

Terrain Classification	Percentage Slope of the Country
Plain	0 - 10
Rolling	> 10 - 25

3.3 Design Speed

Design speed is the basic parameter, which determines geometric features of the road. The proposed design speeds for different terrain categories are as follows:

Terrain Categories	Design Speed (km/h)	
	Desirable	Minimum
Plain	100	80
Rolling	80	65

For road stretches passing through built-up areas, the speeds corresponding to rolling terrain are proposed.

3.4 Cross-sectional Elements

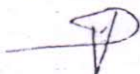
3.4.1 Lane Width

The width of a basic traffic lane is taken to be 3.5m. Thus, for 2 lane carriageways, the carriageway widths will be 7.0m. For the divided cross-section, the 0.25m wide edge strip laid along with the median kerb will provide compensation for kerb shyness on both sides.

3.4.3 Earthen Shoulders

It is proposed to have 1 m wide earthen shoulders.

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3.4.4 Median

The highway will have raised median and its width is proposed to be 0.6 m.

In plain and rolling terrain, where adequate land is available, the median will be placed on one side of the existing pavement with the widening of 2 lane which could be either on left or on the right side of the existing road and this will be decided on site conditions and suitability of widening major structures. In other difficult sections/urban sections, the proposed width reduces to 0.6 m

The medians will be edged with minimum 300mm high non-mountable concrete kerbs.

3.4.5 Side Slopes

For fill section, the following side slopes are proposed.

Fill height upto 3.0m - 2 H : 1 V

Fill height from 3.0m to 6.0m - 1.5 H : 1 V

6.0m

Fill height exceeding 6.0m - To be designed based on soil parameters

Cut slopes will be as follows:

Soil - 2 H : 1 V

Soft/disintegrated rock - 1.0 H : 2 V

Hard Rock - 1 H : 4 V to near vertical

3.4.6 Typical Cross Section

For application to different situations, a number of typical cross-sections (which covers rigid pavement options) have been prepared

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and these are shown in the following table. The table also indicates the situation for which of these cross-sections is applicable.

Cross-Section Type	Features	Applicability
I	New carriageway on one side with median (Embankment sections)	In plain/rolling terrain where adequate land is available.
II	Concentric widening with median, also with service roads.	In built-up area.
III	New carriageway on one side with median, also with service roads.	In urban areas where adequate land is available.


3.5 Sight Distance

Safe stopping sight distance, both in the vertical and horizontal directions, will apply in design. The sight distance values as per IRC recommendations are as follow:

Design Speed (km/hr)	Safe Stopping Sight Distance (m)
100	180
80	130
65	90

In widening mountainous stretches, cutting of visibility splays will be proposed to provide for the needed sight distance in the horizontal direction.

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3.6 Horizontal Alignment

The proposed widening will be parallel and in line with the existing highway after the latter has been corrected for any geometric deficiency.

Adopting a maximum value of 7% for super elevation and 0.15 for side friction factor, the minimum radius for horizontal curves works out to be as follows:

Terrain	Radius of Horizontal Curves (m)	
	Desirable	Minimum
Plain	260	220
Rolling	230	155

3.7 Vertical Alignment

The vertical alignment of the widening carriageway will generally be compatible with that of the existing carriageway except for cases where alignment of the new carriageway deviates from the existing one.

3.8 Gradient

The gradients recommended by IRC for the different terrain classes are as follow:

Terrain	Gradient (%)		
	Ruling	Limiting	Exceptional*
Plain and Rolling	3.3	5.0	6.7

* to be adopted only in very difficult situations for the short lengths not exceeding 100m at a stretch

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