

\$2,000,000 a year, plus depreciation, upkeep and operation. Return cargoes of coal are obtained in Lake Erie port. Probably few will contend that 14 ft. draft ships are not economical for package freight from Lake Ontario or St. Lawrence points. It would be of interest in this connection to have a report on the feasibility and cost from an engineering point of view of lengthening the existing locks on the Welland and St. Lawrence canals 100 ft., and the economic results of such lengthening if it be practicable.

To analyse and compare the respective advantages and disadvantages of these two routes. Assuming that the Government enlarges the Welland Canal and proposes to canalize the French River to North Bay only. The estimate for the enlargement of the Welland is generally stated to be \$500,000,000; which amount at 4% interest, together with amortization, upkeep and supervision of the two existing canals and the proposed canal, may be estimated at another \$1,000,000, or a total of \$3,000,000 a year, which sum is probably under the mark, unless all past experience in cost of Government contracts be reversed.

Assuming the distance from Port McNicoll to Montreal to be 400 miles, and a paying freight rate to be 4/10c. a ton mile, or \$1.60 a ton, or 5c. a bushel, then \$3,000,000 a year would pay the rail freight from Georgian Bay to Montreal on 60,000,000 bushels, which is much greater than the amount of grain and flour shipped in the past from Montreal in any one year, and 50% greater than the greatest Canadian tonnage through the Welland Canal bound down in one year.

This enlargement of the Welland Canal will not materially increase the water power development, as that is regulated by international treaty, and works out so that, though Canada owns two thirds of the water flowing over Niagara Falls, she gets the use of only one third of the power development therefrom, the U.S. getting two thirds. It is manifest that the only saving effected by enlarging the Welland will be that effected by the difference in freight rates between 2,000-ton ships from Port Colborne to Montreal vs. 8,000-ton ships from Port Colborne to Prescott, plus 2,000-ton ships from Prescott to Montreal, estimated above at 3/8c. a bushel on wheat.

Oswego is about 150 miles nearer by Erie Canal to Troy than is Buffalo, and, as the enlarged Welland Canal will be, by treaty, free to U.S. ships, their largest lake ships will deliver grain cargoes to 1,500-ton U.S. barges at Oswego, in the New York State Barge Canal, for New York, instead of into 200 or 300-ton barges at Buffalo as at present, and thus compete with large Canadian ships discharging into 2,000-ton barges at Prescott or Kingston for Montreal. In the past the little Erie Canal boats taking grain from Buffalo to New York have been very keen competitors against the St. Lawrence route. What will be the result of the new conditions when in operation? It would appear that the expenditure on the proposed Welland Canal enlargement when completed will be quite as much to the advantage of the U.S. as to Canada and during construction probably much more than half the cost goes to the U.S. for coal and machinery.

The canalization of the French River to North Bay to a depth of 22 ft., a distance of 82½ miles, is estimated to cost \$14,275,000, and would develop 35,000 h.p. It could bring coal and coarse

freight to North Bay for railway distribution, and return pulp-wood and probably ores from that district, and partially develop a lot of power for which there is probably no immediate market in sight, but the value of which will doubtless be very great in a few years if we judge from the phenomenal increase in the use and value of hydro electric power during the past 20 years. Probably this construction is warranted only in anticipation of the completion of the entire canal to Montreal.

Assuming that the appropriations in the estimates for the Welland and French River works are preliminary to the extension of each system through to Montreal. The Welland-St. Lawrence system, unless an entirely new route inland to the north of the St. Lawrence can be found, passes through international waters from Kingston to Cornwall, and probably nothing can be done toward enlarging this portion without international agreement, including a natural demand by the U.S. for a share of the power development, (loosely estimated at 20,000,000 h.p. by some writers in the press.) Would the U.S., having the free use of the enlarged Welland to carry their big ships to Oswego, the end of their Erie canal, consent to the enlarging of the St. Lawrence system to divert the trade from Troy and New York to Montreal? What share of the expense would they bear? What share of the power development would they demand? Sufficient information is not available to indicate the nature or cost of such an enlargement of the St. Lawrence canals, to a depth of 22 feet.

In the case of the Ottawa-French system, careful surveys and estimates have been made by the Public Works Department. The total length of the canal is 440 miles, of which 346 is free navigation, 66 in improved channels and 28 in excavated canal. The cost is estimated at \$100,000,000. The system is estimated to be capable of developing 1,000,000 h.p. on the direct route and 3,000,000 h.p., including the tributaries which probably within 2 years will, if carefully conserved and utilized by the nation be worth from \$20 to \$100 a year per horse power utilized, over the cost of production from coal, depending upon the purpose for which it is used.

In the absence of authentic estimates and reports on the St. Lawrence route, it is impossible to compare the two routes as to practicability, cost, time of transit and economy of operation. It is not known whether the St. Lawrence enlargement is at all possible due to international questions. If it be possible, then the two systems can be compared in regard to length and total height of locking only. From Lake Superior to Montreal the Ottawa route is 661 miles long, and the total lockage up and down is 780 ft. The Welland-St. Lawrence route is 943 miles long, and the total lockage is 578 ft. Both routes pass through U.S. waters in the St. Mary River. The St. Lawrence route passes through contracted international waters at St. Clair River, Detroit River and St. Lawrence River. The deepened Welland-St. Lawrence Canal would be found to have probably three times the length of actual excavated canal and about the same length of restricted river navigation, as compared with the Ottawa route. Much has been written about fogs, rock excavated channels and sharp curves on the Ottawa route. Any Canadian knows that the St. Lawrence probably suffers quite as much as the Ottawa from fogs. About

half of the existing Welland Canal is in rock excavation and the new canal will not have less. It is not known how much of such channels the proposed St. Lawrence enlargement will include. The Ottawa route has sharp curves, so has the Thames below London, and it is not known what curves will be required on the proposed St. Lawrence enlargement. There are, however, sharp curves in swift currents in St. Mary River at Neebish and other points. Without surveys the distances through restricted waters cannot be compared and therefore neither the time necessary to pass through, nor the dangers of navigation. The St. Lawrence route is known to be longer and will demand greater fuel consumption per ton of freight, and probably more time in transit. The weeks per year when they will open for navigation will probably not greatly differ, although the St. Lawrence system would doubtless have a slight advantage in this respect.

If, as shown above, the annual expense of enlarging the Welland Canal alone would pay the freight on double the quantity of wheat and flour at present carried per year from Lake Huron to Montreal, it is unnecessary to prove that, commercially speaking, neither scheme can be defended as a canal solely. Without further information they cannot be compared physically, nor is the possibility of the St. Lawrence enlargement even sure.

Pending the result of discussion the writer cannot avoid the following conclusions: 1.—Neither canal system can be made, as a canal, a commercial success; 2.—On account of the geographical position and abundance of power capable of being developed along the Ottawa-French River system, that canal and power development, if undertaken by the Government, could probably be made a commercial success in a few years and would be a very valuable asset in case of international disputes, giving Canada a chance for defence on the Upper Lakes that she can never enjoy without it. This canal might be considered by the Dominion Government on the same basis as colonization railways which have been freely encouraged all over Canada. 3.—The possibility of the enlargement of the St. Lawrence system is as yet undetermined, as it requires the co-operation of the U. S. 4.—The cost and value of the power development thereon is unknown as no international agreement, surveys or estimates have been prepared. 5.—The enlargement of the Welland Canal, without a corresponding enlargement of the Welland-St. Lawrence system, will at least benefit U.S. quite as much as Canadian interests, and it is questionable if it will not divert trade from Montreal to New York. 6.—It would give the U.S. control of Lake Ontario in case of international trouble, and be an important factor contributing to the probable loss of the wealthiest and most populous part of Canada.

The Dominion Government has appointed a Commission recently to report on the proposed Ottawa Ship Canal, which doubtless will add much to the present knowledge of the commercial feasibility of this project, and it is to be hoped of an alternative project of a 14 ft. barge canal. It is to be hoped that it will also give some similar information regarding the enlargement of the Welland Canal and the proposed extension of the enlargement to Montreal that will guide the Government in deciding on the wisdom of such vast expenditure of public money before the projects are actually