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THE ST. LAWRENCE SEAWAY

AND

THE LAKEHEAD HARBOUR

Canada's Mid-continental Seaport

by

R. B. CHANDLER, B. A. Sc., P. Eng., M. E. I. C.

CHAIRMAN - LAKEHEAD HARBOUR COMMISSIONERS

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JANUARY, 1962

LAKEHEAD HARBOUR COMMISSIONERS

PORT ARTHUR

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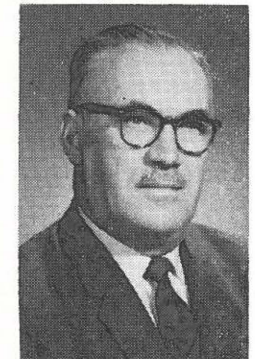
FORT WILLIAM



R. B. CHANDLER, P. ENG.
CHAIRMAN



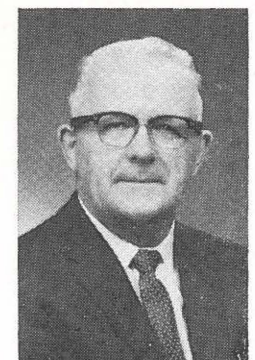
L. C. IRWIN
VICE-CHAIRMAN



D. B. MCKILLOP, P. ENG.



G. F. MCDOUGALL



J. E. YOUNG

LOOKING back into Canadian History we find that Jacques Cartier, the venturesome sailor of St. Malo, France, penetrated the St. Lawrence River basin as far west as the Lachine Rapids in the year 1535.

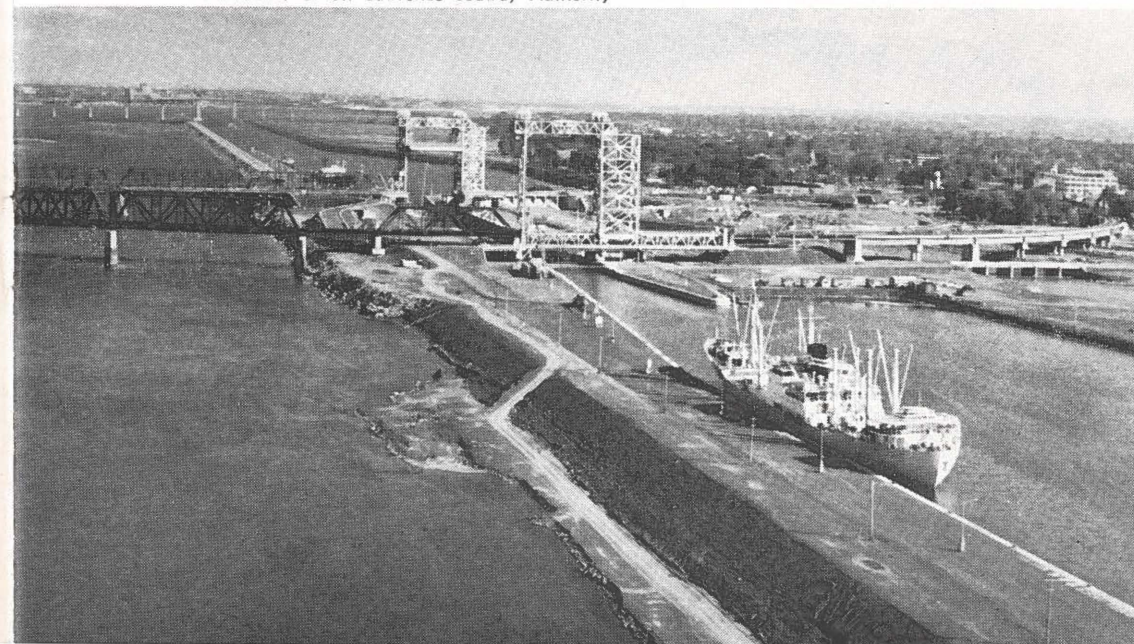
It was not until 1608, however, that Samuel de Champlain established the first French settlement in Canada on the St. Lawrence River at Quebec. Later in 1634 he landed at Montreal, to be followed by Maisonneuve in 1642, who is credited with laying the foundations for that great metropolis.

History has recorded the names of many adventurous explorers, missionaries and fur-traders who played a part in the advancement of civilization along our great inland waterway. The names of Frontenac, Marquette, Dulhut, La Salle and many others stand out for the contribution each made to the prosperity of New France by extending her influence westward in Canada.

Since these early days the establishment of a trans-Canada transportation system that would serve the purposes of quick, easy, economical despatch of incoming and outgoing commodities for the Canadian people, has been the concern of succeeding administrations.

The utilization of the St. Lawrence Seaway, as we know it today, provided a water route from the Atlantic Seaboard to the head of Lake Superior. From this point on down through the years, the canoe, the wagon train and the railroad, each in their day, have served to complete the marvelous chain of transportation facilities which has stimulated immigration, given us Dominion status, and lifted our country to a high place in world affairs.

The St. Lawrence Seaway Authority—This view of the area of St. Lambert Lock is in the direction of the entrance to the St. Lawrence Seaway. From the Montreal Harbour, 1,000 miles from the Atlantic Ocean, ships enter the Seaway and, using it and the Great Lakes Channels, may sail another 1,200 miles into the heart of the North American continent.
Photo Courtesy of St. Lawrence Seaway Authority



Canada is an exporting nation and our national economy depends to a large measure on our ability to sell at a profit the products of our forests, our mines, our wheat fields, and the surplus of manufactured goods available for export.

This has been the goal of individuals, corporations, provinces and our national government since the first settlements were established. To this end, the progressive deepening and improvement of the St. Lawrence River and the interconnecting channels of our Great Lakes system has been given priority on numerous occasions in our national undertakings.

Improvement in Canal Construction on St. Lawrence and Great Lakes Channels 1779 to 1932

ST. LAWRENCE RIVER CANALS

The first serious attempt to provide proper access to the upper reaches of the St. Lawrence River above Montreal without transfer of cargo was undertaken in 1779. It consisted of a series of three locks with a depth of 2.5 feet. This initial canal was located between Montreal and Lake St. Francis at Coteau du Lac. The first Lachine Canal on the St. Lawrence River was opened in 1825 with a 5 foot depth.

During the years 1842 to 1849 five additional canals of 9 foot depth were constructed on the St. Lawrence River between Lake St. Francis and Prescott which provided proper access to Lake Ontario and the upper lakes.

In succeeding years between 1884 and 1901 the St. Lawrence River canals were deepened to 14 feet and this was the limiting depth of channel in the St. Lawrence River until the present-day St. Lawrence Seaway with its 27 foot channel was opened in 1959.

The New St. Lawrence River Canal System

Replacing the 14 foot lock system numbering some 22 units between Montreal and Lake Ontario, we now have 7 locks in the present Seaway, 2 of which are operated by the U.S.A. and the balance by the Canadian Seaway Authority.

These include the following locks listed westward upstream from Montreal Harbour:

LOCK DATA

NAME	DIMENSIONS		NORMAL LIFT	
	Length	Width	Depth Over Sill	
1. St. Lambert	800'	80'	30'	13' to 20'
2. Cote St. Catherine	800'	80'	30'	33' to 35'
3. Lower Beauharnois	800'	80'	30'	38' to 42'
4. Upper Beauharnois	800'	80'	30'	36' to 40'
5. Snell	800'	80'	30'	45' to 49'
6. Eisenhower	800'	80'	30'	38' to 42'
7. Iroquois	800'	80'	30'	0.5' to 6.0'

The controlling channel depth is 27 feet. The initial recommended vessel dimensions established by the St. Lawrence Seaway Authority were: length—715 feet, beam 72 feet, maximum draft 25.5 feet. Later the vessel dimensions were increased to length—730 feet, beam 75 feet, draft 25.5 feet maximum, and these are the present day maximum permissible for St. Lawrence Seaway locks.

THE WELLAND CANAL

The first Welland Canal between Lake Ontario and Lake Erie, completed in 1829, consisted of 40 wooden locks, 110 feet long, 22 feet wide with 8 feet of water over the sills.

The second Welland Canal completed in 1845 had 27 stone locks, 150 feet long, 26½ feet wide with 9 feet depth.

The third Welland Canal completed in 1887 consisted of 26 cut stone locks, 270 feet long by 45 feet wide by 14 feet deep.

The existing reinforced concrete Welland Canal locks were officially opened in 1932 with a depth of 30 feet. There are eight locks in series, six of dimensions 859 feet long by 80 feet wide. One unit is 865 feet long and the guard lock at the Lake Erie end of the canal is 1380 feet long. Three lock sections are twin locks in flight permitting rapid movement of two-way traffic. Lifts vary from 43.7 to 47.9 feet with the exception of the Lake Erie end unit which has a maximum lift of 12 feet available to suit variable Lake Erie levels.

The connecting channels between Lake Ontario and Lake Erie were deepened to 27 feet under the 1954-59 program of construction to conform with draft requirements on the new Seaway.

THE SAULT STE. MARIE CANAL

The first Canadian lock at Sault Ste. Marie was built by the North-West Company in 1798. The lift was nine feet. It was used primarily for the fur traffic and operated until 1814 when it was destroyed by U.S.A. military action.

In 1881 a second lock was constructed by the U.S.A. with a lift of 18 feet which lock accommodated vessels up to 500 feet in length.

In 1895 Canada built the existing Sault Ste. Marie lock. The lock is 900 feet long, 60 feet wide and 22 feet deep. It will not, however, accommodate full draft vessels under present seaway operation.

The U.S.A. has built four additional locks to accommodate deeper draft vessels at Sault Ste. Marie as follows:

THE POE LOCK—opened in 1896—Dimensions were length—800 feet, width—100 feet, depth—22 feet.

THE DAVIS LOCK—opened in 1914—Dimensions were length—1,350 feet, width—80 feet, depth—23 feet.

THE SABIN LOCK—opened in 1919—Dimensions were length—1,350 feet, width—80 feet, depth—23 feet.

THE MacARTHUR LOCK—opened in 1943—Dimensions were length—800 feet, width—80 feet, depth—31 feet.

In addition to the above facilities the U.S.A. is remodelling the former Poe Lock to the following dimensions: length—1,000 feet, width—100 feet, depth—32 feet. Completion date is scheduled for 1965.

International Authorization to Proceed with Seaway Difficult to Obtain

Canadians have been vitally interested in the most recent program of improvement on the St. Lawrence Seaway. As early as 1895 the governments of Canada and the U.S.A. appointed a Deep Waterways

Pictured here is a Great Lakes bulk carrier, a specially designed inland vessel, the largest of which are capable of 25,000 tons capacity. They can carry as much as 800,000 bushels of wheat which would be approximately the yield of a 40,000 acre farm. The ship is seen in the St. Lambert Lock, near Montreal.

Photo Courtesy of the National Film Board



Commission to evaluate possible routes from the Great Lakes to the Atlantic Ocean. This Commission reported in 1897 in favour of a deep water Seaway between Lake Ontario and Montreal. The report of the Commission was strongly criticized by certain anti-seaway groups in the U.S.A. Congress.

In 1927 the late Frank H. Keefer, K.C., M.L.A., of Port Arthur, one of the staunchest advocates of the proposed improving and deepening the Great Lakes system of navigation to accommodate ocean vessels, prepared for international distribution an authoritative pamphlet summarizing the data gathered to that date by various joint Commissions and Associations. He listed the apparent national advantages and strongly criticized sectional opposition.

In 1932 the first real progress was made after some 35 years of hard work on the part of advocates of the St. Lawrence development. A treaty designed to provide a basis for the undertaking was drawn up but never ratified.

Again in May, 1937, Mr. Cordell Hull, Secretary of State for the U.S.A., put forward a proposal for the settlement of problems affecting the entire Great Lakes Basin. Mr. Hull submitted a draft treaty for the construction of the deep waterway project, to include the development of power in the International Section of the St. Lawrence River between Cornwall and Prescott.

Discussion of the Hull proposals were speeded up following the outbreak of war in 1939; was carried on in 1940 and on March 19, 1941, an agreement was signed at Ottawa. However, this agreement was not ratified by the U.S.A.

Again in 1947 progress was recorded when the Canadian Secretary of State for External Affairs on April 24th stated in the House of Commons as follows:

"The Canadian Government was recently approached by the United States authorities regarding the possibility of reaching agreement in principle that the *Seaway* be made self-liquidating through an agreed system of tolls the details of which could be worked out at a later date. The Canadian Government has now concurred in principle with the proposal to make the St. Lawrence Seaway self-liquidating by means of toll charges subject to conclusion of arrangements satisfactory to both Governments for the implementation of this principle."

In December, 1951, Canada passed an act to establish the St. Lawrence Seaway Authority for constructing, maintaining and operating, either wholly in Canada or in conjunction with the U.S.A., a deep waterway between the Port of Montreal and Lake Erie. Later in this year Canada informed the U.S.A. that, if a joint project could not be agreed upon, then Canada was prepared to proceed with an all-Canadian development.

In May, 1953, the U.S. Congress finally passed the Wiley-Dondero Act authorizing an American agency to build the navigation facilities required in American territory in the International Rapids sections.

Court injunctions filed by opposing U.S.A. groups against proceeding with the power development were successfully lifted by the United States Supreme Court on June 7, 1954, and the first sod was turned for the power project on August 10, 1954.

Work on the Seaway got underway in September, 1954. Thus a great international undertaking which was first considered in 1895 and had been under comprehensive study since 1920, finally reached completion in 1959. It had taken 64 years of international study, debate, and joint action to make this possible.

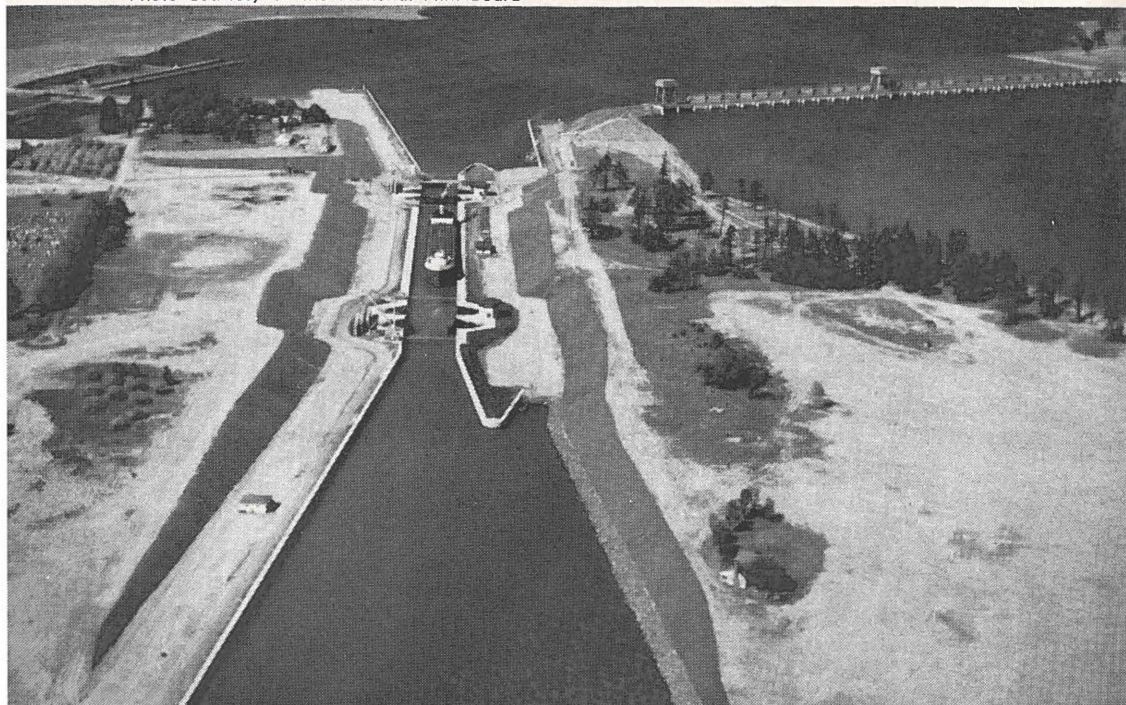
Scope of the Work

The following work was undertaken to secure a 27 foot channel from Montreal to the Lakehead at regulated low water levels on the Great Lakes system:

- (1) The St. Lawrence River between Montreal and Prescott was improved by channel dredging and the construction of a system of dams and canals to provide a 27 foot channel replacing the former 14 foot channel system.

The St. Lawrence Seaway Authority—Here at Iroquois, Ontario, is the Iroquois Lock, the most westerly of seven locks built for the St. Lawrence Seaway. The Iroquois Lock, like all Seaway locks, has a length of 766 feet, a width of 80 feet and 30 feet of water over the sills. Lift of the lock is from six inches to six feet. It was the first major completed structure of the Seaway. Canada has built five of the seven new locks and the United States has built two. This lock provides access between the power pool or Lake St. Lawrence, at top, and the Thousand Islands Section of the St. Lawrence River, at bottom, leading upstream to Lake Ontario. On the right is the Iroquois Dam which controls the level of Lake Ontario.

Photo Courtesy of the National Film Board



- (2) Dredging in the Welland Ship Canal to deepen same to provide 27 foot in depth.
- (3) Dredging work now underway in the connecting channels between the upper Lakes Erie, St. Clair, Huron and Superior.
- (4) New deep draught American Lock at Sault Ste. Marie.
- (5) The construction of a single stage power development at Barnhart Island up river from Cornwall with generating capacity of 2,200,000 H.P. of which Canada and the U.S.A. each receive one-half.

ST. LAWRENCE SEAWAY PROFILE

Location	Elevation above Sea Level
St. Lawrence River—Montreal Harbour	20.0 ft.
Lake Ontario	246.0 ft.
Lake Erie	572.0 ft.
Lakes Huron and Michigan	578.5 ft.
Lake Superior—Lakehead Harbour	602.0 ft.

Note—By means of some sixteen lift locks vessels are raised 582 ft. in negotiating the Seaway between Montreal Harbour and the Lakehead Harbour.

COMPARISON OF THE FORMER 14 FOOT CHANNEL AND THE NEW 27 FOOT SEAWAY

It will be of interest to compare the former 14 foot system of canals, locks, etc. with the 27 foot system in operation today.

ITEM	Former 14' Draft	Present 27' Draft
1. Length in Statute Miles to Lakehead	1216	1210
2. Number of Canals	8	5
3. Length of Canals in miles ..	74	55
4. Number of Lift and Guard Locks in series	31	16
5. Controlling Depth of Channel	14'	27'
6. Maximum size of Vessel Accommodated	253'x44' Beam	730'x75' Beam
7. CARGO CARRIED IN TONS	3000 Laker 1500 Ocean	25,000 Laker 11,000 Ocean
8. Sailing Time— Prescott to Montreal	24 to 26 hours	12 to 14 hours

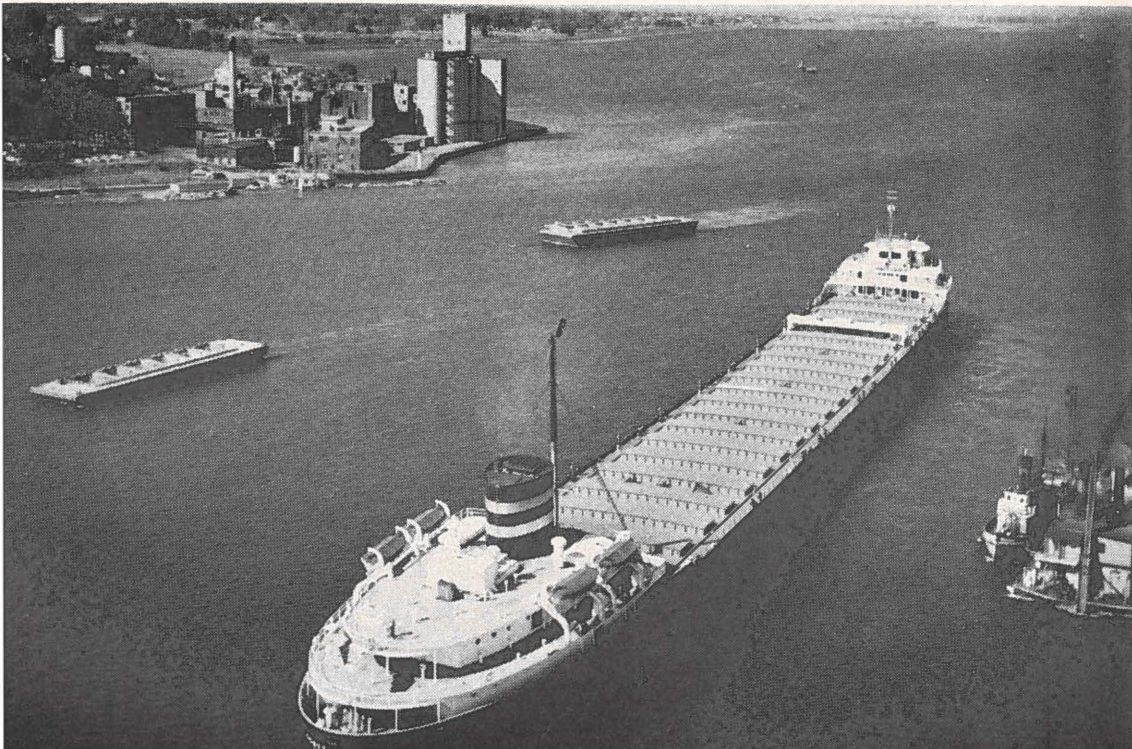
DEPTH OF CHANNEL

Generally speaking the safe loaded vessel draft provided for is 25.5 feet. The actual governing depth of water varies in different circumstances. Where the bottom is soft the clearance is less than where bottom is rock. The clearance allowances have been set at 0.5 feet for soft bottom in sheltered channels; 1.5 feet in exposed channels with soft bottom; 1.5 feet in sheltered channels with rock bottom and 2.5 feet in exposed channels with hard bottom.

In addition to the allowances for clearance which must be provided between the draft of the vessel and depth of channel, an allowance must be made for the "squat" of a vessel underway. Based on a speed of 16 to 18 miles per hour, the "squat" allowances which have been adopted vary up to a maximum of 2.0 feet.

THE ST. LAWRENCE SEAWAY AUTHORITY—Pictured here in the International Section of the Seaway, a short distance upstream from the Iroquois Lock, is a Great Lakes bulk carrier, the largest of which are over 700 feet long and 70 feet wide. The bigger lake freighters can carry some 850,000 bushels of wheat. It requires approximately 40,000 acres of farm land to produce such a cargo. These large lake vessels which are considered one of the most economical form of transport in the world are now able to come all the way down to Montreal from the Lakehead for the first time. Until the opening of the Seaway on April 25, 1959, this type of vessel could not reach Montreal with its cargo because of the shallowness of the St. Lawrence canals. Instead its cargo was unloaded at up-river grain elevators which it was picked up by smaller vessels for carriage farther down river for eventual shipment to overseas ports. The elimination of transshipment charges for the handling of the wheat and more economical movement in larger vessels will enable this Canadian product to be sold more competitively in overseas markets. At upper left can be seen a portion of the town of Cardinal, Ontario.

Photo Courtesy of the National Film Board



Cost of the Seaway

The overall cost of the Seaway and power project combined will be approximately \$1.3 billions. The cost of the power project was \$600 million shared equally by Ontario and the State of New York. The U.S.A. expenditure on navigation facilities in the St. Lawrence River and not including the improvement of upper lakes connecting channels was \$128 millions.

Canada has spent \$329 millions for navigation projects on the Seaway.

The U.S.A. is now deepening all channels above Lake Erie, also has provided a new lock at Sault Ste. Marie and will bear the cost in this regard. The estimated cost of same will be:

Detroit River Dredging	\$112,000,000
St. Mary's River Dredging	122,000,000
New Lock, Sault Ste. Marie	34,000,000
Straits of Mackinaw Dredging	8,000,000
Total	\$276,000,000

A fairly accurate detailed estimate of overall cost would therefore be as follows:

ITEM	Cost to Canada	Cost to U.S.A.
Power Project	\$300,000,000	\$300,000,000
Navigation in St. Lawrence	329,000,000	128,000,000
Upper Lakes Connecting Channels ..	140,000,000	242,000,000
New Lock at Sault Ste. Marie		34,000,000
New Seaway Totals Including Power	\$629,000,000	\$704,000,000
		629,000,000
Grand TOTAL NEW SEAWAY cost including Power Development		\$1,333,000,000

Seaway Tolls

The Seaway operates a schedule of Tolls for vessels and cargo. These may be of interest.

TOLLS (ONE WAY PASSAGE)

ITEM	Montreal to Lake Ontario Section	Welland Canal Section
Toll per registered gross ton	\$0.04	\$0.02
Toll per bulk cargo ton	0.40	0.02
Toll per general cargo ton	0.90	0.05
Toll per passenger	3.50	4.00

Statement of Canada's Operating Income and Expense for Seaway

The annual operating statement for the year ending Dec. 31, 1960, was as follows:

INCOME

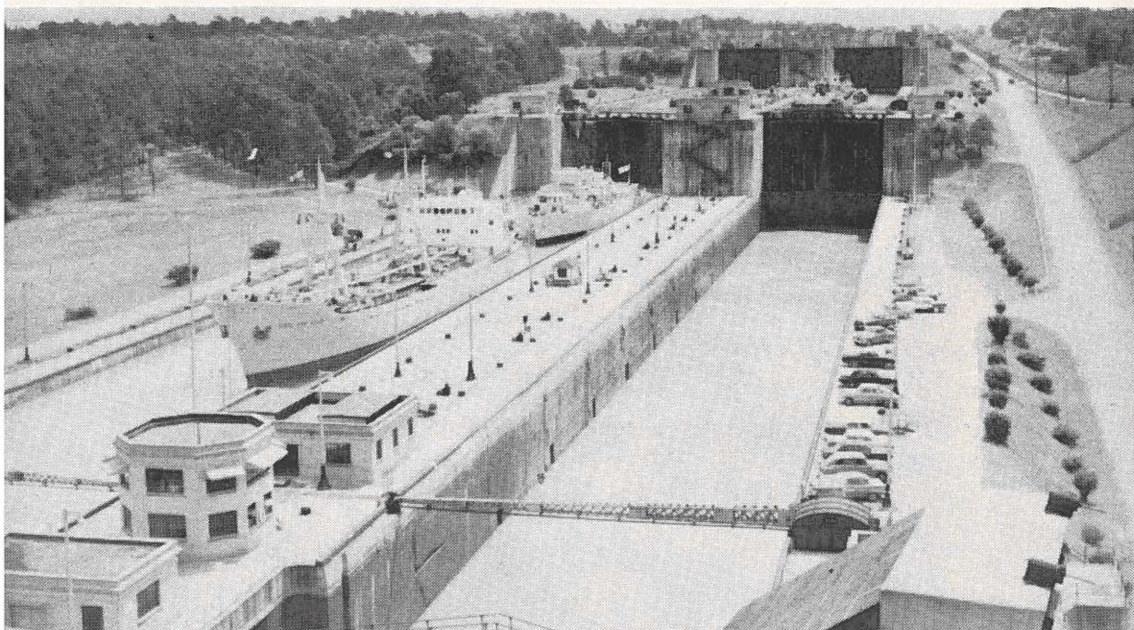
1. Tolls assessed including		
Welland Canal	\$8,482,746.	
2. Rentals, wharfage & miscellaneous	877,896.	\$9,360,642.

EXPENSES

Operation including maintenance and administration applicable to Seaway only		\$5,908,943.
Net operating income prior to interest and depreciation on movable equipment		\$3,451,699.
Interest on loans plus provisions for depreciation on movable equipment		\$12,883,387.
Net Loss for Year 1960		<u>\$9,431,688.</u>

View of Welland Canal Locks.

Photo Courtesy of St. Lawrence Seaway Authority



CARGO TONNAGE CARRIED ON SEAWAY

The schedule of tolls was based on an estimated forecast of expected traffic to increase progressively from 25,000,000 tons to a maximum of 50,000,000 tons in 10 years.

ACTUAL CARGO TONNAGE through the Montreal-Lake Ontario Section of the seaway was as follows:

1959	20,593,142 tons
1960	20,310,346 tons

Registered gross tonnage of the 6809 vessel transits in 1960 was 25,131,200 tons, an increase of 1.4% over 1959.

WELLAND CANAL TRAFFIC

ACTUAL CARGO TONNAGE

1959	27,536,558 tons
1960	29,249,689 tons

Registered gross tonnage of 7536 vessel transits in 1960 was 35,528,265 tons.

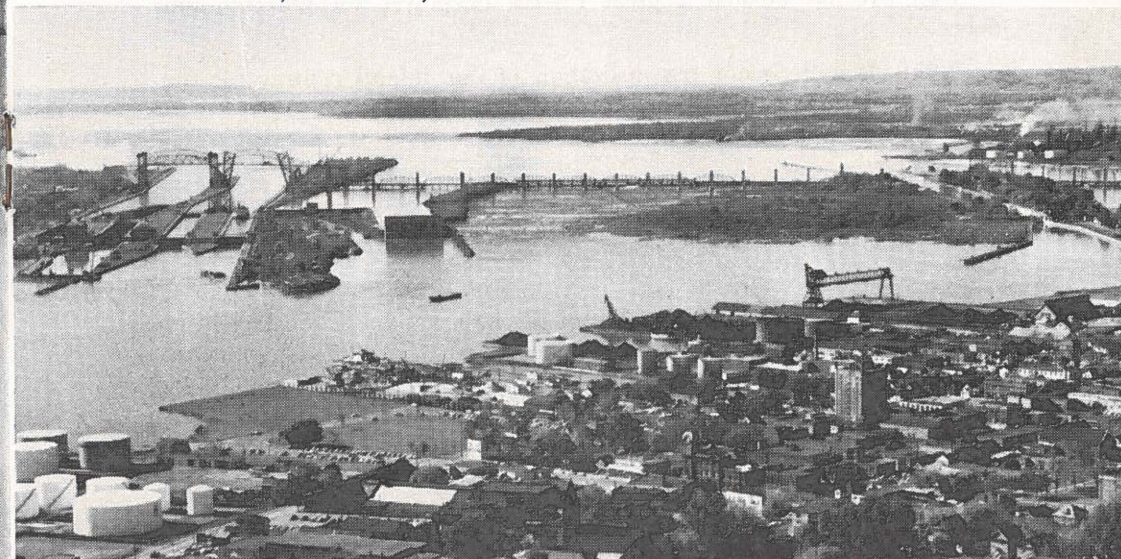
OVERALL TOLLS ASSESSED IN 1960

St. Lawrence Section

To Canada	\$7,156,249	
To U.S.A.	2,956,055	\$10,112,304.
Welland Canal (Canada)		\$ 1,326,497.
Total Tolls (Canada)		\$ 8,482,746.

Sault Ste. Marie Locks.

Photo Courtesy of Sault Daily Star



The Seaway Power Development

Regarding the Power project, Ontario and the State of New York share equally the 2,200,000 Horsepower generated.

The effective head at the Generating Station is 83 feet average out of a total of 92' available on the river upstream to Lake Ontario.

Ontario's actual fixed assets in this plant as of Dec. 31, 1960, was \$291,390,751.

The Economics of the Seaway Project

(1) Transportation in Canada is primarily East and West.

The elimination of the 14 foot draft canals on the St. Lawrence permits through traffic from the Lakehead to lower St. Lawrence River Ocean Ports for the great bulk carrying lake freighters and direct shipment overseas for ocean vessels, with reduced handling cost for all bulk cargo. This eliminates the cost of the former transfer to small canal size freighters of all grain for export.

(2) It permits also the economical transportation of Canadian iron ore from Quebec and Labrador in large bulk carriers to the steel plants on Lake Ontario, Lake Erie and Lake Michigan.

(3) Rail freight charges on grain from the Prairies to the Lakehead are exceptionally low AND FURTHER SAVINGS ARE HIGHLY IMPROBABLE SO THAT the reduction in carrying charges for export grain due to the Seaway enhances Canada's export position in the markets of the world.

(4) It has created a great reserve of power for Ontario and Quebec.

(5) It will permit the utilization of our inland centres for the production of ships of all classes in time of war.

The Lakehead Harbour

So much for the Seaway—what of the important part the Lakehead cities will be called upon to play in the future transportation requirements of Canada?

The Federal Government were quick to foresee the necessity of unified administration of the important harbours of Port Arthur and Fort William at the Canadian head of the Seaway. In 1958 an act was passed to incorporate the Lakehead Harbour Commissioners. This act was assented to on September 6, 1958. It provided for the combining of the harbours of Port Arthur and Fort William into one unit to be known as the LAKEHEAD HARBOUR. It established new harbour limits, which, incidentally, take in considerably more shoreline than was originally included in the two units, and provides for future expansion.

The Act sets up a Commission of five members to administer the Act. Three of these members were appointed by the Federal Government and one each by the Corporations of Port Arthur and Fort William.

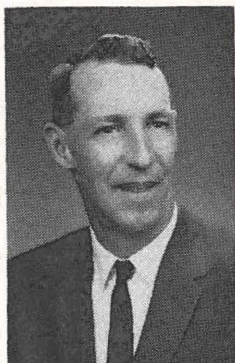
The Commissioners were duly appointed and took office in the spring of 1959. The personnel of the first Commission includes Messrs. L. C. Irwin, J. E. Young and R. B. Chandler, P. Eng., as government appointees and Mr. D. B. McKillop, P. Eng., represents Fort William and Mr. G. F. McDougall, the City of Port Arthur. It is interesting to note the diversity of business experience represented on the Commission. Mr. Irwin is engaged in the grain trade as manager of Searle Terminal Grain Elevator, Fort William. Mr. Chandler is a retired consulting engineer with experience on water-front development across Canada. Mr. Young has wide experience in rail transportation. Mr. McKillop is the area engineer for Canadian National Railways at the Lakehead and Mr. McDougall is general manager of the Port Arthur Shipbuilding Company.

Executive staff members appointed to date include Mr. K. McCuaig, Port Manager and Secretary, as of March 1, 1961, and Captain D. A. Beaver, Harbour Master.

View of Lakehead Harbour from Mt. McKay.

Photo by Lockwood





MR. K. MCCUAIG
PORT MANAGER & SECRETARY



CAPTAIN D. A. BEAVER
HARBOUR MASTER

Mr. L. C. Irwin was accorded the honour of serving as the Board's first chairman.

The Act gives the Commissioners wide powers. They have jurisdiction within the harbour limits over harbour-front lands, not including government property except when authorized by Order-in-Council, or private property, except as provided for in the act. The Commissioners may purchase, expropriate, acquire and hold, lease or sell buildings or property, real or personal, within the harbour required for development, improvement, maintenance and protection of the harbour.

The Commissioners will have regulation and control over the use of harbour property. They will have power to construct harbour facilities and sell or lease same.

They may construct or lease railway facilities on harbour lands.

All navigation in the harbour is under Commission control and to this end the Commissioners have prepared a comprehensive set of by-laws and general information regarding the control and operation of the harbour, also schedules of port charges which were enacted by Order-in-Council P.C. 1960-53, dated January 14, 1960.

Existing Grain Handling Facilities

The Lakehead Harbour enjoys world renown for its ability to handle the western grain crop. The overall storage capacity available will total 106,000,000 bushels by the end of 1961. The potential shipping capacity of its 26 terminals has never been taxed to the limit. During the week ending December 7, 1961, the total grain loaded on vessels East-bound to Canadian ports was 20,608,000 bushels or an average of 2,944,000 per day. It is a matter of record that the great Terminal

No. 7 of the Saskatchewan Wheat Pool has accomplished on its own, loading of a lake freighter with 180,000 bushels of grain in one hour and 550,000 bushels in 4½ hours. Under favorable conditions this elevator could ship 1,000,000 bushels in 10 hours representing the crop of 50,000 acres of western wheat land.

The modern car unloading devices at this plant can receive into the elevator 283 carloads or approximately 500,000 bushels in 10 hours' operation.

It is quite evident therefore that the facilities now existing at the Lakehead Harbour for the movement of grain are without parallel in any other part of the world.

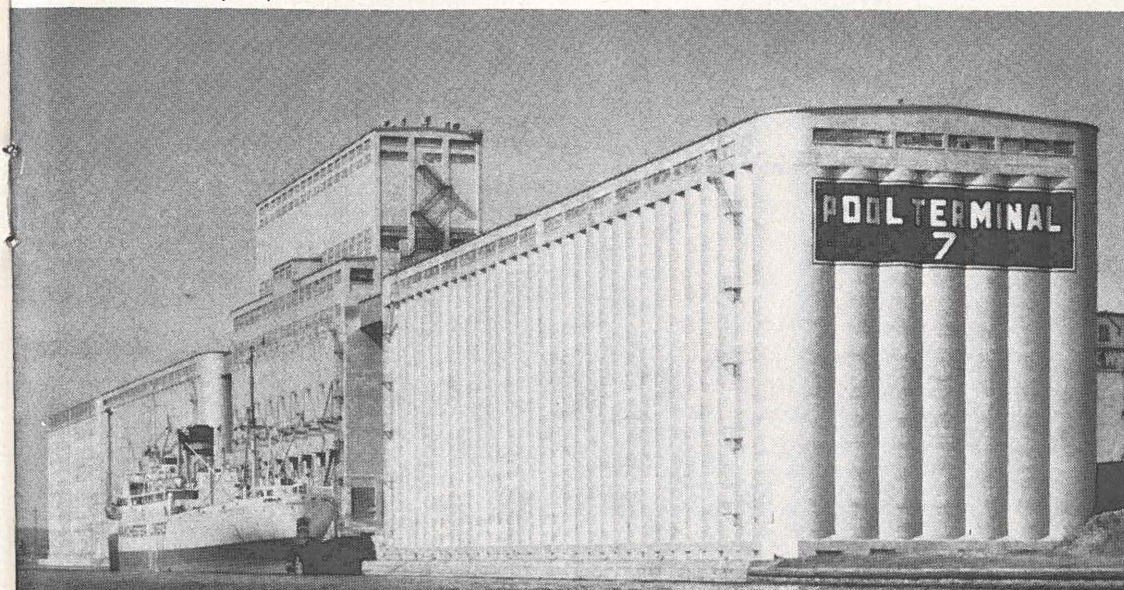
Ultimate Capacity of Seaway

The opening of the new deep draft channels with the required locks in the Upper St. Lawrence River in June, 1959, gave access to Canada's inland waters for a great flotilla of deep sea vessels. It also enabled our largest Great Lakes freighters to proceed direct to Montreal and other lower St. Lawrence River ports. A new era of navigation had dawned for the St. Lawrence Seaway.

The connecting channels between Lake Erie, Lake Huron and Lake Superior are now being deepened to provide a 27 foot channel extending from Montreal to the Lakehead. This program is scheduled for completion in 1962. When completed, 80% of the world shipping can be accommodated.

British freighter "Manchester Progress" loading grain at Saskatchewan Pool 7, Lakehead.

Photo by Kayden



New Seaway Terminal at Lakehead

The Federal Government has recognized the necessity of augmenting the existing handling facilities in our harbour to provide for the increasing volume of waterborne commodities which it is anticipated will be shipped into and out of the Lakehead Harbour. Population growth in the Western provinces will undoubtedly require an ever expanding flow of commodities to provide their requirements.

To meet this situation the Federal Government has undertaken to construct for the Lakehead Harbour a fully modern Seaway Harbour Terminal which when completed should provide quick, easy and economical despatch for the increased traffic through our port. This terminal when completed will cost approximately \$8.5 millions.

The City of Port Arthur has provided the Government with the site for the new terminal. This site is located on the main harbour. The area to be turned over, roughly 180 acres, lies north of the intercity boundary extending to the McIntyre River outlet to Thunder Bay. It is adequate for docks, buildings, freight storage areas, access roads, parking areas, rail connections and marshalling yard included in the initial project and for future expansion.

Handling Capacity of Terminal

The Consulting Engineers for the terminal, Sir Alexander Gibb and Associates, in their report presented to the Government in February 1959 made a forecast of the package freight to be handled in future years. It was established that the average annual tonnage of package freight handled through the existing Lakehead facilities for the eight years 1950 to 1957 inclusive was:

Westbound	392,000 short tons
Eastbound	239,000 short tons
	631,000 total

It was estimated that the effect of the Seaway and the natural development of the Western provinces might increase these tonnages by 1970 to the following:

Westbound	730,000 short tons
Eastbound	615,000 short tons
	1,345,000 total

These figures were arrived at by adding to the previous eight-year average handlings the estimated tonnage which the railways would lose to ocean and lake freighters with the St. Lawrence Seaway completed and open to navigation on a 27 foot draft basis.

After establishing these figures, an annual increment of 3% compound per annum, was added to provide for the normal rate of increase for package freight handled through the Lakehead Harbour. The present terminal has therefore been designed to meet the anticipated conditions applicable to 1970.

So much for the basic design handling data.

Let us take a look at the facilities now under construction to handle the forecast tonnages.

Terminal Facilities Provided

(1) One spacious transit shed for lake freighter service with a storage area of 120,000 sq. ft., approximately 900 ft. in length x 135 ft. wide—clear span steel trusses.

(2) One transit shed for ocean freighter service with a storage area of 60,000 sq. ft., 450 feet in length x 135 ft. wide—clear span without interior columns.

(3) Complete site enclosing steel revetments.

Aerial view of New Terminal looking North—November 4, 1961.

Photo by Sir Alexander Gibb & Partners.



(4) Concrete aprons 65 feet wide extending full length of both ocean and lake freighter berths.

(5) Track loading platforms with roof cover to accommodate 96 freight cars at the lake freighter transit shed and 20 cars at the ocean freighter shed.

(6) Two spacious truck loading sheds for road transports to accommodate 40 trucks loading simultaneously.

(7) Adequate paved parking areas for motor vehicles in transit.

(8) Office accommodation in sheds for auxiliary services, including Governmental authorities, stevedoring firms, vessel agencies, etc., as well as Harbour Commission employees.

(9) Railroad marshalling yards to accommodate 200 cars with rail connections to both CNR and CPR.

(10) Paved access roads and viaduct over railway yards and McIntyre River to provide truck route to Trans-Canada Highway and both cities.

(11) Terminal Entrance Building to accommodate the Harbour Commission executives and staff.

In general, as of January 1, 1962, the progress on existing contracts indicates that the final completion of the Terminal will be May, 1962, provided no unforeseen difficulties arise.

Existing Harbour Facilities

A description of the Port Arthur and Fort William sections of the Lakehead Harbour setting forth the extensive harbour facilities now available will be of interest and the following sections give this information in some detail.

Port Arthur Section

The wide expanse of fully protected harbour area fronting the City of Port Arthur occupies approximately seven miles of shore line. Approximately five miles of breakwater construction creates a sheltered basin varying in width from 2,000 to 4,000 feet, which provides ample accommodation for vessels entering, leaving, and manoeuvring in the harbour without the assistance of tugs. Three entrances are provided for vessels, one in each of the north, central and south sections of the breakwater. These add materially to the convenience for vessels using the harbour. The minimum harbour depth varies from 23.5 to 27.0

feet, and by 1964 the whole enclosed harbour will be completed to this 27 foot depth to meet the St. Lawrence Seaway draft requirements, and the schedule of deepening the Great Lakes connecting channels.

It is along this open roadstead that Port Arthur's pulp mills, grain elevators, ore docks, shipyards, railway freight sheds, and other industrial plants have been built. Each plant has ample berthing space in wide slips opening direct onto the main harbour. Total berthing now available totals 4.5 miles.

Grain elevator storage capacity in Port Arthur for the 15 units will total approximately 68,000,000 bushels when plant additions under way are completed in 1961.

Railway trackage in Port Arthur totals 292 miles. The Neebing marshalling yard adds an additional 50 miles to the local total.

The Federal Government provided the offshore breakwater protection for the harbour and down through the years has undertaken all dredging work in the harbour and its approaches.

During the years 1891 to 1961 a total of 16,105,453 cu. yards of material were dredged from the harbour to obtain a navigable depth at a cost of \$6,412,640.71.

Breakwater structures total 24,337 feet in length of rubble mounds and rock-filled crib construction built at a cost of \$8,864,995.35. Demolition of 7926 lineal feet of the original rock-filled breakwater crib structures, which became obsolete when the harbour limits were moved

Swedish freighter "Figaro" fitting for grain at the Lakehead.

Photo by Kayden



off-shore to provide more sheltered spaces for vessel manoeuvring, required an additional expenditure of federal funds in amount of \$525,377.50.

In all, approximately \$15,800,000 has been expended to date on the Port Arthur section of the Lakehead Harbour, a relatively small outlay when one considers the important role our harbour plays in the scheme of East and West Canadian transportation.

Fort William Section

The main harbour facilities in Fort William are located along the banks of three rivers emptying into Lake Superior which have been dredged to navigable depths and widths under a program of dredging which was initiated in 1884. These are the Kaministiquia, the McKellar and the Mission Rivers.

Over the years dredging work totalled approximately 46,535,141 cu. yards at a cost of \$11,442,020.36 and breakwater construction and miscellaneous wharf construction involved an added cost of \$3,410,050.00. All in all, Federal capital expenditures to date total \$14,852,070.36 for the Fort William Harbour.

Since completion, maintenance dredging of approximately 50,000 cubic yards per year has been necessary to take care of the annual silt deposits brought down by the spring freshets.

The result of the enacting and completing of the master plan for establishing a national harbour at Fort William has been most gratifying. The movement of grain alone through its elevators, plus the coal shipments, amply justify the investment made by the Canadian people to enhance our national economy.

Fort William now has 29,000 feet, or 5½ miles, of navigable river channels varying in width from 400 to 600 feet with a limiting depth of 25 feet. There remains still ample river frontage for industrial expansion.

Grain elevator storage capacity stands at approximately 38 million bushels for the eleven plants located along its rivers.

Other industrial plants include oil storage and refinery plants, paper mills, coal docks, railway freight sheds, etc. In general, no tug assistance is required by vessels using the river channels although assistance is available if required.

Adequate railway facilities have been provided to facilitate car movement to and from the water front.

The Results of Seaway Operation to Date at Lakehead

Great hopes are being held locally for the use of the Seaway by ocean shipping formerly denied access to the Lakehead due to shallow draft channels in the St. Lawrence River. The record of arrivals of salt water vessels in our harbour for the years 1955 to 1961 indicates a substantial increase.

NOTE—Lakehead Harbour Commissioners figures are shown, except where noted "DBS" (Dominion Bureau of Statistics figures).

1955	1956	1957	1958	1959*	1960	1961
Nil	1	2	28	111	164	130

*Seaway officially opened.

"What effect has the Seaway opening had on cargo tonnage in and out of the Lakehead Harbour?" is a question that is frequently being asked. Other standard queries are "To what degree have foreign vessels cut in on the waterborne grain movement from the Lakehead?" "What are the grain elevators doing to expedite loading to ocean-type vessels?"

We will now deal with these aspects of the transportation problems as they affect the local Harbour.

It will be of interest to note the comparative figures for the total shipping tonnages for the Lakehead Harbour for the years 1959, 1960 and 1961 in short tons. Grain is included under "All Commodities."

SEASON 1959	Inbound	Outbound	Total
All Commodities	1,070,940	10,406,889	11,477,829
Pulpwood	508,432	159,700	668,130
Total	1,579,372	10,566,589	12,145,959
*DBS 1959 Total			12,899,432

No. of Ships Using the Harbour

Domestic ships	914
Ocean-going ships (foreign)	111
Total	1,025

SEASON 1960	Inbound	Outbound	Total
All Commodities	1,077,255	10,800,299	11,877,554
Pulpwood	408,750	121,965	530,715
Total	1,486,005	10,922,264	12,408,269
*DBS 1960 Total			12,115,742

No. of Ships Using the Harbour

Domestic ships	1,261
Ocean-going ships (foreign)	164
Total	1,425

SEASON 1961	Inbound	Outbound	Total
All Commodities	1,191,145	12,341,782	13,532,927
Pulpwood	442,500	122,080	564,580
Total	1,633,645	12,463,862	14,097,507

No. of Ships Using the Harbour

Domestic ships	1520
Ocean-going ships (foreign)	130
Total	1650

Based on Dominion Bureau of Statistics Monthly Shipping Statistical figures for the years 1959 and 1960, and Lakehead Harbour Commissioners' monthly statistical figures for the year 1961, comparisons are as follows:

Increased Tonnage 1961 over 1960	1,981,765 tons—16.35%
Increased Tonnage 1961 over 1959	1,198,075 tons— 9.28%

Percentage Increase for Vessels Using Lakehead Harbour

	1959	1960	Increase '60 over '59	1961	Increase/Decrease '61 over '60
Domestic ..	914	1261	347—38%	1520	259—Increase 21%
Ocean-going (Foreign)	111	164	53—47%	130	- 34—Decrease 20%
Total	1025	1425	400—38%	1650	225—Increase 15%

Foreign Vessel Tonnages (Overseas)

	1960			1961		
	Imports	Exports	Total	Imports	Exports	Total
Commodities (excl. of grain)	28,907	48,147	77,054	9,143	26,471	35,614
All Grains	—	617,799	617,799	—	451,727	451,727
Total	28,907	665,946	694,853	9,143	478,198	487,341

The Grain Movement

During the 1959 season ocean-going vessels loaded out 31,736,052 bushels of grain or 11.1% of total grain (286,620,772 bushels) shipped from Lakehead elevators. Of this amount 18,222,153 bushels, or 6.4%, went overseas and 13,512,899 bushels or 4.7% were loaded into ocean-going vessels trading in Canadian waters.

In 1960 grain shipped in ocean-going vessels totalled 25,374,644 bushels which represented 9.3% of all grain shipments (277,945,000

bushels) from the Lakehead. Of this amount 21,113,140 bushels or 7.6% went overseas and the balance 4,261,504 bushels (or 1.5%) were loaded into ocean vessels trading in Canadian coastal waters.

In 1961, grain shipped in ocean-going vessels totalled 25,916,000 bushels, which represented 7.9% of all grain shipments (324,711,000 bushels) from the Lakehead. Of this amount, 14,603,000 bushels (or 4.5%) went overseas, and the balance, 11,313,000 bushels (or 3.5%) were loaded into ocean vessels trading in Canadian coastal waters.

This comparison indicates the magnitude of the grain movement in foreign vessels since the opening of the Seaway. It is relatively small compared with the over-all movement.

Our Lakehead Harbour facilities are internationally famous for their ability to handle the unloading of grain from railroad cars and transferring it to ships for movement Eastward to Ontario for domestic consumption or for export overseas. We have at the Lakehead 26 of the most modern grain elevators in the world designed for this specific purpose.

The existing facilities for loading ships have been designed to give the maximum despatch to vessels of the Upper Lake freighter class. The use of this large capacity shipping equipment for loading ocean vessels would be most inefficient due to the design of the vessels. Furthermore the height of boat spout pivots at present on most local elevators is not sufficient to permit swinging the shipping spouts aboard the ocean freighters. This would require the raising of the boat spouts to permit the loading of foreign vessels in the standard manner.

The non-interruption of present day extremely rapid loading to lake freighters is considered of paramount importance to elevator owners.

The past two seasons of grain handling to ocean vessels at the Lakehead would hardly justify the expenditure of heavy capital funds to provide extra facilities to load foreign vessels in a manner that would not interfere with normal operations at the majority of Lakehead terminals. However, several elevators have undertaken to provide some high spouts where conditions were favorable. In new construction work now underway we note that facilities are being provided to permit the loading of ocean vessels in locations that will not handicap the overall loading arrangements.

At the United Grain Growers' Port Arthur terminal a new gallery system of transporting grain shipments and loading same to ocean vessels has just been placed in operation.

On November 3, 1961, these new rapid handling facilities, which include special shipping belts capable of delivering 25,000 bushels of grain per hour to any one of six new high level boat-loading spouts,

successfully loaded the "Manchester Shipper" for overseas delivery, greatly decreasing the previous loading time for deep-sea vessels.

As a matter of record on November 1, 1961, in 15½ hours loading time, the ocean vessel "East River" took aboard 415,015 bushels of No. 2 northern wheat, representing 11,116 long tons, at the Saskatchewan Pool Terminal No. 4, which indicates the substantial progress made in grain handling to ocean vessels since the Seaway opened.

The Lakehead Harbour Commissioners look forward to the completion of the new Seaway Terminal. It will provide the most modern equipment for moving package freight and will complement our existing outstanding handling facilities for grain, coal, iron ore and other bulk commodities. Ranking third for tonnage handled in Canadian ports in 1960, the Lakehead Harbour, Western Terminus of the St. Lawrence Great Lakes Seaway, is assured of a great future. As Canada grows in population and expands its industrial economy, the Lakehead will undoubtedly be called upon to play an increasingly important role in the scheme of trans-Canada transportation. The Lakehead Harbour Authorities are determined to meet this challenge.

Liberian freighter "Continental Trader" unloading at the Lakehead.

Photo by H. Lockwood

