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 historical articles, notes and papers previously published as Articles, Reports, Working Papers or Journals)

ENGINEERING HISTORY PAPER #111

"Historical Development of Subsurface Drainage in Quebec from 1850 to 1970"

by Suzelle F. Barrington

(originally published in Canadian Biosystems Engineering / Le génie des biosystèmes au Canada 64: 1.1-1.13–2022)

****

EIC HISTORY AND ARCHIVES

****

Historical development of subsurface drainage in Quebec from 1850 to 1970

Suzelle F. Barrington*

[1]*Environmental Engineer, Consumaj Inc., 2550 Vanier, St-Hyacinthe, QC, J2S 6L7 Canada,*

[*]*Corresponding Author: suzellebarrington@sympatico.ca*

ABSTRACT

Despite its beginning in the 1850's and being first in Canada to purchase a tile drainage trencher, subsurface drainage of agricultural lands in Quebec is poorly documented, which the present paper will try to document from 1850 to 1970. In Quebec, Catholic priests and monks played an important role in educating rural communities by establishing French agricultural schools throughout the province. For the English rural communities, Macdonald College (Macdonald Campus of McGill University) played a major role especially in preparing plans, besides promoting the technology. The Quebec Ministry of Agriculture encouraged subsurface drainage early in 1912 but would prefer investing in land clearing and watercourse deepening to establish more farms, from the employment needs created by WWI, the great 1930 depression and WWII. This work mostly completed in the early 1960's, the Quebec Government would then initiate a major subsurface drainage program, allowing private enterprises to take over shortly after 1967. Although the Ministry changed names several times even after 1967, the term 'Ministry of Agriculture' will be used throughout this article. To compare trencher performance, a 15 m average spacing is presumed. This paper is limited to the main events and persons involved, without being able to cover them all.

KEYWORDS

History, subsurface drainage, Quebec

RÉSUMÉ

Peu documenté, le drainage souterrain fait partie de l'histoire du Québec depuis son tout début en 1850, et depuis son achat de la première draineuse mécanisée au Canada en 1902. Le but du présent article est donc de documenter cette historie de 1850 à 1967. L'église catholique a activement participé à l'éducation des communautés rurales francophones du Québec en fondant plusieurs écoles d'agriculture. Du côté anglophone, le Collège Macdonald (Campus Macdonald de l'Université McGill University) jouait un rôle important surtout pour la préparation de plans, en plus de sa vulgarisation. Le Ministère de l'Agriculture encourageait le drainage souterrain à compter de 1912 mais lui adressait peu d'importance pour défricher et excaver les cours d'eaux, afin de trouver des emplois à la suite des deux grandes guerres mondiales, et de la grande dépression de 1930. Une fois les travaux de creusage de cours d'eau pratiquement réalisés vers le début des années 1960, le Ministère lançait un important programme de drainage souterrain pour ensuite laisser la relève aux entrepreneurs privés peu après 1967. En dépit de ses nombreux changements de nom même après 1967, le présent article utilise simplement le nom de 'Ministère de l'Agriculture'. Pour comparer le taux d'installation de drainage souterrain, un écartement moyen de 15m sera présumé. Le présent article vise a souligner les éléments importants de l'histoire du drainage souterrain au Québec, ne pouvant mentionner tous ceux-ci ni toutes les personnes impliquées.

MOTS CLÉS

Histoire, drainage souterrain, Québec.

CITATION

Barrington, S.F.2022. **Historical development of subsurface drainage in Quebec from 1850 to 1970.** Canadian Biosystems Engineering/Le génie des biosystèmes au Canada 64: 1.1-1.13. https://doi.org/10.7451/CBE.2022.64.1.1

MANUAL INSTALLATIONS AND INITIAL CLAY TILE MANUFACTURING

The manual installation of subsurface drains, made of stones trenches and clay tiles, was practiced in Quebec before 1850 and between 1870 and 1885, respectively. Remarks by R. Brodie of Westmount mention the use of stone trenches before 1850 to get rid of stones and provide subsurface drainage (Brodie 1913). Subsurface stone trenches are reported installed on the farm of the Dairy Transformation School of Saint-Denis de Kamouraska (120km East of Quebec City on the St-Lawrence South Shore). This school was founded in 1881 by Édouard-André Barnard, agronomist, who later created 'La Société d'industrie laitière du Québec', a society promoting high quality butter and cheese production (Proulx 1982).

Clay tile drainage was practiced in Saint-Augustin des Desmaures (3km West of the Quebec City airport), by Reverend François Pilote after his arrival in 1870 from the College of Sainte Anne College de La Pocatière. He is said to have, himself, purchased the clay tiles from Montreal (supplier not identified) (Proulx 1985), likely from Henderson & Lovelace of Montréal founded in 1868. Although Henderson & Lovelace were manufacturing clay smoking pipes from a deposit on the Island of Montreal, near Lafontaine and Ontario streets, they were also selling clay tiles (Katz 2019; Desrosiers et al. 2009). There was a pottery closer to Saint-Augustin, that of the farming family William & David Bell, founded in 1845. It was one of the first pottery in Quebec, located in La Petite Rivière (by the St-Charles River at the intersection of Blvd Hamel and Avenue St-Sacrement, now Quebec City), but it started to produce clay tiles at some later date (Desrosiers et al. 2009). Reverend Pilote then went on to encourage the opening of a clay tile manufacturer in St-Augustin (Proulx 1885). Two general potteries (for ceramics and vases) have operated in St-Augustin des Desmaures, from 1796 to 1816, namely Poterie Côté and Poterie Robitaille, but that of clay tiles promoted by Reverend Pilote probably did not operate for long as it is not documented (Desrosiers et al. 2009).

At the time, encouraging subsurface drainage among other practices, from Quebec City Eastward, aimed at improving the poor yields of the farms and preventing the population from immigrating to the United States. Many catholic priests would therefore put an effort in educating their rural parishioners and in establishing agricultural schools, many of them disappearing in the 1960's, while some are still renown as of today, such as La Pocatière (Lemieux 1972).

In perspective, the first extrusion machine to produce clay tiles (63.5 to 101.6 mm in diameter - 2.5 to 4 inches) was invented in England in 1843 and brought to Seneca County New York in 1847-1848 (Weaver 1964). Nevertheless, other clay tile producing mechanisms were used in New England at that time, such as the half circle, the pole type and the horseshoe.

In June 1940, Jean Ulric, a drainage technician for the Ministry of Agriculture, would write about intercepting some of these early subsurface drainage systems. Jean Ulric graduated from Ste-Anne-de-La-Pocatière in 1913 with a 'Brevet de capacité agricole' (Université Laval 1916). Just outside of Quebec City, he writes about a system built of 38 mm (1.5 inches) clay tiles running into box collectors built of 50 mm thick wooden boards which had disintegrated by then, while the clay drains were still working. Since no one then remembered such subsurface drainage installations, Jean Ulric suggests that the system was over 100 years old and that the 38 mm tiles were likely imported from Scotland. Nevertheless, in 1849, B.F. Whartenby of Waterloo, N.Y. was selling 38 mm clay tiles for $9.00 per 330 m (1000 ft) (Weaver 1964). Jean Ulric also reports intercepting subsurface clay tiles in the Saint-Augustin region, which he observed being 'of a different shape' compared to those closer to Quebec City and likely, according to him, of Canadian origin (Ulric 1940).

THE FIRST MECHANIZED TRENCHER

The first mechanized trencher to be purchased in Canada in 1902 was that of J.C. Jamieson of Bristol Quebec (Irwin 1989; Hamer 1911). It was a 1902 steam engine Buckeye, one of the first model sold by the Buckeye company of Ohio. J.C. Jamieson, likely a farmer, had heavily invested in this mechanical trencher because of labour shortages to install tile drains in the heavy clay soils South of Ottawa (Fig. 1). The trencher was not operated successfully until J.C. Jamieson hired a mechanically inclined operator, W.J. Tuck of Weirstead, Qc (some 10km North of Bristol, Qc).

The record installation rate of this machine in 1903 was 1120m (223 rods) with a trench depth of 0.9m (3 ft), but the average day would run between 380m and 755 m (75 to 150 rods). This translated to an average drainage rate of 0.85 ha/day at a trench spacing of 15 m. In 1910, this trencher survived driving itself to Lanark and then Perth Counties, Ontario, to do work in more stony soils, excavating stones of at least 13.6 kg (30 lbs). By 1911, there were some 700 buckeye trenchers operating in Ontario, while in Quebec, there was still the one doing work in Ontario (Hamer 1911).

THE WWI ERA OF 1909 TO 1918

In 1912, the Quebec Ministry of Agriculture purchased its very first 2 subsurface trenchers for $4667.25 (Fig. 2) and started to conduct subsurface drainage demonstrations following the preparation of plans, all this subsidized by an $8000 Federal grant (Agriculture Canada 1915; Quebec Government 1913). Under the same federal budget, Ontario received $5000, and Manitoba received $1 800. The Quebec trenchers were likely the 1908 Buckeye model with the first gasoline engine, a change from the earlier steam engine (American Society of Mechanical Engineers 1988). These 2 trenchers were delivered to St-Césaire, Qc (some 30 km South of Montréal) by Central Vermont Railways at a cost of $42.20 (Quebec Government 1913). From the expense reports produced by both the Federal and Quebec governments, Table 1 lists the farms which benefited from tile drainage in 1912-1914, and in 1915-1916. The Buckeye Company provided an expert, Mr. P. Perrin to help put the trenchers in operation (Quebec Government, 1913).