

The Canadian Engineer

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THE WATER LEVEL OF LAKE ERIE

REPORT OF THE INTERNATIONAL WATERWAYS COMMISSION ON
THE VALUE OF COMPENSATING WORKS IN THE NIAGARA RIVER
—A SEQUEL TO 1910 REPORT AGAINST ATTEMPT AT REGULATION

THE International Waterways Commission, the duties of which, when instituted in 1902, included an investigation into the advisability of locating a dam at the outlet of Lake Erie with a view to determining whether such a dam would benefit navigation, and, if the structure was deemed advisable, a report to the governments of Canada and the United States containing recommendations relative to the construction of the same, and an estimate of the probable cost, has recently submitted its report.

Upon undertaking the work, the commission first divided it into two parts. It first investigated the advisability of regulating works to reduce the oscillation of the lake, thereby raising the low-water level but not affecting the high-water level. This part of the problem was reported upon in January, 1910, the commission finding that material improvement in regulation could not be accomplished except at the expense and to the injury of the channel below. In the case of Lake Erie it would be possible to raise the extreme low-water stage about 1 ft., and this in turn would raise the low-water stages of Lake St. Clair about 0.61 ft. and of Lake-Huron-Michigan about 0.27 ft., all without appreciable increase in the extreme high stages. But in doing this the low-water stage of Lake Ontario would be lowered about $4\frac{1}{2}$ in., the available depth in the St. Lawrence Canals would be diminished about $7\frac{2}{3}$ in., and the city of Buffalo would suffer by increased damage from floods and by a postponement of the date of opening navigation in the spring. The question of damage to vested rights was thus introduced. While the advantages of regulation might outweigh the disadvantages if the persons who were to benefit from the former were identical with those who were to suffer from the latter, the difference was not great enough to justify the two governments in entering upon the vexatious question of damages. The commission therefore recommended that the regulation of Lake Erie be not undertaken, meaning thereby the most complete practicable regulation such as can be secured by a dam and sluice gates located at or near Buffalo.

The second branch of their work, viz., the advisability of compensating works for raising the level at high as well as at low-water, without complete regulation, is the subject of a report under date of June 20th, 1913.

In July 3rd issue of *The Canadian Engineer* mention was made of the recommendations of the commission in

this respect. A copy of the entire report has since been received, and we extract from it herewith.

As was stated in the former report, the Niagara River at its extreme upper end is an important safety valve for the protection of Buffalo from the effect of storms, and should not be obstructed by a dam, but it seemed possible that somewhere in the river, between Lake Erie and the Falls, a submerged dam might be placed which would greatly benefit the navigation of the waters above without injury to those below and with only minor damages, if any, to the adjoining lands. To determine this question it was necessary to make a complete survey of the Niagara River from Lake Erie to the Falls, including the topography of the adjoining lands. The survey was made by the commission. A survey was made also by the Canadian Government of the Welland River, in Canada, which enters the Niagara about a mile above the rapids approaching the Falls. A sketch upon a reduced scale, showing the Niagara River in outline, is shown in Fig. 1.

From a study of the maps it appears that the best site for a submerged dam, or weir, is just above the Welland River, extending from Hog Island, at the mouth of that river, to the mouth of Gill Creek, on the American side. As the Welland is a navigable stream, there would be some advantage in placing the weir below its mouth, but the survey of that river showed that a moderate increase in the height of its surface would submerge a considerable area of valuable land. To provide for the navigation of the Welland it is necessary to construct a lock at the Canadian end of the weir. The object of placing the weir as near as possible to the foot of navigation is to improve all of the navigable portion of the Niagara River above. A study of the topography on both sides of the Niagara River showed that the water surface at mean stage could be raised as much as 3 feet at the site of the weir without inflicting damage upon adjacent lands, except for a distance of about $1\frac{1}{2}$ miles immediately above the weir on the American side. At this place it is proposed to construct a levee of suitable height to protect the land from overflow.

The form to be given the weir has been the subject of careful investigation. In order to disturb as little as practicable the natural distribution of flow through the different parts of the cross-section of the river, the crest of the weir is broken into four sections, as shown in Fig. 2, the height given to each section being such as will raise