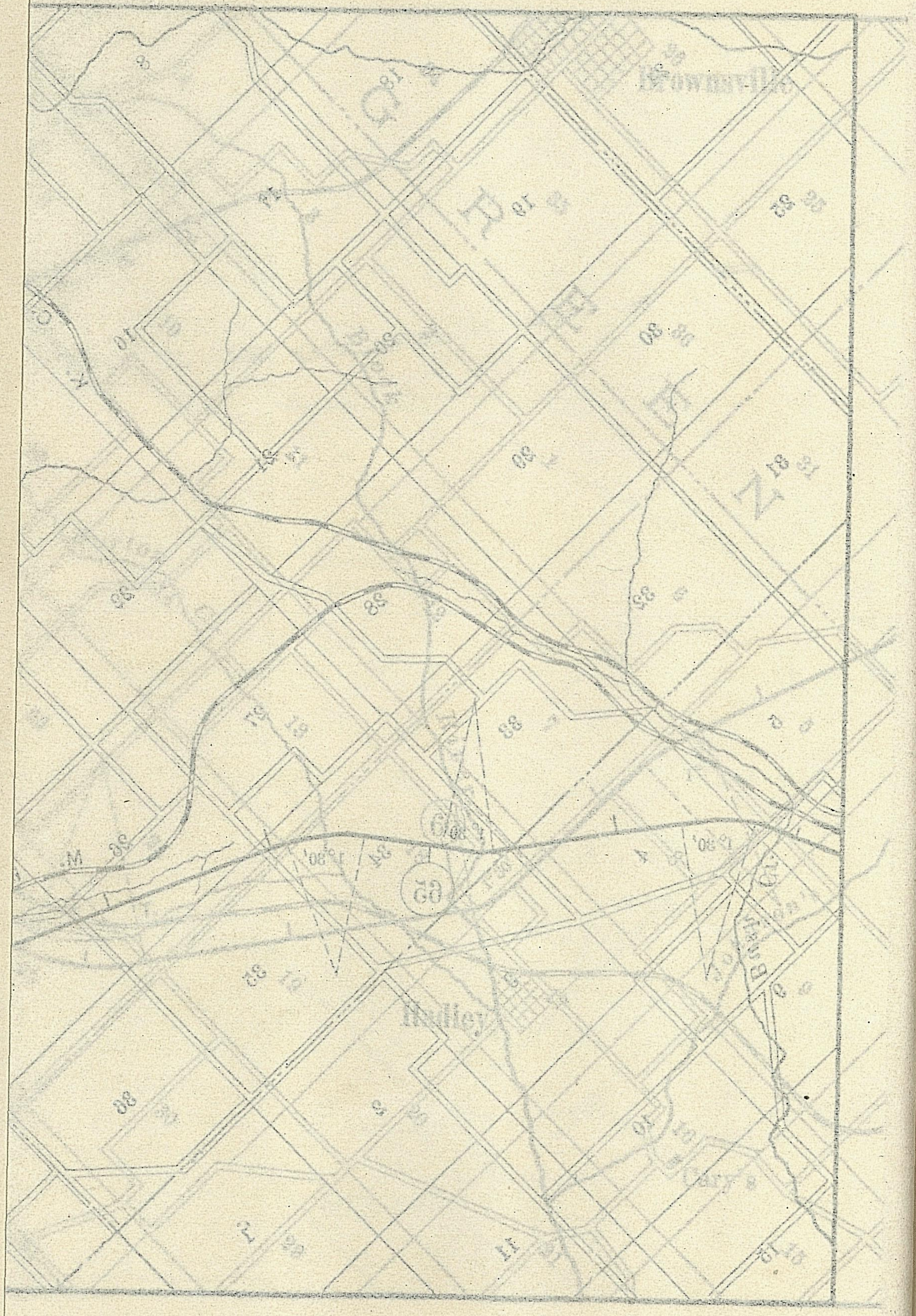

cloth, so that, when laid above the topography sheet, pieces of profile could be readily read off. No P. C. or P. T. was allowed to come within 400 ft. of the end of a bridge; all curves were of even degree of curvature, being either 1, 2, 3 or 4°, and all grades were in even tenths of 1 per cent.

The writer objected to the limitations of the degrees of curve at first, believing that a nicer adjustment could be made by using any degree, with indices of odd minutes when necessary, that seemed at first to fit the ground better, but by being compelled to use the even degrees, found afterward that this could be done almost invariably just as well, but required perhaps more study of the situation. Of course, no rules of this kind can be absolutely iron-clad, and the Principal Assistant Engineer at times modified them himself, but it was considered advisable to make them binding as far as the locating engineers were concerned.

The projected location being made and penciled in on the 400-ft. map, the profile was taken off and the grade line fixed, grades being kept in even tenths of 1%, except where compensated for curvature, and even then, if possible. Of course, in long stretches of ruling grade where often every inch counts, hundredths of 1% rates occurred where compensation was made. Breaks for compensation were made at the even stations nearest the ends of the curves.

All bridges and culverts were located on this profile, the probable quantity of classified excavation in each cut was indicated, and an estimate made of each mile. The classification of the material in the cuts, as shown on this projected profile, was made by the Locating Engineer from his observations of the surface indications; of course, this was only approximate, but was quite close.

Specifications and standard plans of all structures, with tables of constant quantities, were furnished by the railroad, and the excavation and embankment quantities were figured from tables of level cuttings for the standard roadbed sections used. A useful device for scaling the quantities from the profile was made by taking a piece of the same profile paper used for the profile and marking, along the edge at each foot, the quantities corresponding to the height, starting at 0 (see Fig. 12).

As each 10 miles of this profile of the projected location was completed, a tracing on tracing profile paper was made, showing the