

ends of lines were determined by the plane-table. Principal lines of soundings were run parallel to the meridian. Cross or check lines intersected them at right angles. Lines of levels were run between the tide gauges at Henderson's, Bollman's and Woodall's, but no appreciable differences of plane were found. The same result was obtained by simultaneous observation of tide at the several stations mentioned.

This, the most thorough and elaborate survey hitherto made in and adjacent to the harbor of Baltimore, is represented by five topographic and five hydrographic sheets.

In March, 1881, Mr. Charles Junken, United States Coast and Geodetic Survey, made a re-survey of that part of the Patapsco lying between Fort Carroll and the line of Marine Hospital Lazaretto.

SURVEY OF 1886.—In June, 1886, at the request of Major N. H. Hutton, Engineer of the Harbor Board, the work of 1876 was supplemented by a verification of the triangulation and its adjustment to more recent computations made by the Computing Division of the Coast and Geodetic Survey Office of the triangulation of the Chesapeake Bay. The purpose of Major Hutton's request, however, was the tracing upon the ground of the Port Warden line established by the Commission of 1876 and its connection with the triangulation in such a way that its identification could be secured by reference to established ground-marks. The Superintendent of the Coast and Geodetic Survey assigned to this work Assistant O. H. Tittmann. Copies of the original plane-table sheets of the special survey of 1876 were in possession of the Harbor Board of Baltimore, and upon these were laid down the Port Warden line of the harbor after due consultation with the engineer of the Board. In conformity with the suggestions of Major Hutton, Mr. Tittmann confined that part of his work to tracing the pier-head lines around the harbor—the bulk-head lines in certain places only being marked.

The method pursued was to transfer the Port Warden line to the original sheets. These sheets were then taken into the field, and in general the points of deflection of these lines were identified by means of the plane-table. They were then referred by distance measurements and deflection angles to stones planted in the streets or side-