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# STANDARDS
# FOR
# ROAD-RAIL LEVEL CROSSINGS

*(First Revision)*

THE INDIAN ROAD CONGRESS
1990

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# STANDARDS FOR ROAD-RAIL LEVEL CROSSINGS

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# STANDARDS FOR ROAD-RAIL LEVEL CROSSINGS

## 1. INTRODUCTION

1.1. Road-rail level crossings, however, adequately designed and constructed, are accident prone. However, where it is not possible from engineering and economic considerations to provide road over/under bridges, and level crossings have to be provided, the standards given here under should be followed in the interest of maximum safety.

1.2. These standards are intended primarily to be applied to new construction or where an existing crossing is being reconstructed. Existing level crossings need not be altered merely to suit these standards.

1.3. The draft of this standard had been approved by the Specifications and Standards Committee at its meeting held at New Delhi in September 1961. Thereafter as suggested by the Committee, it was forwarded to the Roads Wing of the Ministry of Shipping and Transport for finalizations in consulation with the Ministry of Railways. The Railways gave their concurrence to the standard in September 1970, after effecting slight changes in the original text. The draft standard was subsequently approved for publication by the Executive Committee and the Council at their meetings held respectively in November and December 1970. Provisions of this Standard have been separately circulated by the Railway Board among the different Zonal Railways.

1.4. On the request of the Indian Roads Congress, the first revision has been made by the Ministry of Transport, Department of Surface Transport (Roads Wing) after obtaining the comments from the Ministry of Transport, Department of Railways. Besides the minor editorial changes a fresh clause 21 "Safety Measures to Minimise Accidents" has been added in the revision.

## 2. LOCATIONS

As far as possible, road-rail level crossings should not be located near railway stations and marshalling yards. If this is unavoidable, they should be located beyond shunting limits.

## 3. CLASSIFICATION OF LEVEL CROSSING

3.1. Level crossings shall be classified as below:

| | |
|---|---|
| Special<br>A class<br>B class<br>C class | For vehicular traffic |

D class for cattle crossings and footpaths

3.2. The classification of a rail-road level crossing shall be settled mutually by the Railway and Road Authorities keeping in view the class of the road, visibility conditions, the volume of road traffic and the number of trains passing over the level crossing.

## 4. CATEGORIZATION OF ROADS

For the purpose of this standard, the roads shall be categorized as under:

**(i) Class I Roads**

*(a)* National Highways;

*(b)* State Highways;

*(c)* Important roads within municipal towns ; and

*(d)* Road in and around towns where road and rail traffic is heavy.

**(ii) Class II Roads**

*(a)* Major and Other District roads;

*(b)* Unimportant roads within municipal towns;

*(c)* Roads within non-municipal towns including those within shunting limits of its railway stations; and

*(d)* Other surfaced roads.

**(iii) Class III Roads**

(a) Earth roads; and

(b) Cart tracks.

**(iv) Class IV Roads**

Cattle crossings and Footpaths.

## 5. WIDTH OF CARRIAGEWAY

*(i)* **Between gates**

Between gates the width of carriageway shall be the same as that of the gates (see Clause 7).

*(ii)* **Outside gates**

The minimum width of carrigeway immediately outside the gates (but tapering off to the existing carriageway width within a distance of 30 m from the gate) shall be as below :

***(a)*** **Class I Roads**

7 m or the width of the existing carriageway, whichever is greater

***(b)*** **Class II Roads**

5.5 m or the width of the existing carriageway, whichever is greater.

***(c)*** **Class III Roads**

3.75 m or the width of the existing carriageway, whichever is greater.

***(d)*** **Class IV Roads**

Suitable width, subject to 2 m being the minimum.

## 6. TYPE OF THE PAVEMENTS

*(i)* **Between gates**

The surface shall not be of a lower standard than the surface outside the railway boundary. In case the surface outside the gates be of cement-concrete, black-topped surface may be provided.

*(ii)* **Outside gates**

The surface should not be of a lower specification than that of the existing road. However, in the case of Class I and Class II roads, it will be desirable to have a black-topped surface for a distance of at least 30 m beyond each gate.

## 7. MINIMUM WIDTH OF GATES AT RIGHT ANGLES TO THE CENTRE LINE OF THE ROAD

**(i) For Class I Road**

9 m or equal to the width of the carriageway, immediately outside gates plus 2.5 m whichever is more.

**(ii) For Class II Roads**

7.5 m or equal to the width of the carriageway immediately outside gates plus 2 m whichever more.

**(iii) For Class III Roads**

5 m or equal to the width of the carriageway immediately outside the gates plus 1.25 m whichever is more.

**(iv) For Class IV Roads**

Suitable width, subject to 2 m being the minimum.

## 8. MINIMUM LENGTH OF GUARD-RAILS

This should be 2 m more than the width of the gates on square crossings, and proportionately longer on skew crossings.

## 9. POSITION OF GATES WITH RESPECT TO THE CARRIAGEWAY

9.1. The gates may be swing gates, lifting gates or movable barriers of approved design.

9.2. The gates should be at right angles to the centre line of the road.

9.3. On level crossings across Class IV roads, stakes shall be fixed between the gate posts to prevent passage of road vehicles.

## 10. MINIMUM DISTANCE OF GATES FROM THE CENTRE LINE OF THE NEAREST RAIL TRACK

This should be 3 m on broad gauge lines and 2.5 m on metre gauge and narrow gauge lines.

## 11. WIDTH OF ROAD FORMATION OUTSIDE THE GATES

The width of the road formation for a distance of 30 m beyond the gate should be as follows :

**(i) Class I and Class II Roads**

Width of carriageway immediately outside the gates (see Clause 5) plus 5 m.

**(ii) Class III Roads**

Width of the carriageway immediately outside the gates (see Clause 5) plus 2.5 m.

**(iii) Class IV Roads**

Suitable width subject to 3 m being the minimum.

## 12. LEVEL LENGTHS AND GRADIENTS

**(i) Between gates**

Level for all classes.

**(ii) Outside gates**

**(a) Class I Roads**

Same level as between the gates upto 15 m beyond gates and not steeper than 1 in 40 beyond.

**(b) Class II Roads**

Same level as between the gates upto 8 m beyond gates and not steeper than 1 in 30 beyond.

**(c) Class III Roads**

Same level as between the gates upto 8 m beyond gates and not steeper than 1 in 20 beyond.

**(d) Class IV Roads :** Not steeper than 1 in 15.

*Note;* Shock-free vertical curves as per Indian Roads Congress Standards should be provided at all gradient changes. The level distances mentioned above are exclusive of the lengths required for the provision of vertical curves.

## 13. ANGLE OF CROSSING BETWEEN THE CENTRE LINES OF THE RAILWAY TRACK AND THE ROAD

The angle of crossing between the centre line of the road and that of the railway track should ordinarily not be lower than 45 degrees* in the case of Class I, Class II and Class III roads. For Class IV roads, the angle of crossing should be 90 degrees.

## 14. MINIMUM RADIUS OF THE CENTRE LINE OF THE ROAD ON CURVED APPROACHES

14.1. Minimum radius of the curve shall depend upon the design speed, coefficient of friction between the tyres and road surface and maximum allowable value of superelevation. The minimum radii for different design speeds for good surfaced roads may be provided as indicated in the table below :

| Speed km/h | Radius of horizontal curve (metres) | | |
|---|---|---|---|
| | Plain and rolling terrain | Hilly | |
| | | Not affected by snow | Snow bound |
| 20 | -- | 14 | 15 |
| 25 | -- | 20 | 23 |
| 30 | -- | 30 | 33 |
| 35 | 45 | 40 | 45 |
| 40 | 60 | 50 | 60 |
| 50 | 90 | 80 | 90 |
| 60 | 130 | -- | -- |
| 65 | 155 | -- | -- |
| 80 | 230 | -- | -- |
| 100 | 360 | -- | -- |

* An angle of crossing lower than 45 degrees can also be provided but only after special permission from the Railway Board which may be granted in exceptional cases.

14.2. In difficult terrain where it is not possible to adopt the above standard, the radius may be reduced with the concurrence of the Road Authority.

14.3. For other categories of roads, the best possible radius having regard to safety of the road traffic, should be adopted.

## 15. SIGHT DISTANCES

15.1. The roads in the vicinity of the level crossings shall be provided with sight distances depending upon the design speed as per Table No. 11 of IRC : 73-1980 reproduced below :

**STOPPING SIGHT DISTANCE FOR VARIOUS SPEED**

| Speed | Perception and brake reaction | | Braking | | Safe stopping sight distance (metres) | |
|---|---|---|---|---|---|---|
| V (km/h) | Time, t (Sec.) | Distance (metres) $d_1$=0.278 Vt | Coefficient of longitudinal friction (f) | Distance (metres) $d_2=V^2/254f$ | Calculated values $d_1+d_2$ | Rounded off values for design |
| 20 | 2.5 | 14 | 0.40 | 4 | 18 | 20 |
| 25 | 2.5 | 18 | 0.40 | 6 | 24 | 25 |
| 30 | 2.5 | 21 | 0.40 | 9 | 30 | 30 |
| 40 | 2.5 | 28 | 0.38 | 17 | 45 | 45 |
| 50 | 2.5 | 35 | 0.37 | 27 | 62 | 60 |
| 60 | 2.5 | 42 | 0.36 | 39 | 81 | 80 |
| 65 | 2.5 | 45 | 0.36 | 46 | 91 | 90 |
| 80 | 2.5 | 56 | 0.35 | 72 | 118 | 120 |
| 100 | 2.5 | 70 | 0.35 | 112 | 182 | 180 |

15.2. To further improve visibility, gate lodges should be so sited that a clear and unobstructed view is obtained by the road traffic of all approaching trains. While doing so, care should be taken to make allowance for all possible future extensions, e.g., additions to the railway track(s) or widening of the road.

15.3. On unmanned level crossings, efforts should be made to keep the sight triangles demarcated in the four corners on the basis of speeds of trains and the road vehicles, clear of any obstruction to sight.

## 16. MINIMUM STRAIGHT LENGTH OF ROAD OUTSIDE THE GATES

This shall normally be 30 m, 22.5 and 15 m for level crossings of Class I, Class II and Class III roads respectively. The straight length may, however, be reduced depending on sight conditions if difficult to attain. The reduction should, however, not go below the minimum straight lengths of 15 m, 9 m, and 4.5 m for the three classes of roads respectively.

## 17. WARNING TO ROAD TRAFFIC OF THE PROXIMITY OF LEVEL CROSSING

### 17.1. Unguarded Railway Crossing

The sign should be used on the approaches of level crossings where there are no gates or other barriers. A pair of signs shall be used for the purpose : (i) an advance warning sign located at 200 metre away from the crossing, and (ii) a second sign to be erected near the crossing. The distance of the second sign from the crossing may be 50-100 metre in plain and rolling terrain and 30-60 metre in hilly terrain.

### 17.2. Guarded Railway Crossing

The sign should be used to warn traffic on the approaches of guarded railway crossings. A pair of signs shall be used for the purpose : (i) an advance warning sign located at 200 metre away from the crossing, and (ii) a second sign to be erected near the crossing. The distance of the second sign from the crossing may be 50-100 metre in plain and rolling terrain and 30-60 metre in hilly terrain.

17.3. Gates should be painted white, with a red disc not less than 60 cm in diameter in the centre. The gate posts also must be painted white. Where gates or chains are not provided, posts must

still be provided at the position prescribed for gate posts and these should be painted white.

## 18. MINIMUM DISTANCE OF GATE LODGE

18.1. The minimum distance of gate lodge shall be as given below:

| | Class I Roads | Class II Roads | Class III Roads | Class IV Roads |
|---|---|---|---|---|
| *(a)* From the centre line of the nearest rail track | 6 m | 6 m | 6 m | 6 m |
| *(b)* From the edge of the carriage way | 6 m | 6 m | 6 m | 6 m |

18.2. The recommendation in Clause 15 regarding sight distances should also be kept in view.

## 19. PROVISION OF WICKET GATES FOR FOOT-PASSENGERS

19.1. In the case of level crossings on Class I and Class II roads, wicket gates for pedestrians shall be provided except where there are foot overbridges.

19.2. In the case of level crossings on Class III and Class IV roads, wicket gates need not be provided.

19.3. Wicket gates should be of such a design that cattle cannot easily and readily pass through them.

## 20. PROVISION OF LIGHT ON GATES AT NIGHT

*(i)* **Light as observed by road users**

(a) **Class I and Class II Roads**

Red when either gate is closed to the road. White, when the gates are opened to the road.

(b) **Class III Roads**

Same as above, but reflectors may be used as an alternative to lamps.

*(ii)* **Light as observed by drivers of approaching trains**

(a) **Class I Road :** Red, when gates are closed acros the railway track.

(b) **Other cases :** Nil

## 21. SAFETY MEASURES TO MINIMISE ACCIDENTS

21.1.Latest IRC road signs indicating whether the railway crossing is manned or unmanned shall be installed on either end of the crossing at the prescribed distance as per IRC : 67.

21.2.Speed limit road signs for the imposed Speed Signs of limit on speed of approaching traffic shall be installed on either end of the crossing at the prescribed distance.

21.3.Rumble strips on both sides of the Railway crossing shall be provided as per following specifications. A common application of rumple strips is the placement of intermittent, raised bituminous overlays across the roadway. Raised sections can be 15-25 mm high, 200-300 mm wide, and spaced about one metre centre to centre. A series of such strips, roughly 15-20 at one location shall be provided. The raised sections shall consist of premix carpet/semi-dense carpet/asphaltic concrete.

21.4.Speed breakers shall not be permitted.

21.5.Flashing signals shall be installed on both sides of the crossing after assessing their requirement for each case.