

bumping from floating plant and passing craft, at anything like a reasonable cost.

It was therefore decided to build the work entirely in open water by the aid of helmet divers. The first work undertaken was, of course, the dredging of the foundation trench and the deepening of the berth in front of the wall. This work was done by the ladder dredge "Cornwall," a vessel owned by the contractors, and built to dredge to 50 feet below her full load line.

As the wall runs at an angle to the general shore line, guide signals could be set up on shore and lights fixed to guide the work at night. The dredged material was towed to sea in hopper barges with opening bottoms and deposited in deep water. Certain small portions of the work which this dredge could not reach were excavated by means of a Priestman crane grab, mounted on a barge, but the cost per yard was very high compared to the ladder dredge, as it encountered some hard shale, which is not the class of excavation these grabs can handle economically.

The material proved easy for the ladder dredge to excavate, being mostly clay and mud, no large boulders or hard rock being encountered.

The shale rock scaled off easily in layers with the ladder dredge, without blasting, but the grab had to be assisted by a diver occasionally to clear away some obstinate piece.

The foundation was dredged until the hard shale and a satisfactory foundation was reached, borings having been taken which established the presence of shale rock at a considerable depth below the mud line.

The trench was excavated well clear of the back and front of the wall to provide room to work in and allow for the mud silting down the bank and filling up the angle at the bottom of the trench before concreting could commence. However, very little trouble was experienced from silting, the small amount which did find its way into the trench being easily removed by a grab immediately before the laying of the foundation concrete.

The water at this point, though often considerably agitated on the surface and for a few feet down, was practically motionless thirty feet down, there being practically no currents of any kind to move the mud. The bottom of the foundation trench left by the dredge was found to be remarkably level, requiring no levelling by the divers before commencing on the concreting.

Two 120-ton steel hopper barges, fitted up with a half-yard Koppel concrete mixer and a three-ton Bedford crane on each, were used for mixing the concrete *in situ* for the work.

These barges and the diving boats were moored along the line