there are obstructions on the road allowances such that they are absolutely impassible, road diversions are surveyed around the obstruction. The roads are often graded across sloughs at tremendous first cost and very high repair expenses, inasmuch as they often have to be regraded each year. When the sloughs are filled up in the spring these grades, if not absolutely impassible, are nearly so, and they are so badly cut up with the traffic that they regularly have to be repaired during the dry weather in the middle of the summer. In the meantime the farmer is able to haul only very small loads over the roads and they are probably impassible for the automobile, which is becoming of greater use to the farmer each year. After being carefully repaired during the summer, the same piece of road may be equally impassable the following spring.

Soil Classification and Topography

It seems to me that the time has now arrived when a great deal more attention should be paid to topography and soil classification on such subdivision surveys as are carried on, and that topographical surveys should now be undertaken in the older parts of the country with the object of planning all future developments and gaining exact information as to the land which is either vacant or being held out of production.

The Department of Lands and Mines of the Province of New Brunswick commenced extensive surveys of forest and agricultural lands during the season of 1916. Their soils were classified carefully according to physical properties and chemical tests of samples were made by agricultural experts.

California has recently undertaken soil classification surveys with the primary object of properly assessing the land. The work has consisted of making soil and topographic surveys and maps to show the boundaries of the different types of soils grading them as 1, 2 or 3 of each type, or as unfit for cultivation. All areas in permanent crop such as orchards, vineyards, alfalfa, hops, etc., are shown.

The topography shown consists of streams, dry channels, irrigation or drainage ditches, levees, roads, buildings, fences, brush or timbered areas, etc.

California's Maps

The maps are made by compass and pacing, being plotted in the field or by traverse plane-table. The finished maps on white paper with colored inks show soil acreages, acreages in each permanent crop, acreages in roads, right-of-way, etc.

These maps are accompanied by a report on the soils showing for what crops they are best adapted, a comparison of values and the irrigation or drainage possibilities.

The type of soil is considered to be the most important consideration in fixing land values. Some of the previous errors in assessment in California were that the same soil at different points the same distance from the railway was assessed much differently, and that all lands of certain districts were assessed at the same rate even though some soils were worth five time as much as others.

All deeds, recorded surveys, or approximate surveys if obtainable, or the original public land surveys, were plotted on the maps before they were sent out.

The scale used was one inch to five chains and cross-section paper was used for plotting. Other details shown were the variety of orchards or vineyards, and whether good, bad, etc., the annual crops such as hay and grain, the cost of clearing brush on timbered lands, the value of buildings, the size of irrigation or drainage ditches, the condition of roads, levees, etc., and the depth of water in wells. The soils are named in accordance with the soil surveys of the United States Department of Agriculture. Samples of soil for analysis are taken from representative areas and borings are made. Surface alkali is shown by the presence of weeds and under surface alkali by electrolytic instruments.

The cost of these soil classification surveys in California varied from 3 to 6 cents per acre including office costs. It should be borne in mind that on account of the nature of the country such surveys would probably be considerably more expensive than surveys of a like nature in our western provinces.

It seems eminently desirable that if topographical surveys are undertaken in Canada they should not be of the approximate nature of the compass pacing surveys of California but should be accurate topographical surveys which would serve the purpose of all future planning. Our standard of land surveys has in general been much higher than that of our neighbor to the south; and although our system has been modelled after theirs, it has been carried out with a great deal more accuracy. It is not advisable now to adopt approximate methods in order to effect a small saving in cost and then find in a short time that the work would have to be done over more accurately, costing in the end considerably more than if done properly in the first place.

Add Topographers to Party

However, it seems that the California soil surveys suggest the possibility of obtaining a great deal more information from our original subdivision surveys at comparatively low cost by adding topographers to the party charged with the duty of exploring the interior of the sections. If the lines of levels now run could be extended so that the blind lines would also be levelled, the topographer with compass, hand level and pacing would be able to contour fairly well the interior of the sections. He could first run through the section on the 40-chain or quarter section lines with the compass and pacing, using the hand level to carry elevations. He would leave a mark at each small stream, pond, slough, marsh or muskeg to be traversed, and after finishing the quarter-section lines he would pace traverse these topographical features. Care should be taken to delineate the dividing line separating one class of soil from another and the soil and timber should be carefully classified.

The topographical map prepared from this information would form an admirable basis upon which to plan the development of the township; and if the topography was such that the ordinary subdivision survey did not seem to be well adapted, another plan of subdivision could be superimposed on it and the additional surveys made before allowing the lands to be thrown open for settlement. The subdivision surveys would have at least served the purpose of obtaining the topography and establishing monuments from which other lot corners could be easily established. Bench marks would have also been established for all future purposes.

Denser Settlements Near Railways

It seems, however, that the larger and more important field for our future efforts should be in the country which is near the existing lines of railway and which is only partially settled. Unfortunately thus far our surveys have been mainly restricted to surveys of unpatented or crown lands, but I believe that in future our object should be to secure the denser settlement of the country adjacent to the railways without regard as to whether the lands are patented or unpatented.