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**ADDRESS**

of

**C. H. RUST**

President.

of

**The Canadian Society of Civil Engineers**

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# Canadian Society of Civil Engineers

ANNUAL MEETING, 1912.

## PRESIDENT'S ADDRESS,

In concluding my term of office I again wish to thank the members for the honour which they conferred upon me a year ago, when they elected me President, and to express the great pleasure it affords me to congratulate the officers and members upon the continued growth and prosperity of the Society. The number of members of all classes, published in the Official List, in the autumn of 1887, immediately after the formation of the Society, was 365. The membership at the present time is 2,900.

The great advance in the prosperity of the country has resulted in an increased demand for engineers, which demand has necessarily been of financial benefit to the members of that profession.

The tremendous growth in the Dominion, more especially in the West, within the past few years, has rendered necessary the construction of two additional trans-continental railways; the increase in the production of wheat and other products in the Western Provinces has also resulted in a strong demand to the Government to increase the size of the Welland and St. Lawrence Canals. At the same time a large section of the country has so strongly impressed upon the Government the necessity of constructing the Georgian Bay Canal, that surveys, plans, and estimates of the cost of the work have been prepared.

It is to be hoped that the Government will also recognize the importance of making a thorough survey of the St. Lawrence route, with a view to an enlarged waterway.

In addition, the increased use of electricity, arising from the demand for cheap power, and the utilizing of the same by our municipalities, has necessarily involved the development of our great natural water resources, and this great development throughout the country has consequently increased the duties and responsibilities of our profession.

As my entire professional career has been devoted to municipal engineering, I propose to confine my remarks to this subject.

Municipal engineering is now recognized as a distinct branch of the profession, and includes a great variety of subjects, in which the engineer, embarking in this field, is supposed to be well versed. It is also necessary for him to possess considerable tact in dealing with the various members of his council, and with the public.

A municipal engineer, from the very nature of his duties, must be somewhat of a sanitarian. At present considerable attention is being paid to the health of the people, with the satisfactory result of a decreasing death rate. People moving into cities naturally ask,

where do you dispose of your sewage, and from where do you obtain your water supply?

The old method of disposing of sewage by depositing it into the nearest stream, without any regard to the fate of the town situated lower down, is now very properly being discontinued. Plans for the purification of water supplies, and disposal of sewage are being considered, and plants constructed by a number of our municipalities. These plans for sewage disposal and water supply have now to be approved of by the boards of health of the different provinces. It is a regrettable fact that on very few of these boards of health there is any person qualified to advise upon engineering matters. In most of our provinces these boards are composed entirely of members of the medical profession, who have only a superficial knowledge of the engineering features of the plans submitted, and are consequently not competent properly to decide upon them.

There is now a bill before the Senate, which will be most drastic if it becomes law. The bill entirely prohibits the disposal of sewage into any body of fresh water. This will be a great hardship to many small municipalities who will be unable, for financial reasons, to put in a sewage disposal plant to comply with this act. From the wording of the bill it seems that they have entirely overlooked the fact that spring freshets yearly remove from the streets, roads, and farm yards large accumulations of filth, which eventually find their way into the rivers and lakes.

The question of the proper method of disposing of sewage is one of great difficulty, and no general scheme suitable to all towns can be approved. Each locality of necessity requires special study. Municipalities situated upon the Great Lakes may be allowed to discharge their sewage into the lake, after screening and sedimentation, provided the water supply is filtered and drawn from a point some distance from the sewage outfall. This method of disposal cannot, however, be permitted in the case of towns situated upon small streams, which are used for water supply. In such cases settling basins and filters will be required, and in the colder section of the country it will probably be found necessary to cover these filters.

The furnishing of an adequate and pure supply of potable water to the citizens should be the object of most careful study. Until recently it was not considered necessary to filter the water supplied to the majority of our Canadian municipalities. This problem is now, however, receiving general consideration. Toronto has just completed slow sand filters for the water supply, and is the first city situated on the Great Lakes to take this step.

Within the past few years the use of hypochlorite of lime for the purification of water has come prominently into use.

The obtaining and storage of a constant supply of water from the Great Lakes, through a long line of submerged pipe, is a problem of considerable difficulty. A brief account of the accident to the Toronto conduit may be of interest as showing the troubles and anxieties that befall the municipal engineer. To be suddenly called up in the night, and find that four hundred thousand people are in danger of a water famine, is only one of his many anxieties.

Toronto is supplied with water from Lake Ontario through a six foot rivetted steel pipe, made in lengths of between 150 feet and 160 feet, and bolted together with cast steel flanges.

Early in February a very severe storm from the east occurred, which filled the lake, as far as the eye could reach, with large quantities of floating ice, while ice banks thirty or forty feet high also formed along the shore.

On the 7th of the same month difficulty was experienced in obtaining a sufficient supply of water, and, on examination of the shore crib, a great many branches of trees and other debris were discovered. During the night all the pumps were closed down, and then started up, with the expectation that this would remove the obstruction. This method, however, proved unsuccessful. Divers were then sent down into the pipe where a log, twelve inches in diameter and twelve feet long, was found, as well as other small pieces of timber and a large accumulation of sand. Steps were immediately taken to have this sand removed by pumping, using a centrifugal pump. The supply of water to the city was entirely stopped and had to be obtained directly from the Toronto Bay.

Upon a further examination of the pipe it was found that about 600 ft. from the shore there was an opening of about four and a half inches in one of the joints, only ten bolts being left out of forty. Four other breaks were found in the pipe line, three pipes being entirely separated, all bolts removed and a great many of the rivets sheared off, making it necessary to have these pipes lifted and taken to the city for repairs. The four and a half inch opening, however, was repaired by putting in a tapered wooden gasket. Piles were then driven close together on each side of the pipe and the space filled in with concrete. The work of removing the sand from the pipe was one of considerable difficulty. We are now driving steel sheet piling on either side of the pipe for a distance of twelve hundred feet from the shore, leaving a space of about one foot between the pipe and the piling, and filling this space with concrete. The total cost of making these repairs will be nearly \$100,000.

As a test of the efficiency of the hypochlorite of lime treatment for water purification, it may be pointed out that during the period of some weeks, when the city was using polluted water from the Toronto Bay, no considerable increase in typhoid occurred. With-

out this plant no doubt Toronto would have had a most appalling epidemic of typhoid.

The designing and construction of roadways is a branch of the municipal work that has not been so carefully considered as that of sewage and water supply. Macadam, especially in our large cities, is rapidly giving way to a more permanent and sanitary type of roadway. The ever increasing use of self-propelled vehicles demands a roadway which is dustless and capable of resisting the wear and tear of motor cars travelling at a speed of from twenty to twenty-five miles an hour. At the present time roadway engineers are experimenting with various types of bituminous macadam surfaces to meet these conditions.

The alleviation of the dust nuisance in cities and towns, especially when the temperature is too low to permit of the use of water, should be more thoroughly studied. Medical men inform us that the clouds of dust which arise from the roads are germ-laden, and a source of danger to the health of the community. The use of vacuum-cleaners should be generally adopted as a more efficient method of cleaning the streets.

The transportation of people in large cities is a problem which has not yet been satisfactorily solved. Complaints are constantly being heard of the disgraceful congestion of the various street car services, particularly during the rush hours in the morning and evening. It is essential that traffic conditions in various streets, a subject that up to the present time has received very little consideration, should be carefully studied, in order to obtain a solution of the difficulty. There is also a growing tendency towards constructing, in the business centres, as far as possible, a noiseless pavement. The wooden block properly treated most nearly realises this ideal. For heavy traffic in the neighbourhood of docks, railway yards, etc., the granite block is the most satisfactory. For sidewalks, concrete has entirely taken the place of wood and makes an excellent walk at a reasonable cost. The only objection is that in winter, particularly upon slight grades, it is somewhat slippery.

A great deal of careful consideration will have to be given to the proper and most efficient method of collection and disposal of garbage, ashes, etc. Toronto has now this matter prominently before it, and has to decide whether a reduction plant, or the disposal of the refuse by incineration will be the most satisfactory.

The construction of street railway tracks in city streets is a work involving many difficulties. Experience in Toronto has shewn that T-rails, weighing from seventy to eighty pounds, and grooved girder rails, weighing from ninety to one hundred pounds, are the most satisfactory. T-rails are used on residential streets and in the out-skirts, but the heavy grooved girder type of rail is used upon

streets subjected to heavy traffic. The rails are laid upon steel ties, six feet centres, with suspended joints. Under the whole of the track allowance pavement for about a width of 18 ft., a concrete foundation 12 inches in depth is used. This is increased to 18 inches at intersections. The City of Toronto has been experimenting this year with wooden ties, having two feet centres, to ascertain if the vibration and noise caused by the use of the rigid type of construction necessarily involved by the steel ties could not be got rid of.

Following the almost universal practice in England, within the past two or three years, municipalities have evidenced a strong tendency towards operating public utilities, and, providing these services can be kept clear of politics, there is no reason why they should not be administered as economically and satisfactorily as by a private corporation, with the consequent result of decreased cost to the people.

The universal adoption of the telephone, and the great increase in the use of electricity, etc., has multiplied the number of unsightly poles and wires which now disfigure our streets. In European cities such poles and wires are very rarely seen, but up to the present time American municipalities have not taken very active steps towards disposing of these unsightly and dangerous nuisances. Montreal, I believe, has taken some steps towards the construction of lines of conduits for the use of the various companies. It is to be hoped that within the next two or three years other cities also will take this matter up.

The growth of the municipalities in the Dominion, as shown by the recent census, gives some indication of the large amount of money expended in constructing the facilities which are imperative in rapidly growing communities. With a view to presenting to the members an idea of the vast amount of money spent by the municipalities within the past ten years, I obtained, from twelve of the most important cities in Canada, a statement of the expenditure upon engineering matters only, amounting to the enormous sum of approximately one hundred million dollars. This does not include money expended upon the construction of street railway lines, and in some cases does not cover the amount spent in cleaning streets, and disposing of garbage, nor upon public buildings.

I also endeavoured to obtain a record of the number of miles of roadways, sidewalks, sewers and water mains constructed during this period, but, unfortunately, some of the cities have no records extending back so far. I am, however, able to give you these statistics from Winnipeg, Montreal and Toronto.

CITY.	Miles of Pavements.	Miles of Side-walks.	Miles of Sewers.	Miles of Water Mains.
Winnipeg . . . . .	85	266	135	144
Montreal . . . . .	37	120	114	40
Toronto . . . . .	251	410	70	114

In addition to the construction of these various improvements there have been other and more important works carried out, such as the building of electric plants, street railway lines, subways, bridges, abolition of grade crossings (part of the cost of which is generally borne by the municipalities), the construction of sewerage works, filtration plants, etc.

The spending of this stupendous sum of money distributed over such a large number of contracts should give the public some idea of the immensity of detail required in designing and carrying out the various works. Unfortunately, the average citizen does not seem to appreciate the length of time and the attention required to successfully carry out so vast an amount of work, and the municipal councils frequently insist upon having estimates and plans prepared in such a limited time that it is almost impossible to avoid mistakes, resulting in extra charges, etc.

It is to be regretted that in many of the municipalities the members of the council are not cognizant of, or do not sufficiently realize the importance of the work undertaken by their engineer. This, I think, is one of the reasons for the unfortunate criticism, fault-finding, etc., which so frequently occurs. The engineer, as an advisor of the council, should receive more assistance than the head of any other department, because his department is the one which involves the greatest expenditure in the city service, and the one which naturally the citizens are apt to consider critically. During the past year I have heard of two or three cases in which the engineer considers he has been treated most unfairly by the municipality, and this tendency to censure unjustly an engineering officer seems to be increasing. This is a very difficult matter to deal with, but could perhaps be alleviated if the members of our profession asserted themselves more emphatically, and could induce the press to realize the difficulties that beset the engineer in carrying out the various works. Unfortunately it seems to have become the habit of some members of the press to make assertions derogatory to the engineers without first ascertaining whether they are based upon fact or otherwise.

A very large number of the members of the Society are brought into daily contact with laborers. This is especially the case on railway construction and other works remote from civilization, and, whilst it is not an engineering question, it has occurred to me that

by some effort on the part of engineers the conditions of the men engaged upon these works could be materially improved. We all realize that the more perfect the sanitary conditions of these camps, the better the food, etc., the better is the quality and quantity of the work performed. The consideration of the labor problem should receive more attention than is usually accorded it.

The question of deciding upon the proper examination for admission to the Society of applicants who are not graduates of any recognized engineering school, is one which will have to be carefully considered by the incoming Council.

In concluding this address, I regret that, owing to my residence away from head-quarters, I have not been able to give the attention to the affairs of the Society which I have wished, but through the untiring efforts of the Members of the Council, and of our Secretary, the interests of the Society have been well looked after, and, upon retiring from the office of President, I wish to thank those gentlemen for the able manner in which they have assisted me during the year.