INFRASTRUCTURE SPOTLIGHT: THE ROLE OF ENGINEERING IN INFRASTRUCTURE

Modern, reliable and sustainable public infrastructure is critically important to the country, and to Canadians. Our public infrastructure helps connect communities, drives our economy and keeps us healthy and safe. Given the fundamental role it plays in our daily lives, how we plan, design, build and maintain these assets is vital.

Engineering disciplines

Engineers practise in over 20 disciplines. Civil, mechanical, electrical/electronic, and chemical engineering are the "big four" disciplines, accounting for approximately 64 percent of Canada's engineers.

Engineers play a critical role in planning, developing, building and maintaining our public infrastructure stock. Whether it is water treatment facilities, bridges and roads, public transit, utilities and the electricity grid, engineers play a part in all aspects of public infrastructure. Ultimately, the engineering profession uses its expertise, experience and knowledge to help create a safer, more sustainable, and prosperous future for Canada.

Golden Ears Bridge, Vancouver, British Columbia

Accountability and Public Safety

Engineering is a licensed, self-regulated profession. Professional engineers are responsible, and required by provincial and territorial law to work in the public interest. Engineers balance social, environmental and economic considerations to find the best solutions to complex challenges. They have a responsibility to manage the risks associated with their work, and the impacts on the Canadian public and on the environment.

Engineers are committed to having the skills and knowledge they need to safely and effectively design physical infrastructure to meet the changing needs of Canadians.

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The outcome of that commitment, combined with strict adherence to standards, codes, legislation and regulations, help ensure that Canadians enjoy a high standard of safety and reliability in their infrastructure. From an international perspective, this high quality is the measure of our country – both of our infrastructure and of our engineers.

Regulation of engineering

In order to become a professional engineer in Canada, you must be licensed in the provincial/territorial jurisdiction in which you are employed. The license is a permit to practice engineering. It is a privilege that obliges those who hold a license to hold the public interest paramount, maintain skills and competencies, and obey a code of ethics. These measures help to ensure that Canadians can continue to live in safe, prosperous and sustainable communities.

How do engineers help Canadians every day?

Through their work on infrastructure, engineers help over 33 million Canadians every day. Whether in the private or public sector, they contribute to the economic prosperity and quality of life of Canadians in their communities.

While the profession of engineering itself is largely invisible, its impact is visible all around us. Engineers have the knowledge to plan, design, assess, supervise, build, and maintain Canada's infrastructure. From a design concept, through to implementation and construction, ongoing operation and maintenance, to decommissioning, an engineer is involved.

Engineer overseeing construction progress on the Golden Ears Bridge, Vancouver, British Columbia.

Engineers balance social, environmental and economic considerations to find the best solutions to complex challenges.

Charley Fox Memorial Overpass at the intersection of Hale and Trafalgar streets, London, Ontario

As part of a multidisciplinary team, engineers collaborate with other professions and specialists, such as surveyors, architects, technologists, land-use planners, natural scientists, ecologists, geologists, archaeologists, economists, construction specialists, property negotiators, lawyers, decision-makers and others. Together, their work serves to plan and develop the best infrastructure for the Canadian public.

Most public agencies that own and operate infrastructure assets employ engineers to provide day-to-day expertise for asset management and operations, and for determining infrastructure needs. Public agencies will often use consulting engineers from the private sector for specific or independent expertise or when major capital expansion requires additional design capacity. Most large scale construction is performed by private contracting companies that often employ engineers as well. Engineers also play an important role with regulators, ensuring compliance with building codes, labour laws, environmental approvals and other requirements.

The Business of Engineering

Consulting engineering in Canada is a $21.4 billion a year industry that employs more than 100,000 Canadians. Canada is globally recognized for its engineering services and is the fifth largest exporter of engineering services in the world with 30 percent of its work performed at the international level

Infrastructure without engineers is like an education system without teachers or a health care system without doctors – impossible.

Why are engineers key to quality infrastructure in Canada?

Because they are involved in all aspects of infrastructure, engineers understand that infrastructure is an investment – an investment in the economic, social and environmental prosperity of this country. As a result, the engineering profession is committed to lifecycle design and an active promoter of sustainability.

High quality, reliable infrastructure can only be maintained if engineers and public infrastructure owners understand the full lifecycle needs of their investments, and adopt sound asset management practices. Good asset management – which includes engineers and others – allows us to measure the condition and remaining service life of existing infrastructure. It means constant monitoring and planning of transportation, environmental, health and education infrastructure needs. There are many factors to think about: the condition of current infrastructure, future needs, adaptation to climate change, and population growth.

Engineering Excellence

Canada's engineering learned societies form an essential link between research and engineering practice, between our universities and our consulting and construction companies. Organizations like the Canadian Society for Civil Engineering (CSCE) ensure that practising engineers remain up to date with the latest developments in their fields of expertise. Engineers are constantly striving to build more durable and less expensive infrastructure. The learned societies contribute to this on-going pursuit of excellence and all Canadians benefit from this commitment to the betterment of the engineering profession.

A lifecycle perspective that consistently assesses the condition and performance of infrastructure can save money and improve safety over time. For the lifecycle perspective to work, you need accurate information on the current state of infrastructure, and a consistent set of indicators and processes to assist with long-term planning. By combining technical performance measures – such as the condition and performance of assets – with social, economic, environmental and safety considerations, it's much easier to accurately forecast costs.

Overall, engineering know-how can help governments and infrastructure owners prioritize and assess projects and programs that will help maintain the high standard of infrastructure in Canada, and ultimately protect the safety, health and economic prosperity of Canadians.

Infrastructure Spotlight: The Role of Engineering in Infrastructure

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