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# **NATIONAL HIGHWAY POLICY FOR CANADA**

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## **Steering Committee Report on Phase 1**

**prepared for the  
Council of Ministers Responsible for Transportation and Highway Safety, 1988**

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**This report was prepared by the National Highway Policy Steering Committee for submission to the Council of Ministers Responsible for Transportation and Highway Safety. It is reprinted and published by the Roads and Transportation Association of Canada, 1765 St. Laurent Blvd., Ottawa, Canada (1988).**

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# INTRODUCTION

## THE CONTEXT FOR A NATIONAL HIGHWAY POLICY

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In the past several years, growing recognition of the importance of highway transportation to the Canadian economy has been linked with serious concern for the preservation of the Canadian highway infrastructure. Economic development in the traditional centres of Canadian manufacturing as well as the resurgence of more peripheral resource-based economies have begun to move highway transportation problems to a national level.

The growing demand for transportation service, such as the high degree of mobility among all age groups in Canadian society; changes in traditional methods of goods movement to shipping styles that lessen the impact of inflation/recession cycles; modal shifts in the transport of goods, especially of higher value commodities; has resulted in a new perception of highway transportation in Canada. While a growing economy was a welcome sign, increased demand for highway use led to concern for the preservation of Canada's primary highway system. Heightened awareness of highway problems followed, especially when high levels of demand for highway transportation were reflected by congestion in and around metropolitan areas. This awareness was further aggravated by the public recognition of accelerated deterioration of highways and bridges on highly travelled routes.

But many jurisdictions' abilities to maintain and improve the highway system were slowly being compromised by growing demands on the public purse, by changing priorities in public policy to areas other than transportation, and by increased concern with budget deficits. Although efforts were undertaken nationally to ease the burden of regulation on highway transportation without compromising highway safety or transportation costs, equally serious efforts for promoting new economic development while preserving and improving our highway and bridge infrastructure were more difficult to address from a national perspective.

Consequently a number of national and regional industry task forces, highway user groups and government officials at all levels became more active in expressing their concern for preserving Canada's highway infrastructure. These groups made their views known to the RTAC Board of Directors through a number of regional meetings and symposia on the topic of highway transportation. The RTAC Board of Directors, recognizing the need for a national effort to address the problems of maintaining and improving a safe and efficient highway transportation network for all Canadians, raised the matter to the Council of Ministers Responsible for Transportation and Highway Safety. This Council agreed to sponsor a study aimed at the development of a national highways policy for Canada.

# **THE NATIONAL HIGHWAY POLICY STUDY — PHASE I**

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## **Background and Study Tasks**

At a western regional symposium on highway transportation held in Edmonton in the spring of 1987, a consensus emerged among participants representing all levels of government, private industry and academia regarding a pressing requirement for a highways policy that could effectively address highway transportation needs at a national level. This consensus was confirmed during an eastern regional symposium held in Quebec City in early 1988.

The consensus was raised to the RTAC Board of Directors, which, acting as a national forum for highway transportation needs and issues, resolved to:

**recommend that the provinces and territories request that the Government of Canada join them in examining the establishment of a national highways policy for a designated national highway network, incorporating foreseen needs and long-term funding alternatives, and, that this matter be brought to the attention of the Council of Ministers Responsible for Transportation and Highway Safety. (June 1987)**

At its next meeting in September of 1987, the Council of Ministers Responsible for Transportation and Highway Safety reviewed this resolution and agreed to work together in defining a national highways policy study which could,

- **establish future needs and define standards for the Canadian primary highway system**
- **establish the benefits and costs of meeting those needs**
- **establish funding alternatives for meeting those costs with a view towards recommending adoption of this policy by their governments.**

In support of this agreement a proposal for a National Highways Policy Study was prepared by the RTAC Secretariat. The proposal suggested a four phased approach to the study. Phase I work was to identify a national highways system, develop minimum design and operational standards and inventory the nature and condition of this system. Phase II work proposed to examine funding requirements and assess economic benefits of an improved system. Phase III work was to examine practical means of securing funds necessary to support the national highways system and Phase IV proposed to integrate all the previous work into the development of options for a national highways policy. This proposal was reviewed by the Council of Ministers in February, 1988 and approval and funding were granted to begin Phase I work immediately.

Subsequently a steering committee was formed, composed of representatives of each provincial and territorial transportation department as well as a federal representative from Transport Canada. In April 1988, this committee began work on the five specific tasks that constituted Phase I work. These tasks were:

- 1.1 Establish criteria to define a national system of highways.**
- 1.2 Apply these criteria in identifying and adopting a national highways system.**

- 1.3 Establish minimum design and operational standards for the system.
- 1.4 Inventory the nature and condition of the identified system of highways.
- 1.5 Prepare terms of reference for remaining phases of the study.

All of these tasks were completed in late September, 1988. The following report documents the results of Phase I of the study.

### **Task 1.1: Establish Criteria to Define a National Highways System**

The first task achieved consensus on criteria for identifying highways of national significance that could be applied to the highway systems in each region regardless of specific population size and density or geographic features. Specifically, the criteria adopted to identify a national system of highways are:

- A national highway is any existing, primary route that provides for the interprovincial movement of people and goods by connecting as directly as possible a major provincial population/commercial centre in Canada with
  - another major provincial population/commercial centre
  - another major population/commercial centre in an adjacent province or territory
  - a major port of exit/entry to the USA
  - another transportation mode directly served by the highway mode (eg. ferry terminal)

In addition, other primary routes to recreation or resource areas could be added to the system in future.

These criteria were used to identify a network of interprovincial highways with links to major U.S. highways that would provide for the safe and efficient movement of people and goods from region to region in Canada.

### **Task 1.2: Identify the National Highway System**

The criteria were used to identify a national system of 24,459 highway kilometers in length. This system, represents approximately 16% of the freeway, arterial and collector highway infrastructure under direct provincial or federal jurisdiction. When local and municipal roads are considered, the identified system encompasses less than 3% of total road length in Canada. The national system includes 3,534 bridges.

This system is illustrated in the accompanying map.

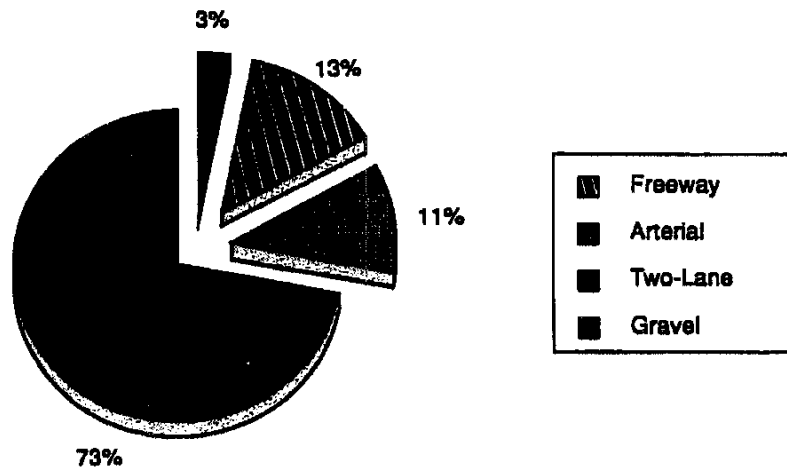
Several highways of local, regional, or in some cases, provincial and territorial importance are excluded from the system. However, these routes were not considered of national significance according to the criteria when they did not form a primary interprovincial or international link or they did not directly link major population/ commercial centres in a province or territory. Additional routes, primarily those serving recreational areas or resource development areas could be added to the system in future work.

Distances within each provincial jurisdiction, including those lengths which are under direct federal jurisdiction in that province (229 km in National Parks excluding Northern territorial roads) are presented in Table 1. The table includes the length of the national highway system and the percentage of the system by jurisdiction as well as the Trans Canada Highway length encompassed in the system and an estimation of the total population resident in that jurisdiction.

**Table 1 — Task 1.2: Distances of the National Primary Highway System by Jurisdiction**

Province/ Territory	National System, including national parks - km	% of system	Trans Canada length including national parks - km	Population x 000
B.C.	5,503	22.5	985	2,889
Yukon	1,145	4.7	—	24
NWT	562	2.3	—	52
Alberta	3,580	14.6	579	2,375
Sask.	2,114	8.7	650	1,010
Manitoba	861	3.5	498	1,071
Ontario	4,928	20.0	1,909	9,114
Quebec	2,869	11.7	600	6,540
N.B.	961	4.0	620	710
Nova Scotia	916	3.8	445	873
P.E.I.	116	0.5	115	127
Nfld & Labrador	904	3.7	904	568
<b>Total</b>	<b>24,459</b>	<b>100</b>	<b>7,305</b>	<b>25,354</b>

This national highway system can be classified into 3,317 km (13.5%) of freeways, 2,733 km (11%) of multi-lane arterials, 17,722 km (73%) of two lane paved highways and 587 km (2.5%) of two lane gravel highways. In total this classification results in 33,169 km of two lane equivalent length. The identified national highway system serves to connect all capital cities, all major population/commercial centres, important ferry terminals and major access points to the U.S.A.



**Figure 1 — Classification**



### **Task 1.3: Minimum Design and Operational Standards**

Recognizing that some standards should be viewed as goals for development of the system over time, consensus was achieved on design and operational standards that should be respected on the national highway system. While each highway jurisdiction in Canada has specific standards for highway design, construction and maintenance, a minimum geometric design standard and several measures of operational efficiency that could be applied to the national system were recognized.

A modest, minimum, geometric design standard was adopted. Taken from the *RTAC Geometric Design Guide* for rural arterial highways:

- **Geometric Design Standard:**  
two lane rural arterial undivided (with full shoulders) and a minimum of 0.8 m paved shoulder and a 100 km/h design speed. (RAU 100)

The committee agreed that in later policy development work (Phase III) a maximum geometric design should be used as a funding cap to preserve equity. A four lane rural divided arterial highway with a 130 km/h design speed was adopted for this purpose, recognizing that this design standard is already exceeded on sections of the national highway system.

Three measures of highway operations were added to the geometric design standard. These measures serve as minimum serviceability, riding quality and structural adequacy standards. The following three measures encompass local practices and are considered appropriate as minimum desirable characteristics for a safe and efficient national highway system:

- **Serviceability:**  
The highway should provide a minimum operating speed of 90 km/h.
- **Structural Adequacy:**  
The highway should be capable of providing all weather service (no seasonal load restrictions) and should be capable of carrying the national standards for vehicle weights and dimensions.
- **Rideability:**  
The highway should provide a riding comfort index (RCI) of 6.0 or greater or the equivalent rating with other measurement systems.

The minimum design and three operational standards were applied to the identified national highway system to assess current deficiencies and to identify a level of national needs that would form the basis of a costing exercise proposed under Phase II work.

### Task 1.4: Nature and Condition of the Highway System

This task had the objective of assessing and describing the existing condition of the identified highway system on a national basis. To do this, two surveys were developed and administered in all highway jurisdictions. The initial survey described and documented the nature of the system and the latter survey attempted to describe current deficiencies on the system. In this second survey, maps of each jurisdiction were used to identify specific sections of highway deficiencies and to overcome problems of overlapping deficiencies and double counting.

The results of both surveys were then aggregated for a national perspective. By comparing the nature and condition of the existing system to the agreed minimum standards, all highway sections in the system were categorized as above or below particular standards.

#### Geometric Design Deficiencies

When aggregated, 7,993 km of two lane roads were identified as being below the minimum geometric design standard. This deficiency occurred largely in Eastern Canada, British Columbia and the Yukon. These geometric design deficiencies indicate that 33% of the system is below minimum design standard while 67% meets or exceeds the two-lane rural highway standard.

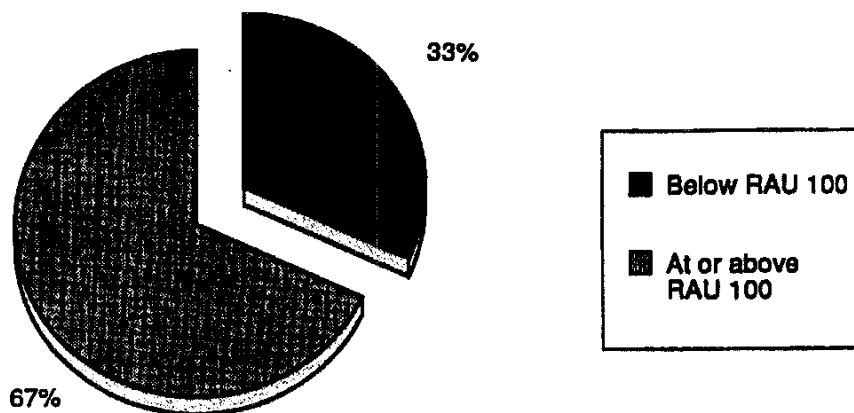


Figure 2 — Geometric Design Deficiencies

### Serviceability Deficiencies

Serviceability was considered deficient when the section of highway could not support a 90 km/h operating speed under normal conditions or, when sections of a highway were below the appropriate local standard used for most of the existing highway. For example, sections of a highway where posted speed was less than 90 km/h were automatically included as deficient. Sections of highway which linked two sections of highway at a higher design standard (eg. two lane section linking four lane sections) were also considered deficient when these sections were included in the jurisdiction's plan for highway improvements. When aggregated, 4,322 km were described as deficient in minimum serviceability. This length was almost evenly distributed among all highway jurisdictions. The survey concluded that nearly 18% of the national system is currently operating below the minimum serviceability standard.

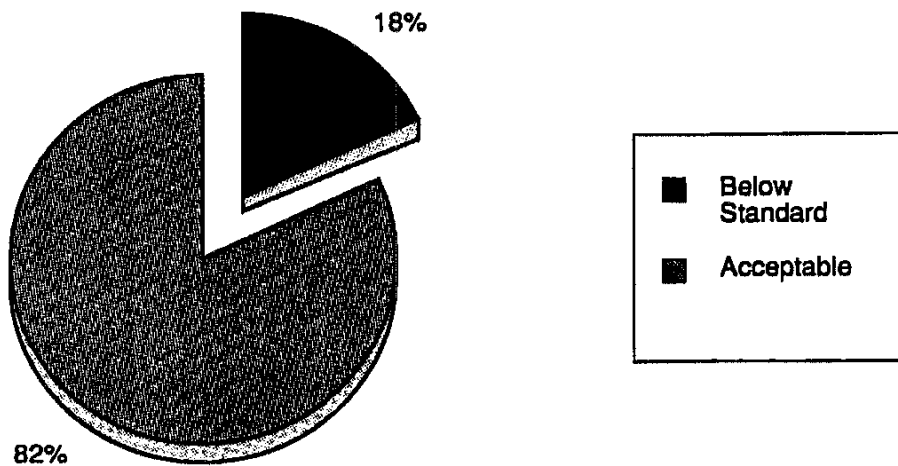


Figure 3 — Serviceability (< 90 km/h operating speed)

### Pavement Deficiencies

The committee surveyed deficiencies in riding comfort and current structural strength as well as rutting problems in those jurisdictions that routinely measure rutting condition (4 provinces). Using two lane equivalent lengths slightly more than 16% of the entire system can be classified as exhibiting below standard ride quality. Approximately 16% of the system is also constructed of pavements which are judged to be inadequate to carry loads at the agreed national standard. When aggregated to remove overlap in pavement deficiencies, the survey results indicate that 8,225 km of two lane equivalent length, or 26% of the entire system expressed in two lane equivalent lengths, is below minimum standard. Graphically, pavement deficiencies as measured by two lane equivalent lengths are presented in Figure 4.

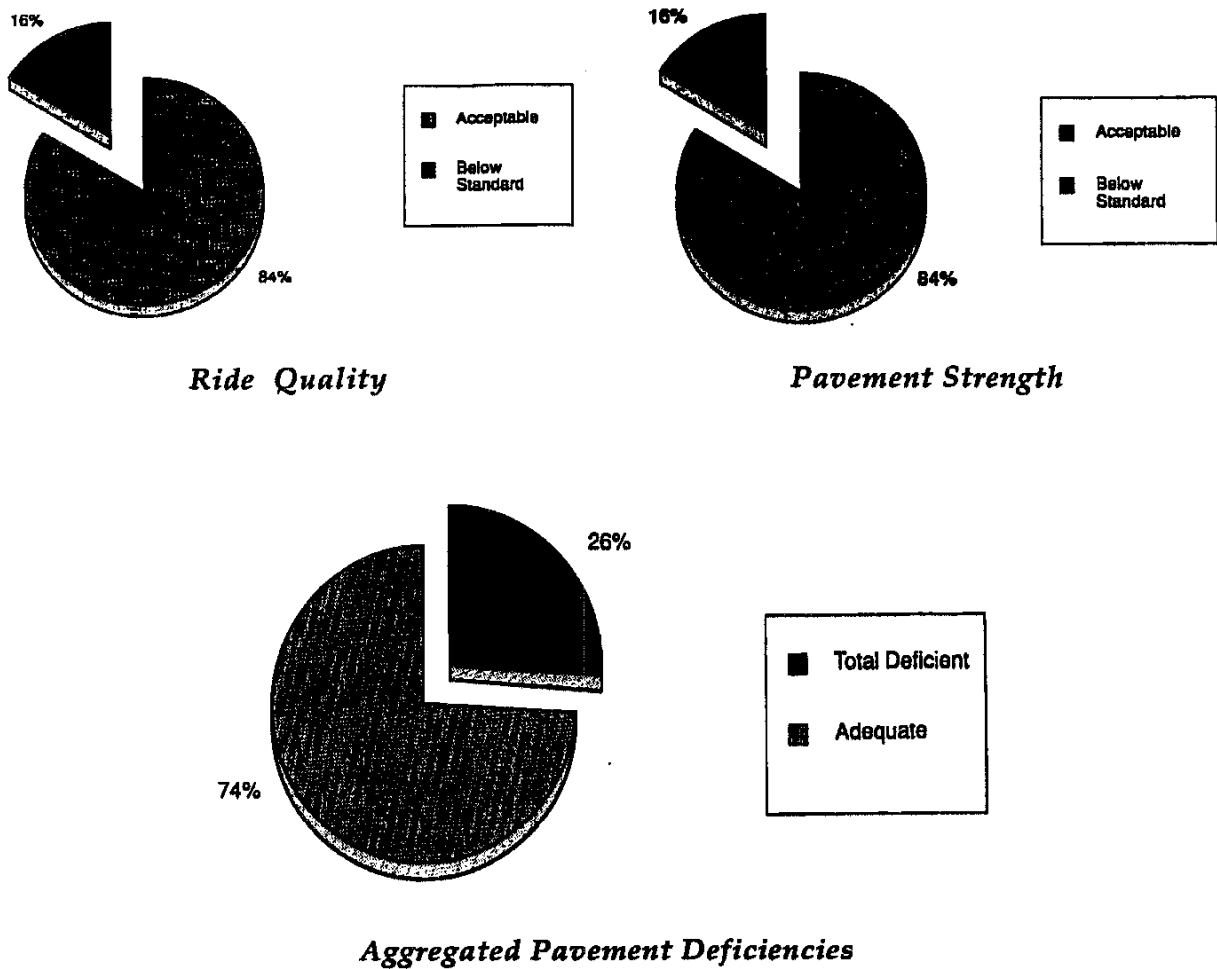


Figure 4 — Pavement Deficiencies

## SUMMARY OF HIGHWAY DEFICIENCIES

In aggregate, 26% of the system is below minimum pavement strength and ride comfort standard and 18% of the system is below a minimum serviceability standard. When combined with overlap and double counting deficiencies removed, approximately 38% of the system is below at least one minimum standard.

It should be pointed out that while these survey results can be used to express the amount of the system not currently meeting the minimum standards, highways actually deteriorate at different rates depending on environmental effects and traffic loadings as well as maintenance, rehabilitation and construction practices. Consequently, the results of this condition survey should be placed within the context of a dynamic system of highways where both restoration and deterioration are occurring.

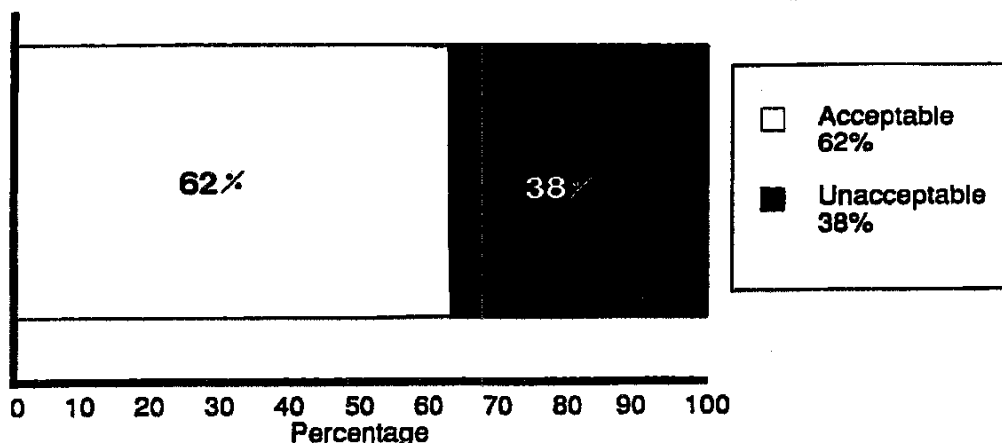


Figure 5 — Combined Serviceability and Pavement Deficiencies

### Bridges

A survey of bridge conditions and needs on the national system was conducted. A bridge was defined as a structure with a span of at least 4.5 metres. The survey identified 3,534 bridges on the highway system and while only 14 are currently posted to restrict national loading, currently 225 require special permits to carry the maximum national load. Additionally, 790 bridges require major rehabilitation or strengthening work within the next five years and are currently included in the highway jurisdiction's five year rehabilitation plan. 117 bridges are shown to have vertical clearance of less than 4.6 m. The results of the bridge survey are illustrated in Table 2.

Table 2 — Bridge Inventory

Total number of bridges	3,534
Bridges with posted load restrictions	14
Bridges requiring special permit	225
Bridges with vertical clearance deficiencies	117
Bridges requiring major strengthening or repair in next five years	790

## **CONCLUSIONS OF PHASE 1**

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Under Phase 1 of the national highway policy study, agreement was reached by all participating jurisdictions on several key issues. A set of criteria were developed and agreed upon for use in identifying elements of the Canadian highway system which are of significance in the national context. By employing these criteria, the current national highway system was identified and adopted. Guidelines were developed and standards agreed upon concerning minimum design, condition and serviceability which should be respected and achieved by a national highway system.

Having reached agreement on these issues, the nature and current condition of the highways forming the national highway system were documented and areas where deficiencies exist relative to the minimum standards were identified.

In keeping with the format for the proposed development of a National Highway Policy and in consideration of progress to date, general terms of reference for Phase 2 work were proposed to the Council of Ministers Responsible for Transportation and Highway Safety in late September, 1988. This Council approved the contents of the report on Phase 1 and agreed to undertake the Phase 2 work with an additional task of identifying resource routes in the national context.

## **REMAINING PHASES OF THE NATIONAL HIGHWAY POLICY STUDY**

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### **Phase 2 — Economic Evaluation of the Benefit and Costs of the National Highway System**

This phase has been proposed to document the costs (capital and maintenance) required to bring the identified system to the prescribed minimum design and operational standards. The costs of providing a four lane, continuous route across Canada will also be examined. Investigation of the benefits accruing to highway users and to the national economy resulting from a program aimed at improving and preserving the identified national highway system will be undertaken. This phase will attempt to place the costing requirements and benefits assessments within the context of highway related revenues and expenditures over the past five years. Finally a consultative mechanism with the Canadian highway users community concerning the national highway policy will be initiated. Work on these tasks is scheduled to begin in November, 1988.

### **Phase 3 — Funding Alternatives for the National Highway System**

This phase is proposed to examine the range of options available to secure the funding for the design, construction and maintenance of highway infrastructure in Canada. Work will be undertaken to identify, investigate and recommend those funding mechanisms which might have applicability in Canada. This Phase will seek approval to begin in 1989.

### **Phase 4 — Development of Options for a National Highway Policy**

This phase will assemble the findings of all preceding phases with a view to developing viable policy options which would provide the institutional support necessary for the National Highway System. It is estimated that this Phase could be completed in time for consideration by the Council of Ministers Responsible for Transportation and Highway Safety at their September 1990 meeting in St. John's, Newfoundland.

## APPENDIX

### Routes Identified for National Highway System by Jurisdiction

Jurisdiction	Highway Number	From	To
<b>Newfoundland - Labrador</b>	1	St. John's	Port-aux-Basques
<b>Nova Scotia</b>	104	New Brunswick border	Port Hawksbury
	104, 4	Port Hawksbury	Sydney
	125	Sydney	North Sydney
	102	Truro	Halifax-Dartmouth
	101	Halifax-Dartmouth	Yarmouth
<b>Prince Edward Island</b>	1	Borden	Wood Islands
<b>New Brunswick</b>	2	Nova Scotia border	Quebec border
	1	St. Stephen (US border)	Sussex
	7	Saint John	Fredericton
	16	Aulac (Hwy. 2)	Cape Tormentine
	15	Moncton	Port Elgin
	95	Woodstock	US border
<b>Quebec</b>	20	Ontario border	Riviere-du-Loup
	185	Riviere-du-Loup	New Brunswick border
	40	Ontario border	Quebec
	175	Quebec	Chicoutimi
	138	Quebec	Sept Isles
	73	Quebec	Charlesbourg
	15	US border	Ste. Agathe
	117	St. Agathe	Ontario border
	10	Montreal	Sherbrooke
	35	Autoroute 10	Iberville
	133	US border	Iberville
	25	Longueil (Hwy. 20)	Anjou (Hwy. 40)
	55,755,155	Trois Rivieres	Sherbrooke



<b>Ontario</b>	401	Quebec border	Windsor (US border)
	417	Quebec border	Ottawa
	17	Ottawa	Manitoba border
	402	London	Sarnia (US border)
	QEW	Toronto	Fort Erie (US border)
	400	Orillia	Toronto
	69	Sudbury	Orillia
	427	Toronto (Hwy. 401)	QEW
	11	North Bay	Nipigon
	71	Kenora	Fort Frances (US border)
	16	Ottawa	Prescott (US border)
	61	Thunder Bay	US border
	66	Quebec border	Kirkland Lake
	<b>Manitoba</b>	1	Ontario border
4		Portage-la-Prairie	Saskatchewan border
75		Winnipeg	Emerson (US border)
<b>Saskatchewan</b>	1	Manitoba border	Alberta border
	14	Manitoba border	Saskatoon
	5	Saskatoon	Alberta border
	7	Saskatoon	Alberta border
	11	Regina	Saskatoon
	6, 39	Regina	Estavan (US border)
<b>Alberta</b>	1	Saskatchewan border	British Columbia border
	16	Saskatchewan border	British Columbia border
	2	Edmonton	Fort Macleod
	3	Medicine Hat	British Columbia border
	4	Lethbridge	US border
	9	Calgary	Saskatchewan border
	43	near Edmonton (Hwy. 16)	Valleyview
	34, 2	Valleyview	British Columbia border
	34, 2, 35	Valleyview	Northwest Territories border

<b>British Columbia</b>	1	Alberta border	Victoria
	3	Alberta border	Hope
	5	Tete Jaune Cache	Hope
	16	Alberta border	Prince Rupert
	97	Cache Creek	Yukon border
	99	Vancouver	US border
	Carcross Road	Yukon border	Alaska border (to Whitehorse)
<b>Yukon</b>	1	British Columbia border	Alaska border
	5	Whitehorse	Alaska border (through B.C.)
<b>Northwest Territories</b>	2	Alberta border	Hay River
	3	Enterprise	Yellowknife