Highway Lighting

Nighttime illumination of a roadway is very important in promoting safety and operational efficiency. As with any highway appurtenance, however, there is an associated cost that should be balanced against the enhancement offered. In general, lighting is used more extensively for urban rather than rural roadways. In addition to furthering highway safety, lighting in urban environments promotes safety to pedestrians. In rural areas, lighting is generally applied in critical areas, such as interchanges, intersections, railroad crossings at grade, narrow or long bridges, tunnels, sharp curves, and areas where roadside interference is a concern.

A typical highway lighting installation consists of an aluminum or steel standard (pole) on top of which is mounted a luminaire (Fig. 1). This lighting fixture comprises a lamp, its housing, and a lens. Like other roadside elements, lighting standards are susceptible to vehicle impact and therefore should be placed outside the roadway clear zone. If it is not possible or practical to locate the standards in a safe area, the standards should be equipped with some form of impact-attenuation feature. For this purpose, breakaway poles may be used. They should be installed along stretches of roadway where vehicles should be traveling at relatively low speeds at which damage to a vehicle striking a standard will not be severe. Breakaway poles should not be used, however, in heavily developed regions, where there is the possibility of an impacted pole damaging adjacent buildings or pedestrians. Installation of poles on the outside of curves on a ramp should
also be avoided because in such locations they are likely to be struck by a vehicle. If lighting standards are placed behind a longitudinal traffic barrier, they should be offset to allow for deflection of the longitudinal barrier when it is impacted. When installed for a divided highway, lighting standards may be placed either in the median (Fig. 1a) or on the right side of the road (Fig. 1b). For high-speed lanes, it is generally preferable to place the standards, equipped with dual-mast arms, in the median since the cost is typically lower and the illumination provided greater than for standards on the right side of the roadways. Overhead lighting installations, such as those depicted in Fig. 1, generally extend 30 ft above grade and are equipped with mercury-vapor lamps.

For interchanges, traffic circles, and toll plaza areas, another form of overhead lighting, known as high-mast lighting, is used. In this case, luminaries are mounted on tapered steel poles or triangular steel towers that range in height from 50 to 150 ft. The luminaires can be lowered to within 3 ft of the ground for periodic inspection and maintenance.

To further facilitate maintenance, hoisting and electric cables can be replaced at ground level, where electrical connections are made. The lamps typically are 1000-W mercury vapor, metal halide, or high-pressure sodium vapor. Even if initially the design of a highway does not specify highway lighting, provision for future installation of lighting should at least be considered. If lighting should be required in the future, its installation
will be greatly facilitated by provision of the necessary conduits under pavements and curbs during construction of the highway.


Figure (1) Highway lighting installation with luminaires mounted on tall posts.