difficult to secure unless the cement is used liberally. It is difficult to fix a proportion, as that will depend on the aggregate. Every case must be judged for itself, the voids being determined and enough cement used to fill them. Many attempts have been made to obtain imperviousness by the addition of various materials, such as barium salts, soap and fatty or mineral oils, but at present there is nothing better than concrete made with carefully chosen and graded aggregate and an ample proportion of cement. Concrete made thus can only be attacked on the surface, and its destruction by percolation is well-nigh impossible. To state its probable length of life would be a rash attempt; it should last indefinitely, in fact, until the harbor or other marine work had become obsolete.

Following some remarks on the corrosive effects of acids, actual or potential, Mr. Blount refers briefly to possible attack by electrolysis, saying that the divagations of stray electric currents should be prevented by proper insulation; it should not be necessary to protect concrete from them because those errant currents should be kept in their narrow channel. These words apply, of course, only to American practice, for, as our readers are aware, the safeguards adopted in this country have proved efficacious in preventing stray currents and consequent risk of injury.

Turning now to reinforced concrete, it is said that all the causes of attack which have been discussed under the head of ordinary concrete are equally valid, and in addition there are some other causes peculiar to reinforced concrete. In practice the reinforcement consists of steel and is liable to the same corrosion as steel in other structures, but fortunately cement is an alkaline substance and the metal, iron, in an alkaline medium does not rust. This comforting fact does not warrant the deduction that the steel reinforcement is immune from corrosion. That is true only if it is completely enclosed with concrete which is fully in contact with it, and is free from fissures, a cogent reason for the use of concrete, for reinforced work, of a higher grade than that generally necessary. It is highly desirable that the concrete should not only be without fissures, but should be impervious. The advantages in preventing the percolation of any saline or corrosive substance are so great that the extra trouble and cost are well repaid. With the knowledge of the present date, it seems fairly certain that little fear need be felt of steel reinforcement rusting when well embedded in good nonpervious concrete of adequate thickness, even when the structure is exposed to seawater or other saline solutions. In summing up his discussion of the possible causes of the destruction of concrete structures in general, the author says that by far the most important is corrosion by saline solutions. For such structures impermeability is im-perative. The material must be free from interspaces which are not microscopic and disconnected. This axiom has been arrived at painfully and with heavy cost in the hard school of experience before reinforced concrete was thought of.

All other causes tending towards destruction sink into insignificance beside this, which, of course, affects a comparatively small proportion of the total number of concrete structures executed, and which can be counteracted by proper care. The next worst is the injury caused by aggregates of the class of coke breeze containing sulphates or potential sulphates. From the very nature of the material, and from the use to which it is put, namely, to make light floors, ceilings and partition walls, it is clear that it cannot be impervious, and it follows that whatever water reaches one of its surfaces will speedily make its way to the interior. Where water can go, air can follow, and the assumption that sulphides are fairly harmless falls to the ground, because they are in the most favorable condition to become sulphates, and the fate of the structure is then settled.

The general conclusions drawn by the author are these: (1) that there exist potential causes of destruction, which, if uncontrolled, will destroy any structure, even when its design is impeccable; (2) that all such causes, except extreme external violence, can be controlled, and their effect nullified by knowledge, care and skill, and, as a necessary result, security and permanence can be attained.

SUGGESTED FEES FOR ENGINEERING SERVICE.

Through the courtesy of Arthur Surveyer, M.Can.Soc. C.E., Montreal, we are enabled to present a brief summary of the code of ethics and proposed fees as adopted by the Association of the Alumni of the Ecole Polytechnique of Montreal.

According to this code, a consulting engineer is quite within his rights, in some cases at least, in charging a percentage of the actual cost of the work involved. The following schedule of fees is suggested: For the preparation of a piece of work or the examination of any work which has been prepared by other engineers, the charges for the services of an engineer and of his staff shall be equal to 2 per cent. of the cost of the work, provided this cost does not exceed \$50,000 or less than \$10,000. Where the work will probably cost less than \$10,000 the remuneration shall be at least \$200. If the work involved an expenditure of \$70,000 to \$100,000 the charge shall be $1\frac{1}{2}$ per cent. of the cost, while if the work costs more than \$150,000 the percentage charge shall be 1 per cent. of the cost.

Where an engineer is merely consulted the charge will, of course, be proportioned to the time spent on the work, the basis of the charge to be a day of six hours, and to be paid for at the rate of \$50 to \$100 a day, depending upon the experience and reputation of the engineer.

Where a consulting engineer undertakes complete supervision of a piece of work, including office consultations, supervision of the contractor, etc., it is, according to this code, reasonable to charge 5 per cent. where the work involved means an outlay of \$1,000,000 or more, 6 per cent. to from \$100,000 to \$500,000, and 7 per cent. to under \$60,000. In no case shall the fee be less than \$700.

The code furthermore specifies that six hours shall be considered the working day of an engineer.

Where an engineer prepares a written report covering certain work, the following charges are suggested: For preliminary study of a project with a report, or for an examination of a project prepared by another engineer with a report on the subject, or a study and report on questions of irrigation, or the preparation of depositions before courts, or presence in courts during trials, the charge shall be \$50 to \$100 per day or more for the first five days devoted to the client's services, and \$25 to \$50 a day for succeeding days. In addition, the client shall be expected to pay salaries of all assistants and an additional amount equalling 100 per cent. of those salaries in order to cover overhead expenses of the engineer's organization.