Leadership in Sustainable Infrastructure
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Case Study

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CIVIL ENGINEERS AND CANADA'S SESQUICENTENNIAL - BUILDING CANADA'S INFRASTRUCTURE FOR MORE THAN 150 YEARS

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1 INTRODUCTION: Civil Engineers build the infrastructure that supports our daily lives and adds to our quality of life and Civil Engineers have been building Canada's infrastructure from long before Confederation. Canada has a rich and varied Civil Engineering Heritage. This presentation looks at the development of Civil Engineering in Canada from its earliest roots and discusses many of the most significant early infrastructure works.

2 NATIVE ENGINEERING, VIKINGS AND THE FUR TRADE: The earliest 'engineering' works in Canada were earthwork mounds made by aboriginal peoples dating from 50 to 100 BCE. The first incursion of Europeans resulted in the Viking settlement at L'Anse aux Meadows in Newfoundland. Native Americans displayed successful building techniques in the Haida and Iroquoian Longhouses and developed the first transportation infrastructure using canoes and other watercraft across a network of lakes and rivers. The early fur trading companies used similar transportation methods. Canada's first canal, bypassing the rapids at Sault Ste. Marie, was built in 1798 by the North West Company.

3 DEVELOPMENT OF THE CIVIL ENGINEERING PROFESSION: This falls into three principal stages, the early works of the Military Engineers, then the "importation" of engineering expertise from Europe and the United States and thirdly the development of 'home grown' engineering expertise. Canadian Civil Engineering as we understand it today dates from the late 17th and early 18th centuries with the works of the French Military Engineers which were mainly aimed at providing protection for the new small settlements against incursions by the native peoples and from the British to the south.

4 MILITARY FORTIFICATIONS: The fortifications of Québec City were commenced in 1745 by Gaspard-Joseph Chaussegross de Léry (1682 – 1756), Chief Engineer of the King's Works in New France from 1716 until his death. He was to make multiple contributions to engineering in the New World. He also built the forts at Chambly, Niagara and Saint Frédéric. Other notable defence structures include the Fortress of Louisbourg and the Citadel of Halifax. More than fifty forts of varying sizes were built by the fur trade

companies, as defence against attacks by natives. Fortifications such as Fort York, Fort George and Fort Erie, in Ontario guarded against possible invasion from the United States.

5 CANALS: The first canals were built by British Military Engineers to make the upper St. Lawrence River navigable. This series of canals included the first lock canal in Canada at Coteau du Lac in 1781. These were followed by the Ottawa River Canals at Grenville and Carillon, and the Rideau Canal, their construction providing safe transportation at a distance from the Canada – US border as a precaution against possible incursions from the US. Other early canals were the Chambly, Shubenacadie and Welland Canals and the Trent-Severn Waterway.

6 RAILWAYS: Canada is the only country in the world whose very existence depended on the construction of two major railway projects, the Intercolonial Railway, which joined the Maritime Provinces to Central Canada and the Canadian Pacific Transcontinental Railway (CPR), joining the 'new' country from coast to coast. The Grand Trunk Railway (GTR) connected the interior to the Port of Montréal and to the ice free Port of Portland, Maine.

7 BRIDGES: The GTR also required the construction of the Victoria Bridge over the St. Lawrence River at Montréal, the longest bridge in the world at the time of its completion Other historic Canadian Bridges include the several bridges across the Niagara River, the Québec Bridge, which still has the longest cantilever bridge span in the world and the Lions Gate Bridge in Vancouver and two International Bridges, the Ambassador Bridge connecting Windsor, Ontario with Detroit, Michigan and the Blue Water Bridge between Sarnia, Ontario and Port Huron, Michigan.

8 MUNICIPAL ENGINEERING: Historic municipal engineering works of note include the water supply systems constructed by the first President of the Canadian Society of Civil Engineers, Thomas Coltrin Keefer, for the cities of Hamilton and Ottawa in Ontario and in Montréal. The Red River Floodway in Manitoba was a major Civil Engineering achievement, built to control the flooding hazard posed by the Red River to the City of Winnipeg.

9 BRITISH COMMONWEALTH AIR TRAINING PLAN: This was a major engineering achievement and an effective Canadian contribution to the World War II effort. A total of over 131,500 aircrew were trained by this 'Plan' between 1940 and 1944. The Civil Engineering contribution to this project involved the construction of some 88 main airfields and the same number of relief airfields from 1940 to 1943. Complete supporting infrastructure was also required and encompassing roads, drainage, water supply, utilities, hangars, control towers, accommodation blocks, classrooms, administration offices, recreation halls and hospitals. Innovative Project Management techniques using fast track construction and standardised prefabricated components were major contributors to the success of this project. The size of this project may be judged by the fact that at the outbreak of World War II, Canada had only 5 military airfields with 6 under construction.

Many of the BCATP airfields continued in commercial use and were to form the basis of Canada's present Air Transportation network.

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