

reduction of the observations. It was also evident that a large amount of important information could be secured by taking more complete levels, and by establishing bench-marks at all tidal stations at which recording instruments were placed, even for a few months. The additional work involved was therefore undertaken from the outset; and as the Survey has to be carried on with a minimum of technical assistance, this has been done by the writer personally. The endeavour has always been made to connect the new levels with any that were already established; and the work of others thus embodied in the results, is always noted. As these levels are chiefly important for the purposes of harbour construction, city drainage, etc., they will, no doubt, be of interest to this Society.

It may be well at the outset to give some definitions and explanations, regarding the leading planes of reference deducible from tidal observations. Mean Sea Level is the most important of these; as it is presumably a plane which has a truly constant elevation around a coast of any extent, however much the range of the tide itself may vary. The elevations of mean sea level which are here given, are determined from hourly ordinates of the tide, as recorded on a self-registering tide gauge, for periods of not less than one complete year at a time. Its evaluation is one result of the harmonic analysis of the tidal record, which is made for all the principal stations for which tide tables are primarily prepared. This analysis, by which the tidal constants are determined, is made in the Nautical Almanac office, London, by Mr. E. Roberts, F.R.A.S., who is himself a leading authority on this method.

On all marine charts, the soundings are reduced to what is known as the level of "low water at ordinary spring tides," and, accordingly, this is usually known as the Admiralty datum. It is not a plane which has a continuous or constant elevation, however; but its elevation is lower where the range of the tide is greater. In an estuary in which the range of the tide increases, it is necessarily an inclined plane, lower at its head. It is convenient for chart purposes, however; although its level, even locally, is not capable of a strict or scientific definition. (See article on *Tides* by Professor G. H. Darwin, in "Admiralty Manual of Scientific Inquiry.") Where there is a pronounced diurnal inequality in the height of the tide, the practice of the Admiralty is to take the level of the lower of the two low waters in the day, to be on the safe side.