

range the design so that they be in co-relation. Whatever one takes from one area must be added to another, with the corresponding changes made in sewer sizes, etc., involved thereby.

The most serious problem is to so design the sewers that they will serve the present needs without an undue financial burden, and yet form part of a greater scheme capable of taking future requirements. This side of the problem will need further study, and it is possible we shall find it a financially sound policy to lay certain portions of trunk sewers now, the capacity of which will be quite inadequate for final conditions, and arrange to parallel them, possibly ten years hence, with relief sewers. The history of a great many cities has shown this to be the method actually carried out, but how much of this was due to lack of foresight and how much to financial considerations, we cannot tell.

It is to be hoped that the town planning authorities will exercise their powers to prevent promiscuous subdivision of land in the future, and to regulate building operations, so that houses are built in more or less compact districts, ever growing from their margins instead of our present system, which leaves the sewerage engineer with the problem of connecting up groups of houses separated by stretches of undeveloped land. Another point is, that subdivisions might sometimes be laid out on the natural contours of the ground and a break away made from the rectangular system of street planning when the latter involves absurd street grades and arbitrary interference with watersheds. Subdivisions should also be so arranged that accommodation for sewers and transportation might be provided on the most suitable lines.

This is a brief description of some of the work done in framing a sewerage scheme for a large area. I have not touched on the disposal of sewage, as that is a problem in itself. In conclusion, I would like to thank Mr. Wynne-Roberts for his permission to write this paper, the initiative for much of the work here described having been his.

"COST-PLUS" DISCUSSION IN TORONTO

IN the "Toronto Star" of February 26th, there appeared the following editorial, evidently written by someone whose knowledge of "cost-plus" forms of contract is extremely limited:—

"There is talk of building the Mount Pleasant car-line on the 'cost-plus' system. That is, some contractor takes the job on condition that the city guarantees him his costs plus a definite percentage of profit thereon. No more profligate way of spending the ratepayers' money could be imagined.

"'Cost-plus' is a system which bonuses waste, for the contractor is paid a profit upon the money which he wastes, as well as upon that which he expends legitimately. He is encouraged, moreover, to pad his costs in every possible way, because he not only gets that much money additional, but a percentage of profit on it. Instead of the incentive being to do the work economically and honestly, the temptation is to do it wastefully and dishonestly.

"If the proposed temporary Mount Pleasant car-line is to be built at all, it might far better be constructed by the works commissioner under the day labor system, than handed over to a contractor who would be paid for employing the most extravagant methods, and rewarded financially if he inflated his costs above the actual figure."

John E. Russell, a well-known Toronto contractor, has kindly mailed to *The Canadian Engineer* a copy of a reply which he sent to the "Star," and which ably defends the integrity of contractors, although avoiding any technical discussion of the merits of "cost-plus" contracts and the methods adopted for preventing their abuse in any manner such as alleged in the editorial above quoted. Mr. Russell's letter to the "Star" was as follows:—

"Your assumption that 'cost-plus' is always to be interpreted as being cost plus a percentage of that cost, is er-

roneous, as contracts on that basis are only occasionally entered into. There are many forms of contract wherein the commission collected by the contractor is fixed or limited, such amount usually being arrived at by making an estimate of the probable cost.

"Now, as to the desirability of that form of contract, you should be fair enough to take into consideration the circumstances of tendering. Referring to the particular topic of your article, you must surely realize that conditions are abnormal when no lump sum tender was received. When so many features of a contract present substantial variation of cost, possible or even probable to occur, that contractors are compelled to guess instead of estimate, and if during construction the unavoidable or uncontrollable happens, who should in all fairness pay the difference, the owner or the contractor?

"It might rather be expected that a newspaper favoring uplift principles would frown upon a huge gambling venture, and what else is a lump sum bid for work under existing circumstances?

"You mention padding costs, etc., therein reflecting on the honesty of contractors, inspectors and accountants. The Canadian law is clear on that form of stealth. Is it unreasonable to expect honest efficient service from a contractor?

"You refer to day labor as a better means of doing city work. In that you assume that some salaried foreman or superintendent will do more to control the cost than a contractor who has his reputation to maintain and who has a large amount of money invested in plant and who has the ability to keep a complete working organization.

"It must be borne in mind, that in former times, when costs were normal, contractors could estimate closely, and by their ingenuity and better methods of doing work, compete fairly; but why it can be expected that contractors should take all the chance is hard to understand. If, submitting a lump-sum bid, a contractor protects himself against all contingencies and some of these do not occur, who suffers in payment?

"Should not contractors be compensated for their service just as any other class of business men, and is it not fair to let contracts on the basis of the owner getting the advantage of savings or paying increased costs, as the case may be, while the contractor gets a fixed fee or sliding scale of profit?"

The Draftsmen's Association, which was organized several months ago in Toronto, has decided to disband, as the members intend to form a trade union instead of an association. Those who are forming the union claim that more than 2,000 draftsmen in Ontario will join.

The Engineering alumni of Toronto University held a meeting in Montreal last month and decided to form an association. The following officers were elected: President, W. J. Francis, Montreal; vice-president, Dr. T. K. Thomson, New York; secretary, C. E. Macdonald, Toronto. The following will be the council: J. M. Robertson, consulting engineer, Montreal; J. B. Challies, Ottawa; E. R. Gray, Hamilton; J. L. Morris, Pembroke; G. R. Munro, Peterborough; W. G. Chace, Winnipeg; and W. A. Buck, Toronto. Arrangements were made for a general reunion of the Alumni Association to be held next October in Toronto.

Permanent headquarters for the Asphalt Association, an organization representing the producers and users of asphalt for paving purposes, have been established in the new National Association Building, 25 West 43rd St., New York. From its main headquarters and its branch offices at Washington, Chicago and Toronto, the association intends to continue its educational and research work. J. R. Draney, of the United States Asphalt Refining Co., is president of the association, and J. E. Pennybacker, formerly chief of management of the United States Bureau of Public Roads, is secretary. A feature of the association's activities is a brochure series, explaining approved methods of constructing asphalt pavements, including asphalt macadam, asphaltic concrete and sheet asphalt.