for the section of road within the park. This period coincided with increased concern for the natural surroundings and their protection from human development. Parks Canada was very aggressive during this time in the creation of new park areas. Maintaining the quality of existing parks was also a priority. A Parks Canada public participation program found strong opposition to the twinning idea.

The early 1970's were also a period during which park planners were less flexible than they were to become later in the decade. Jean Chretien, former minister responsible for National Parks, has described this period as 'too purist' for effective management. For example, the establishment of Kouchibouguac National Park in New Brunswick required the removal of all people regardless of how long they or their families had lived there. A park was felt to be an area where people should not live. A long period of dispute revolving around peoples refusal to accept expropriation and unwillingness to move created much ill will towards Parks Canada. Eventually it was reali-

zed that policy makers within the department would have to be more accommodating to existing conditions. This attitude change reflected in the acceptance of a need to improve the highway condition in Banff National park, especially around the congested Banff townsite.

The new atmosphere of conciliation allowed Parks Canada and Public Works Canada to work together despite their seemingly conflicting roles. Their co-operation resulted in the completion of the Environmental Impact Study, (1975). This study looked at bio-physical, engineering and landscaping aspects of the project. This study, along with other inputs by Public Works led to the completion of the final report, Proposed Improvements to the Trans-Canada highway in Banff National Park; km 0 to 13, (1979). This environmental statement was submitted for a formal review under the Environmental Assessment and Review Process, (EARP), in 1979.

The Federal Environmental Assessment Review Office, (FEARO), is the federal department which is given the power to review proposed projects submitted under the EARP program. Projects have to be initiated or funded by the federal government in order to go through this process. Public lands also qualify, thus this project met both criteria. The final criterium is the most crucial; it states that the proposed project must be "likely to have significant adverse environmental effects" (Proposed Improvements... (1978), 71). This phrase is of course open to a fair degree of interpretation which explains why all developments do not go through this process.

Public Works submitted this project to FEARO for review because initial environmental evaluation prior to 1978 indicated possible severe environmental impacts. In addition, construction of a four-lane highway through a National park was without precedent. Although a reader of Public Works documents gets the impression that the department was willing to go through the review process from the very beginning, the DaDalt/Baker theory differs here. This document points out that Public Works initially felt that the project did not require formal review. It was only after consultation with Parks Canada that Public Works made the decision to go ahead to FEARO with its plan. A mute point maybe, but it demonstrates how different people observing the same thing can reach totally different conclusions. It is always important to consider who is saying what, and where personal loyalties lie before reaching any conclusions. Sometimes reality gets so muddled that it may well be impossible to reach the truth. Politicking goes on at all levels of human society.

The FEARO panel for this assessment was composed of five members; a FEARO chairman, a retired director of Public Works, a biologist from the Environmental Protection Service, a planner from Parks Canada and a faculty member from the department of Environmental Design at the University of Calgary. It is the responsibility of the panel to hear submissions from all interested parties involved including inputs from the general public. After inviting comments from the public and technical agencies, hearings were held in Banff and Calgary during June, 1979. The final FEARO report was submitted to the Minister of the

Environment in October, 1979. The document concluded that,

"the need for additional highway capacity had clearly been demonstrated and there were no viable alternatives that would reduce environmental impacts compared to the proposed project...The project can be constructed and operated with acceptable environmental disturbance and no significant residual environmental impact"

(Banff Highway Project, (1979), 3)

Construction on phase 1 between the east gate of the park, (km 0) and kilometer 13 was begun in 1980. One year later, while construction was still continuing, Public Works submitted another environmental impact statement to FEARO for review. Proposed Improvements to the Trans-Canada Highway in Banff National Park; km 13 to Sunshine road at km 27, (1981), was the so called phase 2 of this project. The new panel was essentially the same with 3 original members, changed only with a new FEARO chairman and a different biologist. Public hearings were again heard in Calgary and Banff with a final report going to the Minister of the Environment in April, 1982. Recommendations with this phase were similar to those for phase 1.

DaDalt and Baker, (1984), are critical of the apparent duplication involved with the review process. They state that a fragmented picture of the project was presented making it difficult to assess the overall impact. Two sets of hearings was also a burden to intervenors who had to go through the process twice. In addition, approval of phase 1 may well have prejudiced the outcome of the phase 2 review.

Construction for Phase 2 commenced in 1982. All construction was initially anticipated to be completed by 1989 or 1990. However, a 'fast-tracking' process used by Public Works greatly accelerated the pace of construction. This process was called the Special

Recovery Capital Projects Program. A response to the downturn in the economy during this period, this program enabled both phases to be completed by the end of 1986.

Janis and Ross, (1984) point out that this 'fast-tracking' of the later stages of phase 1 and all of phase 2 caused problems in environmental co-ordination and management. The Special Recovery Capital Projects Program did create more construction jobs, but did not make more funds available to the environmental management team. As a result, Janis and Ross describe a significant cutback in the depth of environmental reviews as compared to the process prior to the instigation of the 'fast-tracking' process. The downturn of the Western economy in 1982 could not be foreseen during the planning and FEARO review process. 'Fast-tracking' was not a part of a hidden agenda of Public Works. However, the acceleration of the construction timetable for economic reasons points out how environmental considerations can be relegated to a lower level when 'higher' considerations come into play.

In August, 1985 Public Works completed an initial assessment for a phase 3 improvement of the Trans-Canada highway. Proposed Improvements to the Trans-Canada Highway through Banff National Park; km. 27 to km. 75, (1985) evaluated the need and consequences of continuing the four lane highway from where it now concluded to the Jasper highway, (#93), turnoff. As was the case before, the need to alleviate traffic congestion and improve highway safety were the main reasons cited to justify this project.

Public Works did not present this phase of proposed construction

to FEARO for review since the area involved was deemed not as environmentally sensitive as the land involved in phases 1 and 2. Lessons learned from the early phases in regard to construction and management would be applied to this new section. For various reasons including budget restrictions, Public Works has not proceeded with improvement of the highway past kilometer 27. However continued increases in traffic and a higher than usual fatality rate on this section of road in 1988 may encourage interested parties to take this project off the shelf in the near future.

2.2 Analysis of Need and Alternatives

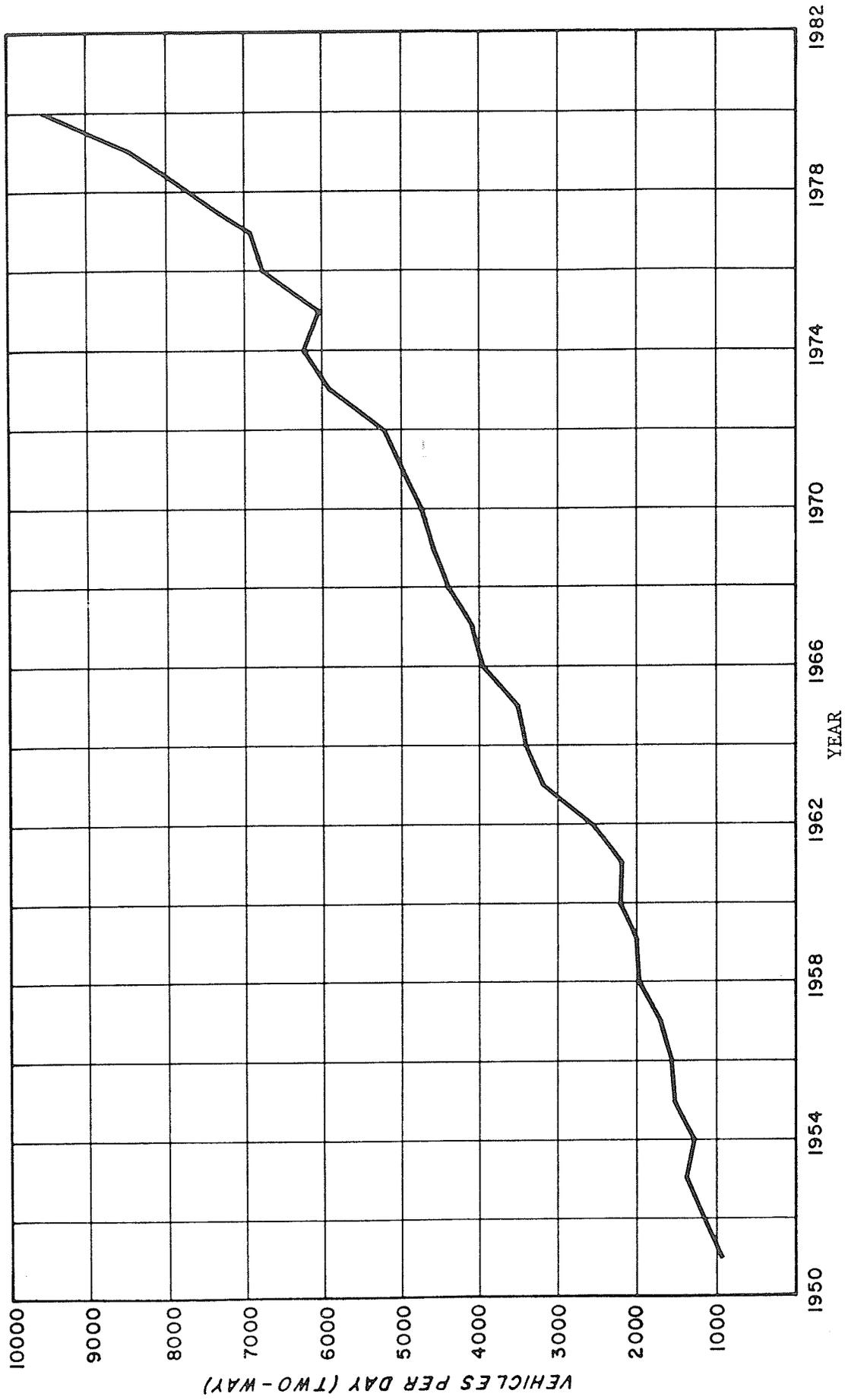
This project was initiated by the increasing volume of traffic using this stretch of highway over time, as indicated in figure 2.1. Although population increase was a major reason for the increased use, it was not the only reason. Traffic had increased almost ten-fold between 1950 and 1980. At the same time population had increased by a factor of about 4.1 times in Calgary, 2.4 times in Alberta and about 1.8 times for Canada as a whole.

Studies indicated that increasing amounts of leisure time available to individuals as well as continued rises in levels of automobile ownership were contributing factors to increased park usage. In addition, the presence of the Banff townsite as well as 3 ski resorts in the park helped encourage visitations. During peak periods the highway was exceeding its designed levels of use resulting in major traffic tieups.

Another factor contributing to highway usage is the presence of a large number of commuters in the area. The Banff townsite has limited accommodation for tourism industry workers so many of these people live in Canmore and Harve Heights which are located just outside of the east boundary of the park. The Banff townsite is not permitted to expand past its present boundaries although re-development of existing buildings is permitted. These new structures are usually built to accommodate more tourists rather than the service

AVERAGE ANNUAL DAILY TRAFFIC
EAST GATE - BANFF NATIONAL PARK

FIGURE 2.1



Source: Proposed Improvements to the Trans-Canada Highway ; (Km 13 to Km 27), 1981.

workers who are needed in increasing numbers to serve the public.

Under normal provincial conditions, the highway would have been twinned long before exceeding levels of designed traffic volumes. Transport Canada evidence indicated that the stretch of highway between the east gate, (km 0), and the traffic circle, (km 13) was the most seriously congested part of the interurban Trans-Canada highway as compared to the rest of the national corridor. (Banff Highway Project: East Gate to Km 13, 1979).

Figure 2.2, Projected 30th highest hour traffic volumes, indicates 'level of service' capability for current designs of two and four lane Trans-Canada highway. The quality of service is related to these levels.

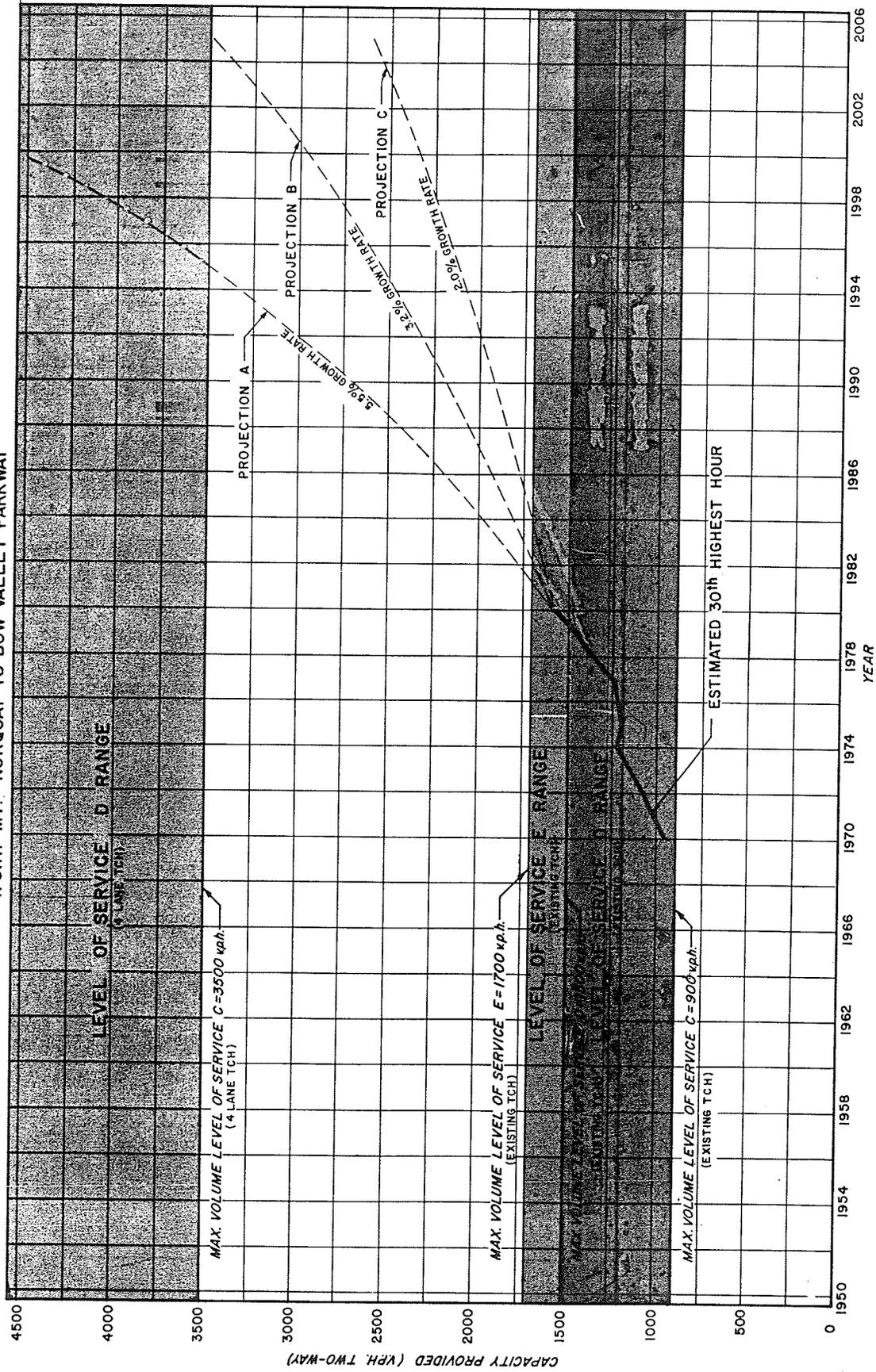
"Level C and the lower range of D (900 to 1200 vehicles/hour) represent stable flow, while the upper range of D (1200 to 1500 vehicles per hour) is entering unstable flow. Level E represents the maximum flow and most constrained operating conditions; almost any incident can cause a flow breakdown" (Proposed Improvements.., (1981), 1.2-15).

Also plotted on this figure is the 30th highest hour traffic volumes at a point on the highway in the park. This plot indicates volumes which exceed 1580 vehicles per hour for 30 hours out of a total of 8760 hours in a year. If you take the top 100 hours of traffic volume, then the figure becomes 1400 vehicles per hour. These levels of traffic are described as unstable.

One of the major arguments made by opponents of twinning was that there was no need to build a highway to meet capacities

PROJECTED 30th HIGHEST HOUR TRAFFIC VOLUMES
 T.C.H. MT. NORQUAY TO BOW VALLEY PARKWAY

FIGURE 2.2



Source: Proposed Improvements to the Trans-Canada Highway ;(East gate to Km 13), 1979

which were reached for a 'few' hours in a year. This argument does have merit. Why do we build roads to meet capacities which, taken as a percentage of the whole, are seldom reached? A one hour 'rush hour' during normal working days equates to 260 hours out of a total of 8760 in a year when traffic volumes are high. We spend enormous amounts of money and pave large tracts of land to accommodate traffic which occurs for about 3% of the time. This figure becomes 6% if you use a two hour 'rush hour' base. Even so, the figure seems small. Would our society not be better off if we kept highway capacities low to deter over use of the automobile? Why don't we organize business within urban areas to stagger working hours? Why don't we limit use of personal automobiles at certain times of the day? Why don't we charge a special fee for vehicles to use urban core regions such as Oslo, Norway recently established? There are many alternatives which have not been considered when describing need. Yes we need more road capacity if we continue to allow conditions to continue as they have in the past, but we can also change these very circumstances which foster perceived need.

Highway tie-ups and the knowledge that they exist would encourage people to leave their automobile at home and use public transit. This would save wasteful burning of fossil fuels and lower emission levels into the atmosphere.

Individualism and freedom are basic components which developed in North American society. Put together with the concept of economic growth over the vast expanse of this continent, a certain degree of psychopathy has enveloped the human species. The roots of economic

growth 'religion' may well have been 19th century Great Britain, but it was in North America where the idea was gripped to make expansion and growth synonymous with success. This 'new religion' has spread throughout the world although the level to which it is practiced may well be lower in certain regions. Population growth and expansion into previously uninhabited lands has enabled this 'religion' to continue to prosper. The 'Americanization' of societies throughout the world cannot be discounted.

In its time, economic growth was perhaps acceptable as long as the environment could adjust to acceptable levels. What acceptable levels were and are is a matter for debate. Human perception of a degrading environment is now beginning to grow. Depleting ozone, de-forestation, acid rain, species extinction and pollution are things now catching peoples attention. Success in the future will have to be equated with economies geared more towards a sustainable development level.

The need for twinning the Trans-Canada highway, or any project for that matter, is not currently questioned on the basis which has just been discussed. Need is defined by current conditions and forecasts of growth. Little, if any, thought is given to changing our lifestyles. Current society seems to plod along until something catastrophic happens. For example, oil and gas shortages in the 1970's did get people thinking about alternatives to burning fossil fuels. Had the shortages continued, or if the fuel supply had run out, then our society would have had no choice but to switch to alternative sources of energy. But fossil fuels became 'abundant' again and people

reverted back to their old ways. Plans to mass produce electric cars were shelved. Big energy consuming vehicles reappeared on drawing boards.

The power of the auto and oil industries to create demand which might not otherwise exist should not be underestimated. Individuals respond by wanting more and more. They do not want to take the bus to work, they want to drive. They do not want a 3 year old car, but one which is brand new. The next door neighbor sees that new car so goes out to buy one. Junior has grown up and wants his own car. More garage space is needed, so the family moves into a quad-garage house. Wood is needed for that new house so it has to be transported from British Columbia. The family wants a vacation in the Rockies but Via Rail or Greyhound are not up to snuff. Demand on the highways continues its upward spiral.

To be fair to Public Works, this group of decision makers is merely responding to the demands placed upon it by society. It is not their job to question the merits of forced public transit or limiting economic growth. We live in a world of specialists which leads to a void in the overall leadership of the society.

Parks Canada cannot be faulted for the fact that the Trans-Canada highway runs through Banff National Park. Historical and geographical reasons make the department, "accept as one of the facts of economic life that transportation routes through the mountain parks

are required in the national interests"(Banff Highway Project; Km 0 to 13, (1979), 8). In fact the 1986 release of the management plan for the four mountain parks re-confirmed this policy. The four mountain parks are Banff, Yoho, Kootenay and Jasper. "Existing national transportation and utility corridors will be managed in a manner that minimizes their impact on the parks' heritage resources and on visitors experiences" (In Trust for Tomorrow, (1986), 62). This policy was pre-ceded by the statement of need, within strict environmental limits, to improve and upgrade these routes as was the case in the twinning project.

The need for this highway project was justified in the Canadian context. It, combined with other development projects, will help us grow and prosper. The care put into the development of this twinning project will enable a miniscule fraction of this planet to be perceived as environmentally sound. But how important was all of the study, and all of the care if everything around the traffic corridor changes? Why protect flora and fauna which will be changed anyways by a warming atmosphere for example? Perhaps if we really wanted to protect this 'pristine' area, and areas like it around the world, then we should put our efforts and resources into the curing of macro-environmental problems. The attitude of protecting small areas of land, while at the same time debilitating the rest of the planet has to be changed. The very fact that we seem to find a need to create parks implies that we must be doing something wrong with other areas which we use. Instead of treating just park areas with consideration, we should treat the entire planet as a park. Every development should be evaluated on its

effects to the environment. Evaluated with regard to effects not only on the immediate area, but also on the planet as a whole. The fact that one area has been designated a 'park' and another area has not, should not alter the evaluation process. It is unfortunate that we have found it necessary to create a whole bag full of mental boundaries for our lives when in reality no such barriers exist. The attainment of a global community ethic will be difficult to achieve. Cultural differences will continue to fuel self and sub-group interests. Unequal distribution of natural resources will create different interests between locations on this planet. These differences weigh heavily on the decisions which we make. They distract our attention away from the real matters at hand which will have long term implications for future generations.

This twinning project illustrates the point just discussed. When alternatives were debated, planners looked at other possible routes between Alberta and British Columbia. However, these routes presented technical problems because of greater distances and steeper grades and thus were not seriously considered. It would have been interesting to look at the quality of this project had a different route been feasible outside the park boundaries. Arguably, the fact that this improvement project took place in a park was good for the environment as a whole. Had a park area not been involved, the intense scrutinization made by interested parties such as Parks Canada, would not have occurred.

Alternate modes of transportation were also considered. However, various studies revealed that 85-90% of the travellers used automobiles to get to and within the park. Proposals such as increasing bus and train service were viable to reduce vehicle volumes, but the main problem was that people would probably not use these alternatives to their sacred cars. The attitude of people towards personal automobile use will be difficult to change. It is obvious that contemporary society is an economic and mental prisoner of the automobile culture. Advocates of forced public transit would no doubt be labelled radicals.

The current Minister of the Environment has suggested that if Canadians were to pay the real price of gasoline then we would be paying \$2.00 per litre instead of the current .50¢. One can only imagine the cries from the public about how hard done by they are to pay all of this extra money even though it might be beneficial to the environment. The nature of politics prevents leaders from making such bold moves. Does anyone remember the Joe Clark government? The power exerted on our legislators by the oil and auto lobbies also cannot be discounted.

Was there a need for this twinning project? Were there any alternatives? Given our society's present attitudes, its level of use of the automobile, current rates of use and low cost of fossil fuels, and the levels of use that existed on this stretch of highway, the twinning of the Trans-Canada highway was required and no viable alternatives existed.

3. Project Planning

3.1 Parks Canada Policy

The planning stage for this twinning project had to take into consideration the mandate which Parks Canada had to administer in regard to park protection. The stated objective of this mandate is,

"To protect for all time those places which are significant examples of Canada's natural and cultural heritage and also to encourage public understanding, appreciation and enjoyment of this heritage in ways which leave it unimpaired for future generations"
(Parks Canada Policy, (1983), 7).

Parks Canada Policy was published in 1983 when it was felt that the policies which had developed since the early 1970's should be put in writing. The exact wording of this mandate was not in place at the time when this twinning project was being planned, but the spirit was the same. A theme of protection from human activity for the park environment was in place since the rapid expansion of park inventory took place in the early 1970's. In fact the wording of the 1983 mandate left a degree of flexibility which was not evident in earlier policy statements. The word unimpaired can be interpreted in many different ways.

Usually, unimpaired has been interpreted to mean no development or as little as possible so as to keep areas in their natural state. It is taken for granted that human involvement is not to be encouraged in order to maintain the pure quality of the environment.

A rigid application of this interpretation was applied in the early 1970's and the resultant experience at Kouchibouguac, N.B. has already been discussed. A more flexible approach to planning resulted in acceptance of existing conditions into final decisions. The existence of a national transportation corridor through Banff National park could not be ignored. In fact, the upgrading of the highway to four lanes was viewed by some schools of thought as an excellent chance to create a better environment around this highway within the park. Parks Canada could influence the plans of Public Works so as to enable the introduction of features which would benefit both wildlife and visitors. For example, fencing was used to isolate the highway from its surroundings. Wildlife are now prevented from entering onto the roadway, and fewer collisions with vehicles are encountered.

The whole area around the Banff townsite is in fact a legacy of previous policies which differed from current thinking. Certain policies of Parks Canada had to be exempt from this anomaly in the park system. Parks Canada was not setting a precedent, as some detractors have suggested, but rather was dealing with a set of isolated circumstances.

Some intervenors at the Federal Environmental Assessment Review Office hearings criticized Parks Canada for inconsistency in the application of its mandate. These people can be characterized as not being realistic to the position park planners found themselves in.

It should not be forgotten that Parks Canada is a department of the federal government. Functionaries from this department have to answer ultimately to the upper echelons of power. There are concerns which have a much greater priority over the interests of Parks Canada. National economic and social interests supersede ones which are deemed of 'lesser value'. One has only to look at the relative powers of Parks Canada in relation to other ministries in the federal cabinet to understand this fact. Parks Canada is merely a department within the Ministry of the Environment. Ministries such as Finance and Public Works are of much greater stature than the Environment. Only recently has the Environment ministry been slightly elevated in importance by our current prime minister.

"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" (Banff Highway Project, (1979), 33).

Parks Canada must conform its policies to meet the wishes of contemporary society. That does not mean inputs can't nudge our society into a more conscionable way of thinking towards our environment. The role of Parks Canada is not to oppose such projects, but rather to input its ideas and goals to create a scheme which incorporates all interests of our society.

A radical position against the twinning project, if taken by Parks Canada, would have only antagonized proponents who would have been less willing to hear inputs of environmentally friendly features. Public support is essential for any bureaucracy which is trying to implement a certain viewpoint. Parks Canada suffered, and continues to suffer from the very vocal radical elements of our society which repeatably criticize it for being too soft on human developments. National parks should remain totally 'pristine' and no development of any kind should be allowed is the philosophy expounded. In addition to this criticism, Parks Canada must endure the attacks from the pro-developers and cost efficiency experts who argue that the environmental restrictions placed on projects are just too limiting and/or costly. This damned if you do and damned if you don't perception envisioned by bureaucrats within Parks Canada is very damaging to their morale. The very people who should be the most supportive of Park goals and ideas undermine the efforts of this agency. With lowered support, Parks Canada functionaries have much more difficulty in getting respect for their views. Economic growth forces are very united and powerful in our society. They draw on the support of the vast majority of people by offering jobs, jobs, jobs in addition to fancy consumer items. To add insult to injury, it is these very jobs and consumer goods which a majority of 'environmental activists' go home to after attacking the compromises made by organizations like Parks Canada. The hypocrisy of this situation cannot be overstated. The sad point is that people don't even realize that they are hypocrites. Their moral superiority gets lost after they

drive to their four bedroom, gas heated, electrically controlled home and have their pasture grazed meat with chemically enhanced vegetable.

In addition to individual hypocrisy, there is societal and state play acting as well. Some countries which have enormous wealth and development relative to others now seem to be very concerned at how 'third world nations' are developing. The solution to the global greenhouse effect is not in the banning of the automobile or in the switching off of factories, but rather in the saving of rainforests which breathe in that carbon dioxide which we spew out. The merits of saving rainforests and other flora and fauna on this planet is not at question here. What is at question is the attitude of those individuals and societies which today have the power, but not the will to stop the processes from which they have greatly benefited. The group will of affluent societies is just not strong enough to forego the luxuries to which they have become accustomed. However, possibly in order to soothe a case of bad conscience, these rich countries give fractions of a percentage point of GNP to 'poor nations'. The 1989 figure for Canada is 0.43%; a figure which speaks for itself.

How does all of this which has been discussed relate to Parks Canada policy for a highway in Canada? Well, it has to do with attitude. If individuals, societies and states continue to think of themselves as separate from others then the interests of the whole get forgotten. The planet is one unit. Everything which the

component parts do has an effect on all of the other parts. An analogy would be the human body with all of its component parts. It is composed of millions of cells. Every cell has a function which helps maintain the whole body. Certain groups of cells work together to form vital organs. If some of the cells or groups of cells become defective, as in for example cancer, then the body suffers. These cancers start small, slowly debilitating their host. Eventually the host dies even though just prior to death, the cancer was prospering. This prosperity seeded its own destruction.

Parks Canada policy was adaptable to this project. The Bow river valley through which this highway passes is no more impaired now than it was before the upgrading took place. Yes it is true a little more land has been covered with pavement, but the new road will allow for better driving conditions. These new conditions may well allow more people to visit the park in an atmosphere better geared for enjoyment and appreciation; two objectives listed in the Parks Canada mandate. Creating places and conditions where people can maintain a link to the natural environment may well be of service to future generations in their dealings with the world around them.

3.2 Environmental Impacts

The environmental impact statement presented by Public Works in Proposed Improvements to the Trans-Canada Highway (Km 0- Km 13), (1979) was the foundation on which this project was evaluated. This was the document on which inputs were made and which was reviewed by the Federal Environmental Assessment Review Office, (FEARO), the government body which administers the Environmental Assessment and Review Process, (EARP). This document was compiled in association with a team of private consultants which Public Works brought together for this project. Both of these parties consulted with Parks Canada officials during the information gathering stage. A similar document was compiled for the road section between kilometers 13 and 27 in 1981. The main environmental aspects covered by these documents will be described in this section.

A) Climate and Air Quality

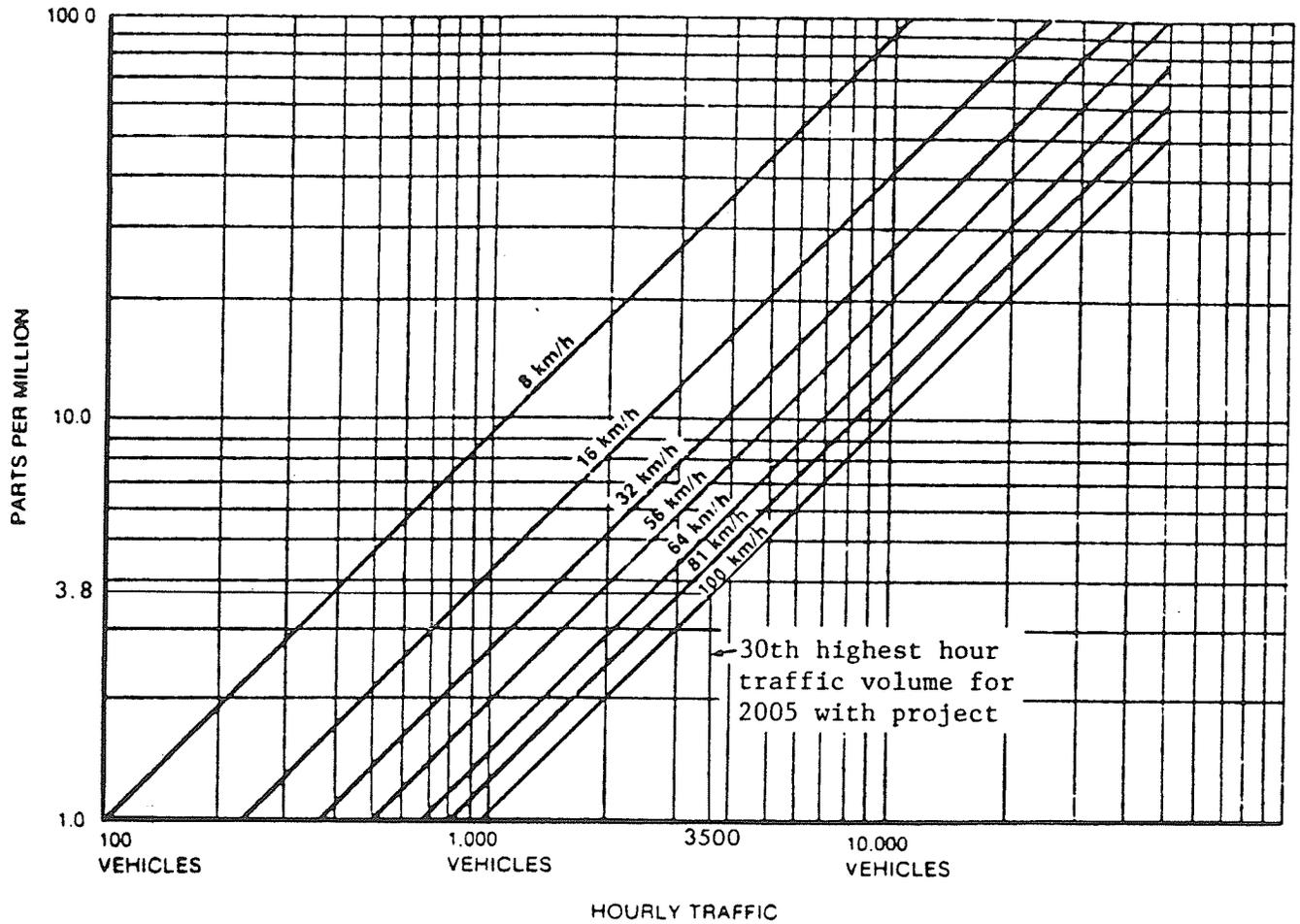
General climatic conditions were looked at using meteorological data from stations within the park. A degree of variability was acknowledged between stations and actual sites along the highway route. Mountainous ranges have a variability in climate between sites due to differences in topography and elevation. With a yearly mean of 2.3°C, Banff townsite exhibited the cool temperatures encountered in the valley. Below freezing temperatures were recorded during every month of the year at Banff, although few days were recorded during the months

of June, July and August. Weather was an important consideration in the creation of a construction timetable which utilized favourable conditions during the different phases of work.

Frost penetration and temperature inversions were also areas of concern relating to temperature. The amount of backfill deposited under the paved highway is determined by the depth of frost penetration at the various locations. Frost heave is in part caused by not enough fill placed beneath the paved surface. Temperature inversions occur in all mountain valleys year round. Vehicle hydrocarbon consumption and wood burning release pollutants into the atmosphere which collect during inversions sometimes to unhealthy levels. Heavy use of the highway during inversions would lead to greater quantities of pollution concentrating in the valley creating impaired surroundings for park visitors. However, the study concluded that pollution was greater during 'stop and go' driving conditions than when the same volume of traffic was moving rapidly. Increasing highway capacity to four lanes from two was therefore concluded to be beneficial to the Bow valley. Figure 3.2 shows how carbon monoxide concentrations are decreased with increased speeds for the same volume of traffic. This fact, of course, does not take into consideration that a highway with increased capacity could attract more vehicles. A similar situation exists with all of the improvements in the reduction of pollution being spewed out by individual vehicles produced in recent years. Much of the gains have been negated by the fact of many more vehicles using the roads today than in previous times.

FIGURE 3.1

CARBON MONOXIDE CONCENTRATION PREDICTION CHART
WORST CASE, 15.25 METERS FROM HIGHWAY, 10% TRUCKS



Source: Proposed Improvements to the Trans Canada Highway ;(Km 13 to Km 27), 1981

Reference: Illinois Department of Transportation Air Quality Manual

Rainfall, snowfall and wind conditions were also looked at. Dust particles blown around during construction would lead to greater pollution. This impact would have to be minimized as much as possible by, for example, watering the highway. Snowdrifting was not considered a serious problem on this highway. Any runoff of rainfall would be allowed to follow a natural course on and around the new highway. Areas de-vegetated during construction would be re-seeded as soon as possible to minimize water erosion on steep slopes for example.

B) Geology and Terrain

The valley corridor was mapped by air photo interpretation. Surface forms, textures and modifying processes were incorporated into genetic earth information which was gathered from ground research. All of this information was integrated to give an overview of the area into which the new roadway would cut. The main consideration was how susceptible the genetic earth materials were to erosion especially when they were disturbed. Materials identified in the transportation corridor included moraine till, fluvioglacial materials, lacustrine materials, eolian materials, fluvial materials, organic materials, colluvial materials and some anthropogenic materials. The erosion potential of each of these materials was determined through testing. Erosion potential was found to be greatest for fluvial materials in steep areas, as well as areas with high till and colluvial concentration. Roadcut design and disturbance would have to take into account the materials present at any given area.

Bedrock was identified as folded and thrust-faulted shales, sandstones and limestones of Paleozoic and Mesozoic age. Certain small sections of roadway would require cuts into the bedrock which would result in a scarred landscape. Every effort would be made to limit the detrimental aesthetic aspect of this type of scarring.

The Vermillion lakes located just west of Banff were designated a unique geological feature mainly due to the beautiful setting close to the town of Banff and Mount Rundle. An earlier proposal to circumvent the lakes was discounted as too damaging to the natural aesthetics of the area. The new roadway would stay to the north of the lakes even though a deeper cut into the bedrock would be required. The loss of sheep habitat in this area was recognized as regrettable but necessary. A complete plan was drawn up to minimize the loss of grazing area. Mitigation measures included minimum clearing of soil, controlled vehicle access and hand shaping of the rock-soil contact points.

Originally, Public Works implied that it anticipated to get aggregate materials used in construction from new and existing borrow pits. Parks Canada made it quite clear that no new borrow pits would be developed within park boundaries, and that existing borrow pits would have to be rehabilitated once construction was completed.

C) Hydrology

The study concluded that most hydrological impacts of construction could be reduced to minor proportions. Culvert and bridge crossings would be constructed at relevant points so as not to impede the normal flow of streams and rivers. Flood volume statistics were measured for all water bodies so as project design could accommodate these levels of discharge.

One creek was designated for diversion due to technical reasons. Chinaman creek would be re-designed to take into consideration fish migration and spawning needs. All culverts related to this project would be designed so as not to impede fish migration. Other features of this diversion would include gravel laid bottoms, undercut banks, pond creation and placement of boulders in stream beds.

Additional contamination by salt distributed on a wider road surface was recognized as a potentially adverse result of this project. It was not known what effect increased salt runoff would have on areas receiving runoff, especially small sensitive streams.

Additional sediments in runoff during construction was seen as inevitable. The rapid re-vegetation of cut and fill areas was seen as the best way to limit the amount of contamination to productive fish streams

Drinking water for the town of Banff is taken out of Forty Mile Creek over which this project passes. The maintenance of this water quality was recognized in the study. The actual water used for drinking is piped in from a higher elevation than the road surface so no adverse effect was anticipated.

It is important to note that this study made no mention of lead contamination in runoff caused by vehicle transit in this region. Lead and other contaminants from vehicles are proven carcinogens but are difficult to prevent entering into the ecosystem. Only recently have steps been taken to eliminate lead from gasoline across Canada. The study did mention the possibility of toxic chemical spills. The best way to control this was through the designing and policing of safe highways. Such would be the result of this improvement project.

D) Vegetation

Biophysical land classification was completed for the project area. The Montane forest, in which the highway traverses, was divided into zones which the study described in detail. The importance of maintaining existing vegetation was twofold. First, excessive erosion could be prevented by limiting the removal of trees, shrubs and grasses. Secondly, vegetation was seen as a significant visual resource for motorists along the highway route. The delineation of vegetation into zones helped in the design of a route which best suited the surrounding environment.

A list of individual plant species was also compiled for the project area. Species described as 'endangered' or 'very rare' were not affected by the routing of the new highway.

Construction equipment would be restricted to pre-staked areas in order to decrease damage. Excavated topsoil would be recycled whenever practical. Any burning of cleared materials would be discouraged except when absolutely necessary. When burning was required, it would be limited to times of low fire hazard.

E) Fish Resources

The study concluded that this project would have a low impact on fish resources. The main impact was to Chinaman Creek whose impact mitigation has already been mentioned.

The major fish species and their life histories were identified and described. All watercourses from rivers to small unnamed streams were examined. No significant fish populations were identified in the vicinity of highway crossings. Highway design would not permit any new barriers to fish migration.

It is interesting to note that sport fishing is permitted in Banff National Park. The report identified this practice and went on to describe all of the different species caught. Apparently some species of life are of lesser importance than others when it comes to protection.

F) Wildlife Resources

All fauna should be considered significant for the scientific, ecological and aesthetic values of the park was concluded by the impact statement. The document detailed the, "occurrence, abundance and seasonal distribution of mammals, birds, amphibians and reptiles which are found in the area which may be affected by the proposed highway twinning project" (Proposed Improvements..., (1981), 3.6-1)

The greatest concern expressed was for five species of ungulates. Elk, mule deer, white-tailed deer, bighorn sheep and moose were the main animals in collisions with vehicles on the existing highway. The mortality rate had risen from about 70 animals killed in 1976 to 115 in 1980. There was a need to do something about this problem. Separating the highway from the surrounding area with fences was recommended. In addition, crossing structures; underpasses and overpasses, would be built to allow for ungulate movement between portions of their range on both sides of the highway. Figure 3.2 estimates Bow Valley wildlife populations to give the reader an idea on the number of ungulates we are dealing with in the vicinity of the highway.

Figure 3.2

Bow Valley Wildlife populations :1980 estimate.

Elk	350-400
Sheep	450
White-tailed deer	50
Mule deer	100
Moose	10-20

Source: (Proposed Improvements..., (1981), 3.6-1-20)

Some adverse impacts discussed involved the loss of habitat due to the widening of the highway. This, combined with lower mortality, could result in additional habitat having to be created for the animals. Clearing of forest sections and re-seeding with forage species could be considered. Not discussed in the study was the question of what to do in the long term with changing ungulate populations. A significant drop in collisions with vehicles would be of benefit to both humans and presumably the ungulates themselves. But what about in the future when the ungulate populations increase? Should wolves be re-introduced into the park since humans virtually eliminated the species during the 1950's in a rabies control program? Should the weaker animals be allowed to starve? Should humans create more habitat? Should a controlled kill off be allowed? All of these questions relate to how we interpretate our role in the park environment. Current policy would seem to indicate a policy which keeps the area as close to its natural state as possible. But is the current state natural?

In the late 1800's a series of fires swept away much of the climax forest in the Bow Valley. This created a suitable habitat for elk so the decision was made to import elk into the park from Yellowstone National Park in the U.S.. About 250 animals were released into the Bow Valley between 1917 and 1920. This population mushroomed during the next 25 years. In 1943, elk numbered between 3500 and 4000. A reduction slaughter program was introduced to allow the habitat to recover from over grazing. One could argue that the entire Bow Valley is not in a natural state since elk are not a natural fauna to this

area. Current park policy preserves these conditions even though such preservation could be deemed 'un-natural'. So to question this highway improvement project on the grounds that it will impair the natural state of the Bow Valley is incorrect. The current condition of this area is the product of 100 years of human inter-reaction, and the expansion of the highway is just a continuation of this process.

The 'naturalness' of human activity itself has already been discussed. Rapid flora and fauna depletion and extinction on this planet would lead to the conclusion of un-natural when describing human activity. Perhaps the concept of natural should be equated to the word respect. If humans respect the environment in which we, and the flora and fauna, live, then we can deem human activity as natural. In this regard we can deem Inuit whale hunters as a natural force in comparison to the European whalers of the last century who had a very un-natural effect on whale population numbers.

Competition among species is natural, but when one species has the abilities which we have, then the equation becomes unbalanced. Obviously humans shall win a struggle against species lacking the technical skills which we have.

The highway through Banff National Park is a product of our technical skills. Superficially we appear to be showing respect. The plans are to have a road which least impacts the environment. Keeping the ungulates off the road, and the revegetation of cut and fill

areas show respect. But the highway is only part of a greater human system which does not show respect for the environment. Vehicles burning fossil fuels, the tearing down of large tracts of forest for grade housing, the transportation of raw materials to industry which produce toxins are all activities which do not respect other flora and fauna. These activities shall have to be changed before any human activity can be deemed symbiotic and natural. Small scale levels of respect such as those exhibited by this project get lost in the greater scheme of things.

3.3 Socio-Economic Impacts

The planning stage of this project took into consideration an area spreading over the entire lower Bow Valley reaching to Canmore in the east to Lake Louise in the West. The history of transportation in this region has already been discussed, and won't be repeated here. Transportation has shaped, and continues to fuel, the economy of Banff and the surrounding area. The primary functions of this region have been to transport people and goods through the Rocky Mountain Range and to attract tourists. The conclusion reached at the planning stage was that this highway project would better facilitate the operation of both of these socio-economic functions.

A Review of the Banff Highway Project, (1984), was critical of the planning because it felt that a large enough area was not considered. For example, the use of the East Kootenay range in British Columbia by Calgaryans, and the adjacent Kananaskis development east of the park were not considered. Future usage of the new and developing facilities at Kananaskis was not estimated thus it was unknown if this facility would draw people away from the Banff area. Kananaskis is located in an environment similar to Banff which is both closer to Calgary and more facility oriented. However, to be fair to the planners there was no reason to assume that there would be a significant drop in visitation to Banff. Current trends indicated continued increases in usage, and besides, the highway was already being used well above designed levels of usage.

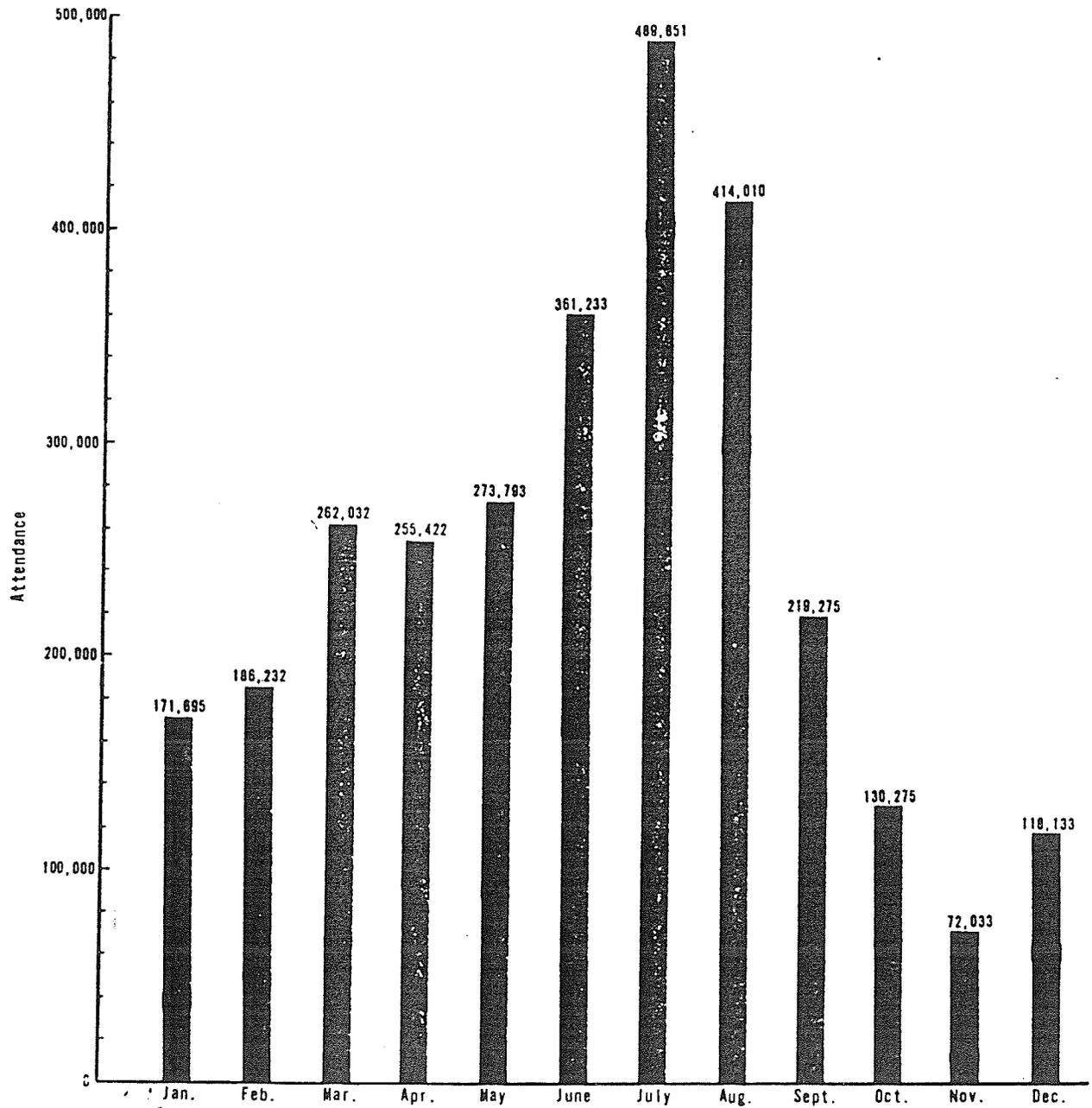
During construction every effort would be made to facilitate reasonable flow of traffic without causing too much congestion, noise or dust for park visitors and through travellers. The construction schedule would be designed to take into account levels of traffic at different times of the year. This did present some difficulties since the best months for construction work coincided with the seasonal peak of visitors during the summer. Figure 3.3 gives an example of a typical yearly profile for monthly visitations to Banff. This figure also gives the reader an idea of the number of people we are dealing with for this area. The consistency of this profile is demonstrated in figure 3.4. The summer months were perpetually packed with vehicles visiting the region. The situation on the road was detracting from the beauty of the environment, and possibly was even keeping some potential visitors away from the park.

The period during construction was not anticipated to be of serious consequence to business in the region. Access to the town of Banff and campground areas would not be curtailed. The use of ski areas in the winter months would also be accommodated into the construction schedule.

A possible problem in accommodation was anticipated for construction and seasonal workers. During the summer months a large influx of service industry workers occurs into the region. There is limited accommodation in the town of Banff and many workers have to leave the park area and go to Canmore which is 15 kilometers away.

FIGURE 3.3

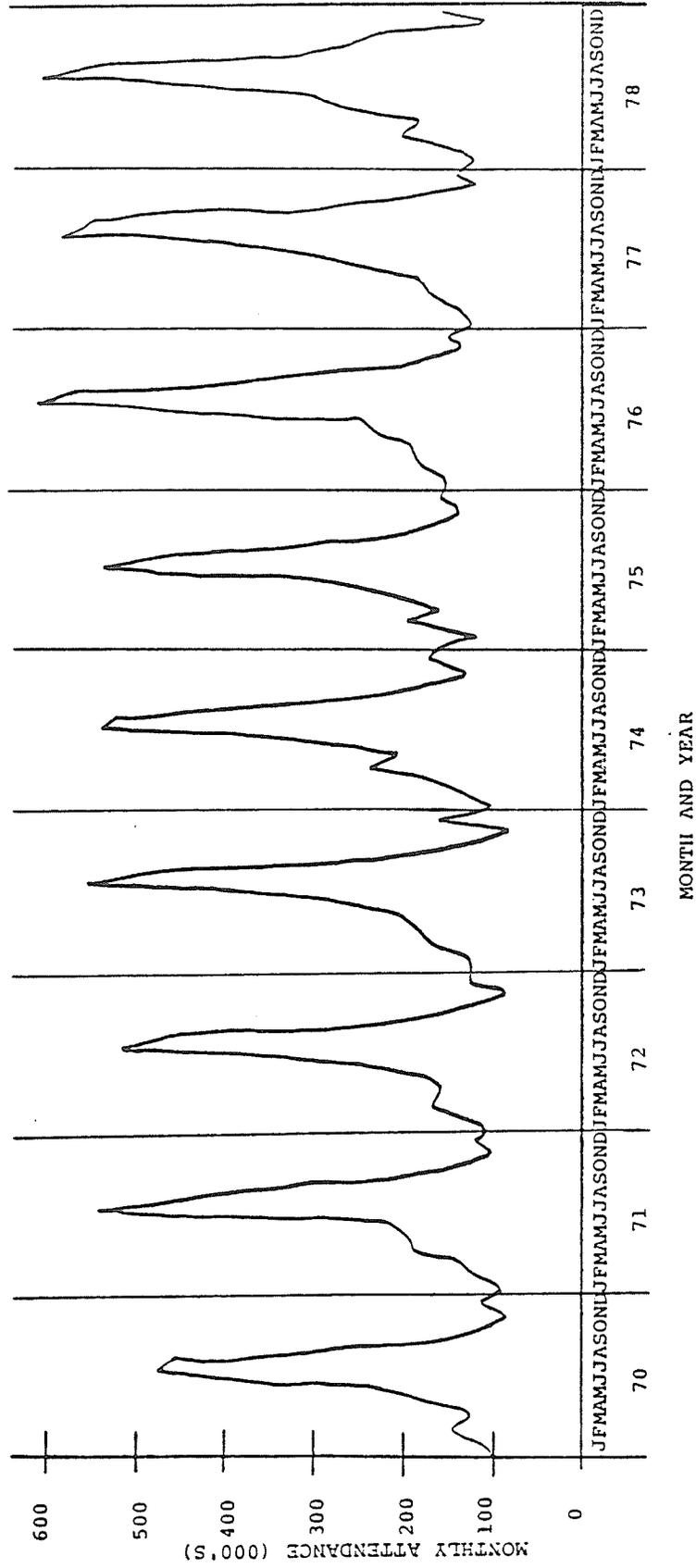
MONTHLY VISITOR ATTENDANCE - 1979 - EAST GATE



Source: Proposed Improvements..., (1981)

FIGURE 3.4

MONTHLY ATTENDANCE
BANFF NATIONAL PARK
1970-1978



Source: Trans-Canada Highway: Banff National Park, (1979)

Under normal conditions private industry or government would respond to the demand and build more units for these people to reside in. However park policy prevents this from occurring. The addition of construction workers into this area would only add to the problem. It was concluded that the problem would be at least partially alleviated by the fact that the Alberta Housing Corporation was developing residential and commercial lands in and around Canmore during this time.

During the Federal Environment Assessment Review Office hearings, the commercial transportation interests estimated that delays to their member elements caused by congestion on this section of highway would be costing them almost \$1,000,000 (1979\$) by the year 1991. Another forecast by the tourism industry sector estimated a loss of between \$3.2-14.7 million over a 10 year period if current conditions on the highway were to continue, (A Review of the Banff Highway Project, 1984, 72). This twinning project therefore made sense from an economic standpoint because the current highway was costing the local and regional economies money. Federal money input into this region by Public Works for this construction project would also enhance the local and regional economies. Socially the scheme would create jobs and lead to a better atmosphere of travel for visitors and local commuters alike. Figure 3.5 gives a summary of major socio-economic impacts which this project would have on the region in and around Banff.

Figure 3.5

SUMMARY OF MAJOR SOCIO-ECONOMIC IMPACTS:

Impact	Construction			Operation		
	Beneficial	Adverse	Neutral	Beneficial	Adverse	Neutral
<u>Regional</u>						
Employment	x					x
Income	x					x
Population Increase			x			x
Housing			x			x
Services			x			x
Highway Congestion		x		x		
Travel Time and Costs		x		x		
Visitor Experience		x		x	x	
Business Viability			x	x		
<u>Extra-Regional</u>						
Commercial Transportation		x		x		
Seasonal Dwelling Owners*		x		x		
Kananaskis Country			x			x
Crowsnest/Yellowhead Highways			x			x

* Calgarians with seasonal dwellings in the East Kootenays of B.C.

Source: Proposed Improvements.., (1981)

4 Project Implementation

4.1 Committee Terms of Reference

Pre-planning is an essential ingredient in any project to ensure all parties have a chance to input their interests as they relate to the particular endeavour which is under study. Of equal importance, however, is the establishment of a mechanism which ensures the implementation of planning recommendations. Very often the spirit of plans is lost in the rigid legal documentation required by our society. A committee was established to supervise construction of this project.

The Federal Environment Assessment Review Office recommended the creation of a committee which would "ensure that highway design and construction meet the high environmental and aesthetic standards necessary in a park" (Banff Highway Project, 1979, 53). Membership in this committee would include staff from Parks Canada, Public Works, the Environmental Protection Service of Environment Canada, and others by invitation. Six items were listed by the panel for committee terms of reference.

- 1) facilitating design approvals
- 2) environmental standards and practices
- 3) aesthetic standards
- 4) further studies and resulting mitigation requirements
- 5) special environmental conditions in contracts
- 6) ensuring that recommendations made by the FEARO are implemented

(Banff Highway Project, 1979, 53)

Figure 4.1 outlines the committee structure and membership which was adopted for this improvement project. One senior committee would supervise the operations of four sub-committees. Figure 4.2 is a conceptualized flow chart indicating the interrelation between different committees. In theory each area of interest would take into consideration inputs made from other committees before making a final decision on any particular aspect of this project.

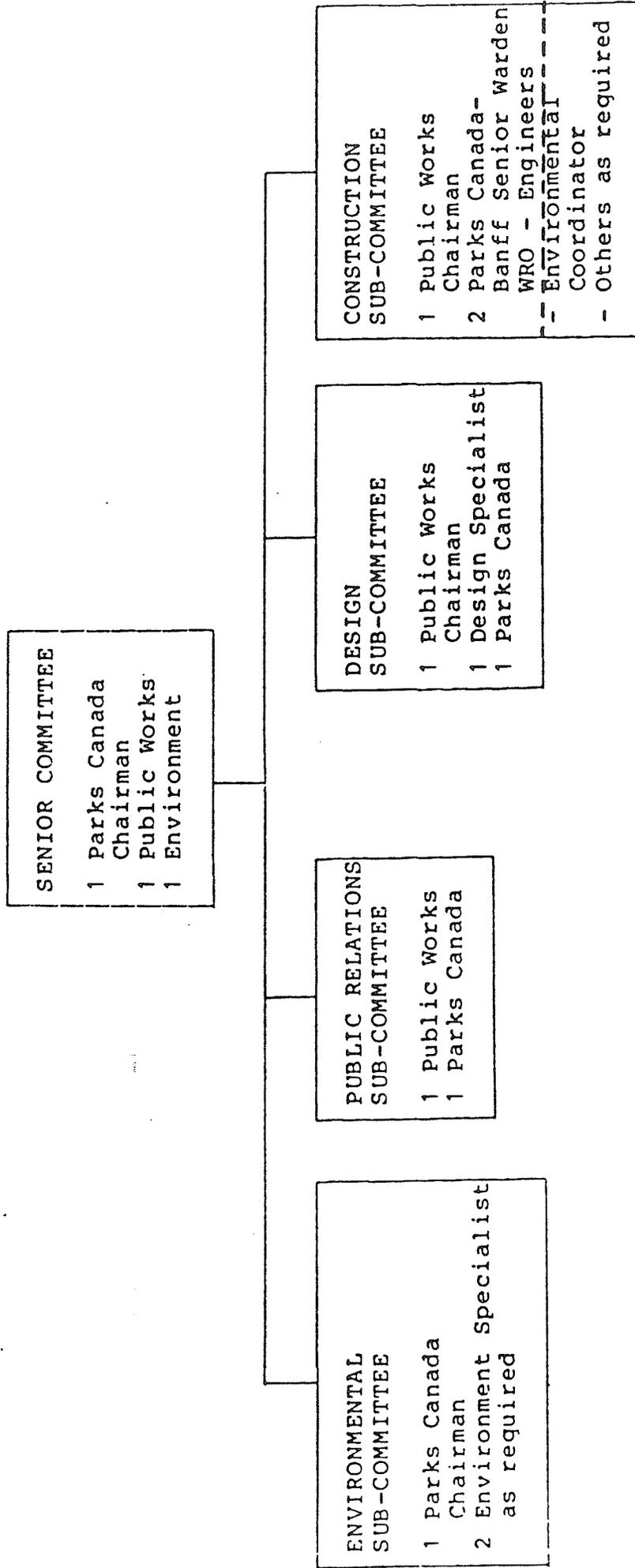
The objective and function of each committee will be outlined as follows;

A) Senior Committee: The objective of this team was to co-ordinate the activities of the four sub-committees and to make decisions relative to this project. The function of the committee was to decide on major issues of controversy, provide a channel of communication between the sub-committees, and ensure that data and recommendations were available in time to follow the construction timetable.

B) Environmental Sub-Committee: The objective of this team was to ensure design, construction and operation of the Trans-Canada highway conformed to the standards set out by the FEARO panel. The standards should be of an aesthetic and environmental standard expected of that in a National Park. Among functions listed were the investigation of all aspects of the project relating to the environment, collaboration with the Construction and Design sub-committees to ensure 'sympathetic' installations, and to design proposals for rehabilitating both existing and newly created terrain.

BANFF HIGHWAY PROJECT

COMMITTEE STRUCTURE

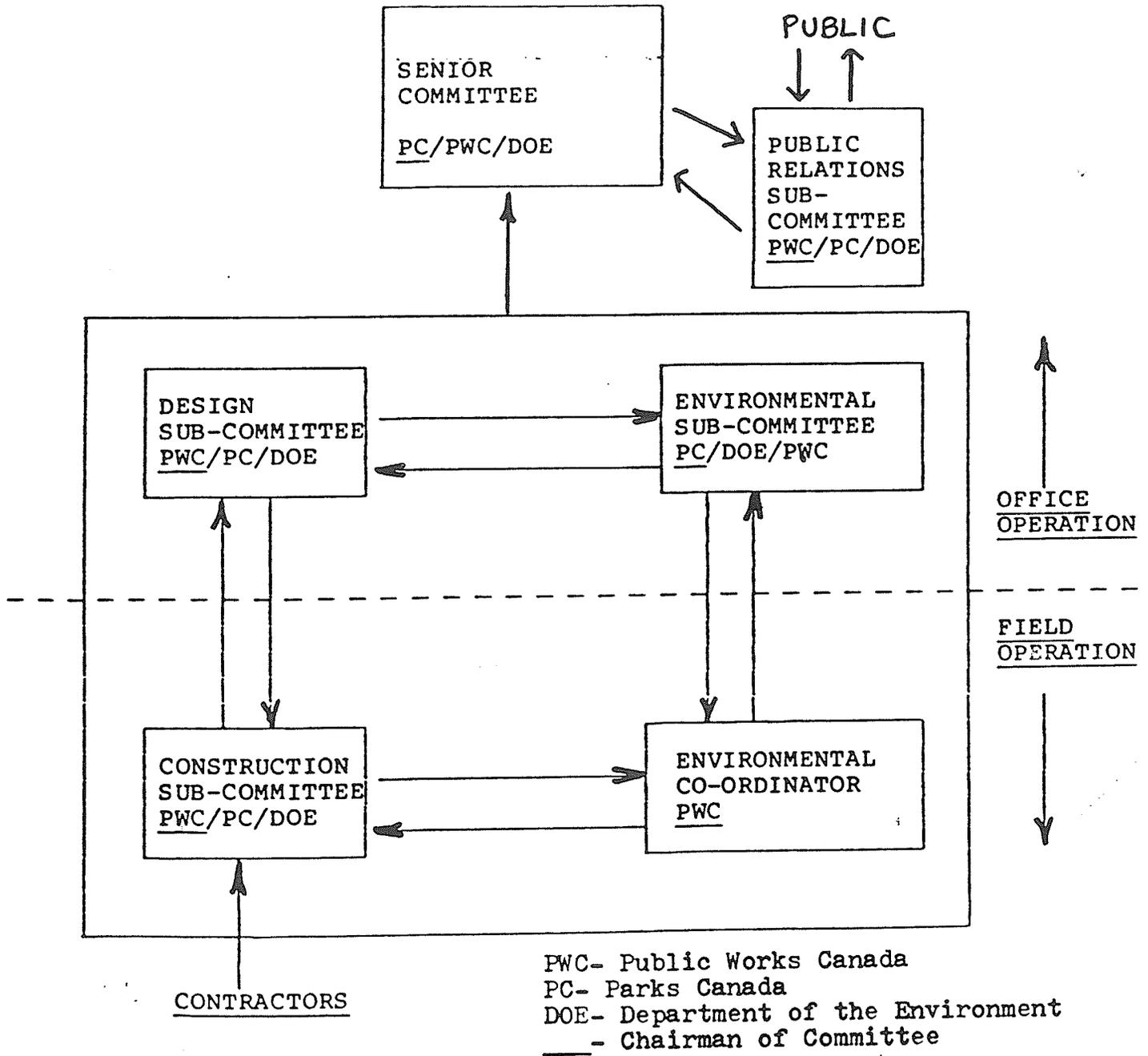


Chairman for sub-committees report to Senior Committee and may be junior members (non voting if voting is required)

FIGURE 4.1

Source: Banff Highway Project Follow Up Study, 1984

FIGURE 4.2



Source: Banff Highway Project Follow up Study, 1984

FUNCTIONING OF COMMITTEES

C) Public Relations Sub-Committee: The objective of this team was to report to the Senior committee on all matters relating to public relations. Among functions listed were ensuring that the public was informed on the status of the project, responding to the concerns of groups or individuals, arranging news releases, arranging 'press tours', and ensuring that park visitors were informed about detours, road closures, etc..

D) Design Sub-Committee: The objective of this team was to oversee the design of Public Works construction and to ensure that design met the standards outlined by the FEARO panel. The primary function of this committee was to ensure that designs gave due consideration to engineering, environmental protection, economics, logistics, operations, schedules, and park planning.

E) Construction Sub-Committee: The objective of this team was to ensure construction was carried out according to FEARO recommendations and to ensure aesthetic standards and public safety were maintained. Among functions listed was the maintaining of day to day contact with park staff through an Environmental Co-Ordinator, supervision of the total highway construction, and to supervise highway designs and time schedules.

A Policy Committee was established to oversee the whole committee structure outlined in Figure 4.1. The purpose of this group of individuals was to ensure that matters of policy were adhered to

in the decision making process which was established. This overseeing committee was also given the job of ensuring that recommendations of the two FEARO panels were carried out. As a matter of reference the recommendations of these two panels are listed in Appendix 1.

4.2 Operation of the Committee Structure

Careful planning went into the design of the committee structure to ensure that things would flow smoothly in regard to the implementation of this project. All indications would seem to indicate that this was the case. Of course there was some 'discussion' between Parks Canada and Public Works committee members. Parks Canada's primary goal differed from the goal of Public Works. But problems relating to design and cost were to be expected, and the decision making process was able to handle them.

The Special Recovery Capital Projects Program or 'fast-tracking' program did cause some problems as already mentioned in chapter 2.1. The Janis/Ross(1984) study pointed out that committees usually had at least two weeks to review sections of construction prior to tender calls. However, under 'fast-tracking', decisions had to be made sometimes in as few as three days. This shortage of review time occasionally led to problems on site and in the addition of unnecessary costs.

Changes in staff also created problems during construction. New committee members had to familiarize themselves with the project causing delays or lack of adequate review on some aspects of this project. Another factor to consider is the always present inter-personal problem which people have with each other. These are not documented, so it is difficult to assess what effect someone 'who is not talking to someone else' has on the project.

During any project certain circumstances occur which are unforeseen in the planning process. These surprises put the management team to test. On site experimentation was sometimes necessary. For example, a borrow pit was discovered to contain a large, high quality aggregate deposit. Plans were altered to take advantage of this deposit with subsequent re-habilitation included. Another unexpected problem was the icing which occurred at animal underpasses caused by the multiple use of these features(drainage and animal trail). Some mitigative measures were taken, but it was difficult to change drainage once construction was complete. Future plans should take this into account so that design leaves animal underpasses dry year round.

Road fence locations were sometimes experimented with to resolve the trade-off required between visual and habitat considerations. Fencing was moved or vegetation was added when required in order to enhance the aesthetics of the fencing structure.

An overall analysis of the operation of the committee structure would conclude that the decision making process worked well, although 'fast-tracking' did threaten proper evaluation in some cases. The system was able to handle unforeseen circumstances and was able to properly implement the recommendations of the FEARO panel.

5 Project Completion and Follow-Up

5.1 Environmental Impacts- Fauna

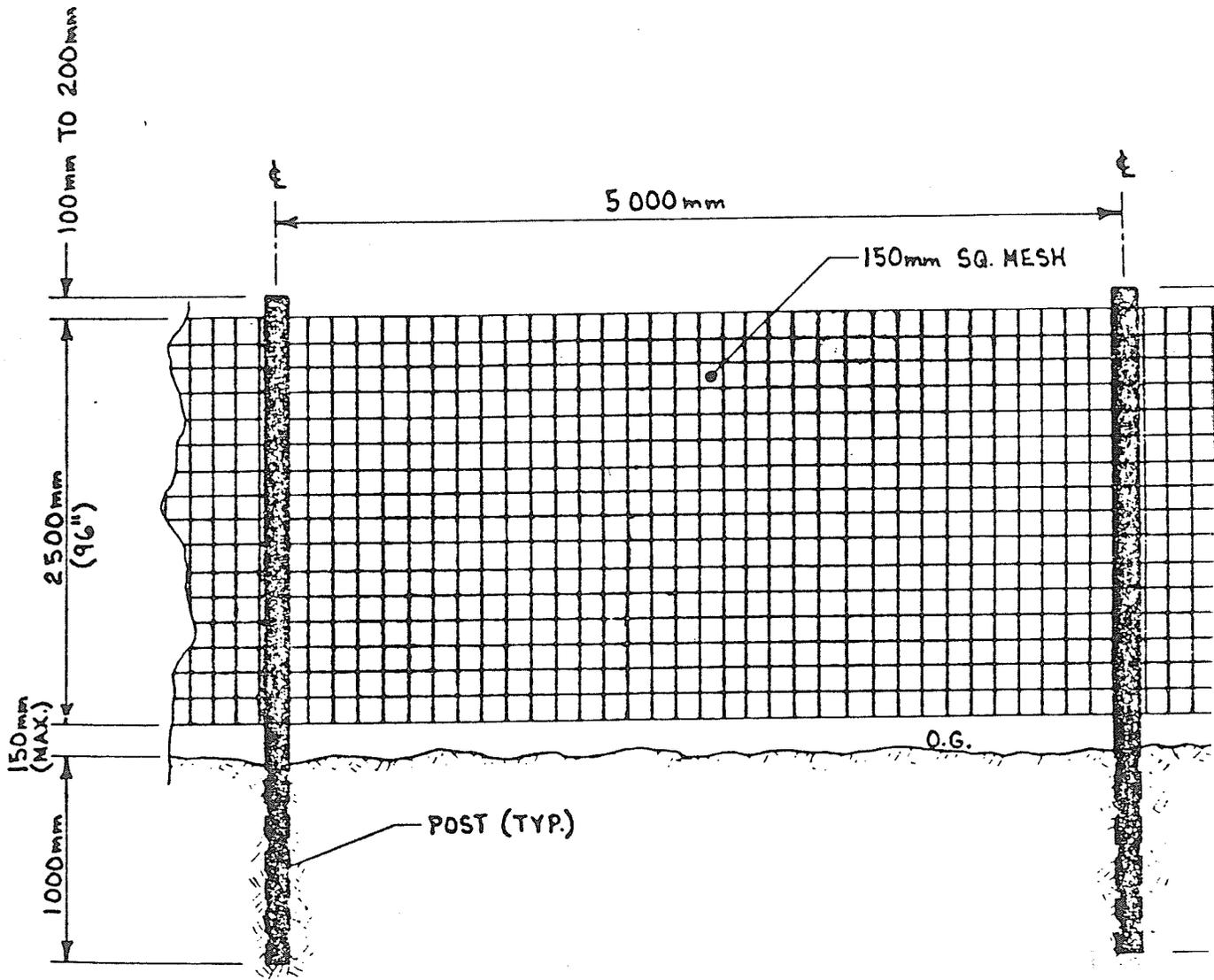
The primary concern expressed during the planning stage was the one dealing with ungulate collisions with vehicles. Evidence presented at FEARO hearings indicated that road kills were having a significant effect on elk and moose populations in the area. It was estimated that current highway kills were having a negative effect on population size.

The conclusion reached by all parties was to isolate the new twinned highway corridor from the surrounding valley by fencing. In order to facilitate ungulate and other fauna crossings between sides of the highway, a series of underpasses was installed. A proposed overpass for bighorn sheep was not built for financial and technical reasons. A system of monitoring the effectiveness of these provisions was also established.

The design of the fence installed along the highway is indicated in figure 5.1. Distance from the roadway was also an important consideration. A balance had to be achieved between visual aesthetics and habitat retention. A fence too close to the highway would be an eyesore, but a fence too far away would deny ungulates good grassland feeding areas at the margins of the highway. It would appear that a good balance was achieved. The design and placement of the fence blended in nicely with

FIGURE 5.1

Source; Banff Highway Project -Follow Up Study, 1984



TYPICAL ANIMAL FENCE INSTALLATION

N.T.S.

GENERAL NOTES:

FENCE MATERIAL TO BE 150mm x 150mm MESH OF MINIMUM 11 Ga. (3mm) GALVANIZED STEEL WIRE WITH A TWISTED FRICTION TIGHT JOINT AT EACH VERTICAL AND HORIZONTAL CONTACT POINT.

POSTS TO BE PRESSURE TREATED LODGEPOLE PINE WITH TOP DIAMETER MIN. 150mm AND BOTTOM DIAMETER MAX. 225mm. POSTS TO BE SET IN PRE-DRILLED HOLES, BACKFILLED AND WELL COMPACTED WITH LOCAL NON-ORGANIC SOIL.

FENCE TO BE STAPLED EVERY 300mm INCLUDING TOP AND BOTTOM WIRES ON ALL POSTS USING 50mm STEEL STAPLES.

PUBLIC WORKS CANADA
TRANS-CANADA HIGHWAY
BANFF NATIONAL PARK

TYPICAL ANIMAL FENCE
DETAIL

the scenery. Figure 5.2 exhibits an eyelevel view of the fence on a flat portion of the throughway. Figure 5.3 indicates an elevated viewpoint; note the successful revegetation of a roadcut. Figure 5.4 shows fencing below eyelevel which cannot be seen from the highway.

Special features were incorporated into the design of the fence to facilitate the passage of people, streams and vehicles while preventing ungulates from doing the same. Figure 5.5 shows the design of a pedestrian stile which enables park visitors to cross the fence at points along the highway. The same figure indicates design of a small stream and drainage swale crossing. Both features were successfully integrated into the fence structure at relevant points.

Figures 5.6 and 5.6(a) display the design and actual look of a Texas gate. These gates enable vehicles to go into a viewpoint parking area for example, but prevent ungulates from crossing because of the slots. Ungulate hooves cannot grip the steel circular pipes and the slots between the pipes allow for legs to fall through.

The possibility of ungulates getting through breaks in the fence was also taken into consideration. This circumstance could happen if, for example, a tree fell over a section of the fence. The fence would either break or more likely get pushed down to a level where the animal could jump over it. The height of the fence was designed to prevent the possibility of ungulate jumpings. As it turned out quite a few entries were also occurring at the East gate bound-

FIGURE 5.2
Eyelevel fencing
Source: Author

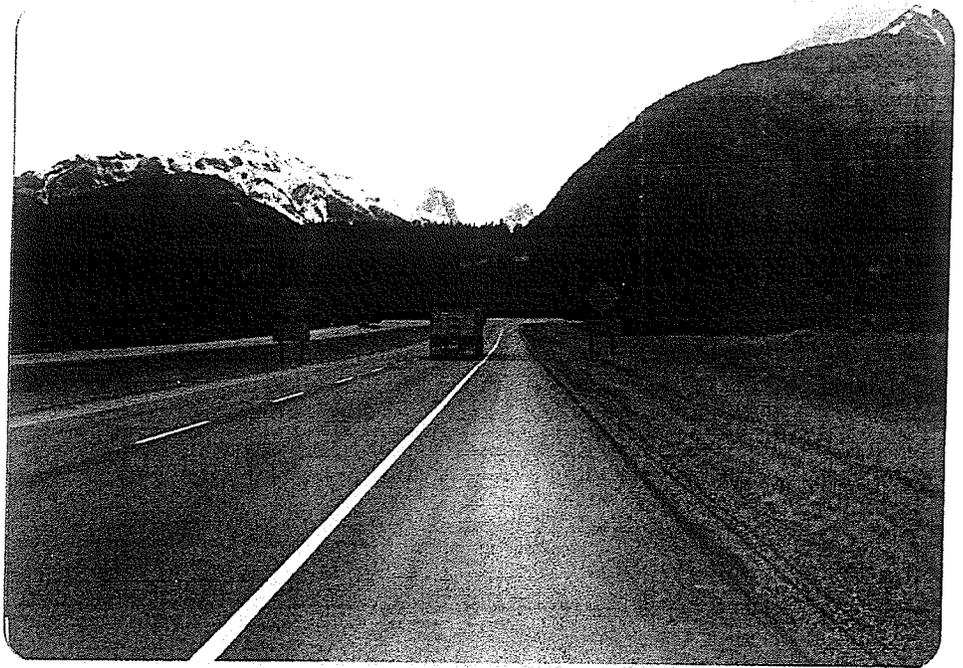


FIGURE 5.3
Elevated Fencing
Source: Author



FIGURE 5.4
Fencing Below Eyelevel
Source: Author

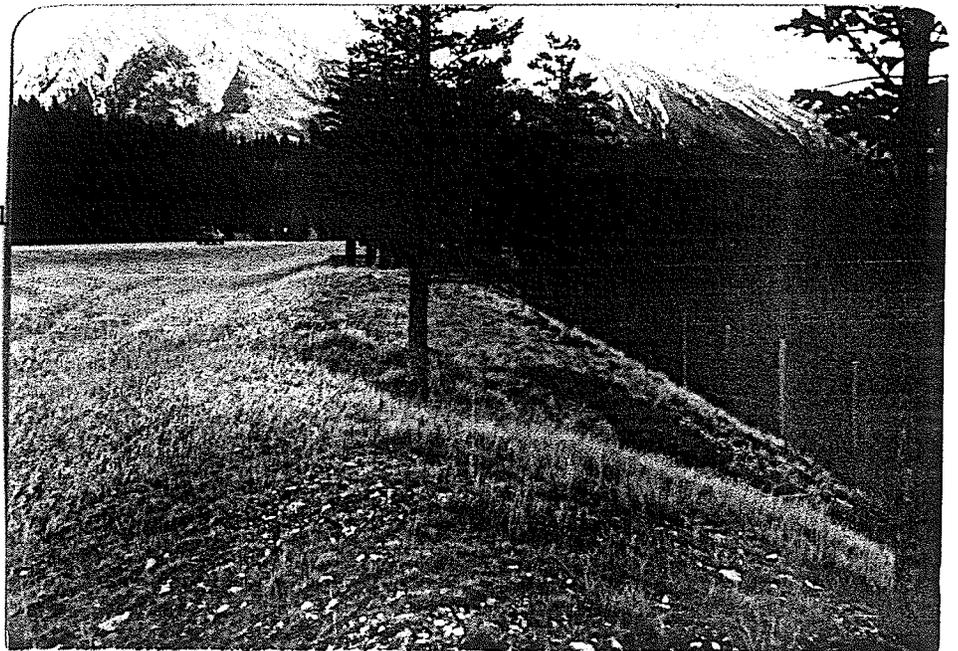
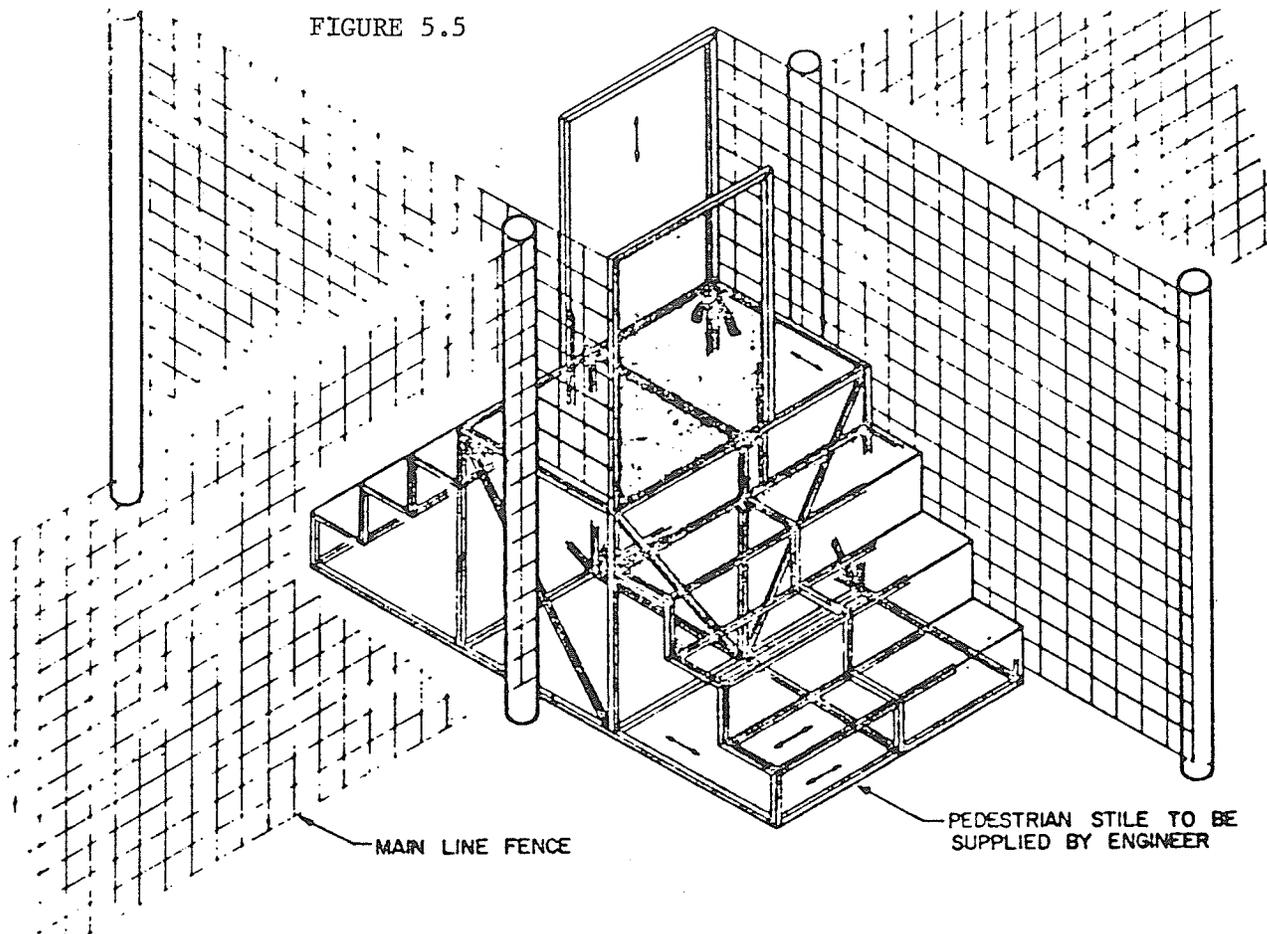


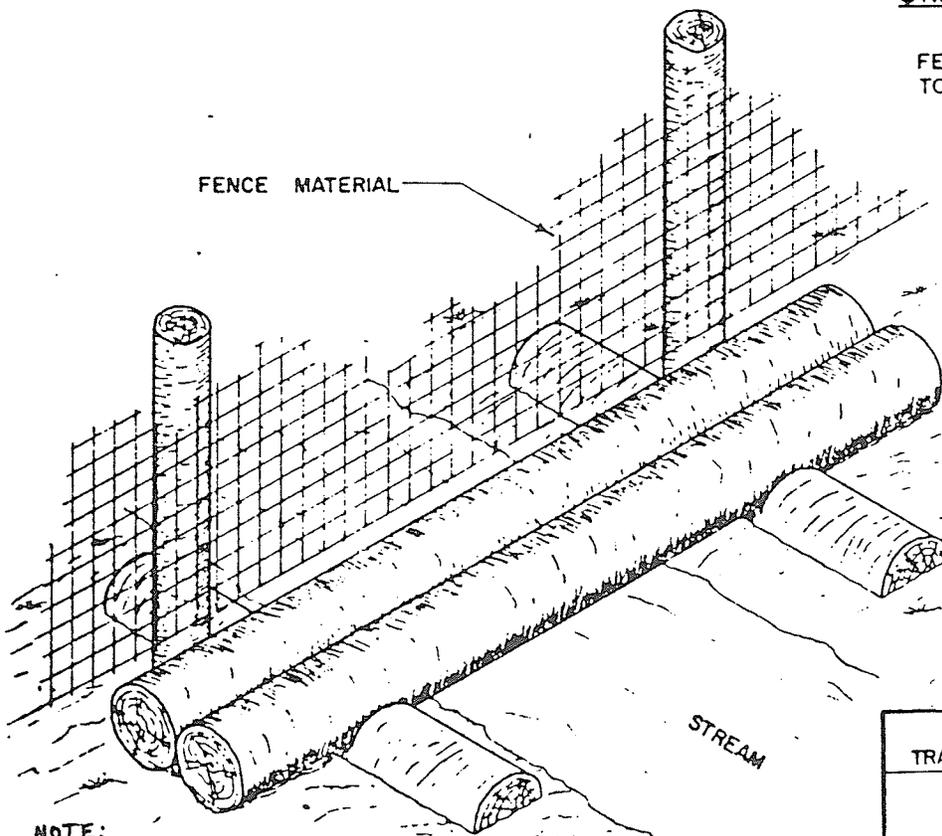
FIGURE 5.5



PEDESTRIAN STILE
1:25

SMALL STREAM & DRIANAGE SWALE CROSSING
N.T.S.

FENCE MATERIAL STAPLED TO LOG BRIDGING.



NOTE:

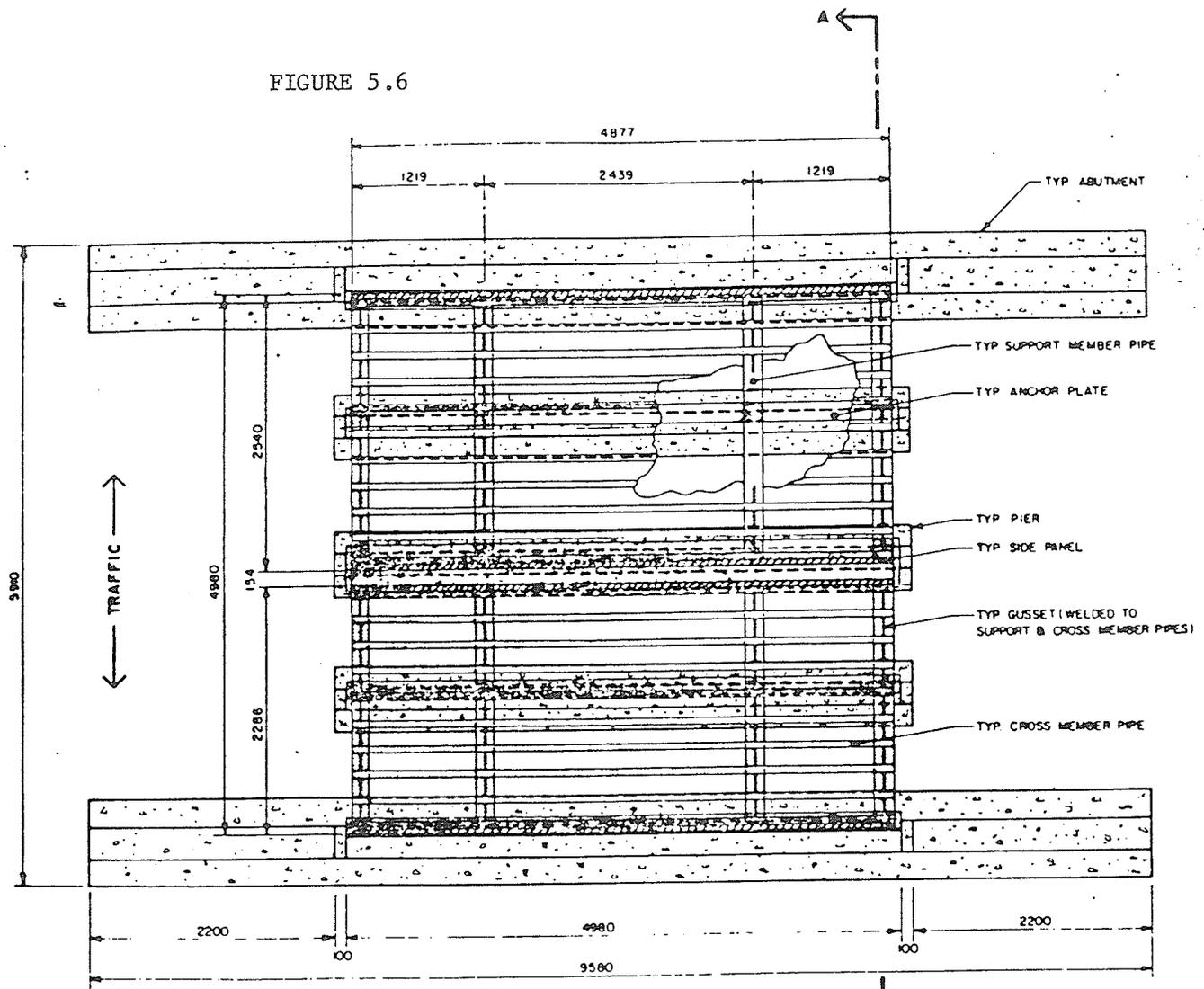
ALL MATERIAL TO BE PRESSURE TREATED WITH PENTACHLOROPHENOL WITH A RETENTION OF 96 kg PER CUBIC METRE OF 5% PENTA PETROLEUM

BASE. PRESSURE TREATED TO CSAA08062-1976 SOURCE: Banff Highway Project- Follow Up Study, 1984.

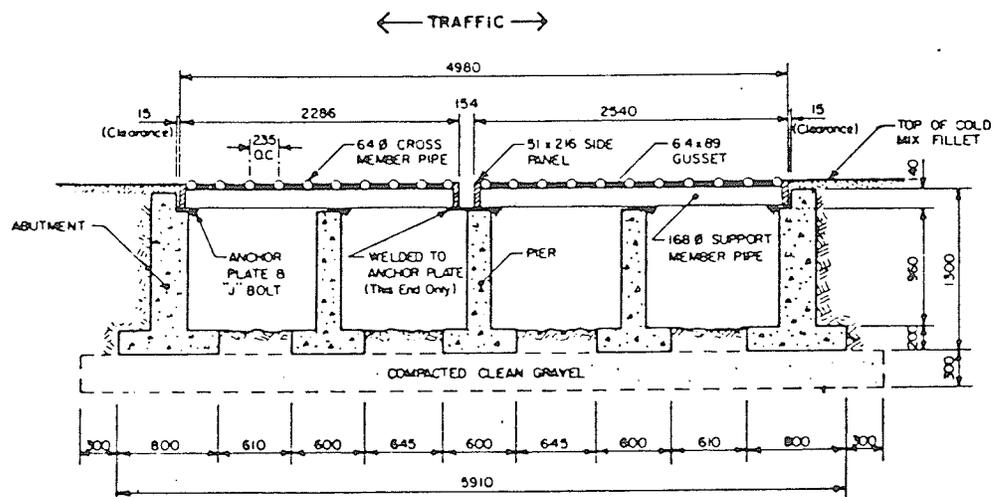
PUBLIC WORKS CANADA
TRANS-CANADA HIGHWAY/BANFF NATIONAL PARK

PEDESTRIAN STILE
&
SMALL STREAM CROSSING
DETAILS

FIGURE 5.6



PLAN VIEW
1:40



SECTION A-A
1:40

GENERAL NOTES:

- ALL DIMENSIONS INDICATED IN MILLIMETRES.
- DECK WAS CONSTRUCTED IN TWO SEPARATE UNITS (2286 x 4877 & 2540 x 4877) THEN ASSEMBLED ON SITE AUG. 20, 1984.
- MANUFACTURED BY CHRISTIANSON PIPE LTD. AND CONFORMS TO THEIR CATTLE GUARD No CG-101

SECTION A-A
1:40

PUBLIC WORKS CANADA
TRANS-CANADA HIGHWAY/BANFF

TEXAS GATE DETAILS

Source: Banff Highway Project-Follow Up Study, 1984.

FIGURE 5.6 (a)
Actual View of a
Texas Gate
Source: Author

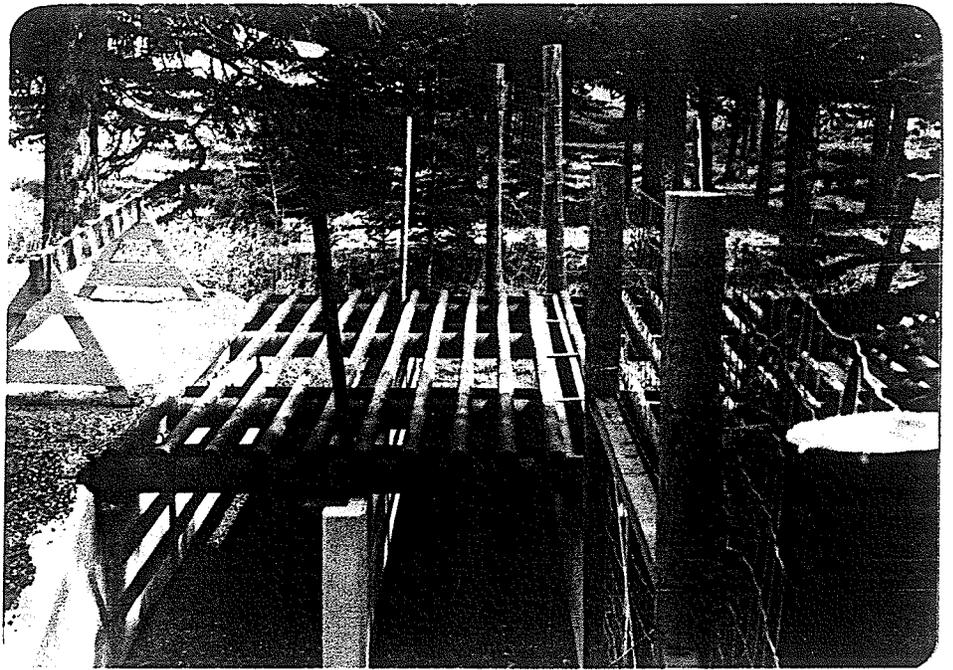


FIGURE 5.7 (a)
Actual View of a
One-Way Deer Gate
Source: Author
Note sand at base
used to monitor
gate usage.



ary, the terminus point of the fencing structure. Specially designed one-way gates were installed into the fence structure to allow ungulates to escape the road corridor once they got into it. Instead of park personnel having to capture the beasts, they could instead chase the animals toward these gates where exit could be accomplished. As time progressed, the animals have even learned to use the gates by themselves. Figures 5.7 and 5.7(a) show the design and actual look of these gates. The design enables exit from, but not entry into, the highway corridor. Steel bars on hinges are shaped much like a funnel to allow animals to push open the structure by themselves.

The C.P. rail line runs parallel with the highway for a distance at the east end of the park before veering into Banff. This narrow area required the C.P. line to cross the fencing bounding the highway. In order to prevent animals from using this point to cross into the corridor, special plastic matting was placed across the rail bed. The polyethylene material prevents hooved animals from getting a grip so they slip on the material which deters them from crossing here. The design and actual look of this barrier is indicated in figure 5.8. Monitoring of this structure found that it was effective although snow build up during the winter on the edges allowed some animals to find a pathway across. Keeping the material clear was therefore imperative for proper function of this structure.

There were also portions of the highway which required steep sides due to the constrained space through which the road passed.

Figure 5.9(a) and 5.9(b) display this feature. Note also the steep sided roadcuts in the background of both pictures. This type of cut into the bedrock was designed specifically to limit the amount of habitat loss in the area. Vegetation remains almost right to the edge of the bedrock cut. Figure 5.9(b) also displays the use of reflective tape fencing at the top of the steep sided wall. It was feared that if animals would get onto the highway, they might jump over the side and drop to serious injury or death. The reflective tape acts as a visual barrier which steers animals to areas of less steep drops.

Underpasses were deployed to allow animals to travel between sides of the highway, as well as facilitate flows of water where required. Three designs were considered during the planning process, as exhibited in figure 5.10. The reinforced earth design was not used since its cost was similar to the more spacious open-span design. The culvert design was new, costing less than half the price of a regular open-span. A total of 8 underpasses were built or upgraded.

Monitoring of the underpasses found that the ungulates were indeed using them. This was not a total surprise since animals had used these structures in the past. Sand was placed at underpass openings in order to get track impressions of animals. This method along with visual monitoring allowed park personnel to get an idea of the type and number of animals using these openings.

The culvert design did appear to be less used than the open-span

FIGURE 5.9 (a)
Steep Sided Highway
Section

Source: Author

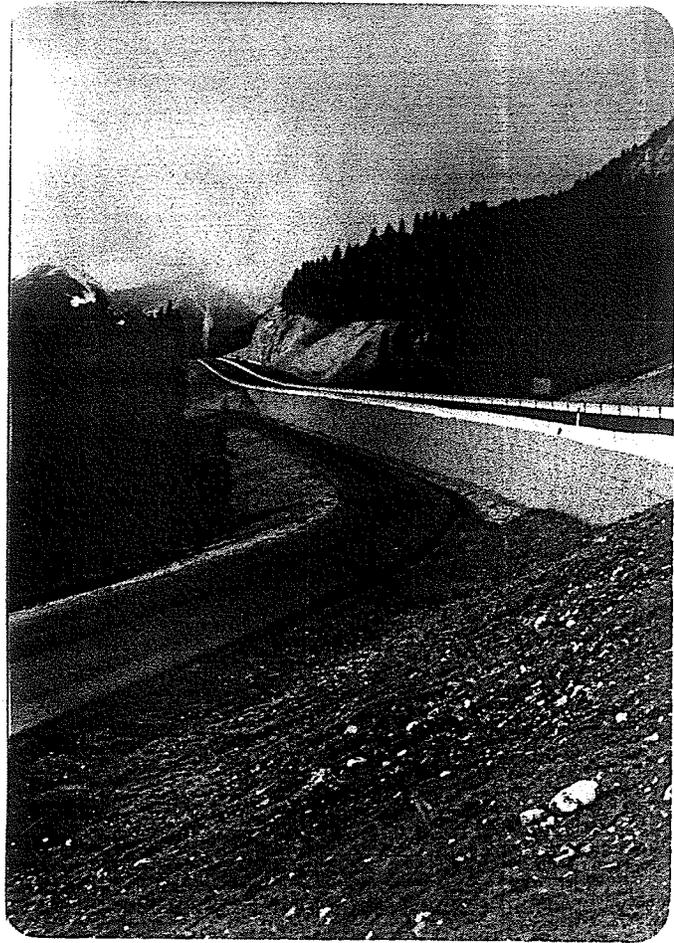
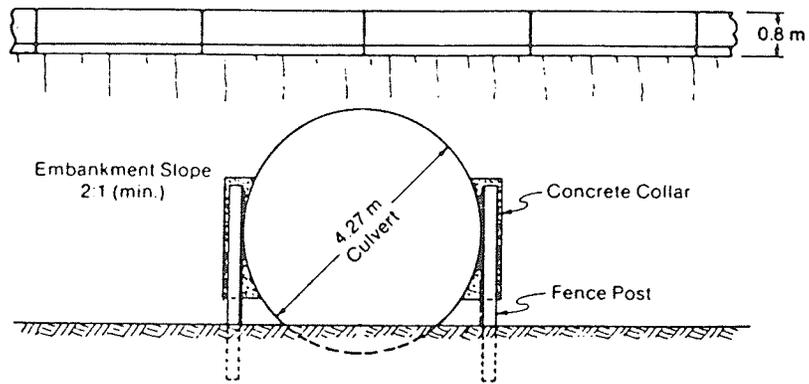


FIGURE 5.9 (b)
Reflective Tape Fencing
Along Top

Source: Author

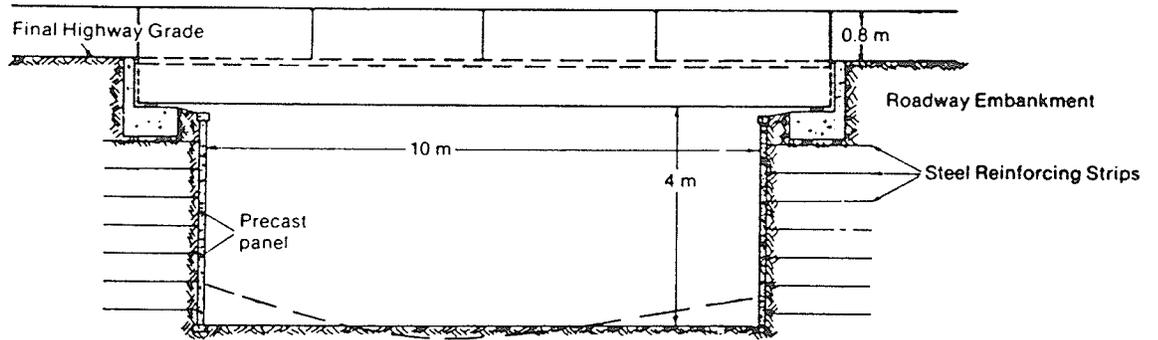


FIGURE 5.10



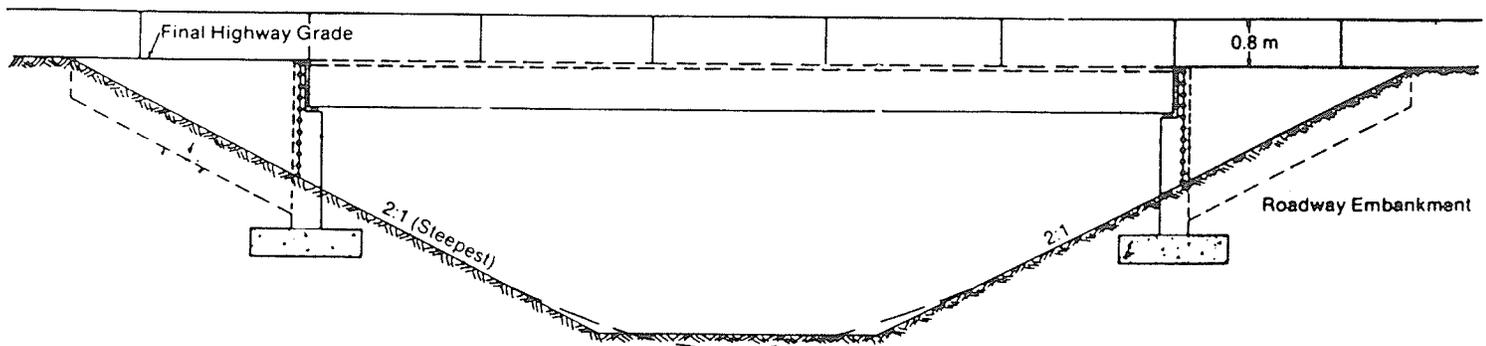
Culvert

Section A-A



Reinforced Earth

Section A-A



Open-Span

Section A-A

probably because of the more constrained environment in the culvert. In addition, icing during winter months was more severe at the culvert. Ungulates cannot grip properly on an ice base, and this problem creates a problem for their free flow. All underpasses exhibited icing but the open-span design allowed more area for animals to find an ice free trail. Snow drifting and snow-plow buildups at the entrances of underpasses also created some problems for ungulate crossing.

Browne,(1985) and Scott-Brown,(1984) both suggested the installation of an audio-visual system to properly monitor the real usage of the underpasses. Evaluation of animal behavior was also a consideration of this system. However, the system was not installed due to budget constraints.

With regard to overall ungulate numbers, the project seems to have had a positive effect, especially for the elk. Ross,(1984), indicated in his study that ungulate vehicle collisions had become the main means of controlling elk in the park. This observation would seem to have been correct since population estimates from 1988 for elk are over double those from 1980. Kunelius,(1988), estimates that there are about 1000-1200 elk in the park. The balance which nature will find has yet to be realized, but if the period between 1917 and 1943 is an indication, then there are going to be many elk running around in the future.

The recent return of wolves to the Bow valley from the surrounding areas may be due, in part, to the increase of elk in the valley.

Parks Canada research indicates that elk are "the major prey item of the local wolves", (Kunelius, 1988, 7). The degree to which this limiting control effects the elk population will depend on the final number of wolves which settle into the Bow valley.

Another predator, the coyote, is having an effect on the population of Bighorn Sheep. While fencing did eliminate most vehicle kills, coyotes now can chase sheep into the fence where they are cornered and killed. In the past two years, 33 sheep have died in this manner, (Dawson, 1989, 12). Deer and elk have adapted to the fencing by running along it when persued, whereas sheep run right into the fence causing injuries and sometimes death. Park personnel are experimenting with large strips of plastic fencing along the existing wire structures to make things more visible for the sheep.

The overall results of highway 'isolation' have proved effective in the reduction of ungulate collisions with vehicles. Traffic kills have been reduced by about 70% over the entire length of the Trans-Canada highway traffic corridor, (Wardens office, 1988). This figure rises to a 95% reduction over pre-fencing totals if you consider just the length of highway which was fenced. In this respect the project can be deemed a success. Obvious 'fresh' kills have been considerably lowered.

One point needs mentioning, however. Although planners may perceive a highway 'isolated' from its surrounding environment, this

fact can never be achieved. Highways entail snow and ice control, salting, exhaust emissions, lead deposits, lubricant drippings, and noise. Ungulates and all flora and fauna are affected by these residuals. Many 'natural' deaths of animals may not be so natural after all. Stress and behavior changes in wildlife are also intangibles which are left unmeasured.

5.2 Environmental Impacts- Other

Air quality was an area of concern during the planning process. While construction was going on, problems relating to dust in the air, as well as exhaust emissions from construction machinery were encountered. However, these detrimental effects were limited to those people who were travelling through the corridor in their vehicles. Hikers or bikers who travelled on the road margins also encountered fouled air. Completion of the improvement scheme has meant a return to cleaner air. The elimination of 'stop and go' driving conditions was already mentioned as beneficial to the reduction of carbon dioxide emissions. Other than encouraging the further use of automobiles, which we know is detrimental to the global climate, this project did not alter local climate conditions.

Visually, this project has not impaired the quality of the environment. Limited amounts of vegetation were removed by the construction process. Areas disturbed by workers and vehicles were rehabilitated to as close to their original condition as possible. However, some areas with steep slopes did have difficulty re-vegetating. Figure 5.11 shows a slope that partially grew back some vegetation, but not enough to prevent water erosion channels appearing in its face. Figure 5.12 shows a slope where lack of vegetation has resulted in earth falling down on to the roadway, making necessary manual removal of materials.

The ongoing monitoring process which was established by Parks Canada will have to deal with problems, such as those encountered with

FIGURE 5.11

Erosion channels cut
into slope

Source: Author

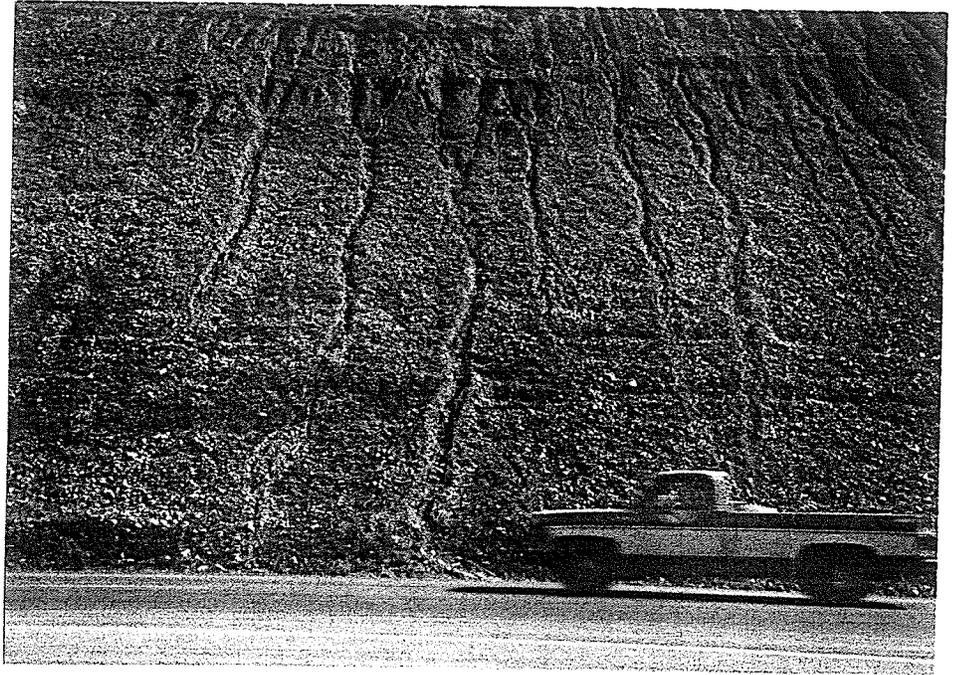


FIGURE 5.12

Eroded materials
falling onto roadway

Source: Author

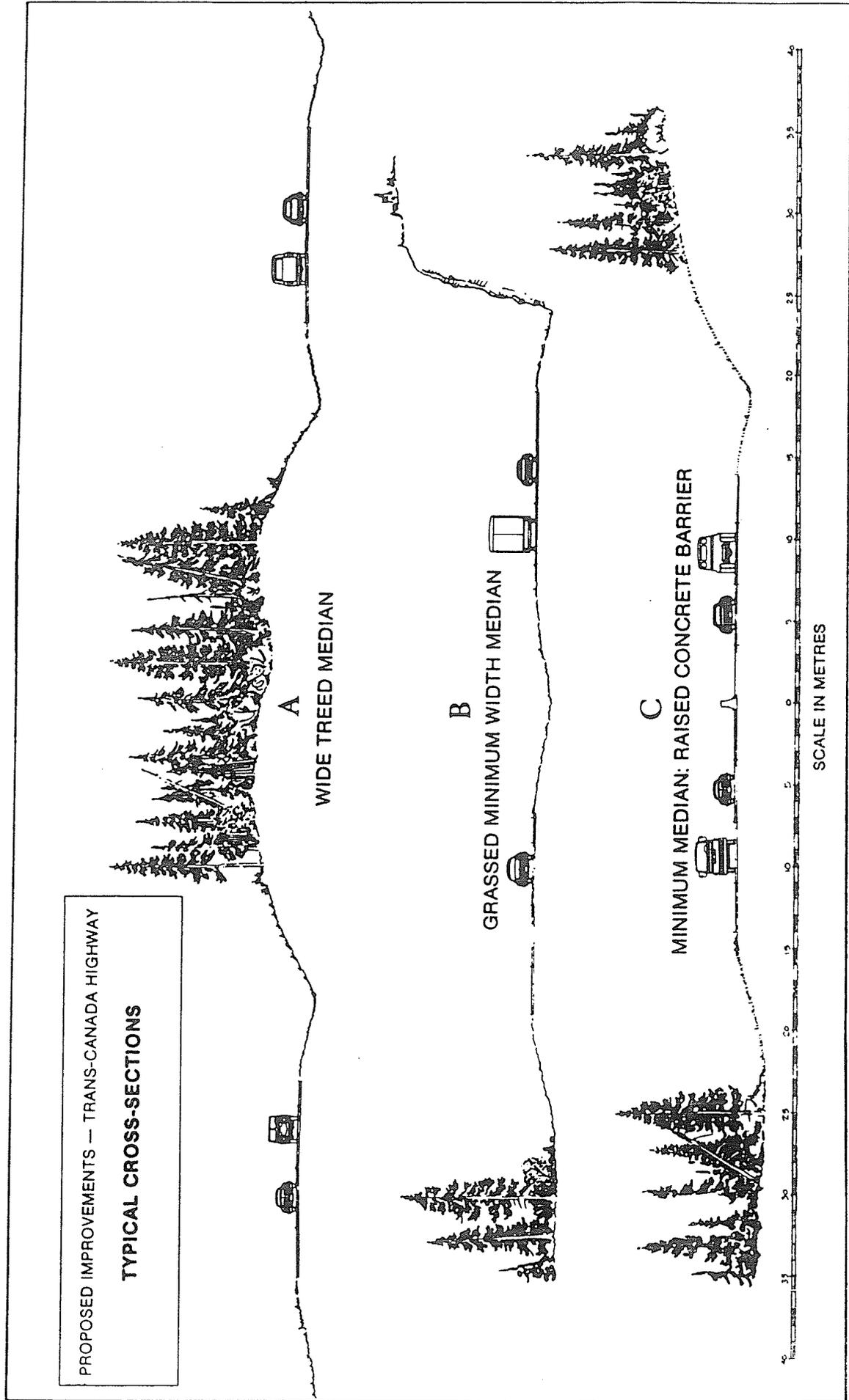


re-vegetation, and in the future as they arise. Vegetation should remain stable once it has reestablished itself into the soil. Most road margins had achieved this level of security shortly after seeding took place. Figure 5.3 did show a slope which had been successfully restored to a level expected in the park atmosphere. Figure 5.9 showed a roadcut which limited the impact on the environment.

Three basic designs of roadway were deployed in the area. In areas with wide spaces available, the opposite directions of traffic were separated by a wide median with vegetation left intact. Grass medians were used in more constrained areas. In the most narrow areas, such as those around roadcuts, a raised concrete barrier was deployed. In these cases a tradeoff had to be made between the poor aesthetics of the concrete, and the retention of habitat. Providing a wider median would mean less habitat in areas identified as critical to fauna in the area. This was the case in the area displayed in figure 5.9. The land on top and around the rock was important sheep grazing land. Figure 5.13(a) shows these designs of highway in cross-section. Figure 5.13(b) displays the actual look of these designs.

The Chinaman Creek diversion was a unique feature of this project. Three sections of this stream were diverted as indicated in figure 5.14. Much effort was put into the remodelling of the newly created stream bed. The purpose of this work was to create a suitable fish habitat for feeding and spawning. Long stretches of the realigned creek bed were filled with gravel to simulate natural conditions. Undercut

FIGURE 5.13 (a)



Source : Proposed Improvements, 1979.

FIGURE 5.13 (b)

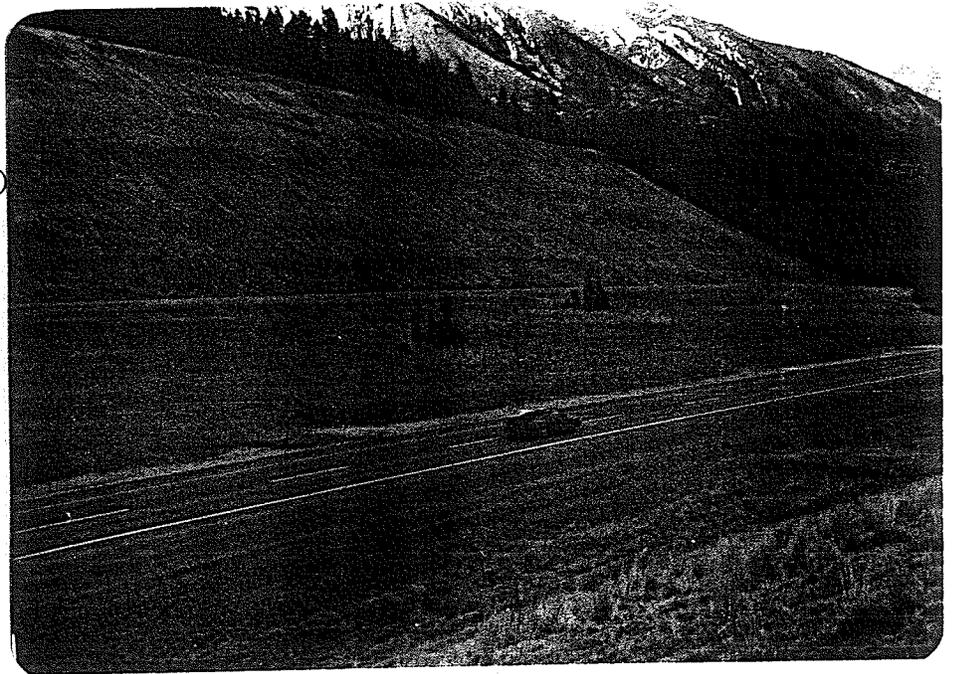
Wide treed median

Source: Author



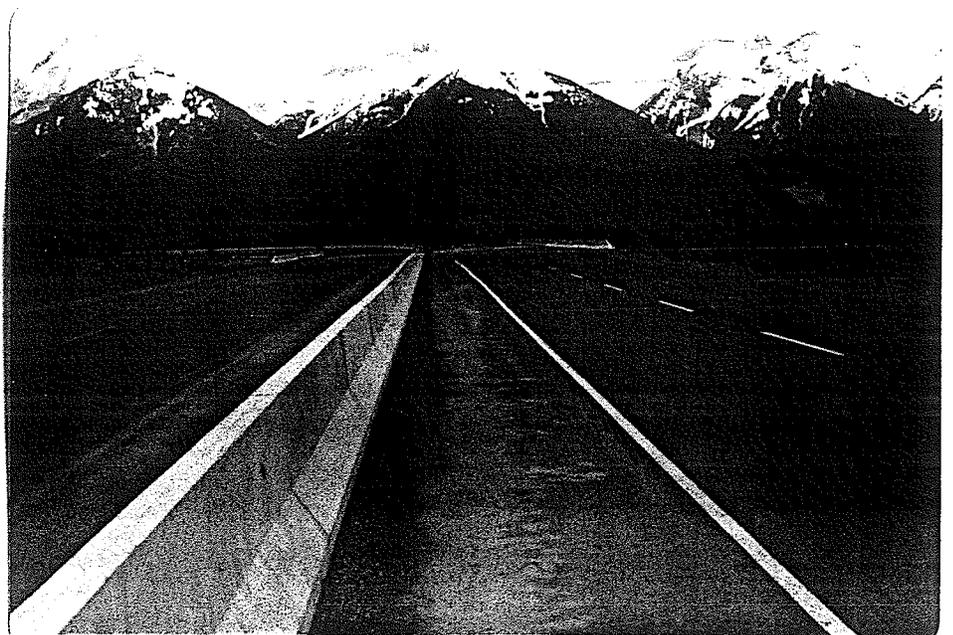
Grass median (wide)
(width varied with
points along highway)

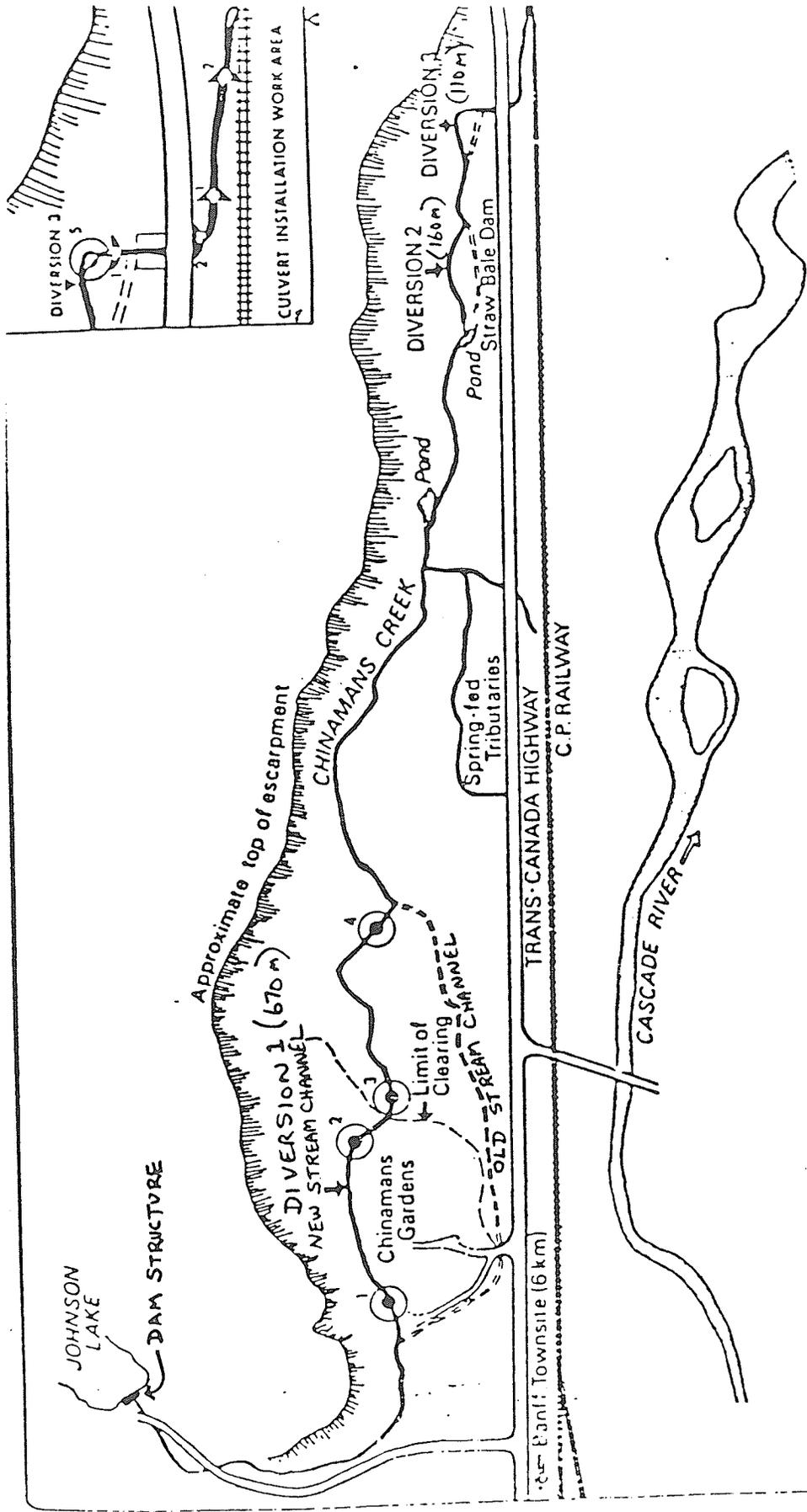
Source: Author



Raised concrete
barrier

Source: Author

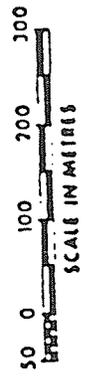




Source: Banff Highway Project Follow Up Study, 1984

FIGURE 5.14
CHINAMANS CREEK REFERENCE MAP

- FLOW MEASUREMENT SITES
- STREAM CHANNEL PRIOR TO DIVERSIONS
- WESTBOUND LANES CULVERT SITE
- ┆ STOP NET LOCATIONS
- △ SILT CONTROL STRUCTURE LOCATIONS



banks, pond creation and special aeration pipes were incorporated into the plan. Monitoring during the early stages was carried out at different sites along the new channel to measure water flows. Silt control structures were built to prevent sediments from filling and clogging the gravel bottom. The project was deemed a great success by both the Janis/Ross and Faculty of Environmental Design reports. Fish were observed using the new channel. However, the unexpected did happen. In February, 1986 a dam structure that held back the waters in Johnson lake located upstream of Chinaman creek gave way. A considerable amount of damage was caused to the realigned stream. Water had re-cut into the the old channel leaving sections of the new bed 'high and dry'. Figure 5.15(a) shows a close up view of the partially collapsed dam structure. Figure 5.15(b) shows the dam structure from a distance with the now empty Johnson lake in the background. Much time, effort and resources had to go into the reconstruction of this scheme.

The failure of the dam is very symbolic of a theme that has been present throughout this paper: Much effort went into this micro-environmental project, yet it failed to consider the dam. This structure was not even mentioned in any studies. What was the use of all of that effort, all of that work and all of the money spent, when a greater force could just wash most of it away in one giant swoop?

Parks Canada is responsible for the maintenance of this project now that construction is complete. Problems such as that at Chinaman creek and along eroding slopes cost money. This department

Figure 5.15 (a)

Failed dam structure

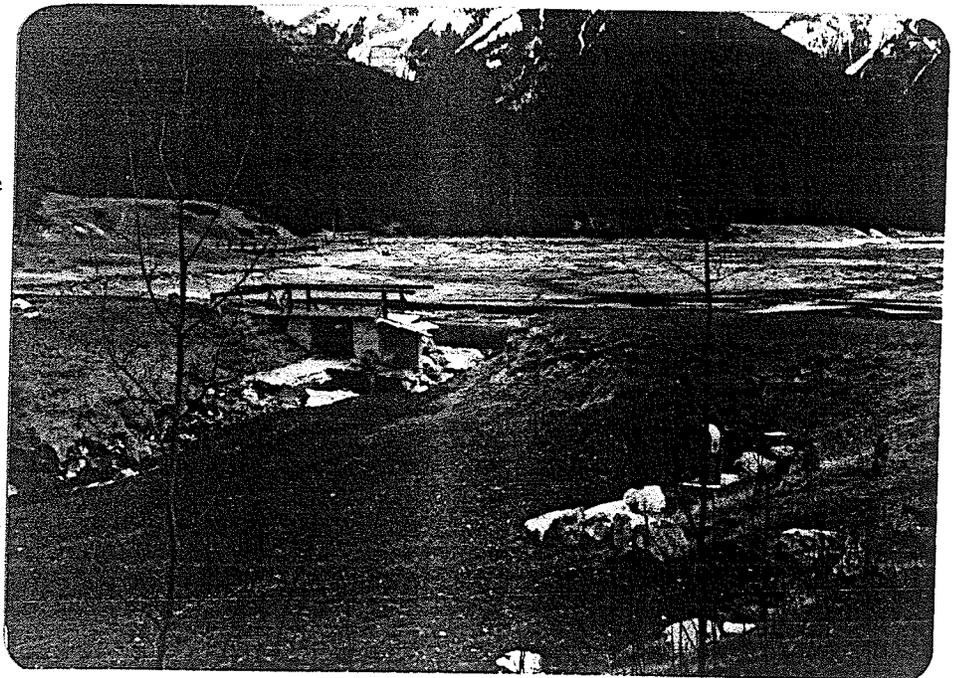
Source: Author



Figure 5.15 (b)

Drained Johnson Lake

Source: Author



is heavily weighed down with maintaining the infra-structure of its domain. It has been estimated that fully 60-70% of budgets go to this purpose. Little money is left for what the department should really be doing. Park creation and the construction of more visitor appreciation facilities are unable to proceed due to financial constraints. Projects such as the audio-visual monitoring of ungulates are let go. Clearly there would seem to be a problem here. Perhaps Public Works should be the responsible authority for maintenance of roads in park areas. Yes, this would be a partial loss of autonomy for Parks Canada but a financial liability would be removed from the shoulders of park personnel. This assumes, of course, that Public Works would take on this responsibility, something which may not be true. More money for their department would inevitably help. A budget increase for Public Works may well mean a cut for Parks Canada so the shifting of budgets idea may well be a useless proposal.

The project was completed much in the way that was envisioned during the planning process. Although there were some setbacks, the environment in this area did not suffer in regard to the impairment of the resource. Banff National Park remains a very attractive draw for tourists from across Canada and around the world. Hopefully, people who get great satisfaction from this environment can apply the same spirit to the places in which they reside.

5.3 Socio-Economic Impacts

In the final analysis, the major consequence of this project was the creation of an efficient utility corridor for bringing people in and out of the park area. People using this area can now better enjoy and appreciate the beauty of the region without having to endure urban type traffic snarls. In 1980, the average annual daily two-way traffic at the east entrance of the park was about 9500 vehicles per day, (Proposed Improvements, 1981). In 1988 this figure had risen to about 12,000 vehicles per day, (Banff Administration Office, 1989). This project has helped facilitate visitor use of the park by creating better access especially during peak periods of use.

In terms of attendance to the park, visitations have increased by 45% between the years 1979 and 1988. In 1979, 2,950,000 visitors entered the park as compared with 4,200,000 visitors in 1988, (Park Administration Office, 1989). Banff townsite remains the most visited site in the National Park system; 2.6 million people in 1988 alone. Predictions made during the planning stage regarding continued increases of park usage did, in fact, come true.

The breakdown of visitors by mode of entry into the park remains much the same as it stood ten years ago. Fully 93% of visitors arrive in private automobiles while only 5% arrive by motorcoach tours and only 3% come by scheduled bus or train, (Ruston, Tomany and

Associates, 1989). It is interesting to note that during this time of renewed interest in the environment, the Canadian government has decided to cancel daily train service through the park. It is true that few people entered the park by this mode in relation to the total number of visitors, but it seems that we should be encouraging greater usage rather than eliminating it all together. One can only gasp at the lack of foresight demonstrated by our leaders.

The increase in visitors has led to an expansion of commercial accommodation units in Banff townsite. In 1981, 2700 units housed a maximum of 8100 visitors at any one time. In 1988, 3503 units housed 10,900 visitors. From an economic standpoint, this project would seem to have had a beneficial effect on this region. More employment has resulted from this expansion. In fact, shortages of labour are common for this region. The large amount of lower paid service industry jobs are hard to fill. One factor contributing to this shortage was, and is, the lack of accommodation for workers in the townsite area. This problem has been partially solved by the business sector which now provides more 'in house' residences for its employees.

Detractors, however, argue that increased visitations have tainted the natural flavor of the environment. Enjoyment levels have apparently been reduced because of too many people congested into such a small site. This is open to debate, of course, but it is Parks Canada policy to allow all people who wish to visit the ability to

do so. Restricting the number of visitors who could come to the park at any given time would not be a good policy. Elements of elitism would enter into the picture, as would economic factors. Restricting developments in back country regions already has these two elements at play. Only those people with the time and the money can spend long periods of time in the far away reaches of the park. An aging population will increase the numbers of people who cannot enjoy much of the park region.

In the future, park planners may well have to be more flexible in their consideration of developments so as more people can enjoy all of the regions of the park rather than just one crowded townsite. As long as these developments do not harm the surrounding area to a large degree, then they should be permitted. For example, the cutting of more trails through the region could be seen as good. Very small numbers of flora and fauna will be disturbed, but this detracting would be greatly offset by the beneficial effect which such a move would make. We need to get modern people back into nature so as they can reacquaint themselves with their roots. We need an enlightened population which will deal better with the environment than the last few generations have.

6. Reflections on the Nature of our Environmental Impact Concerns.

6.1 The 'Natural' Dilemma

Whenever we discuss the environmental impacts which a project will have on its surrounding region, the word 'natural' comes into play. People often use this word to describe a mental perception they have about what they feel is natural. The perceived impact which a project will have is based on this mental perception. But is the definition arrived at really a true reflection of 'the real nature'? We are faced with questions of our own role in the natural scheme of things. If we are to consider ourselves an unnatural force, are all of the results of our actions as they display themselves in the environment unnatural? If we are to consider ourselves part of the natural scheme of things, why then do we question the results of our actions? Defining our role on this planet is a fundamental pre-requisite when considering the impacts of our endeavors. We need this definition to determine if our impacts are 'good' or 'bad'.

Ungulates exhibit the dilemma just described. Perhaps ungulate populations in the park were too high due to the unnatural eradication of carnivours by humans earlier in this century. Perhaps the vehicle had replaced the carnivours as the 'natural' means of controlling populations. Population numbers are not precise. We do not know what the numbers were before man arrived and indeed we do not know what the

exact numbers are for today. Natural process is in a continued state of flux. It is wrong for us to take a picture of a certain place at a certain moment in time and then say this is the way it should be. If we had been in North America 10,000 years ago, would we consider all of the ice around as being the natural state for the rest of time?

Much of the original growth of the Bow Valley was burned by fires after the completion of the railway. Obviously we do not know which fires were caused by lightning or which ones were caused by train cinders. How do we separate the natural burn areas from the un-natural ones? Should we only preserve natural burn areas? Are all of the new trees growing on areas of cinder burn natural or man made? Does it really matter?

The problem of trying to quantify the correct amount of human influence on the natural order again surfaces. How much or how little should human influence everything else which exists around us? Park personnel in Yellowstone National Park allowed fires caused by lightning to burn in 1988. After several weeks things were perceived to be out of control because large amounts of land were being burned. Park officials were severely criticized because they let nature take its course. Are the areas which were saved from fires now unnatural? Was the dry weather which caused the fires to get out of control caused by human activities, such as carbon dioxide emissions?

There are now two components to consider in the 'natural' order. First you have the dynamic character of nature itself which continually changes through time. Secondly you have human activity which interacts with the natural dynamo. Unfortunately the planet is fluid. Human elements mix with nature's, and the result is a grey mass which does not identify embryonic origins. For the purist who feels human activity is not a natural force, nothing can be deemed natural anymore since everything has been touched by human activity. Even the virgin rainforest deep in the Amazon jungle breathe air tainted by industry. Ocean water under polar ice caps contain chemicals created by man.

What humans can do is limit their activities to those which least impact the environment around them. Yes these activities will have effects but these need not be degrading or irreversible. The effects may even be perceived as enhancing the quality of the environment. Advocates of limiting human interaction with flora and fauna state such interactions add stress to environments where plants and animals live in harmony. Yes, clear cutting a forest and hunting animals puts stress on these habitats. But nature itself is very stressful. From fires caused by lightning to carnivores hunting their prey, habitats around this planet are far less harmonious than perceived by some. Swimming with sharks or encountering a polar bear might change some peoples attitudes.

The hunting of carnivores in Banff National Park during the early part of this century arguably created a better habitat for ungulates. The reduction of road kills does the same thing. Yet in the long run this beneficial habitat may cause great pain for future generations of elk for example. Overpopulation will result in starvation. They will destroy their habitat by overgrazing. They will cause less competitive fauna to suffer. The park area may tend toward a single species environment. An eerie parallel can be seen with humans on this planet.

Components in the environment limiting human growth have been reduced allowing people to utilize vast areas of this earth for food production. Increased amounts of food have allowed more people to survive at a given moment in time which has resulted in exponential population growth. More land is then needed for more food production. Land which is overutilized turns to desert. An estimated 6 million hectares a year are being turned into desert lands. As a result, more land elsewhere is being put into food production. An estimated 30,000 hectares of rainforest is cut down daily. Three life forms are eliminated every day by human activity.

David Suzuki has described the human race as an "out of control malignancy". Fully 80-90 million humans are added to this planet every year. It is fortunate that most of the people on this planet do not develop and consume to the levels which we do in Canada. A radical

new approach in attitude towards environmental concerns shall have to be adopted. The current 'mitigation of effects' attitude is merely window dressing to a more severe problem. The continued facilitation and expansion of technologies that clearly harm the environment has to end. Both new and old technologies which are friendly to the environment should be encouraged. The sight of millions of bicycles on Peking streets as well as hand labour on fields of crops may signify a society which is advanced to ours. Perceptions of affluence and needs are learned. A sheep herder in the Andes may well feel more freedom and wealth than the average North American who is burdened down by the weight of material goods, trapped in an artificial environment of steel and concrete.

The concept that humans are a psychopathic species on this planet is not totally unfounded. Have we been morally irresponsible to this planet? Is the planet full of psychopaths? From single-celled creatures to whales, inter-species relationships are anything but symbiotic much of the time. Eat or be eaten is the moral which seems to guide all species. Survival of the fittest seems evident. In this context, human proliferation would seem justified. We are merely following the rules and morals of the planet. Maybe evolution is guiding us to a mono-species, 200 degree Celsius planet. Maybe this is the natural way. If humans are part of nature then their actions and consequences should also be deemed natural.

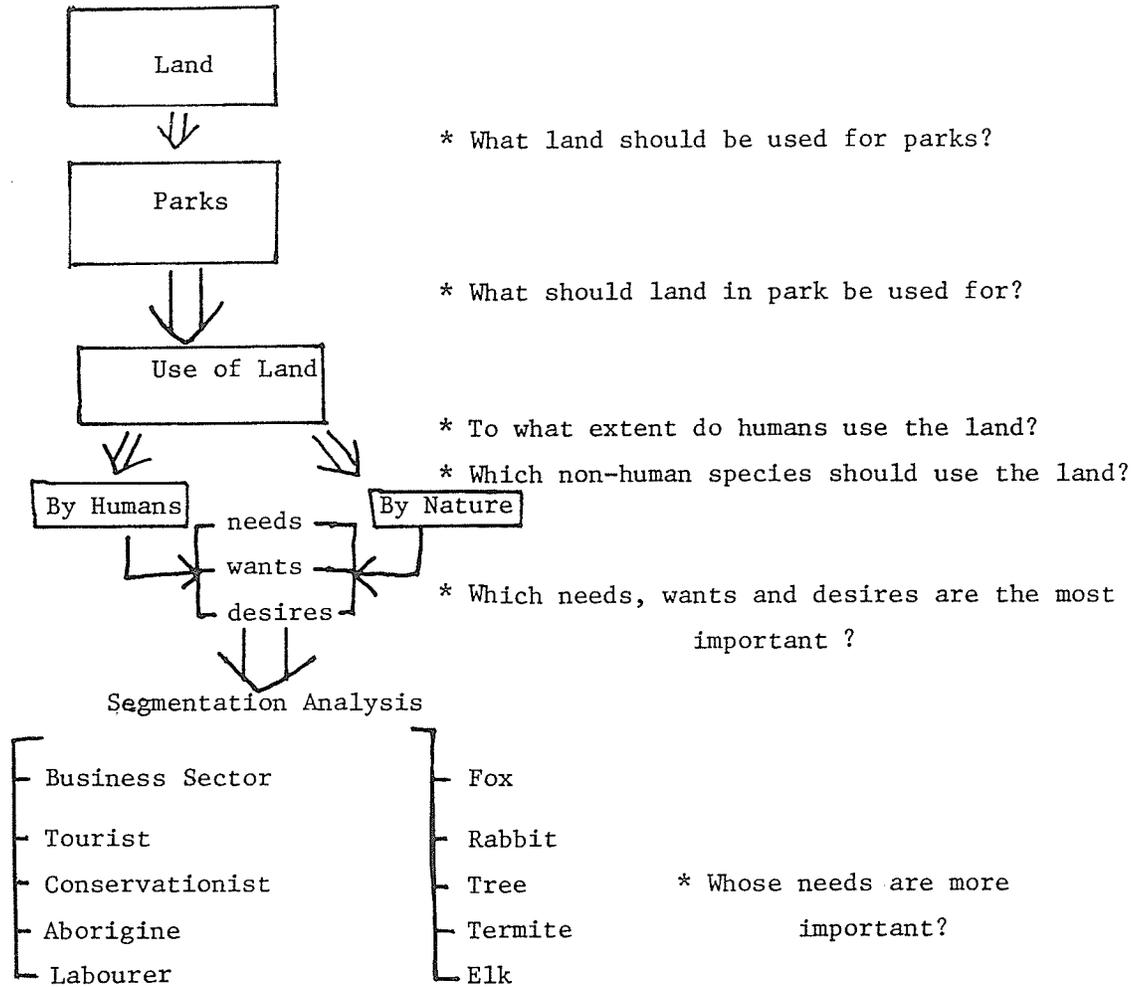
If we are the guardians of the natural order, that is not part of the natural system on this planet, then we must ensure that our actions do not affect that which we deem natural. This would seem to be the popular idea today. Yet we continue to do things which influence nature. Economic growth affects nature and therefore should be stopped. We should create an economy which is geared towards sustainable development. Such a planetary economy may well be the way of the future for an idealist. A cynic would conclude that there is no way humans will ever achieve a 'planetary psychology'. Social characteristics are so engrained into the human soul by political, cultural and egotistical institutions that a massive case of amnesia seems inescapable.

6.2 Conflict Resolution

One of the critical roles played by park planners is to come up with solutions when conflicts arise. Which interests get consideration? Which interests are more important? What variables should be used in a cost-benefit analysis? Which tools, (legal, educational, monetary, scientific) should be used? Questions such as these are very important because, from the answers come the foundations on which decisions are reached. Without such basis, decisions are open to as much controversy as the problems which they initially tried to solve. However the basic problem with such questions is that they do not have firm answers. Different individuals have different ideas and perceptions on what is right and what is not. Several so called 'experts' on the same topic can have totally divergent views. For example, the taking away of land from human usage could be viewed as both good and evil. We may well allow the production of 'natural' biomass but at the same time are limiting the production of human biomass. Are national parks in Kenya 'killing' little babies by preventing a very fruitful human population from utilizing this land? Thus the dilemma is encountered. From what perspective does the decision maker base judgements.

Figure 6.1 presents some basic problems which create conflict in our society in regard to parks. Answers are required to questions posed in order to mitigate conflict. The Mitigation Symposium, (1979) suggests seven steps for the mitigation of conflict. First, there

Figure 6.1 Simplified Decision Making Flow Chart



* Areas of Conflict; Decisions required

has to be an understanding of the mitigation concept itself. A wide viewpoint, such as that illustrated in figure 6.1, is required in order to take into account all interests. The next step involves the evaluation of criteria used in coming to your conclusions. Of what relevance are the things you have considered to your final decision? Early planning, proper implementation procedure, supervision of operation and maintenance, follow-up, and the securing of sufficient funding are the other ingredients described for proper mitigation of conflicts.

In regard to Canada's land, how much should be under park jurisdiction, and which land should be reserved for parks? Ideally, one would presume the more land, the better. However, sacrifices are required when taking land out what can be termed the 'human domain'. One could question if our society is willing to take, for example, productive timber land out of our exploitive pursuits so that a 'park' could be established. It is true that this occurred at South Moresby on Vancouver Island, but the price extracted on our society by the developers was quite high. In addition, this piece of land was but a small fraction of the total land area. In the human context, parks take wealth out of our hands as in money, but put into our hands a more abstract kind of wealth; preserved natural areas. Such a new type of wealth generation is fine for those who have much money but what about those who do not have such superfluous amounts of cash. How can we explain to the unemployed construction worker that he is better off with this park. With unemployment present today and into the future, jobs are going to be an important factor in the decision making process.

Park decision makers must offer alternative methods of economic wealth generation for those lost due to development restrictions. Tourism and its related developments offers the best hope to create new economic wealth generation for park areas. Attracting people to regions which they would not otherwise go could generate many service industry jobs, hands which otherwise might be employed in the destruction of the natural environment. In this context, the twinning of the Trans-Canada highway through Banff National Park can be deemed a constructive endeavor. More capacity for the movement of people means more jobs in the long run.

Self interest is the ultimate stimulus for the action of different organisms on this planet. Parks are part of the natural environment and if pressures on other parts of this planet are too great, then parks too may succumb to exploitive pressures. National parks in Kenya are examples of protected lands which are being pressured by human demands. Demands in Kenya are much more basic, (ie food), than those in Canada, however, our society demands a much higher level of exploitation of the environment. Canadian parks will not 'die' because Canadians are starving, but rather because everyone 'needs' that enormous house, two cars, VCR, TV and all of the fancy consumer items which we surround ourselves with. Therefore, preservation of natural environments becomes not a question of present day 'needs' but rather in the adapting of our needs to the capability of the environment. This capability must be defined in the context of balanced distribution of resources among all species, including the human one.

If we do not allocate at least some of the planets resources to other species, then these other life forms will not survive the selfish pursuits of the human species.

Can we realistically expect to solve the inter-species relationship conflict when we have not even solved inter-human conflicts? This continued fighting with each other is a sad reflection of the legacy which the human race leaves with this planet. All of the resources used, and all of the destruction caused in the waging of these battles is a revolting use of the resources around us. The end to such conflict would free up a vast amount of natural resources which could be put to far better uses. Perhaps we could then focus our attention at issues that really matter, not ones which were caused many generations ago.

Do humans protect regions of this planet because of a sincere desire to see the needs of other species fulfilled, or rather do they protect areas as a type of 'zoo' for human viewing. Humans may think that they are endeavoring in such selfless acts as protecting other species, but one can question this type of morality. Does the park warden like animals or the surroundings of the job? Does Brigitte Bardot like seals or the publicity? There is also an element of elitism at play here. Limited access to park regions is great for those people who can afford to, and have the ability to, backpack through pristine wilderness. But what about people with limited amounts of time and resources? What about those people who can't access regions for physical reason? The aging of Canadians will have an impact on the types of services which will be demanded from park areas in the future.

The bottom line of any decision reached is that there is an element or elements of self-interest involved. Even the arbitrator between feuding groups has the self-interest of creating a compromise decision so as to fulfill his/her mandate to do so. How can humans try to guarantee the 'rights' of other species while at the same time try to lessen the self-interest feature of our species. Parks protect other species, but can we further the cause of specie protection by other methods? This question will be discussed in the following section.

6.3 Species Inter-relation

Park planners always have the problem of accommodating the 'wants and desires' of other species into their policy decisions. Since we cannot communicate with other species, we have to surmise what their interests are and how they have to be 'protected'. Some plans of course ignore the interests of other species. Beneficial effects resulting from human activity which do occur, as related to other species, are more by default than by plan. Humans, like any other organism on this planet, use the resources around them to fill their needs and desires first.

In terms of the overall human society, there does not appear to be an overall consensus on the protection of flora and fauna other than man. Different bureaucracies established by humans have different levels and selective types of protection. Some species are 'protected', some are not; and, this depends on which region of the world you are in. Even within Canada, protection of species varies depending on location. Only within the human species have people tried to achieve an 'equal' level of protection.

Human rights for Canadians are entrenched in the Canadian Constitution. However, rights for species other than humans are absent in this code of human behaviour. The question arises, should there be constitutional protection for species other than man? Should we 'give' rights to other species? This may seem at first to be a logical

method in which to gain a common consensus; an ethic of protection for species other than ourselves. If such a prevailing attitude could be achieved by Canadian humans, then we in this country would not have to worry about the endless creation of 'artificial legislations' which force a preservation ethic onto the society. Ideally there would be no need for 'parks' since the whole country would become a type of utopian society where all different species could live with each other, in harmony, respecting each other's rights. However, how realistic is this utopia? Can we entrench rights of other species in our constitution; the so-called universal law of the land?

I would conclude that the Canadian Constitution would not be a good place to put legislation dealing with protection of species other than man. The main reason that I would cite for this opinion is the fact that the constitution is conceived on the principle of equality among individuals, that is, human beings. Such principles may be of little or no relevance to other species who have different roles and functions on this planet. The question arises, how natural is 'protection of any species considering that this planet works on an individualistic, self-interest motivation?

Protection is a key word which should be defined in the context of this discussion. Do we mean protection of other species from human influence? Do we mean protection from other predators? Are we suggesting a changing of the natural order? Protection of specific species from humans and other species may be argued as an unnatural

undertaking. Protection implies the intervention by an entity against the natural forces present on this planet. The necessity of protection from humans is a subject of conjecture. Humans are, in one sense, a natural species competing with other species on this planet. In another sense, humans are above nature so their influence should be controlled. Philosophical perception becomes an important consideration. For the purpose of this discussion, protection shall be defined as the act by humans of trying to mitigate the apparent undesirable influence which this species has on other species in the natural environment of this planet.

The human species is definitively having an 'undesirable' influence on this planet because of the unprecedented number of extinctions of species which have occurred in the past 100 years. This period coincides with a time of exponential population growth and swift technological procession by the human race. Almost every species' biomass is decreasing in size today, except that of the human. Humans are converting other species' existing biomass into their own tissue or into their domain. The phrase 'undesirable influence' needs this comparison of modern times with pre-industrial times because one could otherwise argue that humans are merely competing better than other species at this time, within the natural process. Without viewing in a historic context, the problem of disappearing species may be viewed as just the natural elimination of inferior organisms. In a majority of cases, however, these lost species would exist today if it were not for the negative influence of humans.

The Canadian Constitution would not be a good place for us, Canadian humans, to 'protect' other species. This legislation is a law which, as is with other laws, is open to a degree of interpretation. Many of the concepts expressed in such laws are idealistic, and, not in fact, reality. Laws exist, but, are sometimes broken. Protection of species other than humans needs a much more rigorous and effective method.

Another method of legislation which could be more effective would have to be directed toward the inner soul of the human being itself. Externally imposed 'laws' are not effective if the human being does not believe in them. There is no point in legislating protection of other species if the majority of humans, in this case Canadians, do not abide by such laws in spirit and/or fact. Therefore, internally (soul) directed behavioral control, such as education, are much more effective and realistic. The ways and beliefs of our ancestors will have to be attacked. These influences shall have to be lessened even if this means the loss of some of our cultural identity. The creation of an environmental ethic based on a new conservation based culture may well be immeasurably more effective to future generations than a whole book of laws.

Generations of humans since the industrial revolution have slowly lost touch with the natural environment. New generations see the products of the land rather than the utilization of the land itself. Trees are seen as lumber, animals are seen as meat, fur coats or pleasant distractions.

Individual accountability on the use of the natural environment has been lost in the bureaucratic, institutionalized structure of our society. No one person seems ever accountable anymore for the environmental degradation that same person causes through the lifestyle in which one pursues. Rather, abstractions are used when pointing fingers. For example, Inco is blamed for acid rain. But does anyone ever stop to think what this 'creature' Inco really is? How come the Incos of the world have been able to get away with what they have done? These 'institutions' state that they have worked, and continue to work, within existing laws. Moral values are lost by these godless, soulless creations. As with technologies, humans seem to have lost control of the very things which they have created. It is very difficult to stop these mechanisms once they have been started. Herein lies the point. Laws are faulty. They reflect human attitudes which prevail at a given time. Laws would not be needed if humans could be in some way able to indeed rise above nature and act in a logical, unselfish manner. Somehow the institutionalization of laws has become engrained into our societies and into our brains. When problems arise, our answer is to create laws on top of other laws for a solution. These short term actions do not address the real root of the problem which is the human being itself. Efforts must be directed towards the way in which this being thinks so as to create an atmosphere of willful protection for other species among all humans.

Education of the world's people to the problems of the future, and to the desirability of preserving species other than man can be

achieved. If some kind of international education program was initiated today, in 40 years the world could have a generation of environmentally-wise people. The main problem is, of course, the beliefs, laws, institutions, inequalities of wealth and resources, and all of the other problems which new generations inherit from their predecessors. Every new generation has this ball and chain attached to itself in its efforts to 'move forward'. This ball becomes larger and heavier, and movement becomes harder.

Protection of species other than man is essential to the future of the human race. It is too bad that we have to justify such protection in our own terms, but that is the way our world seems to be. Species look after their own interests. Regardless, the evolution toward a mono-species planet must be seen as irresponsible and unnatural. Humans, who made themselves the caretakers of this planet, must see that they cannot survive on a planet where species diversification is eliminated. Declining gene pools and lack of alternative species may have lethal consequences to humans in the future in terms of lack of food, shelter and pleasure. The world will become a very lonely place. Lack of species diversification will turn humans into more of a machine than they are fast becoming. Do we wish our children to view a barren land while they sit in front of their computer terminals being fed through tubes with chemical foods? When humans show little concern for their own kind, how then can one realistically expect humans to show some respect for other species?

Laws have existed for quite some time in human civilizations, and yet we have developed our environment into the shape that it is in today. We still worship, protect and propogate human biomass to a degree unparalleled to, or by, any other species on this planet. One human can kill 50,000 deer for example and still remain relatively unpunished to a person who kills another human being. Is this justice? Are our laws effective? The answer is NO! Species protection in the Canadian Constitution may be, at most, idealistic, but in practical terms, would just not work. Humans must be taught to respect other species and only then can protection be fully realized.

The planning stage of the Trans-Canada highway improvement project did show respect for other species. Road design did take into consideration the lives of non-human inhabitants of the park region. It is unfortunate that all of our endeavors do not have so much regard to all life on this planet.

7 Recommendations

- 1) Change the criteria for defining 'need' when referring to highway volumes and capacity. Create policies to shift traffic away from peak volume times.
- 2) More support for public transit. One bus requires much less facility development than 40 cars, yet carries roughly the same number of people
- 3) Create a better environmental ethic in the general population through more interpretative programs for example.
- 4) Shift highway maintenance responsibilities to Public Works. Do not reduce Parks Canada's budget in response.
- 5) More support from 'environmentalists' for Parks Canada policy and compromise. Any bureaucracy has to show a level of support from the public.
- 6) More emphasis should be placed on solving macro-environmental problems.
- 7) Extend the park protection ethic to other non park areas through education and legislation. Ideally, every area on earth should be treated with respect. Every development should be evaluated by a FEARO type panel.
- 8) Increase the price of gasoline to reflect the damage which its burning causes to the environment. This would also encourage the development of vehicles which are powered by alternative fuel sources.

- 9) Define what is meant by the word 'natural' when used in the context of studies involving the environment.
- 10) Canadian and global economies should shift away from economic growth as their primary goal to economies which favour sustainable development.
- 11) Allow for more controlled facility development in National parks in order for more people to appreciate the park surroundings especially those with disabilities or handicaps.
- 12) Allow the private sector to propose and build facilities in National parks under the strict supervision of Parks Canada. Economic conditions prevent the public sector from making initiatives which could be of great benefit to public appreciation of park areas.
- 13) Allow for the controlled removal of surplus elk populations in the park. Elk could be relocated to other park and non-park areas. Special hunting ranges could also be set up for some of the elk. Although the author does not condone hunting, the society in which we live continues this practice. High fees could be charged which could then be used to supplement park budgets.

8 Conclusion

This thesis has found that the Banff Highway Twinning Project was very well orchestrated in regard to conformity with Parks Canada policies. The project was adaptable to policy objectives and its impact on the environment was carefully studied prior to, during and after construction. I would commend all of those involved in creating a 'job well done'. If only all human endeavors were so closely scrutinized, then perhaps we would have a better environment today.

I would conclude, however, that the entire process works within a system which is faulty. There is no doubt that the small scale implications of the project were addressed, but what about the large scale consequences? This project perpetuates a system of travel which we know to be environmentally destructive. The present day system seems unable to address such radical ideas as the changing of our system of transportation or limiting economic growth. The automobile has become so interrelated with the entire economic growth and habitational systems of humans, that it is impossible to advocate the death of it.

There are greater implications with this project. A measure of the efforts involved would find enormous amounts of human and financial resources going into the study of what amounts to be a very small fraction of space on this planet. I would ask of what use is the study of micro-environmental consequences when other factors are at work which could destroy the entire planet as we know it? Yet these macro-factors

are not given problem solving resources in proportion to their severity.

Micro-environmentalism is good if practiced universally. The Brundtland Report has even stated that the culmutative effects of every small scale project which respects the environment will help solve macro-environmental problems. But, many areas on this planet do not have the resources to solve local problems. This is where rich countries should divert some of their resources. If this means slightly reducing the quality of our projects, well so be it. For example, after plans were complete for the Banff highway project and cost estimates were established, a percentage of this cost could be skimmed off of the budget and diverted to a 3rd world habitat improvement scheme. This money could then be administered using the expertise developed over time by Parks Canada. Maybe this would mean having only 7 underpasses instead of 8, but, the \$250,000.00 saved could be used to a greater value in a poor nation if the money was administered properly. This could be a possible method how Parks Canada could contribute to macro-environmentalism.

Common concensus is very difficult to achieve in the human population. Natural concepts of competition are very difficult to overcome. Global degradation must be seen as a common enemy. The current AIDS 'epidemic' is an excellent example of how something can unify humans to form a common objective. The cure and eventual eradication of the

disease benefits all people. The main difference between AIDS and global degradation is not the eventual death of its victim, but the speed at which the death occurs.

Humans are reactionary operating on short term, selfish goals. Since global degradation is a slow process, humans leave the problem to future generations. It is true that small steps are being taken to cure some of the ills of this planet, but, the problem with this approach is that once the disease has gone too far, there is no turning back. We deal today in the death of cells of this planet. Love Canal, Chernobyl, and yes even highway corridors are non lethal deaths to the body as a whole. They can be overcome by remedial means. But time will continue to kill cells of this planet. Too many cell deaths could become lethal. It is when organs such as the ozone layer, tropical rain forests, and air and water die that real concern will be shown. Future generations shall heap scorn on the peoples of today because of our lack of foresight for their needs and desires.

We all suffer from the so called "prisoner's dilemma" mentality. If all people would practice environmentally moral habits, then one person deviating wouldn't make that much of a difference. Likewise, if only one person practices environmentally ethical practices, then it hardly makes a difference in the destruction done by others. The problem deals with the individual mentality exhibited by all species, including human, on this planet.

The scenario would be different if humans were on the same level as aphids. Aphids, with their limited mentality, cannot really be blamed for following instinctive habits which are environmentally destructive. But humans are quite able to think out the consequences of their actions, yet they continue in practices they know are environment 'unfriendly'. It is interesting that some talk of creating stations in outer space, or finding planets with habitats like earth. Perhaps the efforts would be better spent if we concentrated on preserving what we have here now. Only time will tell if success will be achieved.

The outlook is not good.

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Appendix

Appendix 1 - Recommendations made by the Federal Environmental
Assessment and Review Office; Phases 1 and 2.

Federal Environmental Assessment and Review Office

Banff Highway Project Recommendations; Km 0 - 13(Phase 1)

- 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.

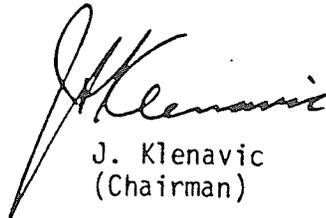
(7) That special efforts be made by all parties to ensure effective communications in order to allow the project to be designed and constructed in an environmentally acceptable and aesthetically pleasing manner.

(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

Federal Environmental Assessment and Review Office
Banff Highway Project Recommendations; Km 13 - 27(Phase 2)

4.1 THE PANEL RECOMMENDS THAT:

- 1) Construction between km 13 and km 23 be allowed subject to the following conditions which are required to make the project environmentally acceptable:
 - (i) fencing along both sides of the highway, together with one-way gates and properly located and designed over and underpasses be incorporated in the project so as to reduce road kills, improve public safety and facilitate animal movements between the valley floor and the slopes to the north;
 - (ii) further study be carried out to evolve the best design for the termination of fencing;
 - (iii) where a concrete median barrier is constructed, a reasonable number and size of openings be provided to assist small animal passage across the highway;
 - (iv) reclamation of disturbed areas be carefully investigated and appropriate mitigation measures be incorporated into designs before they are finalised;
 - (v) special attention be given to the slopes above the Vermilion Lakes by (a) carrying out detailed investigation of seepage areas to identify potential erosion zones and design appropriate mitigation measures, (b) minimizing the potential loss of Douglas fir stands (c) making every effort to revegetate and (d) using retaining walls, if appropriate;
 - (vi) the best state-of-the-art techniques should be utilized for revegetation;
 - (vii) certain additional measures to minimize impact on the montane zone be investigated before the alignment of the highway is finalised. These include further investigation of the feasibility of retaining walls to reduce encroachment in the Vermilion Lakes area and the possibility of putting the additional lanes on the north side of the existing highway to avoid the wetlands between Forty Mile Creek and the Norquay interchange;
 - (viii) plans be made to identify and avoid or salvage any rare or endangered species along the right of way;
 - (ix) the proponent carefully apply the mitigation measures identified in the EIS to all water bodies crossed by the TCH and, in consultation with Parks Canada, develop an appropriate design to protect the fish in the two unnamed creeks at km 16.5 and km 17;
 - (x) monitoring and evaluation of the effectiveness of Phase I mitigation measures be initiated as soon as possible by Parks Canada and changes indicated be incorporated in Phase II where possible;
 - (xi) a formal evaluation of the mitigation measures, using the results of monitoring, be prepared to assess their effectiveness and identify any improvements necessary to remedy problems noted;
 - (xii) annual reports be prepared during construction, and include information on the manner in which the Panel recommendations and the proponent's commitments are being implemented;
 - (xiii) the overall responsibility for monitoring and evaluation rest with Parks Canada;
 - (xiv) Public Works be responsible for the redesign, costs and construction of changes to any mitigation measures found necessary as a result of monitoring or evaluation;
 - (xv) a Committee structure similar to that used in Phase I be continued for Phase II. The Committees should have the same responsibilities as those recommended in the Phase I report (Appendix B). In addition, the Senior Committee should be responsible for ensuring that evaluation and annual reports are prepared and made public for all works under way on the TCH;
 - (xvi) the role of the Environmental Coordinator be continued during Phase II and if construction is significantly accelerated consideration be given to increasing resources assigned;
 - (xvii) the contractor briefing practices implemented for Phase I be continued.
- 2) In connection with the construction between km 13 and km 23:
 - (i) the exact transition section between four lanes and two lanes be determined in accordance with good engineering practices and the requirements of Park preservation;
 - (ii) the construction period be shortened to reduce disruption in the Park, provided environmental protection scheduling requirements are respected;
 - (iii) resources for the monitoring and evaluation be regarded as an integral part of the project cost.

- 3) A decision on twinning of the TCH between km 23 and km 27 be postponed until Parks Canada and Public Works have resolved:
- (i) that a satisfactory evaluation has been carried out of the effectiveness of the Bow Valley Parkway to relieve congestion on the TCH;
 - (ii) whether the proposed modifications of this section of highway are compatible with overall highway requirements in the Park and in particular the relative priorities and benefits of any improvements that are determined as necessary to the remaining sections of the TCH in Banff National Park.

Should the km 23 to km 27 stage eventually proceed, similar conditions to those established for the km 13 to km 23 stage should apply to make this part of the project environmentally acceptable.

4.2 IT IS FURTHER RECOMMENDED THAT:

- 1) Public Works and Parks Canada work closely together on studies of optimal transportation solutions to possible future TCH congestion problems;
- 2) Transport Canada undertake such studies as are necessary to provide advice on various transportation options through the Rocky Mountains, in order that Parks Canada, Public Works and others are aware of possible future highway or other transportation demands on National Park lands;
- 3) Parks Canada identify potential resource management constraints related to transportation demands so that these can be taken into account in the development of interprovincial transportation routes and future Park policy;
- 4) an interdepartmental committee consisting of Transport Canada, Public Works and Parks Canada be established to coordinate the study of transportation matters involving the Mountain Parks;
- 5) that measures be taken to prevent wildlife/vehicle accidents in the vicinity of km 26 near Healy Creek;
- 6) in the event that the Healy Creek borrow pits are used, further investigation prior to construction be carried out to develop a plan for eventual improved utilisation of this area by ungulates;
- 7) that an overall management plan for large animals in the Park be developed to take into account the incremental effects of this project on habitat and movements, and of past and future projects which have affected or may affect the species concerned. Habitat modification would be a component of this plan;
- 8) that Parks Canada continue to actively promote the use of public transportation for visitors both to and from, and within the Park;
- 9) that further research be conducted on wildlife kill mitigation measures;
- 10) that model testing be conducted of the proposed Minnewanka interchange and the design adjusted if necessary to ensure a minimum of snow clearance problems.