

# The Canadian Engineer

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## WATER PRESSURE UNDER DAMS

IN an article upon another page of this issue, Mr. Maerker calls attention to what he terms a "fallacy in the design of dams subject to upward water pressure." He points out that the overturning moment due to the upward thrust of water near the heel of a dam should not be added to the overturning moment due to the horizontal water pressure unless the upward thrust is greater than foundation reaction. He bases his argument on the fact that the upward thrust due to water simply replaces an equal amount of foundation reaction. He admits, however, that the stability of the dam is impaired by the upward thrust of water, owing to the lowering of the resistance against sliding. Allowance would have to be made, therefore, when designing the structure, for this danger of failure through sliding.

Whether the allowance be regarded as a provision against overturning or against sliding, probably makes but little practical difference. In either case basic assumptions must be taken that may vary greatly in their actual accuracy, and the results might not be such as to warrant the refinement suggested by Mr. Maerker.

Nevertheless it is always interesting to discuss the reasons for assumptions, as it leads to a clearer understanding of the various features of design. Engineering should be based upon scientific laws to as great an extent as possible. It should be empirical only where absolutely necessary through lack of accurate knowledge, or else where advisable in order to save mathematical computations which, if carried out, would yield no adequate return.

While Mr. Maerker's article may not change any of the assumptions used in designing dams and similar structures, it will cause many engineers to give further thought to the subject, which alone will prove beneficial regardless of whether these engineers do or do not find themselves in agreement with the theories advocated by Mr. Maerker.

The amount of the upward thrust, the area against which it acts, and the line of its distribution, must all be assumed, and in order to be reasonably safe the engineer must make considerable allowance for more than average conditions. The precautions taken by standard engineering practice in the past have no doubt been warranted, and Mr. Maerker would probably insist upon just as much material being used in a dam designed according to the method he suggests, as in a dam designed in accordance with present standard practice.

## ENGINEERS FAVOR EMPLOYMENT ACTIVITIES

RESULTS of a referendum recently held by the American Association of Engineers, asking the opinion of the membership as to how the income of the association should be distributed amongst the ten main activities of the association, indicate that of all the things which the members believe to be important, the employment service is the most popular.

The vote proves that the members desire to have about 17% of the income spent on this service. It is interesting to note that compensation was second with about 16%. The official publication, promotional work, publicity, legislation, protection and prevention of abuses, membership, civic welfare, and ethics and practice, were next, in the order named.

Mining engineers voted the greatest percentage to employment, while the least percentage voted to employment was by those engineers employed by educational institutions. Government engineers voted more to be spent on publicity than did any other class of members. The greatest desire for development of the organization appears to lie in the educational group, for those engineers voted 3% more for promotional work than did any other class of engineers.

Public utility employees voted the greatest amount to be spent on legislation, although engineers employed by states ran a close second. Legislation was least desired by government engineers, who voted a full 3% less than those employed by public utilities.

Engineers in private practice voted the greatest amount to be spent on civic welfare work. The least amount voted to this work was about 3%, voted by mining engineers. Engineers in private practice voted a greater amount to be spent on protection and prevention of abuses than did any other class of members.

Municipal engineers voted the most money to be spent on compensation, while railroad engineers, engineers in public utility work, and engineers employed by states, followed in the order named. The complete results of the ballot follow:—

Employment, 17.4%; compensation, 16.3%; association's publication, 14.8%; promotional work, 10.9%; publicity, 9.8%; legislation, 8.8%; protection and prevention of abuses, 8.1%; membership campaign, 5.8%; civic welfare, 4.5%; ethics and practice, 3.6%. The percentage named in every case is the average of the votes cast by the members, and therefore represents the average opinion of the membership as to the percentage of the association's income that should be spent for the various activities.

The result of the vote, as regards employment activities, is no surprise. Just as self-preservation is the first law of nature, the first and basic desire of all engineers—and of everyone else for that matter—is to be ensured of a good market for their abilities. Ethics, membership campaigns, etc., are naturally regarded as of minor importance compared with employment. At the same time, legislation, publicity and other activities have a basic effect upon employment, and in the last analysis may count for more than the direct assistance rendered by a society's employment bureau.

The obligation upon every individual to purchase Victory Loan bonds may not be so apparent as it was during the war, but it is just as real. Depression and unemployment would surely follow the country's failure to absorb the much-needed loan.