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EDMONTON BENCH-MARKS.

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The first bench-mark in the city of Edmonton was chosen on top of a stone ledge of the Bank of Nova Scotia. From this ledge levels were carried out and other bench-marks established, generally on the rim of manhole covers or on nails in electric light or telephone poles.

With the improvement of streets the manhole covers were adjusted and the poles removed, so that it soon became necessary to put in some permanent bench-mark system.

In 1908 a number of brass bolts, turned up at one end, were placed in public buildings throughout the business section of the city. The cost of the brass bolts was \$1.25, and when established made a bench-mark costing approximately \$3.25 each.

It was intended that as a district developed a complete system of bench-marks would be installed in this way, but for some reason the heavy buildings in the city do not stand well on this soil, and hence do not make good bench-mark supports. For example, we placed a bench-mark on the new Government post-office, and found by comparing it with old-established bench-marks that after one year it had settled 0.10 of a foot.

During the fall of 1909 bench-marks were placed at street intersections over a part of the city. These were made by boring a six-inch hole in the ground to a depth of four feet and refilling with concrete. In the top of the concrete was placed a rounded cast-iron bolt. The location of these bench-marks was kept as uniform as possible, being placed one foot off main streets and six inches from the property line. By this location it came at the inside edge of the plank walk, and was not disturbed by building operations except in some cases where the grade was lowered.

The costs when complete was approximately \$5. In dry, well-drained soil the elevations seem to remain constant, but in wet places it is found that the bench-marks have risen, probably due to frost.

In view of these facts it was thought advisable, in the spring of 1911, to lay the basis for a complete new system. As the city is crossed and recrossed with railways, it was decided to place this system along the right-of-way of the

different railways, each bench-mark being about one-half mile apart. Upon the advise from the railway engineers they were located two feet from the boundary of the right-of-way as the position least liable to be disturbed.

These bench-marks were made by boring an eight-inch hole seven feet six inches below the general ground elevation and refilling with concrete. The last eighteen inches of concrete was placed in a piece of six-inch cast-iron water pipe, which acted as a casing, and allowed the top of the bench-mark to be raised six inches out of the ground. In the top of the concrete was placed a square brass bolt, 1 x 1 x 8 inches long, and a brass number plate, as shown in Fig. 1. The bench-mark was then covered with a wooden box, made with four pointed legs, that were driven down over it.

In establishing the levels in this main system the original elevation was taken from the top of the brass bolt in the corner of the Bank of Nova Scotia, this elevation being transferred from the stone ledge above it, which had been taken as the first bench-mark in the city. From there levels were carried to bench-mark No. 1, and hence around the system.

In carrying the levels two rods were used with each instrument, and by cross-reading two turning points were obtained for each set-up. The ground was covered three times, and an average of the six elevations taken. The closing error in approximately thirteen miles was 0.06 of a foot, this error being distributed proportionately to the distance from bench-mark No. 1. This formed the outline of a rectangular system, having its longest sides above two miles apart.

From this main system secondary bench-marks are run out to cover the entire area within the city limits. The secondary bench-marks are of three kinds: those used in undeveloped and outlying districts; those constructed in boulevard or residential districts, and those constructed in business districts. In the outlying sections of the city it is found that a railway spike driven in a telegraph or electric light pole makes a good bench-mark. The pole may be painted white underneath the spike and the elevation painted on in red.

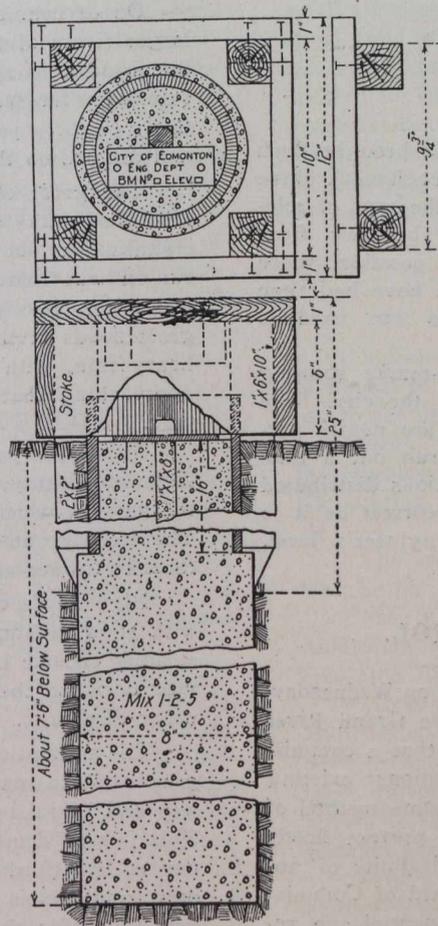


Fig. 1.