



**THE ENGINEERING INSTITUTE OF CANADA**

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## **EIC's Historical Notes and Papers Collection**

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

### **ENGINEERING HISTORY PAPER #18**

## **“The Engineering Journal as a Source for the History of Engineering”**

**by Andrew H. Wilson**

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EIC HISTORY AND ARCHIVES

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## Abstract

This is the second in a sub-series of EIC Working Papers that examines the role of the Engineering Journal, which was published by the Institute from 1918 until 1987. The first of the Papers discussed highlights from the Journal's own history.(1) This next one begins by covering this same ground very briefly, for the benefit of those who have not read the earlier one. It goes on to consider technical papers and articles that appeared over the years and were of historical interest when published, acquired this kind of interest some years after publication, or could well become 'historical' in the future. It then discusses briefly the development of the Institute itself, as reflected in the pages of the Journal, and ends with a number of comments.(2)

A shortened version of this Working Paper was presented in early October 1997 at the 10th Kingston Conference organized by the Canadian Science and Technology Historical Association. The author takes responsibility for the selection of the material included.

## About the Author

Andrew H. Wilson is a graduate mechanical engineer with training in economics. Now in the process of retiring as a consultant, he has been devoting much of his time recently to activities associated with the history of engineering in Canada and with research and writing in this field, with particular reference to the Engineering Institute of Canada and the Canadian Society for Mechanical Engineering. He is currently a member of the Institute's Council as Secretary for EIC History and Archives and of the Society's Board as Chairman of the History Committee.

## About the Working Paper Series

In June 1995 the Council of the Institute agreed that a series of Working Papers on topics related to its history and development, to the history and development of other institutions serving engineering in Canada, and to engineering generally, should be published from time to time. The Papers may, or may not, be authored by members of the engineering profession.

The Papers will have limited initial distribution, but a supply will be maintained at EIC Headquarters in Ottawa for distribution on request. They may also be published again later - in whole or in part - in other vehicles, but this cannot be done without the expressed permission of the Engineering Institute of Canada. The Series will be administered by the EIC Executive Director and by the Secretary for EIC History and Archives.

The opinions expressed in the Papers are those of the authors and are not necessarily shared by the Institute.

## Introduction

The Engineering Journal was published by the Engineering Institute of Canada and was in print from 1918 until 1987 - a period of almost 70 years. I would like to discuss this Journal as a source for the history of engineering, from two points of view:

- \* the technical papers and articles that appeared in it over the years; and

- \* the development of the Institute itself.

But before doing so, I propose to review very briefly the publishing history of the Journal and, after doing so, to offer a few comments on its value as a source.

I should also point out that several references have been made in the text to the 'old' Civil Society, or the 'old' CSCE. This refers, of course, to the Canadian Society of Civil Engineers that was established in 1887 and became the Engineering Institute of Canada in 1918 and distinguishes it from the 'new' CSCE, or Canadian Society for Civil Engineering, which was established in 1972 as a semi-autonomous constituent society of the Institute.

## The Journal Itself

Late in 1917 the Society Affairs Committee of the 'old' Civil Society recommended, among other things, that its name should be changed to reflect more effectively the growing diversity within the profession of engineering in this country. This was done, effectively, in April 1918 when the Society's original Charter was amended by Parliament and a new name - the Engineering Institute of Canada - was adopted. The Committee also recommended that the Institute should publish a regular magazine in order to improve communications with its members. This was also done quickly. The first issue of the first volume of the Engineering Journal, 82 pages long and with a buff-brown cover, appeared in May 1918. The majority of its content was technical, but it also contained Institute news and advertising. The EIC's General Secretary was the Editor. At the beginning, the language of publication was English.

The table of contents of the Journal remained much the same for around 40 years. However, as it became better known, the number of pages increased to 150 and more per issue, along with the number of articles and the space devoted to news and advertising. Volume 1 had only eight issues, but from 1919 until the late 1960s there were - come budget or other crisis - 12 issues per annual volume. Since the Institute continued for many years to publish Transactions, the technical papers and articles appearing in the Journal were intended to be of more general interest, written by members, and usually based on earlier oral presentations to the

General Professional and Annual Meetings, to meetings of the Institute's branches, and to specialist conferences. In some issues, all of the papers were devoted to a single topic or to closely related ones.

A few very special issues were published from time to time. For example, one of these appeared in June 1937 to commemorate the Semicentennial of the founding of the 'old' CSCE in 1887. It had a special gold cover and, with only a few pages short of 300, was the largest ever to appear. In the May 1943 issue, the Journal celebrated its own 25th Anniversary.

By the late 1940s, from increases in the size of the magazine and the numbers of advertisers, the use of coated paper and colour printing for the advertisements, and the extensive news departments, it was clear that the Institute and the Engineering Journal were both participating in a period of general economic expansion. The number of items appearing in French, or in both official languages, began to increase. By the mid-1950s, each volume had over 2000 pages of text and advertising. But by 1961 this number was down to 1700 and continued to decrease from then on as cost-recovery advertising became more and more difficult to attract.

From 1965 until 1982 the Journal underwent many changes to its format, content, authorship of material, publishing and management responsibilities in a series of attempts to increase its appeal to contemporary readers, compensate for evaporating advertising revenues, and adapt to the changing membership structure resulting from the Institute's decision to form constituent societies within its Charter. From 1968 until 1975, each issue also carried one or more Transactions papers, thereby providing a vehicle for the publication of more theoretical papers but taking space from more general ones. And while the new constituent societies (formed in the early 1970s) usually started out using the Journal for communication with their members, four of them soon began publishing their own vehicles, with the result that information on the development of the Institute as a whole and on the profession was found less and less frequently in the Journal.

As time passed, both budgetary and policy constraints interfered with the resources available to the Institute for the publication of the Journal, while the editorial people strove to maintain the quality of the technical contributions and made more frequent use of professional writers. In 1982 and 1983, to save money, it became necessary to adopt a newspaper format - rather than a magazine one - for several issues. Then in late 1983 the Journal became a two-, four- or eight-page section in a commercial magazine - The Engineering Digest. This arrangement ended in February 1987. But there was one final issue in the full magazine format. It appeared at the end of 1987 and was published to help celebrate the centennial of the founding of the engineering profession in Canada.

In terms of its value as a source for technical material related to the history of engineering, the size of the Engineering Journal was not particularly important until the late 1970s, by which time the number of pages of text per year had been considerably reduced from the peak figures and the number of issues was down to six, five and sometimes only four per volume.

### Technical Papers and Articles

I propose to consider these in three categories:

- \* those that discussed engineering history or were 'historical' in some other way when published;
- \* those that described a project or state of the art when published and came to be of historical interest later on; and
- \* those that described a project or state of the art when published and may still become of historical interest sometime in the future, or are already in the process of doing so.

Within these categories, the papers and articles in the second one are the most numerous. At the same time, I should point out that some of those in the second and third categories may include information of a historical nature, usually by way of introduction or scene-setting.

A distinction between the 'papers' and 'articles' appearing in the Engineering Journal has not been strictly applied in what follows; in fact none has been made in the formal sense. However, in general terms, the former are intended to cover more specialized or complex material than the latter. I should add that the Journal carried articles with economic, social and political content from time to time and that, until the late 60s, the recorded discussion of a technical paper was often included in the same issue or in a later one.

During the 70 years or so during which it was published, at least 3000 technical papers and articles appeared in the Engineering Journal - not counting the semi- or non-technical ones, abstracts from the current literature, technical notes, and other shorter items. As you might expect, space will not allow me to be definitive in my coverage. Nor will I be able to say a great deal about the Institute itself; this will be done in later Working Papers. And the abstracts, notes and short items on subjects of historical/engineering interest are simply too numerous to be included in what follows.

## Historical at the Time of Publication

The papers and articles included in this category have been listed according to their dates of publication rather than in the chronological order of their subject matter. In most cases a few comments have been added:

October 1920: "Reminiscences: Pioneer Life in the West" by H.J. Cambie. Mr. Cambie played a significant part in the building of the CPR through the Rocky Mountains in the 1880s. A tablet was erected by the EIC in Vancouver early in 1928 in recognition of his contributions to this work.

October 1920: "The Development of the Steam Engine in the Maritime Provinces of Canada" by D.W. Robb. He was the eldest son of Alexander Robb, who founded the Robb Engineering Company in Amherst, Nova Scotia, and was himself the senior executive of this company for many years.

February 1921: "Municipal Engineering" by R.O. Wynne-Roberts surveyed the development of the various branches of municipal engineering, including water supply, sewage disposal and road construction, with statistics relevant to Canadian cities.

December 1921: "Engineering Theory and Practice at the End of the 17th Century" by D.S. Ellis. This paper described engineering practice in France during the reign of Louis XIV.

December 1921: "History of the Montreal Aqueduct" by A.E. Doucet. This paper also dealt with early 19th century water supplies for the city of Montreal. Thomas C. Keefer, the first president of the 'old' CSCE, was involved in the development of the aqueduct project in the 1850s.

September 1924: "100 Years of Electrical Engineering" by G.W.O. Howe was a summary of the paper presented by the author at the meeting of the British Association for the Advancement of Science held in Toronto in August 1924. Professor Howe occupied the Chair of Electrical Engineering at the University of Glasgow for many years.

December 1924: "The Story of the Rideau Canal" by Hammett P. Hill. This was an abstract of the paper read before the Kingston Branch of EIC in November 1924. It was the first of several papers on the Canal that appeared in the Journal over the years.

June 1925: "Work of the Canadian Railway Troops in the Great War, 1914-1919" by Lt.-Col. A.C. Garner, DSO. Much of the work of these troops was done under fire and its military value can be gauged to some extent by the numbers of decorations won for bravery. By July 1918 these included 17 DSOs, 15 DCMs, 183 Military Medals, and 50 Mentions in Despatches.

November 1927: "The Early History and Development of the Nickel Industry" by Herbert Walter. Articles and papers on specific Canadian industries appeared in the Journal from time to time. Some, like this one, were 'heavily historical' while others were not.

April 1930: "The Development of Radio in Canada" by A.N. Fraser was presented at the General Professional Meeting of the EIC in Ottawa in February. Among the Canadians mentioned in connection with this subject was R.A. Fessenden, whose contributions to the early developments in radio have not always been recognized in Canada.

September 1930: "Visit of the R-100 to Canada" by the editorial staff of the Journal. This event, which took place during the summer of 1930, rapidly acquired historical significance when, on the morning of 5 October, the R-100's sister ship - the R-101 - crashed in France on its way to India. In 1931 the R-100 was itself broken up and Britain's involvement with rigid airships ended.

October 1930: "Coal Mining - Past, Present and Future" by T.L. McCall was read, appropriately, before the Cape Breton Branch of the Institute on 11 March.

March 1931: "The Great Ship Canals of the World" by A.J. Grant was the address delivered by him on his retirement from the presidency of the Institute. The Canadian 'representative' was the Welland Canal. In the days of the 'old' CSCE, retiring presidents often gave historically important retiring addresses that were published by the Society. Some of the early EIC presidents did the same, but the practice lapsed with the passage of time.

October 1934: "Geology and Civil Engineering: Their Relationship, with Reference to Canada" by R.F. Legget was presented to a meeting of the Montreal Branch. It drew on projects in several parts of the world.

January 1937: "The Royal Engineers in British Columbia - 1858-1863" by Judge F.W. Howay was principally concerned with the story of the building of the Cariboo Road during the gold rush of the late 1850s. The paper was presented originally to the EIC's Western Professional Meeting in July 1934.

April 1939: "The Place of Research in the Evolution of the Automobile" by T.A. Boyd. A member of GM's Research Division in Detroit, Mr. Boyd read this paper to the Hamilton Branch of the Institute.

December 1939: "Canadian Nickel: Its History, Production and Uses" by K.H.J. Clarke described the origins of nickel mining and refining industry world-wide and the operations of the International Nickel Company in the Sudbury Basin. Mr. Clarke was an engineer with INCO and read his paper to the Toronto Branch.

December 1939: "The Civil Engineer in Canada" by C.R. Young and R.F. Legget was mainly concerned with developments within the profession of civil engineering in this country, from the mid-19th century to the late 1930s. It was prepared originally for presentation at the British-American Engineering Congress in New York in September 1939, but this Congress was cancelled in view of the deteriorating European situation.

June 1940: "Some Developments in Alloys during the Last Twenty Years" by Owen W. Ellis. This was an abstract from a much longer paper delivered to the General Professional Meeting of the Institute in Toronto in February. It described a few of the outstanding contributions to the art of engineering metallurgy since 1920.

January 1941: "The St. Lawrence Project: A Review of Early and Recent Developments" was given the rare designation of 'contributed paper' rather than being the work of a particular author or authors. It has been included here for its own sake as a historical paper, but also to draw attention to the fact that, over the years, one of the more frequently discussed engineering projects - as reflected in the pages of the Engineering Journal - appears to have been the development of the waterway of the St. Lawrence River for both shipping and power generation purposes.

November 1942: "Brothers of the Bridge" by A.L. Carruthers, as abstracted by R.C. Purser from a presentation to the Victoria Branch of the EIC. The 'Brothers' were Benedictine monks in Europe in the Middle Ages who built and rebuilt bridges.

October 1944: "Standardization in Canada" by W.R. McCaffrey covered the origin and development of the Canadian Engineering Standards Association, which later became the Canadian Standards Association, and with which the EIC had a long-term connections.

July 1945: "Canada's Pulp and Paper Industry: Past and Future" by R.L. Weldon traced briefly the development of the industry back to the pioneering work of Charles Finnerty in Nova Scotia in 1844.

August 1947: "The Past: A Chronology of Early Canadian Engineering Activities" by J.G.G. Kerry was presented during the EIC Symposium on "The Engineer and the Community" in May 1947. Mr. Kerry was one of a handful of Institute members of his time who took an active interest in the study of engineering history. In addition to his general interest in this subject, he was particularly concerned with the development of the St. Lawrence Waterway and read several papers on it at Institute meetings.

December 1948: "Waiting for the Daylight" by F. Cyril James. This paper reflected the substance of an address given by Dr. James, then Principal of McGill University, to the meeting of the Newcomen Society held in Montreal on 21 October 1948, and was published in



the Journal with the permission of the Society. It dealt with the contributions of the steam engine and other engineering advances to the first Industrial Revolution, the positive effects of which were felt until the early 1900s. After this, wars and economic hard times brought a 'darkness' which, by 1948, had yet not been dispersed by daylight.

February 1949: "Samuel Fortier: Pioneer in Soil Mechanics" by Robert F. Legget described the career in Canada and the United States of an engineer whose contributions to irrigation and soil mechanics were outstanding and of lasting importance in North America.

September 1951: "Some Modern Aspects of Tunnelling" by Brian H. Colquhoun dealt with tunnelling in historical and world-wide contexts. It was presented at the General Professional Meeting of the Institute in May 1951.

February 1952: "Coal Mining in Cape Breton" by Louis Frost was presented to the Halifax Branch in May 1951. This activity dates from 1720.

August 1952: "The Engineer's Place in the Development of Canada's Natural Resources" by the Hon. Robert H. Winters, who was at the time the Minister of Resources and Development and one of the few engineers to achieve federal cabinet rank in this country. It was delivered to the Montreal Branch in March 1952. It reflected the author's philosophy of engineering and set the profession in a pro-active role in the country's development.

January 1953: "Wind Power: History and Present Status" by H.E. Parsons was a concise summary of what was accomplished in the commercial development of power from the wind during the period from the end of World War I until 1950.

September 1953: "Fictions in the Story of Radar" by Sir Robert Watson-Watt was presented originally as an address to the Annual Banquet of the Institute held in May 1953 in Halifax.

August 1954: "Canadian Hydro Electric Developments on the Niagara River" by R.L. Hearn, then General Manager of the Hydro Electric Power Commission of Ontario. This paper sketched the power developments on the Canadian side of the Niagara River and Falls from earliest times up until the design of the Sir Adam Beck Generating Station #2.

October 1955: "From Fire Sticks to Jet Engines" by J.M.F. Vickers traced the study of combustion from the middle of the 17th century to the middle of the 20th. According to the author, progress in this field began erratically but later steadied, and expanded considerably during and after World War II.

February 1959: "Fifty Years of Aeronautical Engineering" by several authors. This tribute was the last given to aeronautical engineering by the Institute through the Journal. The Canadian Aeronautics Institute (later the Canadian Aeronautics and Space Institute) had been formed as an autonomous 'learned' society in 1954 and was to become the principal source of historical material on this branch of engineering in Canada.

May 1960: "Engineering Astride the Border" by R.F. Legget. Inspired by the success of the construction of the St. Lawrence Seaway, this paper discussed U.S.-Canada engineering cooperation going back to the 19th century, to Thomas Keefer and Samuel Fortier.

January 1961: "History of Hydraulic Models" by H.A. Young described the development and use of these models for taking some of the guesswork out of the construction of harbour and river works.

February 1961: "Early Ottawa Engineering" by Robert F. Legget discussed this subject from Champlain's time to the early 1900s.

September 1962: "Engineers and the Canadian Economy" by J.P. Francis, who was at the time a senior public servant in the federal Department of Labour and who, also at that time, initiated a number of studies of technical and professional manpower.

June 1964: "Under the Choppy Channel - a 'Chunnel'" by Irwin Ross, a freelance journalist, discussed the history of the idea of a 'Chunnel' between England and France and the problems that had arisen in attempting to make it a reality up until the time of writing.

June 1965: "An Evaluation of Welding" by M.N. Vuchnich dealt with the development of welding in Canada in a historical context over a 40-year period from the 1920s.

September 1965: "The Columbia Treaty Dams" by E. G. Tallman. This paper is an example of 'contemporary' engineering history in that the subject was first studied by the International Joint Commission in the mid-1940s and, only a few years later, gave rise to a number of massive construction projects on the recommendation of the IJC.

March 1966: "The National Building Code of Canada: A General Review" by Robert F. Legget covers the history and development of the NBC under the aegis of the National Research Council since before the publication of the first Code in 1941.

April 1968: "Restoration of the Fortress of Louisbourg" by A.D. Perry of the National Historic Parks Branch in Ottawa discussed both the original construction of the Fortress in the 18th century and its restoration in the 20th, as well as its development as a national historic site.

February 1969: "The Institution of Civil Engineers 150th Anniversary" by Robert F. Legget discussed the beginnings, policies and development of this U.K. Institution and the influence these had on the establishment of the 'old' CSCE in 1887.

January/February 1971: "William R. Casey: The Forgotten Engineer" by John B. Thompson of the National Historic Sites Service in Ottawa. Casey lived from 1808 until 1846, when he died after falling ill with tuberculosis. This paper was intended to draw attention to his contributions to the building of the early railways in Canada, contributions that are usually less well remembered than those of Fleming, Gzowski and Shanly, for example.

April 1972: "Evolution des techniques et de la civilisation: Un examen critique" par André A. Marsan was presented in March to a meeting in Montreal of the Société des Ingénieurs Civils de France. It provided a discussion of the emerging link-up between technology and economic growth.

September 1972: "One Hundred Years of Engineering at McGill" by Peter Collins was the story of a Faculty that has had close connections with both the 'old' CSCE and the EIC and has produced a relatively large proportion of all Canadian engineering graduates.

March/April 1976: "Building the Rideau" by Edward F. Bush. In contrast with Robert F. Legget and others who were engineers and wrote about this canal and its builder, Colonel John By, Edward Bush - like his colleague, John B. Thompson - was an historical researcher with the National Historic Sites Service.

July/August 1977: "H.F. McLean and the Sons of Martha Cairns" by Paul McNally and C.E. Hyson. As the authors pointed out, McLean is probably one of Canada's unsung heroes. A contractor and not an engineer, the hydroelectric projects and the railroads he built in the 1920s, 1930s and 1940s belong to a period that has been largely neglected. Canadians usually look further back for their construction 'heroes' - to Van Horne, J.J. Hill and the others who pioneered the business of railroad building.(3)

September 1983: "Recalling Engineering's Past" by Anthony W. Kruysee. This brief article covers the story of the Old Hamilton Waterworks, to whose design Thomas C. Keefer made a major contribution and where the Gartshore beam engines were installed in 1859.

#### Became Historical after Publication

Judging by the number of technical papers and articles that appeared in the Engineering Journal over the years, the prime area of interest to the members of the Institute was the development of

Canada's energy, fuel and power resources. Given the availability of power sites, the size of the country, the importance of power as the Canadian population grew and the country industrialized, and the engineering problems involved in harnessing energy, this should not be surprising. In the majority of cases, the papers reflected the design and construction of power plants rather than their operation and maintenance.

A number of the earliest issues of the Journal were devoted almost entirely to energy and power. Indeed, Volume 1, Number 1, in May 1918 presented an extensive report on the first General Professional Meeting, held two months earlier in Toronto, on the subject of "The Fuel-Power Problem." The September 1920 issue included five papers presented at the seventh General Professional Meeting that month at Niagara Falls, four of them based on the Queenston-Chippawa development. The July 1924 issue published the Canadian contributions to the First World Power Conference held that summer in London, England. Several subsequent issues that same year provided reports on this Conference as a whole.

Later issues dealt with the development of power on the Peace, Columbia, Ottawa, Gatineau and Saguenay Rivers, as well as at Kitimat, Shawinigan, Churchill Falls, James Bay and many other places. For example, all of the technical papers in the November 1954 issue were devoted to Alcan's Nechako-Kemano-Kitimat development. Dams and water storage facilities were usually discussed in the context of hydraulic power generation.

Papers and articles also dealt with steam, gasoline, diesel, water-driven and other prime movers. Post World War II issues discussed nuclear power - for example, the August 1957 issue is a 'special' on nuclear power. And in most years from 1958 until the early 1970s, the October Journals were "Power Issues" and often had more pages than their companion issues for the other months of the year.

Power developments along the St. Lawrence River were discussed on a regular basis. In fact, as mentioned above, the development of the St. Lawrence Waterway as a whole was perhaps the most written-about single topic in the Journal and the one that often gave rise to the most discussion. For example, the February 1929 issue carries a report on Professor Duncan McArthur's presentation to the Ottawa Branch on this Waterway. Also, as noted above, J.G.G. Kerry became well-known for his views on its development. His paper on "An All-Canadian and Very Deep Route" was published in June 1951 and the discussion reported in the October. From January 1955 until just after its completion, the Journal carried monthly progress reports on the construction of the Seaway. The September 1956 and September 1958 issues were special ones dealing with its history, its general and specific design features, its harbours, and the generation and transmission of power by and from it.

Not surprisingly, by the time the Engineering Journal came to be

published in 1918, the construction of Canada's railways had slowed considerably. More attention was being paid to the development of locomotives, rolling stock and other equipment than to the location and construction of more track. Electrification was discussed as early as May 1919, and mechanical and electrical equipment at Toronto's Union Station in February 1921. However, among the later papers was one on the CNR's extension from Sherridon to Lynn Lake in Manitoba in October 1954, and another was on the Great Slave Lake Railway in May 1965. The March/April issue of 1976 included five general papers on railway engineering.

Roads received more attention after 1918 than before, and especially during and after World War II when the Alaska and Trans-Canada Highways were being built. Sea transportation, shipping and marine engineering received little attention in terms of the numbers of papers and articles that appeared in the Journal. After World War II some attention was paid to the design and construction of pipelines.

The transportation mode that received most attention was aviation, particularly between 1918 and 1954 when aeronautical engineers belonged to the EIC and not to the Canadian Aeronautics Institute, and especially during World War II. For example, in the July issue in 1920 included a paper on "Progress in Aviation" which dealt with both aircraft and their engines, principally in Canada and Britain. In the 1930s, proposals for transatlantic air travel were discussed. Some papers discussed the impact of aircraft on transportation systems in Canada, while others dealt with aeroengines. Surveying, and the aerial variety in particular, received the Journal's attention, especially in the 1930s. During World War II, the design, production and testing of aircraft were regular topics. But one of the more interesting series of papers in this field analysed the effectiveness of German aeronautical research and development during this War. The four papers that appeared in the Journal in 1948 and 1949 were based on a much longer report by the same authors to the National Research Council. Later, in the 1960s, there were articles on the design of Canada's topside sounder - which became the 'Alouette' research satellite.

Of the canals, the Welland has received most attention, quite often in tandem with the development of the St. Lawrence. For example, A.J. Grant's paper on "The St. Lawrence Route and the Welland Ship Canal" was published in September 1920.

Technical papers on particular bridges were published relatively frequently in the 1920s, 1930s and 1940s. These included the Detroit-Windsor Bridge, the Montreal South Shore Bridge, the Second Narrows and Golden Gate Bridges in Vancouver, and the Ile d'Orléans Bridge in the Lower St. Lawrence.

A paper on the construction of the Mt. Royal Tunnel in Montreal appeared in April 1919, and one on Toronto's Bloor Street Viaduct

in July 1919. Papers of the Greater Winnipeg Floodway appeared in 1961 and on the Lafontaine Bridge and Tunnel in Montreal in 1965 and 1967.

In the building and construction fields, there were papers on concrete, structural and other materials, heating, ventilating and air conditioning and insulation. Cold weather construction techniques were discussed regularly, beginning in the 1920s. But papers on construction in the Arctic, and indeed on engineering in cold regions generally, appeared relatively infrequently until the development and potential exploitation of oil resources in this region began in the early 1970s.

The Journal also published material on specific structures from time to time - for example, in Montreal, the Royal Bank Building in February 1928, the Sunlife Building in 1932, and the Laurentian Hotel in 1948. It also covered the construction of the Toronto Subway and the Winnipeg Floodway.

From time to time an issue, or a series of issues, of the Journal would present reviews of engineering in the provinces, particular parts of the country, or particular industries. Of the latter, the resource industries received most attention but, from the 1960s, papers on manufacturing and manufacturing processes appeared more frequently.

In the field of communications, papers on wireless telegraphy appeared in the issue for May 1920, transatlantic wireless telephony in May 1926, the development of radio in Canada in April 1930, radar in November 1945, colour TV in August 1955, and on the Trans-Canada telephone system in August 1956.

Pollution and environmental protection were not neglected. For example, the Journal devoted all of the technical space in its June 1960 issue to water pollution problems in Canada. There were also articles from time to time on the application of computers and computing generally, surveys and mapping, remote sensing, control systems, and the information society.

Other technical areas that received periodic attention were regional, city and town planning, harbours and port facilities, the behaviour of metals, welding, and safety in industry. Articles on economic issues were also to be found from time to time. Social planning was a regular topic in the 1940s. Beginning in the 1950s, annual reports covering progress within specific sectors of industry were published.

Contemporary military engineering was covered, especially during and after World War II. For example, the paper on "Canadian Engineers' Part in the War" by General A.G.L. McNaughton appeared in April 1945, following its presentation to the EIC Montreal Branch two months earlier. In some ways, it allows for comparisons

- alongside Col. Garner's paper mentioned above - between the engineering activities of the Canadian Army during the two World Wars.

From the 1920s to the 1950s the Engineering Institute established a number of technical committees whose reports provided continuing commentaries on their subject areas. Among these were fuels, alkali soils, prairie water problems, road safety research, standardization and metrication.

Over the years, a number of some of the authors of technical papers and articles became familiar to readers of the Journal. Among them were E.A. Allcut, J.B. Challies, J.J. Green, S.D. Lash, F.L. Lawton, Robert F. Legget, Huet Massue, A.G.L. McNaughton, P.L. Pratley, E.M. Rensaa, G. Lorne Wiggs, C.R. Young and, in more recent years, Dinkar Mukhedkar, F.P.J. Rimrott, Manfred Rotmann and G.P. Williams as well as such professional writers as Ian Reid and Jim Hilborn of the Corpus organization, which was responsible for the editing and production of the Journal in the 1970s. However, some of the important writing of both the technical and administrative kinds was done by the editorial staff of the Engineering Journal, and especially by editors Fraser S. Keith, Richard J. Durley, L. Austin Wright, Garnet T. Page and Pierre Bournival.

The Centennial (and final) issue of the Journal - Volume 70, Number 3 - looked much more to the future than to the past. But it did include a review of another important source of Canadian engineering history - Norman Ball's book, Mind, Heart and Vision. It also included a 'history of engineering' quiz, some biographical information, and an account of the commemoration of the Quebec Bridge by the 'new' Canadian Society for Civil Engineering.

But this special issue gave pride of place to the 10 Canadian engineering achievements judged, by a specially appointed committee, to be the most significant during the period from 1887 to 1997. They were: the Canadian Pacific Railway; the Polymer petrochemical plant at Sarnia; the De Havilland 'Beaver' aircraft; the St. Lawrence Seaway; the Trans-Canada microwave network; the Bombardier skidoo; the 'Alouette' satellite; the CANDU reactor; Hydro-Québec's 735 KV electrical transmission system; and the Syncrude oil sands plant. These achievements may all be considered - in 1998 - to be historical.

**May yet become Historical (or are in the process...)**

Most of the papers and articles that fall under this heading appeared in the later issues of the Journal, roughly from 1970 to 1982. However, the task of finding candidates for the future was made easier by the fact that, between 1976 and 1980, most of the issues included special reports.

For example, in the January/February 1976 issue the report was on engineering in Quebec, including two articles on aspects of the James Bay hydro-electric project. The May/June issue in 1976 had two special reports - one on engineering in Saskatchewan, and the other on Canada's contributions to space technology. Discussed in the context of space were the first communications technology satellite, the STEM type of antenna, and the remote manipulator system later dubbed the 'Canadarm.' The November/December issue also had two special reports - one on engineering in Ontario, which drew attention to the CN Tower, and the other on manufacturing, including the contributions of CAD/CAM to productivity in this area.

In 1977, the January/February issue focussed on nuclear power generation. The May/June issue discussed the emerging discipline of biomedical engineering, from which a number of significant devices and techniques had been developed in recent years. The July/August issue discussed Canadian recent Canadian contributions to ocean technology, including ice platforms and artificial islands in the Beaufort Sea and the work of the Centre for Cold Ocean Research (C-CORE) at the Memorial University of Newfoundland. A special report on aviation appeared in the September/October issue of 1977 and discussed, among other achievements, the 'Dash 7' and 'Challenger' aircraft, flight simulators and remote sensing technology.

The October 1978 issue included four articles on electric vehicles. The April 1979 issue included six articles on information, communications and computer technology. Manufacturing processes were again discussed in the Engineering Journal in August 1979. And in the December 1979 issue there were articles on aspects of municipal engineering.

Finally, when we consider Canadian engineering achievements during the period from 1970 to the end of this century in a historical context, we should not overlook Canadian contributions - through its consulting engineers as well as its design and manufacturing firms - to countries overseas. Some of these were discussed in the January 1979 and the July 1982 issues of the Engineering Journal.

### **The Institute and Professional Development**

There will be no time-dependent sub-headings in this case since most of the material in this category was reported in the Engineering Journal shortly after it happened, and much of it has generated historical interest only with the passage of time.

As noted below, there were papers and articles that appeared over the years that concerned the 'old' Civil Engineering Society and the Institute and were written as 'history.' There was also a good deal of retrospective biographical material - mainly in the



obituary department - that appeared in print, principally over the period from 1918 until 1962. After that, only deceased past presidents - it seems - rated more than a line or two. And again until the 1960s, some but not all of the advertising carried by the Journal may have acquired historical value with the passage of time.

Over the years, Institute-related material appeared regularly in the Journal in a variety of departments - for example: Council, committee and branch reports and lists of officers; annual reports; by-law changes; financial statements; editorials and presidential messages; elections to membership; university enrollments and graduations; honours, awards and appointments; employment opportunities; inter-society relations and activities; professional news; relations with, and advice to, governments; letters to the editor; library additions; recent publications; book reviews; abstracts from current literature and other technical developments.

Over most of its years, the Journal was able to supplement its printed reports with a wide selection of individual and group photographs, and especially those taken at Annual Meetings and Banquets. Very occasionally there would be a list of members. In the early years of publication, the content was almost always in English but, gradually, technical articles and news items began to appear in French, followed later by the simultaneous translation of presidential and other messages.

From time to time, major analyses of the growth and development of the Institute's membership would be published in the Journal. For example, a memorandum from the Committee on Development was published in October 1932. A later report, by Huet Massue, appeared in September 1952. But the Journal's principal contribution to the 'people' end of things was its publication of current biographical, career, and other information about its members although, in the 1960s and 1970s, it also published information on non-members associated with the engineering industries across Canada.

All of the major initiatives in the Institute's development were reported extensively in the Journal, as long as there was space available. For example, as soon as publication began, some members took an intense interest in the development of the Model Law intended to help regulate the practice of the profession of engineering in Canada. The seminal paper on the subject by F.H. Peters appeared in the September 1918 issue. Two months later the draft of a Law was published. Over the following two years, a dozen or so issues carried information on the progress of the legislation in the provinces.

The activities of the provincial associations - both generally and individually - and their links to the Institute remained of continuing interest to the members of the Institute and were regularly reported in the Journal from the 1920s to the 1960s in

the form of news items as well as in longer articles. One such, "The Engineering Institute of Canada and the Provincial Associations of Professional Engineers," appeared in the October 1943 issue and was prepared by the editorial staff of the Journal. It also covered the founding of the 'old' CSCE, the development of the Model Law, and the 'consolidation' debate of the 1930s, as well as Institute-Association interactions.

Naturally, when the Institute set up the committee under Gordon M. Pitts to examine the possibilities for 'consolidating' the learned and regulatory elements of the profession, the Journal carried regular and sometimes extensive reports of the meetings, discussions, proposals and other information until the ballot vote held in 1937 turned it down. The possibilities for 'consolidation-confederation' were revisited by EIC and CCPE representatives - and the Journal - between 1955 and its, again negative, resolution by ballot in 1963.

By the time the Institute came to consider the formation of constituent societies in the late 1960s, the detailed coverage of such internal initiatives had been reduced considerably in the Journal as it grew steadily smaller. Nevertheless, the editorials, articles, news items, and letters-to-the-editor that were carried in it from time to time served to draw the attention of members to the developing situation.

The commemorative issues of the Journal that appeared from time to time also served to capture the story of the Institute's development. For example, the issue in July 1927 carried an article on "The Origin and Development of the Canadian Society of Civil Engineers, now the Engineering Institute of Canada" (written by the Editor, R.J. Durley) in commemoration of the 40th anniversary of the founding of the CSCE.

Ten years later, the special issue with the gold cover appeared in June 1937 in commemoration of the Semicentennial of the Institute. But while there was historical and biographical material on the Society/Institute and its presidents in this issue, the bulk of it was devoted to a series of specially written essays on the development of 17 sectors of industry and government - from bridge building and hydroelectric generation to public works - over the 50 years from 1887 to 1937. Yet historically speaking, this is one of the most important issues of the Journal ever to be published.

An issue commemorating the 25th anniversary of the first publication of the Journal appeared in May 1943, with a special silver and blue cover. It included a retrospective article on the Journal itself, and a series of 23 specially written and mostly industry-related articles similar to the series in the 'golden issue' of 1937.

In May 1953, there began a series of articles that appeared monthly

for several years commenting on the contents of the issues published 35 years earlier.

A 40th anniversary-of-first-publication issue appeared in April 1958. It included a brief summary of the Institute's development over these years, but its principal technical content was - yet again - a series of industrial review articles.

The June 1962 issue of the Engineering Journal was designated to commemorate the 75th anniversary of the founding of the 'old' Civil Engineering Society. As was the case in June 1937, this issue included an article on "The Story of the Engineering Institute of Canada: 1887 to 1962", written by the editorial staff, together with one on "Canadian Engineering 1887...", which included short pieces on such engineering achievements as the CPR, the Quebec Bridge, the Welland Canal and Atomic Energy, as well as longer articles on specific technologies or industries.

The September 1968 Engineering Journal was designated to commemorate the 50th anniversary of the beginning of publication. It appeared at a time when individual issues were particularly slim and the commemoration part was limited to a laudatory, yet critical, editorial by the EIC General Manager, Pierre Bournival, and one feature article, "Samuel and Thomas Keefer: Pioneers of Canadian Engineering" by Tom Ritchie.

The May 1971 issue of the Journal was special in that it commemorated the founding, a year earlier, of the Canadian Society for Mechanical Engineering and provided an appraisal of its first year in operation. The May 1972 issue commemorated the founding of the 'new' Civil Engineering Society.

During the 1970s, the Journal had a History Editor, George Richardson, who wrote several articles on the story of the Institute - for example, "The Birth of the EIC" in the January/February issue for 1976. Several articles on the history of the Institute also appeared in the much-shortened Journal that was published as part of the Engineering Digest during the two years prior to the celebration in 1987 of the Centennial of Engineering as a Profession in Canada. However, the Centennial issue of the Journal - as noted above - had relatively little historical material in it.

One area of continuing Institute interest was the development of engineering standards. Sir John Kennedy, a Past President of the 'old' Civil Society, was involved at the beginning. Throughout the 1920s and 1930, and also in later years, regular reports as well as articles and papers on this subject appeared in the Journal. In October 1944, W.R. McCaffrey published a paper on "Standardization in Canada" in which he described the origin and development of the Canadian Engineering Standards Association, from whose title the word 'Engineering' was dropped in recognition of the broadening of

the Association's mandate. Beginning in May 1954, the Journal carried a series of articles on the history, development and case interpretation of the ASME Boiler Code. And in the 1970s a number of articles on metrication and its application in Canada were published.

From time to time, a single or a series of articles and papers on the development of another continuing Institute interest - engineering education in Canada - appeared. The principal contributors were senior academics: for example, Dean C.R. Young of the University of Toronto. From time to time the Journal itself would take the initiative in articles that described the growth and development of faculties and facilities at the various university schools of engineering across Canada. One series appeared in the September 1962 and January 1963 issues. Another - prepared by George Richardson - appeared in 1976. For many years the December issues of the Journal carried a statistical analysis of engineering student enrollments at Canadian universities.

The Journal took special pride in announcing in June 1938 the election of the first woman associate member, Elizabeth (Elsie) Gregory McGill, who went on to become a distinguished member of the profession. Yet it was not until the decade prior to its demise that the Journal carried the occasional article on the participation of women in the engineering profession. Special attention was paid to them, for example, in a series of articles that appeared in the November/December 1975 issue and in the article by Frances Brunet in March 1983.

Over the years, the history-related activities of the Institute itself were sporadic, but were reported in the Journal. For example, tablets were erected inside the Headquarters Building in Montreal commemorating those members who had served during World War I. In 1925 the Council of the Institute established a Committee on Biographies in order that the careers of distinguished members would be officially recorded. This Committee remained in existence for several years, but its output was meagre.

On 1 July 1928, the Institute participated in the unveiling of a cairn at Spuzzum in British Columbia to commemorate the building of the original Cariboo Road. The September 1928 issue of the Journal carried an article providing background information on this event. A memorial tablet was unveiled in June 1929 - on the initiative of the EIC Branch - at the Hydraulic Lift Lock at Peterborough, Ontario, in memory of R.B. Rogers, the superintending engineer during its construction. It, too, was reported. The Journal also reported on the Institute's participation with the federal government in the Canadian Engineering Heritage Record in the 1970s.

### Some Comments

I would argue that the contributions of the Engineering Journal to the recording of both the technical and professional aspects of engineering history in Canada have been extensive.

Yet there were a number of important things that this publication never did. For example, on the technical side, only infrequently - and not always intentionally - did it publish the complete story of an individual project or a particular technology. Perhaps the most complete story told over the years was of the development of the St. Lawrence Waterway after World War II. And although there were several series of related material published from time to time, there was no overall system of coverage. Some disciplines, like the civil one, garnered more ink than others. The emphasis was most often current rather than historical, and this applied also to much of the the biographical material that appeared.

The Journal did, however, tell parts of a story and described phases in the development of a technology. It provided important information on the timing of projects and developments, as well as clues and references for the historical researcher to follow up, and it provided supplementary information for other texts and related research.

On the Institute side, much of the biographical information was of some value, although it might not be definitive. And, from 1918 until the mid-60s, the Journal provided a pretty complete story of the development of the Institute through the reports of the Council, the regions, branches and committees. It also provided continuing discussions of engineering education and professional development, although little on the participation of women in the profession.

I would also argue that policy statements made by senior officers and others within the Institute and quoted in the Journal, while it remained in a magazine format, can be tested for validity, interpretation and implementation in a historical context. Let me give you one example of this. The President of the Institute, Henry H. Vaughan, wrote on the first page of the first issue of the first Volume of the Engineering Journal:

The Journal will afford us all a means of being better informed on the activities of the (Institute) throughout the entire country, for keeping our members closely in touch with each other and with headquarters and for increasing the usefulness of the Institute to its membership...

The very short answer is that, from 1918 until at least the early 1960s, the Journal was relatively successful in achieving these objectives. Then a number of things happened - some internal, some

external - and the situation changed and, to many members, the Institute became less useful. And so, in numbers, the membership began to decline. But action was taken to stop this through changes to the Institute's structure, as well as to the publication arrangements for the Journal. Then, this action notwithstanding, the Journal disappeared altogether in 1987.

In terms of the disciplines represented by papers in the Journal, those related to civil engineering and its sub-disciplines are the most numerous, followed by electrical and mechanical engineering. But quite a number of them cover more than one discipline. Also, with the passage of time, the Journal published fewer and fewer papers in the chemical, mining, metallurgical and aeronautical disciplines since their practitioners preferred to publish under the imprint of the Chemical Institute of Canada, the Canadian Society for Chemical Engineering, the Canadian Institute of Mining and Metallurgy, and the Canadian Aeronautics (and Space) Institute.

Now the main thing is to see to it that the Engineering Journal is not forgotten as a source of historical material relevant to engineering in Canada over a period of almost 70 years.

#### Notes

(1) Andrew H. Wilson, The Engineering Journal, 1918-1987: Some Notable Highlights, EIC History & Archives Working Paper 1/1995, Engineering Institute of Canada, Ottawa, December 1995.

(2) The third Working Paper in this sub-series will present a selection of extracts from papers and articles included in the Historical at the Time of Publication category of this present Paper. Compiled by the same author, it will be numbered 7/1998.

(3) The 'new' CSCE's National History Committee has taken the lead in making everyone more aware of what Harry F. McLean did, and about his cairns. One source of what has been done by the Society is the essay by Ralph E. Crysler that is included in EIC History & Archives Working Paper 4/1997 History Activities of Learned Engineering Societies in Canada, dated March 1997.

In addition to the Crysler essay on the history activities of CSCE included in Working Paper 4/1997, there are two other essays on the corresponding activities within CSME and the Institute itself to which reference may be made.

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