## SECTION 46 – PAPER LOCATION

1007. On the contoured plan, sketch in a preliminary alignment. In normal country this will often tend to follow contour lines. In hilly country plot the grade contour, which is the average gradient for the section of the road concerned, plotted from one contour to the next, so as to produce a line of even slope.

1008. By studying the contoured plan, and referring to the recce report, survey report and cross sections, adjust the preliminary alignment:

a. To avoid heavy construction and bad ground.

b. To minimized and balance cut and fill.

c. To keep within the ruling grade.

d. To use curves of acceptable radius.

e. To ensure proper drainage, while keeping the number of culverts to a minimum.

1009. Plot the tangents of the selected alignment on the map, producing adjoining lines to meet at the intersection point.

1010. Curves must now be fitted in. The simplest method is to use a curve chart (see Figure10.3). This chart should be reproduced on tracing cloth, and can then be placed over the map so as to fit various curves to the tangents meeting at each IP. Select the curve which combines the best degree of curvature with the best gradient and minimum earthwork. Table 10.2 gives data for curves suitable for military roads.

1011. Plot the longitudinal section (profile) of the chosen alignment. The simplest method of judging the best grade line is to use a transparent straight-edge until it fits the ground line as closely as possible, with the amount of cut and fill as nearly in balance as can be estimated by eye. Two or three trial lines may have to be tested in this way.

To ensure that the most economical alignment is selected, a mass diagram must be prepared (see Section 28). A change of alignment may be desirable to improve grade, or to reduce or balance earthwork.

1012. The selected alignment must be accurately plotted on the contoured map (see Figure10.4). To help in setting out, the bearing and length of tangents should be given, and curves should be specified by:

a. Degree of curvature (D).
b. Radius (R).
c. Central angle (Δ).

**TABLE 10.2: DATA FOR SELECTED CURVES SUITABLE FOR MILITARY ROADS**

| Degree of curve (D) ($^0$)(‘) | | Radius of curve (R) (ft) | Log R | Tangential offset to (ft) |
|---|---|---|---|---|
| (a) | | (b) | (c) | (d) |
| 1 | 00 | 5729.64 | 8·758128 | 0·873 |
| | 05 | 5288.92 | 3·723367 | 0·945 |
| | 10 | 4911.15 | 3·691183 | 1·018 |
| | 15 | 4583.75 | 3·661221 | 1·091 |
| | 20 | 4297.28 | 3·633194 | 1·164 |
| | 25 | 4044.51 | 3·606866 | 1·236 |
| | 30 | 3619.83 | 3·582044 | 1·309 |
| | 35 | 3618.80 | 3.558564 | 1.382 |
| | 40 | 3437.87 | 3.536289 | 1.454 |
| | 45 | 3274.17 | 3.515101 | 1.527 |
| | 50 | 3125.36 | 3.494900 | 1.600 |
| | 55 | 2989.48 | 3.47595 | 1.673 |
| 2 | 00 | 2864.93 | 3.457115 | 1.745 |
| | 10 | 2644.58 | 3.422356 | 1.891 |
| | 20 | 2455.70 | 3.390176 | 2.036 |
| | 00 | 2292.01 | 3.360217 | 2.181 |
| | 45 | 2033.68 | 3.318832 | 2.400 |
| 3 | 00 | 1910.08 | 3.281051 | 2.618 |
| | 15 | 1763.18 | 3.246297 | 2.836 |
| | 30 | 1637.28 | 3.21122 | 3.054 |
| | 45 | 1528.16 | 3.184169 | 3.272 |
| 4 | 00 | 1432.69 | 3.156151 | 3.490 |
| | 20 | 1322.53 | 3.2121404 | 3.781 |
| | 40 | 1228.11 | 3.089236 | 4.071 |
| 5 | 00 | 1146.28 | 3.059290 | 4.362 |

| | | | | |
|---|---|---|---|---|
| | 30 | 1042.14 | 3.017927 | 4.798 |
| 6 | 00 | 955.366 | 2.980170 | 5.234 |
| | 30 | 88.946 | 2.945442 | 5.669 |
| 7 | 00 | 819.020 | 2.913295 | 6.105 |
| | 30 | 764.489 | 2.883371 | 6.540 |
| 8 | 00 | 716.779 | 2.855385 | 6.976 |
| | 30 | 674.686 | 2.829102 | 7.411 |
| 9 | 00 | 637.275 | 2.804327 | 7.846 |
| | 30 | 603.805 | 2.78087 | 8.281 |
| 10 | 00 | 573.689 | 2.758674 | 8.716 |
| 11 | 00 | 521.671 | 2.717397 | 9.585 |
| 12 | 00 | 478.339 | 2.579735 | 10.453 |
| 13 | 00 | 441.684 | 2.645111 | 11.320 |
| 14 | 00 | 410.275 | 2.613075 | 12.187 |
| 15 | 00 | 383.065 | 2.583272 | 13.053 |
| 16 | 00 | 359.265 | 2.555415 | 13.917 |

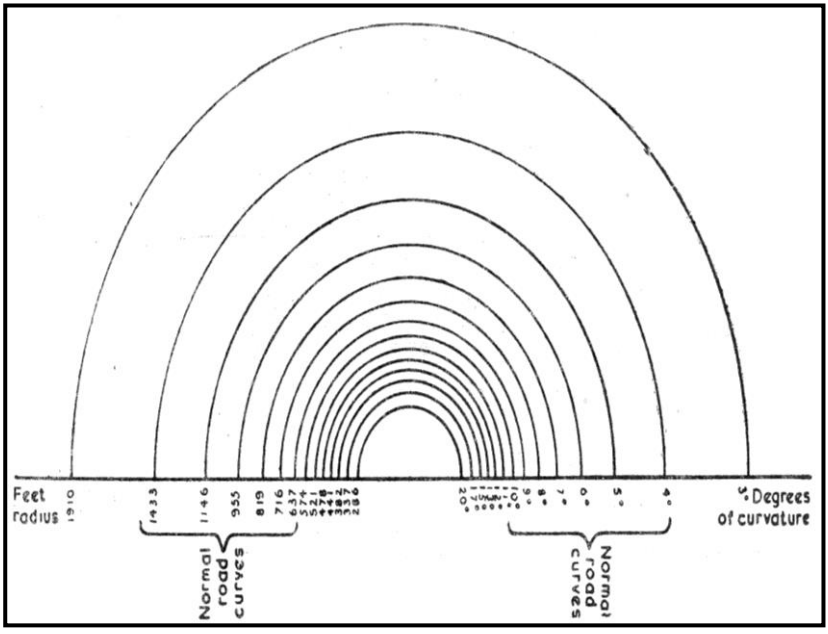


Figure 10-3: Curve Chart

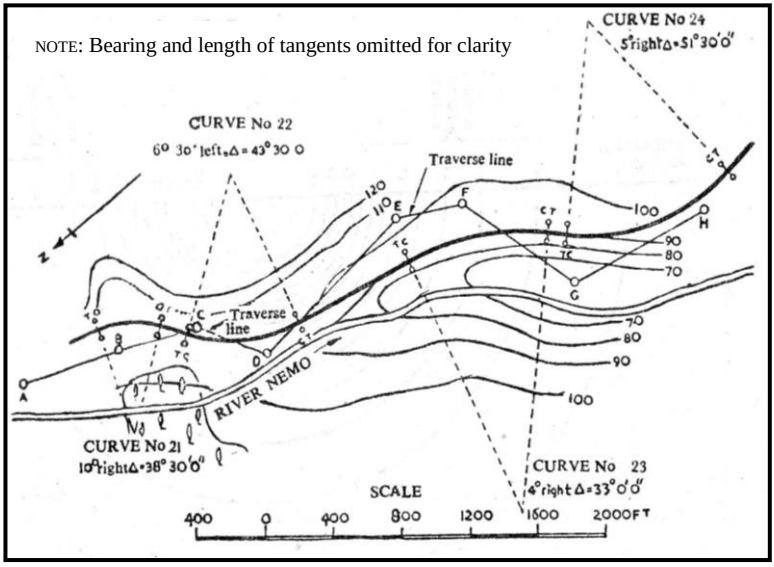


Figure 10.4: Example of Paper Location