FIG. 4. PART OF NORFOLK QUADRANGLE, VA. SCALE, 1:125,000; CONTOUR INTERVAL, 5 FEET

Some lessons are well taught by contrasts. Compare, for example, the harbors of Norfolk, Va., Fig. 4, on a branch of Chesapeake bay, and of Erie, Pa., Fig. 5, on the nearly rectilinear shore of the smallest of our Great Lakes. Many an American knows, of course, that Norfolk is an important seaport in southeastern Virginia, but how few of us know that it occupies several separated parts of a 20-foot lowland that is divided and subdivided by the ramifying sea-arms of a half-drowned valley system, of which the main member is called Elizabeth "river," though it is not a river in any proper sense of the word, but a salt-water branch of a large marine embayment. How intricate is the sheltered shore line of these branching waterways! How excellent is the protection that they give to shipping, and how extensive is the water front of this well-placed city! How easily the general arrangement of the waterways may be apprehended if they are rationally described as "irregularly ramifying valleys, half submerged"! How surprising that this simple explanation of branching embayments is little more than half a century old! How gracefully simplified is the exposed shore line on the north, where heavy waves sweeping in from the Atlantic have cut away former points of land and built a smoothly curved beach across the bays!

FIG. 5. PART OF ERIE QUADRANGLE, PA. SCALE, 1:62,500; CONTOUR INTERVAL, 20 FEET

Erie is known also, even if to many of us it recalls little more than a school-day memory of the projecting northwestern corner of Pennsylvania which cuts off the western end of New York in order to give lake frontage to the Keystone State; but how few of us know the singular nature of the natural harbor of Presque Isle bay that has determined the site of this inland port! The lake shore thereabouts lies along a nearly straight, harborless bluff some 50 feet in height; but curiously enough, a curved, plume-like sand reef springs from the shore and encloses in its graceful sweep a protected body of water, open to the east, several square miles in area. The formation of the sand reef is apparently due to a local outward deflection of the long-shore, wind-driven currents, but the cause of the deflection is obscure. Recent studies have shown that the sand reef is gradually shifting eastward, for the waves sweep the sands along the smooth western beach and the winds blow the sands over into the bay, while on the east new "plumes" are successively added; but the changes thus accomplished are so slow that no apprehension need be felt that the bay will soon be shifted east of the city. It is a good fortune, truly, for Pennsylvania that its part of the lake front includes this great natural breakwater, which defends that otherwise harborless lake shore. But how utterly unlike the seaport of Norfolk is this lakeport of Erie!

The uses to which large-scale topographic maps may be put are many and varied. One of the most important is in the location of roads and railroads, which shall avoid difficult grades without too great an increase of distance. This is well illustrated in a part, Fig. 6, of the Piedmont belt, that stretches from Virginia across North and South Carolina into Georgia, a hilly region elaborately dissected by