THE ENGINEERING INSTITUTE OF CANADA
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L'Institut canadien des ingénieurs
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EIC's Historical Notes and Papers Collection

(Compilation of Articles, Notes and Papers originally published as
EIC Articles, Cedargrove Series, and EIC Working Papers)

ENGINEERING HISTORY PAPER #42

"EIC Presidential Biographies, 1937 - 2010 Part One"

by Andrew H. Wilson
(previously produced as Cedargrove Series #13/2010 – February 2010)

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EIC HISTORY AND ARCHIVES

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Abstract

The semi-centennial issue of the *Engineering Journal* published in June 1937 included a section with brief biographies of the presidents of the Canadian Society of Civil Engineers from 1887 to 1917 and of the Engineering Institute of Canada from1918 to 1937. This present paper is intended to update the biographies for the years from 1937 until 1987. It has been extended to include briefer material for the presidents serving between 1988 and 2010.

The material has been collected from a number of sources, including EIC's *Engineering Journal*, personal communications with a number of the past presidents and, for the most recent presidents, news releases by the Institute and several websites.

The paper is physically in two parts, of which this is the first, since a single one would be cumbersome to staple and to handle. Some photographs have been included in Part Two.

About this Series

Principally, the Cedargrove Series is intended to preserve some of the research, writings and oral presentations that the author has completed over the past half-century or so but has not yet published. It is, therefore, a modern-day variant of the privately-published books and pamphlets written by his forebears, such as his paternal grandfather and grandmother, and his grandfather's brother John.

About the Author

He is a graduate in mechanical engineering and the liberal arts and has held technical, administrative, research and management positions in industry in the United Kingdom and the public service of Canada, from which he retired almost 25 years ago.

He became actively interested in the history of engineering on his appointment to chair the first history committee of the Canadian Society for Mechanical Engineering in 1975 and served both CSME and the Engineering Institute of Canada in this capacity for varying periods of time until 2003. He has researched, written and edited historical material for both organizations, and is a past president of both.

Introduction

Several years ago, a promise I made to many of the then living past presidents of the Engineering Institute of Canada was that I would put together biographical material for them similar to the material for the 'first fifty' presidents that had appeared in the semi-centennial issue of the *Engineering Journal* in June 1937. For a variety of reasons, it has taken rather longer than I had hoped to keep this promise.

This present paper is in two parts, to make for easier stapling and handling. The second part (#14/2010) also includes briefer material on those who served as president of the Institute between 1988 and 2010. As well, this second part includes photographs of the presidents - but not all of them - on both sides of 1987. The location of the 'split' coincides with my 'three-phase' theory of the Institute's development, which was discussed in a previous paper in the Cedargrove Series (#6/2008) and coincides with the end of the second and the beginning of the third phases - that is, when the original constituent (now member) societies were being formed.

The material was collected from sources that include the *Engineering Journal*, published by the Institute up until 1987, and personal communications between myself and a number of the past presidents. It also made use of news releases and websites. A list of sources appears at the end of each part. *In terms of coverage, the material for the presidents concentrates on the years prior to their election to the office, rather than on their entire careers.* It does not, therefore, include awards and other forms of recognition (such as election to the Canadian Academy of Engineering) that the presidents may have received *after* being in office. Some such supplementary information can be found in the Honours, Awards & Fellowships section of the EIC website (www.eic-ici.ca) and in the HAF citations collected and held in the Institute's archives at the University of Ontario Institute of Technology (and from the Academy's website).

Reference should also be made to two companion papers in the Cedargrove Series. The first - #6/2008, and already mentioned - analyses (anonymously) the backgrounds of all of the presidents of the Institute and its predecessor, the Canadian Society of Civil Engineers, between the years 1887 and 2008 against my theory of the three phases in the historical development of CSCE/EIC. The second - #7/2009 - provides biographical information on the senior executives of the Society and the Institute who served the presidents over the same period. These papers have been included in the History & Archives section of the EIC website, under the sub-section headed *Articles*.

With regard to #6/2008, the sharp-eyed reader will notice at least two differences between it and this present paper. One is that my computer has again discovered how to incorporate French accents into the text. The second is that, from presidents Tupper to Hutchison in Part One and Dinsmore to Shaw in Part Two, the years of the presidencies overlap, while they have been shown as single years in #6/2008. The latter were based on the listing made by Eric Scott, the executive director for the Engineering Centennial in 1987. However, I feel that, since their years in office began between late spring and mid-fall and not early in the year, they should be shown as overlapping, as are the presidencies from Steeves onward in #6/2008.

For the reader who is unfamiliar with the various institutes, societies and associations within the engineering profession in Canada that are mentioned in the text, their full names have been listed at the end of it.

The Presidents: 1937-1971

Georges Joseph Desbarats (1937) was, numerically, the 49th president of CSCE/EIC and shared the semi-centennial year of the Institute with President Cleveland. He was one of a handful of senior federal public servants who have held this office. Born in 1861 in the Province of Québec, he graduated with honours from L'École Polytechnique at the age of eighteen and went straight into the service of the Dominion Government as an assistant engineer in the Department of Railways and Canals. He took part in the design and construction of some of the most important sections of Canada's canal system - for example, the Carillon Canal, the locks at Ste. Anne de Bellevue, the Canadian locks at Sault Ste. Marie, and the Welland and Soulanges Canals. In 1892 he was appointed an inspector of railways in British Columbia. Four years later, he severed his connection with the Dominion Government for a period of three years to join a firm of contractors on the building of the Galops Canal. He then returned to government service and took charge of a hydrographic survey of the St. Lawrence, after which he was appointed director of the government shipyard at Sorel, Québec, for the Department of Marine and Fisheries and responsible for its reconstruction and operation.

In 1909, Desbarats was appointed deputy minister of Marine and Fisheries and, a year later, became deputy minister of the (then) new Department of Naval Service, in which he acquired heavy responsibilities during World War I, and for which he was recognized in 1915 when appointed a Companion of the Order of St. Michael and St. George (CMG). During the War, his department acted as agent in Canada for the British Admiralty and was involved in the construction of many ships and the supply of their crews. It also organized the Royal Canadian Naval Air Service and built defensive air stations for Maritime harbours.

In 1923 the Government established a Department of National Defence to merge the land, sea and air services, with Desbarats as deputy minister. He held this appointment at the time of his Institute presidency. From 1914 onwards, his administrative abilities were tested during the frequent changes in organization and the application of new technologies. For example, in addition to responsibility for the Royal Canadian Air Force in the post-war years, he oversaw the growth of active civil aviation activities in a country of such vast distances. The Department also surveyed air routes and constructed airports and the safety and communications services for them, as well as radio links with the Far North. During the years of his public service, Desbarats also held a number of non-departmental appointments and headed technical missions to international agencies.

Desbarats joined CSCE as a member in 1897, served on Councils of the Society and the Institute several times prior to becoming president, and was elected to honorary membership of the Institute in 1936, prior to his presidential term, which was the year of the CSCE/EIC semi-centennial celebrations. He was also active in the Ottawa Branch, serving as chairman in 1931.

Georges Desbarats died in April 1944.

John B. Challies (1938), a senior public servant for the first half of his career, followed Georges Desbarats as president. He was born at Winchester, Ontario, in 1881 and was educated at the University of Toronto, graduating in civil engineering as a member of the Class of 1903. He then began a twenty-year career in the Dominion public service, joining the Topographical Survey of Canada as an engineer. He then, successively, was chief hydraulic engineer of the Department of the Interior, superintendent of water power for Canada, director and chief engineer of the Water Power and Reclamation Service, the first director of the Dominion Hydrometric Survey and responsible for its organization, a member of the Dominion Power and Fuel Boards, and consulting engineer to the Department of External Affairs. During this latter assignment, he was active in the International Joint Commission and in federal-provincial conferences on international waterways.

In 1924, Challies left Dominion service in Ottawa and joined the Shawinigan Water and Power Company in Montreal, where he also became well-known in the electric utility field. At the time of his Institute presidency, he was this company's assistant general manager. As one of the country's recognized authorities on water resources engineering, he represented Canada at a number of international conferences, including the World Power Conferences of 1924, 1930 and 1936.

Challies joined CSCE in 1907, was a member of the Council of the Institute in 1920 and 1921 and a vice-president in 1924. He was also active in the Ottawa Branch, which he helped to organize. Fraser Keith, wrote in the *Engineering Journal* at the time of Challies' election as president:

> During that difficult transition period in the Institute's history, from 1915 until 1919, I.....as general secretary, had repeated cause for gratitude to J.B. Challies for the advice and assistance he rendered Headquarters, first as an officer of the Ottawa Branch, and then as a member of Council. He became the first and only chairman of the Ontario Provincial Division, which was set up by Council for the sole purpose of leading the movement among the organized engineering bodies of Ontario for a licensing authority, with the result that there came into being the Association of Professional Engineers of Ontario. A member of the first Council of the Association, he represented the civil engineers, in which position he served during its formative period and until 1924 when he moved to Montreal. Elected to the Institute's Council in 1920, he continued in office for two years, during which period he was chairman of the Special Committee on Policy that recommended important changes to the By-Laws, all of which were subsequently endorsed by the membership. Perhaps the outstanding feature of these changes was the establishment of the basic principle that is the warp and woof of the Institute's strength, namely, the right of every branch, large or small, to have direct and continuous representation upon Council and to select such representation from within its own membership. As a reward for his contribution to the licensing movement in Ontario, and to the clarification of the policies of the Institute, he was elected a vice-president.

Challies served as chairman of the EIC Committee on International Cooperation in 1925, was treasurer of the Institute in 1935 and 1936, and was a member of the Committee on the Consolidation of the profession from 1935 until 1937.

John Challies died in March 1969.

Harold Wilson McKiel (1939) was an academic, and the engineering dean at Mount Allison University when elected president of the Institute - the first to be chosen for this office from the Maritimes, and the first chemical engineering graduate. He was, however, born at Gananoque, Ontario, in 1888.

McKiel graduated from Queen's University in 1908 with a BA degree in chemistry, which he followed in 1912 with an honours degree in chemical engineering. In 1911, he was employed as an assistant chemist by the Canada Cement Company, after which he was an assistant in electro-metallurgical research at Queen's under the federal Department of Mines. He was also, for short periods, a demonstrator and tutor in physics at Queen's and a member of the administrative staff of Mount Royal College in Calgary. In 1913, he became professor of mechanical engineering at Mount Allison. However, towards the end of World War I, he was also employed by the British Chemical Company on explosives production. In 1920, he was named the Brookfield Professor of Engineering at Mount Allison and was appointed Dean of the Faculty in 1934. In 1929, McKiel added an appointment as consulting engineer to the Maritime Coal Railway and Power Company and, later, to Enamel Heating Products Ltd. In academia, he became a member of the Board of Governors of Nova Scotia Technical College in Halifax. He was also a office-holder in the Maritime Section of the Canadian Institute of Chemistry, a member of ASME, and a member, councillor, vice-president and president of the APENB

McKiel joined EIC as an associate member in 1919 and was elected a full member in 1923. He served as Branch chairman, was on the Council in 1927 and a vice-president in 1936 and 1937.

He died in July 1970.

Thomas H. Hogg (1940), born at Chippawa, Ontario, succeeded Dean McKiel as president at the 54th Annual General Meeting of the Institute in Toronto in early February. A 1907 graduate of the School of Practical Science of the University of Toronto, with a BASc degree gained the following year. Hogg had gained an international reputation as an hydraulic engineer and consultant by the time of his presidency, in recognition of which he had been honoured by the University of Toronto in 1927 with a Doctor of Engineering degree.

After a term spent as a university demonstrator in applied mechanics, Hogg joined the Ontario Power Company at Niagara Falls in 1909, where he did drafting, designing, surveying and construction

work. In 1911, he was appointed managing editor of the *Canadian Engineer* in Toronto. Eighteen months later he joined the Hydro-Electric Power Commission of Ontario as an assistant hydraulic engineer. He rose to become the chief hydraulic engineer in 1924, to which he added operations in 1934 and, not long after, became chief engineer. In 1937 he was appointed chairman and chief engineer of the Commission.

In these positions, Hogg was responsible for the design of many of the Commission's power plants. He served as a consultant to the Dominion, Manitoba, Nova Scotia and Ontario Governments on power projects across the country. He was also involved, on behalf of Ontario, in national and international conferences and in reports associated with the St. Lawrence Waterway. He participated in several of the World Power Conferences.

At the time he began his presidency, Hogg had been a member of CSCE/EIC for thirty-six years, as a student, associate and full member - the status he gained in 1922. He was a member of Britain's Institution of Civil Engineers and the American Society, and a member of APEO. He had also been elected a Fellow of the American Institute of Electrical Engineers.

Hogg's term coincided with the first full year of World War II, which brought with it new and urgent problems for the Institute.

Tom Hogg died in February 1958.

A student at Dalhousie University when the renowned C.D. Howe taught there, **Chalmers Jack Mackenzie** (1941) was born at St. Stephen, New Brunswick, of Scottish lineage, in July 1888. He worked briefly with his mason/builder father before attending university, where he received his degree in engineering in 1909, just before his twenty-first birthday. Seeking somewhat newer pastures to follow his profession, Mackenzie went west early in 1910 and, with a classmate from Dalhousie, opened a consulting practice in Saskatoon and carried out inspection and survey work. Not long thereafter, the partner left for other work and Mackenzie joined up with another St. Stephen native to continue consulting. The new partnership became involved in public works in both Alberta and Saskatchewan until October 1912, when Mackenzie received an invitation to join the staff of the University of Saskatchewan at Saskatoon to start the engineering course there - a connection that, with interruptions for graduate work and service in World War I, was maintained until October 1939 when he left for Ottawa to take the place of General A.G.L. McNaughton, who had returned to military service from the presidency of the National Research Council.

Having decided to stay in teaching in 1913, Mackenzie designed a full engineering degree course for the University of Saskatchewan but, having realized that he himself needed post-graduate study, also enrolled in a master's program in civil engineering at Harvard University - a course he completed in a year. In 1916, the first of Mackenzie's students graduated and the UofS Engineering School was closed for the duration. He and his teaching colleague, J.P. Oliver, joined the Canadian infantry. Commissioned and sent to France, he served there with distinction until the end of the War, winning

the Military Cross.

Regular engineering classes were resumed at Saskatoon in 1919. Around two years later, it was decided that the Engineering School should become a College within the University and Mackenzie was appointed the founding dean. This was the title by which he was known by many, long after he left academia. Under his guidance, the College grew and prospered, its student body reaching 500 by 1939, and its reputation among schools of engineering along with it. Mackenzie, himself, was also active in the wider community. He was, for example, a member of the Saskatchewan Drought Commission in the 1930s and a director of the Saskatoon City Hospital. He was elected to a term on the City Council, which served to emphasise his interest in future planning and development for the city. During the Depression, he was appointed chief engineer for the Broadway Bridge design and construction, which the federal government had agreed to fund as a relief project, and for which he took temporary leave from the University. The bridge opened to traffic in November 1932. He also participated actively, and for many years, in the research work of his College and of the EIC committee examining the deterioration of concrete caused by sulphur-bearing groundwater.

In 1935, Mackenzie was appointed to a three-year term as a member of the Honorary Advisory Council on Scientific and Industrial Research, as it was then called, chaired by the president of NRC. He was re-appointed in 1938 and selected to chair the committee reviewing the future direction of the Council's work. In September 1939, when President McNaughton prepared to return to military duties, Mackenzie was appointed acting president for the period of his absence, a position he took up in October. His status gave rise to regular correspondence between him and the General on matters pertaining to NRC. It was captured in a book, published in 1975, that provided a unique commentary on the wartime activities of the Council. In addition to his work within and on behalf of NRC, Mackenzie took part in Canadian diplomatic and scientific cooperation with the United States and Britain before, and after, the entry of the U.S. into World War II in December 1941. By then, also, he was president of the Engineering Institute of Canada.

To break the rules for this paper, briefly, it may be added that in 2007 C.J. Mackenzie was elected to the Canadian Science & Technology Museum's Hall of Fame, an honour he so far shares with McNaughton and only a handful of other engineers. His career success was due in part to his low-key manner and - as they say now - apparent 'unflappability.' Robert Legget quoted Mackenzie in a Royal Society memoir as saying:

> ...there is nothing to recommend about trench warfare but I did come out of World War I with a firm resolution that in future I would allow nothing in the way of misfortune, violent confrontations or frustrations to upset me in any emotional way. Keeping this resolution has, I believe, made for efficiency, objectivity and peace of mind under conditions of temporary confusion.

Mackenzie was an enthusiastic golfer, playing into his 90s. At age 92, he passed his Ontario senior's automobile driving test.

Dean Mackenzie died in February 1984 in his 96th year.

One dean succeeded another as president of EIC when **Clarence Richard Young** (1942) took over from Dean Mackenzie. This happened less than a year after Young was appointed Dean of the Faculty of Applied Science and Engineering at the University of Toronto.

Young was born near Picton, Ontario, in 1879 and received his bachelor's degree at the University of Toronto in 1905. He joined the teaching staff at UofT in 1912. In 1929 he was appointed professor of civil engineering in succession to Professor Gillespie. He retired in 1949.

Young's professional experience was largely in structural engineering. In addition to his academic duties, he was active in consulting work that included many special investigations and reports involving the technical, economic and legal aspects of civil engineering. He was involved, for example, in structural design for hospitals and prisons for the Ontario Government and served on the board that assessed the plans for the Detroit-Windsor bridge. He was also concerned with studies of vibrations in the Victoria Bridge in Montreal and did work on the properties of soils for an earth dam across the Grand River in Ontario. He made frequent contributions to technical journals, the proceedings of engineering society conferences, and authored a text book on structural problems. He was involved with the military, beginning with his membership of the UofT COTC and his service in the Canadian army during World War I. He also wrote about the role of engineers in society.

Young joined the CSCE as a student in 1903 and became a full member in 1908. He was an active member of the CSCE/EIC Branch in Toronto, serving as its chairman. Before becoming president, he chaired the Institute's Committee on International Relations and represented it on the Committee for Professional Training of the (U.S.) Engineers' Council for Professional Development. He took a prominent part in the Society for the Promotion of Engineering Education. A member of ASCE, he took part in the work of several of its technical committees. He was also a committee chairman within the Canadian Engineering Standards Association (now the CSA), his special interest being concrete and reinforced concrete. In 1937-38 he was a member of the Royal Commission on Transportation, which dealt with the economics of commercial transportation in Ontario.

Dean Young died in 1964.

Kenneth M. Cameron (1943) was yet another senior public servant - and civil engineer - to follow his predecessors Marceau, St.-Laurent, Desbarats and Camsell into the CSCE/EIC presidency. He was also the second graduate of the Royal Military College, Kingston - Col. R.W. Leonard being the first to do so, in 1919.

Born at Strathroy, Ontario, in 1881, Cameron graduated with honours from RMC in 1901. The following year, he received the degree of BSc in civil engineering from McGill and, in 1903, an MSc from the same university for graduate work in hydraulics. He joined CSCE while a student at McGill and was the recipient of one of the four student paper awards established by the Society in 1902. Coming to Ottawa in 1912, he became active in the Ottawa Branch, serving as chairman in 1922 and representing it on the Institute Council in 1924 and 1925. In 1941 and 1942 he was the vice-president for Ontario.

His first job after graduation was in the office of the chief engineer of the Canadian Pacific Railway, which was followed by two years with the Canadian Niagara Power Company at Niagara Falls. He lectured in surveying and geodesy at McGill during the 1905-06 academic year, and then went to the United States where he gained experience in the construction of the Pennsylvania Railroad tunnels under the Hudson River at New York, in power station inspection in the State of Maine, and as a resident engineer in the construction of irrigation and hydro-power dams in Wyoming. Returning to Canada in 1908, he worked with a firm of consulting engineers in Toronto before joining the federal Department of Pubic Works, first at London, Ontario, and then - as district engineer - at Sherbrooke, Québec. He came to Ottawa in 1912 as senior assistant in the Dredging Branch of the Department. September 1918 he became assistant chief engineer of the Department and, in 1923, succeeded Arthur St.-Laurent as chief engineer, the position he still held during his Institute presidency. During this lengthy period Cameron was concerned, for example, with the construction of three large drydocks at Saint John, Québec and Esquimalt.

Cameron was also served as president of the Professional Institute of the Civil Service of Canada and represented engineers during the hearings of the Beatty Royal Commission in 1930. At the time of his EIC presidency, he was chairing a Dominion Government sub-committee on matters concerned with postwar construction projects. He contributed the article on *Fifty Years of Public Works in Canada* to the semi-centennial issue of the *Engineering Journal* in June 1937.

Ken Cameron died in July 1961.

Jacques de Gaspé Beaubien (1944) was born in 1881 at Outremont, Québec and received his engineering degree from McGill University in 1906, prior to which he had obtained experience with the Montréal Light, Heat and Power Company. After graduation, he remained at the university, working as a demonstrator and then joined the Westinghouse Company at East Pittsburgh, Pennsylvania. From 1908 onwards he was in practice as a consultant, first under his own name, and later in the firm of Beaubien, Busfield & Company, working principally in the field of hydro-electric and power development. His clients included cities, industrial companies and utilities, principally in Québec.

His work during World War II included the preparation of a French version of the National Building Code. He was a member of several military committees, as well as a committee on postwar reconstruction projects, and was named a director of Defence Communications Ltd., a Crown corporation. He served as chairman of the National War Savings Committee and was a member of the National War Finance Committee. Before the end of the War, this work was recognized when he became a Commander of the Order of the British Empire (CBE). Among the technical appointments he held at this time were membership of the City of Montréal Electrical Commission and, as the representative of the Canadian Chamber of Commerce, of the main committee of the Canadian Engineering Standards Association (now the CSA).

Beaubien joined CSCE as a student in 1903, becoming an associate member in 1908 and a full

member of EIC in 1921. He was treasurer from 1938 to 1940 and vice president in 1941. His other technical memberships included the Corporation of Engineers of Québec, the Association of Consulting Engineers of Canada, and the American Institute of Electrical Engineers. He was also a member of the Canadian Institute of International Affairs, the Canadian and Rotary Clubs of Montréal, of which he was president, and the province of Québec Safety League.

de Gaspé Beaubien died in May 1969.

A Winnipegger, **Edward P. Fetherstonhaugh** (1945), took office as president of the Institute at the Institute's Annual General Meeting in that city. He was, at the time, Dean of Engineering and Architecture at the University of Manitoba.

Fetherstonhaugh was born in Eastern Canada, at Montréal in 1879. He received his education at the High School of Montréal and McGill University, from which he graduated in 1899 with honours in electrical engineering. For the next four years he was associated with Fetherstonhaugh & Company, patent lawyers, managing their Ottawa office. While in Ottawa, he began the military part of his career, holding a commission in the Ottawa Field Company of the Royal Canadian Engineers. He then returned to McGill for graduate studies in 1905 and 1906 and, as did de Gaspé Beaubien, gained experience with the Westinghouse Company in Pittsburgh, but working also as an electrical engineer in its Winnipeg office.

In June 1909, Fetherstonhaugh was appointed to the newly established chair of electrical engineering at the University of Manitoba and began the work of organizing the work of the department. When World War I broke out, he became active in the University's COTC contingent. In 1915 he was sent overseas to serve with the Royal Canadian Engineers in France and Belgium, achieving the rank of major and being decorated with the Military Cross. He also received a mention in despatches. He remained in the service for some months after the Armistice. His return to Canada and to the University of Manitoba coincided with the establishment of the Faculty of Engineering in 1921, and he was appointed Dean. Architecture was added later. In 1923, he also took command of the University's COTC, with the rank of Lieutenant-Colonel, relinquishing it in 1929.

Fetherstonhaugh was active as a consulting engineer, undertaking work for the Dominion and provincial governments as well as for municipalities and private concerns. For example, in 1929 he chaired a board of three engineers commissioned by the city of Winnipeg and the Winnipeg Electric Company to study the problem of electrolysis and soil corrosion of underground water pipes. He began in 1921 to serve on the main committee of the Canadian Engineering Standards Association, on its Electrical Sectional Committee, and on the sub-committee for Manitoba. He also served on a number of public boards and directorates, including the Advisory Board of the Royal Military College (1931 to 1935), and was a trustee of the Winnipeg General Hospital (1923 to 1936).

Fetherstonhaugh joined CSCE as a student in 1899, becoming an associate member in 1908. He was elected a full member of EIC in1920. He chaired the Winnipeg Branch in 1921. He was also a

member of the American Institute of Electrical Engineers and a founding member of the Association of Professional Engineers of Manitoba. He was a leader in the development of engineering education in the prairie provinces.

Dean Fetherstonhaugh died in Winnipeg in October 1959, in his 81st. year.

He was followed as president by **James Bertram Hayes** (1946), a Nova Scotian who was widely travelled and experienced in the management of public utilities. Born at Springhill in 1892, he graduated from Mount Allison University before going to Halifax to attend Dalhousie University and Nova Scotia Technical College, from which he graduated in engineering in1916. From May of that year until June 1919 he served in the Canadian army, receiving a commission in the Royal Canadian Engineers.

Hayes' first post-war position was as an industrial surveyor with the government in Halifax. In 1920 he joined the staff of the Nova Scotia Tramways and Power Company in Halifax to work as an engineer on the maintenance of ways. The company was then operated by Stone & Webster of Boston and, in 1922, he was assigned to the company's head office there as secretary to the district manager. A year later he transferred to the staff of the Jamaica Public Service Company at Kingston as assistant manager. In 1924 he went to Madison, Iowa, as manager of the Fort Madison Electric Company and, the following year, was sent to Richmond, Virginia, as assistant to the president of the Virginia Electric Power Company. In 1927 he was appointed general superintendent of transportation for the Norfolk division of this company.

Hayes returned to Halifax in 1929 to become general manager of the Nova Scotia Light & Power Company, a position he still held at the time of his Institute presidency. During World War II, his responsibilities to special assignments to meet the requirements of the naval and military authorities, one example of which was the degaussing of ships.

Hayes joined the Institute in 1920 as a member and served on the executive of the Halifax Branch. He was also a member of the Canadian Electrical Association, the Canadian Transit Association and the Halifax Board of Trade and served as president of each.. He was a registered professional engineer in Nova Scotia.

Hayes died in May 1962.

Colonel **LeRoy Fraser Grant** (1947) - soldier, engineer and professor - was born in Toronto in 1884, received his secondary education in Québec and Ontario and graduated with honours from the Royal Military College, Kingston, in 1905. However, he did not receive his engineering degree until 1926, from Queen's, while on the teaching staff at RMC.

On graduation from the College, Grant was commissioned in the Royal Canadian Artillery

(Permanent Force) and assigned to the defence of Halifax. But in 1907 he left the army to join the staff of the Grand Trunk Pacific Railway as the resident engineer at Prince Rupert, B.C.. In 1910 he was commissioned as a land surveyor in that province and, from 1911 until 1914, was associated with a firm of consulting engineers in Vancouver. On the outbreak of World War I, he was recalled to the army and was sent overseas as captain and adjutant of the Canadian Overseas Railway Construction Corps. Two years later, as a major, he was second-in-command of the 5th Battalion of the Canadian Railway Troops and was mentioned in despatches three times.

At the end of the War, Grant returned to British Columbia where he was employed by the provincial Department of Lands on surveys associated with the Southern Okanagan Irrigation Project. In 1921, he was appointed instructor and, later, associate professor in engineering at RMC, a position he held until re-joining the Canadian army at the outbreak of World War II. However, during his time at RMC he served in the militia, commanding the 32nd. Field Battery from 1932 until 1936 and the 9th Field Brigade from 1936 until 1937. During this time he was promoted to the rank of Lieutenant-Colonel. In 1940 he was appointed GSO1 for Military District No. 3 at Kingston but, having reached the age of retirement, left the army in 1944 on appointment as an associate professor of engineering at Queen's, the position he held at the time of his Institute presidency.

Grant joined CSCE as a student in 1908, was elected an associate member in 1913 and a full member of EIC in 1927. He was chairman of the Kingston Branch in 1925 and secretary-treasurer of it from 1928 until 1937. He served on the Council of the Institute from 1938 until 1940 and was Ontario vice-president in 1943 and 1944, when he was appointed to chair the Committee on the Training and Welfare of the Young Engineer. He was, first, a member of the Association of professional Engineers of British Columbia, and later, from 1938, of the Ontario Association. Grant took office as president a time of rapid growth and development within the Institute, during which he - significantly - brought EIC into the American Engineers' Council for Professional Development as the only non-U.S. member.

He was also a distinguished yachtsman, principally on Lake Ontario, and served as president of the Lake Yacht Racing Association.

Colonel Grant died in March 1976 at the age of 91.

John N. Finlayson (1948) was, numerically, the 60th president of CSCE/EIC. A native of Pictou County, Nova Scotia, he graduated BSc in 1908 and MSc in 1909 at McGill University in Montréal, where he served as a lecturer in mathematics until 1910, when he joined the staff of Waddell & Harrington, bridge engineers, of Kansas City and acted a the company's representative during the erection of CNR bridges in British Columbia.

Finlayson was appointed professor of civil engineering at Dalhousie University in 1913. At the same time, he acted as a consulting engineer in Halifax and Winnipeg and was responsible for the design of a number of bridges and buildings. In 1919 he was appointed professor and head of the Department of Civil Engineering at the University of Manitoba and, in 1936, Dean of the Faculty

of Applied Science at the University of British Columbia, the position he held at the time of his presidency.

Finlayson joined CSCE as a student in 1908 and became an associate member in 1912, a full member of EIC in 1919 a life member in January 1948. He served the Institute as chairman of the Winnipeg Branch in 1928, chairman of the Vancouver Branch in 1941 and a member of the Council in 1945 and 1946. His own Council in 1948 included three future presidents of the Institute: Vance Mcnab and Stephens.

During his time as president of the Association of Professional Engineers of Manitoba, the Manitoba Act was completely revised by the Legislature. While in Manitoba, Finlayson also acted as chairman of the Land Drainage Arrangement Commission of the Province. In 1942-43 he was chairman of the Engineering Bureau of the Vancouver Board of Trade and a member of the Council of the Board in 1944. As well, he was a member, and served as chairman, of the Vancouver Section of the Institute of International Affairs, a member of the British Columbia Metals Research Board and a member of the Rehabilitation Section of the Co-ordinating Council for Greater Vancouver. He was a member of the American Society of Civil Engineers.

Dean Finlayson died in 1971.

John Edwin Armstrong (1949) was an American who came to Canada, rather than the other way round. He was born at Peoria, Illinois, in 1885 and graduated from Bradley Polytechnic Institute in 1905 and from Cornell University in 1908 with a degree in civil engineering.

He was always associated with railroads, starting with the Toledo, Peoria and Western Railroad in the early 1900s. After graduation from Cornell, he was with the Pennsylvania Railroad at Pittsburgh before coming to Canada to join the Canadian Pacific Railway in 1912 as an assistant engineer. In 1928 he was appointed assistant chief engineer of the CPR and in 1939 became chief engineer, the position he held while president of the Institute. He became a Canadian citizen in 1921.

Armstrong was elected a full member of CSCE in 1917. He served on the finance committee of EIC from 1939 until 1947 and was a vice-president in 1945-46. He also chaired the special Institute committee on the Engineering Features of Civil Defence in 1942, with particular reference to the possibility of the enemy bombing of Canadian soil.

He made special contributions to the American Railway Engineering Association, where he served as a director and chaired standing and special committees, was a vice-president, and president in 1934-35. For the Canadian Standards Association (formerly the Canadian Engineering Standards Association), he served on the main and executive committees throughout the 1940s. In 1940 he was president of the Canadian Railway Club. He was also active in the Kiwanis Club of Montréal.

John Armstrong died in Montréal in December 1964.

James Alfred Vance (1950) assumed office as the president of the Institute in July, later in the year than was usual. He was born in Oxford County, Ontario. He studied civil engineering at the University of Toronto but assumed direction of the family steel and concrete bridge construction business after the death of his father in 1914. Under his management, the firm extended its activities to include the design and construction of factory buildings, sewers, dams and various other steel and concrete structures. At the time of his presidency, he was proprietor and engineer of the firm of J.A. Vance, Contractor, Woodstock, Ontario.

Vance's business interests, however, were not limited to his own. For example, he was president of Avalon Fabrics of Stratford, Ontario and a director of a number of other industrial enterprises and telephone companies, as well as owning and operating a 450-acre stock farm near Woodstock. His public services included trade, professional and service organizations, such as the Woodstock Board of Trade, of which he was president. He served as Ontario director of the Canadian Chamber of Commerce, was a trustee of the Beck Memorial Sanitarium in London, Ontario, and a member of the Board of Governors of the Canadian Independent Telephone Association in Toronto. During World War II, his company built a military camp at Woodstock, and he headed the Victory Loan Committee for Oxford County.

Vance joined the CSCE as a student in 1914, became a junior member of the Institute in 1919, an associate member in 1924 and a full member in 1939. He was the councillor for the London Branch from 1933 to 1945 and, in 1948, the vice-president for Ontario. In this latter capacity, he visited all the branches in the province. In 1949, he accompanied President Armstrong on his tour of Newfoundland at the time the 30th branch of EIC was formed there, following the province's entry into the Canadian Confederation, and represented the president - and Canada - at a meeting of the Commonwealth Engineering Institutions in South Africa.

Jim Vance died in 1981.

Ira P. Macnab (1951) followed McKiel and Hayes as the third EIC president from the Maritimes. He was born at Malagash, Nova Scotia, and spent seven years as an apprentice and journeyman machinist before studying engineering at Mount Allison University and the Nova Scotia Technical College, from which he received his degree in mechanical engineering in 1913.

After two years as manager of a machine shop, Macnab joined the Nova Scotia Light & Power Company and, by 1923, was superintendent of the tramway department. That same year, he moved to Calgary to be an executive with the Riverside Iron Works but, in May 1925, left there on his appointment as general manager of the Venezuela Power Company. He was transferred to the Monterey Railway, Light and Power Company in Mexico in 1930. In 1931, he returned to Halifax to join the Nova Scotia Board of Commissioners of Public Utilities. In 1947, he was appointed general manager of the Halifax Public Service Commission.

Macnab joined EIC as a full member in 1919. He was active in the organization of the Halifax Branch and its vice-chairman prior to leaving for Calgary. He chaired it in 1938, after his return to

Halifax, and represented it on Council the following year. In 1948-49, he was the representative of the Maritime provinces on the Council.

Macnab was a member of APENS, a member of its Council in 1938, and later served as vice-president and president of it. In 1950, he was elected president of the Canadian Council of Professional Engineers (now Engineers Canada). He was active in the promotion of the joint agreement between APENS and EIC which combined membership and fees and allowed the two organizations to function as a unit in the province.

Macnab was a member of the American Waterworks Association, was active in its Canadian section, and had been honoured by the Association. After returning from Mexico, he served as an elected representative of the Cumberland County Municipal Council. In 1942, he was appointed chairman of the committee to prepare a new master plan for the future development of the city of Halifax. At the time he was elected president of the Institute, he was serving on the executive of the Halifax Civil Defence Committee. He had also served as a member of the Council of the Halifax Board of Trade, as a member of the Board of Regents of Mount Allison University and, later, as member of the Board of Governors of the Nova Scotia Technical College. In 1950, he received an honorary doctorate from Mount Allison.

Ira Macnab died late in 1970.

John Bertram Stirling (1952) was born at Dundas, Ontario, in 1888. He graduated in arts and in engineering from Queen's University in 1909 and 1911. From then until 1917, he worked on construction projects in the prairie provinces, as well as in Ontario. He then joined the Canadian army and served overseas with the Royal Canadian Engineers.

In 1915, Stirling had joined the staff of E.G.M. Cape & Company as a field engineer, and returned to it at the end of World War I, remaining with it for the rest of his engineering career. At first, he was a supervising engineer on many construction projects throughout Canada, included among which were the Canadian Vickers plant in Montréal, the Banting Institute in Toronto, and docks and elevators at Saint John, New Brunswick, and at Georgian Bay ports. He became a vice-president of Cape in 1940 and president in 1950.

Stirling was prominent in the affairs of the Canadian Construction Association and its president in 1942 and 1943. He was a member of the Corporation of Engineers of Québec (now OIQ) and served as president in 1948. Two years later, he was elected president of the Montréal Board of Trade. He was also a member of the boards of two Montréal hospitals, as well as a trustee of Queen's University and president of its Alumni Association. In 1951, Queen's awarded him the honorary doctorate of laws degree.

Stirling joined CSCE in 1913 as an associate member, transferring to full member of EIC in 1934. He began his service on the executive of the Montréal Branch in 1939, chaired it in 1945, was

its councillor in 1946, and was vice-president for Québec in 1951. He chaired the Institute's Professional Interests and Finance Committees.

John Stirling died during the summer of 1988, just months short of his 100th birthday. To honour him and to commemorate his many services to engineering in Canada, the EIC Council approved the establishment of an award in his name for distinguished services rendered to the Institute and its Societies at the national level. It was generously funded by E.G.M. Cape & Company.

Ross L. Dobbin (1953) was born at Lindsay, Ontario, but his family moved to Peterborough soon afterwards. He graduated in mechanical engineering from the University of Toronto, receiving his degree in 1911. Like his predecessor, John Stirling, Dobbin gained his early engineering experience in Western Canada where he served as resident engineer for Walter J. Francis & Company on the construction of the Moose Jaw water supply. Three years later he was appointed waterworks superintendent for the Peterborough Utilities Commission. Subsequently, he was named acting manager of the Utility, becoming general manager in 1927 - the position from which he retired on April 1, 1953.

Dobbin had a long and active connection with the American Waterworks Association, which he first joined in 1914. He presented many papers to its meetings and was awarded its Diven Memorial Medal. He was elected chairman of the Canadian Section in 1922 and president of the Association in 1931 - the second Canadian to hold this office. He was also a member of APEO and a councillor in 1927 and 1928, and of the Association of Municipal Electric Utilities, of which he was president in 1930. He was a member of the Senate of the University of Toronto from 1927 until 1932. He was also a prominent member of the community at Peterborough, serving as a director or as president of a number of organizations.

Dobbin joined CSCE as a student in 1910, transferring to associate member in 1914 and to full member of EIC in 1919. He was a charter member of the Peterborough Branch and was secretary of it for a number of years before being elected chairman. He represented the Branch on EIC's Council for 14 years and was a vice-president of the Institute in 1936 and 1937.

During his presidential year, Dobbin represented the Institute at the coronation of Queen Elizabeth II in London. He died in May 1970 at the age of 87.

Dobbin was succeeded by **Donald McGregor Stephens** (1954), of Winnipeg, who was born in 1903 at Reston, Manitoba. Before entering the University of Manitoba, he attended normal school for a year and afterwards taught in various western towns, as well as being employed occasionally on farms or in construction. He went on to graduate in civil engineering at the University in 1931, and was president of the undergraduate society in his final year. As do most engineering students, he spent his undergraduate summers on field work, surveying in northern Manitoba. Following graduation, he returned to the University to do a year's work in economics and hydraulics.

In 1933, Stephens joined the provincial Department of Mines and Natural Resources and advanced through it to become deputy minister in 1938 and to serve in this capacity until 1951. During these years, he was concerned with water conservation schemes, mining road projects, forest management and many other programs. He served on two committees associated with the International Joint Commission having to do with boundary waters, and on another international board dealing with the Souris River. Earlier, in 1941, he was selected to represent the western provinces on the construction project sub-committee convened by the federal Committee on Reconstruction and chaired by Kenneth M. Cameron, later to be president of EIC. In 1948, the province decided to develop the Pine Falls hydro site and appointed Stephens to chair the engineering board responsible for all phases of this work. He represented Manitoba on the Prairie Provinces Water Board until 1951. He was also involved in the solution of problems associated with the Red River floods of early 1951, as a result of which he was selected to represent the province on the Greater Winnipeg Dyking Board.

When the Manitoba Hydro-Electric Board was set up in May 1951, Stephens was appointed chairman and general manager, the position he held when elected president of the Institute. He also retained the responsibilities given him, in 1948, as chairman of the Manitoba section of the Winnipeg River Interprovincial Advisory Board, responsible for power development co-ordination with Ontario. In 1952, when the MHEB secured control of the Winnipeg Electric Company, which supplied the city, he was appointed president and general manager of the re-organized company.

Stephens joined the Institute as a junior in 1934, transferred to associate member in 1934 and became a full member in 1940. He chaired the Winnipeg Branch in 1942 and was a member of the Council from 1946 to 1949. He was a member of APEM and served as its vice-president in 1953. He was also a member of the Canadian Institute of Mining and Metallurgy, the Institute of Public Administration and the Canadian Institute of International Affairs.

Donald Stephens died in Winnipeg in April 1968.

Richard E. Heartz (1955) was unusual in that he was born at Marshfield in Prince Edward Island and has been the only Island-born president of CSCE/EIC. However, he attended Mount Allison and McGill universities for his engineering education. Immediately on graduation in 1917, he joined the Royal Flying Corps and was commissioned as a pilot several months later.

In 1920, Heartz joined the Shawinigan Water & Power Company in Québec and was its president and a director at the time of his presidency of the Institute. His first assignment was on the construction of the Company's No.2A development at Shawinigan Falls. He was then associated as resident engineer on the construction of power developments at La Gabelle on the St. Maurice River, St. Narcisse on the Batiscan and Paugan Falls on the Gatineau, after which he was transferred to the Company's head office in Montréal. In 1935 he was appointed assistant chief engineer, a vice-president in 1941 and, in1942, was loaned to the federal government as general manager of Wartime Merchant Shipping Ltd. to assist in the direction and coordination of the work of 14 shipyards and their suppliers as part of the Canadian cargo vessel building program. He was promoted to chief engineer of Shawinigan in 1947 and president in 1952.

Heartz joined the CSCE as a student in 1917, became an associate member of EIC in 1926 and a full member in 1933. He was chairman of the Montréal Branch in 1941, a member of the Council from 1942 to 1944, treasurer in 1948, and vice-president and chairman of the Finance Committee in 1949 and 1950. He was a long-time member, and active, in the American Societies of Civil and Mechanical Engineering. He was also a member of the Corporation of Engineers of Québec (now OIQ).

At the time of his presidency, Heartz was a member of the Board of Sir George Williams College in Montréal and the Board of Regents of Mount Allison University, from which he received an honorary doctorate of laws degree in 1952, and a member of the board of governors of the Royal Edward Laurentian Hospital of Montréal.

Dick Heartz' date of death is not known.

Vernon A. McKillop (1956) followed him in the presidency. A native of West Lorne, Ontario, where he was born in March 1899, McKillop studied electrical engineering at the University of Toronto, graduating in 1924 - his education having been interrupted by army service in World War I. After graduation, he joined the Public Utilities Commission in London, Ontario.

At the time of his Institute presidency, McKillop was the general manager of the PUC, having been appointed to the position in 1952 and having advanced in rank and responsibility on a regular basis throughout his career. He was involved with the distribution of electricity, bought from Ontario Hydro, the distribution of water and the search for additional underground supplies of it, the operation of an extensive park system and recreation program, and the management of the city-owned railway from London to Port Stanley on Lake Erie.

It may seem strange for a city to own a railway, but London did. As McKillop's predecessor - E.V. Buchanan - said in 1935 when London took this one over, "I got an electric train for Christmas!"

During and after World War II, McKillop served as a volunteer advisor to the London Board of Education in its dealings with students and veterans who showed an interest in engineering as a career. He was a member of APEO, of the Canadian Section of the American Water Works Association, of which he was chairman of it in 1956, and of the Association of Municipal Utilities, of which he was president in 1942. His association with EIC began in 1926 when he joined as a junior member. He was elected an associate member in 1929 and a full member in 1940. He was active in the London Branch, chairing it in 1933. From 1940 until 1955 he was a member of the Institute's Council, representing the London Branch, and served as a trustee of the Bennett Educational Fund from 1948 until 1956.

Verne McKillop died in March 1968.

Clement Matthew Anson (1957) was born in England in 1901 - the first Institute president born in the 20th century. His grandfather had built blast furnaces in India and the United States as well as England. His father had taken part in the original development and production of raw steel for stainless steel products and eventually became the manager of a steelworks in Australia. Anson, himself, spent his working life making steel.

At the age of 20, he left Australia to enroll in engineering at McGill and graduated in metallurgy in 1925. At that time, he worked as a labourer in the blast furnace department of the Dominion Iron & Steel Company at Sydney, Nova Scotia. From there, he worked his way upwards in the company. He served as a coke oven specialist and in a succession of assistant positions - blast furnace superintendent, superintendent of heavy mills, general superintendent and general manager. In 1940 he was appointed general manager of the company and, subsequently, his responsibilities were enlarged to include the Seaboard Power Corporation, Dominion Limestone (quarrying), James Pender & Company (a wire nail manufacturer) and Dominion Shipping Company Ltd. (shipping operations), all of which were subsidiary companies of the Dominion Steel and Coal Corporation Ltd. He took office as vice-president and general manager of Dominion Iron & Steel Ltd. in 1952.

Anson was elected an associate member of EIC in 1931, transferring to full member in 1941 and was active in the Cape Breton Branch if the Institute, based in Sydney. He served on Council as the vice-president for the Maritime Zone in 1946 and 1947. He was awarded the Institute's Julian C. Smith medal in 1950 and the Leonard Medal in 1954, becoming the first engineer in the steel industry to receive both.

Anson was a member of the Canadian Institute of Mining and Metallurgy and the British and the American Iron and Steel Institutes. He was a governor of the Research Council of Nova Scotia, the Nova Scotia Centre for the Geological Sciences and Nova Scotia Technical College. He was also active in the Sydney community.

Clem Anson died in October 1981.

Numerically the 70th president, **Kenneth Franklin Tupper** (1958-1959) was one of a rare kind of engineer - one who served in industry, government and academia. Born in the United States, but growing up in Western Canada, he received his early education in Saskatoon and Calgary. He took his degree at the University of Toronto, graduating in mechanical engineering in 1929. He subsequently studied aeronautical engineering and received a master's degree from the University of Michigan in 1938. Meanwhile, he worked for the Riverside Iron Works in Calgary in 1929, but later that year joined the staff of the Division of Physics at the National Research Council in Ottawa as a draftsman. Shortly thereafter, when NRC's Division of Mechanical Engineering was formed, and the aeronautical laboratories became part of it, Tupper joined it to work on the design and operation of wind tunnels and ship model testing. In 1943, he was assigned to the Canadian aircraft jet engine project and became chief engineer when the Crown corporation, Turbo Research, was formed to continue it. In 1946, when the project was passed on to A.V. Roe Canada Ltd, Tupper left

it and returned to NRC, where he was assigned to the new atomic energy project at Chalk River. In 1947 he was appointed to take charge of the division responsible for plant operations and services. In recognition of his wartime services, he was honoured as an Officer of the Order of the British Empire (OBE).

In 1949, Tupper became the fifth dean of the Faculty of Applied Science and Engineering at the University of Toronto, and remained there until 1954 when he returned to industry as president of Ewbank & Partners (Canada) Ltd. of Toronto, a consulting firm in the thermal and electric power fields. He was elected a full member of the Institute in 1949 and represented the Toronto Branch on the Council in 1957.

Ken Tupper died in 1994.

John Jeffrey Hanna (1959-1960) followed Tupper as president. Born in Toronto in 1892, he graduated in civil engineering at the University of Toronto in 1914 and, on graduation, joined the engineering department of the city of Calgary, briefly. From then until 1919, he served with the Royal Canadian Engineers, attaining the rank of captain.

After war service, Hanna re-joined the city staff and was involved, first, in natural gas and general engineering. During 1920 and 1921 he was the resident engineer for the city on the Hillhurst Bridge Later in 1921, he was with the Lethbridge Northern Irrigation District as resident engineer on the Oldman River flume. He then joined Imperial Oil Ltd. at its Calgary refinery and worked, successively, as a construction engineer, mechanical superintendent, assistant refinery manager and refinery manager. He retired from the company in 1957.

Hanna joined CSCE in 1917 as an associate member, becoming a full member of EIC in 1940. Over the years, he took a very active part in the Calgary Branch of the Institute. He served on many of its committees, was chairman in 1949-50, and its representative on EIC's Council from 1952 until 1954. He was also active in the Association of Professional Engineers of Alberta, served on its Council and committees, as its vice-president and president and, in 1955, its representative on the Dominion Council of Professional Engineers. For both the Calgary Branch of EIC and the Alberta Association, he took a special interest in engineering education and student guidance.

In the broader community, Hanna was a member of the Calgary Chamber of Commerce, a councillor and committee chairman. He was a member and director of Rotary International and chaired the finance committee of the Calgary Branch of the Canadian Red Cross Society. He also served as a alderman of the city of Calgary, and was in his second term while also president of EIC.

John Hanna died in November 1970.

George McKinstry Dick (1960-1961) was born in Scotland, where he completed his secondary

education prior to coming to Canada. After a short stay in Western Canada, he became a resident of Sherbrooke, Québec and began an apprenticeship with the Canadian Ingersoll-Rand Company (CI-R). During World War I, he was employed on the design of machinery for the manufacture of munitions. After the war, he was a student at Bishops University at Lennoxville and later at McGill, where he won several awards, and from which he graduated with an honours degree in mechanical engineering in 1924.

Dick then accumulated a variety of engineering experience, beginning with the Brompton Pulp & Paper Company at East Angus, Québec, and Babcock Wilcox & Goldie-McCulloch Ltd. at Galt, Ontario, after which he re-joined CI-R at Sherbrooke. For many years, he was the company's chief hoist engineer. During World War II, he served again in munitions manufacturing, as chief engineer of the company's subsidiary, the Sherbrooke Pneumatic Tool Company. He also served as technical assistant to the works manager of CI-R and, in 1945, was appointed the company's manager of engineering. His duties were continuously broadened and he was named manager of engineering and purchasing. In 1952, he was made chief engineer, the position he held while president of the Institute.

Dick was a charter member of the Eastern Townships Branch of EIC, its first chairman, and represented it on the Institute's Council. He also served as vice-president for Québec. Among his EIC assignments was the vice-chairmanship of the Engineers Confederation Commission, set up jointly in the late 1950s by EIC and the Canadian Council of Professional Engineers (now Engineers Canada).

He also served as the regional representative for the Eastern Townships on the Council of the Corporation of Engineers of Québec (now OIQ). He was a member of ASME, the Technical Association of the Pulp & Paper Industry of the U.S.A., the Canadian Pulp & Paper Association, the Canadian Institute of Mining and Metallurgy and the British Association for the Advancement of Science. He also took an active interest in education and was a member of the advisory committee for the Faculty of Science at l'Université de Sherbrooke and in the affairs of the larger Sherbrooke community. He was, for example, a governor of the Sherbrooke Hospital. He travelled extensively on the American continent and in Europe.

George Dick died in Sherbrooke early in 1970.

Born in 1902 at Fort Stewart, Ontario, **Bristow Guy Ballard** (1961-1962) received a degree in electrical engineering from Queen's University in 1924. He then took a graduate course at the Westinghouse Electric and Manufacturing Company at East Pittsburgh, Pennsylvania, after which - in 1925 - he joined the company. For the next five years he was a member of the heavy traction section of the Railway Motor Engineering Department, working on the design and construction of many types of rotating machines for such railroads as the Great Northern and the Illinois Central.

In 1930, Ballard joined the staff of the National Research Council's Division of Physics in Ottawa and, over the next decade, built up its electrical engineering research facilities. He also acted as a

consultant in electrical engineering matters and developed a number of pieces of specialty equipment. In 1946, he was named assistant director of the Division of Physics and Electrical Engineering and, in 1948, was appointed the first director of the new Division of Radio and Electrical Engineering. In 1954, he was promoted to vice-president (scientific) of NRC - the position he held during his presidency of EIC. In 1956, he received a DSc degree from Queen's.

One of Ballard's principal objectives at NRC was to stimulate the development of Canadian engineering through research. To foster this, in 1955 he convened a conference of engineering deans to offer them - through NRC - a similar array of university grants and scholarships similar to those available to scientists. He was not at first successful, but tried again later!

Ballard joined the Institute as an associate member in 1931 and transferred to full member in 1940. He took an active interest in the Ottawa Branch and served as chairman, also representing it as a member of the Council. In 1960, EIC elected him an honorary member. He also served as chairman of the Ottawa Section of the American Institute of Electrical Engineers and a senior member of the Institute of Radio Engineers (prior to the amalgamation of these two organizations). He was a member of APEO and of the Professional Institute of the Public Service of Canada.

Guy Ballard died in Ottawa in September 1975.

Frederic Lewis Lawton (1962-1963) was described in his presidential biography as an 'impatient' engineer - one who became displeased with less than all-out effort, one who preferred the direct to the devious approach to the solution of a problem, one who made one day do the work of two. It also bothered him that Canadian engineers were often accepted for their excellence more readily abroad than at home.

Born in England in December 1900, Lawton came to Canada as a youngster and grew up in Alliston, Ontario, and in Toronto. One of his first jobs was as a cub reporter, and the attraction of the newspaper never left him. Another was with the Toronto Street Railway, and during this time he attended high school level night classes in mathematics in order to qualify for admission to engineering at the University of Toronto. During two of his undergraduate summers he worked in the gold mines in the Timmins area. He graduated with honours in electrical engineering in 1923.

After graduation, Lawton joined the General Electric Company at Schenectady, New York, where he took an advanced engineering course and gained experience in industrial controls, large and small motors and generators. Later, he was in charge of large-scale shop tests of long-distance transmission systems. In December 1925, he came back to Canada and joined the Québec Development Company as an assistant electrical engineer on the Ile Maligne project, after which he worked for the Duke-Price Power Company, the Aluminum Company of Canada and, since 1948, Aluminum Laboratories Ltd. - the R&D subsidiary of Aluminum Ltd. He became head of the Power Division and, later, vice-president. His duties included hydro-electric and other power investigations for developments in the Americas, Europe, Africa and Asia and consulting services in the power field for Aluminum Ltd.

subsidiaries. In April 1957, he became a director of the Saguenay Transmission Company Ltd. and of Saguenay Power. Prior to his EIC presidency, Lawton had presented/published around 40 major papers.

Lawton joined the Institute as a student in 1920, becoming an associate member in 1928 and a full member in 1936. His first major responsibility within it came in 1937 when he was elected chairman of the Saguenay Branch. Since then, he served as chairman of the Montréal Branch, chairman of the Institute's Committee on Technical Operations, the Finance Committee and the Committee on Branch Operations, and as vice-president for Québec.

Fred Lawton's date of death is not known.

Thomas Clinton Higginson (1963-1964) was born in Montréal in 1909, worked there, but spent much of his career in Saint John, New Brunswick. Unlike most of his fellow presidents, he had no university degree in engineering, but continued his post-secondary education over a period of years, with special emphasis on mechanics and hydraulics.

Higginson's professional and business career began at Willis Overland in Montréal where he became an assistant manager. From there, he joined the engineering department of the Automatic Sprinkler Company of Canada and rose to the position of manager of engineering and sales. In 1946 he moved to Saint John where he formed, and still operated at the time of his EIC presidency, the Maritime Division of Automatic Sprinkler, with branch operations in Halifax. Also in 1946, he established Eastward Industries Ltd, and became its president. In 1949 he entered the land development business and was president of the company he formed. On a technical level, he held patents and design registrations in Canada and abroad. He developed a moisture and heat control system for veneer logs that was used in World War II, and was active in the development of fire control systems for buildings and other applications.

Higginson was a member of the Association of Professional Engineers of New Brunswick. He joined the Institute as a full member in 1949 and later served as chairman of the Saint John Branch and as vice-president for the Atlantic provinces. He was a member, and past president, of the Saint John Board of Trade, a member of the electric power development committee of the Atlantic Provinces Economic Council, took an active part in the industrial development of the region, and was a long-time member of the Rothesay School Board.

Clint Higginson's date of death is not known.

George E. Humphries (1964-1965) was born in Wolverhampton, England, in December 1907, took a mechanical engineering course at the Technical College there, and combined this with job training on steam plant design and construction. He received a diploma and a National Certificate for his studies.

Humphries came to Canada for the first time in May 1928 and worked as a structural draftsman and designer for the Hamilton Bridge Company, the Hydro-Electric Power Commission of Ontario and McClintic Marshall Construction Ltd. of Pittsburgh, Pennsylvania. Returning to England in September 1930, he returned to the Technical College, in addition to studying civil engineering through correspondence and extension courses.

Humphries returned to Canada in 1931 and worked for two years in Northern Ontario and Québec on prospecting, surveying and mine development. He worked for a further two years in gold mines, mostly directing underground development. In 1935 he became chief engineer of the mining division of Canadian Comstock Ltd. and was engaged in the design and construction of mine and mill plant. He joined the Royal Canadian Engineers in 1940 as a sapper and was sent to England, where he served for 18 months before returning to Canada for officer training. Commissioned, he was sent back to England in December 1942 and served there and in Northwest Europe until September 1945. During this time he was involved in development work on advanced landing grounds for close support aircraft and in the development of bridging techniques for large river crossings without the use of floating equipment. Humphries was demobilized late in 1945 with the rank of captain. For his war service, he was mentioned in dispatches and became a Member of the Order of the British Empire (MBE). He continued to serve in the active militia, retiring in 1956 with the supplementary reserve with the rank of Lieutenant-Colonel.

In January 1946, Humphries joined with Brigadier Murray Dillon to form the consulting firm, M.M. Dillon & Company, in London, Ontario. He was chief engineer from then until 1959, when he was named president and chief engineer - the position he held while president of EIC. He had joined the Institute as a junior member in 1930, transferring to full membership in 1940. He served as secretary of the London Branch in 1950, as chairman in 1951, and as Branch representative on the EIC Council from 1957 until 1959. He was elected vice-president for the Ontario Region in 1962.

Humphries was a member of the Associations of Professional Engineers of Ontario and Manitoba, and a member of the Military Engineers' Association of Canada, the Society of American Military Engineers, the Canadian Good Roads Association and the London Chamber of Commerce. He was also a member of the Association of Consulting Engineers of Canada, serving as a director from 1960 until 1963 and as president in 1963.

George Humphries died in March 1993.

He was followed by **Gaëtan Jules Côté** (1965-1966), who was born in Sherbrooke, Québec, in October 1913, and was a member of consulting engineering firms based in Sherbrooke, Québec, from the time of his graduation in civil engineering from Montréal's l'École Polytechnique in 1936. In 1940, he qualified as a Land Surveyor in the Province of Québec and, in 1945, received a certificate in prestressed concrete from a Belgian university. In 1963, l'Université de Sherbrooke granted him an honorary doctorate of science degree.

In 1936, he joined the consulting firm of Crépeau et Côté, of which his father was a principal, and remained with it until he enlisted - and was commissioned - in the Royal Canadian Engineers. He saw active service during World War II and ended it in 1945 as Lieutenant-Colonel commanding the 3rd Battalion of the RCE. He participated in the construction of the PLUTO oil pipelines across the English Channel and pipelines between Belgium and Holland during the Allies' Northwest Europe campaign, as well as the construction of numerous Bailey bridges. For his services, he was awarded military membership in the Order of the British Empire (MBE).

On leaving the army, Côté re-joined the Sherbrooke firm of Crépeau et Côté and took part in the design and construction of water supply and sewage systems, filtration and sewage treatment plants, and in projects involving bridge, viaducts ,schools and other buildings. In 1952, he became a partner in the firm of Côté, Lemieux, Carignan et Royer and was concerned with the design and construction of a variety of municipal works and of highways.

In 1954, Côté was a co-founder of the Faculté des Sciences at l'Université de Sherbrooke and was appointed director of the School of Engineering, a position he held for four years.

In 1956, he was a founding partner and director of Cartier, Côté, Piette, Boulva, Werminlinger & Associés, consulting engineers in Montréal, and of Teknika Inc. of Sherbrooke, to which he belonged during his presidency of the Institute. This firm was concerned, among other projects, with the design of the Lachine Hydro Development on the St. Lawrence River and three control dams near Beauharnois and the design and supervision of a short wave communications system between Montréal and Manicouagan, with school projects, and with the construction of three islands for EXPO 67.

Côté joined the Institute as a full member in 1946. He was a co-founder of the Eastern Townships Branch in 1951, the councillor for this Branch on the EIC Council from 1952 until 1963, and vice-president from 1963 to 1965. He was also a member of the Corporation of Engineers of Québec and the Corporation of Land Surveyors, the Canadian Institute of Surveying, the Association of Consulting Engineers of Canada, among other Canadian and American engineering organizations. In addition, he was a member of la Société des ingénieurs civils de France and for many years was the liaison between this organization and EIC. He was also a director of a number of Québec/Canadian companies.

Gaëtan Côté died late in 1997.

Joseph Mervyn Hambley (1966-1967) followed Côté and was in office during the first half of Canada's Centennial Year. He was born at Copper Cliff, Ontario, and attended secondary school in Sudbury, following which he was employed for a year at the International Nickel Company's smelter at Copper Cliff before proceeding to Queen's University. He graduated in electrical engineering in 1929.

After a year with the Canadian General Electric Company at Peterborough and Toronto, Hambley joined Ontario Hydro in 1930 as an assistant engineer in the Operating Department, serving in the Georgian Bay System and in Northern Ontario. He was appointed director of operations in 1947 and deputy general manager in June 1959. On January 1, 1960, he became general manager of Hydro.

Hambley joined the Institute as a full member. He was also a member of the Canadian Electrical Association and served as its president in 1964-1965. In 1961, he was made a Fellow of the American Institute of Electrical Engineers (now IEEE). In 1965, he received the first honorary Doctor of Engineering degree conferred by the University of Waterloo and, in 1967, an honorary doctorate from Queen's. He was a member of APEO, the Electric Club of Toronto and the Board of Trade of Metropolitan Toronto and served on the Canadian National Committee for the World Energy Conference. He held directorships in several Canadian companies.

In addition to taking part in the preparations for the international engineering conference organized the Centennial Year by Canada's engineering societies, Hambley was in office when sustaining membership in the Institute was introduced.

Mervyn Hambley died in June 1997.

John H. Swerdfeger (1967-1968) shared Canada's Centennial Year presidential duties with Mervyn Hambley. Born at Innisfail, Alberta, in 1922, he was educated in Vancouver, graduating in civil engineering from the University of British Columbia in 1944, after a short period of service in the Royal Canadian Navy. His post-graduation education covered courses in business management and urban land economics. His early engineering experience included design and construction supervision on the Hell's Gate Fishways, the design of bulk grain handling systems for a number of B.C. ports and the port of San Francisco, and structural design work for the B.C. Electric Company.

In 1949, Swerdfeger joined the consulting firm of McCarter, Nairne & Partners as chief engineer and rose to become senior partner as well as president of their subsidiary, Unecon Engineering Consultants Ltd., the positions he held during his Institute presidency. His work for these firms included hospitals, schools, office and public utility buildings, town development projects and other large projects serving the forest and mining industries throughout British Columbia and the Yukon.

Swerdfeger joined the Institute as a student in 1941, transferred to junior in 1946, and became a full member in 1949. He was active in the Vancouver Branch, where he served as chairman, and was its representative on the EIC Council and vice-president for the Western Region. In 1966 he was leader of the EIC delegation to the 9th Congress of the Pan-American Confederation of Engineering Societies (UPADI) held in Mexico City. He was registered as a professional engineer with the Association in British Columbia in 1948, participating actively in its activities in Vancouver and serving on the Board of Examiners. He was also a member of the American Concrete Institute.

Jack Swerdfeger died in 2005.

Numerically, **Jean-Paul Carrière** (1968-1969) was the 80th president of CSCE/EIC. His career spanned both professional engineering and military service.

Born at Hull (now Gatineau), Québec, in 1907, and orphaned while still a young boy, Carrière worked as a 14-year old mechanic and handyman in a local bicycle shop. Even then, he was preoccupied with the idea of becoming an engineer. He began almost immediately realizing this idea, by taking correspondence courses in engineering subjects. At the age of 17 he moved on to employment with the Hull city engineer. In this job, he attracted the attention of the Eddy Paper Company, who offered him training as a papermaker - but he acquired experience in several trades.

In 1929, Carrière joined the Department of Public Works in Ottawa as a draftsman, while continuing his engineering studies. In 1931 he joined its staff at Rimouski, Québec, during which time he was articled to the district engineer and applied for membership in the Corporation of Engineers of Québec. He was admitted to the Corporation five years later. By 1940, he had moved to London, Ontario.

Carrière saw military service in militia units in Ottawa, Rimouski, and London. In1940, however, he went on active service with the Royal Canadian Engineers, serving in England until 1942, when he was sent back to Canada to the War Staff College at Kingston. Late in 1943, he was back in Europe, and spent the next two years in England, France, Belgium, Holland and Germany. He served as a staff officer, RCE, in charge of the construction of forward airfields for the 1st Canadian Army, then as commander of the 2nd Battalion, RCE.. He was promoted to full colonel in February 1945 and made deputy chief engineer of the Canadian Army with special responsibilities in regard to the Rhine and Issel bridges constructed in the Canadian Army area. During his military career, Carrière was twice mentioned in despatches and received honours from both France and Belgium

In the years immediately after the War, he served as commander of the Hull Regiment and of the 10th Infantry Brigade from 1950 to 1951, and as commander of the 8th Infantry Brigade from 1951 to 1954. He served as ADC to the Lieutenant-Governor of Québec from 1947 to 1951 and to the Governor General of Canada from 1951 to 1954. He was appointed honorary colonel of #3 Field Regiment, Royal Canadian Engineers in 1963.

In 1945 Carrière rejoined the Department of Public Works in Ottawa as assistant to the chief engineer in Ottawa. In 1946 he was appointed municipal manager and chief engineer for the city of Hull, and a member of the Improvement Committee for the National Capital. In 1949 he joined the Dufresne Engineering Company in Montréal as chief engineer. From 1951 until 1954 he was chief engineer of Collet Frères Limitée, also of Montréal. He then returned to Ottawa, to the Public Works Department, as chief engineer. In 1957 he returned to Montréal on being appointed vice-president of Collet Frères. In 1959, he became executive vice-president and general manager of Franki Canada Ltd., foundation specialists, also of Montréal, becoming president in 1963 - the position he held while president of the Institute.

Among the notable projects in which he participated were the blasting of Ripple Rock in British

Columbia, the second section of the Beauharnois hydro-electric project, the organization for the trans-Canada highway, and the Notre Dame Hospital in Montréal.

Carrière joined the Institute as an associate member in 1939, transferring to full member in 1940. He served on various committees of the London, Ottawa and Montréal Branches, was vice-chairman of the Montréal Branch for 1950-51, its member of the EIC Council and a member of the Finance Committee from 1952 to 1954, vice-chairman of the Ottawa Branch for 1956-57, chairman of the Montréal Branch for 1963-64, its councillor, a member of the EXPO 67 Committee for 1964-65, and vice-president for Québec for 1965-66.

He was elected to the boards of several of Canadian companies. He authored a number of technical papers published in the *Engineering Journal* and in ASCE's *Civil Engineering*, as well as articles on military engineering and contributions to several books.

Brigadier Carrière died in 1979.

Jean-Paul Carrière was followed as president by **William Gordon McKay** (1969-1970), who shared with his own successor, Leslie Hutchison, the year of 1970 - the interregnum leading to the third phase in the development of CSCE/EIC - the one during which the Institute began its development as a federation of learned societies.

McKay was born in Regina, Saskatchewan, in December 1917 and raised in Portage La Prairie, Manitoba. He entered his first year of engineering at the University of Manitoba in 1936 but, a year later, transferred to Queen's University, from which he graduated with a degree in civil engineering in 1940. That same year, he began graduate studies in sanitary engineering at Queen's, but these were affected by World War II and were not completed. In 1941, McKay joined the Public Health Engineering Division of the federal Department of Pensions and National Health to undertake investigations into water supplies on board ships, trains and other common carriers, at air force and army establishments, and at wartime industry plants in Ontario. In 1942 he moved west to the district engineer's office in Edmonton to do similar work, principally at military establishments and at the city of Prince Rupert.

In October 1945, McKay joined the Edmonton office of the consulting firm, Underwood & McLellan as a resident engineer to work on projects in Calgary and Red Deer and several smaller Alberta municipalities. Six months later, the office was moved to Saskatoon, where U&M had its head office and McKay worked on a program of improvements and extensions to road, water and sewer systems at RCAF stations in Western Canada. In April 1949, he was sent to Flin Flon, Manitoba, to assist with a major water and sewer installation, which included a system of wooden utilidors to house piping. Later that year, he was put in charge of the construction phase, which ended in the fall of 1951.

Early in 1952, the original partners in the firm - J.E. Underwood and R.A. McLellan - sold the firm to five associates, one of whom was McKay. These were major growth times for consulting in

municipal engineering in Western Canada as small towns were modernized with water and sewer systems and larger towns and cities grew with numerous sub-divisions. Initially an associate and director, McKay was appointed manager in 1955, but continued as project engineer for certain projects. He was named president and general manager of the firm in 1960, and served in these capacities and as chairman from 1966 until 1970. After stepping down, McKay remained with the firm in the role of company secretary. During this post-war period, the firm had expanded significantly - as had the number of consulting engineering firms in the Prairie Provinces. In 1968, McKay - and UM&A's head office - moved from Saskatoon to Winnipeg.

McKay joined EIC as a student in 1941 and as elected a full member in 1944. His active participation in it began in the early 1950s in Saskatoon, when he served on the executive of the Saskatchewan Branch and as its chairman. In the mid-1960s, he became vice-president for the Prairie Region and, in 1968, senior vice president under President Carrière. Earlier, in 1957, he had served as president of the Association of Professional Engineers of Saskatchewan. He was a member of the American Water Works Association and chairman of its Canadian Section, the Western Canada Water & Waste Water Association and a past president of it, and a director of the Association of Consulting Engineers of Canada.

Bill McKay was the only living president from the Institute's second development phase at the time of writing.

William Leslie Hutchison (1970-1971) was born in Ottawa in 1912, the great-grandson of William Hutchison, who came out from Scotland around 1830 to work with Colonel By on the building of the Rideau Canal. He was educated at Glebe Collegiate and at McGill University, graduating in electrical engineering in 1934, having been president of the Student Council. His subsequent career combined engineering with management, consulting and business.

His early years of employment were influenced by the Depression. During World War II, Hutchison was engaged in the production of war materials as works manager at the Hamilton Bridge Company. After the war, he was manager of manufacturing in Canada, and then director of manufacturing for the U.K. and Europe, for the Remington Rand Company. Returning to Canada in 1956, he joined Moffats Limited and remained with the company until 1962. During this time, as vice-president, he was involved in the establishment of its international business and the setting up of its British subsidiary and manufacturing unit in Scotland.

Hutchison became a founding director of Fluid Power Limited when it was formed in 1960 from one of the divisions of the Viceroy Manufacturing Company - a manufacturer of hydraulic cylinders, presses and systems. He became active in FPL in 1962, through the management consulting firm he established on leaving Moffats, and assumed the presidency of it in 1964. Shortly thereafter, an affiliated company - Fluidic Systems Limited - was established to provide design engineering services to meet the demands of the growing fluid power industry. As they developed, both companies became active in the United States as well as in Canada. In 1969 FPL became part of Garlock Inc.

Hutchison joined EIC as a full member in 1943. He was active in the Hamilton Branch and served as chairman in 1952. After moving to Toronto, he chaired the Toronto Branch in 1960. He was a member of the Council from 1961 to 1964, and vice-president for the Ontario Region from 1965 until 1967, and senior vice-president under Bill McKay for 1969-1970. During these latter years, he was involved in the changes within the Institute that led to the founding of the first constituent society - CSME.

Hutchison was also a member of APEO and a Fellow of the Institution of Mechanical Engineers in Britain. He served on the national executive of the Canadian Manufacturers' Association and represented Canada at meetings of the Pacific Basin Economic Co-operation Council in 1969 and 1970, as well as representing the Canadian engineering profession at the UPADI Conference in 1970 at Buenos Aires.

Les Hutchison died in March 1983.

Acronyms

ACEC: Association of Consulting Engineers of Canada (the national 'business' body to which consulting companies belonged), now the Association of Consulting Engineering Companies (ACEC)

AIEE: American Institute of Electrical Engineers, now merged (in 1963) with the Institute of Radio Engineers (IRE) as the Institute of Electrical and Electronic Engineers (IEEE)

APEBC: Association of Professional Engineers of British Columbia, now the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC)

APEM: Association of Professional Engineers of Manitoba, now the Association of Professional Engineers and Geoscientists of Manitoba (APEGM)

APENB: Association of Professional Engineers of New Brunswick, now Engineers and Geoscientists New Brunswick

APENS: Association of Professional Engineers of Nova Scotia, now Engineers Nova Scotia

APEO: Association of Professional Engineers of Ontario, now Professional Engineers Ontario (PEO)

APES: Association of Professional Engineers of Saskatchewan, now the Association of Professional Engineers and Geoscientists of Saskatchewan (APEGS)

ASCE: American Society of Civil Engineers

ASME: American Society of Mechanical Engineers

CCPE: Canadian Council of Professional Engineers (the national body to which the Associations in the provinces and the Order belong), now Engineers Canada

CESA: Canadian Engineering Standards Association, now the Canadian Standards Association (CSA)

CEQ: Corporation of Engineers of Quebec, now l'Ordre des ingenieurs du Québec (OIQ)

CGS: Canadian Geotechnical Society

COTC: Canadian Officers' Training Corps

CSCE: from 1887 until 1917, the Canadian Society of Civil Engineers (predecessor of the Engineering Institute of Canada) and, since 1972, the Canadian Society for Civil Engineering (an EIC constituent/member society); CSCE/EIC has been used to indicate all or some of the time between 1887 and the present that has included both institutions

CSEE: Canadian Society for Electrical Engineering, later the Canadian Society for Electrical and Computer Engineering (CSECE), now IEEE Canada

CSEM: Canadian Society for Engineering Management, formerly the General Members' Group/Society of EIC

CSME: Canadian Society for Mechanical Engineering

DCPE: Dominion Council of Professional Engineers, now CCPE/Engineers Canada - see above

EIC: Engineering Institute of Canada; note that CSCE/EIC has been used to cover periods during which both the (original) CSCE and the EIC were in operation

IEEE: Institute of Electrical and Electronic Engineers, formerly, before their merger, the American Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE)

IMechE: Institution of Mechanical Engineers (U.K.)

UPADI: Pan-American Union of Engineering Societies

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