# CORRESPONDENCE

**With this issue we open, this, a new department. The department will be just as valuable as engineers and contractors wish to make it. The space is yours, state your difficulty. If we cannot help you some one else can. Short descriptions of new methods, accurate data as to costs, the exposure of antiquated clauses in specifications, anything that will interest you as an engineer will interest your fellow Engineers.—Ed.**

## THE CALCULATION OF OVERHAUL.

Sir,—In your issue of September 6th, 1907, appeared a description of two graphic methods of calculating overhaul.

Since the method to be used in calculating overhaul depends upon the specifications and their interpretation, I shall, first, state the specification and then give a method which, to my mind, appears suitable for such a case.

Haul: The limit of free haul will be 500 feet. For any haul exceeding 500 feet the contractor shall be paid at the specified price per cubic yard per station.

From the field book one may secure the quantities in each station of cut and fill and prepare the following table:

| Station. | Cu. Yds. of Emb. | Cu. Yds. of Exc. | Total to each Sta. |
|---|---|---|---|
| 124 | .... | .... | 2710 |
| .... | 880 | .... | .... |
| 125 | .... | .... | 1830 |
| .... | 790 | .... | .... |
| 126 | .... | .... | 1040 |
| .... | 640 | .... | .... |
| 127 | .... | .... | 400 |
| .... | 320 | .... | .... |
| 128 | .... | .... | 80 |
| .... | 80 | .... | .... |
| 129 | .... | .... | .... |
| .... | .... | 60 | .... |
| 130 | .... | .... | 60 |
| .... | .... | 120 | .... |
| 131 | .... | .... | 180 |
| .... | .... | 340 | .... |
| 132 | .... | .... | 520 |
| .... | .... | 920 | .... |
| 133 | .... | .... | 1440 |
| .... | .... | 1290 | .... |
| 134 | .... | .... | 2730 |

On profile paper plot the cut and fill, and using the grade point as zero plot the diagram, the fill being on one side of the zero line and the cut on the other.

By aid of the scale mark the points where the arms of the diagram are horizontally 500, the limit of free haul, 600, 700, etc., feet apart.

These points so determined will give the stations and fraction of stations containing the yardage hauled one, two, three, etc., stations beyond free haul.

From the diagram we can now secure the number of cubic yards hauled and the distance the material is hauled.

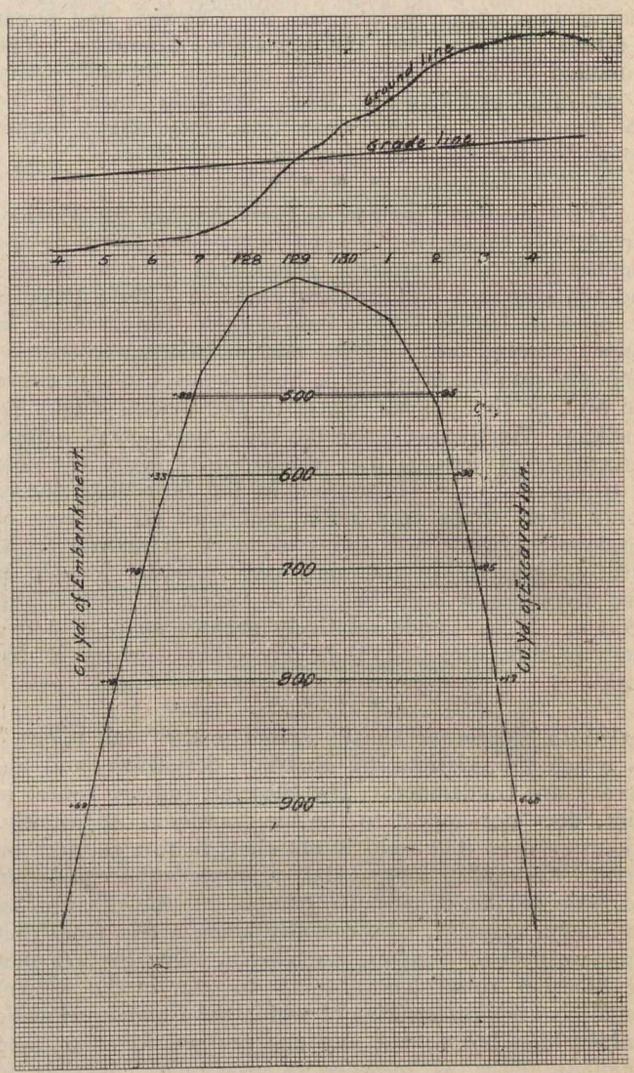
$$\frac{100-85}{100} \times 340 + \frac{33}{100} \times 920 = 354.6 \text{ for one sta.} = 354.6$$

$$\frac{75-33}{100} \times 920 = 386 \text{ for 2 sta.....} = 772.0$$

$$\frac{100-75}{100} \times 920 + \frac{17}{100} \times 1290 = 449.3 \text{ for 3 sta.....} = 1347.9$$

2474.5

Therefore, cu. yds. of overhaul = 2474.5. The accuracy of this method depends on the correctness of the diagram to scale, and, although a graphic method, I consider it more




accurate than the methods described in the Engineer of September 6th, as it eliminates errors due to the scaling of quantities hauled.

Yours, G. F. R.

December, 1907.

### Railway Spirals.

Sir,—In the lining of transition spirals on trackwork it it is frequently noticed that the spirals do not appear to be true. Looking along the tangent towards the curve the spiral appears to have a shoulder midway on the first chord instead of curving away so gradually as to leave the exact position of the B.S. in doubt. As the only idea in having a spiral is to approach the curve so gradually as to have the rail elevation vary directly with the degree of curve, the effect of the spiral is almost wholly destroyed. To avoid this trouble the spiral is sometimes shortened, but the real trouble is in the ordinate of the first chord.

The spiral used by the C.P.R. on some branches is in length 60 + 60 feet per degree. Let us consider the 1 degree curve with 120 feet of spiral, 2 chords at 60 feet, central angle of 36 min. We wish to ascertain the true middle ordinate of the first chord. The angle deflected for B.C. at B.S. is 36 min. × ⅓ = 12 min., deflection for midway point M is 12 min. × ¼ = 3 min. The point M is distant from tangent