Part 3.4

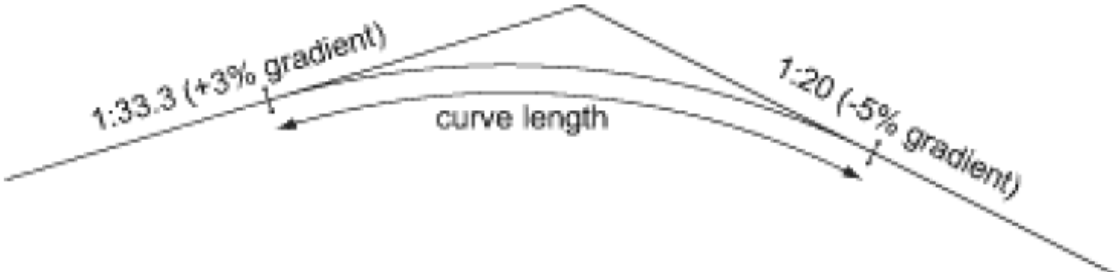
# Vertical Curves

Where changes in gradient occur, vertical curves will be required at sags and crests. Except where indicated in the following notes, curve lengths should normally be either:

- the sum ***K*** x ***A***, where ***K*** is given in below table and ***A*** is the algebraic difference of the gradients expressed as a percentage; or
- the minimum length for appearance stated in the table;

whichever is the higher.

**Example of a vertical curve calculation**




**Gradient exaggerated for illustrative purposes**

*Calculation*

| | |
|---|---|
| *For a 20mph design speed* | *$K$ = 3 (from table)* |
| *Algebraic difference of gradients expressed as a percentage ($A$)* | *= 3 minus -5.0 (from diagram above)*<br>*= 8* |
| *Curve length* | *= 3 (from table) x 8*<br>*= **24m*** |

*(greater than minimum length for appearance from table (20m))*

**Table T3.4.1 - Vertical curves for all internal roads**

| 85th %ile design speed (mph) | Minimum length of vertical curve (*K*) | Minimum length of vertical curve for appearance (metres) |
|---|---|---|
| 30 | 6.5 | 30 |
| 25 | 4 | 25 |
| 20 | 3 | 20 |
| 15 | 2 | 20 |

**Notes**

- You should hold early discussions with us for large, flat sites to ensure that the vertical alignment is acceptable. In some cases, it may be necessary to provide combined kerb and drainage units to ensure both an acceptable alignment and drainage of the highway.
- For crests, it may be necessary to increase the length of vertical curve derived in order to achieve the required forward visibility distance.
- We may accept shorter curve lengths where there are exceptional difficulties in achieving the length normally required.
- To avoid stretches of road where water gathers, do not apply the minimum length where ***A*** is less than five on any sag curve that results in a low point on the road.
- Speeds on new residential development roads should normally be restricted to 20mphor less.

[End]