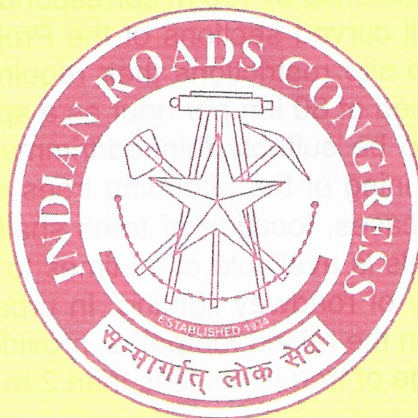


# MANUAL OF SPECIFICATIONS AND STANDARDS FOR FOUR LANING OF HIGHWAYS

*(Second Revision)*



**INDIAN ROADS CONGRESS**  
**2019**



## SECTION 11

### LANDSCAPING AND TREE PLANTATION

#### 11.1 General

The Concessionaire shall plant trees and shrubs of required number and type at the appropriate locations within the Right of Way and in the land earmarked by the Authority for afforestation keeping in view the IRC Guidelines on Landscaping and Tree Plantation. The Authority shall specify the number of trees which are required to be planted by the Concessionaire as compensatory afforestation or otherwise in **Schedule 'C'** of Concession Agreement. In case the number of trees to be provided is not specified in **Schedule 'C'**, the concessionaire shall not be required to plant trees. The Concessionaire shall also maintain the trees and shrubs in good condition during the Concession Period as per the maintenance schedule. The Guidelines given in this section shall be followed in Plantation of Trees and shrubs.

#### 11.2 Design Considerations in Various Locations

##### 11.2.1 *Set-back distance of trees and other plantation*

Trees on the roadside shall be sufficiently away from the roadway so that they are not a hazard to road traffic or restrict the visibility. Most vulnerable locations in this regard are the inside of curves, medians, junction corners and cut slopes. Trees shall be placed at a minimum distance of 14 m from the centre line of the extreme traffic lane to provide recovery area for the vehicle that runs off the road. A second row of trees 6 m further away will also be planted wherever possible. Preferably the first row of trees shall consist of species with thick shade and other rows of vertical type providing thin shade. Expansion of the Project Highway to 6-lanes shall be taken into consideration while locating the trees so that land is free of trees when further widening takes place. In case future widening is not to be considered the same shall be specified in **Schedule 'D'** of Concession Agreement. The distances for alternative rows of trees shall be reckoned from the nearest edge of the unidirectional carriageway. No plantation shall be allowed on the embankment slopes.

##### 11.2.2 *Set-back of trees on curves*

In plain terrain a stopping sight distance of 180 m corresponding to the design speed of 100 km per hour may be ensured on all curved sections of the Project Highway along the innermost lane. However, where there are site restrictions their requirement may be reduced to 130 m corresponding to the design speed of 80 km per hour as a special case. The existing trees and vegetation on the sides have to be suitably thinned/trimmed, or even removed if necessary and a regular programme of pruning of the offending trees shall be undertaken as part of the maintenance operations. In all cases, location of trees shall be checked to ensure that clear vision of all highway signs/signals is available at all times to the motorists. Also, the foliage or trees shall not come in the way of roadway lighting. In urban/built-up sections of the Project Highway, trees can be planted on the raised footpaths, provided the distance between the edge of the kerbs and the nearest edge of tree is not less than 2 m.

##### 11.2.3 *Vertical clearance of trees and other plantations*

For safe traffic operation, the vertical clearance available across the roadway shall be minimum 5 m. From this angle, the probable size of all plants shall be anticipated in advance, at the time



of initial planting. To allow for the effects of growth, wind and rain, trees shall be trimmed to 6 m and 6.5 m above the pavement in rural and urban areas respectively.

#### 11.2.4 *Plantation in medians*

In the sections of the Project Highway where median width is more than 2.5 m, shrubs shall be planted and maintained to cut-off headlight glare from traffic in the opposite direction.

Flowering plants and shrubs are eminently suited for the purpose. These shall be planted either in continuous rows or in the form of baffles. The height of shrubs shall be maintained at 1.5 m to cut-off the effect of traffic lights coming from the opposite direction.

In the sections, where the width of median is less than 2.5 m, shrubs or flowery plants may be planted in between crash barriers or other means like metal/plastic strips shall be provided to cut off glare.

The shape of shrubs and plants shall be suitably regulated so that there is no overgrowth either vertically or horizontally beyond the edge of the median.

In the vicinity of road intersections and median openings, median plantation shall be avoided or restricted to low-growing varieties to ensure adequate visibility.

#### 11.2.5 *Spacing of avenue trees*

The spacing of avenue trees will depend on the type and growth characteristics of trees, requirement of maintenance, penetration of distant views, etc. A range of 10-15 m would meet the requirement for most varieties.

#### 11.2.6 *Choice of trees*

The following guidelines shall be kept in view while selecting the species of trees to be planted:

- i) Trees shall be selected with due regard to soil, rainfall, temperature and water level.
- ii) Trees which become very wide shall be avoided as their maintenance would cause interference with traffic flow.
- iii) The species must be capable of developing a straight and clean bole up to a height of 2.5 to 3.5 m from the ground level.
- iv) The selected trees shall, preferably, be fast growing and wind-firm. These shall not be thorny or drop too many leaves.
- v) The trees shall be deep rooted, as shallow roots injure pavements.
- vi) In urban areas, the species selected shall be of less spreading type, so that these do not interfere with overhead services, clear views of signs/signals, and efficiency of roadway lighting.

### 11.3 **Landscape Treatment**

A suitable landscape treatment with provision of foundations and coloured lighting so as to enhance the overall aesthetics duly designed by a qualified and experienced landscaping architect, shall be provided at grade separators, elevated sections, viaducts, traffic islands, toll plazas, bus bays, truck lay byes, rest areas, O&M centre, etc. The locations where landscape treatment is to be given shall be specified in **Schedule 'C'**. The landscape treatment shall also be provided for special areas as given in IRC:SP:21 (Para 8).



## 12.5 Street Lighting

### 12.5.1 General

- i) The concessionaire shall provide lighting at specified locations of the project highway, using appropriate system and source of electric power as per the requirements of this Section. Such locations shall be specified in **Schedule 'C'**.
- ii) The Concessionaire shall make suitable arrangements for procuring power supply to ensure uninterrupted lighting during night and when visibility is low, including provision of DG sets as standby arrangements.
- iii) The Concessionaire shall bear all costs of procurement, installation, running and operation cost of all lighting, including cost of energy consumption specified in this Section.

### 12.5.2 Specifications

- i) Unless stated otherwise in this Manual, the minimum level of illumination on the locations of the Project Highway where lighting is to be provided as per this section shall be 40 Lux.
- ii) The layout of the lighting system together with type of luminaries for different locations shall be prepared by the Concessionaire in such a manner that the minimum illumination level prescribed in **Para 12.5.2(i)** can be achieved and shall be submitted to the Independent Engineer for review and comments, if any, for compliance by the Concessionaire.
- iii) Overhead electrical power and telecommunication lines erected within the ROW by the Concessionaire shall be provided with adequate clearance so that safe use of the highway is not affected.
- iv) Vertical and horizontal clearances for electrical installations shall conform to IRC:32.
- v) All the fixtures, wires/cables, lights shall conform to relevant BIS specifications as a minimum. The Concessionaire with the prior review and comments of the Independent Engineer can use fixtures with better specifications.

### 12.5.3 Locations where lighting is to be provided

Unless specified otherwise in **Schedule 'C'** of the Concession Agreement and else as per in this Manual, the Concessionaire shall provide lighting at the following locations of the Project Highway:

- i) **Toll Plaza Area:** The lighting in and around Toll Plaza, toll booths, office building, on the approach road, etc. shall be as per **Section 10** of this Manual.
- ii) Rest Areas as given in **Para 12.9**
- iii) **Truck lay-bye:** Lighting at the truck lay-bye shall be as per **Para 12.6**
- iv) **Bus Bay & Bus Shelter Locations:** Lighting shall be provided as per **Para 12.7**
- v) **Grade separated Structures, Interchanges, Flyovers, Underpasses (vehicular/pedestrian) and Overpasses:** Lighting shall be provided as per **Para 3.4.6** of this Manual.