side. The total length of the columns varied from 18 to 25 feet. The installation of the gauges was similar to that described in the Report of December 1898, page 16, to which reference may be made.

Data for time and height.—It was not anticipated that there would be any difficulty in obtaining correct time at these localities; as they are all telegraph or telephone stations. But at Lower East Pubnico the telegraph office was closed; and the long-distance telephone elsewhere was not found satisfactory for the purpose. The only point where the time could be obtained correctly was at Barrington Passage, which is in reality the best centre of communication in the whole of this region. At the three other localities, chronometers were used, which were obtained from St. John, N.B., as soon as the necessity for them became evident. The observers were supplied with tables of correction for these chronometers, based upon their rates. The rate was also checked during the season, and at its close, by time comparisons. The time was thus kept correct to the nearest minute, which is as close as tidal observations can be made.

It was not deemed necessary to establish Bench-marks at any of these localities except Clarke harbour. At Shelburne and Pubnico, the wharves are of piling and are not liable to settlement; and the zero of the tide scale is fixed with reference to the cap of these wharves, so that it can be placed at the same elevation again should observations be resumed. The tide column at Trepassey, Newfoundland, stands on solid rock, and can be replaced without alteration in level if required again. At Clarke harbour the Bench-mark is an iron bolt drilled into the rock at 14½ feet from the north-east corner of Swim's warehouse, which is the most northerly of a set of buildings extending to the Government wharf. The level of the zero of the tide scales at the various localities is defined as follows:—

Shelburne, N.S.....	Zero of tide scale	14.12	feet	below	cap of wharf.
Barrington Passage...	" "	14.42	"	"	"
Clarke Harbour.....	" "	21.98	"	"	the Bench-mark.
Pubnico Bay.....	" "	17.58	"	"	cap of wharf.
Trepassey, N'fld.....	" "	at rock surface, foot of tide-column.			

FURTHER TIDE LEVELS AND BENCH-MARKS.

Repeated endeavours have been made to ascertain the relation at Halifax between the Admiralty datum, the Royal Engineers' datum, and the City datum, none of which accord with each other. In explaining these relations care will be taken to distinguish what is reliable from what is uncertain.

The most important of these from a marine point of view, is the Admiralty Low Water datum, to which the soundings on the chart of Halifax harbour are referred. This datum is fixed by reference to a Bench-mark in the Dockyard; and it is defined as follows in a note on the chart of Halifax harbour: "The soundings are reduced to the level of Low Water Ordinary Spring Tides, viz.: 16.08 feet below a Bench-mark cut near the South-east angle of the Sail loft at the Dockyard." It is further to be noted that the tidal observations themselves show that the datum as thus defined, accords correctly with mean low water at spring tides.

The levels were carried over from this Bench-mark to the tide gauge, which is situated at the Marine and Fisheries' wharf; and the Admiralty datum as thus defined has been used throughout the series of observations as the plane of reference to which all tide levels have been referred by this Survey. The observations at Halifax were begun in 1895; and the levels have been repeatedly checked from the same Bench-Mark in subsequent years; and any changes in elevation at the gauge, due to settlement or other causes, have been carefully allowed for, to maintain the same elevation for reference throughout.

The levels of the Tidal Survey are thus consistent, and they are in accord with the chart datum. But it is highly desirable that the tide levels as now determined, should be known with reference to the other datum planes, to make them available in the construction of harbour works, city drainage, etc.