BOUNDARY MONUMENTS

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Ever since the world existed, land has been man's most precious possession; it is from it that he derives his subsistence. From the earliest times, the greatest care was taken to define the boundaries of property and to prevent their displacement. A special curse is pronounced in the Old Testament against the man who shall remove his neighbor's landmark, while a very large part of the Book of Joshua is occupied by the description of the various pieces of land allotted to the different houses of the Israelites. At the time of the Roman Empire, a festival called Terminalia was celebrated on the 22nd February in honor of Terminus, the god of landmarks; it took place at the boundaries where sports and dancing were indulged in. The ancient custom of "Beating the Bounds", still observed in many English parishes, probably originated from the Roman Terminalia; it is as old as Anglo-Saxon days, as it is mentioned in laws of Alfred and Athelstan. The priest of the parish, with the churchwardens and parochial officials, headed a crowd of boys who, armed with green boughs, beat with them the boundary stones. Sometimes the boys were themselves whipped or even violently bumped on the stones to make them remember. Obviously, boys were selected to ensure that the witnesses to the boundaries should survive as long as possible.

In the early days of Canada, when land had very small value and a little money could be spared from the necessities of life, the surveys were often very crude and little attention was given to the establishment and maintenance of boundaries. The general practice in Eastern Canada was to mark a corner by a squared wooden post, bevelled at the top so as to turn off rain, and to witness it by several blazed trees in close proximity. Although not absolutely permanent, a six-inch cedar post witnessed by large pine or spruce trees can be identified after a great many years, unless the place is swept by fire. Even then, it is often possible to identify the charred end of the post in the ground. A great defect of wooden posts is that they can so easily be removed.

At the inception of the surveys in Manitoba, the practice of the eastern surveyors was continued, but there was a wide difference in the conditions. Poplar, usually of small size, was the prevailing timber, and very few trees were large enough to be used as witness trees. A single fire was sufficient to obliterate all traces of posts and witness trees. In prairie, corners were perpetuated by a mound built around the post and by four pits. Even after the post had disappeared, the mound crumbled and the pits filled in, the spot could be recognized for many years by a peculiar difference in the vegetation of the virgin prairie and of the four pits, but this difference disappears when the spot is ploughed over and there is nothing left to indicate the corner. The faults of the system were well recognized, but the government of the day would not sanction the expenditure necessary for the improvement of the surveys. All that could be obtained was to substitute in lieu of the wooden post a three-foot length of half-inch iron pipe pointed at one end and squared at the other end, but it could be so easily removed that a great many disappeared. One must bear in mind that in the early eighties, the revenue of Canada was not much over thirty millions of dollars and the expenditure for surveys was nearly a million dollars; any amount of land could be bought for less than a dollar an acre. The reluctance of the Government to increase its surveys' expenditure may, therefore, be understood.

The most important feature of a land survey is the boundary monuments. The object of the survey is to define the boundaries of the several parcels laid out in such a manner that there shall be no possible dispute between the respective owners. Though the survey may be inaccurate, there is no room for

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dispute so long as the boundaries are marked by permanent monuments. If, however, a monument is lost, its re-establishment may become an extremely complicated problem leading to expensive litigation. To find the position of the monument is no longer an operation in surveying; it is a question of fact to be determined by evidence. It has passed from the hands of surveyors into the hands of lawyers. The permanency of boundary monuments is thus of paramount importance; it deserves the utmost care and attention from the surveyor.

The best boundary mark is undoubtedly a cut stone, of fair size, and sufficiently long, in our climate, to reach below frost line. It seems preferable that the mark, whether a stone or anything else, should not project above ground, because it would be liable to be disturbed by traffic; if it is necessary to make its position conspicuous, it can be done by placing something else near it, whether a post, a mound, a blazed tree, etc. A concrete monument is nearly as good as a cut stone, and if sand or gravel is not too far, is not so expensive. Such monuments were found very satisfactory for the Alberta-British Columbia boundary, but the Commissioners have now reached a point where gravel has to be brought from such a distance that it costs $60 to build a monument.

Evidently the use of cut stones or concrete is restricted to special cases: it is not adapted to township surveys. What is wanted is some kind of post which, although substantial and permanent, is neither too heavy nor too bulky. Once placed in position, it must be difficult to displace or remove it, and impossible to do so without tools. The inscriptions for denoting the corner must be easily and quickly made, neat, perfectly legible and not subject to deterioration. It must also be conveniently packed for transportation.

The post adopted for the surveys of Dominion Lands fulfils these requirements fairly well. It is made of one piece of standard once-inch iron pipe 30 inches in length. On the top is a bronze cap, three inches in diameter, into which the iron pipe is forced; it bears the inscriptions, "Dominion Lands Surveys" and "Seven years' imprisonment for removal." There is room in the centre of the cap for all the inscriptions necessary to identify the corner: these are made with steel dies. A malleable iron foot-plate three and a half inches in diameter is fastened to the bottom of the pipe. The post is coated inside and outside with Mexican asphaltum and then filled with concrete consisting of equal parts of sand and Portland cement. The posts are packed in tens in well finished basswood crates reinforced with iron straps and bolts. The post weighs 7-1/2 lbs.; the complete crate with the ten posts weighs 85 lbs., making a neat and convenient package for transportation. It is the intention to change in the next lot of posts the mode of fastening of the bronze cap and bottom plate. Both will be soldered to the iron pipe by means of the oxy-acetylene blowpipe, using spelter for soldering the bronze cap and thin bars of cast iron for the foot-plate.

A hole 30 inches deep is made for receiving the post; the bronze cap is flush with the surface of the ground. In ground not frozen and free from stones, a convenient tool for digging the hole is a post-hole auger. In stony or frozen ground, a bar of octagonal drill steel with chisel ends is a good tool for loosening the earth and cutting roots. A spoon shovel can be used for removing the earth from the hole. After inserting the post, with Crown turned towards the north, the hole is filled with earth which is well tamped around the post. To all intents and purposes, such a post may be considered as everlasting; even if the iron were to be entirely destroyed the concrete core and the rust would remain in the ground as evidence of the monument.

Where a corner falls upon rock, the short bronze post is used. It has the same top as the long post, but the shank is only three inches long. A hole 7/8-inch in diameter is drilled in the rock; all dirt and foreign matter is carefully removed and the hole filled by adding one and one-half ounces of water to two and one-half ounces in volume of Portland cement. The post is then inserted and pressed down until the cap rests upon the rock surface.

DISCUSSION

Mr. Hogarth: We have all listened with a great deal of interest to the paper that has just been read, on the "Establishing and Placing of Certain Monuments Necessary for Different Surveys." I am sure that all the members of the O.L.S. appreciate the work that Dr. Deville has undertaken in order to place before us the best there is in the way of survey monuments at the present time. The post that Dr. Deville has described here is a metal post. I think some of our men are acquainted with concrete posts. We have used some of them and they are satisfactory; it is a post something like that recommended by the Committee a year ago. Once that post is planted, it is a very difficult matter to move it. Of course it is bulky and weighty, and it can only be used in localities where transportation is convenient.

Mr. Hogarth then moved a very hearty vote of thanks to Dr. Deville for the trouble he had gone to in preparing this paper for the Association. Seconded by Col. Van Nostrand.

Chairman, in putting the motion to the meeting, said: "Dr. Deville has been Surveyor-General of Canada for more than forty years, and I am sure that the remarks he has made should have a great influence. And what I claim is, that as the Dominion of Canada has had charge of making the surveys of the Canadian North-West and they have seen proper to make those surveys as exact as science can make them, and to mark them permanently, and the Province of Ontario should also make the surveys the same as in the North-West. I claim it is no credit to the Province of Ontario to make those surveys in any way which is not permanent, and I think it is the duty of the Province to make those permanent markings the same as they do in the North-West."

Motion put and carried unanimously.