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**Canadian Society of Civil Engineers.**

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**TRANSACTIONS.**

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**THE ESQUIMALT GRAVING DOCK WORKS, BRITISH COLUMBIA.**

By W. BENNETT, M. CAN. SOC. C.E.

To be read on *Monday March 28th or April 11th.*

These works, which were fully illustrated in "Engineering" of the 26th and 27th of July, 1888, were originally commenced by the Government of British Columbia, and have been completed at the cost of the Dominion of Canada, the Imperial Government contributing £50,000 thereto, in consideration of which, any of H.M. ships have priority of entry and free dockage for 15 years, on payment of working expenses only. The works were designed by Mr. Kinipple, the senior member of the late firm of Kinipple & Morris, Engineers in Chief for the whole of the works.

The outer or Cofferdam works were commenced in September, 1876, and the inner or Dock works some four years later. The Earl of Dufferin, then Governor General of Canada, was present when the first pile of the dam was driven. The Dock was opened on 20th July, 1887, H.M.S. "Cormorant" being the first to enter, and followed, when her repairs were completed, by H.M.S. "Caroline."

The progress of the outer works was to a certain extent hindered by the fact that at Esquimalt the range of tide, which was supposed to be about 10 feet, is very uncertain, the tide remaining frequently at almost H.W. level for days together, which thus prevented the wales and struts of the dam being placed in their respective positions. The original drawings had therefore to be somewhat modified in order to prevent further delays in the completion of this portion of the work.

In January, 1876, the contract for the Cofferdam was given to Messrs. Reed Brothers, of Tokenhouse Yard, London, by the British Columbian Government, for the sum of £12,344. Owing, however, to the non-fulfilment of their contract in the specified and extended time, the Government, in June, 1879, after the contractors had ceased work altogether, took possession of the Cofferdam works, and completed them in the following October, under the superintendence of their Resident Engineer. (Figs. 1 to 8.)

When the water was pumped out from the area on which the Graving Dock was to be constructed, the dam was found to be perfectly tight in every respect, although for fully one-third of its total length, of upwards of 500 feet, viz., at the shore ends, the sheeting piles had to be planted on a very uneven foundation of rock, overlaid with sand, shells, and boulders, all of which, of course, had to be removed. Some of the holes for the rock pile shoes were drilled in 25 feet of water. The dam did not show the slightest strain when the full pressure, due to a head of nearly 30 feet, was brought against it, and remained intact until it was removed on the completion of the Dock in 1887. Although the dam was not removed for 7 years after its completion, no pumping whatever was required during that time beyond that which was due to percolation through the strata, or to rainfall.

The three sluices through the Cofferdam were not constructed as shown on Figs. 5, 7, and 8, as much on account of the tidal difficulties already referred to as for the avoidance of leakage, and in lieu thereof one sluice, equal in capacity to the three proposed, was built in the channel way at the back of Tletis Island (Fig. 1), and by its means the Dock was flooded at the testing of the caisson against the meeting faces.

The greater portion of the Portland cement used in the construction of the Dock was supplied by Messrs. Gibbs & Co., of Gray's Essex, and