

**Drainage and Drainage Laws.**

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Chapter 36, R. S. O., called "The Ontario Drainage Act," is an Act providing for the construction of drainage works under the Department of Public Works. For this purpose the amount was limited to \$200,000, and some rather extensive works undertaken a number of years ago must have reduced very much, if it did not absorb the whole sum. The money was advanced by Government upon the security of the municipality and paid back by the lands benefited in twenty annual payments of eight dollars on the hundred which extinguished the debt. The amount was distributed over the lands in proportion to the benefit derived from the drain, by three assessors appointed by the municipal council, to which an appeal was to be made by parties dissatisfied with the assessment.

We now come to the law relating to Municipal Drainage, and by far the greater portion of the drainage of the large level tracts has been done under this law. No one can deny that it has been a great benefit, and yet we are sometimes in doubt whether it has been a benefit or a curse.

The law as at first understood seemed simple enough and intended to do much good. It was understood that the cost of the work should be borne by the lands benefitted, and in proportion to the benefit. This was simple common sense, and an interpretation which any disinterested person would approve of, but lawyers and engineers, and courts, and judges have twisted and tortured and interpreted it in so many different ways that the only certainty about it is that it is both uncertain and expensive. Lawyers who have grown up among drainage suits, and a large percentage of whose business is drainage law, seem wholly at a loss to understand it, but they are making money out of it just the same.

A strong feeling is growing up amongst those who are placed under the operations of this law that some other method must be found, or some other machinery to do this work.

Like the reduction in the number of County Councillors, everybody admits the necessity but as yet no satisfactory scheme has been propounded. It seems better that every one should be compelled to dig through his own property than to be subject to this law. To be sure this would be an injustice in some cases, but cheaper by far than the justice often obtained by the law, which after all is often unjust to nearly every one.

A brief outline of this much befogged law is as follows: In case a majority of the owners of land through which the drain is wanted petition the municipal council to that effect, the council may order an examination of the locality by a surveyor (commonly called "the engineer" in drainage parlance), and also plans and estimates and an assessment of the property upon which is to be levied the cost of the work, and if in their opinion it is desirable they may pass a by-law to provide for the construction of the work and raising the money.

This by-law is published, setting forth the report of the engineer, and also the amount of assessment proposed to be made against the several lots and parts of lots, and appointing a day upon which the council will sit as a Court of Revision to hear appeals against the proposed assessment. But just here let me remark that having incurred the expense of the survey and plans the council nearly always think it desirable to proceed with the work because if it stopped there the expense could not be collected from the lands of the petitioners, but would have to be paid from the township funds.

At the Court of Revision nearly every one is found to have appealed against the assessment, and each comes forward and testifies on oath that not he but some one else should pay the assessment made against his lands. And when the Court has closed the hearing appeals it generally appears from the evidence that no one has been justly assessed, and out of this jumble of contradictory evidence the council have to decide how the money is to be raised for the construction of the drain.

They having decided this, if any one is dissatisfied they can appeal from the decision of the council to the County Judge, whose decision is final, unless some point of law is raised, which is frequently the case; upon this they can carry it into the courts, and there from one court to another until they have become satisfied that the law is a poor profession for a farmer, but a good one for a lawyer.

The council have authority to raise money by the sale of debentures for the construction of drains, which is payable in annual instalments, collected in taxes spread over a number of years. But in lands which the drains are said to benefit. But in many cases lands are taxed for the construction and maintenance of drains which lie miles from the drain and many feet above its level, lands which were as well drained if it should become which would be as well drained if it should become filled up. Certainly such lands derive no benefit from the drain, whatever be the reasons for assessing them, and which under such circumstances are compelled to pay for nothing. This is surely compelling the payment of money without an equivalent.

The drain having been constructed the next thing heard of it is that some one's hogs or cattle have been filling it up, and this perhaps before the debentures are all paid off for the first construction. Upon complaint of any one person who has been assessed for the construction, that the drain is out of order, the council meet, send on the engineer to assess for the construction, that the drain is out of order, the council meet, send on the engineer to examine and report upon its condition, and if he finds that it is in need of cleaning out or improving the council must order it to be done. Or perhaps

he finds the drain insufficient and recommends its enlargement, and perhaps from some cause there is a change in the flow of water which finds its way into the drain. Then a new survey has to be made, new levels taken, new plans and estimates. A new by-law must be published, and another Court of Revision, and appeals are again in order, and so on, but not to the end of the chapter, for this drainage chapter has no end; once into it always into it, for there is no way provided by which you can escape, and any man who owns land may be brought under its operation at any time when a majority of those living along a stream or watercourse between the outlet and any given point, petition to have such stream or watercourse improved.

But the heaviest expense incident to this municipal drainage is when a drain is carried from one municipality into another, and arbitrations and law suits follow where the municipalities cannot agree about their respective shares of the expense, which is the rule rather than the exception.

There is surely reason to hope that some simpler and cheaper way will be found of accomplishing this very useful work than the means at present provided. Far too great a percentage of the costs go to engineers, arbitrators and lawyers.

The engineers have too much power and latitude, and a thoroughly organized system seems to have grown up and become legalized at the expense of professionals to enrich themselves at the expense of the poor struggling landholder, who has been placed almost hopelessly in their power. No one man should have the power to compel the council to clean out a drain. It should in any case require a petition from taxpayers representing at least twenty-five per cent. of the amount required to do the work. This change in the law was asked by the Grange, but not granted.

As previously noticed the amount of water which falls upon the surface of the earth is removed in three different ways. First, by flowing over the surface until it reaches the large streams; secondly, by evaporation; and thirdly by percolation, or sinking into the ground.

The result of the first of these is that the surface of the land is washed and the richest of the soil is carried by the torrents from the higher lands into the flats and marshes, the turbid floods are carried onwards, or mixed with the turbid floods of the great lakes or perhaps until lost in the body of the great lakes or perhaps in the ocean itself, thus not only depriving the land of much of its richest plant food but of the valuable properties which descend with the rainfall, which might be arrested by the soil and detained for future use by the growing crops. What does not escape use by the first means, or by drainage of some kind, remains standing in pools or ponds upon the surface of the ground and becomes the breeding grounds of countless myriads of insect pests, which spring forth in clouds to torment and prey upon both man and beast; or spread miasma and the germs of disease broadcast over the country, carrying misery and death to many a home, until removed by the second means, namely evaporation, or the third, second means, sinking into the earth, where the excess of moisture renders the land cold and sour, destroying or retarding the vigorous and healthy production of vegetable growth, and delaying agricultural operations until late in the season, the evil results of which are so well known to every farmer.

We know that a week in the ripening of a crop often makes all the difference between success and failure, between profit and loss, when the crop is struck with rust or shrivelled by a few days' excessive heat, or perhaps caught by an early frost.

It requires but a few such losses to amount to a sum sufficient to thoroughly exhaust the land, which to a great extent obviates all such risks and proves a permanent advantage in many ways.

And this brings us to the question of underdrainage which is one of great importance to most of farmers in Ontario. Professor Stephens says, in his treatise on underdrainage: "Where the soil is shallowest it is injured by the stagnant water remaining constantly beneath it; and where deepest it is injured by the chilly exhalations arising from the water below. The direct injury done to soil by stagnant waters may be estimated by these effects: Manure, whether putrescent or caustic, imparts no fertility to it; the plow and harrow and even the roller cannot pulverize it into fine mould. The new grass contains little nourishment for live stock, and in old the finer sorts disappear and are succeeded by coarse sub-aquatic plants. The stock never receive a hearty meal of grass, hay or straw, being always hungry and dissatisfied, and of course in low condition. Trees acquire a hard bark and stiffened branches, and become a prey to parasite plants. The roads are constantly soft, and become rutted. The air always damp and chilly, from early autumn to late spring the hoar frost meets the face like a damp cloth. In summer mosquitoes, green flies, gnats, midges and gad flies torment both man and beast from morning to night."

These are no exaggerated statements but such as I have observed in hill, valley and plain. Further he says of underdrainage: "It makes sour land sweet and productive; heavy land light and tractable to work, and the pecuniary effects are not less remarkable than the physical benefits." And he goes on to show the advantages by giving the proceeds of certain lands before and after underdrainage, showing the great advantage of drainage from a pecuniary point.

But the length this paper has already reached must prevent anything but the most hasty glance at the subject.

The cost of underdrainage is what stands in the way of its general adoption, and this must vary in different localities.

Thorough underdrainage consists in putting in a sufficient number of underdrains to carry off the water as fast as it can filter into them from every part of the surface. The expense of this depends upon various circumstances. The price of tile where it is used; the nature of the soil to be drained; the distance apart and depths of the drains, and the cost of the labor. And here let me say that none but a careful man who understands properly how to take out the bottom of a drain should be employed for this purpose, for if this part of the work is not carefully and properly done the money expended on the work is wasted.

Experiments made in Britain some years ago seemed to prove that the depths of the drains had much to do with the efficiency of the drainage. A field was drained the soil and sub-soil of which did not perceptibly differ throughout, one-half, being six acres, was drained three feet deep, the drains being fifteen feet apart; the other half was drained one and a-half feet deep and thirty feet apart. These drains discharged into two separate main drains; at the mouth of these main drains self-registering meters were placed, which remained from June to the following April, when it was found the six acres drained three feet deep and fifteen feet apart had discharged 35,711 gallons per acre, while the six acres which was drained three and a-half feet deep and thirty feet apart had discharged 46,510 gallons per acre. Showing that half the number of drains put down six inches deeper discharged 10,799 gallons more per acre. The portion of the field which discharged the most water produced the most grain, and the other produced the most straw.

The same authority relates a circumstance of a very peculiar nature which happened in Fifeshire, Scotland. A farmer had a 16-acre field which he intended to drain, the soil being wet and cold, but he was induced to sink a shaft near the centre of the field with the expectation of finding coal. He had some trouble in sinking the shaft and eventually had to abandon it, but he found thereafter the field did not require draining; the shaft had accomplished that. He constructed a deep drain from the abandoned shaft, from which a stream of water flowed continually and seemed to effectually drain the whole field.

I was much interested some years ago with some letters from a farmer which were published in an agricultural paper I was taking at that time. He was a native of that part of Scotland called the Lothians, and came to the state of New York comparatively poor, but a man of energy and shrewd observation. He became a recognized authority on matters of practical farming, and particularly underdrainage. His advice and opinions were much sought, and so numerous were enquiries that he could not find time to answer them all, and he adopted the plan of writing letters in a general way to the Genesee Farmer and Country Gentleman.

Mr. Johnson, for that was his name, was strongly impressed with the benefits of underdrainage in Scotland, and when he came to America he settled on an old exhausted farm which had ruined several previous occupants. The neighbors expressed much sympathy with the poor emigrant and predicted that he would soon go the way the others had gone. But Mr. Johnson was made of different stuff, his methods were different and different results followed. He found the land was foul, stiff and sour. He commenced by summerfallowing. No tile being made in this country he imported a quantity from Scotland as soon as he could. The result was so encouraging that he induced a man who understood the work to commence the manufacture of the near him, and this was probably the first tile manufactured in America. His neighbors seeing his success began to follow his example, and tile kilns were started in various localities, and the poor emigrant who had been the object of so much sympathy for settling on the old exhausted farm became an example and authority, particularly on matters of underdrainage, far beyond the bounds of his own state. And the poor old exhausted farm became celebrated for its productiveness under his enlightened management, and his success may in some degree be an example to us.

The depth of drains and distances between must to some extent depend upon the soil and sub-soil. In stiff tenacious soils some have doubted the advantage of underdrainage, and it is necessary to put the drains closer together, and, therefore, they need not be so deep. But the tendency in this country is to make them too shallow, and, no doubt much of the advantage of underdrainage is lost by this practice. Mr. Mechl put his drains in strong clay four feet deep and forty feet apart, and in more porous soils from six to seven feet deep and from seventy to ninety feet apart, and claimed to drain his land satisfactorily. But in this country it is doubtful if any drains are put to the depth of six feet, unless it be a cutting through some high ground for the purpose of getting an outlet, and in some kinds of soil such a depth would be of no advantage. The general depth of drains in this country is from thirty inches to four feet, and seldom more, unless through a knoll or rise of ground. Thirty inches is not deep enough unless it be in some exceptional cases, such as a stiff tenacious clay, where it is possible it might be more suitable than deeper drainage. The distance between the drains must depend upon the nature of the soil and the depths of the drains, for the deeper the drains the further they will draw the water, unless there be some condition of the sub soil to prevent it.

The cost of underdrainage, and the scarcity of tile and skilled drainers prevents many people from attempting it, but those who do generally continue it, for the benefits are immediately felt. Cases are numerous where the cost has been repaid by the first crop after drainage; but this cannot be taken as