

Business and ruling grade should determine the general route. Most of the lines of 20 and 30 years ago were pioneer lines, and steep grades and sharp curves were freely used to lighten the cost of construction, as nothing else would have been paid for at that time. There was not then the same necessity for the extensive and thorough reconnaissance which is now imperative in this day of heavy traffic and low grades.

Far too little time was formerly given the engineer for reconnaissance work. In my own experience I once, because of an incorrect plan, ran my preliminary line into a lake, instead of passing by the end as I intended. As the work had already been advertised for tender, no time was left to make changes, and the road to-day runs through the middle of the lake. Once, after completing the reconnaissance, I put on two survey parties, and, while keeping ahead of the preliminary party and giving them general directions, I was able, with the aid of 20-in. x 30-in. sheets on which the preliminary work had been plotted the night before, to lay down the location at odd times in the day, using the flat wooden case in which the sheets were carried as a table. These sheets were, one by one, carried back to the locating party, and the whole combination was thus kept moving. Such work is too much for one man, and those who do it receive few thanks as a rule.

Be sure that you do not use the maximum grade or curve oftener than is absolutely necessary. When you are climbing toward a summit, try to avoid losing elevation by inserting reverse or down grades, but look well for supporting ground to right or left, and thus by gaining distance reduce the rate of grade. If the country is such that high grades must somewhere be used, try to bunch them in one division, and reduce grades to the utmost on all the other divisions.

Reconnaissance should be so thorough that a close preliminary line can be run and sufficient topography taken within 300 or 400 feet on either side. This may be shown on plan by contour lines or elevations in figures. From this data, a paper location plan and profile is made. When running, in this paper location is the time to study the ground in detail and make necessary changes. This general method of reconnaissance and preliminary, having the details filled in to the extent necessitated by the character of the country, should result in good location at reasonable cost.