

**NATIONAL HIGHWAY POLICY STUDY FOR CANADA
STEERING COMMITTEE REPORT ON PHASE 3**

**Prepared for the
Council of Ministers Responsible for Transportation
and Highway Safety**

**Prepared by:
National Highway Policy Steering Committee
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1.0 INTRODUCTION

In all regions of Canada an extensive road and highway network has been developed over the years to meet growing demand for personal mobility and travel, tourism, and the movement of goods for trade, industry and commerce. But a fundamental concern for the long term viability of the highway network rests with the division of jurisdictional responsibility for highway transportation in Canada. The provincial and territorial jurisdictions with direct responsibility for the construction, maintenance and operation of the highway system must establish taxation and investment priorities consistent with the economic, social and development needs and objectives of their jurisdictions. In the absence of a sustained federal role in highway transportation investment, an effective mechanism for identifying and addressing highway transportation needs at a national level is a pressing requirement in Canada. In response to this requirement, the Council of Ministers Responsible for Transportation and Highway Safety agreed to create and sponsor a National Highway Policy Study for Canada in September, 1987. The goals established for this study by the Council of Ministers were to:

- Identify future needs and define standards for the Canadian primary highway system
- Establish the benefits and costs of meeting these needs
- Establish funding alternatives for meeting those costs with a view towards recommending adoption of a national policy by their governments

To meet these goals a multi-phased study was proposed and representatives of the provincial, territorial and federal transportation ministries were appointed to a steering committee charged with carrying out the study.

The first phase of the study, completed in 1988, was used to develop broad highway policy objectives, to identify a national highway network, to establish design and operation standards for these highways and to inventory the nature and condition of the identified network.

The second phase of the study, which was completed in 1989, assessed the costs of achieving the established highway design and operational standards. These costs were placed within a framework of highway users benefits and the wider economic, social and environmental impacts anticipated from an improved national highway system. As well, these costs and benefits were placed within the context of existing highway revenues and expenditures.

Phase three work, which is recently completed, was used to initiate sectoral consultation on the early results of the study and to review some other countries' experience in the provision of highways with particular reference to national highway systems.

A summary of the results of Phases 1, 2 and 3 tasks are reported here. Complete reports of each task are available from the Roads and Transportation Association of Canada.

2.0 PHASE 1

In September, 1988 the first phase of the National Highway Policy Study for Canada concluded with a report to the Council of Ministers Responsible for Transportation and Highway Safety which contained broad highway policy objectives, criteria to select the national highway system in Canada, identification and description of the national highway system, highway design and operational standards for this system, and an assessment of the system's nature and current condition. The identification of primary resource and recreation highways which connect to the national system in each jurisdiction was subsequently developed to complete Phase 1 of the study.

2.1 Policy Objectives

Six broad objectives were established for a national highway policy in Canada through the first phase of the study. These policy objectives were:

- **To ensure that all regions of Canada are provided with adequate and required levels of service, safety and efficiency in highway transportation**
- **To provide proper and necessary emphasis and predictable support by levels of government to the national highway network**
- **To serve and enhance interprovincial and international trade, travel and industry and promote Canadian competitiveness**
- **To bring cohesiveness and uniformity of standards to the major highway transportation linkages of national significance**
- **To meet growing regional transportation needs and address deteriorating highway conditions through sustained improvement programs**
- **To preserve and protect the substantial capital already invested by Canadians in what constitutes the backbone of the Canadian highway system.**

2.2 National Highway System Identification

For the purposes of the National Highway Policy Study, the criteria adopted to select the national highway network are:

- **A national highway is any existing, primary route that provides for interprovincial and international trade and travel by connecting as directly as possible a capital city or major provincial population and commercial centre in Canada with**
 - **another capital city or major population and commercial centre**
 - **a major port of entry or exit to the USA highway network**
 - **another transportation mode served directly by the highway mode**

Application of the criteria identified a national highway system of 24,449 km in length, representing slightly less than 3% of Canada's existing total road and highway inventory.

In addition to the national highway system, each jurisdiction identified a primary route that currently serves resource or recreation purposes. While these routes are not included in the national highway system at present they constitute regionally important routes that should serve as prime candidates for consideration in the event of expansion of the national system. Taken together, these resource and recreation routes constitute approximately 7,700 km in length.

2.3 Design and Operational Standards

Four minimum design and operational standards and a maximum design standard to serve as a funding cap on any subsequent cost-sharing arrangements were established in the first phase of the study. The existing highway conditions were then compared against the four minimum and modest standards to indicate current deficiencies on the national highway system. The accepted minimum standards and the existing highway conditions associated with these are:

Geometric Design.

As a minimum, the highway should have a design standard of two-lane, arterial, undivided with full shoulders (0.8 m paved shoulder and a 100 km/hr design speed minimum).

An astonishing 33% of the entire national highway network falls below this minimum standard.

Serviceability (Capacity).

The highway should be capable of providing an operating speed of 90 km/hr.

Based on a ten year projection of traffic, approximately 18% of the system cannot meet this standard. Because most of these deficient sections cannot meet the serviceability standard for existing traffic conditions, ten year projections of traffic only magnify the deficiency.

Structural Adequacy (Strength).

The highway should be capable of providing all weather service (no seasonal load restrictions) and be capable of carrying the national standards for vehicle weights and dimensions.

Taken together, 16% of the national highway network was judged incapable of meeting this standard. In addition, 22% of all bridges with a span of at least 4.5 m require structural rehabilitation within five years.

Rideability (Comfort).

The highway should provide a riding comfort index (RCI) of 6.0 or greater or the equivalent rating using other measurement systems.

Again, 16% of the national network failed to satisfy this riding comfort standard.

To preserve some measure of regional equity, a maximum geometric design standard was adopted, recognizing that this standard is exceeded on sections of the national system to meet pressing local requirements. This maximum is adopted to serve as a funding cap, not a limit for design.

Geometric Design Maximum Cap.

Four lane rural divided arterial with full access control and a design speed of 130 km/hr.

2.4 Nature and Conditions of the National Highway System

With 33% of the national highway system below the minimum geometric design standard, 18% below the minimum serviceability requirement and a combined 26% below either minimum pavement strength and/or ride comfort index, the current condition of the national highway network was identified as a serious concern. When combined, 38% of the national highway system or approximately 6,900 km were discovered to be inadequate against the minimum standards. Added to this was the 22% of bridges on the national system requiring rehabilitation work within five years. Because highways deteriorate at different rates depending on materials, maintenance, rehabilitation and construction practices, environmental conditions and traffic loadings, these highway deficiency results are indicative rather than definitive of the existing condition of the national highway system. Nevertheless, the deficiency survey indicates the serious nature of the needs on the national highway system in Canada.

These deficiencies are dispersed over a national highway system comprised of approximately 17,700 km of two lane paved highways (73%), 3,300 km of multi-lane, access-controlled freeways (14%), 2,700 km of multi-lane paved arterials (11%), and 580 km of two lane gravel highways (2%).

The national highway system represents less than 3% of the length of all roads and highways in Canada but carries approximately 26% of all vehicle-km of travel. In 1986 annual travel on the national highway system amounted to approximately 48.5 billion vehicle - kilometres, representing the lion's share of intercity and international vehicle movements in Canada.

3.0 PHASE 2

The results of the first phase of the study were extended in the second phase by examining the capital costs required to bring the national highway system to the accepted design and operational standards. These costs were then placed in a wider context of highway user benefits, economic and environmental impacts and existing road-related revenues and expenditures.

3.1 Capital Costs of National Highway Improvements

The capital costs of bringing all the deficiencies on the national highway system to the minimum design and operational standards were estimated at \$12.7 billion (1989\$). Of this total cost, approximately \$4.8 billion (38%) is required for twinning existing highways or constructing new four lane facilities, nearly \$3.2 billion (25%) is needed for reconstruction and resurfacing work, approximately \$1.4 billion (11%) is to address bridge construction or rehabilitation, \$1.3 billion (10%) is required for new construction of two lane highway bypasses, and \$2.0 billion (16%) is required for interchange construction.

In an extended cost analysis, it was estimated that after completing this remedial work on the national highway system, an additional \$4.8 billion would be required to complete a continuous, cross-Canada, four lane route following the existing TransCanada highway route wherever possible. Important improvements to the existing TransCanada Highway in Northern Ontario and the construction of a new freeway around heavily congested Montreal are major elements of this extended cost analysis. The remaining estimates of the extended cost analysis represent an effort to answer questions concerning the costs of constructing a four lane, cross-Canada facility even where this facility would exceed traffic requirements.

3.2 Benefits and Impacts

The present value (1989\$) of highway users benefits resulting from a program of national highway system improvements was estimated to range between \$10 billion and \$17 billion using a twenty-five year highway planning framework. The completion of a four-lane cross Canada route would add an estimated \$561 million to \$963 million to this benefit total. User benefits calculated total vehicle operating cost savings, travel time savings, and accident reductions including the possible reduction of 160 fatal traffic accidents annually, resulting from the implementation of the capital improvements on the national highway system.

Wider economic impacts were assessed through simulating the effects of increased demand for highway construction and introducing the effects of user benefits to the simulation. While sensitive to financing assumptions, the simulation indicated that the Canadian economy is slightly enlarged during the highway construction period with little effect on per capita incomes of Canadians. Employment gains in the highway construction and related sectors of the economy are significant. The highway transportation sector realizes productivity gains and, when combined with improved market accessibility in both north-south and east-west directions, trade competitiveness is improved. Of particular significance to the restoration or replacement of a maturing highway system, public investment in infrastructure can contribute to private productivity and greater economic growth. Additionally, the capital improvements, estimated to cost \$12.7 billion, can provide all jurisdictions with sufficient multi-year program flexibility so as to result in modest demands on Canadian economies.

Natural and social environmental impacts of a program of national highway improvements were examined at a macro level. It was determined at this level of environmental analysis that the impact of a national highway improvement program on the natural and social environment during the construction stages could be minimized with proper planning and management. New construction projects in wetlands and other sensitive environments or on productive farmlands could represent a concern for the program. Project-specific environmental investigations at later stages of the program are recommended for these situations.

3.3 Revenues and Expenditures

To place the capital costs of highway system improvements, the user benefits and the wider impacts resulting from these highway improvements in the context of current Canadian levels of effort in the construction and maintenance of roads and highways, the second phase of the study examined road revenues and expenditures for a five year period (1983 - 1988).

Expenditures for road construction, maintenance and operations including road-specific transfer payments to junior levels of government, amounted to \$24.4 billion for the 1983-1988 period. The provincial and territorial share of these expenditures was approximately \$23.2 billion (95%) while the federal share, comprised of direct expenditures on federal jurisdiction roads and provincial, road-specific transfer payments was approximately \$1.2 billion (5%).

Of this total road expenditure, annual expenditures by all levels of government on the national highway system amounted to \$946 million. This annual expenditure on the national highway system was comprised of approximately \$668 million for construction and major rehabilitation or reconstruction projects and \$278 million for routine maintenance. Because the capital costs of the proposed national highway improvements were estimated at \$1.27 billion annually, over a ten year period, a doubling of the current level of construction and rehabilitation effort on the national highway system is required to meet the national standards.

For the 1983-1988 period, tax revenues derived from road use fuel taxes, license, permits and registration fees, and toll highway revenues were examined. From all these sources, revenues amounted to \$33.3 billion over the five years. Nearly 83% of this total was derived from road use fuel taxes. Provincial government revenues derived from fuel taxes remained relatively constant over the survey period despite the introduction of fuel taxes in Alberta and Saskatchewan in the last year of the survey. For example, in 1983 provincial fuel tax revenues were \$3.1 billion, in 1988 provincial fuel tax revenues were \$3.6 billion. Federal government revenues derived from sales and excise taxes on road use fuel consumption doubled over the survey period from \$1.5 billion in 1983 to \$3.2 billion in 1988.

4.0 PHASE 3 RESULTS

The third phase of the national highway policy concentrated on two tasks. A consultation process with a wide base of Canadian public and private sectors was initiated to focus on the results of Phase 1 and 2 of the study. In addition, a report on the experience and practice of Canada and selected other countries in funding highway infrastructure with particular reference to national highway systems was commissioned.

4.1 Sectoral Consultation

In January of 1990, the Phase 2 Report of the National Highway Policy Study for Canada was released. A letter requesting sectoral comment from approximately forty industry or national and regional association representatives accompanied the report. Twenty-five responses with substantive comment have been received. In addition, several associations have responded with copies of policy positions respecting a national highway system.

Although the letter requesting comments was open in nature, four categorical areas for comment were suggested by the National Highway Policy Study Steering Committee. These categories dealt with:

- the importance of highway transportation to the industry sector and the degree to which an improved national highway system would affect this sector,
- the extent to which the industry sector was affected by the costs of transportation,
- the methods of financing which should be considered for undertaking a program of national highway improvements, and
- the validity and relevance of the estimated user benefits and economic impacts attributable to the proposed improvement program.

Responses have been of two opinions. The majority have expressed support for the National Highway Policy Study and for a National Highway System in Canada. These comments suggest highway transportation costs and facilities are important not only to their sector but to all Canadians. Where these submissions addressed the four categorical questions, responses indicate support for those user-pay concepts which involve spending all revenues received from road users on roads, including federal government fuel revenues, then exploring further the dedication of user revenue to highway programs, and finally examining toll highway facilities. Specific interest groups recommend particular options or aspects for consideration such as the use of concrete pavement on national highways, paved shoulders for cyclists, removal of at-grade rail crossings, etc. User benefits and impacts of the program as outlined in the Phase 2 report are largely judged reasonable or understated.

A small number of responses, principally from the rail sector, suggest that a national highway policy study should not be performed in isolation of other modes because "highway policy is rail policy." Canadian National Railways response strongly suggested the National Highway Policy Study Report on Phase 2 is flawed in regards to its treatment of costs, revenues, benefits and impacts. The remaining responses in this group, while critical of the study, were most concerned

Table 1 – Comparative Results of Sectoral Consultation

| Sector | Importance of highway transportation to sector | Impact of highway transportation costs to sector | Suggested methods of financing | Accuracy of user benefits and impacts | Other comments/ suggestions |
|-------------------------------|---|--|--|--|---|
| Tourism | Very important to \$24 billion industry | High - fuel taxes discourage tourism | Fund from broader base than travelling public, since all Canadians benefit | Not stated | Support NHP initiative, all Canadians benefit from tourism, quality of highways important, taxes on users are already very high |
| Construction | Important to selected industries but not high importance | Low, except for transporting some construction materials | National dedicated fuel tax and trust fund | Understated, wider economic impacts should be highlighted | Federal government has responsibility for ensuring adequate road infrastructure, benefits to construction industry & to wider economy |
| Bus Industry (intensity) | Very important | Very high | Dedicated user fees and portion from general taxes | Bus industry costs are high and any benefits help | Reducing transportation costs for passengers will encourage bus travel |
| Transit (Urban) | Not stated | Not stated | Not stated | Not stated | Treat all modes and encourage public transportation investment for energy & environment reasons |
| Automobile Drivers | Very important | Travel costs are important | Spend all existing user revenues before broad, general taxes for additional revenues | Not stated, but safety of motorists important | Support initiative, stress multi-lane, freeway Trans Canada |
| Shippers | Very important | Very high | Trust fund of dedicated user fees | Not stated, any benefit is welcome | Strong Federal leadership required |
| Trucking Industry | Very important | Very important | Spend existing user revenues on highways | Not stated | Strong support, especially for four-lane Trans Canada. Where traffic justified, establish provincial priorities. OTA against federal involvement. |
| Rail | Competitive & important | More highways could deal rail a crippling blow | Comprehensive cost allocation - spend for best transportation value | Biased & inaccurate, energy costs not analysed, traffic costs not included | Compartmentalized approach flawed study, should include rail mode in transportation policy study, deal with rail/road diversion |
| Regional Chambers of Commerce | Very important in areas of the country with no alternatives | High transportation costs to regions | Trust funds of dedicated user fees and spend existing revenues on roads | Any reduction in costs is a benefit and employment impacts are welcomed | Transportation (road and rail) to regions crucial |
| Engineering Sectors | Only indirectly | Not impacted | User pay principles, perhaps dedicated, spend existing user revenues | Appropriate benefits, but U.S.-based shippers & carriers also benefit | Don't overstudy |
| Better Roads Coalitions | Very important to Canada | Varies from very high to very low | Spend existing user revenues | User benefits and impacts are already well-understood | Strong support, especially four-lane Trans Canada and removal of rail crossings at grade. |
| Cyclists | Recreational importance | Not stated | Not stated | Not stated | Consider cyclists in design of highways |

that a national transportation policy should be the object of study, not a national highway policy in exclusion from other modes. Responses from each sector are summarized in Table 1.

4.2 Multi-Country Review of Highway Policies

The purpose of the second task of Phase 3 was to prepare a report on the experience and practices of Canada and selected other countries in the construction, maintenance, operation and financing of highways with particular reference to national highway systems. The report was to serve as a background source for discussion of possible policy options that could be adopted in Canada. The countries reviewed included three economically developed countries whose three tier political structures of federal, state/provincial and municipal levels of government closely resemble Canada:

- USA
- **Federal Republic of Germany**
- **Commonwealth of Australia**

Passing comparison was made with several other economically developed countries whose political and administrative structures for dealing with highway transportation, unlike Canada, are dominated by the central government or corporations created by the central government. These countries included:

- France
- **Great Britain**
- Italy
- Spain

Information for this review was obtained through a general survey, correspondence and published sources. Principal results of this comparative review are presented here.

The relative importance of land transportation by both road and rail modes is presented in Table 2. The measure of ton/km used to describe freight transportation in Table 2 clearly overstates the value of bulk hauls over longer distances. This overvalue is particularly true in those countries of larger geographic size such as Canada, USA and Australia. Freight and passenger movement by air and marine modes is not examined here because complete data were unavailable and further comparison of modes exceeds the scope of the review. Nevertheless, Table 2 indicates that road and highway transportation plays a significant role in the movement of people and goods in every country. The modal comparison also serves to highlight the predominance of road transportation of passengers even in those European countries often assumed to be most dependent on rail services for passenger transport. It could be anticipated that all these countries would have policies in place which reflect the importance of highway transportation for freight and passenger movement.

To determine the extent of importance which highway transportation appears to play in all countries, the comparative size and annual level of expenditure on construction and maintenance of highway systems is examined in Table 3. As can be seen, for its large geographic size and smaller population, Canada has a reasonably large highway system which is supported by annual level of total expenditures second only to the USA. However, in expenditure per 1000 km of highways Canada fares more poorly, ahead of only France where toll concession companies dominate highway expenditures. The expenditure by toll concessionary companies have been excluded from the review of government expenditures. Canada's poorer showing is in part a result of large distances and small population. But what is particularly striking about Table 3 is the low level of expenditure on highways by Canada's central government when compared with all other countries reviewed. It appears that Canada's treatment of highway transportation differs significantly from other countries reviewed.

This annual expenditure comparison is restricted to national highway systems in Table 4. Although accurate estimates of expenditures on national highway systems alone were unavailable for Great Britain and Spain, the comparison with other countries shows Canada well behind both the USA and European countries but ahead of Australia. Comparatively, Canada's expenditures on the national highway system are lower than could be expected given our geographic size, distances between centres, the overall condition of the national system and the fact that the national highway system forms the backbone of Canada's highway network.

Table 2 – Annual Land Transportation Modal Comparisons (1988)

| | Freight million ton/km | | Passenger million passenger/km | |
|--------------------------------|---------------------------|------------------|-----------------------------------|---------------|
| | Road | Rail | Road | Rail |
| USA | 1,064,000 40% | 1,564,000 60% | 3,531,000 99% | 19,630 1% |
| Federal Republic of Germany | 153,500 72% | 60,000 28% | 571,600 93% | 42,100 7% |
| Australia | 74,000 48% | 79,480 52% | * 83% | * 4% |
| Canada | 72,000 21% | 272,000 79% | 250,000 99% | 2,100 1% |
| Italy | 150,648 89% | 18,274 11% | 506,443 92% | 43,849 8% |
| France | 137,600 73% | 50,700 27% | 597,000 89% | 73,000 11% |
| Spain | 124,241 90% | 14,466 10% | 168,390 91% | 15,779 9% |
| Great Britain | 113,300 87% | 17,300 13% | 493,500 93% | 39,000 7% |

* Australia: air and water transport make up remaining 13% of passenger transport

Table 3 – Highway System Length and Expenditures Comparison (1988)

| | Highway System Length km | Total Highway Expenditures ¹ Millions of Units of Account – SDR ² | | | Expenditure | | Expenditure per 1000 km highways |
|-----------------------------|--------------------------|--|-----------------|----------|-------------|------------|----------------------------------|
| | | Central | State/province | Total | as % of GNP | per capita | |
| USA | 1,350,967 | 9,672.2 31% | 21,304.3 69% | 30,976.5 | 0.7 | 90.07 | 16.27 |
| Canada | 275,271 | 154.0 6% | 2407.5 94% | 2561.5 | 0.9 | 98.5 | 9.3 |
| Federal Republic of Germany | 103,304 | 614.5 36% | 1443.5 64% | 2058.0 | 0.2 | 33.73 | 19.92 |
| Great Britain | 50,306 | 2024.3 100% | – | 2024.3 | 0.4 | 36.6 | 40.24 |
| Italy | 160,266 | 628.2* 34% | 1281.0 66% | 1963.2 | 0.4 | 34.2 | 12.25 |
| Spain | 150,837 | 1149.6 64% | 655.0 36% | 1804.6 | 0.8 | 46.3 | 11.96 |
| Australia | 121,600 | 795.0 49% | 833.5 51% | 1628.5 | 1.3 | 101.78 | 13.39 |
| France | 366,470 | 1006.1* 68% | 484.6 32% | 1490.7 | 0.2 | 26.6 | 4.07 |

1. Excludes municipal roads

2. SDR = International Monetary Fund Special Drawing Right; in 1988 1 SDR = \$1.60 Canadian

* Italy and France do not include toll concessionary expenditures as these are not government expenditures

Table 4 – Annual Capital and Maintenance Expenditures on National Highway Systems

| Country | Expenditures (millions SDR) | Length (km) | Expenditures/kilometre (thousands SDR) | Year |
|-----------|-----------------------------|-------------|--|------|
| USA | 14,380 | 70,926 | 203 | 1988 |
| Italy | 1,950 | 6,192 | 315 | 1987 |
| Germany | 1,272 | 8,600 | 148 | 1987 |
| France | 1,153 | 6,700 | 172 | 1988 |
| Canada | 796 | 24,449 | 33 | 1988 |
| Australia | 329 | 16,000 | 21 | 1985 |

Notes: France is expenditure by Concessionary Companies only; Italy is expenditures by Concessionary Company and central government; USA, Canada, Germany and Australia are expenditures by federal and state/provincial governments only. Spain and Great Britain unavailable.

SDR = Special Drawing Right of International Monetary Fund (1988, 1 SDR = \$1.60 C\$).

The tables and brief discussion have established that land transportation in general and highway transportation in particular plays a large role in all of the countries reviewed here. Canada's position in this international comparison suggest that although highway transportation is significant and our highway systems including the national highway system are comparable to other countries given our geographic size, Canada's expenditures on highways and the national highway system in particular are less than could be expected compared to all other countries. The explanation for this showing could be the result of policy and programs for highway transportation in this country or a result of diminished revenues with which to fund highways in comparison with other countries. Table 5 examines annual road revenues and the percentage of road revenues returned to roads.

Any review of road revenues is hindered by the range of taxes and treatments of government revenues derived from road use. While road related revenues are dominated by fuel taxes and license and registration fees in all countries, a variety of additional sources of road revenues are used in other countries ranging from large toll highways systems, vehicle ownership taxes, value-added taxes on all vehicles and equipment sales, insurance taxes, tire taxes, heavy vehicle taxes and so on. To simplify this, all revenues reported by a country as road-related were included in Table 5. In Canada these revenues include federal and provincial motive fuel taxes, vehicle registrations and license or permit fees and a limited number of toll highway revenues. To avoid currency fluctuation problems, all revenues and expenditures are again reported in Special Drawing Rights (SDR) used by the International Monetary Fund.

While generally indicative, Table 5 distorts several findings. For example, although Australia spends more on roads than it takes in from road users (124% of road revenues become road expenditures) as a country, the expenditure pattern is that the federal level of government spends only approximately 46% of road fuel revenues on roads. Consequently the level of expenditure by the Australian states is very high compared to the road revenues available to them. The revenues and expenditures for roads in the USA match so precisely (100% of road revenues are expended annually) largely because of the principles of dedicated user fees to road and highway programs. In the USA, these road revenues may be committed to highway programs in the year but actual

Table 5 - Annual Road Revenues and Annual Road Expenditures as a Percentage of Annual Road Revenues (1988)

| Country | Revenues per 1000 registered vehicles | Total road expenditures as a % of total road revenues |
|---------------|---------------------------------------|---|
| Great Britain | 1087.42 | 21% |
| Spain | 879.12 | 18% |
| Germany | 472.41 | 63% |
| Canada | 336.79 | 61% |
| USA | 261.11 | 100% |
| Australia | 244.63 | 124% |

In 1988 1 SDR = \$1.60 Canadian. France and Italy are not included because of the unavailability of precise toll revenues from concessionary companies.

expenditures can occur in the following year. In Canada the federal government spends approximately 8% of all federal motive fuel revenues on roads annually which suggests that the level of expenditure by many provinces as a percentage of road revenues is much greater than the 61% indicated in Table 5. France and Italy are not included in this table because of the unavailability of precise toll revenues from concessionary companies. In practice, after a small return to capital which varies annually, nearly 100% of revenues from tolls are invested in highway maintenance and construction by these concessionary companies.

Nevertheless, as illustrated in Table 5 Canada ranks below the European countries in terms of revenues per 1000 vehicle registrations but well ahead of both Australia and the USA. The result of the road expenditures as a percentage of road revenues comparison is a similar ranking, only slightly behind West Germany. The implications of this comparison is that Canada's treatment of highways and the national highway system in particular is at least as much a result of policy decisions as diminished road revenues. Consequently a comparison of policies and programs in each of these countries in comparison with Canada is presented. The comparison among countries regarding the treatment, responsibilities and funding mechanisms for national highway systems is summarized in Table 6.

USA

In 1956, the USA developed a Highway Trust Fund accounting mechanism to accelerate construction of a National System of Interstate and Defence Highways (the Interstate System) to achieve a minimum four-lane, access controlled highway standard in all of continental USA. The federally administered Highway Trust Fund had the advantage of not producing deficits, ensuring highway users that new tax increases would be used exclusively for roads and of placing a financial limit on federal contributions to roads and highways. In practice, the USA federal highway programs have been established so that all highway programs are state programs with federal cost-sharing and federal approval requirements for construction and major maintenance work on designated highway systems. For the Interstate System, construction and rehabilitation is currently cost-shared at a 90% federal portion from the Federal Highway Trust Fund and a 10% state share from state highway resources. These arrangements and the expansion of the Interstate System to a larger national system are currently under review in the USA. Today, the Interstate System of approximately 70,926 km is nearly complete everywhere to a minimum four-lane divided standard.

The important principles of US highway programs including the Interstate System program are:

- the federal – state relationship whereby federal assistance is channelled through state highway departments which assume direct responsibility for implementation,
- a federal – state matching ratio for expenditures whereby states must participate directly in program funding,
- distribution of funds among states and among highway programs by an apportionment formula,
- system designation whereby federal financial aid must be expended on coordinated and connected road networks,

- a balanced trust fund accounting mechanism whereby total receipts and total expenditures for highways at the federal level should be balanced in each year, and
- the imposition of federal taxes related to highway use which fund all significant federal highway programs.

Today approximately 23% of annual funding for roads and highways is provided by the federal government, 50% of funds are provided by state highway agencies and 27% of funds are provided by local city, town or country governments. Annual road expenditures in the USA amount to approximately \$70 billion (US\$).

Australia

In Australia, the federal or Commonwealth level of government assumed full financial responsibility for a newly designated National Highway of approximately 16,000 km in 1974. Since then, 100% of the National Highway System financing is provided by the federal government using a Highway Trust Fund of partially dedicated or "hypothecated" road user fuel taxes. The Australian states continue to be responsible for roads and highways under the Australian constitution but National Highway System projects are developed and implemented by the state highway agencies and are subject to approval and full financing from the federal government. The Australian National Highway System is much improved since 1974. In 1985, Australian funds for all road expenditures were divided as 35% from federal sources, 36% from state sources and 29% from local government sources. These road expenditures totalled \$3.7 billion (AUS\$).

Federal Republic of Germany

In West Germany, the federal autobahn system of 8,600 km of a minimum four-lane, access controlled freeway is owned and financed 100% by the federal government although States and larger municipalities are responsible for implementing construction and maintenance programs. The federal government is also 100% financially responsible for the federal trunk highway network of approximately 31,229 km. In 1987 approximately 30% of all road financing came from federal sources with state and local governments providing the balance. Expenditures totalled approximately 20 billion DM. West Germany has succeeded in building, expanding and maintaining a very high standard of highway system through careful and longer term planning. All investments in transportation infrastructure (road, rail, marine and air) are subject to careful requirement planning and five year funding levels are established and respected.

Italy and France

Italy and France have created concessionary companies which are granted limited-time highway concessions by the national governments to construct, maintain and operate a national system of high standard, controlled access motorways which are financed almost exclusively from user tolls with some return to capital for the corporation each year. The high traffic volumes moving between cities and often between countries on the controlled access motorways provide the opportunity for toll corporations. On these concessionary highways, routine public subsidies are not made. These concessionary companies, which remain responsible to the central government, have accelerated the pace of motorway construction without creating large public debts. However, central governments in Italy and France continue to finance extensive national truck highway systems directly.

Spain and Great Britain

Great Britain, without a provincial tier of government, finances all national motorways from central government revenues. Recently, several large expansion projects on the national motorway system have been evaluated for private sector development. Like Italy and France, high intercity traffic volumes and well established alternative routes provide an opportunity for private sector investment in highways. Spain appears to be following a similar path for toll financing the construction and maintenance of national motorways but lags behind Italy and France in this regard. Lower traffic volumes in parts of the country and hosting of both a World's Fair and Summer Olympics have necessitated accelerated plans for investment in highway construction by the central government.

Canada

Canada has followed a different course in the provision and maintenance of highway transportation facilities. Like the USA and Australia, the provincial level of government is responsible for virtually all road and highway transportation in Canada but unlike all the other countries reviewed here, the federal level of government provides little direct support for national highway transportation in Canada. Similar to other countries, the federal government does derive significant revenues from road and highway use in Canada. But direct responsibilities for the construction, improvement and upkeep of Canada's highway system is predominantly a responsibility of the provinces and territories.

Historically, especially in the first half of this century, the federal government has played a role in assisting the development and construction of parts of Canada's highway system through assistance to the provinces for roads. Not since the completion of the TransCanada Highway in 1971 which was constructed on a 50% - 50% cost shared basis between the federal and provincial governments and revised to a higher federal share in parts of Atlantic Canada and British Columbia, has the federal government taken a role in the provision of national highway networks. Since that time limited assistance from the federal government has been provided in particular regions of Canada for highway programs falling under various federal and provincial economic regional development agreements and cost shared highway programs. These agreements and programs have usually been small and of shorter duration.

Federal efforts in transportation have more recently been directed at safety, trade and "deregulating" many components of Canada's transportation sector and increasingly relying on domestic and international market forces to determine rational transportation prices and supply. This has put additional pressures on many provincial jurisdictions for the provision and upkeep of required and safe highway transportation. Provincial and territorial agencies with the direct responsibility for construction and operation of the highway system within their jurisdiction establish investment priorities consistent with the social and economic concerns of their jurisdiction. There is no formal mechanism currently in place for identifying and addressing highway transportation needs at a national level.

Table 6 – Comparison of National Highway Systems, Responsibilities, and Funding Mechanisms

| Country | National System | Length of National System | % of All Roads | Minimum Design Standards | Ownership | Operational Responsibility (including design, construction, maintenance, etc) | National Highway Construction | Funding Responsibility | Annual Travel VEH-km Billions | Funding Source/Mechanism |
|-----------------------------|-----------------|-----------------------------|------------------|------------------------------------|---------------|---|---|---|-------------------------------|--|
| U.S.A. | Yes | 70,926 km Interstate System | 1.1% | 4 lane controlled access | States | States | 90% Federal | States 100% | 703.9 (22% of all travel) | dedicated user taxes/Hwy Trust Fund |
| Federal Republic of Germany | Yes | 6,600 km Autobahn | 1.7% auto-bahn | Autobahn: 4 lane controlled access | Federal | States | 100% Federal | States & Municipalities 100% | 217 (49% of all travel) | user taxes/general revenues in multi-year plan |
| Australia | Yes | 16,000 km National Highways | 2.0% | 2 lane paved | States | States | 100% Federal | States & Federal Varies | 12.6 (9% of all travel) | partially dedicated user taxes/Hwy Trust Fund |
| Canada | Identified | 24,449 km | 2.7% | 2 lane paved | Provinces | Provinces | 100% Provincial except National Parks & North | 100% Provincial except National Parks & North | 48.5 (26% of all travel) | general revenues/ad hoc |
| Italy | Yes | 6,192 km national motorway | 0.8% motorways | motorway - 4 lanes | Central State | Concessionary Corp. (Autotrade) | self-funded largely | Concessionary Corp. 100% | 50.0 (28.6% of all travel) | tolls/concession corp. (Auto-trade) |
| France | Yes | 6,700 autoroutes | 0.8% auto-routes | motorway - 4 lanes | Central State | Concessionary Corps. (semi-public) | self-funded largely | Concessionary Corp. 100% | 21,500 veh/day (AADT) | tolls/concessionary companies, self-funded |

5.0 SUMMARY OF PHASE 3

The work of Phase 3 of the National Highway Policy Study for Canada has advanced the study by initiating a wider consultation process with sectors of Canadian society that directly use or rely on highway transportation. As well, a brief multi-country review of national highway policies and programs has been completed which illustrated the very different perspective that Canada has adopted for the provision and upkeep of highways when compared with other economically developed countries. Major findings of Phase 3 are:

- Reasonably strong support for a national highway policy in Canada exists especially for policy that involves spending existing road revenues on roads and highways before adding additional road user taxes. The rail transportation sector suggests national transportation policy should provide the objective of subsequent work.
- In a review of USA, Australia, Germany, Great Britain, France, Spain, Italy and Canada, road highway transportation plays a very significant role in the transportation of passengers and goods in all countries.
- With the exception of Canada, all these countries have well established policies for the provision and maintenance of required highways in effect at the national level.
- With the exception of Canada, all these countries have identified and addressed through national policies and programs a national highway system which forms the major element of their highway systems.
- Canada has an extensive highway system which reflects the geographic size of the country but annual support for this highway system on a per kilometre basis is less than most other countries in recent years.
- Support for the provision and upkeep of a national highway system in Canada is much less than that of most other countries on a per kilometre basis possibly reflecting the absence of national policy for highways in Canada.
- The review of annual road expenditures as a percentage of annual road revenues indicates that Canada falls behind the three other federal states examined here of USA, Australia and Germany. In Canada nationally, 61% of road revenues are returned to roads, in Germany the same comparison is 63%, in the USA 100% and in Australia 124%.
- The absence of sustained national highway policy and programs supported by established funding arrangements and clear jurisdictional responsibilities is unique to Canada in this review.

In conclusion, Phase 3 of the National Highway Policy Study recommended that given the work accomplished in the three completed phases of the Study, the indication of support for a policy in Canada at this early stage and the evidence from other economically developed countries, cooperative work be undertaken that can lead directly to the formulation and successful implementation of a national highway policy for Canada.