

Section 14

**Special Requirements for
Hill Roads**

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SPECIAL REQUIREMENTS FOR HILL ROADS

14.1 General

14.1.1 The Concessionaire shall pay due attention to geo-technical, environmental and social aspects of hill roads and take appropriate measures to ensure the following: (The guidelines given in IRC:SP: 48 may be referred to, for details).

- (i) Stability against geological disturbances.
- (ii) Prevention of soil erosion.
- (iii) Provision of efficient drainage and preservation of natural drainage system.

14.1.2 If there are any landslide prone areas along the road alignment, adequate investigation shall be undertaken and appropriate remedial measures shall be provided as per guidelines given in IRC:SP: 48.

14.1.3 Where any new construction/realignment is involved, the alignment shall avoid large scale cuttings and fillings and follow the profile of land, as far as possible.

Areas having potential landslide or settlement problems shall be avoided. Adverse impact on the environment shall be reduced by adopting proper mitigation measures. Refer to guidelines given in IRC:SP: 48.

14.1.4 Unstable hill slopes shall be adequately addressed by providing appropriate bio-engineering and stabilization measures.

14.1.5 Necessary safeguard shall be taken to

protect ecology sensitive areas like wild life and bird sanctuaries, reserve forests, national parks, etc.

14.1.6 Provision of protective structures for traffic such as parapets, railings, roadside safety barriers, boulder nets, etc. shall be provided, where necessary.

14.2 Set back distance at horizontal curves

Requisite sight distance should be available across the inside of horizontal curves. Lack of visibility in the lateral direction may arise due to obstructions like walls, cut-slopes, wooded areas, etc. Set back distance from the central line of the carriageway, within which the offending obstructions should be cleared to ensure the needed visibility, can be determined using the Equation given in IRC:52.

14.3 Grade compensation at curves

At horizontal curves, the gradient shall be eased by applying the grade compensation correction for gradients steeper than 4% in accordance with IRC:52.

14.4 Hairpin Bends

Hairpin bends, where unavoidable, may be designed either as a circular curve with transition curves at each end or as a compound circular curve.

Design criteria given in IRC:52 shall be adopted for the design of hairpin bends. At hairpin bends the full roadway width should be surfaced.

14.5 Climbing Lane

Climbing lane shall be provided, where specified in Schedule-B of the Concession Agreement, in order to address the necessity of making available separate lane for safe overtaking for vehicle travelling uphill.

Proper signing and road markings shall be provided to ensure that the absolute right of way for climbing vehicles is available.

14.6 Heavy rock blasting should be avoided. Controlled blasting shall be resorted to. Blasting shall be supervised by experienced personnel. Blasting and related operations shall be carried out in accordance with Clause 302 of MOSRTH Specifications.

14.7 Cut slopes shall be rendered stable in the construction stage itself, by cutting at the correct angle and benching etc. including slope stabilizing structures like drains, breast walls, pitching, etc.

14.8 Where it is necessary to cross hills or high ridges, the various alternatives including construction of tunnel to avoid deep cuts shall be considered and the most preferred alternative shall be chosen. The alternative to be followed shall be indicated by the Government in Schedule-B of the Concession Agreement. Where road is to be taken through tunnel, its salient details shall be indicated in Schedule-B of the Concession Agreement.

14.9 For drainage of water from roadside, an effective system of drainage shall be constructed to lead the run-off to natural water courses. In particular, catch water drains (Refer to para 6.5 of this Manual) shall be provided above the cut slopes. It shall be ensured that water is not drained into villages and cultivated

land. Location of cross drains and culverts should be so chosen as to avoid erosion of the outlet. Erosion control works like drop walls, apron at out-fall points along with pitching/paving of the channel shall be provided where required.

14.10 Retaining Walls

14.10.1 Retaining walls shall be provided:

- (i) To support the down hill side unstable strata or fills,
- (ii) To achieve width of roadway, where cutting into hill is restricted,
- (iii) To arrest damage caused to the valley side and the road, by under cutting by a stream or other water course,
- (iv) At valley points, where water flows over the road,
- (v) At places where the valley side gets saturated in the monsoons and is likely to result in slips and damage to the road,
- (vi) At any other locations warranting provision of retaining walls.

14.10.2 For general features, arrangement and design, guidelines given in IRC:SP: 48 may be referred to.

14.11 Construction of apron, pitching, flooring shall conform to Clauses 2503 to 2507 of MOSRTH Specifications.

14.12 Disposal sites shall be identified for disposal of waste, debris, etc. Tipping of waste into valley sides, stream channels, water bodies, and forest areas shall not be resorted to.