Keating, Edward Henry (1844-1912)

REPORT

—ON THE—

TOWN CREEK AND SEWER OUTLET.

WINDSOR, N. S.

J. B. Black, Esq., M. D., Warden of Windsor.

Sir,—In compliance with a request from your Council, I visited Windsor, on the 11th ultimo, for the purpose of examining the Creek and reporting upon what course it would be most advisable for you to follow before expending any further sums of money in extending the existing "Trunk" or outlet Sewer. This Sewer is built of heavy planking, and measures in the clear three feet in height by two and a half feet in width. Its depth at the upper end (which is within a few feet of the Railway culvert) is 6½ feet below the average level of the ground or marsh, and its total length about 278 feet to the tidal valve or "clapper." I am unable to say what its actual condition is, inside, as the statements given to me were conflicting, and I did not feel disposed to take a journey through it. It is, however, asserted that with the exception of the portion recently built at the upper end, it is in an unsatisfactory state, and by no means to be relied upon, having been originally built "piece-meal" at different times, by different parties and in different ways. If this assertion is correct there can be no doubt that your proper course would be to remodel that portion of the work before proceeding further, and if it is incorrect the question still remains if it would not be advisable in any case to do so.

From below the Railway embankment to a point near Flat Iron Corner, I staked out a line and took levels upon it. The result shows that the ground—which is marsh land—is level from end to end, and that the Railway culvert is too high at its upper end (even if it were in perfect order) to admit of carrying off the water as effectually as the existing wooden trunk sewer would allow at its present grade.

The area of the water shed of the Creek, as nearly as I can arrive at

it from the information received, is about 74 acres, but this, I estimate from the configuration of the ground, can easily be reduced to about 50 acres, by leading the storm waters from the remaining portion of the area off in other directions.

I have been unable to obtain any satisfactory data regarding excessive falls of rain in short periods of time, and in answer to my enquiry on this point I was informed that the heaviest recorded rain-fall, during the past sixteen years, was 3.65 inches in 24 hours. This would yield about 9½ cubic feet of water per minute on each acre requiring to be drained, but it is obviously too small an allowance to make, because excessive rain storms in this country never continue regular for 24 hours in succession, *i. e.*, the rain does not fall continuously at the same rate, as some hours will often yield ten or twenty times as much as others. In the absence of more reliable information I am therefore obliged to assume that the conditions as to rain-fall will be similar to what they are in this city, and a number of years experience here has led me to adopt 12 cubic feet per minute per acre as the minimum allowance which should be made for combined sewage and rain-fall during our heaviest storms.

It follows therefore that if we provide for the drainage of only 50 acres, your outlet sewer must have sufficient capacity and inclination to discharge 600 cubic feet of water per minute, and the existing trunk sewer is capable of discharging about three times this quantity.

The difficulty in this case, however, is that the highest Spring tides rise about eight feet higher than the general level of the lowest part of the town which it is required to drain, and the sewer remains tide-locked for about four hours.

These, I admit, are serious difficulties and add greatly to the expense of dealing with your sewerage and rain-fall.

I have given these matters very careful consideration, much more, in fact, than I at first thought would be necessary, and I am of opinion that although the existing trunk sewer is of more than ample capacity to discharge the heaviest storm waters, it is a long way inadequate to hold those waters in store, not only for the time that the mouth of the sewer is tide-locked, but for the much shorter period that elapses from the moment that the tide reaches the level of the marsh until it rises to its highest point and recedes again to the same level. If therefore you extend the present sewer or wooden trunk, without taking further precautions, the inevitable result will be that the low parts of the town will be inundated much more frequently and to a greater extent than has ever happened before.

During the shorter period of time to which I have alluded, viz. : from the moment that the incoming tide reaches to about the level of the marsh, or low part of the town, until the ebb tide falls again to the same level, it is absolutely necessary to get rid of the storm waters from the drainage area, either by pumping them out or by providing some means of storing them safely, in order to prevent the flooding of the low lying district. This period, from the best information I can gather, is about two hours, and we have therefore to provide for the storage of at least 72,000 cubic feet of water from the 50 acres of ground required to be drained.

A tank sewer to hold this large quantity of water would require, in your case, to be about 10 feet wide by six feet in height and 1200 feet in length, which I take to be impracticable on accout of the expense it would

involve. I have therefore to suggest as probably the only plan which is likely to prove at the same time satisfactory and within your reach financially, that you construct an independent tank or reservoir which will hold in store all the storm waters which must of necessity find their way into the creek or, now, open ditch. The proper size and depth and the best position for this reservoir I have marked upon the accompanying plan and profile. It would also appear advisable to lower the existing trunk sewer about two feet at its upper end, in order to obtain sufficient fall for a main sewer to take the place of the present open creek. This sewer I have marked upon the plans as 30 inches by 21 inches, with an inclination of 3 inches in each 100 feet, or sufficient to produce a current of about 3 feet per second with a depth of one foot of water. It is advisable to obtain this velocity in order that the sewer should be self-cleansing and to avoid the expense of occasionally cleaning it out by hand, or of providing special flushing arrangements. A sewer of this capacity, when running full, will discharge about 980 cubic feet per minute, or over 50 per cent more than is required. The tank or reservoir is shown to be 115 feet in diameter, and it is necessary to make it of about this size in order that it may hold in store 72,000 cubic feet of water at a depth of seven feet, or within one foot nine inches of the level of the lowest ground or marsh level, and it is calculated that the water should seldom or never exceed this depth in the tank, providing the tidal valves are looked to and always kept in working condition.

The outlet sewer from the tank is made 36x30, or the same size as the present trunk sewer, so as not only to give the water a free outlet but also to make the old work available if it should be found sufficiently sound and perfect to be utilized, by being lowered to the proper depth.

The river end of the outlet is shown to be slightly enlarged from the proposed man-hole in Water Street to the outer valve, so that it can be easily examined by men passing through it. If, however, this end is found to be in good condition there will be no occasion to disturb it, beyond making the tidal valve or clapper as perfect and tight as possible, and providing a good vertical fall for the water at the mouth and a timber apron which will keep itself clear of deposits of mud.

A second or inner valve is also provided, as shown on the section, for fear that the outer one should at any time fail to act.

Man-holes are provided at regular intervals to give easy access to the sewer, so that it can be readily examined at any time.

The ventilators marked upon the plans are intended to answer as well for the drainage of the surface water from the adjoining lands. The exact number of these which should be provided I cannot now estimate, more may be required than I have shown, but they are mere trifles and may be inserted wherever needed.

The Railway culvert, upon the proposed plan, needs to be lowered about four feet at its upper end and three feet at the lower end. If, however, the Manager of the W. & A. Railway raises no objection to the proposed sewer being extended under the embankment, as shown on Cross Section No. 3, it would be better to increase the thickness of the woodwork one inch all round for that distance, or say about 60 feet. A wooden culvert of this description will last, in its proposed position, infinitely longer than the one which was originally placed there by the Railway Company, and which is now in a useless condition.

I have shown the sewer upon the plan as extending from the outlet to the centre of Victoria Street, a distance of about 1170 feet, and there appears to be no occasion for the town to incur the expense of carrying it further. The sewer, shown as running northwardly along Victoria Street and thence eastwardly along Stannus Street to Flat Iron Corner, will not only answer all necessary purposes but it will also serve effectually for the drainage of that portion of the town, and its size can advantageously be somewhat diminished.

When the works, as herein proposed, are completed the drainage of the remaining portions of the town will be a simple matter.

ESTIMATE OF COST.

The following estimate of cost provides for extending the new sewer up to Victoria Street and for building anew that portion which is already in existence, so that if any part of that sewer can be utilized, it will be a clear gain.

Excavations for sewer, 935 feet, at 40 cts. per foot	$ 374.00
" " outlet, 150 feet, at $2.00 "	300.00
30 feet of outlet sewer No. 1, at $1.50 "	45.00
130 feet of outlet sewer No. 2, at $1.00 "	130.00
935 feet of sewer No. 3, at 60 cts. "	561.00
Man-holes, ventilators, iron gratings and tidal valves	160.00
Tank complete	1,000.00
Add 10 per cent for contingencies	257.00
Total estimated cost	$2,827.00

Respectfully submitted,

E. H. KEATING, C. E.

Halifax, 3rd May, 1884.

Extract of Letter to Warden, May 5th, 1884.

There is another plan which might prove considerably cheaper than the one suggested, and if it is practicable at all, would be even more satisfactory in the results, but as I am not sufficiently acquainted with the nature of the land about the mouth of the creek I did not care to recommend it or even propose it in the report. It is simply this, to put a strong water-tight bulkhead across the mouth of the creek, as far out towards the river as may appear practicable, and between the wharves of Harding and Curry & Shand, which will at once form your tank or reservoir without any further trouble. There would also be a saving in the cost of the sewers, as the smallest size marked would then be ample. Of course, if the wharves on each side are not water-tight, or not easily made so, this plan would prove a total failure, but it appears to me well worth looking into.

Yours very truly,

E. H. KEATING.