THE MANITOBA
Professional Engineer
OF THE PROVINCE OF MANITOBA
February, 1987

The Centennial of Engineering in Canada

By K.J. Hearson, P. Eng.

The year 1987 will be celebrated as the Centennial of Engineering in Canada; this occasion is being marked with a multitude of events across our country.

Prominent among these is the Canadian Engineering Centennial Convention in Montreal from May 18th to 22nd, 1987. The scope, prestige and quality of the technical program, a copy of which was included in our December mailing, is outstanding. Visitors and eminent persons of international stature will join with Canadian engineers to address a wide range of subjects of the world of engineering.

Not only will the technical portion of the convention appeal, but also the parallel activities will constitute a real celebration.

Immediately following the Centennial Convention will be the Commonwealth Engineers' Conference, to be held in Montreal from May 21st to 24th, 1987. The Commonwealth Engineers' Council represents engineering societies throughout the Commonwealth.

The Centennial was officially "kicked off" at a ceremony on Parliament Hill on January 22nd, 1987. There, invited guests including the Right Honorable Brian Mulroney participated in a kickoff including a ceremony commemorating the ten outstanding Canadian engineering achievements.

As part of the Centennial celebrations, Vancouver will host the World Federation of Engineering Organizations 11th General Assembly on May 28th and 29th, 1987. Also, a World Congress on Inshore Engineering will be held on May 25th and 26th, 1987 preceding the General Assembly.

The first general meeting of the Engineering Institute of Canada, then called the Canadian Society of Civil Engineers, was held on February 24th, 1887 in Montreal. To mark this date, the EIC will host a commemorative meeting on February 24th, 1987 in Calgary. The event will include a commemorative ceremony, an EIC national council meeting and a black tie dinner for engineers and guests.

To close out the Centennial at the National level, a Centennial Awards Banquet will be held in Ottawa on October 29th, 1987. The Canadian Council of Professional Engineers, the Associations of Consulting Engineers of Canada, and the Engineering Institute of Canada will hold a joint awards banquet.

Regional celebrations will take place from Newfoundland to British Columbia as all provincial Associations have events and/or exhibitions planned. Travelling exhibits will be seen throughout Newfoundland, Ontario, New Brunswick and Saskatchewan, where the exhibit will be placed on permanent display in the Regina Science Centre. Also, in Newfoundland, the first Trans-Atlantic flight will be honoured in an Alcock and Brown commemoration.

Videos will be produced in Newfoundland, Ontario, and Alberta for distribution throughout the year. Exhibits of the non-travelling type will be produced in Ontario, Manitoba and Alberta. Tours will be held in the Yukon, Northwest Territories and Ontario. A thresher machine is being restored for permanent display in Prince Edward Island.

This is a brief overview of the activities planned across our nation; many more are organized which look back at the last one hundred years and look forward to the next one hundred. A separate article in this issue expands on Manitoba's Centennial project.

Our provincial association and the National Centennial Board have a great deal of additional information which is available for the asking. Make a request, plan your attendance, and experience the Centennial first-hand. □



Photo courtesy of Provincial Archives of Manitoba.

Construction scene of the Hudson Bay Railway in 1920.

MANITOBA'S ENGINEERING CENTENNIAL PROJECT:
A PROMINENT ENGINEERING EXHIBIT AT THE MUSEUM OF MAN AND NATURE

By L. Ganetsky, P. Eng.

The Manitoba Museum of Man and Nature is one of Canada's finest medium-sized museums. In honour of the Engineering Centennial this year, and prompted by our Association's Centennial Committee, the Museum is planning a permanent exhibit. The exhibit will focus on the engineering aspects of hydro-electric development, mining and the development of the Port of Churchill. The major theme linking these elements will be the construction of the Hudson Bay Railway.

It is interesting to note that it was in 1887, exactly 100 years ago, that the Winnipeg and Hudson Bay Railway Company was formed.

The rail link between Winnipeg and Churchill was completed in 1929, sixty years after the excitement and plans to build it began.

Recently, historians have begun to contemplate the astonishing feat of engineering and human labour that made the Hudson Bay Railway possible.

The exhibit at the Museum is intended to examine the development of the Railway from the perspective of the surveyors, engineers, and workmen that constructed it. The exhibit will consist of about a dozen

(continued on page 2)

THE MANITOBA
Professional Engineer

February 1987

Published by the Association of Professional Engineers of the Province of Manitoba
530 - 330 St. Mary Avenue
Winnipeg, Manitoba R3C 3Z5
(204) 942-6481

A.P.E.M. COUNCIL

E. A. Speers, P. Eng., **President**
E. W. J. Clarke, P. Eng., **Past-President**
W. D. Christie, **Vice-President**
G. E. Laliberte, P. Eng.,
K. A. Buhr, P. Eng.
O. Hawaleshka, P. Eng.
W. R. Newton, P. Eng.
G. W. Saunders, L.L.B.
A. Schwartz, D.D.S.
K. J. T.Kjartanson, P. Eng.
W. McGilvery, P. Eng.

GENERAL MANAGER and REGISTRAR

W. B. Mackenzie, P. Eng.

The Manitoba Professional Engineer is published under the direction of the Publication Committee

PUBLICATION COMMITTEE

Kelly J. Hearson, P. Eng., **Editor & Chairman**
Jerry Bogan, P.Eng.; Dave Cross, P.Eng.;
Vern Dutton, P.Eng.; Len Ganetsky, P.Eng.;
Paul Gordon, P.Eng.; Andrew Kusiak, P.Eng.;
Bill McKay, P.Eng.; Glenn Morris, P.Eng.
Don Spangelo, P.Eng.;

CORRESPONDENTS

John Markowsky, P. Eng., Sundance
Dick Menon, P. Eng., Brandon
Alex Murchie, P. Eng., Thompson

PRODUCTION MANAGER

Vera Toth

Opinions expressed are not necessarily those held by the A.P.E.M. or the Council of the A.P.E.M.

Annual Fees IMPORTANT REMINDER

Fee invoices have been mailed to all members. Members are again reminded that receipt of fees **in the Association office** after February 28th, 1987 will incur a late payment administration fee of $35. (If fees are mailed prior to February 28th and received after February 28th, the late payment fee **will apply).**

Also, be reminded that if all fees owing are not received in the Association office **before** July 1st, 1987 the member's name will be removed from the register and that person is then prohibited, by law, from practising engineering in Manitoba.

Regrettably, due to a computer problem by the firm responsible for addressing and mailing the fee invoices, first initials only were shown. Unfortunately, time constraints prevented us from having new invoices printed, addressed correctly and mailed.

W.B. Mackenzie, P. Eng. □

MEMBERS OF THE STAFF



Donna Bilodeau



Vera Toth

These two ladies are hardworking members of our Association office staff.

Donna is a native Manitoban and hails from Ste. Rose du Lac.

Vera comes to us from Coleman, Alberta via Tumbler Ridge, B.C. (site of Canada's largest open-pit coal mine and the world's longest conveyor belt system).

Donna is our receptionist, handles bookkeeping duties and is secretary to a number of committees. Vera is also secretary to a number of committees and is production manager of this publication. Both are pleasant, courteous and more than willing to answer any queries you or the general public may have relating to Association activities or operations.

ENGINEERING ENDOWMENT FUND UPDATE

By G.A. Morris, P. Eng.

The first phase of the fundraising campaign for the University of Manitoba Engineering Endowment Fund was completed early last December. During October and November, staff members in the Faculty of Engineering pledged more than $140,000 to the Fund, whose objective is to support excellence in engineering education. The average donation by academic staff members was $1,600, second highest among the University faculties. With follow-up canvasses planned, the staff objective is to raise $200,000 during the next five years.

The executive of the UMES, the undergraduate engineering student society, is planning a referendum on a program of "voluntary" student contributions to the Fund. If approved by a two-thirds majority, the program will see an annual contribution of $50 by every undergraduate student in the Faculty.

The overall objective of the Engineering Endowment Fund campaign is to raise $2 million from staff, students, alumni, engineering organizations during the next five years. Although the "external" campaign, among engineering alumni and organizations, is not scheduled to begin until February, it was given a boost last November. UMA Engineering Limited announced a $50,000 contribution to the Engineering Endowment Fund and a $1,500 annual engineering Scholarship. □

INVITATION TO U OF M THESIS DAY

The Department of Electrical Engineering of the University of Manitoba extends invitations to all those members interested in reading graduation thesis on Thesis Day, March 20th, 1987

For further information, please contact A. Jakobschuk, P.Eng., Theses Co-ordinator at 474-9603. □

IN MEMORIAM

With deep regret the Association records the passing of:
J.A. Harding, P. Eng.
G. S. Bowman, P. Eng.

Engineering Exhibit

(continued from page 1)

units displaying various artifacts, photos, models, and miniature diorams.

The units will examine the worker's daily toil with their tools and instruments, as well as their daily lives. The technological facts of spanning rivers and rapids as well as the utilization of donkey-powered slip-scrapers will be considered. Tools created by the workers will also be included.

The exhibit will examine the economic development that came in the wake of railway-building, including mining and hydro electric development. Finally, it will consider the development of the Port of Churchill with its grain-handling facilities.

Artifacts demonstrating the work and lifestyles of those involved in the engineering design and construction of this project will be used wherever possible, along with archi photos and graphic panels.

It is intended that this exhibit will clearly demonstrate the impact and significance of engineering on Manitoba's development, both past and future.

The exhibit is expected to open in June, 1987. □

Exceptional Canadian Engineering Feats Saluted

Throughout this issue you'll find mention of historic achievements of engineering in Manitoba and in Canada. The theme of the Canadian Engineering Centennial, "1887-1987: Mind, Heart and Vision. Canadian Engineering: The Next Hundred Years", covers the last hundred years where the greatest amount of raw physical labour went into building the facilities in Canada, setting the stage for the next centennial of effort.

A jury has selected the ten most exceptional and representative feats of Canadian Engineering's First Century (our Professor Glenn Morris, P.Eng., was on the jury of eight members). The criteria of selection were very stringent. The jury examined some 110 projects, illustrating the versatility and vitality of engineering in all disciplines. Each project, besides the obvious engineering advance, must have played a catalytic role resulting in major economic and social change within its own era. It must have posed "extraordinary demands in organization and administration" and, within the context, "be identified by its original character, ingenuity, creativity and true uniqueness."

The final short list illustrates the grandeur and scope of the great Canadian Engineering Adventures undertaken, with enthusiasm, by our forefathers.

The National Railway Networks

In 1885, the Canadian Pacific Railway was completed in four years instead of the projected ten. The logistics of penetrating virgin country of muskeg, impenetrable forests and mountains and surmounting the politics and economic shoals resulted in uniting this great country to give "Dominion from sea to sea."

The Polymer Industrial Complex. The development of synthetic rubber

The wish of 1942 became reality by 1944. More than five thousand people and two thousand companies took part in this immense construction to produce synthetic rubber from butadene, at a time when such production met the high demand for the Allied war effort. Polymer became Polysar with installations in fifteen countries, yet, headquartered in Sarnia with a staff of six thousand five hundred persons. Polysar is a prize example of development from chemical research; world leader in the petrochemical industry.

The DCH-2 Beaver: De Havilland Aircraft's "Little Flying Jeep"

In 1947, a team of engineers came up with a design for a new bush plane; fifteen Beavers were built and sold in Canada that year. Weighing in at one thousand pounds, the Beaver carried six passengers and a pilot or the equivalent cargo. The Beaver has proven very popular to the United States military and in opening up Alaska. In 1968, one thousand six hundred and ninety-two Beavers came off the assembly lines — a rugged symbol of Canadian engineering ingenuity which gained an international reputation.

The St. Lawrence Seaway

Completed in 1960, this impressive engineering feat included bridges, tunnels, caissons, locks, canals, dams, railways and roadways constructed around rerouting 563.25 km of water from Montreal to Lake Erie. Over a billion dollars was invested with over two million horsepower generated in electrical power. Allowing shipping to move thirty-seven hundred km into the interior of the continent, the seaway rises 182 m above sea level, resulting in a shipping route that conveys fifty million tons of cargo during the eight-and-a-half month season.

The CANDU (Canada-Deuterium-Uranium) Reactor and the nuclear production of electricity

Major engineering advances followed the discovery of neutron economy: energy production utilizing heavy water. The fact that the Canadian option involved uranium which did not have to be enriched and the technical simplicity of the CANDU reactors themselves made this an ideal system; exportable and very economical in the production of electrical energy. Throughout the development, strong emphasis on professional ethics has guaranteed efficiency, safety and reliability, in response to community needs. More than $3.6 billion of annual economic activity is generated by the nuclear industry, making this a major cornerstone of the Canadian economy.

The ALOUETTE I satellite

Designed and built in Canada, this first satellite was launched by NASA on September 29th, 1962. Set to orbit the planet for a year, it stayed up for ten years. The apparatus included two special antennas measuring 46m and 23m respectively, designed to sweep and measure reflections of radio waves and effects of solar activity on the ionosphere. This satellite was the precursor to the development of international satellites, and contributed to present spacecraft design.

The largest microwave transmission network in the world

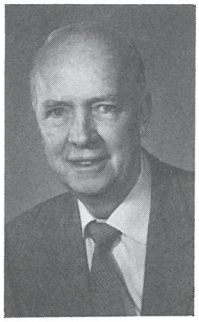
This network of microwave transmission is the backbone of our system of telecommunication from sea to sea. Sponsored by the Canadian Broadcasting Corporation and executed by the seven members of the Trans-Canada telephone system, this network was constructed in three years involving 139 towers (ranging in height from 9.14 m to 106.68 m) over a 6,276.27 km track from Sydney, Nova Scotia to Victoria, British Columbia. Newfoundland was linked later. The system is designed to provide distortion-free images in telecasting. Site marking, construction of access routes, trials, and the feedback to the final erection of the galvanized steel towers developed a Canadian engineering know-how that is recognized internationally and resulted in Canadian involvement in the PANAFTEL network linking French Africa with Paris.

The Bombadier Snowmobile

Thirty years of research resulted in rubber-covered tractor wheels, patents for Caterpillar-type wheels, a new suspension system, a drive wheel and gave birth to the individual motorized sled called the SKI-DOO. Subsequent design improvements on engines, suspensions, speed transmission, poly-carbonate-injection casing design, gains in soundproofing, all benefitted to produce the small, light-weight, strong and resilient machines we know today. Transportation and life-style in the Canadian North has been drastically changed by the development of the snowmobile.

President's Message

Ted Speers, P.Eng.



The James Bay Hydroelectric Project

Originating on the La Grande River on James Bay, this system transports 10,000 megawatts of electricity south to the rest of Quebec. Begun in 1976, construction involved 5500 km of power lines and 11,650 pylons with an average separation of 470 m. There are five high-tension lines of 735,000 volts A.C. Nineteen substations control dispersion of energy loads on the lines, easing maintenance and monitoring their tension. The task was a huge one involving, in addition to the obvious engineering feats, environmental and native issues.

The development of the Athabasca Oil Sands

The open pit tar sands 456 km north of Edmonton have so far produced some 243 million barrels of synthetic crude oil since 1979. The target was 140,000 barrels per day by 1989. This unique mine, covering thirty square kilometers cost $2.3 billion at start-up.

Gigantic development work over five years explored the oil layers, soil reconstitution, construction of roads, dams, wasteweir, bridges, buildings and work camps. The extremes of climate from -50°C to +40°C and the corrosivity of the mineral, necessitated specialized equipment adapted to the specific northern conditions. This research will serve to develop further industry and economic fall-out as this mammoth undertaking releases the trillion barrel oil reserve at this site.

The scope of these engineering masterpieces will be on display, this summer, in the Old Port of Montreal, as well as across Canada at special museums and science and engineering centres.

Ten exhibits out of one hundred and ten submissions have been honored. There are many more. All that have been featured are large ventures embodying a wide spectrum of engineering disciplines. We, in Manitoba, will honour the developments of the Hudson Bay Railroad, the Manitoba Hydro on the Nelson River, the mining endeavours and we can think of many others, not the least being the Winnipeg Floodway that protects the city from devastating floods.

All engineering advances are not large. We think of vascular suturing devices designed by mechanical engineers at NRC, artificial dialyzing equipment, orthopedic devices, even collapsible lamp standards — all serve, in their own way, to improve the human lot.

The Sons of Martha, the engineers, serve mankind in every avenue of human endeavour. □

IN PRAISE OF ENGINEERING: now more crucial

We in the developed countries live in the realm of the engineer. From the moment we turn on the water in the morning until we turn off the lights at night, we are surrounded by engineered structures, systems, products and processes. They help to feed, shelter, clothe, transport, comfort and entertain us, and allow us to communicate invisibly with one another. No matter what we do for a living, much of our own work is done with things made by engineers.

Yet most of us who are not concerned in our jobs with the nuts and bolts of technology seldom give more than a passing thought to how critical the engineering profession is to our existence. This is because the marvels of engineering have come to be routine. They are as much a part of our daily environment as the mountains around a Nepalese Sherpa. They have ceased to inspire the awe they deserve except when, as in an avalanche, something goes wrong with disastrous results.

The engineer himself (or, increasingly these days, herself) has faded into the landscape along with his all-pervasive output. We know the names of the sculptors and architects whose works grace our big cities — the Henry Moores and the I.M. Peis — but who knows

"The world we live in has largely been created by engineers, who have delivered blessings to mankind since the dawn of history."

who actually erected the buildings and bridges, who cut the streets and installed the pipes and wires that make a city run? In any list of historical persons, engineers rank far below monarchs, politicians and generals. The reason for this is simple: engineers normally solve problems instead of creating them, and a problem solved is a problem out of mind.

The lack of recognition of the engineer in relation to his significance is hardly a recent phenomenon. History does record the name of the man who built the Great Pyramid — Khufu-onekh — but it is less commonly known than that of Cheops, the Egyptian king for whom that incredible feat of engineering was carried out. While the poets and philosophers of antiquity are enshrined in immortality, the builders of the seven wonders of the world are forgotten. We have all heard of Homer and Plato, but who was in charge of constructing the Acropolis? Virgil and Cicero are still quoted, but who engineered the Coliseum?

In particular, the engineer has always lived in the shadow of the scientist. The latter traditionally has received the credit for advancing the cause of mankind with discoveries that might never have done any good for anybody without the added value of innovative engineering skill. The difference between the two callings is that the scientist seeks new knowledge for practical purposes. Neither could function without the other. "There are science and the application of science, bound together as the fruit of the tree that bears it," as Louis Pasteur said.

In fact, the scientist and the engineer have often been one and the same person. Galileo not only unlocked the secrets of the sky, he built the first high-powered telescope. Marconi was a trained physicist, but his fame rests in taking Heinrich Hertz's equations and applying them to wireless communication with an antenna and radio sets he built himself.

But what, in the first place, *is* an engineer? It is difficult to summarize the work of hundreds of thousands of men and women in a vast range of technical specialties in a single sentence. The *Encyclopaedia Britannica,* however, came very close when it defined engineering as "the professional art of applying science to the optimum conversion of resources to benefit mankind."

The *Britannica* points out, incidentally, that it is no accident that engineers live by the exercise of ingenuity. The words engineer and ingenious have the same Latin root, *ingenerare* meaning "to create."

Though engineers had been at work since before history was ever written down, no name existed for their occupation until the Middle Ages, when the term "enginer" was used to describe the man who fashioned "engines of war" such as swinging battering rams and catapults. Military engineers had never confined their skills exclusively to warfare, however. The paved roads that radiated from home throughout Europe and the Middle East were the work of engineering officers in the Roman legions, in peaceful times they also turned their minds to the construction of the massive stone aqueducts that arouse wonder to this day.

In medieval times a clear distinction grew up between the military and the civil engineers who constructed the great cathedrals of Europe. The craft was becoming more sophisticated: the cathedral builders employed such devices as groining, pointed arches and flying buttresses to deal with lateral thrust and stress. Engineering was also becoming diversified. Hydraulics engineers had long worked in mines and mills, and chemical processing systems were in operation. The advent of clockwork brought the mechanical engineer onto the scene.

"From the beginning, Canada was an engineer's country."

It was this type of engineer, with his gears and shafts and metal screws, who set off the Industrial Revolution. John Kay's fly shuttle and James Hargreaves' spinning jenny took workers out of their cottages and into factories. The man closely associated with this epochal development, James Watt, was an engineer in spirit and practice. Watt did not invent the steam engine — Thomas Savery and Thomas Newcomen are variously credited with that — but he improved on the invention enormously by redesigning it and making additions to it. Watt made the steam engine an efficient source of power for industry. He did what engineers are meant to do — take ideas and make them work.

Watt was a typical old-timer engineer in another respect; he was self-educated, having spent only one year training as an instrument maker. So were his contemporaries who built the canals, railways, highways, foundries and machine tools that transformed Britain from a small agrarian nation into a wealthy world power.

"The new Dominion burst with engineering activity of every known kind in the years that followed."

The engineer of that era ordinarily served an apprenticeship under an experienced practitioner, then went on to tackle the problems of nature with little more than a T-square and his own skill, knowledge, common sense and intuition. The celebrated 18th century English canal builder James Brindlay never used models or drawings. As recounted by C.C. Furnas and Joe McCarthy in their 1966 Life Science Library book *The Engineer.* "Once, when asked what the arches of a proposed canal aqueduct would look like, he sent to the market for a cheese, sliced it in halves, placed the two semicircular portions on a table with their round sides up and laid a ruler across their tops to represent the trough of the canal."

Though the first school of road and bridge construction was formed in France as early as 1747, the age of rule-of-thumb engineering did not really end until electricity was put to its first major practical use in the telegraph in the mid-19th century. The common sense approach that had governed the building of things and the formulation of processes in earlier times could not be applied to electrical reactions because electricity did not follow common sense rules.

Discoveries in dynamics, chemistry, metallurgy and other fields also complicated engineering. No longer was it sufficient to go about with a handbook containing formulas based on the known data about a subject. In a world becoming ever more aware of the complexities of nature, the handbook had to give way to the textbook. Schools of engineering had to be founded, and standards of competence set by professional societies.

The colonies that would make up the future Canada entered early into engineering education. In 1854 our first engineering school was opened in what is now the University of New Brunswick. It was the start of an educational movement that would swell to

to human survival than ever before....

.e point where today one in every hundred working Canadians is a graduate engineer. Still, for a long time to come, most of our engineering skills had to be imported from other countries.

The founding of the New Brunswick school was by way of an acknowledgement that this vast, rugged, undeveloped land was an engineer's country. Little economic progress could be made without public works such as roads, harbour improvements and canals. The great difficulty in maintaining a distinct political presence north of the United States border was a lack of communication among the pockets of settlements in British North America. The railways which were just then being built promised a solution to the problem.

Canada must be the only nation on earth to have a reference to an engineering work in its constitution. A commitment to complete the Intercolonial Railway linking the Maritimes with the central provinces was a key provision of the British North America Act. Another railway, the Canadian Pacific, was needed to bring British Columbia into Confederation and bind the nation together. Building the CPR across the barriers of the Canadian Shield and the western mountains presented one of the mightiest engineering challenges ever undertaken. Its completion 01 years ago opened the door to the settlement of the Canadian West.

The new Dominion burst with engineering activity of every known kind in the years that followed. Canada's great sprawls of rock were turned from a hobble into a spur to development through the skills of mining engineers. Their colleagues in the pulp and paper industry did the same with our forest.

"Today as never before Canadian engineers are spreading their skills around the world."

Hydro-electric engineers helped to give Canadians a priceless legacy of cheap, reliable energy.

Given the central role engineers have played in the building of our nation, it is fitting that one of them, Sir Sanford Fleming, should rank high among our national heroes. As a frontier surveyor and railway builder, he personified the energy and ingenuity of the engineer in Canada's formative years. And Fleming represented another tradition among his Canadian colleagues. He was an internationalist whose best-known achievement was to establish a system of standard time around the world.

Even before Fleming rose to fame, Canadian engineers had their eyes trained outward. In the 1850s and '60s they took part in such historic projects as laying the transatlantic telegraph cable between Newfoundland and Ireland and drilling the first railroad tunnel in the United States. The new science of petroleum engineering had its cradle in Southern Ontario at about the same time. (In those days before the internal combustion engine, the oil was refined for use in kerosene lamps.) As early as 1874, Canadian petroleum engineers were exporting their expertise to the Dutch East Indies. From then until the outbreak of World War I, they were to be found in the far corners of Europe, Africa, South America, the Middle East and Australia, drilling and building refineries and pipelines to meet the growing thirst for oil in the age of the automobile.

In the meantime, the Canadian with the slide rule and the high laced boots became part of the scenery at mining and utility construction sites in Latin America and the Caribbean. It has been said of the British Empire that trade followed the flag. In Canada's case, exporters often followed the engineer.

Today as never before, Canadian engineers are spreading their skills around the world, not only in their traditional fields of leadership in hydroelectricity, telecommunications and pulp and paper, but in every aspect of engineering activity from metallurgy to medicine. In recent years, Canadian firms have worked on project and studies in more than 100 countries — and trade has continued to follow the engineer.

Camille A. Dagenais, Chairman of the Board of the globe-ranging SNC Group of Montreal, has conservatively estimated the export spin-offs from overseas engineering activity at $700 million annually, in addition to the $300 million a year which engineering companies earn directly from foreign projects. Among a "small sampling" of items bought from Canadian suppliers he lists piping, handtools, telephone poles and textbooks, along with turbines, generators, crushers, cranes and mobile housing. An uncountable number of jobs at home are dependent on the jobs Canadian engineers do abroad.

"Other rewards of working abroad, though less utilitarian, are perhaps more important in the long run to individuals and groups," writes Mr. Dagenais. "Best of all, perhaps, is that you have helped make life better for people in other parts of the world. Today, with widespread drought and the threat of famine looming in so many countries, the contribution of Canadian engineers is more vital than ever."

When Canadian engineers gather in Montreal in May, the vital contribution which the profession can make to dealing with the desperate problems of the world will be a prime topic of discussion. The conference will mark the founding of the Canadian Society of Civil Engineers (later the Engineering Institute of Canada) in 1887, and it will doubtless be remarked how much the profession has changed in those hundred years. Engineers now work in large teams, drawing on the immense capacity of computers to aid them in their efforts. They have branched out into a range of specialties and sub-specialties that would be utterly bewildering to a member of their profession a century ago.

But though the approaches, techniques and tools have changed, the basic function of engineers is constant. They are the members of society who are ultimately responsible in detail for getting things done. Now only must they get things done, but get them done in the most economic manner possible. Consider that *Britannica* definition again:"...the optimum conversion of the resources of nature to benefit mankind."

The depletion of natural resources worldwide has lent this phrase a keen new meaning. We humans can no longer afford to waste the dwindling supply of resources at our command. Nor can we afford more damage to the natural environment. The waves and clouds of pollution around us are evidence of the folly of the theory of development at any price.

In the global village of communication created by the engineer, the social conse-

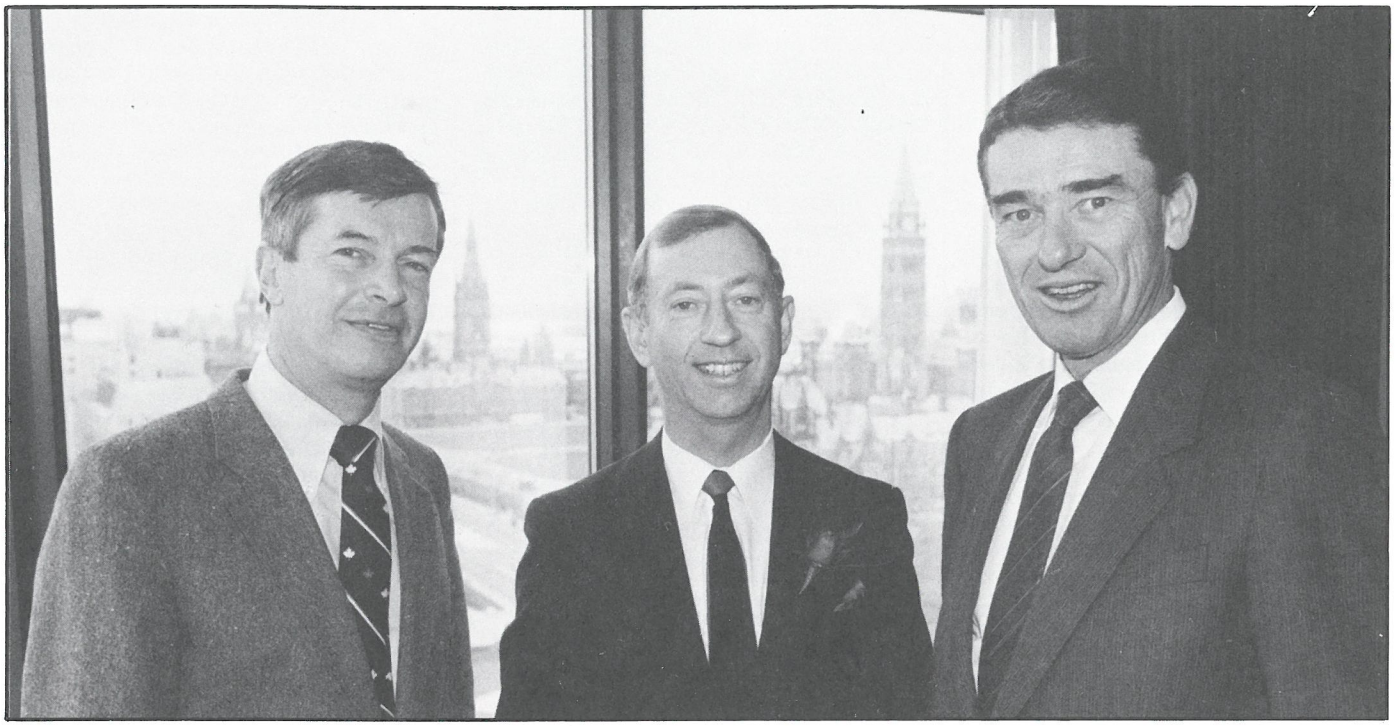
"The fate of man now more than ever hangs in the balance, and engineers will play a crucial part in determining that fate."

quences of development weigh heavily on the public conscience. The harm done to minorities in the pursuit of an elusive material progress can no longer be overlooked. A new human dimension has thus been added to the engineer's professional obligations. Albert Einstein anticipated this back in the 1930s when he told an audience of students at the California Institute of Technology that "concern for man himself and his fate must always form the chief interest of your professional endeavours ... in order that the creations of your minds shall be a blessing and not a curse to mankind."

The fate of man now more than ever hangs in the balance, and engineers will play a crucial part in determining whether that fate will be blessed or cursed by the application of technology. Enormous problems still haunt the world, and many of those problems have been man-made. But if anyone can do something to solve them, it is the engineer who has been working "to make life better for people" since the dawn of history. It is a huge responsibility to be placed on a profession — but then, engineers have always managed to do the things that need to be done. □

(Reprinted from Royal Bank of Canada Newsletter, October 1986)

McGinnis Profound in Acceptan



Lloyd McGinnis, P. Eng. receives CCPE Gold Medal. From left: the Hon. Stewart McInnes, Minister of Public Works; Gold Medalist for 1986, Lloyd McGinnis; and CCPE President, Yvon C. Dupuis.

The Canadian Council of Professional Engineers (CCPE) presented its highest award, their Gold Medal, to a member of our Association, Lloyd R. McGinnis, P.Eng. at a luncheon at the Westin Hotel in Ottawa.

This national award is presented annually by CCPE to an outstanding engineer in Canada in recognition of exceptional engineering achievements.

Lloyd McGinnis is one of Canada's most outstanding engineers. He is President and Chief Executive Officer of W.L. Wardrop & Associates Ltd. of Winnipeg, Manitoba. "McGinnis has attained remarkable success in the profession of engineering and in the business community", said Yvon C. Dupuis, P.Eng., President of CCPE.

As an engineer, McGinnis has enhanced the quality of life in Canada and developing countries. His career has taken him from the Canadian Arctic to the African tropics, China, Mexico, Iran and Cuba. McGinnis has a wide range of technical competence and his company is a leader in the fields of public works engineering, energy conversion, radioactive waste management, automation, robotics and space systems engineering.

McGinnis graduated from the University of Manitoba in 1956 with a B.Sc. in Civil Engineering. In 1967 he received his M.Sc. in Transportation Engineering and Urban Planning from the Georgia Institute of Technology. A member of the Association of Professional Engineers of Manitoba, McGinnis is involved in many professional organizations including the Association of Consulting Engineers of Canada, and the American Public Works Association. He is a Fellow of the Canadian Society for Civil Engineering.

Currently Chairman of the 175,000 member Canadian Chamber of Commerce, McGinnis is also President of the Rotary Club of Winnipeg and Chairman of World Community Service for the Rotary clubs throughout the Prairie Provinces. He serves on the Advisory Board of Royal Trust and is a Past-Director of the Winnipeg Convention Centre and Flyer Industries.

The Honorable Stewart McInnes, Minister of Public Works for Canada, presented the Gold Medal to Mr. McGinnis, who's response follows:

Ladies and gentlemen, I stand before you with mixed emotions. On the one hand, this is an exciting and exhilarating occasion, but on the other, it is a most humbling experience.

It is exhilarating because of the good fortune that has come my way. I never ever expected to be nominated for such an honour and of course, I never dreamed of being selected for the Award! So this is truly an exciting moment. But having said that, this is also a humbling one. Humbling, because I know there are hundreds and maybe thousands of others in the profession who are more deserving than I.

As I say that, the words of Golda Meir ring in my ears, because she reportedly said to one of her Cabinet Ministers, "You don't have to act so humble — you are not really all that great." So I know I am not all that great. I also know that others would be standing here instead of me, if only they had been nominated. So I know how fortunate I really am to have this honour. And I want you to know how much I appreciate your kindness and your generosity.

I am often asked to explain what motivates me. As a matter of fact, I was asked again here today. For some reason, people want to know why I get involved and put so much

"...my global perspective tells me that this paradise of ours is being threatened."

energy into so many activities which appear to have nothing to do with the engineering profession. Although I am often asked, I never seem to have an adequate answer.

Maybe I do so because I am the kind of person that responds to requests to be of service. Or, it is because I enjoy the enrichment that it brings to my personal walk through life. Maybe it is an expression of my appreciation for the good fortune which continues to come my way.

I am appreciative because this nation of ours has been very good to me and my family. It has provided us with the opportunity progress from a humble beginning to enjoy one of the highest standards of living in the world. I have taken much out, it behooves me to put something back! Maybe it is a combination of all these things — I really don't know.

ce Speech for CCPE Gold Medal

But then again maybe, there is a more profound basis for my motivation. Possibly I pursue the things that I do because of my global exposure. Twenty years of travel, particularly in the third world countries, has brought me face to face with the reality of how fortunate we Canadians really are! It has given me first-hand knowledge and an in-depth appreciation of what we have in comparison to most of our neighbours throughout the globe. I have come to realize that what you and I take for granted is beyond the wildest dream of most of mankind. If there is anything I have learned from 20 years of tramping the globe, is that we Canadians live in a paradise! I cannot imagine what I personally, or we collectively, have done to deserve it. But I do know, that God has truly placed us in a paradise.

So maybe I am motivated by the fact that my global perspective tells me, that this paradise of ours is being threatened; and that we can no longer be confident that our future will always be better than the past.

There is something within me that suggests we are being threatened by the rapid changes which are taking place in our economic and social environment. This in itself would not necessarily be of concern, but the threatening aspect lies with the seeming reluctance of Canadians to change with the times and face up to the challenge of global competition.

There is no question in my mind, that unless we rapidly access the new technology which envelopes us; unless we develop a mind-set which enables us to compete with the best; unless we enhance our economy with increased markets and exports; and unless we equip our young people to cope with what lies ahead; our very standard of living is truly being threatened. And our engineering profession is being threatened in the process. We Canadians, at this very moment, are involved in a world-wide race for technological survival. History teaches us that economic and social advantage is always held by those nations which are skilled in the development and application of new technology. So, one of my concerns is that history will repeat itself, but this time at our expense! Knowledge is the economic frontier of the future. And the winners of tomorrow will be the knowledge and technology-intensive societies. So it is imperative to me that we Canadians get on with the task of developing such a society!

Because of our heritage; because engineers traditionally have built nations through the application of new ideas, one might assume that we in the engineering profession are well positioned to take advantage of what lies ahead. In some respects, maybe we are. But in others, I am not so sure. I am not so sure that we are not running the risk of leaving our destiny in the hands of others; leaving our destiny to chance.

The implications of the changes which are taking place around us are so profound, that we must ensure that the engineering community as a whole is fully cognizant of the challenge which lies ahead. We must make sure that our young engineers and new graduates recognize where the jobs of tomorrow lie. We must be absolutely certain that they recognize the importance of holding a high-tech card, and that they have an appreciation of when and where and how they might be able to play that card! I am concerned that our emerging engineers will not have the entrepreneurial spirit, the desire to achieve, and the will to win, which is needed to compete in the global marketplace of tomorrow.

Somehow, those of us who have been in the profession for a long time, will have to make sure our young engineers are aware of the environment in which they will be expected to carve out their careers. And somehow, we will have to find ways in which to help them, as never before.

"I cannot imagine what ... we collectively have done to deserve it."

At the same time, we will have to ensure that we have a national policy for technological development that is relevant to the times, and that there will be ample opportunity for appropriate and continuing education for all our young people. Funds must be available to carry out the research and development that we so desperately need to keep pace with global competition. If our profession is to continue to contribute to our national well-being; if we are to continue to transfer technology from the researcher to the workplace; we must ensure that the members of our profession, particularly the young members, are kept in tune with the changes which are exploding around us!

Thirty years ago, when I graduated, there seemed to be a lot of emphasis placed on safety of the public, so-much-so that one got the impression that public safety was the prime role of the engineer. At the same time, engineering in those days was often defined as "doing better that which has been done many times before." In view of the rapid changes which envelope us, we have come to realize these terms of reference are no longer adequate. We have come to realize that, no longer can we be constrained because it has not been done before. The reality is such that much of what lies ahead has never been done before by anyone! Certainly, public safety is still of concern to our profession. But a much higher order of priority, in my view, is the environment in which that safety will be provided.

To be relevant, the engineer of today must be concerned about the environment in which we will work and play in the tomorrows to come. I am not just talking about our physical environment. I refer to the very type of society that we Canadians carve out for ourselves. Because, if we are to maintain our standard of living; if we are to continue to have the privilege of this paradise of ours, our environment of tomorrow will have to be a knowledge- and technology-intensive society. Since knowledge and the application of technology is the trademark of our profession, it behooves us to build on past successes and to do our part to pave the way for the engineers of tomorrow.

Ladies and gentlemen, I suspect that some of my motivation is fueled by a desire to preserve and enhance what we have. And in some small way, I suspect, I am merely trying to do my part to help pave the way for those who follow. If nothing else, I owe it to my profession to do so.

In conclusion, I want to thank you again for your kindness and your generosity. At the same time, I want you to know that I treasure this honour the profession has bestowed upon me. I do so because I am proud to belong to an association which has made such a significant contribution to our past, and because I believe that throughout the millennia which lies ahead the engineering profession will continue to leave its footprints in the sands of time. You are most kind. I thank you from the bottom of my heart. □

Letters to the Editor

I read with interest the article "Flexible Automation — A New Challenge for Industry" by Andrew Kusiak, P.Eng., which was printed in the December 1986 issue of *The Manitoba Professional Engineer.*

The concern I have with this and many other engineering articles is the apparent lack of concern for the users of the equipment which is being installed. The only comment regarding labour was an off-handed remark "Labour has not been a significant barrier, even though it is widely perceived that failure to automate will ultimately result in fewer jobs". A more dramatic example of this lack of concern for the users was indicated in another article in the same magazine issue entitled "Engineering Under Pressure" by Samuel C. Florman, P.E. Maybe if engineers in management had shown more concern for the crew of the Challenger, that disaster may not have occurred.

I believe that engineers must consider the effects of new technology on the employees and make provision for training, retraining, relocation and/or displacement costs in their feasibility and economic justification studies. The Professional Engineers Act was legislated to protect the public. It should also include consideration for the affected employees.

John M. Roll, P. Eng.
Workplace Innovation Centre □

Centennial Board's Book on First Century of Canadian Engineering is Long Overdue

A major first in the literary world of Canadian science and technology: a book on the history of engineering in Canada is now available. Commissioned by the Engineering Centennial Board to highlight the events of 1987, this book is not only aimed at engineers but the general public as well. Its author, Norman Ball, carried out the painstaking task in two-and-a-half years. Along the way, he discovered that Canadian engineers scaled the heights of excellence.

"This book was long overdue," says Norman Ball from behind his hornrims. His laughing eyes are serious now. "This document breaks the conspiracy of silence which up to now has blanketed the history of science and technology in Canada".

The "conspirators", he alleges, are those intellectuals, academics and university professors, in short, all of those persons whose task it is to explain the country and translate its aspirations. The historian of the National Museum of Science and Technology in Ottawa presses on. "You can do 16 years of schooling without ever hearing spoken the name of a Canadian physicist, mathematician or engineer."

"Right from the very beginning, I knew what kind of book I did NOT want to do..."

"The science museums are also guilty," he says.

"Quite often, they restrict themselves to trumpetting the successes of foreign scientists. The general culture of the history of Canadian science is so poor that I fixed two major goals for my book: first, to show how important engineering has been in Canadian history; and, to prove that our engineers are now and always have been among the best and the brightest."

Norman Ball is 42. Of medium height, calm and ponderous, he travels history books like others would continents. He collected, notably, the efforts of our first engineers to accomplish a work which will endure. He speaks of these unknown works. "I wanted to show that no matter where the geographical locale or when the historic moment, engineering was there. For example, the mass exodus to the cities in 1890 and, notably, the development of public services: there had to be major work done on aquaducts, sewers, bridges, buildings and many other things to provide proper living conditions for people."

The first of the book's six chapters is titled: "The years before 1867: A marriage of convenience between engineering and technology."

"During these groundbreaking years," the author says, "engineers discovered that they had to adapt European working methods to Canadian conditions. These first builders laid the foundations for Canadian engineering. As the title of the second chapter says, these were years of challenge and successes: in the West, the thrust of the railroad to the Pacific Ocean and, in the East, the birth of the electrochemical industry at Shawinigan."

The action picks up in the third chapter. To describe the century, the author sought inspiration in the famous quote by Prime Minister Sir Wilfrid Laurier: "The Canadian century: Spectacular growth and the World War." On the vast fronts of history and Canadian geography, the author has marshalled his first battalion. He attacks with the rural exodus toward the urban centres and the arrival on Canadian soil of successive waves of immigration. Massive problems of supply, lodging and public health arose. New materials had to be produced. But the situation was not critical to the point where Canada could not contribute to the War Effort.

Norman Ball continues. "I didn't seek to reinvent history. I followed the course of known events and I brought to light their scientific and technological dimensions. We all know the facts which marked the construction of the railways across Canada. But the huge struggle that Sir Sanford Fleming carried on in the early 1870s is less well-known. There was the question of building an "Intercontinental" line through the Maritimes. For budgetary reasons, the Sir A. MacDonald government demanded that the ties be made of wood. Fleming was against this.

In a private meeting with the Prime Minister, he outlined his plan: "Short-term savings can be ruinous in the long term. The ties must be iron." MacDonald would not back down. But Fleming was just a hard-headed. He took his argument to the Privy Council of London and they bought it."

In the second part of his book, Norman Ball tells how engineers changed their work methods to adapt to the dark conditions of the Depression Era. Up until 1920, engineering played a primal role in the Canadian economy. However, come the 1920s and human resources became the only working capital accepted. Machines went underemployed. The Second World War sounded the death knell of this period. Plants and factories sprung up like mushrooms. Everything was being manufactured: soap, airplanes, bombs, textiles. Engineers who weren't at the Front didn't waste time. They discussed efficiency and productivity. This penultimate chapter concludes on an optimistic note: the Post-War Boom, the Trans-Canada Highway and Expo '67.

"Right from the very beginning, I knew what kind of book I did NOT want to do," says Ball. "I didn't want to simply prepare a long list of engineers or just describe certain engineering highlights. I strove to avoid superlatives: the largest, biggest, most spectacular, etc. I wanted to merge the small with the big." "Take for example, the Quebec bridge; the second, in 1917, which only partially collapsed. In itself, this structure was without a doubt a grandiose work and very attractive in the bargain. When it was inaugurated it was the largest of its kind in the world. My book describes this highlight. But I place it in context with the thousands of other bridges built across Canada, so that many citizens can make their own comparisons and appreciate the feat, thus bringing the scope of the construction of the Quebec bridge even closer to home."

Norman Ball set one goal for himself: to awaken Canadians, especially engineers, to the richness of their professional culture. He likes to repeat that the goal that guided him throughout the work was to recall well-known historical events and bring to the fore their scientific and technological dimensions. "In most industrialized countries, these scientific and technological dimensions are normally cited in all scholarly historial and general culture works."

Norman Ball does not sell a "message". But, he doesn't seek to avoid controversy, either. "Historical fact shows that Canada waged a bitter social struggle on "doing what is best". What is a good engineer? He who builds a twenty-kilometre railway at lowest cost, as demanded by the developer, but which will have to be rebuilt totally five years later; or he who builds only five kilometres of railway that will be there for an eternity? It goes without saying that the debate still rages today."

"... I fixed two major goals for my book: first, to show how important engineering has been in Canadian history; and to prove that our engineers are now and always have been among the best and the brightest."

And contrary to popular opinion, Canadian engineering has not been devoid of beauty, the author shows. Inspired by the greats of Canadian engineering, he invites their modern counterparts to play leadership roles. He concludes his work thusly. "They should not only participate actively in the social and political life of Canada, but they also have the responsibility to identify problems and find original solutions. □

(Courtesy. OIQ Plan)

A Flood of Human Effort

by C.H. Templeton, P. Eng.

The flood of 1950 inundated one-third of Winnipeg, cut off rail and highway transport and shut down essential services. But the people took it in stride. They put away their usual grumbling, selfishness and greed and set out to meet the challenge with good humor and hard work. The story of the 1950 flood is in reality a story of the people of Manitoba. They fought the flood, and in most cases lost. They helped others even as water was rising above the floor of their own home.

Even before the flood reached its peak, engineers were working towards a solution to prevent future floods.

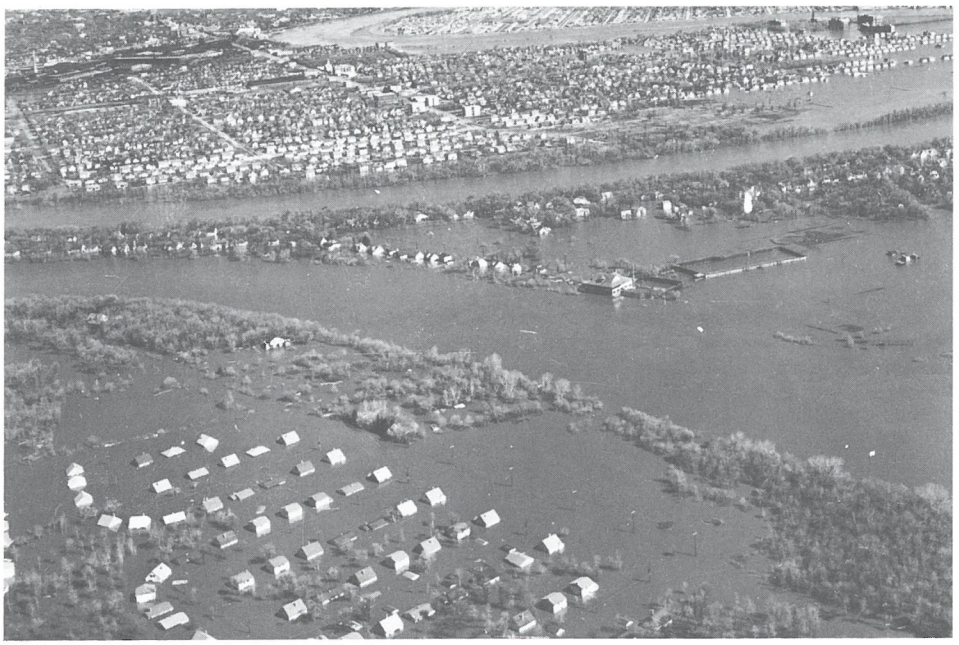
As the water receded it became apparent that the cost of repairs to many new homes including those in new subdivisions like Wildwood would be greater than the owner's equity and many might abandon their homes. CMHC had personal covenents that required it's mortgagees to pay regardless of what happened, but to invoke the covenents in these circumstances would seem cruel and should be avoided if at all possible.

Premier Doug Campbell appointed engineer Don Stephens to see what could be done. Prime Minister McKenzie King appointed engineer C. D. Howe to restore the confidence of the people of the city. Howe readily accepted Campbell's thesis that the third largest city in the country could not be abandoned in it's time of need, which goes to show how different things were in 1950 than they are in 1987.

The two engineers decided that some temporary measures should be undertaken to prevent flooding while long term flood prevention measures could be studied. The eventual solution was found to be the Floodway, but that is another story.

To undertake these measures the Greater Winnipeg Dyking Board, composed of three engineers, was formed. It perceived the only practical way to build dykes inside a city was to raise the streets nearest the rivers. But there were practical limitations as to how high they could be built without undue disruption to the city during non high water times. They decided that dykes built to a level four feet lower than the 1950 flood was optimum. For floods higher than that level temporary dykes could be built by trucks dumping dirt along the river side and still maintain two way truck traffic. This required a dyke top 50 feet wide.

Having decided on the scheme they set out to get the dykes built. All jobs were tendered and contracts awarded to the lowest bidder. Jobs were sized so that virtually every dirt-moving contractor in the province was working to capacity. The Highways Department postponed for one year it's program so the dyking program could be expedited. Freeze-up was late in November that year and virtually all of the dykes were built by then — only nine months after the flood.



A view of Wildwood, Kingston Crescent, Fort Rouge.

But dykes alone would not prevent flooding. Backup of sewers, drains and other conduits could flood the areas behind the dykes. Some 23 gates and pumping stations with capacities large enough to pump out the sewers was the largest — 108 inches in diameter.

All of these activities caused major disruptions to utilities. Telephone trunks had to be relocated, power lines had to be rerouted and new high voltage services to the pumping stations fed by two power sources had to be built. All of this had to be done at a time when the utilities were recovering from a major dislocation of their own plants because of the flood.

Members of the University of Manitoba Engineering Class of '50 pitched into everything with the same fervor with which they had fought a war and a flood.

The Dyking Board was set up, staff hired, program conceived, dykes and pumping stations surveyed and built, and existence terminated all in 20 months. Surely this must be some kind of a record for intergovernmental boards.

The flood fighting, repairs, and remedial measures could only have been achieved in a city with a resourceful and innovative people who were willing to put aside their personal wants for the overall good of their community. This was best illustrated by the people whose houses were situated on the river side of the streets which were built up as dykes. They accepted their unfortunate circumstance of not getting flood protection without lawsuits or demonstrations about "rights". They were the real heros and heroines of the dyking story. Another group worthy of comment and who were behind the scenes throughout the whole effort — the Sons of Martha — the engineers were there quietly doing their job. □



View of University of Manitoba.

The First Decade of A.P.E.M.: *1920 1929 the "Roaring Twenties"*

by D.N. Spangelo, P.Eng.

In celebration of the Centennial of Engineering in Canada we will be publishing a series of historical notes taken from Council Meeting Minutes dating back to the 1920's. Each of the six issues of the *Professional Engineer* published in 1987 will feature, a decade at a time, highlights of Council business, Association news, and social activities.

We hope you will enjoy these often amusing glimpses into the past and perhaps gain an appreciation and understanding of how the Association has evolved over the years.

Thanks to Mrs. Loreen Dunklee for providing the background material for these articles.

The "Start-Up" Decade 1920-1929

The first meeting of the Provisional Council was held on April 19th, 1920. There were six meetings that year. The first General Meeting was on September 27th, 1920 with 71 registered members present. The Registrar was paid an honoraium of $300 for the year.

In 1921 a scholarship of $150 was set up for the University of Manitoba Faculty of Engineering. An engineering library was also established in the Carnegie Library.

At the meeting of February 21, 1922, the secretary was instructed by Council to lobby Members of Parliament to protest the possible Dominion Government action to discontinue the Scientific and Industrial Research Council in the interests of economy (noted here with a distinct feeling of deja vu).

In 1923 the Annual General Meeting was held on January 18th in the Engineering Building with only 42 members present. The president discussed suggestions for making the Annual Meeting more interesting. (Attendance has obviously been a problem from day one).

Council was endeavouring, without success, to deter the Provincial Government from supplying free engineering services to municipalities. The Association secretary was paid $25.00 per month.

In 1924 the Minutes indicated there was considerable difficulty in collecting fees. The problem was periodically turned over to a solicitor for collection. A committee was appointed to look into the matter of a permanent quarters for the Association. (An office was finally opened in 1956).

The secretary was authorized to purchase one hundred cigars for the 1925 Annual Meeting. It is not known if this helped to increase attendance.

In 1926 the Annual Meeting was back at the University of Manitoba Engineering Building, 33 were present. Though a technical paper was proposed it was not recorded. Towards the close of the meeting it was pointed out that a quorum was not present. The meeting was then adjourned.

In 1927 a report to Council on a proposed joint headquarters revealed that the Association Land Surveyors were not enthusiastic, the Manitoba Association of Architects were not interested, and the Winnipeg Branch of the E.I.C. could not afford it. It was decided to have two or more speakers at the next Annual Meeting, plus a vocalist and a pianist. (The meetings were obviously becoming more interesting).

At the Annual Meeting of January 28th, 1928 E.W.M. James was appointed Registrar for a short period following the resignation of J. Quail. A sum of $350 was granted to the Social Committee for a social evening. This took the form of a supper dance at the Royal Alexander Hotel.

At the Annual Meeting on January 17th, 1929, 84 members were present, while almost 300 attended the joint supper dance the same year (obviously social activities were more interesting).

The next issue will cover highlights of the "Dirty Thirties". (And we think unemployment is a concern now!) □

Council Reports

NOVEMBER 14, 1986 *by W. G. McKay, P.Eng.*

Where Council approves the report of the Ad Hoc Committee on the Ethical Use of the Engineering Seal

This meeting, postponed from November 10th because of the Great Storm, was convened at 3:30 p.m., November 14th, with President Speers, Councillors Buhr, Newton, Christie, Kjartanson, and McGilvery all present. Later, Past-president Clarke and Councillor Hawaleshka joined the meeting. Registrar Bill Mackenzie and Joan McKinley were also in attendance.

Minutes and Financial Statements: After welcoming the two new council members, Kelly Kjartanson and Bill McGilvery, the Minutes of the two previous meetings were considered and quickly approved. Financial Statements were approved. However, Mr. Christie raised several questions relating to the format of the financial statement.

Licences, Engineering Graduates, Transfers, etc., were likewise quickly approved.

Liaison Councillors on Committees: The following were appointed Committee Liaison Councillors: Board of Examiners — O. Hawaleshka; Consulting Engineers — W. Christie; Professional Development — K. Kjartanson; Safety in Engineering Practice — W. Newton; Salary Schedule — W. McGilvery; University Liaison — K. Buhr.

Appointments by Council: Council then appointed the 1986/87 Board of Examiners consisting of thirteen members; nine from the University and four from the public sector and from private practice. The Nominating Committee was appointed consisting of ten members, including past-presidents Clarke and Kane and Councillors Buhr and Christie.

Ad Hoc Committee on the Ethical Use of the Engineering Seal Report: Mr. Newton, chairman of the committee, spoke on the report. Council accepted the report and agreed that it was comprehensive and should be very useful for practicing engineers.

Safety-in-Engineering Practice Committee Report: Because of certain problem conditions detected in post-tensioned cast-in-place slab floors as used in parking garages, the committee has come forth with recommendations to alert the membership as to these deteriorating conditions.

Other committee recomendations relating to amendments to the Code of Ethics (such as the situation where an engineer may be aware of a dangerous condition and it should be his duty to advise the appropriate authorities of this condition) were discussed. Further discussion indicated there were other sections of the Code of Ethics requiring revision. Hence the Council tabled a motion to revise canon 3.3 until recommendations on the Code of Ethics were received from the Practice and Ethics Committee.

Advertising in the U. of M. Engineering Yearbook: Debate ensued as to whether A.P.E.M. should place an advertisement; as to the quality of the content of the publication; as to the size of the advertisement and as to where the advertisement could be placed if such placement was possible. After motion and amendments the final action was to place an informative advertisement.

Canadian Engineering Accreditation Board: The CCPE Board will hold a meeting in Minaki in September 1987. After some debate as to financial support for those who may be attending, it was resolved that the Council would not authorize any financial support but any such members are free to attend at their own expense.

U. of M. Engineering Student Co-op Education Program: A solicitation for financial support from the Association for a proposed co-op program for the Civil Engineering Department at the University of Manitoba was considered. Discussion indicated some divided opinions as to whether a single department should not be supported. The matter was tabled until the December council meeting.

Manitoba Telephone System Engineers and the Manitoba Labour Relations Board: Council further considered a request for financial support by a group of MTS Engineers to cover further legal costs in the appeal to the Manitoba Labour Relation Board. The Association has already provided information to this group relating to the registration of engineers currently in the employ of MTS. After much debate involving the role of the professional engineer in the MTS organization, it was decided that the President and the Executive Committee would continue a watching brief on the situation.

New Winnipeg Building By-Law: Council then considered a report of the Legislation Committee on proposed Winnipeg Building By-Law changes. Their recommendations related only to sections of the By-Law where the practice of professional engineering might be involved and where the aspect of safety in engineering might apply. A number of comments relating to the construction aspects and to the need for

A Retrospective Look at Manitoba in Our Centennial Year

By W.B. Mackenzie, P. Eng.

One hundred years ago Manitoba was young and robust, wrestling with the growing pains of Confederation, looking to the future with high hopes and unbounded enthusiasm. It must have been an exciting time. The governments of the day were looking nervously southward where the people of another young, brash and burgeoning country, caught up in the flawed vision of "Manifest Destiny", were looking with covetous eyes at the vast, empty expanses of Western Canada.

A long and fragile chain, the transcontinental railway, was holding the shaky structure of Confederation together. But, as railway systems and communication systems spread through Western Canada so also did the feelings of nationalism and national pride. The spectre of annexation by the U.S.A. began to fade.

The development of Manitoba in those early days after Confederation, and on into the 20th century, related very directly to the building of railways. Branch lines into rural areas were the woof and the warp of the economic fabric that welded the structure of provincial and national unity into a cohesive whole. As the railway system grew so did the province grow. To say that the construction of railways played a role in our history is to dramatically understate its importance. And since railroading, and in particular the location and construction of railways, was very much an engineering-oriented operation, the contribution to and the development of Manitoba by the engineering profession deserves a gold star chapter in its history books.

And although in those early years world markets easily absorbed as much wheat as Manitoba farmers could produce, the vision of their own seaport was irresistible. It could be located at the mouth of the Nelson or the Churchill. It would eliminate the extreme freight hauls east and west to Canada's seaports. And fortuitously a branch line of The Canadian Northern was already in place as far north as The Pas. But between The Pas and Hudson Bay lay 400 miles of virgin, virtually uncharted Canadian Shield wilderness. To locate and build a railway there would present some formidable challenges.

Working in that part of Manitoba's wilderness was not facilitated by such luxuries as roads and aeroplanes — there weren't any. One young engineer who took up the challenge and saw the project through to completion was J. Leslie Charles. Les Charles was the archetypal engineer of that era. His whole engineering career revolved around railway engineering. Often working under the most primitive conditions, never complaining, Les, like other engineers of the time, simply went out into the field and got the job done. Travelling by canoe in the summer and by dog team in the winter, working in an area mainly noted for its dense clouds of black flies and mosquitoes or in season, bitter, sub-zero weather, Les Charles and other members of the party did locate what we now call the Hudson Bay Railway. It was a monumental task by today's standards. Les Charles saw it become part of Manitoba's history.

In this Centennial Year we Manitoba engineers would do well to contemplate who and what has gone before in this profession of ours. And having done so we might be excused if we indulge in a small amount of exaggeration, some justifiable hyperbole, and say that the engineering profession, through the work of pioneers like Les Charles, has been the masterkey in the development of Canada's Keystone Province. □

more inspection of construction by professional engineers was the background for the recommendations. The report was accepted and the appropriate city authorities will be advised.

DECEMBER 8, 1986 *by D. E. Cross, P. Eng.*

At which Council approve financial support for MTS Engineers and considers the formation of a Research and Development Committee.

The meeting began punctually at 3:30 p.m. after the type of pizza to order for supper had been selected.

Licences, Registrations and Reinstatements were approved with the exception of two potential licencees who are employed by the same firm and who submitted identical answers to the Professional Practice Examination. A decision on these two was withheld pending a reply to a letter from the Registrar requesting clarification of the matter.

Vice-President and Executive Committee Member Named: Elections were then held for vice-president and executive member. W.D. Christie, P.Eng. was elected vice-president and G. E. Laliberte, P.Eng. was elected executive member.

Self-Interest Group for Engineers: Councillor Newton spoke to the Council regarding the question of a self-interest organization for engineers. Council passed a motion to initiate discussion on the most effective means of addressing the problems of employee engineers, the thought being that engineers need a forum through which to speak. Such a forum would be a self-interest group and would be independent of A.P.E.M. which is a licensing body.

Discipline of Licensed Members: The next item of the agenda related to a member of APEO who had been licenced in Manitoba and had been found guilty by an APEO discipline hearing in connection with work that he had performed in Manitoba. The details of the disciplinary proceedings have been published in the APEO Publication "Dimensions" but the name of the individual had been withheld. Council referred the matter back to the Practice and Ethics Committee with the request that they consult with their legal counsel and determine what action might be taken in connection with this matter.

MTS Engineers to Receive Financial Assistance: John Adam, P.Eng., Chairman of the "Watching Brief Monitoring Committee" presented the final report of his committee regarding the Society of Engineers of the Manitoba Telephone System (SEMTS), MTS and the application by Team (the Telecommunications Association of Manitoba) for certification as a bargaining unit including professional engineers. After a long discussion including an "in camera" session a motion was presented and passed which would authorize the A.P.E.M. to provide financial assistance to SEMTS. The President was instructed to write SEMTS and outline the reasons for this decision.

Committee Members Approved: The next item on the agenda was the approval of members of various association committees for 1987. After some discussion all committee members as listed were approved and appointed by Council.

Council then considered a request from CCPE to name a representative to the Canadian Engineers Qualification Board. One member is required from either Manitoba or Saskatchewan. The president agreed to contact the Saskatchewan Association and obtain their agreement to naming Dr. Jack Cahoon, P.Eng. to this position.

Congress of Canadian Engineering Students Receive Support: A request from the 19th Congress of Canadian Engineering Students for funds was considered and Council agreed to provide one thousand dollars ($1,000.00) for the purpose.

Research and Development Committee Considered: Mr. Speers advised Council that he thought it would be appropriate to set up a Research and Development Committee and requested Council's approval to do so. A decision on the matter was deferred and will be considered at the next meeting of Council.

Councillor Kjartanson raised the matter of a "period of grace" which was allowed in connection with payment of annual fees. Council referred the matter to the Legislation Committee and a report from that committee will be considered by Council.

Centennial Diorama Progress: Bob Foster, P.Eng. attended the Council meeting and advised Council on the progress being made by the Museum of Man and Nature in connection with the A.P.E.M. Engineering Centennial Diorama. Representatives of the Museum of Man and Nature are expected to attend the next Council meeting to give Council further information regarding the progress of this project. It is anticipated that the diorama will be complete and open to the public during the latter part of June 1987.

The meeting adjourned at 7:50 p.m. □

News from Other Associations

The B.C. Association is concerned that the **employment picture for professionals may get significantly worse** before permanent improvement arrives. On September 30th, 1986, their Engineers' Benevolent Fund had $152,473 available to assist members in need. The Association currently has approximately 14% unemployment amongst its members.

Alberta's Association is concerned as well with **high member unemployment** in the wake of an economy which remains "very low". Their unemployed members will be the prime benefactors of a $50,000 aid package introduced to aid job search endeavors. The program includes discussion sessions focusing on job search, skill training, motivation sessions and job search techniques.

The Ontario Attorney General's office has totally accepted the idea that **compulsory liability insurance cannot be implemented,** but is unsure how to proceed.

The B.C. Association has approved a policy where they will provide **subsidies to members to make up shortfalls in continuing education** course registration but only after all other avenues have been exhausted, and subject to budget constraints.

The P.E.I. Association has in the past made a narrow interpretation of its mandate, with little public comment made. This keeps the Association from becoming **embroiled in political, social, religious or other non-engineering debates,** however, fails to show direction and leadership to others. President Jake Bartlett has encouraged all members to become much more vocal on public issues.

Since 1973, **the number of full-time employees** in the office of the Ordre des ingenieurs du Quebec has grown from 16 to 50.

In their attempts to be known by and be able to easily **deal with Government officials,** the B.C. Association, on different occasions hosted a cocktail party for MLA's, hosted a lunch for Ministers and Deputy Ministers, and invited MLA's to a reception at their annual general meeting.

Act Enforcement Officers have been appointed in Newfoundland, Saskatchewan and Prince Edward Island.

Consideration is being given by the B.C. Association to the **establishment of a "Benefits Package"** similar to those available to small companies, to all members, at the cost of the member.

The New Brunswick Association have recently held a **seminar explaining the concepts of quality assurance.** The seminar was open to all professional people and businessmen who want to learn about quality assurance.

Another milestone has been reached in the history of the Northwest Territories Association. The first official meeting of a branch office, the Eastern Arctic Branch, was held on December 11, 1986 in Frobisher Bay, with 20 people in attendance. □

Conference Theme: PRODUCTIVITY

MICONEX '87, the Microelectronic Conference and Exhibition, will take place April 21 to 23, 1987 at the Winnipeg Convention Centre. The theme for this year's MICONEX is "Productivity Through Technology: A Spectrum for the Future".

When announcing the theme, Conference Chairman Ed Gonzalez stated "Manitoba and Canada are facing significant challenges to succeed in a highly competitive world economy. The development and use of new and emerging technologies to increase productivity to compete in world markets are key for the economic growth of Manitoba and Canada. MICONEX '87 is expected to provide a forum not only for Manitoba but for Western Canada's universities and private sector organizations; to demonstrate its technological advancements; to review issues and opportunties related to the spectrum of technologies which can assist in the improvement of productivity; and to develop a conscience for the social implication of the use of these technologies.

Technical sessions planned for the Conference include Artificial Intelligence and Expert Systems; VLSI Circuits and Systems; Advances in Custom and Semi-Custom Design; Signal Processing and Microelectronics Applications. The major portion of the Conference will be a variety of sessions dealing with the application of technology in specific industries: Management Strategies for Overcoming Technological Change; Industrial Manufacturing Systems; Food Industries; Agricultural Industries; Industrial Training and Evaluation Systems; Transportation; Health and Apparel Industries.

MICONEX is co-sponsored by the Institute of Electrical and Electronics Engineers (IEEE) and the Electronics Industry Association of Manitoba (EIAM). For additional information contact Ed Gonzalez, Infotech Manitoba, 1970 Ness Avenue, Winnipeg, Manitoba, R3J 0Y9 or phone 896-2222. □

Precast and Prestressed Concrete Seminar

The Canadian Prestressed Concrete Institute will be presenting a one-day seminar on their publication, the "Metric Design Manual — Precast and Prestressed Concrete" on Thursday, February 26th, 1987 at the Westin Hotel in Winnipeg. A full day of presentations will be made by leading consultants, professors, and industry experts on the important information contained in the new manual. Seminar fee also includes a copy of the manual, coffee breaks, and lunch. For further information, contact Robert Waddell, P.Eng., at 477-1220. □

Iron Ring Ceremony

The secretary of Camp 8 wishes to advise that the next Iron Ring Ceremony is tentatively scheduled for Tuesday, March 10th, 1987.

For further details please call Dave Sexton at 945-7488. □

Licences Issued in December '86 and January '87

A. P. F. Chan (Ont.)
K. W. Dean (Sask.)
J. C. Drapee (Que.)
R. P. Fallowfield (Ont.)
G. W. Ilott (Que.)
S. F. M. Jim (Ont.)
J. K. Johnstone (Ont.)
D. L. Killam (B.C.)
P. K. Mehta (Ont.)
C. S. Seaby (Ont.)
R. G. Skrentner (Minn.)
J. S. Stanford (Ont.)
A. Tork (Ont.)

Engineering Graduate Members Registered in December '86 and January '87

N. K. Chopra
A. R. Dalkie
P. J. Franzen

We cannot locate:

S. V. Burr
J.P.Y. Chan
V. Chan
D.B.T. Davis
L. J. Fouillard
J.R.D. Gervais
D. F. Johnston
R. J. Lewak
J. R. Lion
E. B. McGowan
M. Y. Marcus
M. R. Orecklin
D. M. Phipps
R. Picard
R. Porath
L. Stocco
R. S. Whitmore
A. J. Zaidi

If you know the whereabouts of these members, please contact the Association office.

Resignations Effective December 31, 1986

R. Bartel
G. C. Bergson
W. V. H. Bowerman
C.J.R. Brown
S. T. Brown
A. J. Burgess
H. Carswell
J. R. Crosby
M. Dacenko
W. J. Dubesky
B.F.T. Fletcher
E. J. Gaines
H. N. Gawley
G. J. Gouw
P. K. Horseman
R. B. Keeler
S. K. Kingwell
L. S. Kryski
David Lane
F. H. Lieben
J. A. McIntosh
R. A. McKenzie
A. W. Miller
P. C. Miller
T. E. Morimoto
R. S. Penny
J. F. Ripley
P. A. Robertson
J. W. Steeves
R. Tan
R. H. Walker

New Members Registered During December '86 and January '8

R. L. Baird
I. B. Baragar
G. S. Brar
P. J. Broad
A. Buhr
H. C. Card
K. A. Johnston
R. K. Johnston
J. T. Kentel
M. M. Kostecky
K. W. Kowaski
T. J. Smith
G. R. Thompson
D. A. Weigelt