

is taken to record permanently, by reference to a bench-mark, the level of low water as originally decided upon for the soundings on a chart, it becomes possible to refer any future measurements to the same datum, and thus to ascertain whether exceptional tides fall below it, and so reduce the chart soundings. Questions relating to the grounding of vessels at low tide can thus be satisfactorily investigated. Any changes in the depths on shoals, or in their position and extent, can be correctly followed. Tidal observations taken at any later date can be reduced to the datum level of the chart itself, and the rise of the tide as given in a tide table will then show the draught available for vessels in addition to the chart soundings.

The only harbours in eastern Canada in which such bench-marks were found to exist, were at Quebec and Halifax. At these, the Admiralty low-water datum was adopted as the plane of reference for the tidal observations, since their commencement in 1894 and 1895. There is also a series of such bench-marks on the St. Lawrence, below Quebec, established in 1885 to 1889, when the latest Admiralty surveys of the St. Lawrence were made by Staff Commander W. F. Maxwell. At St. John, N.B., all such marks were lost in the great fire of 1877. An endeavour has there been made by this Survey to re-establish the elevation of the original low-water datum, as explained further on. It is of unusual importance there, because in New Brunswick, properties and wharf rights are defined by the low water mark, and the variation in its level is pronounced where the range of the tide is so great.

The most important of these planes of reference is undoubtedly Mean Sea Level; and this is the more emphasized because of the difficulty of defining accurately any low water datum. Mean Sea Level is the only satisfactory plane of reference for geodetic leveling; and even from a geological point of view, any subsidence or elevation of the coast can only be ascertained with reference to it. This level can be definitely determined at localities where continuous observations with a self-registering tide gauge have been obtained, and where a bench-mark has been established for reference; as its value can then be worked out at any time, from the tidal record secured. The record when referred to a bench-mark, also affords elevations for extreme tides, mean low water, etc.

The general practice of this survey has accordingly been to establish a local bench-mark wherever tidal observations have been secured, even for a few months in the summer season. In our more