Although this process can be done manually, for straight roads it is almost always done using software. This allows the designer to access the photometric file for the selected luminaire and then to manipulate the mounting height, clearance, set-back, tilt and layout of the luminaires necessary to determine the spacing required to meet the appropriate lighting criteria. Of these variables, clearance and set-back have limits. To allow safe passage, the clearance of all parts of the lighting equipment above the carriageway should be at least 5.7 m. To reduce the risk of death or injury caused by collision with a lighting column, the minimum set-back of the lighting column from the edge of the carriageway is related to the design speed of the road, as listed in Table 16.8.

Table 16.8 Minimum set-back of lighting columns from the edge of the carriageway

Design speed for road (km/h)	Minimum horizontal set-back from the edge of the carriageway (m)
50	0.8
60	1.0
100	1.5
120	1.5

Bends in the road with a radius greater than 300 m can be considered as straight as far as lighting is concerned. For bends with smaller radii, the layout of the luminaires should be designed to ensure the necessary road surface luminance and good visual guidance. Where the width of the carriageway is less the 1.5 times the mounting height of the luminaires, the luminaires should be arranged in a single sided plan on the outside of the bend. For wider roads, an opposite layout should be used. A staggered layout should not be used on bends as it gives poor visual guidance. The spacing of luminaires on a bend is less than on a straight road, typically half to three quarters of the spacing on a straight road.

To check that the road surface luminance criteria are met for bends, an isoluminance template can be used. This consists of a contour on the road where the luminance from a single luminaire is at 12.5% and 25% of the maximum road surface luminance. Given a layout of luminaire positions, the luminance templates of the individual luminaires can be superimposed on the plan of the road to determine the luminance uniformity. Further details of this approach are given in BS 5489: Part 1.

Conflict areas have different shapes and use illuminance as a criterion rather than luminance. The illuminance produced at a point P from a single luminaire is given by the formula:

$$E = \frac{I \cos^3 \gamma}{h^2}$$

where: E = illuminance at the point P from the luminaire (lx)
I = luminous intensity in the direction from the luminaire to the point P (cd)
γ = angle of the direction of I from the downward vertical (degrees)
h = mounting height of luminaire (m)