A Short History of the early Welland Canals

which was the start of the

St. Lawrence Seaway in the Niagara area

A presentation by Ron Potts
to the IEEE Hamilton Life Member Chapter

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Shipping news
The 3,700-kilometre Great Lakes and St. Lawrence Seaway system is the world’s longest deep-draft navigation network, serving more than 100 commercial ports and moving more than 160 million tonnes of cargo a year. The four-year, $500-million upgrade to the system includes automating the locks connecting the Great Lakes and St. Lawrence River, rebuilding walls and gates for the locks and installing hands-free mooring. In addition, shipping companies that use the route are investing $1-billion in new ships that are bigger and more efficient.

EQUINOX CLASS CARRIER
Algoma Central Corp. is building a fleet of eight Equinox Class, efficient dry-bulk carriers in China. They will be Canadian flagged andcrewed and operate on the Great Lakes. The Algoma Equinox is the first.

Exhaust scrubbers
Reduces 97% of sulfur dioxide emissions

Efficiency
Ship employs technology to reduce energy consumption

Advanced hull
Minimizes resistance and allows greater speeds with less power

Low-residue cargo holds
Facilitates cleaning

Water management
Bilge management system reduces oil residue; sewage system will reduces water use

GREAT LAKES CARGO BREAKDOWN
More than 164 million tonnes of goods are transported per year. In millions of tonnes:

- Petroleum products: 8.8
- Coal: 29.8
- Other dry bulk: 13.1
- Salt: 8.1
- Aggregate/cement: 6.5

The Globe and Mail
Total Mileage Duluth to Atlantic: 2342 Miles (3,700 kms)

FEET ABOVE SEA LEVEL

Lake Superior: 333 Miles
St. Mary's River: Soo Locks—70 Miles
Lake Michigan: 345 Miles
Lake Huron: 223 Miles
St. Clair River-Lake St. Clair-Detroit River: 77 Miles
Lake Erie: 236 Miles
Welland Canal: Eight Locks—28 Miles
Lake Ontario: 160 Miles
Thousand Islands Section: 27 Ft. Channel—68 Miles
Lake St. Lawrence: 44 Miles
International Rapids Section: Three Locks and Dams, 27 Ft. Channel—44 Miles
Lake St. Louis
Lake St. Francis Section: 27 Ft. Channel—30 Miles
Sault Ste. Marie Section: Two Locks, 27 Ft. Channel—16 Miles
Lachine Section: Two Locks, 27 Ft. Channel—31 Miles
Tide Water Section: Deep Water from Montreal to Sea—1000 Miles
The First Welland Canal 1829

• In 1824 Mill owner William Merritt started the Welland Canal Company.

• Construction started in 1829.

• Two years later the first vessel went through the canal.

• The canals’ route was from Port Dalhousie through Thorold to Port Robinson on the Welland River and on to Chippawa. The route then followed the Niagara River to Lake Erie.

• In 1883 the canal was extended to Port Colborne.
Canal Route
The First Welland Canal 1829 cont’d

• The Canal was 44km. long with 40 wood locks.

• George Keefer built a Mill behind the escarpment edge which eventually became the town of Thorold.

• The increasing size of ships on the Great Lakes made the requirement of a larger canal necessary.

• The Government purchased the Welland Canal Company and planned a second canal.
The Second Welland Canal 1845

• Construction began in 1841 and completed in 1845.

• With 27 locks of cut stone, this canal followed the same route through Thorold. This part was covered over in 1900.

• Lock 1 was at Port Dalhousie with Lock 7 reaching Niagara Street. Lock 9 reached Queenston Road.

• At Lock 16 was a road tunnel; the CN Railway was a tunnel at Gate `18.

• The Town of Thorold was at Gate 21 and Lock 26 was the last of the step sequence with Lock 27 about 3 miles from Lake Erie.
2\textsuperscript{nd} Canal Locks
Second Canal at Chippawa Creek 1831
Second Canal at Chippawa Creek 1933
The Second Welland Canal 1845 cont'd

• A branch canal from Dunville to Port Maitland using the Grand River was also built.

• Modifications to the 2\textsuperscript{nd} canal continued. Increasing the depth to 10ft., by raising the banks and lock walls in 1853.

• By 1881 the canal had been connected to Lake Erie due to increased traffic, but the connection by the Grand River was discontinued.

• In 1870 the government started to consider a uniform system for the St.Lawrence Seaway and a third canal.
The Third Welland Canal 1881

• With 26 stone locks.
• The third canal followed the same route as the previous ones from Port Colbourne until it reached Allenburg.
• It then by-passed Thorold and followed the Ten Mile Creek valley down the escarpment to Port Dalhousie.
• The remains of some locks can still be seen.
• The third canal was kept free of industry by Government policy.
The Third Welland Canal 1881 cont'd

- The northern entrance was actually at the mouth of Ten Mile Creek known as Port Weller 3 miles east of Port Dalhousie.
- 25 masonry lift locks 370 ft. x 12 ft. finally made 14 ft. to the sills were constructed between Allenburg and Port Dalhousie some 25 miles.
The St. Lawrence Seaway - The 4th Canal

- Lock 1 started in 1913, then delayed until 1919, then finally started in 1922-3 and again in 1926 and completed in 1932.

- Seven locks between Port Weller - Lake Ontario and Port Colborne – Lake Eire with a combined vertical lift of 99.4 m., with a transit time of 12 hours and approximately 42 km of the Welland Canal.
Welland Canal Section
Section du canal Welland

The Welland Canal’s eight locks (all of them Canadian) lift ships 100 metres over the Niagara Escarpment.

Les huit écluses du canal Welland (toutes du côté canadien) permettent d’élèver les navires à 100 m au-dessus de l’escarpement du Niagara.
The St. Lawrence Seaway - The 4th Canal cont'd

• A comparison of the Welland Canal with the Panama Canal is interesting. Welland has 7 locks and Panama 3, the depth of both canals is similar at 82ft.9 for Welland and 82ft.0 for Panama.

• The size of the locks gives Panama a much wider width of 65ft verses 48 ft and the Panama gates weigh 3 times as much as Welland, 150 tons each verses 48 tons.

• Labour rates during construction of the 4th canal were 25 to 30c per hour in 1923 rising to 75 to 85c in 1927, for trades including Carpenters Electricians and Machinists
THE FOUR WELLAND CANALS
DIAGRAMMATIC COMPARISONS

FIRST WELLAND CANAL
STARTED 1824 — COMPLETED 1829

LENGTH BETWEEN GATES . . . . 110 FT.
WIDTH OF LOCK . . . . . . . . . . . . . 22 FT.
DEPTH OF WATER OVER SILL . . . . 8 FT.
SINGLE LIFTS . . . . . . . . . . . . . 6 FT.
NUMBER OF LOCKS . . . . . . . . . . . . 39

TYPICAL VESSEL
LENGTH 180 FT. — CARGO CAPACITY 180 TONS

TYPICAL LOCK

SECOND WELLAND CANAL
STARTED 1842 — COMPLETED 1848

LENGTH BETWEEN GATES . . . . . 150 FT.
WIDTH OF LOCK . . . . . . . . . . . . . 28 FT. 6 IN.
DEPTH OF WATER OVER SILL . . . . 8 FT.
SINGLE LIFTS . . . . . . . . . . . . . 3 FT. 6 IN. TO 4 FT. 6 IN.
NUMBER OF LOCKS . . . . . . . . . . . . 27

TYPICAL VESSEL
LENGTH 140 FT. — CARGO CAPACITY 160 TONS

TYPICAL LOCK

THIRD WELLAND CANAL
STARTED 1875 — COMPLETED 1881

LENGTH BETWEEN GATES . . . . . 270 FT.
WIDTH OF LOCK . . . . . . . . . . . . . 40 FT.
DEPTH OF WATER OVER SILL . . . . 8 FT.
SINGLE LIFTS . . . . . . . . . . . . . 1 FT. TO 1.5 FT.
NUMBER OF LOCKS . . . . . . . . . . . . 30

TYPICAL VESSEL
LENGTH 260 FT. — CARGO CAPACITY 870 TONS

TYPICAL LOCK

WELLAND SHIP CANAL
STARTED 1913 — COMPLETED 1932-33

LENGTH BETWEEN INNER GATES . . . 1000 FT.
WIDTH OF LOCK . . . . . . . . . . . . . 80 FT.
DEPTH OF WATER OVER SILL . . . . 30 FT. (BEACHES 25 FT.)
SINGLE LIFTS . . . . . . . . . . . . . 48 FT. 6 IN.
NUMBER OF LOCKS . . . . . . . . . . . . 8
THE GUARD LOCK AT Humberstone Is 1000 FT. LONG BETWEEN INNER GATES
TOTAL LOCKAGE . . . . . . . . . . . . 325 FT. 6 IN.

TYPICAL LOCK

TYPICAL VESSEL
MAXIMUM LENGTH 850 FT. — CARGO CAPACITY 9500 TONS AT 24 FT. DRAFT.