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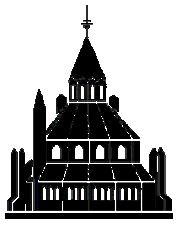

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CANADA'S INFRASTRUCTURE DEBT – PART I: ASSESSING THE INFRASTRUCTURE SHORTFALL

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PARLIAMENTARY INFORMATION AND RESEARCH SERVICE
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CANADA'S INFRASTRUCTURE DEBT – PART I: ASSESSING THE INFRASTRUCTURE SHORTFALL

Public physical infrastructure[1] is the foundation of Canadians' economic well-being and their quality of life. The tainted-water crises in Walkerton, Ontario, in 2000 and in North Battleford, Saskatchewan, in 2001 demonstrated that infrastructure failures can be life-threatening and entail significant economic and social costs.

Over the past several years, a number of groups – including the Federation of Canadian Municipalities, the Conference Board of Canada, and the various associations of Canadian engineers – have concluded that years of underfunding have left Canada with about $60 billion in outstanding infrastructure repair and replacement costs. These problems are not unique to Canada. In the United States, the American Society of Civil Engineers (ASCE) estimated in 2003 that the United States needed to invest US$1.6 trillion over the next five years to bring its infrastructure to acceptable levels.[2]

This paper discusses the state of Canada's infrastructure. It first draws on research by Statistics Canada on the importance of infrastructure, and then describes recent federal investments in infrastructure. It ends by addressing the scope of the shortfall in government infrastructure funding over the past several years. A related paper, *Canada's Infrastructure Debt – Part II: Addressing the Infrastructure Shortfall*,[3] considers possible actions that governments – particularly the federal government – might take to address infrastructure investment shortfalls, including the much-discussed diversion of a portion of the federal excise tax on gasoline to municipalities.

(T1T) While information technology's supporting infrastructure is also important to a country's prosperity, this paper concentrates more narrowly on "bricks and mortar" infrastructure. Examples include: highways and roads; trunk and distribution mains; sewage treatment plants and sanitary sewers; docks, wharfs, piers and terminals; railways and rail track; bridges; runways; canals and waterways; outdoor recreational facilities; electric power construction; waste disposal facilities; communication towers; irrigation facilities and reservoirs.

(T2T) American Society of Civil Engineers, *Report Card for America's Infrastructure, 2003 Progress Report*, 2003, HTUhttp://www.asce.org/reportcard/UTH.

(T3T) Blayne Haggart, *Canada's Infrastructure Debt – Part II: Addressing the Infrastructure Shortfall*, PRB 03-53E, Parliamentary Information and Research Service, Library of Parliament, Ottawa, forthcoming in September 2004.

THE IMPORTANCE OF INFRASTRUCTURE

According to the U.S. National Science Foundation, "A civilization's rise and fall is linked to its ability to feed and shelter its people and to defend itself. These capabilities depend on infrastructure – the underlying, often hidden, foundation of a society's wealth and quality of life. A society that neglects its infrastructure loses the ability to transport people and food, provide clean air and water, control disease and conduct commerce."(4)

Public infrastructure is an essential component of a productive economy, and integral to supporting a high standard of living. A recent Statistics Canada study on the contribution of public infrastructure to the economy remarks that over the past century "[p]ublic investment in canals, highways and airports has supported the transportation sector, while public investment in roads, sewers and water treatment facilitated urban expansion."(5) Investment in public infrastructure capital stock, the study also notes, "is needed for a strong, flexible and viable economy. Workers need to ride the subway or drive their car to get to work; companies need to ship goods; manufacturers need to use water and dispose of waste."(6)

The state of the nation's infrastructure – safe roads and effective water treatment, for example – is also an important contributor to Canadians' quality of life. Without dependable public infrastructure, "our water would be unsafe, our journeys slow and our economy stagnant. The prosperity we have achieved would have been an impossible dream."(7) As well, new and renewed infrastructure can contribute to meeting the country's environmental goals. For example, a well-run public transit system not only relieves congestion on roads, it also reduces the amount of pollutants emitted into the atmosphere.

For these reasons, investments in public infrastructure matter. Just as governments can influence the economic climate through their choice of tax rates and regimes, regulatory structures and program spending in areas such as health and research and

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T(4)T Quoted in Canadian Council of Professional Engineers, "Brief to the Standing Committee on Finance regarding the federal government's pre-budget consultation process," 25 September 2003, p. 3.

T(5)T Tarek M. Harchaoui, Faouzi Tarkhani and Paul Warren, "Public infrastructure in Canada: Where do we stand?" Catalogue No. 11-624-MIE2003005, Issue No. 005, Statistics Canada, November 2003, p. 2.

T(6)T *Ibid*., p. 6.

T(7)T Canadian Society for Civil Engineering, Canadian Council of Professional Engineers, Canadian Public Works Association and National Research Council of Canada, *Civil Infrastructure Systems Technology Road Map 2003-2013*, June 2003, p. 14.

development, so, too, can they improve Canadians' quality of life by investing in public infrastructure.(8)

The Statistics Canada study cited earlier and a companion technical paper(9) found that the amount and quality of public infrastructure is a significant contributor to businesses' prosperity, and that businesses across all industries realize reduced costs when spending is increased in order to create, maintain or improve public infrastructure. Specifically, "for the Canadian business sector … every $1.00 increase in the net capital stock generates approximately 17 cents of 'cost savings' producer benefits per year." By industry, this figure ranges from a low of about 4 cents in storage and warehousing, to a high of 42 cents for transportation industries.(10)

Public infrastructure capital also contributes significantly to businesses' multifactor productivity growth – that is, the productivity growth resulting from all factors of production (land, labour and technology). According to Statistics Canada, public physical infrastructure capital contributed about 18% of the overall business sector's multifactor productivity growth over the 1961-2000 period, varying across industries, "with the largest impact occurring in transportation, trade and utilities." Furthermore, the Statistics Canada technical paper concludes that "the output effect of public capital leads to an even larger 'crowding in' of private capital formation." In other words, public investment stimulates private investment.(11)

DIVISION OF RESPONSIBILITY BY GOVERNMENT LEVEL

In 2002, Canada's public infrastructure (defined by Statistics Canada to mean civil engineering works, such as roads and dams) was worth $257.3 billion, and accounted for almost 70% of the overall public capital stock. Of this total, local governments were responsible for about 50%, provincial and territorial governments for just over 40%, and the federal

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T(8)T Harchaoui, Tarkhani and Warren (2003), p. 1.

T(9)T Tarek M. Harchaoui and Faouzi Tarkhani, "Public capital and its contribution to the productivity performance of the Canadian business sector," Catalogue No. 11F0027MIE, Issue No. 017, Statistics Canada, November 2003.

T(10)T Harchaoui, Tarkhani and Warren (2003), p. 12.

T(11)T Harchaoui and Tarkhani (2003), pp. iv-vi.

government for the remaining 6.8%. Highways and roads attracted the greatest share of infrastructure investment at the provincial/territorial (69%) and local (just under 50%) levels.(12)

While provinces/territories and municipalities are responsible for the majority of the country's infrastructure, the funding situation is complicated by two factors. First, municipalities, as creatures of the provinces/territories, are limited in their ability to raise revenue to invest in infrastructure (a point that is explored in *Canada's Infrastructure Debt – Part II: Addressing the Infrastructure Shortfall*). Second, provinces and territories have often proven unwilling or unable to raise taxes or undertake deficit financing in order to pay for infrastructure renewal. As a result, and partly because the federal government has consistently posted budgetary surpluses over the past seven years, much of the focus on who should pay for infrastructure renewal has been placed on the federal government.

FEDERAL GOVERNMENT INITIATIVES

In its past several budgets, the federal government has begun to reinvest in infrastructure. Infrastructure Canada, created in August 2002, is the agency responsible for coordinating and managing most of the federal government's public infrastructure-funding initiatives.

The 2000 federal budget introduced the Infrastructure Canada Program, worth $2.05 billion through 2005-2006. It was created to enhance municipal infrastructure in urban and rural communities across the country and to improve Canadians' quality of life through investments that protect the environment and support long-term economic growth.

Outside Infrastructure Canada, the 2000 federal budget provided $600 million over four years for the Strategic Highway Infrastructure Program, $500 million of which went to support highway construction, with the remaining $100 million supporting national system integration.

The Canada Strategic Infrastructure Fund was created in 2002 to fund large-scale strategic infrastructure projects that improve quality of life and further economic growth. The Fund calls for partnerships with municipal and provincial/territorial governments, as well as with the private sector. The December 2001 federal budget allocated at least $2 billion to the fund

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T(12)T Harchaoui, Tarkhani and Warren (2003), p. 5.

through 2007-2008, while the February 2003 budget provided an additional $2 billion over ten years.

The 2003 federal budget also announced $1 billion over ten years (changed to $1 billion over five years in the 2004 budget) for the Municipal Rural Infrastructure Fund, which focuses on the needs of communities of less than 250,000 people and includes a component addressing the infrastructure needs of First Nations communities. The fund addresses areas such as water quality, wastewater treatment and local roads.

The federal government has also implemented a $600-million Border Infrastructure Fund, in cooperation with provincial, territorial and municipal governments, academic and research institutes, and Canadian and American partners from the public and private sectors. This fund supports key infrastructure initiatives under the *Smart Border Action Plan*.

While it is not specifically targeted toward infrastructure renewal, the 2004 federal budget exempted municipalities from paying the Goods and Services Tax/federal portion of the Harmonized Sales Tax on its inputs, which the federal government estimates will save municipalities $7 billion over ten years. This exemption was made in the context of a proposed, but not yet concrete, “New Deal for Canada’s Communities,” which would help address infrastructure spending problems.

The federal government also funds the Green Municipal Enabling Fund, a $50-million revolving fund administered by the Federation of Canadian Municipalities (FCM) that provides grants to support studies of the technical, environmental and/or economic feasibility of innovative municipal projects. The FCM also administers on behalf of the federal government the Green Municipal Investment Fund, a $200-million permanent revolving fund that supports the implementation of innovative environmental projects.

Other federal investments include funding in the 2000 and 2001 federal budgets for repairs and maintenance to federal infrastructure, and funding in the 2004 budget for the clean-up of federal contaminated sites.

PUBLIC INFRASTRUCTURE INVESTMENT: FALLING BEHIND

Many reports indicate that, despite the recent increases in federal infrastructure funding, Canada as a whole has underinvested in public infrastructure over the past several decades, and continues to do so. Reports by the Conference Board of Canada, among others, conclude that while recent federal government investments represent a step in the right direction, they are not adequately addressing Canada's infrastructure shortfall. The following section describes the magnitude of the challenge facing Canadian governments.

A. Infrastructure Share Declining

Public infrastructure capital stock as a share of overall tangible produced capital stock (defined as residential and non-residential structures, machinery and equipment, consumer durable goods and inventories) provides one measure of the level of investment in public infrastructure. According to Statistics Canada, this share has fallen over the past 30 years, peaking at 8.1% in the 1960s before falling to 5.5% in 2001. At the same time, business-sector capital stock's share of tangible produced capital stock was unchanged at 30%.

The decline in public infrastructure capital stock's share of total capital stock, combined with the stable share of business-sector capital stock, suggests "that the business sector capital stock has increased the demands placed on the available public infrastructure facilities."[13]

Statistics Canada concludes that the decline in the ratio of public infrastructure capital stock to total capital stock "is largely attributable to the federal and provincial components which saw their share declining substantially (respectively by 46% and 20%). In contrast, the share of local government capital infrastructure in the national tangible produced assets increased slightly during the same period."

The same report concludes that investment in capital assets such as highways and roads, bridges and outdoor recreational facilities faces a similar situation. While real spending in most of these areas has increased over the past 40 years, Statistics Canada reports that the ratio of investment in public infrastructure to the total national public capital stock began to fall in the

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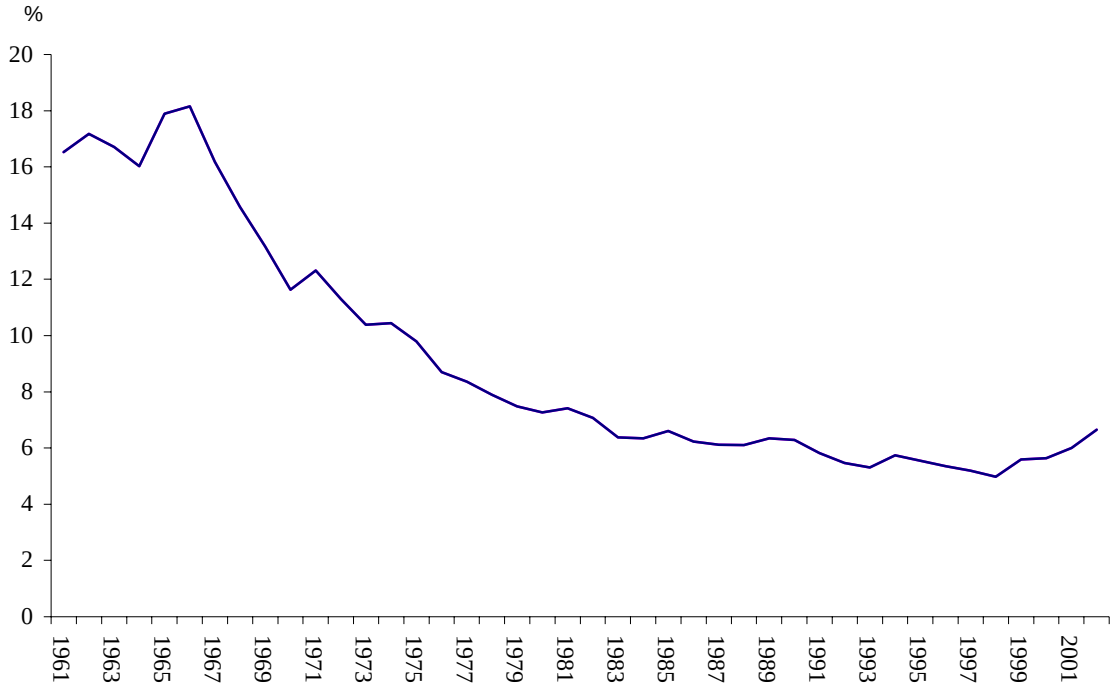
T(13)T Harchaoui, Tarkhani and Warren (2003), pp. 7-8.

early 1980s, though investment in highways and roads began to recover somewhat in the second half of the 1990s. Even in this area, road and highway investment as a share of the national tangible produced capital stock is still below its early-1980s share.(14)

Over the past several decades, Canadian governments as a whole have also been investing less in infrastructure as a share of their overall spending. According to Statistics Canada data, total government fixed capital formation as a share of total government outlays fell from a high of 18.2% in 1966 to a low of 5.0% in 1998; since then it has recovered somewhat to reach 6.6% in 2002, as shown in Figure 1.

Figure 1: Total Government Fixed Capital Formation as a Share of Total Government Outlays, 1961-2002



Source: Statistics Canada, CANSIM II data.

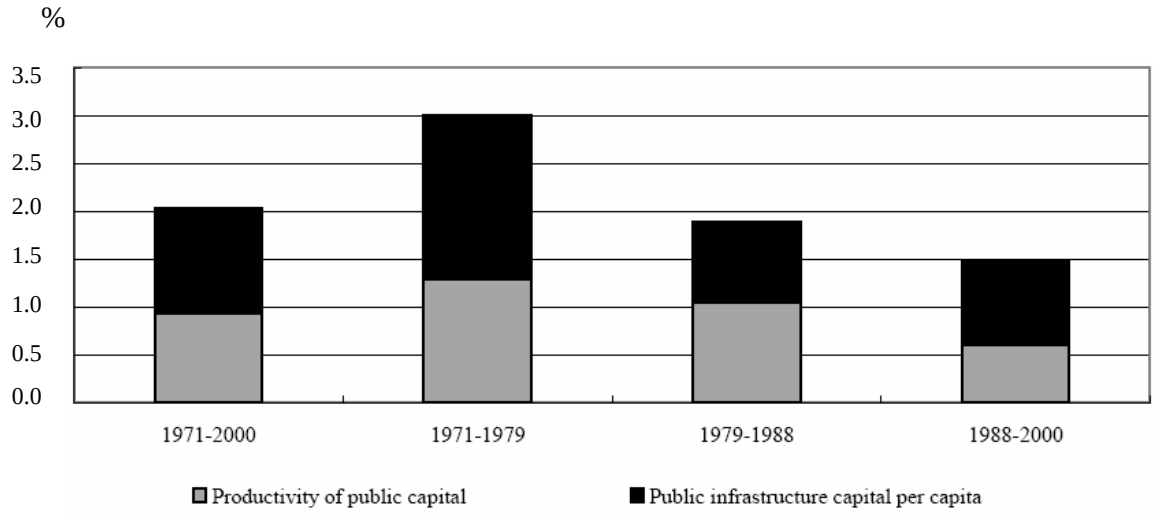
B. Infrastructure Productivity Growth

In order to estimate the approximate contribution of public infrastructure investment to Canada's standard of living, it is instructive to add together public infrastructure

T(14)T *Ibid*., p. 9.

capital productivity growth and the growth in public infrastructure capital per person (i.e., the "demands placed by Canadians on the available public infrastructure capital"). As Figure 2 shows, the contribution of public infrastructure to Canada's standard of living has declined significantly since the 1970s. According to Statistics Canada, public infrastructure capital productivity growth has declined over the past 30 years, from 1.29% in the 1970s to 0.61% in the 1990s. These rates compare unfavourably with labour productivity growth of 1.3% in the 1970s and 2.1% in the 1990s. Over the same period, the growth in public infrastructure capital per person fell from 1.71% to 0.87%.[15]

Figure 2: Contribution of Public Infrastructure to Canada's Standard of Living (Average Annual Growth Rate in Percentage)



Source: Harchaoui, Tarkhani and Warren (2003), p. 11.

C. Size of the Infrastructure Debt

While the above studies and figures suggest that Canadian governments have underinvested in infrastructure, the exact level of underinvestment – what could be termed the infrastructure debt – and the ongoing annual level of underinvestment – what could be termed the annual infrastructure deficit – are open to interpretation based on, among other issues, what one considers to be an appropriate level of infrastructure. Studies seeking to measure infrastructure underfunding, however, are remarkably consistent in their findings (though many

T(15)T *Ibid*., p. 10.

have a tendency to refer to the backlog of infrastructure investment as a deficit when "debt" is the more appropriate term). Most studies conclude that governments in Canada have underinvested in public infrastructure by almost $60 billion, and that this infrastructure debt continues to grow at a rate of about $2 billion per year. According to the Coalition pour le renouvellement des infrastructures du Québec: "No opposite or significantly different estimate has ever been brought to the attention of the members of the Coalition… ."[16]

According to the *Civil Infrastructure Systems Technology Road Map 2003-2013*, a June 2003 report produced by the Canadian Society for Civil Engineering, the Canadian Council of Professional Engineers, the Canadian Public Works Association and the National Research Council of Canada, Canada's "infrastructure deficit" is increasing:

> In 1985 it was estimated that the cost to rehabilitate just the municipal infrastructure, which represents only 70 percent of the total Canadian CIS [civil infrastructure systems], would exceed $20 billion. Despite the additional investments of recent years, this municipal backlog has risen to an estimated $57 billion. If left unchecked, the amount could climb to more than $110 billion by 2027.[17]

TD Economics, which has also examined the infrastructure debt issue, estimates the cumulative municipal infrastructure shortfall at "at least C$44 billion, of which $17 billion is attributable to under-investment in roads and highways." The same analysis "estimates that the total infrastructure shortfall is growing by about C$2 billion per year."[18] As a result, the infrastructure debt will continue to grow so long as the annual shortfalls are not addressed.

These figures are supported by a study of Quebec municipalities that was prepared by the Conference Board of Canada for the Union des municipalités du Québec. In results that the Conference Board has remarked are duplicated throughout the country, the paper found that "[m]unicipal investment growth in Quebec averaged 6.6% per year from 1955 to 1977, but it averaged a meagre 0.1% per year from 1978 to 2002." If public infrastructure

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T(16)T Coalition pour le renouvellement des infrastructures du Québec, "Mémoire présenté au Comité permanent des finances de la Chambre des communes, lors des audiences publiques sur les consultations prébudgétaires," September 2003, p. 10.

T(17)T Canadian Society for Civil Engineering, et al. (2003), pp. 14-15.

T(18)T TD Economics, "A choice between investing in Canada's cities and disinvesting in Canada's future," 22 April 2002, p. 15, HTUhttp://www.td.com/economics/special/db_cities0402.pdfUTH.

spending growth had merely equalled population growth, infrastructure spending should have grown by 2.6%. The study concluded that Quebec municipalities face a $17.9-billion infrastructure debt, which is consistent with the findings of other organizations.(19)

These analyses are also echoed by groups such as the Federation of Canadian Municipalities, which has remarked that "a large 'infrastructure gap' has emerged between current fiscal capacity and the needs of citizens for core services, including transportation and transit, water supply, wastewater treatment, solid waste systems, and recreation and cultural facilities."(20) As well, the Canadian Construction Association has argued: "Our highways, airports, bridges, sewer and water systems, our schools and hospitals, roadways and ports have been shamefully neglected in the past and are now in urgent need of substantial reinvestment. A backlog of much-needed improvements has been created which, if not addressed in a sustained and priority manner, will continue to grow exponentially in cost each year."(21)

The *Civil Infrastructure Systems Technology Road Map 2003-2013* also concluded that Canada has used 79% of its infrastructure's life expectancy, and that 59% of Canada's infrastructure is more than 50 years old (see Figure 3). According to the Association of Consulting Engineers of Canada**,** nearly 60% of Canada's infrastructure is between 50 and 150 years old, and 79% of Canada's infrastructure's life expectancy has already been used.(22) Along the same lines, according to the Canadian Council of Professional Engineers, one-half of Canada's infrastructure system will have reached the end of its serviceable lifespan by 2027.(23)

T(19)T Conference Board of Canada, *Performance and Potential 2003-04: Defining the Canadian Advantage*, Ottawa, 2003, p. 128.

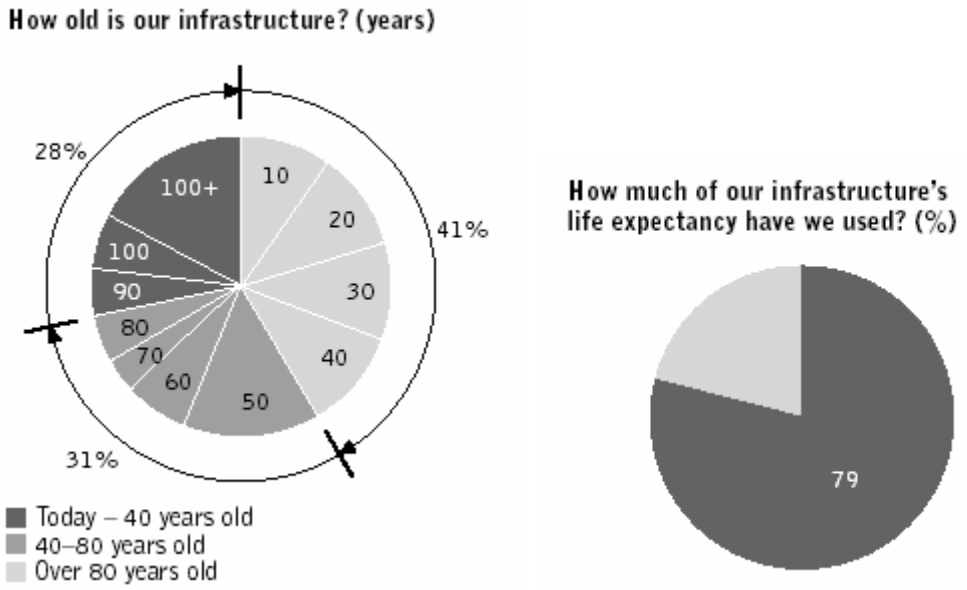
T(20)T Federation of Canadian Municipalities, "A new deal for community prosperity and well being," submission to the House of Commons Standing Committee on Finance, September 2003, p. 5.

T(21)T Canadian Construction Association, "Pre-budget submission to the House of Commons Standing Committee on Finance," September 2003, p. 4.

T(22)T Association of Consulting Engineers of Canada, "The second national debt: Canada's growing infrastructure challenge," submission to the House of Commons Standing Committee on Finance, 2 September 2003, p. 3.

T(23)T Canadian Council of Professional Engineers, "Brief to the Standing Committee on Finance Regarding the Federal Government's Pre-Budget Consultation Process," 25 September 2003, p. 12.

Figure 3: Age and Remaining Life Expectancy of Canada's Civil Infrastructure



Source: Canadian Society for Civil Engineering, et al. (2003), p. 11.

TD Economics argues that while, in the past, Canada has been able to ignore the need to reinvest in infrastructure, it is less easy to do so today:

> Until recently, the relative youth of Canadian cities meant that the pressure on Canadian governments to re-invest in infrastructure was relatively modest compared to that faced by their U.S. and European counterparts. But, it is becoming evident to most Canadians that their cities are showing distinct signs of strain. Merely maintaining existing roads, bridges, transit systems and other types of infrastructure is not enough – modernization is also required.(24)

In more specific areas, the Canadian Urban Transit Association estimates that $13.6 billion will be needed over five years to meet transit infrastructure investment needs across Canada. Of this amount, $4.8 billion is needed to renew outdated facilities and rolling stock, and $8.8 billion is required to expand services to meet growing demand. It argues that current transit budgets are capable of meeting only $6.8 billion of this cost, leaving a $6.8 billion shortfall that will require new funding sources.(25)

T(24)T TD Economics (2002).

T(25)T Canadian Urban Transit Association, "Investing in public transit for Canada's future," submission to the House of Commons Standing Committee on Finance, September 2003, p. 5.

With regard to roads and highways – the major part of Canada's infrastructure – a 1997 study by the Council of Ministers Responsible for Transportation and Highway Safety concluded that the "estimated cost of correcting all current deficiencies on the National Highway System is $17.4 billion (1997 dollars)." This amount is much larger than the $600 million dedicated to highways in the 2000 federal budget. The same study concluded that reduced congestion and improved highway standards resulting from this investment could "be expected to reduce the number of fatal traffic accidents by up to 247 per year and injury accidents by up to 16,000 per year," and "reduce fuel consumption by up to 236 million litres per year, although hydrocarbon emission levels [would] not [be] expected to change significantly."(26)

Other areas also require funding, including: First Nations reserves, in which the infrastructure is generally in worse shape than in the average Canadian municipality; water works; and marine infrastructure. According to the Canadian Council of Professional Engineers, "[t]he Canadian Water and Wastewater Association reported … that an annual investment of $5.8 billion over the next 15 years ($1.8 billion on water distribution systems and $4 billion on wastewater treatment facilities) will be required for underground infrastructure in Canada."(27) The Chamber of Maritime Commerce told the House of Commons Standing Committee on Finance that the country's marine infrastructure is also in need of renewal. The Chamber told the Committee that of the $2.65 billion announced for transportation infrastructure in the 2000 federal budget, only $5 million was targeted for marine infrastructure, and none of the 2001 federal budget's $2-billion Strategic Infrastructure Fund went to marine infrastructure.(28)

CONCLUSION

Public infrastructure – our roadways, sewers and other public capital projects – is critically important both to Canadians' standard of living and to their overall quality of life. Despite this importance, many studies indicate that Canadian governments have underinvested in

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T(26)T Council of Ministers Responsible for Transportation and Highway Safety, *The National Highway System: Condition and Investment Needs Update 1997*, September 1998, pp. 1-2, HTUhttp://www.comt.ca/reports/sumrep.pdfUTH.

TT(27)TT Canadian Council of Professional Engineers (2003), p. 12.

TT(28)TT Chamber of Maritime Commerce, "Pre-budget consultations submission to the House of Commons Standing Committee on Finance," 1 October 2003, p. 4.

infrastructure (to which some would add, “and continue to underinvest”), creating an estimated $60-billion cumulative shortfall. This paper has outlined the current situation facing Canada. A second paper, *Canada’s Infrastructure Debt – Part II: Addressing the Infrastructure Shortfall*, examines some proposed solutions to this large underfunding problem.