

as to deal more intelligently with the problem of their removal down to grade, but this was not included in the scope of the examination, nor would it be practicable with accuracy or at any reasonable cost. Their location and the depth of water upon them has been found, and the areas of navigation which they affect are shown upon the plans accompanying this report, but more detailed measurement was not attempted. It is therefore to be understood that the quantities hereafter given are calculated from the average level of the bottom.

3. For computing the quantities of excavation the original bottom has been taken from plans furnished by Mr. T. S. Rubidge, superintending engineer of the St. Lawrence canals. These plans consist of cross sections showing all parts of the bottom which were above the grade line adopted by him, and of a plan of the soundings taken on the preliminary survey of the channel. These preliminary soundings have been used only to determine the original bottom level of certain limited areas which were below grade line and not shown upon the sections but upon which it was found excavation had been done. For all other parts, that is for all parts above Mr. Rubidge's grade line, the original bottom has been taken from the cross section. In the case of the island shoal preliminary soundings are now available which were not so in September last. These have slightly altered the quantities on that shoal and have contributed to the need for recomputation.

4. On lower bar the quantities outside the normal side lines of the channel, have not been computed because the banks were not fully defined as above noted. On lower bar extension no computation of the quantity below grade can be made, because of insufficient information as to the original bottom level, and this item was therefore omitted. The quantity outside of the normal side lines is also omitted because it cannot be satisfactorily defined and measured.

5. The grade line now used in defining the excavations is the new one ascertained as already described. It differs somewhat from Mr. Rubidge's, mainly no doubt because it was taken from the low water surface as now found in the channel, while his was taken before the channel was excavated. The quantities of excavation performed in the parts of the channel named as computed from the data described and divided under the required headings are as follows:

These, it will be noted, comprise the excavation of the entire channel except that below grade and outside the normal side lines in the extension of lower bar and that outside the normal side lines of lower bar.

Navigable Depths.—The sweeping of the channel with horizontal bar in order to find the areas clear for navigation at different depths at low water of nine feet on the sill, gives the following main results, viz.:

Upper bar is clear to fourteen feet deep at low water but is not clear for fifteen feet.

North Shoal, in common with Lower Bar, has the shallowest water in the channel and is at one point clear to only ten and a half feet.

Caledonia Shoal is clear to fourteen feet but is not clear to fifteen feet.

Island Shoal is clear to twelve feet with exception of a short piece at the south bank.

Lower Bar is clear to only ten and a half feet.

Lower Bar extension is not clear to fourteen feet but is all clear to thirteen feet except at one small place which is clear only to twelve feet. The spaces between the several bars and shoals are all clear to seventeen feet.

263

Now, the minister will see by that report that on every shoal where these men were working they went away and left it with, you might say, only ten feet and a half of navigable water.

The areas which are clear at different depths in each of the bars are shown on the accompanying plans. The lines inclosing these areas it must be noted are not ordinary contour or shoal lines; they are merely the boundaries of areas in each of which there are points having less water upon them than the depth which the line signifies.

I may say that immediately on Mr. Kennedy's finding these spots—which were well known to Mr. Rubidge and the engineers, but on which they reported to have seventeen feet of water—they started a report in order to cover up their tracks, that these were spots on which loose rock had swept in this channel. Now here is what Mr. Kennedy states:

Character of Bottom.—The examination of the composition of the bottom with the steel bar and grips was not undertaken till November. The time which then remained to be devoted to such examination was necessarily brief and it was spent in trying the character of Upper Bar and Island Shoal as furnishing the best examples of two opposite conditions. The first was chosen because being at the head of the channel and well clear of any dumping ground it is a place where the bottom may be supposed to be least changed. The second was chosen because it is that into which loose stuff is most likely to have been carried and deposited by the cross current of the Gut. On the upper bar sixty-six places were examined by the steel bar. On probing as with an ordinary sounding pole the bottom almost invariably gave evidence of being rocky and firm; nothing soft could be felt and very seldom anything at all loose. At some places the rock felt fairly smooth and level, at others jagged with small points and invariably on feeling over any considerable space high points of rock were found which might be either projections of the solid or large detached pieces. On putting the bar upon the bottom and turning it round so that the projecting foot when revolving might drop into interstices and move anything movable, it was very seldom that any such thing could be found. The foot often dropped into well defined crevices at a particular point of each revolution, sometimes being freed under strain and catching at the next revolution but often being held entirely fast until freed by being lifted.

The bar used in this way had much displacing power because the foot was only six inches long, and there was a cross bar above water of two and a half feet long by which the strength of two or three men could be put upon it. The indications obtained were almost always that the bottom was of rock too firm to be disturbed, but whether of solid bed rock or of very heavy detached pieces could not be distinguished. Masses of rock of every size and shape were met with.

Some were undoubtedly projections of solid rock, some had steep or perpendicular sides and others allowed of the foot of the bar being hooked under them. Of these latter some could be lifted up a foot or so before the hold was lost but in the majority of cases the bar hooked under something which could not be lifted but