

edge of the wall by the rush of water, and the wall falls outwards. In the majority of instances this effect is due to the fact that proper measures have not been taken to conserve the accumulations in front of the wall, or, as an alternative, to dump shingle or stone along its frontage, which method would have created a buffer between the stroke of the waves and the wall.

In a great number of cases, the first idea of those responsible for works of this class is to build a structure as massive, and therefore almost as expensive as a breakwater. From the rate-payers' point of view this may be magnificent, but it is not business. The art of design is to effect the desired end by making Nature do your work for you as far as that is practicable. There are exposed positions where, almost inevitably, a sea-wall has to bear the brunt of the full momentum of heavy seas. Under such conditions, no doubt a curved or stepped wall is more effective than a wall with a nearly vertical face, but it is in the main doubtful if the ratio of its efficiency in this respect could not be achieved by less costly methods. One expedient of this character is the formation of an apron at the toe of such wall. Reinforced concrete will probably be found the most efficient material in its construction. Great care has to be taken to carry the apron sufficiently seawards, and to build its front edge sufficiently deep to counteract the effect of the scour induced by recoil from the wall, which is apt to set up a guttering action, thus tearing out and undermining the front edge of the apron and causing its collapse. An apron built with this object should be constituent with the wall, and the reinforcement between the wall and the apron fairly massive, to counteract the tendency to cracking by unequal settlement at the junction of the apron and the wall. The apron also requires to be built with expansion joints, so that minor settlement may not cause dislocation and thus disintegration.

In nine cases out of ten the policy of pushing the edge of a parade to the extreme limit seawards is the cause of much of the useless expenditure entailed on the fronts of sea towns. It is a form of greed which recoils upon itself, as the amenities of a seaside resort are greatly enhanced by leaving a strip of open ground between its houses and the actual foreshore. By