



**THE ENGINEERING INSTITUTE OF CANADA**

*and its member societies*

**L'Institut canadien des ingénieurs**

*et ses sociétés membres*

---

## **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 #30**

## **“Consulting Civil Engineering Firms in the Prairie Provinces”**

**by William G. McKay**

(previously published as EIC Working Paper 18/2004 – Jan 2004)

\*\*\*\*\*

EIC HISTORY AND ARCHIVES

\*\*\*\*\*

© EIC 2017

Abstract

In this paper, the author discusses the beginnings and later development of five consulting engineering firms in the Prairie provinces. The economic and political climates that greeted the three earlier ones prior to World War I were quite different from those experienced by the later two, following World War II. All of the firms were active in the municipal engineering field, but also in others. Collectively, they have made major contributions to the development of the Prairie region and, in the case of the two post-World War II firms, well beyond it. The material deals more with the organization and development of the firms, as well as the principal people involved in them, rather than with the projects they undertook, although some of these have been included in the text.

To illustrate the growth in the number of municipal systems in the Prairie provinces in the early years of the 20<sup>th</sup> century, an Appendix has been added in which reference is made to a published report on the waterworks and sewage systems built in these provinces prior to 1916. These systems were crucial for provincial economic development. A list of the sources and references used in this paper follows the Appendix.

About the Working Paper Series

In June 1995 the Council of the Engineering Institute of Canada agreed that Working Papers on topics related to its history and development, to the history and development of other institutions serving the engineering profession in Canada, and to engineering generally should be published from time to time.

These Papers have limited initial distribution, but a supply is maintained by the EIC History & Archives Committee for distribution on request. They are listed and summarized in the History & Archives section of the EIC's website ([www.eic-ici.ca](http://www.eic-ici.ca)) and electronic copies may be obtained through this same source. The individual Papers may also be published later, in whole or in part, in other vehicles, but this cannot be done without the expressed permission of the Institute. The series is presently administered by the Publications Sub-Committee of the main Committee in co-operation with the executive director of the Institute.

Opinions expressed in the Working Papers are those of the author(s) and are not necessarily shared by the Engineering Institute of Canada or its History & Archives Committee.

*The editors of this present Working Paper were Peter R. Hart and Andrew H. Wilson*

About the Author

William Gordon McKay was born in Regina, Saskatchewan, in 1917, attended high school in Portage La Prairie, Manitoba, began his post-secondary education at the University of Manitoba and completed it at Queen's University, graduating in civil engineering in 1940. During his final year, he took courses leading to certification as 1<sup>st</sup> Lieutenant in the Royal Canadian Engineers, but did

(ii)

not serve in the Canadian Army. When his master's degree course at Queen's was ended prematurely in 1941, Bill joined the engineering staff of the Public Health Engineering Division of the federal Department of Pensions and National Health, serving in its St. Catharines and Edmonton offices and working in the public health engineering field. In 1945 he joined the consulting engineering partnership of Underwood & McLellan, first in Edmonton and later in Saskatoon, continuing his involvement with this engineering discipline. When the U&M partnership was dissolved in 1952, Bill became one of the five principal shareholders of Underwood McLellan & Associates (UMA), headquartered in Saskatoon and later in Winnipeg. In 1955 he was appointed manager of the company. In 1962 he became president and general manager and, four years later, president and chairman of the board. Following a serious illness, he stepped down from these positions in 1970 and assumed the role of secretary of the various operating companies associated with UMA, although he did not retire fully until 1982.

Bill McKay joined the Engineering Institute of Canada in 1944, was active in the divisions and branches in Saskatchewan and Manitoba, and was elected vice-president of the Manitoba-Saskatchewan Region in 1966. He served as president of the Institute in 1969-70. He has also been president of the Association of Professional Engineers of Saskatchewan, the Western Canada Water and Sewage Conference, the Association of Consulting Engineers of Manitoba, and the Association of the Scientific, Engineering and Technological Community (SCITEC). In the late 1980s, he became a member of the executive of the EIC Life Members' Organization, subsequently occupying the chair. He also served as secretary of the LMO (now the Canadian Society for Senior Engineers) and, since 2000, has been its representative on the EIC History & Archives Committee. Bill was awarded the EIC's John B. Stirling Medal in 1994 in recognition of his distinguished service to the Institute over many years.



## Introduction

At the meeting of the EIC History & Archives Committee in June 2000, I volunteered to prepare a paper on the engineering consulting firms that had started their practices in the early 1900s in the Prairie provinces. From my association with Underwood & McLellan, beginning in 1945, I had met some of the engineers from these firms and was aware to a limited extent of their histories.

There appear to have been three such firms that worked in the Prairies as consulting engineers and surveyors: Chipman & Power, John Galt, and Underwood & McLellan. They were active primarily in the field of municipal engineering: water supply, distribution and treatment systems; sewage systems and treatment; streets and drainage. But it is quite possible that, in addition, the majority of the principals were registered federally and provincially as land surveyors. The incomes of these firms were derived almost entirely from their practices, in contrast with those engineers who might, from time to time, have provided consulting services on a part time basis in addition to their work as salaried city or town engineers. Two of the three firms expanded after World War II and grew eventually into major companies that still operate in the Prairie provinces and elsewhere.

As information was collected on the early firms, it became clear that the scope of this paper should be expanded to include the early years of two of the Prairie engineering consulting firms with somewhat later origins and which are still in business: Associated Engineering Services Ltd. and W.L. Wardrop & Associates Ltd.. The former was chosen because it was the first firm to begin operations in Alberta in the early 1950s, and the latter to reflect the situation in Manitoba, where the city of Winnipeg's own engineering department provided the majority of the services required up until World War II.

The Appendix provides a listing of the municipal water and sewer systems that had been built in the Prairie provinces prior to the survey that was made in 1916. For some of these, the early consulting engineering firms provided services. Sources and References follow the Appendix.

### Chipman & Power

I have been unable to find much information about the head office location of Chipman & Power (C&P) or its method of operation, primarily because the firm's early client files no longer exist. I am certain, however, that it was located in eastern Canada, in Toronto, where plans and specifications were prepared. For the construction phase, the firm placed resident engineers on site.

Of significance for the municipal water systems built by C&P in the Prairie provinces was the circular steel standpipe reservoir, 24 to 30 m (80 to 100 ft.) in height, which provided the pressure for domestic use and storage for fire protection. In many instances, the steel structure was enclosed in a circular wooden structure. This unique construction feature led to some of the water towers, particularly those in Manitoba and Saskatchewan, becoming local landmarks. A few are still

standing but not in service.

Of particular interest are the installations at Weyburn and Humboldt, Saskatchewan, two of the few remaining. The former has been described in this way:

"The Weyburn water tower, technically referred to as the standpipe water reservoir, was constructed in 1909 under the direction of consulting engineers, Chipman & Power. The tower is constructed of an inner steel tank, 20 feet in diameter and 80 feet high, with a capacity of 150,000 imperial gallons. The unique timber housing is 25 feet in diameter and 95 feet high.

"Old field book records state the tank was constructed by the Canada Foundry Company for \$6,700 and the frame housing was built by F. Rooney at a cost of \$1,800. The structure is placed on a massive concrete foundation consisting of 40 yards of rock and 1,466 bags of cement with a 6:1 ratio, at a cost of \$2,500...

"The entrance to the tower was demolished by a windstorm in 1976. In 1977, the tower was taken out of service, but an engineering investigation completed in October of that year confirmed its structural stability. It was reconstructed to the original design in 1982...

"Situated on a hill on the south side of Weyburn and visible for miles in any direction, the water tower acts as a sentinel to those travelling to and from the city... This distinctive structure is commemorated on the Weyburn flag and coat of arms..." (1)

The Winter 2004 issue of the magazine *Heritage* noted that construction of the Humboldt tower began in 1914. C&P was apparently responsible for the plans of the original water and sewer system. The tower was designed in the 'coastal lighthouse' style. The wooden shell is pierced by four slender windows spiralling to the top, suggesting an interior spiral staircase. The inner steel tank is enveloped in a timber housing measuring 7.5 m (20 ft.) in diameter and 24 m (80 ft.) high, topped by a conical cedar shingle roof. The structure was abandoned in 1977 when a new water treatment plant came on line. But the non-profit organization, Friends of the Water Tower, is determined to preserve it as a symbol of the early struggle to obtain adequate water supplies to survive on the Prairies. The Friends have ensured a municipal designation for it as a heritage site, and a restoration project is under way. Future plans include building an interior staircase to the top and reinforcing the railing on the roof to make a viewing platform. (2)

Figure 1, on page 4, shows the tower at Humboldt.

It is interesting to note that the C&P resident engineer for the Weyburn tower was Wesley B. Redfern, later a founding partner of Proctor & Redfern, consulting engineers of Toronto. The resident engineer for the standpipe built at North Battleford, Saskatchewan, was John B. Stirling, later president of E.G.M. Cape & Company of Montréal and president of EIC. This latter structure

has now been replaced by an elevated storage tank of much greater capacity.

There are two similar structures designed and built under the supervision of Chipman & Power at Portage La Prairie, Manitoba, although they do not have the wooden outer casings. Both are still standing, although out of service. One was located originally in the north area of the city but is now at the West End Mall. A plaque on it reads, "Built by Manitoba Iron Works - 1905." It is shown in *Figure 2* on page 4. The other is located at the Assiniboine River water treatment plant.

Other water towers were erected at Neepawa, Manitoba (one), Saskatoon (two - one in the Nutana area, and the other in the Mayfair area), and at Moosomin, Saskatchewan. All of them have now been taken down.

### **John Galt - Haddin & Miles - Haddin, Davis & Brown**

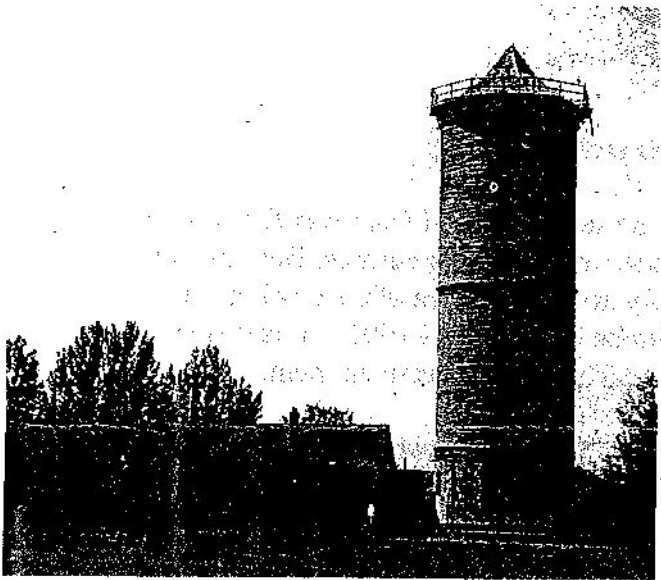
John Galt was one of the earliest consulting engineers on the Prairies and among the first fully-trained non-railroad engineers to work there. He was a graduate of Glasgow and London Universities. Immigrating to the United States in 1879, he later moved to Toronto. By 1885, he had established a consulting practice in hydraulics and sanitary engineering in Ontario.

In 1902, his first introduction to the Prairies was as a consultant to the city of Regina, to establish a water supply. Regina was then the one major city in the three provinces that was not located on a major river. A well supply, involving the development of a series of springs, was established in the Boggy Creek area, northeast of the city. This could provide a water supply for a number of years. Galt appointed Owen Smith to be the resident engineer for this project. In a letter to a colleague sixty years later, Smith recalled:

"Regina's first water supply was really built on a shoe string as the only visible running water at that time was springs at Boggy Creek, 7 miles N.E. from the city 'in a prairie coolie.' The plan was to dam the coolie, take the available water from the springs, and make a reservoir in the coolie for the spring run-off for additional supply. Subsequently, it was apparent that a open reservoir on the prairie is no good as, under bright sunlight and summer conditions, algae grows so abundantly that storage water positively stinks.

"However, when laying the supply main near the reservoir and springs, we ran into such a heavy flow of groundwater the contractor had great difficulty in laying the pipe which, for the first three miles was a 15-inch sewer pipe laid to a light grade, in some places 15 feet deep. The situation gave the cue for subsequent developments, under (Regina's) new engineering department, who got flowing wells at 100 feet deep.

"As water is the essence of life and no place can grow without it, I have felt a private satisfaction in putting Regina on the map for, truly, when I first went there, Regina had few natural advantages to make a city." (3)



**Figure 1: Humboldt Water Tower**

(Credit: Main Street Studio, Humboldt, Saskatchewan)



**Figure 2: Portage La Prairie Water Tower at the West End Mall**

(Credit: W. G. McKay)

Around 1905, Galt expanded his practice into many Saskatchewan communities, including municipalities along or near the CPR main line. His firm undertook an enormous amount of work involving reservoirs, streets, sewers, electrical supplies and other activities at Kindersley. It did reports for other municipalities in the province, such as Leader, Carlyle, Rosetown, Drinkwater and Wynyard. Galt also expanded his activities into Manitoba and Alberta, where he was named engineering consultant by the city of Edmonton in 1909 in its first attempt to draw water from nearby Pigeon Lake.

The project engineers for many of these works - Owen Smith, Edmund Miles and John Haddin - became partners in the firm. By 1916, Galt had retired and the firm became Haddin & Miles, a partnership, with its head office located in Calgary. This firm (and others) experienced severe economic times following World War I, during the 1930s and the period of drought on the Prairies. Difficult times continued throughout World War II. Work was taken wherever it could be found. Among its projects were two that were unique. One, at Morris, Saskatchewan, involved the design and construction of a concrete fire wall to divide a business block on the main street, where there were numerous woodframe buildings. This reduced both the risk of fire - aggravated by Prairie winds and an inadequate water system - and the consequent high insurance premiums for businesses there. The other was an investigation and survey of surface 'oil veins' near Flaxcombe, Saskatchewan, which has been described in this way:

"J.J. Strutt.....apparently owner of Eagle Lake Farm and the Big Four Farm, found that there was some dirty, sticky, smelly black gloop seeping onto the land. He hired Haddin to survey and investigate what both men referred to as 'oil veins,' and correspondence continued on the subject for several months. Nothing ever came of the project after Haddin's survey, but little did he know how close he was to being a pioneer in the petroleum boom of subsequent years." (4)

In 1950, the partnership of Haddin & Miles became Haddin, Davis & Brown. Edgar Davis had previously been a partner in the consulting firm of Davis & Ripley in Alberta. However, his interests were less in engineering and more in investment and finance. Brown had been a senior engineer with Haddin & Miles.

Davis became the principal partner and the firm became one of the major consulting operations in Western Canada as a result of the economic growth in the three Prairie provinces that accompanied the major post-war oil developments and supported the growth and modernization of existing and new municipal systems. The firm was also one of the first to expand and, in the early 1950s, became active in the Manitoba area, finding clients throughout the province. In 1954 it established an office in Regina, some 50 years after John Galt's first project on the Prairies. In 1965, after the retirement of Haddin and the death of Brown and a series of mergers, this partnership became part of Reid, Crowther & Partners Ltd. Crowther, who had joined Haddin, Davis & Brown in 1964, was a structural engineer and the new firm placed increased emphasis on its mechanical, structural and electrical services. The head office remained in Calgary, but there were also offices in Winnipeg, Regina and Vancouver, where bridge work predominated, and in Toronto, where the firm entered



the heavy industrial field. In its most recent name change, in the late 1990s, the firm became Earth Tech Canada Inc., a member of the Tyco International group of companies.

### **McArthur & Murphy - Murphy & Underwood - Underwood & McLellan \*\***

In 1910, the town of Yorkton, Saskatchewan, had a program of municipal improvements under way. Franklin McArthur was the town engineer and A. A. Murphy was in charge of the construction of the municipal power plant, which would be one of the first to use diesel power. Both men were 1907 graduates of Queen's University, Kingston, the former in civil and the latter in electrical engineering.

From this association, the partnership of McArthur & Murphy was formed and an office was opened in 1911 in Saskatoon. Its first project was the design and construction of a water system and a power plant and distribution system at Wilkie, Saskatchewan. The resident engineer for the Wilkie project, and also for nearby ones at Scott and Biggar, was J. E. (Ed) Underwood. In 1912, Roy A. McLellan joined the firm while McArthur left to join the provincial Department of Public Health. The firm then became known as Murphy & Underwood. Underwood and McLellan were 1907 graduates of the University of Toronto in civil engineering, and were registered as Dominion and Saskatchewan land surveyors. The federal and provincial survey practice was to be the mainstay of the firm's income during the 1920s and 1930s. Most of its engineering work at this time was related to towns in the central and northern parts of the province.

It is interesting to note that the power plants designed by Murphy were usually based on Mirlees diesels, from the U.K., and General Electric generators, from the U.S..

Murphy & Underwood's first out-of-province project, beginning in 1913, was the installation of a water and sewer system and an electrical generation and distribution system for the town of The Pas in Manitoba - a job won by them in competition with John Galt's firm. Roy McLellan was appointed resident engineer. Interestingly, the water system was installed by Hurst Engineering & Construction of Winnipeg, whose principal was the father of William D. Hurst, who would later become well known as the chief engineer of the city of Winnipeg. The Pas project was put on hold during World War I, but was completed shortly after it ended. Power for the electrical system was provided initially by steam, by the choice of the town council, but it was later replaced by diesel engines, which gave many years of service.

After World War I, as opportunities for municipal electrical installations grew fewer, those for provincial government systems increased. Even so, Murphy & Underwood's electrical consulting business declined and, in 1920, Mr. Murphy left the firm to go into commercial business in

**\*\* Editors' Note:** The author of this paper has also contributed one called *Memoir* to the EIC History & Archives Working Paper series (11/2002, May 2002). In it, he provides more details of the growth and development of this firm. (See also Source and Reference (5) on page 18)

Saskatoon. For a very short while, the firm was known as J.E. Underwood & Associates, before becoming Underwood & McLellan (U&M), the name it carried until 1952.

By the 1930s, the firm's income had reached a low point under the influence of the Depression and the Prairie drought. As already noted, the main income source for U&M was surveying. The firm participated, for example, in a survey of the provincial border between Manitoba and Saskatchewan in the Flin Flon region. Over a period of four years, it also took advantage of a boom in the staking of mining claims in Northern Manitoba, working from an office in The Pas supervised by Mr. McLellan.

Sometimes, projects did not proceed. I have already mentioned Haddin's brush with the oil industry at Flaxcombe, Saskatchewan. In the late 1930s, U&M were involved in a proposed natural gas pipeline to supply Saskatoon from a source at Lloydminster. The firm was ready to begin the survey when the prospect of war in 1939 put the project on hold. It was later cancelled.

During World War II, Roy McLellan joined the RCAF and served in the Works & Buildings Division of No. 4 Training Command. He had charge of the design and construction of water and sewer installations, later taking charge of these installations across the country. In the 1950s, when the upgrading of RCAF air bases was taking place, U&M were fortunate to participate in a number of the projects in the Prairie provinces, including the construction of the major new base at Cold Lake, Alberta. Through this work, the firm was able to increase its staff substantially.

In 1949, the firm took part in the largest legal survey in which it had ever participated: the survey of the right-of-way for the inter-provincial pipeline from Edmonton, Alberta, to Gretna, Manitoba. Portions of this survey were sub-contracted to other firms, but U&M - and Mr. McLellan - had overall responsibility for it. There were, in all, 1430 km (886 miles) of direct line, 165 km (102 miles) of diversion for the South Saskatchewan Dam, 335 km (208 miles) of property line, and 2300 property corners.

As I noted in the *Memoir* I wrote earlier for the EIC History & Archives Working Paper series:

"By 1952, the Underwood & McLellan partnership had been in operation for 41 years. Ed Underwood, who was then 70, and Roy McLellan, who was 63, had probably sat across from each other at the same desk for at least half that time. It was time for change. I believe it was primarily Mr. McLellan's direction that the new firm - Underwood McLellan & Associates (UMA) - should be an incorporated company, something new in the consulting engineering field in the Prairie provinces at that time. There were five selected shareholders (associates) in addition to the original partners. The initial issue was 6000 shares to each of the five, at \$1 per share, and one each to Mr. Underwood and Mr. McLellan. By 1955, the transactions were complete and the partners began retirement..." (5)

Figure 3, on page 9, shows the longtime partners in U&M and the five original associates of UMA.

The company's head office remained in Saskatoon. Of the original five associates, Fred L. Small - a 1932 graduate in civil engineering - had held many positions with the partnership in the office and in the field and was the first of the five to serve as president of UMA, beginning in 1954. David A. Ferguson was a 1945 civil graduate and had articulated as a land surveyor, so was in charge of surveys. B.M. (Bev) Ellis graduated first in chemical engineering in 1948, and later earned a master's degree in sanitary engineering. He took charge of municipal engineering. G.M. (Gerry) Beaumont - a 1950 mechanical graduate - was in charge of water and sewage treatment plant design. He later left the company to earn a law degree, then returned as its corporate secretary. I was the fifth associate, a 1940 graduate in civil engineering. I joined the partnership in 1945, and worked mostly in managerial positions, including that of its president.

Writing in the 'Reflection and Observations' section of their book on U&M in 1954, Ed Underwood and Roy McLellan noted that, although the firm passed through some very difficult and trying times, they both looked back on the past 43 years with considerable satisfaction. They were glad they had not yielded to the temptation to abandon private practice for the more certain income of a civil servant or other salaried engineer or land surveyor. They valued most highly the opportunity the business had afforded of serving such a large number of interesting people and contributing in some small measure to the development of the Prairie provinces. (6)

From my position as an observer of the development of consulting engineering on the Prairies, I feel that these same reflections and observations might also have been made by John Haddin and Edmund Miles about their own partnership.

Beginning in the 1950s, UMA expanded rapidly across the Prairies, opening offices in Winnipeg and Calgary, at the same time increasing its engineering services and its staff. Branches were added later in Edmonton, Vancouver, Toronto and Halifax. Associated companies were also created: Western Photogrammetry, for aerial photography and mapping; and Spantec, for project management, with design and industrial construction capabilities. In the 1960s, a partnership arrangement was formed for several years with Sir Alexander Gibb & Partners of London, England, and joint projects were undertaken involving the Idylwyld Freeway in Saskatoon, the Churchill River diversion in Manitoba, and the shipbuilding facilities in Marystown, Newfoundland. The head office was moved to Winnipeg in 1968. In the 1980s, UMA expanded into the United States.

In 1986, UMA and its predecessor partnership had reached their 75<sup>th</sup> year. To celebrate this achievement, a book was written by Alan W. Bell, a long-time member of the UMA staff. When discussing business development activities, Mr. Bell wrote:

"In the company's early years, new business came primarily as a result of personal contact. The principals were well known and had an excellent reputation. So it was natural that when people wanted engineers to undertake a new piece of construction, they

Figure 3: Underwood McLellan and Associates, 1954

(Source: *A Consulting Engineer's Partnership* by J. E. Underwood and R. A. McLellan, 1958)



J. E. UNDERWOOD



R. A. McLELLAN, M.B.E.



W. G. McKay



F. L. SMALL



G. M. BEAUMONT



B. M. ELLIS

The  
Five  
Original  
Associates



D. A. FERGUSON

would turn to Underwood & McLellan. As the firm became larger, it became evident that steps had to be taken to organize the new business development activity more formally. There was reluctance in some quarters to the idea of engineers actively seeking new sources of business. However, it soon became understood that, in addition to conducting a professional practice, the company was also conducting a business. If it was to be successful, a continuous stream of new projects had to be brought in. In order to do this, a hit and miss method could not be relied upon, but business activities had to be tracked and the services of Underwood & McLellan actively promoted.

"The company was well established in the municipal market, but the services that were now offered in other fields such as structural, mechanical and electrical engineering design needed to be publicized and new clients sought. Business development officers were appointed...in Saskatoon...in Winnipeg, and...in Calgary." (7)

### **Associated Engineering Services Limited**

Following the end of World War II and the establishment of increased government support for the oil industry, Alberta became the province that promised the most support to newly formed and established consulting engineering firms. One such firm was Davis Ripley & Associates. In 1945, Edgar Davis joined a partnership with Herbert A. Ripley - a 1940 graduate in civil engineering - and opened an office in Calgary. Ripley opened one in Edmonton. However, this firm was dissolved in 1948 when, as mentioned above, Davis entered into partnership to form Haddin, Davis & Brown. Meanwhile Ripley carried on in Edmonton under the name of Ripley & Associates, in a one-roomed office, with the assistance of a draftsman, a field man and a secretary. As the work load of the firm increased, he recruited Norman A. Lawrence and A.L. Rowand and incorporated the firm as Associated Engineering Services Limited (AESL). Its principal clients were municipalities in the northern part of the province. It also participated in a number of national defence projects in northern Alberta and British Columbia. Its early works included water and sewer projects at Taber, Westlock and Barrhead, water supply and treatment plants for the Department of National Defence at Suffield and Wainwright, and housing projects at Fort St. John and Fort Nelson. The company was invited to join a Vancouver syndicate to work on the building of the aluminum smelter at Kitimat. The staff was further strengthened with the addition of Bryan A. Ellis, William H. Ralston and John R. O'Brien, all of whom remained with the company and were later presidents of it. Rowand was killed, tragically, in an airplane crash while travelling between Vancouver and Kitimat. Ripley became seriously ill in 1952 and less active in the company. In 1954 he handed over the presidency to Norm Lawrence and retired three years later. Lawrence, himself, assumed the role of chairman of the board in 1969, and retired in 1973.

AESL entered Saskatchewan in 1953, opening an office in Regina to serve clients in southern Saskatchewan, including the towns of Oxbow, Melville, Outlook and Eastend. It undertook a major joint water supply project, at Buffalo Pound, for the cities of Regina and Moose Jaw, to replace the Boggy Creek project mentioned earlier in this paper with a supply of water diverted from above

the Gardiner Dam on the South Saskatchewan River. Experience at Buffalo Pound led AESL to design the E.L. Smith water treatment plant in Edmonton and, much later, several similar projects in Ontario.

The company also expanded into British Columbia, often hiring local engineers who brought special knowledge of the area to the company. There, AESL was involved initially in municipal work in the interior and on Vancouver Island, expanding later - and significantly - into the Lower Mainland.

As consulting firms increased in size, along with the growing economy, they took the risk that among their younger experienced engineers were some who would leave to form their own firms. In AESL's case, for example, in 1958 Donald R. Stanley - a former provincial sanitary engineer - along with two other engineers began practice as Stanley, Grimble & Roblin which, as Stantec Ltd., has become a well-known firm offering work in a wide variety of engineering disciplines.

The experience AESL was gaining during its early years led to it being associated with water and sewage collection systems and water treatment plants in the northern territories: for example, at Fort Franklin, Aklavik and Tuktoyaktuk. This experience led to the company being assigned to design and supervise the construction of a water supply system at Alert, at the north end of Ellesmere Island. It also serviced Arctic communities such as Sachs Harbour, Coppermine and Spruce Bay.

As the principal source of information on AESL has noted:

"Also worthy of mention is the work carried out in the 1960s in the development of 'new towns' to house new industrial complexes across the provinces and territories. This included location, town planning, site surveys and all aspects of housing and utilities. The new towns included:

- Gold River on Vancouver Island for forestry development;
- MacKenzie in northern B.C. to accommodate major pulp and paper facilities;
- the initial layout of Hinton in western Alberta, also to accommodate the pulp and paper industry;
- Grande Cache, north of Hinton, to accommodate a major coal mine development;
- Edzo (west of Yellowknife, NWT) to help provide a better site for native residents of Fort Rae;
- Tumbler Ridge to accommodate a major coal development; and
- early work on Sherwood Park, Alberta, which developed rapidly into a city." (8)



In the early 1970s, the company expanded its services into the international market and has provided engineering consulting to countries in Africa, Asia, the Middle East and the Far East, Central America and the Caribbean as well as the United States. Its work in liquid waste management in Sri Lanka received the 1995 Award for International Development of the Canadian International Development Agency (CIDA). It also expanded its interests into the field of industrial development, and especially petroleum in Alberta. By 1981, its staff numbered 1200. However, the recession that began the following year led to the cancellation of a number of large projects and this figure was reduced significantly - to around 250. At the same time, the company refocused its activities to include civil and municipal engineering and smaller civil and structural projects for the industrial sector. It also began to develop a niche position for itself in the provision of engineering services to airports. AESL participated, for example, with partner Crippen Consultants Ltd., in the design and construction of a new runway and lighting system at the Vancouver International Airport.

In the 1990s, the firm recovered some of its earlier strength and some of its size, to 350 staff across Canada. Its head office remains in downtown Edmonton and there are branch offices in British Columbia, Alberta, Saskatchewan and Ontario. It participated in such diverse projects as Suncor's Athabaska River bridge near Fort McMurray, TransAlta's water treatment plant at Wabamun Lake, and Rogers Sugars' Taber plant modernization. The 1990s also brought significant changes in the application of computers to consulting practice and to project delivery. The firm is owned by its employee shareholders.

Figure 4, on page 13, shows the principals and associates of AESL in 1970.

#### **W. L. Wardrop & Associates Ltd.**

While firms such as Underwood & McLellan and Haddin & Miles had head offices in Saskatchewan and Alberta, none of those established between 1910 and 1940 seems to have established an office in Manitoba, due in part to the fact that the city of Winnipeg had a large, in-house, engineering staff working on water and sewage projects, and roads and streets for the Greater Winnipeg area. Only occasionally did the city engage outside consultants, such as Burdock & Howson of Chicago. In addition, it had a large construction organization, complete with asphalt and concrete plants and its own aggregate source on the Greater Winnipeg Water District Railway, which was associated with the Shoal Lake Aqueduct\*\*.

By the early 1950s, when the population of the city was again expanding, both Underwood & McLellan and Haddin, Davis & Brown established branch offices in Winnipeg and were building practices based there, in the surrounding municipalities and in other cities and towns in Manitoba. New firms were, however, beginning to spring up: for example, Independent Design Engineers and Templeton & Associates.

\*\* The Canadian Society for Civil Engineering has designated the Shoal Lake Aqueduct as a Historic Civil Engineering Site

Figure 4:

Principals and Associates of AESL

1970

(Source: *Associated Engineering History*  
July 2002)



N. A. Lawrence, B.Sc., P.Eng.  
Chairman of the Board



B. A. Ellis, B.A.Sc., P.Eng.  
President



D. A. Whelen, B.Sc., P.Eng.  
Vice-President Development



W. H. Rolston, M.Sc., P.Eng.  
Vice-President Engineering



J. R. O'Brien, M.A.Sc., P.Eng.  
Director



R. H. Nicolson, B.Sc., P.Eng.  
Director

**Associates:**

E. I. Carefoot, B.Sc., P.Eng.  
G. C. Fuerst, B.Sc., P.Eng.  
S. D. Jaycock, B.Sc., P.Eng.  
A. P. Livingston, B.E., P.Eng.  
A. M. Lount, B.A.Sc., P.Eng.  
R. R. McEwan, B.A.Sc., P.Eng.  
A. E. Meyer, B.Sc., P.Eng.  
M. J. Stewart, Ph.D., P.Eng.  
L. C. Ward, B.Sc., P.Eng.





W. L. (Les) Wardrop, an engineer with the city of Winnipeg in the 1940s, had undertaken two 'consulting-type' assignments under the direct supervision of the city engineer, William D. Hurst. They were concerned with dust control in the asphalt plant and with a concrete plant for the city, which was never actually built. Some time after completing this work satisfactorily for the city - and even although his prospects for responsibility and promotion within the city department were encouraging - Wardrop felt he had an aptitude for consulting work, as well as a desire to do it, and thought it might well be possible to establish his own consulting practice, headquartered in Winnipeg. He found, somewhat to his surprise, that Mr. Hurst supported this move, so he established a small office, with a staff of four - a structural and a mechanical engineer, a draftsman and a secretary - in February 1955 under the name of W. L. Wardrop & Associates. With his own civil and electrical engineering degrees, Les Wardrop felt the potential fields of work were covered. The company operated as a single proprietorship until February 1957, when it was incorporated, and several of the senior engineers were admitted to partnership as shareholders.

*Figure 5*, on page 15, shows Wardrop's first office personnel - and his successor as CEO of the firm, Lloyd R. McGinnis.

While the firm had an increasing number of municipal and housing sub-division clients in Manitoba in the 1950s, to smooth out the fluctuations in his overall business Wardrop decided to explore the possibility of establishing an office for the northwestern area of Ontario, at the Lakehead, in 1956. The firm later expanded into other centres in Ontario and Western Canada.

Early on, Wardrop began to develop strong contacts with the federal Department of National Defence and was chosen to work on radar stations in Manitoba and British Columbia. The firm was also chosen to develop the townsite for the new Atomic Energy of Canada research establishment at Pinawa, Manitoba, in 1960. Indeed, in his history which commemorates the first 40 years of the incorporated firm's history and which Les Wardrop largely wrote - with additional material by several of his colleagues - he strongly emphasized the work that must be done by the managements of engineering consulting firms to develop contacts with potential clients and joint venture partners. Over the years, Wardrop undertook studies and contracts in Canada and elsewhere with several venture partners.

The firm also took advantage of contacts in the international field to participate in development projects. The first of these contacts was made by Les Wardrop, with the External Aid Office and Brigadier A.B. Connelly in 1967. Les was also taking part in federal trade missions overseas around this time. The fact that some members of the Wardrop firm were bilingual also helped. The first assignment came in August 1968, in Cameroon, West Africa. Lloyd McGinnis spearheaded the involvement in international work, and especially the water supply projects in Ghana and Tanzania in Central Africa in the early 1970s. In the 1980s, work was done in Ghana, Nigeria and Pakistan. In the 1990s, work in these countries continued and was expanded, into environmental work, in India and the Philippines.

Wardrop lays out in a preface the "milestones" in the firm's growth and development, from which

**Figure 5: W. L. Wardrop & Associates Ltd.**  
 First Office: 456 Notre Dame Avenue, Winnipeg  
 (Source: Wardrop: *The First Forty Years* by W. L. Wardrop, 2000)



**J.L. GREER, Secretary**  
 B.Sc. (M.E.) ('48 Saskatchewan)  
 P.Eng. M.E.I.C.  
 M.A.S.H.A.E.



**W.L. WARDROP, President**  
 B.Sc. (E.E.) ('39 Manitoba)  
 B.Sc. (C.E.) ('47 Manitoba)  
 P.Eng. M.E.I.C.  
 M.A.W.W.A. — M.C.I.S.S.  
 M.A.P.W.A. — M.W.C.W.S.C.



**DONNA CLIFFORD**  
 Office Secretary



**R.W. McKNIGHT, VICE-President**  
 B.Sc. (C.E.) ('50 Manitoba)  
 P.Eng. M.E.I.C.  
 M.A.C.I. — M.P.C.I.

Below: Lloyd R. McGinnis, CEO, 1995



**It all began with the five of us .....**

Ralph Baker, Chief Draftsperson, with Wardrop's first truck



the following information has been taken:

- \* The firm was launched in 1955. The initial projects consisted of public works engineering and housing subdivision servicing;
- \* The firm's "missions" in the 1960s were expansion, diversification and improvements in the quality of the engineering services provided; the disciplines expanded to include civil, mechanical, structural and electrical engineering; branch offices were set up in Thunder Bay and Regina; projects included bridges and highways.
- \* The 1970s were times of growth and maturity; the International Division was created, a branch was set up in Edmonton; assignments were undertaken in the pulp and paper, mining, nuclear and solar energy fields.
- \* Computerization was in full operation by the 1980s, along with other advancing technologies; a branch office was established in Toronto to pursue work on nuclear waste management, fusion energy, the environment and aerospace; the firm changed its name to Wardrop Engineering Inc. but, to meet the needs of the marketplace, Wardrop Applied Systems Inc. was formed to pursue developments and prototype designs for industrial applications.
- \* In the 1990s, emphasis was placed on engineering for sustainable development, aerospace, re-engineering and computer software applications and information management, including in-house management systems. (9)

Not all of Wardrop's years had encouraging financial outcomes, and there were periods when staff were laid off because of the lack of business. For example, after more than 10 years in business, the staff had - in 1978 - reached 300, but the lack of business in the ensuing months reduced this number significantly in 1979 to 125. However, things began to improve and in recent years the staff has numbered around 400. The firm and its staff have won awards for their work.

Les Wardrop retired on January 1, 1980, at the age of 64. He was succeeded as president by Lloyd McGinnis, but continued as a consultant and director. He was there when the 40<sup>th</sup> anniversary of the founding of the firm was celebrated in Winnipeg, and is to write the 50<sup>th</sup> anniversary book for publication in 2005!

### **In Conclusion...**

The installation of municipal systems in many of the towns, and the expansion of the city systems following World War II, provided the basis for the establishment of a consulting engineering industry in and across the Prairie provinces. It also provided opportunities for younger engineers, in some instances, to take over practices from senior owners and, in others, to begin new firms.

For business development, it was apparent that the local, provincial and federal engineering departments would have to be approached and convinced that the consulting industry could provide more cost effective services than they themselves could by increasing their staffing for special projects. The co-ordination and presentation of this approach led to the formation of the Prairie chapter of the Association of Consulting Engineers of Canada (ACEC), and eventually to the creation of provincial organizations as parts of this national body.

To those readers who may note the absence from this paper of firms that began in the 1950s and 1960s, I should say that my intent was to record the history of the pioneer firms along with just a few examples of the later firms to show how the expansion of public and private activities after World War II provided the environment for these firms to start and to grow.

Finally, I also wanted to record the opinion, expressed in the past by some of my predecessors and contemporaries, that there was personal and professional satisfaction to be gained by applying our engineering skills to the improvement of the living standards in the communities which we served.

## Appendix

### Water and Sewer Systems - 1916 Survey

The Commission on Conservation, a federal government agency, published a report in 1912 on *Water Works in Canada*. In response to the interest shown in it, the Commission published a further report entitled *Water Works and Sewage Systems of Canada* early in 1916. The author was Leo G. Denis, a hydro-electric engineer and an employee of the Commission. The Commission chairman was Sir Clifford Sifton.

The information that follows - for the provinces of Manitoba, Saskatchewan and Alberta - has been taken from the Denis report. It was gathered through a questionnaire sent to each municipality that had indicated in the 1912 survey that it had a such a system or systems. The part of the questionnaire related to water systems asked 22 questions; the part for sewage systems asked eight. In regard to the latter, there appeared to be few treatment facilities, and discharge was directly into a body of water. While some of the entries named the superintendents or engineers who managed the systems, there were no indications that consulting engineers had been involved.

The cities and towns included in the report were as follows - by province, alphabetically, and by the year in which system operations began:

Manitoba: Brandon (1893); Carberry (1900); Carman (1909); Dauphin (1913); Grandview (1904); Neepawa (1913); Portage La Prairie (1905); St. Boniface (1904); Selkirk (1910); Souris (1912); Winnipeg (1899). No starting date was given for the system at Rathwell. The one at The Pas was listed as under construction.

Saskatchewan: Biggar (1913); Carlyle (1911); Craven (1900); Estevan (1910); Francis (1909); Indian Head (1906); Kindersley (1913); Maple Creek (1907); Melfort (1913); Melville (1912); Moose Jaw (1905); Moosomin (1907); North Battleford (1910); Outlook (1910); Prince Albert (1907); Regina (1905); Rouleau (1912); Saskatoon (1906); Scott (1913); Swift Current (1911); Tantallan (1908); Weyburn (1911); Yellowgrass (1908); Torkton (1906). No starting dates were given for Arcola, Battleford, Canora, Montmartre, Watrous and Wilkie. The system at Humboldt was not listed.

Alberta: Athabaska (1914); Banff (1907); Bankhead (1905); Bassano (1913); Blairmore (1912); Calgary (1891); Camrose (1911); Cardston (1906); Carmangay (1912); Claresholm (1910); Coleman (1906); Coronation (1914); Edmonton (1902); Exshaw (1906); Frank (1904); Gleichen (1912); High River (1913); Jasper (1912); Lethbridge (1904); McLeod (1907); Medicine Hat (1900); Mirror (1913); Pincher (1910); Raymond (1911); Redcliff (1913); Red Deer (1906); Stetler (1910); Taber (1910); Tofield (1913); Vegreville (1914); Wetaskwin (1910). No starting dates were given for Belleview and Pincher Creek.

In the Commission's report, information was given on the population (in 1916), the source of water and the number of service connections for each of the cities and towns mentioned.

### Sources and References

- (1) Weyburn Saskatchewan Water Tower, taken from website <http://city.weyburn.sk.ca/engineering/building/historical/tower.htm>.
- (2) Winter 2004 issue of the magazine *Heritage*, page 33, taken from website <http://humboldt.isask.ca/watertower/>. (Published by Heritage Canada, 5 Blackburn Avenue, Ottawa, Ontario K1N 8A2.)
- (3) Article on "Prairie Engineering; 250 Years of History," which appeared in the magazine *Mosaic*, No. 2, May 1984, page 7. (Published by Reid Crowther & Partners Ltd., 7410 Blackfoot Trail S.E., Calgary, Alberta T2H 1M5 - now Earth Tech Canada Inc., 850 Pembina Highway, Winnipeg, Manitoba R3M 2M7.)
- (4) *ibid*, page 8.
- (5) William G. McKay, *Memoir*, Working Paper 11/2002, May 2002, page 11. (Published by the EIC History & Archives Committee, 9 Cedar Grove Court, Nepean, Ontario K2G 0M4.)
- (6) J. E. Underwood and R. A. McLellan, *A Consulting Engineer's Partnership*, June 1958, page 71. (Published by Underwood McLellan & Associates Ltd., Saskatoon, Saskatchewan - now The UMA Group - see (7) below.)

(7) Alan W. Bell, *Looking Back: UMA Group - The First 75 Years*, 1998, pages 11-12. (Published by The UMA Group, 1479 Buffalo Place, Winnipeg, Manitoba R3T 1L7.).

(8) *Associated Engineering History*, July 2002, chapter 1, page 6. (Published by Associated Engineering Services Ltd., 10909 Jasper Avenue, Suite 1000, Edmonton, Alberta T5J 5B9.)

(9) W. L. Wardrop, *The First Forty Years*, 2000, unnumbered page following the Table of Contents. (Published by W. L. Wardrop & Associates Ltd., 386 Broadway, Suite 400, Winnipeg R3C 4M8.)

\*\*\*\*\*