

form of fertilizer. The success of the activated sludge process would seem largely to depend upon the fact that a revenue is expected from the dried activated sludge. From the standpoint of conservation alone, particularly if a satisfactory and economical process is found for dewatering the sludge, there is everything to be said for the process, and, particularly in cities which do not possess tanneries, there are no objections to the use of this material as fertilizer. On the other hand, it is doubtful whether the activated process will be popular with small municipalities because of the expert care necessary in operating the plant. In the second case the tendency is to first dissolve and then thoroughly oxidize as much of the organic material in the sewage as possible, and turn out the smallest possible quantity of a stable residue.

In the latter case no attempt would be made to obtain any income, and the process would be worked out along lines of operation that would be, so far as possible, automatic.

Like many others, we were in favor of the conservation idea, and the saving of as much as possible of the nitrogen and other fertilizer ingredients in sewage by the activated sludge process, until our work and that done elsewhere convinced us of the as yet unsolved difficulty of rapidly and economically drying the sludge.

Even if the material could be produced economically and without nuisance, it is realized that the sale of same and consequently the economical operation of the plant would be a purely business proposition, in competition with established industries, and, in case of success, with other municipalities.

For these reasons the writer has come to the conclusion that the second process will be the one generally adopted. It appears as though the final solution of the sewage disposal problem will come about eventually through a combination of the activated sludge process or trickling filters in combination with sludge digestion tanks. It may be that the activated sludge process will be the preliminary installation, followed by digestion tanks. It may be that actual sewage digestion tanks will be the first installation, followed by the activated sludge process. Certain preliminary work, which has been carried on by us for a year, shows very promising results, and it is hoped that in the near future we will have information and data for publication as to the results obtained.

## Letter to the Editor

### COST-PLUS-FIXED-FEE CONTRACT

Sir,—In your issue of September 11th, the article by A. E. Wells, entitled "Cost-Plus-Fixed-Fee Contract," makes it quite clear that the method is very advantageous to the contractor who does the work.

Will you permit me to say a few words concerning what cost-plus-fixed-fee means to owners, and incidentally to touch upon the question of what it means to the small-fry contractors who are ambitious to expand?

This is what it means to the owners:—

First.—Placing themselves absolutely in the power of the contractor, who can make the work cost as much as he likes.

Second.—Placing themselves at the mercy of all the workmen on the job; for the latter cannot be induced to labor faithfully when they know that the "boss" will lose nothing by their idleness, no matter how honest may be the intentions of the contractor about keeping down the expense.

It is useless to deny the correctness of these two statements, for anyone with common sense must acknowledge it. While it is practicable to improve this method materially for the owner by substituting a sliding-scale fee for the fixed fee, even this will not protect him effectively, unless there be something in the nature of a penalty for the contractor,

either to prevent him from neglecting to push the work or to make him pay for his negligence. A limit of total cost which can be increased or reduced properly, in order to provide for an increase or decrease in the estimated total quantities of materials, will prevent the owner from being excessively robbed, and still will give the contractor every opportunity to come out whole in the case of all but extraordinary hard-luck.

Such a method I expounded in a paper recently published by "Contracting," of Chicago.

[NOTE.—This article is reprinted for the reader's convenience, on page 527 of this issue of *The Canadian Engineer*.—EDITOR.]

It outlines an ideal, just, scientific and perfectly feasible method of contract-letting and profit-sharing,—one that is fair to both parties by making the owner and the contractor partners on the job, thus tending towards harmony and towards the utilization of every practicable method of legitimately keeping down the cost.

My scheme could be enlarged slightly in the interest of both the contractor and the owner by arranging in the specifications for a modification of the limiting cost by a ratio based upon the ratio of general average rise or fall of workmen's wages during the progress of the work. It would not be difficult to draft such a clause upon truly equitable lines.

Again, my method could be amended in the interests of labor by arranging that the contractor and the owner, immediately after the final settlement, shall each turn back a certain percentage of his declared profit (say, 20%) into a fund, which fund shall be divided among all the employees who have stayed on the work until its completion or until their services were no longer needed, the amount of each individual's share of the bonus being directly proportional to his total salary or wages in comparison with the sum of all salaries and wages. Such an arrangement would tend to make everyone on the job do his utmost to keep down the cost and to work faithfully and to the best of his ability.

And now a word as to how cost-plus-fixed-fee affects the small-fry contractors. Is it not evident that it will militate towards cutting them out of bidding? When an owner is willing to let any work on a cost-plus basis, he naturally wants to award it to a large contractor of means who has an established reputation for fairness and efficiency. That would practically mean letting all contract-work without competition,—and contractors as a body would object seriously to any such procedure. It is true that the owner might call for competitive bids by letting each bidder name a lump sum for his fixed fee, and awarding the contract to the competitor who names the lowest figure; but the adoption of such a method would often result in serious trouble, delay and expense.

It would be a great benefit if there were evolved and adopted, with the least possible delay, a method of contract-letting and profit-sharing that should always prove satisfactory to both parties to the agreement. By having it first discussed thoroughly in the papers, then seriously considered by a small committee representing the various organizations of engineers, architects, contractors and bankers, so as to determine tentatively some standard method for formal approval by each of the said organizations, the result desired could be attained. The benefits to be derived by the adoption of such a standard are far beyond the ability of anyone to predict.

J. A. L. WADDELL,

Consulting Engineer.

Kansas City, Mo., December 1st, 1919.

Applications are being invited by W. Foran, secretary Civil Service Commission of Canada, Ottawa, Ont., to fill the following vacancies: Instructor in mathematics, Royal Military College, Kingston, \$1,800 per annum; engineering clerk, Topographical Surveys Branch, Department of Interior, \$1,260 per annum; inspector of gas and electricity at St. John, N.B., \$1,260 per annum. The last mentioned position is open only to residents of the province of New Brunswick.