This battery of objectives and the individual nature of each site ensure that there is no standard method of lighting urban centres and public amenity areas, nor any universally applicable recommendations. What can be given are some general recommendations for the illuminances to be used in city and town centres, although even these may need to be adjusted for a particular site, depending on the ambient environment, the level of crime, street parking etc. Table 16.11 lists the lighting classes recommended for city and town centres, based on the type of traffic, the traffic flow, and the environmental zone (see Table 6.1). The minimum maintained illuminances associated with each lighting class are given in Table 16.5.

Guidance on some of the techniques used to light urban centres and public amenity areas are given in CIBSE LG 6: *The outdoor environment* and ILE/CIBSE *Lighting the environment – A guide to good urban lighting*.

Table 16.11 Recommended lighting classes for city and town centres

Type of traffic	Normal traffic flow/E3	Normal traffic flow/E4	High traffic flow/E3	High traffic flow/E4
Pedestrian only	CE3	CE2	CE2	CE1
Mixed vehicle and pedestrian with separate footways	CE2	CE1	CE1	CE1
Mixed vehicle and pedestrian on the same surface	CE2	CE1	CE1	CE1

16.5 Tunnel lighting

A tunnel can be defined as a section of road that is not exposed to the sky. Tunnels shorter than 25 m do not need lighting. Tunnels longer than 200 m will need lighting by day and night. Tunnels between 25 and 200 m in length may need lighting by day and night. The nature of lighting provided will depend on the tunnel class, classes ranging from 1 to 4 depending on the traffic density and traffic mix. The purpose of tunnel lighting is to enable drivers to see vehicles and obstructions within the tunnel. The lighting of tunnels has to address two different problems. The first is the black-hole effect experienced by a driver approaching a tunnel. The second is the black-out effect caused by a lag in adaptation on entering the tunnel. Neither of these problems occurs at night, because then the average road surface luminance inside the tunnel is recommended to be at least 1 cd/m^2, a value similar to if not greater than that of the road surface outside the tunnel (BSI 5489-2: 2003). By day, this is not the case. By day, the luminances around the tunnel portal will be much higher than those inside the tunnel so both the black-hole effect and the black-out effect may be experienced and driver safety may suffer.

The black-hole effect refers to the perception that from the distance at which a driver needs to be able to see vehicles and obstructions in the entrance to the tunnel, that entrance is seen as a black hole. The major cause of the black-hole effect is the reduction in luminance contrasts of the retinal images of vehicles and obstructions in the tunnel entrance caused by light scattered in the eye. There are two approaches that can be used to alleviate the black-hole effect. The first is to reduce the luminance of the surroundings to the tunnel. This can be done by ensuring that the tunnel portal is of low reflectance, by shading the tunnel portal and the road close to the tunnel entrance with louvres designed to exclude sunlight, by using low reflectance road surface materials outside the tunnel and by landscaping to shield the view of high-luminance sources, such as the sky.