

differ in England and Holland owing to the generally greater range of tide in England, and by reason of the fact that the inland waters of Holland are kept at an artificial level by means of a vast system of pumping. Canal and inland waters are by law maintained at artificial heights, and one object of this is that an immense drainage reservoir for flood water in case of inundation is thus secured. There is no fixed general water-level throughout Holland, but its regulation is under the control of a Government Department, who study the national requirements and maintain the balance with great skill. If a really serious breach in the defences of Holland took place, such, for instance, as the giving way of the Helder Dam, it is quite conceivable that practically the whole country might be submerged.

The level of the main outlet drainage sluice of a marsh, if fixed too low, is only operative for a short period at extreme low water; if fixed too high, it ceases to operate too soon. The broad standard rule for the level of the sluice outfall may be stated as a level such that the drainage can get away freely from about half-ebb to half-flood. The gutters which carry off the effluent water are sometimes of brick or concrete, with elm flaps, more frequently iron pipes with grids and tidal flaps. After a period of exceptional flood it is the duty of the marsh bailiff in charge of a given level to see that the tidal flaps are lifted to allow the land water to get away with the least possible delay, and conversely, in periods of drought, it is sometimes necessary to hold back a portion of the land water and prevent its escape. Fig. 35 shows the design of a standard sluice on Foulness Island.

The materials of which sea-walls are built average about twice the weight of water, unit for unit, but the design of a sea-wall based merely on a diagram of forces would be inadequate and precarious. The casualty element looms large in this class of work. Clay is the most resistant material for sea and river embankments, but obviously on the score of expense local materials must perforce be used. Some of the walls reared in the Fen country, probably by the Romans, are in effect artificial sand dunes, with some admixture of silty mud. Their designers trusted to bulk and height to effect their purpose, and the