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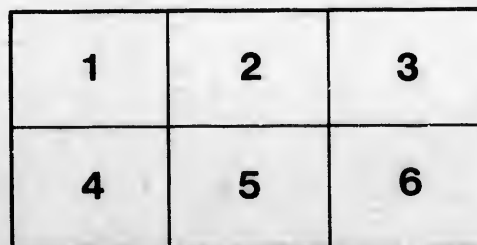
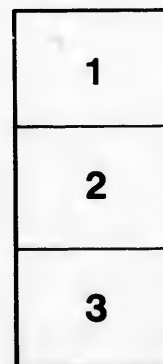
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Cost, Character and Utility  
— OF —  
Existing Great Lakes, Champlain  
— AND —  
St. Lawrence Improvements.

THOMAS C. KEEFER, C. E.,  
OTTAWA, CANADA.

First Annual Convention  
— OF THE —  
International Deep Waterways Association,  
CLEVELAND, SEPT. 24, 25, 26, 1895.

1895:  
W. M. Bayne Printing Company,  
Cleveland, O.

## **Cost, Character and Utility of Existing Great Lakes, Champlain and St. Lawrence Improvements.\***

THOMAS C. KEEFER, C. E.,  
Ottawa, Canada.

I have delayed acknowledgment of the invitation, with which I have been honored, to attend the first annual convention of the International Deep Waterway Association, to be held at Cleveland next week, until I could know whether I would be able to accept or not. I have also been honored by an invitation from your president to present a paper on the subject of the approaching convention, which would contain some basis of estimate for a deeper waterway between Lake Erie and tidewater.

I have not been able to prepare a paper because I do not think I could add anything to the one read by me before the World's Commerce Congress in 1893, at Chicago, on the same subject; but desire to contribute the little I am able to do to a project of such continental interest.

The international feature of your association assumes an international route for the deep waterways at whatever point they may reach tidewater and this seems to me now to be the most important question connected with the subject, though doubtless because the association is not yet in position to express an opinion upon it.

In view of the fact that New York is the most important terminus for a deep waterway from the lakes to the ocean, because it is the most important market on this continent, and that Montreal is the nearest point of tidewater and upon the shortest route to Europe from the great lakes—an international route, via the St. Lawrence and Lake Champlain, is in my judgment the only suitable one for the class of vessels which deep waterways on the lakes will develop, the only one which will make lake ports (including Buffalo) sea ports, and the only one which can compete with railways, because it has the maximum of wide, deep water and the minimum of artificial channel, as also the minimum of lockage to tidewater at Montreal, and is capable of the same to New York.

It is to be assumed that the steel fleet, the cost and annual capacity of which is already enumerated by millions of dollars and millions of tons, will not long remain ice-bound above Niagara, and therefore the question of route, on which the cost both of construction and transportation depends, is not a premature one. The natural channel depth of the St. Lawrence between its rapids is at least 30 feet, with ample width everywhere where deepening is required in approaching its canals.

These are conditions of traction on which economy, safety and efficiency depend, and can be obtained on no other route.

\*[NOTE.—Letter, Sept. 20, 1895, to Executive Secretary Frank A. Flower.]

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Frank A. Flower.]

With the exception of the canal at Sault Ste. Marie, the Canadian enlarged system, designed twenty-five years ago and still incomplete, has long since been outgrown by the development of the upper lake commerce, but will be useful among other things as a *raison d'être* for your convention; and, if completed during the century, may show enough improvement in the present conditions of transportation to give impetus to your greater undertaking. There is no hope of anything further being considered here in Canada until the present enlargement is completed. If the addition of five feet to the draught between Ontario and the sea is considered of sufficient importance by your convention, as bearing on the question of a still greater depth, a resolution from such an influential body favoring the earliest possible completion of the St. Lawrence canals, should have the greatest possible weight (from its international character) with the authorities in Ottawa.

As to cost: The total cost of the Canadian canal system between Lake Erie and Montreal, when completed for 14 feet draught of water, will be about \$60,000,000, of which \$15,000,000 represents the expenditure prior to the present enlargement, leaving \$45,000,000 for the cost of new and enlarged work, including one entirely new canal to replace the Beauharnois, and an entirely new route for almost the whole of the lockage on the Welland canal. All the work of excavations made previous to the present enlargement and utilized in the latter, would not represent \$10,000,000, probably not more than half that sum, thus giving the cost of these canals with locks 270x45 feet in the chamber and 14 feet draught of water, somewhere about \$50,000,000.

In any new canal the locks would be reduced in number, possibly one-half. The new Soulanges canal, nearly fourteen miles long, overcomes the same lockage as the Beauharnois canal, on the opposite side of the St. Lawrence, with less than half the number of locks.

For the Welland and Lachine the last enlargement is the third construction, and for all the others, the second. The spoil-banks of one generation were again removed by the next and the work of enlargement was carried on subject to the maintenance of navigation, and hampered by vested interests created by the first canal. The number of locks is excessive. Engineering, inspection, etc., have been extended over a quarter of a century for an amount of work which could have been carried out as a business enterprise in one-fifth of the time—the whole constructed as a public work, and all which that implies.

These are all the conditions and considerations we are in possession of, in the absence of location and survey, in order to arrive at a probable cost of carrying 20 feet draught from Lake Erie to tidewater at Montreal by an independent system of canals where practicable, and in connection with the existing canals where that would be preferable.

With the modern appliances for handling large amounts of excavation above and below water, a 20-foot canal between Lake Erie and Montreal with the larger locks required ought not to very much exceed the amounts which Canada has already expended upon her canals between these points. In any such work no doubt a much wider margin, between the keel and



sides of the vessel and the bottom and sides of the canal, would be adopted for traction purposes, on these short canals, in that respect increasing cost in comparison with present canals.

For the connection of the St. Lawrence with Lake Champlain in Canadian territory, surveys and estimates have been made by the late John B. Jervis and others. The intervening country is most favorable, and the total cost of reaching Lake Champlain from the point of departure on the St. Lawrence should not exceed that of reaching Montreal.

The section on which information is needed for an international route to New York, is that between deep water in Lake Champlain and deep water in the Hudson, on the plan of making Lake Champlain the feeder of the canal.

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