

parties to gather information about unsettled areas, and when it is remembered that these parties are generally in charge of trained observers and surveyors, the value of their reports and of their maps cannot be overestimated. The very fact that these reports are not made by railroad engineers increases their value, for the observations deal largely with the general and mineral resources of the country, which should be controlling factors in the location, but which are often not noted by an engineer absorbed in the study of those details which appear on plan and profile.

Maps and local knowledge are the two first things to be secured in the equipment of a survey party. Where accurate maps cannot be obtained, there is no source of information of more general value than the men who have worked for long periods in the district, and have had years in which to learn what the engineer is usually expected to acquire in a few weeks. The knowledge that they possess may not be such as to be immediately applicable to the problem of selecting a line; but the first duty of an engineer is to get thoroughly acquainted with the general topography of the district, and by availing himself of the services of the local men and by exploring with the assistance of such minor instruments as the hand level, the aneroid barometer, and the pocket compass he can accomplish this speedily.

It is to be remembered that the great engineering errors in railroad location are made in most cases before the instrumental surveys are even started, and that the more widely the preliminary explorations are extended, and the more completely all local sources of information are utilized, the better will the engineer be fitted to deal with the problem that he has been given to solve. The policy now adopted by some Canadian lines of keeping small reconnaissance parties in the field to work up information requisite for future locations is admirable practice, the value of the result being, however, in direct proportion to the character of the men employed, for there is no task that calls for more steady, thorough-going, conscientious hard work than the complete exploration of any piece of country. Exploration should never be regarded as complete until the engineer is able to select the route along which his detail surveys will be made.

The work of exploration is almost unnecessary in districts of which complete topographical maps have been published. A sheet showing all roads, towns, rivers, streams and contour lines with 20 feet intervals, leaves little for the engineer to desire for his pre-