GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

2025/Proj./PMRCL/SoD/30/111 New Delhi, dated 28.08.2025

Managing Director,
Patna Metro Rail Corporation Limited (PMRCL)
Urban Development & Housing Department
Vikas Bhawan, New Secretariate,
Patna - 800015, Bihar.

Sub: Approval of Schedule of Dimensions (SoD) for Standard Gauge (1435 mm) (For 2900 mm wide stock & 25 KV AC) for Patna Metro Rail Corporation Limited (PMRCL)

Ref: SoD document uploaded on RDSO's online portal by Patna Metro on 12.08.2025 along with compliance

The Schedule of Dimensions (SoD) for Standard Gauge (1435 mm) (For 2900 mm wide stock & 25 KV AC) for Patna Metro Rail Corporation Limited (PMRCL) has been examined in consultation with RDSO and approval of Railway Board is hereby conveyed for the same.

Accordingly, approved copy of SoD is enclosed.

Encl: As above

28.8.25

(F. A. Ahmad)
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Copy to:

1. **Executive Director/UTHS**, RDSO, Manak Nagar, Lucknow w.r.t letter No. No. UT/125/Patna Metro/Civil dated 19.08.2025
2. **OSD/UT & Ex-Officio Joint Secretary**, Ministry of Housing & Urban Affairs (MoHUA), Nirman Bhavan, New Delhi-110011

SCHEDULE

OF

DIMENSIONS

FOR

STANDARD GAUGE
(1435 mm)

(FOR 2900 mm wide stock and 25 KV AC)

REVISION – 09 (Modified)

AUGUST-2025

For

PATNA METRO RAIL CORPORATION LIMITED

URBAN DEVELOPMENT & HOUSING DEPARTMENT

VIKAS BHAWAN, NEW SECRETARIATE, PATNA,

BIHAR - 800015

Project Directorate Approved on 28/08/2025 Railway Board

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RDSO, Lucknow

General Manager

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PREAMBLE

The schedule of Dimensions for Standard Gauge Corridor has been prepared based on following factors:

1. The kinematic envelope and other infringements have been calculated for the 2900 mm wide and 4048 mm high rolling stock, based on the kinematic envelope calculations. The track and vehicle maintenance shall conform to the clearances indicated in Kinematic Envelope calculations. The maximum height of KE in Panto working condition is 5018 mm for At-Grade/Elevated Section/Platform and 4318 mm for Underground Section/Platform. Whenever, a new stock is introduced, the track and coach tolerance for maintenance shall comply to Kinematic Envelope Calculations. The sanction shall be obtained from the Competent Authority before the operation of the Rolling Stock.

2. The clearances are based on assumption that windows are sealed and doors are closed during movement

3. Track and Rolling Stock shall be maintained to the tolerances taken for calculation of Kinematic Envelope.

4. The Structure Gauge indicated in SOD shall not be violated under any circumstances except for designated railway operational structures. Designated railway operational structures include platform coping, Platform Screen Door / Platform Gate, hand railing in back-of-house platform edge, Track Access Gates.

5. The vehicle Kinematic Envelope for the platform area shall be applied only within confines of stations up to 70 Kmph vehicle speed for underground and 70 Kmph for elevated / At grade sections. At all other location, the Kinematic Envelope corresponding to 90 kmph vehicle speed shall be used for determining the Structure Gauge and electrical clearances.

6. The Design speed of the Metro Rail System shall be 90 KMPH.

7. The maximum operating speed shall be 80 kmph in the At Grade/Elevated and underground mainline sections, 60 Kmph in underground and Elevated/At Grade stations and 25 kmph in Depot.

   Maximum speed potential on diverging lines at turnouts having:

   i) Weldable CMS crossing (1 in 9) and thick web switch with 300 m radius of lead curve rail shall be 45 Kmph.
   ii) Weldable CMS crossing (1 in 9) and thick web switch with 190 m radius of lead curve rail shall be 35 Kmph.
   iii) Weldable CMS crossing (1 in 7) and thick web switch with 190 m radius of lead curve rail shall be 35 Kmph.
   iv) Weldable CMS crossing (1 in 7) and thick web switch with 140 m radius of lead curve rail shall be 25 Kmph.

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8. The evacuation of passengers in between stations shall be done from front & rear emergency doors of the train, hence no separate walkway is provided. However, space available between the track paths shall be used as walkway. The evacuation system shall be legislated by Patna Metro Rail Corporation Ltd. and evacuation shall be effected under the supervision of designated officials of Patna Metro Rail Administration. It shall be ensured that no train operation on the adjacent track will be allowed during evacuation.

9. The SOD is applicable for Ballastless/ballasted track on main line and Depots.

10. No vertical curve shall be provided on the platform portion.

11. KE for At Grade and Elevated Section Main Line shall be applicable for train speeds upto 90 kmph and upto a maximum wind speed of 100 kmph only. For KE on Elevated/At Grade Platforms, Train Speeds of maximum 70 kmph shall be considered for Wind Speeds of maximum 70 kmph. For KE on Underground stations, Train Speeds of 70 kmph and 0 kmph wind speed will be considered. The speed of trains at Platforms on Elevated or At-Grade stations shall be restricted to 40 kmph when wind speed is more than 70 kmph but less than 90 kmph. Train Operations shall be halted for Wind Speeds of 90 kmph and above. This shall be ensured through continuous recording of wind speed at critical locations, monitoring through the Operational Control Centre under a Standard Operating Procedure approved by competent authority of Patna Metro Administration.

12. The Kinematic envelope for stations and all other locations shall not be infringed under any circumstance.

13. All the Electrical clearance (Static/Dynamic) shall be measured from Kinematic Envelope of rolling stock. The Kinematic Envelope of Rolling Stock should not infringe under any circumstance. Any infringement to SOD should be condoned by Railway Board.

14. No workmen/equipment/structures are allowed between Vehicle and Structure Gauge during operation of trains

15. The train operation will be stopped in affected section by Central Control if any one of the Train in UP and DN direction derails. The operation will remain suspended till the clearance given by Accident Site Manager from the site by exchange of private number with Central Control.

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PATNA METRO RAIL CORPORATION LTD.

SCHEDULE OF DIMENSIONS

FOR 2900 mm - 25 KV AC

STANDARD GAUGE (1435 mm GAUGE)

INTRODUCTION

The dimensions given in this Schedule of Dimensions are to be observed in all works on 1435 mm gauge (STANDARD GAUGE) and 2900 mm wide Rolling Stock, unless prior sanction has been obtained from the Railway Board through the Commissioner of Metro Railway Safety to execute works which infringe this Schedule of Dimensions

This Schedule of Dimensions is applicable to Under Ground, Elevated and At-Grade sections of Patna Metro Rail Corporation Ltd. which shall be with 25 KV AC Traction system and Over Head current collection. The Rolling Stock shall be 2900 mm wide with sealed windows and doors closed while in motion.

The Under Ground system may be with a Circular Tunnel or Rectangular Box or of any other suitable shape while Elevated system may be with suitable Over Ground Structures such as Viaducts. Both, Under Ground and Elevated systems shall have suitably designed Ballastless (DFF) Track. For depot, the track may be ballasted/ballastless.

The Schedule of Dimensions (SOD) has been divided into Five chapters as under:

Chapter-1	----------	General
Chapter-2	----------	Station
Chapter-3	----------	Rolling Stock
Chapter-4	----------	Electric Traction
Chapter-5	----------	Platform Screen Door/Platform Gate

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CHAPTER - 1
GENERAL

1.1 SPACING OF TRACKS

1.1.1 Minimum distance, centre to centre of tracks without any structure between tracks for tangent (straight) track for:

(a) Under Ground Sections .....3560 mm
(b) Elevated Sections .....3650 mm
(c) At-Grade Sections .....3650 mm

Note: See Appendix-1 for minimum track centers on curves.

1.2 CURVES

1.2.1 Minimum radius of curves (horizontal)

i) On main running lines
   a) Under Ground Sections — 200 m (Minimum)
   b) Elevated and At-Grade Sections — 120 m (Minimum)

ii) Depot and other non-passenger Lines — 100 m (Minimum)

iii) At passenger platforms — 1000 m (Minimum)

1.2.2 Check Rail/Restraining Rail

Check Rail/Restraining Rail shall be provided on curves on main line where radius is 190 m or less. Check rail/Restraining Rail shall not be mandatory for curves in depots, yards and non-passenger lines where speed is less than 25 Kmph. The clearance between check/restraining rail and running rail shall be suitably decided by metro depending upon the study of track vehicle interaction.

1.2.3 (i) Minimum radius of Vertical Curve — 1500 m

1.2.3 (ii) Minimum length of Vertical Curve — 20 m

1.2.4 The minimum transition length for curves (horizontal) should be 15.0 m

1.2.5 The minimum length of alignment elements (circular curves and straights) between two transition curves should be 20.0 m

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1.3 GRADIENTS

1.3.1 The maximum grade (compensated) shall be 4%.

Note: (i) There will be no change of gradient in transition portion of curves.
(ii) The gradient will be compensated for curvature at the rate of 0.04% per degree of curve.

1.3.2 Maximum permissible gradient on turnouts

i) On Ballasted Track — 0.25%

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ii) On Ballastless Track 3.00%

Note:

(i) There shall be no change of gradient (i.e. vertical curve) on and within 15.0 m (desirable) / 3.0 m (minimum) of any turnout on Ballastless track. In case of Ballasted track, there shall be no change of gradient on and within 30 meters of any turnout.

(ii) There shall be no horizontal curve within 15.0 m (desirable) / 3.0 m (minimum) of any turnout on Ballastless Track and 30 meters of any Turnout on Ballasted Track.

(iii) Turnout shall normally be installed on straight track. In exceptional situations, turnout may take off from curve provided that the radius of lead curve (main line as well as diverging line) is not less than 190 m. The negotiability of rolling stocks on such turnout must be certified by rolling stock supplier and confirmed through oscillation trial and a suitable speed restriction should be imposed on main and/or diverging line based on track geometry and other considerations, if required. In case of turnout installed on curved track, the minimum distance for commencement of vertical curve or another horizontal curve shall be 15 m for Ballastless track. Turnout shall not be laid on transition curve.

(iv) The limit of turnout for above purposes shall be taken from Stock Rail Joint (SRJ) to end (i.e. heel) of crossing for Ballastless track. For Ballasted track, it shall be from SRJ to last common sleeper behind end of crossing.

(v) The maximum permissible gradient on turnout and the location of turnout with respect to vertical / horizontal curves in vicinity shall be confirmed from rolling stock supplier for the negotiability of rolling stock.

(vi) The above stipulations shall also be applicable for turnout to be laid outside station limit, if any.

1.4 BUILDINGS AND STRUCTURES

1.4.1 Minimum horizontal distance from centre of track to any structure for heights above rail level on level/constant grade tangent track shall be as under:

(a) Under Ground Sections

(i) Circular tunnels

Height from rail level		Horizontal distance from C.L. of track
(i)	Up to 50 mm	1430 mm
(ii)	50 mm to 165 mm	1430 mm increasing to 1565 mm
(iii)	165 mm to 305 mm	1565 mm increasing to 1584 mm
(iv)	305 mm to 880 mm	1584 mm increasing to 1699 mm
(v)	880 mm to 1095 mm	1699 mm increasing to 1703 mm
(vi)	1095 mm to 1130 mm	1703 mm increasing to 1725 mm
(vii)	1130 mm to 2030 mm	1725 mm
(viii)	2030 mm to 3287 mm	1725 mm increasing to 1729 mm
(xi)	3287 mm to 3850 mm	1729 mm decreasing to 1387mm
(x)	3850 mm to 4883 mm	1387mm
(x)	4883 mm to 4970 mm	1387 mm decreasing to zero along an arc of radius 2800 mm

Also refer to Figure No. PMSG-2B (TNL)

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(ii) Rectangular Box Tunnels

	Height from rail level	Horizontal distance from C.L. of track
(i)	Up to 50 mm	1430 mm
(ii)	50 mm to 165 mm	1430 mm increasing to 1565 mm
(iii)	165 mm to 305 mm	1565 mm increasing to 1584 mm
(iv)	305 mm to 880 mm	1584 mm increasing to 1699 mm
(v)	880 mm to 1095 mm	1699 mm increasing to 1703 mm
(vi)	1095 mm to 1130 mm	1703 mm increasing to 1725 mm
(vii)	1130 mm to 2030 mm	1725 mm
(viii)	2030 mm to 3287 mm	1725 mm increasing to 1729 mm
(xi)	3287 mm to 3850 mm	1729 mm decreasing to 1387
(x)	3850 mm to 4838 mm	1387 mm

Also refer to Figure No. PMSG-2A (TNL)

(b) Elevated and At-Grade Sections

	Height from rail level	Horizontal distance from C.L. of track
(i)	Up to 50 mm	1480 mm
(ii)	50 mm to 165 mm	1480 mm increasing to 1615 mm
(iii)	165 mm to 880 mm	1615 mm increasing to 1749 mm
(iv)	880 mm to 1095 mm	1749 mm increasing to 1753 mm
(v)	1095 mm to 1130 mm	1753 increasing to 1788 mm
(vi)	1130 mm to 2030 mm	1788 mm
(vii)	2030 mm to 2876 mm	1788 mm increasing to 1808 mm
(viii)	2876 mm to 3296 mm	1808 mm
(ix)	3296 mm to 3775 mm	1808 mm decreasing to 1545 mm
(x)	3775 mm to 6250 mm	1545 mm

Also refer to Figure No. PMSG -2

Notes for (a) and (b) above:

(i) Extra allowance shall be provided for curves as laid down at para 1.7.

(ii) The term 'structure' covers any item including light ones like ladders, isolated posts, cables etc. erected alongside the track.

(iii) For passenger platform refer to para 2.2.1 to 2.2.3 of chapter 2.

(iv) Minimum Lateral clearance of OHE Mast shall be 2000 mm in Elevated sections and 2150 mm in At-grade and Depot sections for Tangent Track from centre line of track.

1.5 KINEMATIC ENVELOPE

The Kinematic Envelope for level or constant grade tangent track, refer to:

a) Figure No. PMSG-1 for At-Grade and Elevated Sections (Outside Station)
b) Figure No. PMSG-1 (TNL) for Under Ground Sections (Outside Station)
c) Figure No. PMSG-1A for At-Grade and Elevated Platform / PSD
d) Figure No. PMSG-1A (TNL) for Under Ground Platform / PSD

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1.6 STRUCTURE GAUGE

1.6.1 Under Ground Sections

The Structure Gauge (Fixed Structure Line) has been arrived at by allowing a minimum clearance of 100 mm to Kinematic Envelope and minimum electrical clearance of 270 mm from 25 KV AC live parts conforming to the stipulations in chapter- 4 of this SOD.

Refer to Figure No. PMSG-2A (TNL) and PMSG-2B (TNL) for Structure Gauge for Outside station on level or constant grade tangent track corresponding to minimum contact wire height of 4318 mm.

Note:

Extra allowance shall be provided for curves as laid down at para 1.7

1.6.2 Elevated Sections

The Structure Gauge (Fixed Structure Line) has been arrived at by allowing minimum clearance of 150 mm to Kinematic Envelope and minimum electrical clearance of 320 mm from 25 KV AC live parts conforming to the stipulations in chapter-4 of this SOD.

Refer to Figure No. PMSG-2, for Structure Gauge for outside stations on level or constant grade tangent track corresponding to minimum contact wire height of 5000 mm.

Note:

Extra allowance shall be provided for curves as laid down at para1.7

1.6.3 At-Grade Sections

The Structure Gauge (Fixed Structure Line) has been arrived at by allowing minimum clearance of 150 mm to Kinematic Envelope and minimum electrical clearance of 320 mm from 25 KV AC live parts, conforming to stipulations in chapter 4 of this SOD.

Refer to Figure No. PMSG-2, for Structure Gauge for outside stations on level or constant grade tangent track corresponding to minimum contact wire height of 5000 mm.

Note:

Extra clearance shall be provided for curves as laid down at para 1.7

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1.7 EXTRA CLEARANCES ON CURVES

Following are the extra allowances considered for curves.

Abbreviations used in para 1.7:

C is the distance between centres of bogies in metres,
C_1 is the coach (vehicle) length in metres,
R is the radius of curve in metres,
Ca is the Cant applied in mm,
h is the height from rail level in mm and
g is the distance between centres of rails in mm

1.7.1 INSIDE OF CURVE

(A) Curvature effect

(i) Mid throw at the center of the vehicle = V (in mm) = $125xC^2/R$
(ii) Allowance due to gauge widening on curves

For values of items (i) and (ii) above, refer to Appendix-2

Note:

In the Kinematic Envelope and as well as in Structure Gauge for Tangent Track, Lateral Shift of 26.0 mm due to nosing is already included. Accordingly,

(i) In case the value of Mid throw (V) is equal to or greater than 26.0 mm, lateral shift of 26.0 mm shall be subtracted from the total extra allowance worked out in para 1.7.1(A) above for inside of a curve.

(ii) In case the value of mid throw (V) is less than 26.0 mm, the extra allowances shall be as per Para 1.7.1 (A) (ii) only.

(B) Allowance for Super elevation

(a) **Under Ground (Box structures), Elevated and At-Grade Sections**

The lean 'L' due to Cant at any point at height 'h' above rail level is given by:

L = Ca x h/g (all in mm)

For values of Structure Gauge (E_1) for inside of a curve with Cant effect only, (as shown in Figure No. PMSG-4), refer to:

(i) Appendix -3 (TNL) for Under Ground Sections
(ii) Appendix -3 for At-Grade and Elevated Sections

(b) **Circular Tunnels**

In the case of Circular Tunnel, the cant is provided by raising the outer rail and suitably shifting the centre of the Circular Tunnel towards inside of curve and upwards. This has same effect as assuming rotation of the Circular Tunnel about mid point of top of inner rail resulting in shift of Tunnel centre laterally towards inside of curve and also vertically upwards.

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The Rigid OCS shall also be rotated with the tunnel so as to be along the centre line of canted track.

For values of horizontal and vertical shifts of centre of Circular Tunnel for different values of cant, refer to Appendix-4 and Figure No. PMSG-3

(C) Allowance for vertical curve (vertical throw)

Vertical Throw V_1 and V_2 (in mm) for vertical curve shall be calculated as under:

V_1 (with vehicle centre in sag or vehicle end on summit) = $125xC^2/R$

V_2 (with vehicle centre on summit or vehicle end in sag)

= $(125xC_1^2/R)-(125xC^2/R)$

Values of vertical throw due to vertical curves of different radii are given in Figure- PMSG-5.

1.7.2 OUTSIDE OF CURVE

(A) Curvature effect

i) End throw at the end of vehicle = Vo (in mm)
= $[125xC_1^2/R]-[125xC^2/R]$

ii) Allowance due to gauge widening on curves

iii) Additional nosing due to gauge widening on curves

The values of items (i) to (iii) are shown in Appendix-2

(B) Allowance for Super elevation

(a) **Under Ground (Box structures), Elevated and At-Grade Sections**

The lean 'L' due to Cant at any point at height 'h' above rail level is given by:

L = (-) Ca x h/g (all in mm)

-ve sign indicates relief due to cant or reduction in clearance required.

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Note:

Full relief for lean due to cant (Ca) is to be taken into account only for calculation of track spacing without any structure between tracks. In case there is a structure adjacent to track, relief for lean is to be taken into account only if the cant provided is greater than 50 mm and shall be limited to a value = (Ca - 50) x h/g.

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Values of Structure Gauge (F_1) on outside of curve with cant effect only (as shown in Figure No. PMSG-4), refer to:

i) Appendix 3 (TNL) for Under Ground Sections
ii) Appendix 3 for Elevated and At-Grade Sections

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(b) **Circular Tunnels**

In the case of Circular Tunnel, the cant is provided by raising the outer rail and suitably shifting the centre of the Circular Tunnel towards inside of curve and upwards. This has same effect as assuming rotation of the Circular Tunnel about mid point of top of inner rail resulting in shift of Tunnel centre laterally towards inside of curve and also vertically upwards.

The Rigid OCS shall also be rotated with the tunnel so as to be along the centre line of canted track.

For values of horizontal and vertical shifts of centre of Circular Tunnel for different values of cant, refer to Appendix-4 and Figure No. PMSG-3

(C) Allowance for vertical curve (vertical throw)

The provisions at para 1.7.1 (C) above shall be applicable in this case also.

1.8 MINIMUM TRACK SPACING ON CURVES

Under Ground, Elevated and At-Grade Sections
The worst case will be when the end of a bogie carriage on the inner track is opposite the centre of a similar carriage on the outer track.

1.8.1 Without any structure between tracks

The minimum track spacing on curves without any structure between tracks shall be the sum of the following:

i) (E + F),
ii) T_1 (Extra lateral allowance due to curvature on inside of curve)
iii) T_2 (Extra lateral allowance due to curvature on outside of curve)
iv) Minimum clearance between adjacent Kinematic Envelopes stipulated is as under:
   a) 300 mm for Under-Ground Sections
   b) 300 mm for Elevated and At-Grade Sections.

Where,

'E' is the distance from vertical axis of centre line of canted track to canted Kinematic Envelope on inside of curve at a height 'h' (from rail level) for a given cant (Figure No. PMSG-4A) and

'F' is the distance from vertical axis of centre line of canted track to canted Kinematic Envelope on outside of curve at a height 'h' (from rail level) for a given cant (Figure No. PMSG - 4A).

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Notes:

i) The value of 'F', calculated from the formula at Figure No. PMSG-4A includes full relief due to cant.

ii) The sum of 'E' and 'F' for same height (which are with cant effect only), shall be the maximum of values calculated for various heights from rail level.

For values of E, F, T_1 and T_2, refer to the Appendices as shown below:

SECTIONS	For E & F	For T_1 &T_2
i) Under Ground	3A (TNL)	2
ii) Elevated and At-Grade	3A.	2

1.8.2 With a structure between adjacent tracks

The minimum track spacing on curves with a structure between tracks shall be the sum of the following:

i) ($\mathbf{E_1}$ +$\mathbf{T_1}$) Minimum clearance to the structure from centre line of track on inside of curve (for outer track)

ii) ($\mathbf{F_1}$ +$\mathbf{T_2}$) Minimum clearance to the structure from centre line of track on outside of curve (for inner track)

iii) Width of structure between adjacent tracks (measured across the tracks)

Where,

$\mathbf{E_1}$ is the horizontal distance from vertical axis of centre line of track to canted Structure Gauge on inside of curve for a given cant,

$\mathbf{F_1}$ is the horizontal distance from vertical axis of centre line of track to canted Structure Gauge on outside of curve for a given cant,

$\mathbf{T_1}$ is extra lateral allowance due to curvature on inside of curve and

$\mathbf{T_2}$ is extra lateral allowance due to curvature on outside of curve

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Notes:

a) The values of '$\mathbf{E_1}$' and '$\mathbf{F_1}$' for a given cant Ca, shall each be the maximum of values at different heights of structure from rail level. In case the cant provided is greater than 50 mm on inner track, the value of $\mathbf{F_1}$ shall be for the cant of (Ca-50) mm. In case the cant provided is 50 mm or less on inner track, the value of F_1 shall be for ZERO cant.

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b) Minimum track spacing, so worked out with a structure between the adjacent tracks as per para 1.8.2 shall not be less than that calculated as per para 1.8.1 for tracks without any structure between adjacent tracks.

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For values of E_1, F_1, T_1 and T_2, refer to the Appendices as shown below:

SECTIONS	For E_1 & F_1	For T_1 & T_2
i) Under Ground	3(TNL)	2
ii) Elevated and At-Grade	3	2

1.9 CANT AND CANT DEFICIENCY

a) Maximum Cant Gradient = 1 in 440

b) Maximum Cant / Cant Excess = 110 mm

c) Desirable rate of change of Cant = 35 mm/sec

d) Maximum rate of change of Cant = 55 mm/sec

e) Desirable rate of change of Cant Deficiency = 35 mm/sec

f) Maximum rate of change of Cant Deficiency = 55 mm/sec

g) Maximum Cant Deficiency = 85 mm

h) Maximum unbalanced lateral acceleration = 0.55 m/s^2

1.10 DERAILMENT GUARD

(a) Derailment Guard shall be provided inside/outside of running rail on viaduct as well as in tunnel having multiple tracks and at grade section at locations specified by Metro Railway. In tunnel, the derailment guard should preferably be provided inside the track so that it permits less sway of coach towards tunnel wall in case of derailment. On Viaduct and At -Grade sections, the Derailment Guard should be provided on the outside of running rails.

(b) Lateral Clearance between the running rail and the derailment Guard shall be 210 ± 30 mm. It shall not be lower than 25 mm below the top of running rail and should be clear of the rail fastenings to permit installation, replacement and maintenance.

Note:

In case of single track tunnels, the derailment guards shall be provided:

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(i) Entry of tunnel: 200 m from tunnel portal outside the tunnel to 50 m inside the tunnel.

(ii) Exit of tunnel: 50 m from inside of tunnel portal to 200 m outside the tunnel.

(iii) In the curved track having radius 500 m or less including transition portion but excluding locations where check rail is provided.

(iv) Covering locations of all important installations e.g. location of any substation or hazardous structures inside the tunnel etc., damage to which in the assessment of Metro Rail administration can result into serious loss of life or/and infrastructure as a result of derailment in tunnel.

The above is subject to the condition that metro railway shall carry out the risk assessment analysis for derailment in tunnels and ensure that the maintenance practices in the maintenance manual are as per the risk assessment mitigation plan.

Additional Note:

In case of Double Resilient Base Plate Assembly Fastening System as approved by MoR, the lateral clearance between running rail and the derailment guard shall be 250 ± 20 mm. This fastening system, if used in tunnels having multiple tracks, Metro Administration should ensure that K.E. for adjacent track is not infringed so long as the wheels of any derailed vehicle are within the main rail and derailment guard and also the K.E. of derailed rolling Stock shall not have any infringement with the Structure Gauge.

1.11 EMERGENCY EVACUATION

For emergency evacuation of passengers, unobstructed clear pathways of minimum 610 mm width shall be provided.

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CHAPTER - 2

STATION

2.1 SPACING OF TRACKS AT STATIONS

Minimum spacing of tracks at station on straight and on curve of radius of 1000m and flatter, without any structure between tracks

At-Grade, Elevated and Under-Ground Stations..... 3900 mm

2.2 PLATFORMS

2.2.1 Maximum horizontal distance from centre of track to face of passenger platform coping

(i) For Elevated/At Grade section 1525 mm

(ii) For Underground section 1515 mm

2.2.2 Minimum horizontal distance from centre of track to face of passenger platform coping

(i) For Elevated/At Grade section 1520 mm

(ii) For Underground section 1510 mm

Notes:

a) Platform faces shall be flared away smoothly from the centre line of the track at either end for a distance of 1500 mm beyond passenger area/ at Platform end so as to give from centre of track a minimum dimension :

- 1575 ± 5 for Under Ground Stations
- 1590 ± 5 for At-Grade and Elevated Stations

b) For additional clearance for platforms on curves, refer to para 2.7.

2.2.3 Height above rail level for passenger platform:

	Maximum	Minimum
(a) At-Grade (Ballasted)	1085 mm	1075 mm
(b) Elevated & Underground (Ballastless)	1095 mm	1085 mm

2.2.4 (i) Minimum horizontal distance of any isolated structure on a passenger platform from the edge of coping except Platform Screen Doors/Platform Gates 2500 mm

ii) Minimum horizontal distance of any continuous structure on a passenger platform from the edge of coping except Platform Screen Doors/Platform Gates 3000 mm

Notes:

a) The Platform Gates (PG) may be installed at platform as per design of Original Equipment Manufacturer (OEM) of PG but shall have a minimum clearance of 10 mm from Kinematic Envelope.

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b) The structure on the platform is treated as isolated if the length along the platform length is 2000 mm or less. Any structure having a length exceeding 2000 mm is treated as continuous structure.

c) ~~The clocks /mirrors/CTV/LED/LCD Screens/PIDS (Passenger Information Display System) etc. shall not be considered structures and shall be located at a minimum horizontal distance of 1000 mm from platform edge/coping with minimum height of 2500 mm from platform surface.~~

d) For platform structure setting-out dimensions at stations, refer to figure No. PMSG-6 and PMSG-7 for Elevated / at grade station and PMSG-6 (TNL) and PMSG-7 (TNL) for underground station. ~~No fixed structures should infringe the Structure Gauge except for designated railway operational structures. Designated railway operational structures include platform coping, hand railing in back of house platform edge, Track Access Gates. Such designated railway operational structures should not infringe the Kinematic Envelope under any circumstances.~~

~~**Note :** Anything like above, hung from the Roof of Station shall be adequately secured and a safety loop is to be provided for taking care of incidences of failure of hanging arrangement.~~

2.2.5 For Structure Gauge at station platforms, refer to following figures:

a) For Under Ground Station : Figure No. PMSG-6 (TNL) & PMSG-7 (TNL)

b) For At-Grade and Elevated Stations : Figure No. PMSG-6 & PMSG-7

2.3 TRACK GRADIENT IN PLATFORM

(a) Desirable (recommended)	Level
(b) Maximum	1 in 1200
(c) Exceptional	1 in 400

Note: 1. There shall be no change of gradient within station platform track.

2. Any gradient steeper than 1 in 1200 and up to Exceptional gradient of 1 in 400 shall be proposed by Civil Engineering Head and approved by Managing Director in consultation with Head of Safety nominated by Metro Authority.

2.4 INTERLOCKING AND SIGNAL GEAR

Maximum height above rail level of any part of interlocking or signal gear on either side of centre of track subject to the restrictions embodied in Note below shall be as under:

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(a) For Under Ground Stations

- From CL of track to 1330 mm — 25 mm
- From 1330 mm to 1465 mm — 25 mm rising to 65 mm
- From 1465 mm to 1585 mm — 65 mm rising to 200 mm

(b) For Surface and Elevated Stations

- From C.L. of track to 1330 mm — 25 mm
- From 1330 mm to 1465 mm — 25 mm increasing to 65 mm
- From 1465 mm to 1640 mm — 65 mm increasing to 200 mm

Note:

Except for check rails of ordinary and diamond crossings, or wing rails and point rails of crossings leading to snag dead ends, or such parts of signalling gear as are required to be actuated by the wheels, no gear or track fittings shall project above rail level for a distance of 229 mm outside and 140 mm inside the gauge face of the rails.

2.5 POINTS & CROSSINGS

2.5.1	Maximum clearance of check rail opposite nose of crossing	44 mm
2.5.2	Minimum clearance of check rail opposite nose of crossings (Note : Check Rail Clearance has been calculated for the track Gauge 1435 mm +2 / -2 mm)	41 mm
2.5.3	Minimum clerance between switch rail and stock rail at heel of Switch Rail	52 mm
2.5.4	Maximum clearance of wing rail at nose of crossing	44 mm
2.5.5	Minimum clearance of wing rail at nose of crossings	41 mm
2.5.6	(i) Minimum clerance between toe of open switch and stock rail	157 mm
	(ii) Maximum clerance between toe of open switch and stock rail	163 mm
	Note: Point Machine shall be provided considering the requirement mentioned in para 2.5.6 (i) and (ii)	
2.5.7	Minimum radius of curvature for slip points, turnouts and crossover roads	190 metres

2.5.8 On main lines, the turnouts and diamond Crossings shall be of the following types or flatter:-

(a)	1 in 9 turnout	300 m radius
(b)	1 in 7 turnout	190 m radius
(c)	Scissors cross-over of 1 in 9 consisting of 4 turnouts and 1 diamond crossing	
(d)	Scissors cross-over of 1 in 7 consisting of 4 turnouts and 1 diamond crossing	

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2.5.9 On depot lines, the turnouts and diamond Crossings shall be of the following types or flatter-

(a) 1 in 7 turnout 190 m radius

(b) Scissors cross-over of 1 in 7 consisting of 4 turnouts and 1 diamond crossing

(c) 1 in 7 derailing switches/ 1 in 7 symmetrical split turnout

2.5.10 Diamond crossings not to be flatter than 1 in 4.5.

Note:

a) The above restrictions shall not apply to moveable diamond crossings

b) There must be no change of superelevation (of outer over inner rail) between points 18 metres outside toe of switch rail and nose of crossings respectively, except in the case of special crossing leading to snag dead-ends or under circumstances as provided for in item 2.6 below

2.5.11 Minimum length of tongue rail 9000 mm

2.6 SUPERELEVATION AND SPEED AT STATIONS ON CURVES WITH TURNOUTS OF CONTRARY AND SIMILAR FLEXURE

2.6.1 Main Line:

Subject to the permissible run through speed based on the standard of interlocking, the equilibrium superelevation, calculated for the speed of the fastest train may be reduced by a maximum amount of 85 mm without reducing speed on the main line.

2.6.2 Turnouts:

i) Curves of contrary flexure

The equilibrium superelevation (**s**) in mm should be $=(1510/127)(V^2 / R)$
Where, R = radius of turnout in metres and V is speed on turnout in Kmph.
The permissible negative superelevation on the turnout (which is also the actual superelevation of the main line) may then be = (85 – **s**) mm

ii) Curves of Similar flexure

The question of reduction or otherwise of superelevation on the main line must necessarily be determined by the administration concerned. In the case of a reverse curve close behind the crossing of a turnout, the superelevation may be run out at the maximum of 1 mm in 440 mm.

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2.7 ADDITIONAL CLEARANCE FOR PLATFORMS ON CURVES

The additional clearance for platforms on curves is to be provided as shown at appendix-5. There shall be no superelevation and gauge widening at stations on passenger platform lines.

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CHAPTER - 3
ROLLING STOCK

3.1 PASSENGER ELECTRIC MULTIPLE UNITS

1.	(a) Maximum Length of the coach body (over Couplers)	23000 mm
	(b) Maximum Length of the coach body	22150 mm
	(c) Maximum width of the coach body	2900 mm
	(d) Maximum Height of the coach body (With pantograph in locked down condition)	4048 mm
2.	(a) Distance between bogie centers*	14750±350 mm
	(b) Maximum distance apart between any two adjacent axles*	12900 mm
	(c) Length of rigid wheel base for single bogie*	2200 mm to 2400 mm

Note:

* The above dimensions a), b) & c) should commensurate to each other as per the design selected by Metro considering the maneuverability of the coach and the entire train on sharper curves and maximum gradient to avoid any infringement on the structure gauge.

3. Kinematic Envelope for level tangent track

(i)	For Underground Sections	Figure No. PMSG-1 (TNL), Rev.7
(ii)	For Underground Sections (At Platform)	Figure No. PMSG-1A (TNL),Rev 7
(iii)	For At-Grade and Elevated Sections	Figure No. PMSG-1, Rev.7
(iv)	For At-Grade and Elevated Sections (At Platform)	Figure No. PMSG-1A, Rev.7

(v) Same pantograph shall be used for underground and elevated corridors.

4 (a)	Minimum clearance from rail level under fully loaded condition for bogie mounted equipment in worst condition* (* The worst condition means wheels with maximum tread wear and primary springs with maximum deflection) in static condition.	65 mm
(b)	Minimum clearance from rail level under fully loaded condition for body mounted equipment in worst condition* (* The worst condition means deflated secondary air springs, wheels with maximum tread wear and primary springs with maximum deflection) in static condition.	102 mm

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(c) Minimum clearance from rail level, under dynamic Condition of fully loaded vehicle for bogie and body mounted equipment with maximum tread wear and primary springs with maximum deflection, with the exception of wheels & attachments there to (vide note below'#'). — 50 mm

Note:-

 # A tyre or an attachment to a wheel or sand pipes or Wheel/ Track Lubrication Nozzle and ODD rail guard in line with the wheel may project below the minimum height of 50mm *from a distance of* 51mm *inside to* 216 mm *outside of the gauge face of the wheel.*

5. Incline of Tread/ Wheel Profile — RDSO SK91146
   (Incline of Tread will be 1:20)

6. Wheel

	a)	Maximum wheel gauge back to back distance	1360 mm
	b)	Minimum wheel gauge back to back distance	1358 mm
7.	a)	Maximum diameter on the Wheel Tread (measured at 63.5 mm from wheel gauge face for RDSO SK91146 wheel profile)	860 mm
	b)	Minimum diameter on the Wheel Tread (measured at 63.5 mm from wheel gauge face for RDSO SK91146 wheel profile)	780 mm
8.	a)	Minimum projection for flange of new wheel measured from tread (measured from tread at 63.5 mm from wheel gauge face for RDSO SK91146 wheel profile)	28.5 mm
	b)	Maximum projection for flange of worn wheel measured from tread (measured from tread at 63.5 mm from wheel gauge face for RDSO SK91146 wheel profile)	34 mm
9.	a)	Maximum thickness of flange of wheel (measured from wheel gauge face at 13 mm from outer edge of flange for RDSO SK91146 wheel profile)	29.4 mm
	b)	Minimum thickness of flange of wheel (measured from wheel gauge face at 13 mm from outer edge of flange for RDSO SK91146 wheel profile)	25 mm

10. Minimum width of wheel for RDSO SK91146 wheel profile — 129 mm

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11.	Floor Height		
	a)	Maximum height above rail level for floor of any unloaded vehicle	1130 mm
	b)	Minimum height above rail level for floor of fully loaded normal vehicle	1100 mm
12.	a)	Maximum height of centre coupler above rail level for unloaded vehicle	815 mm
	b)	Minimum height of centre coupler above rail level for fully loaded vehicle	740 mm
13.	Maximum Axle Load		16 Ton

3.2 LOCOMOTIVES AND ENGINEERING SERVICE VEHICLES

Other items of rolling stock, viz shunting locomotives, OHE maintenance and inspection cars, emergency re-railing van, track machines, etc., used on PMRCL System (where these cars would be plying) shall conform with the Kinematic Envelope of the Passenger Electric Multiple Units as shown in Figure No. PMSG-1 (TNL) Rev. 7 and PMSG-1A (TNL) Rev. 7 for underground sections and stations respectively and Figure No. PMSG-1 Rev. 7 and PMSG-1A Rev. 7 for Elevated and At Grade sections and stations respectively.

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CHAPTER - 4

OVERHEAD ELECTRIC TRACTION 25 KV AC 50 CYCLES PER SECOND

4.1 ELECTRICAL CLEARANCES FOR UNDER GROUND

4.1.1 Minimum height form rail level to the underside of Wearing Copper / Metal Conductor of Rigid OCS (Overhead Contact System) in Tunnel .....4318 mm

4.1.2 Stagger of Rigid OCS Conductor in Tunnels shall not be more than

(a) On Straight .....± 200 mm
(b) On Curves .....± 300 mm

4.1.3 Prescribed minimum clearance between live parts of contact lines and bodies of structures.

Air clearance between bodies of structures and live un-insulated parts of contact lines, feeders and current collectors for 25 KV AC shall be as under:

	Condition	Minimum clearance between live parts and structures	Absolute minimum dynamic clearance between live parts and structures
a)	Long duration (Static)	270 mm	-
b)	Short Duration (Dynamic)	170 mm	150 mm*

*in exceptional cases and considering operating in climatic conditions. (Ref. IEC 60913)

4.1.4 Prescribed minimum clearance between live parts of contact lines and the bodies of vehicles

Minimum Air clearance between bodies of vehicles and the live un-insulated parts of the contact line or feeders for 25 KV AC shall be as below:

	Condition	**Clearance (mm)**
a)	Long duration (Static)	290 mm
b)	Short Duration (Dynamic)	190 mm

4.1.5 Maximum width of Pantograph – Under dynamic condition

The Kinematic Envelope for the underground system with Ballastless track is shown in figure PMSG-1 (TNL), the pantograph adopted should be such that its actual half K.E. width does not exceed 820 mm and 980 mm at the top and bottom respectively in the pantograph raised condition for a contact wire height of 4318 mm to fulfil electrical clearance as per para 4.1.3

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Notes:

a) At the Transition portion between underground sections and elevated sections, the height of the contact wire shall be increased gradually and maintained between 4318 mm to 5000 mm.

b) In the Depot deck portion, where Rigid OCS is provided and the track is Ballastless, the Electrical clearances laid down at paras 4.1.1 to 4.1.4 shall be applicable.

c) For the location of rigid OCS in circular tunnel with canted track, refer to para 1.7.1 (B)-b and 1.7.2 (B)-b of SOD for 2900 mm Rolling Stock of Patna Metro.

d) It shall be ensured that environmental level inside the tunnel is controlled suitably so that no extra air clearance, over and above the minimum separation prescribed in para 4.1.3 and 4.1.4 on account of pollution, fog etc. is required.

e) The limits of Para 4.1.5 would not apply to special locations like insulated overlaps and out-of-run wires.

4.2 ELECTRICAL CLEARANCES FOR AT-GRADE AND ELEVATED SECTIONS

4.2.1 Minimum vertical distance between any live bare conductor (Overhead equipment or Pantograph) and any earthed structure or other bodies (Rolling stock, Over bridge, Signal gantries etc.)

	Condition	For Flexible OHE
(a)	Long duration (Static)	320 mm
(b)	Short Duration (Dynamic)	270 mm

Note:

A minimum vertical distance of 340 mm shall normally be provided between rolling stock and contact wire to allow for a 20 mm temporary raising of the tracks during maintenance. Wherever the allowance required for track maintenance exceeds 20 mm, the vertical distance between rolling stock and contact wire shall correspondingly be increased.

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4.2.2 Minimum lateral distance between any bare live conductor (Overhead equipment or Pantograph) or any earthed structure or other bodies (Rolling stock, Over bridge, Signal gantries etc.)

	Condition	For Flexible OHE
(a)	Long duration (Static)	320 mm
(b)	Short Duration (Dynamic)	220 mm

4.2.3 Height of contact wire:

Minimum height from rail level to the underside of live Conductor wire

(i) In the open (Elevated & At grade sections) .....5000 mm

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(ii) Under the bridges/Heavy Structures.....4388 mm

(iii) In running and carriage sheds wherever staff are expected to work on the roof of the rolling stock in Depot.....5200 mm

Note:

1) Contact wire height from the bridge portion to the open section shall change gradually and be maintained between 4388 mm to 5000 mm.

2) On curves, all vertical distance specified in items 4.2.3 above shall be measured above level of the inner rail, increased by half the super elevation.

3) Movement of Over Dimensional Consignment in vicinity of 25kV AC Traction & Power Supply System is not permitted.

4.2.4 Maximum variation of the live conductor wire on either side of the centre line of the track under static conditions:

(i) On straight..... ± 200mm

(ii) On Curves ..... ± 300mm

Note:

These limits would not apply to special location like insulated overlaps and out of run wires.

4.2.5 The clearance under Power Line crossing in Territory of 25 KV AC Traction & Power Supply System of Patna Metro, are as under:

Following minimum clearances need to be ensured:

1.0	Clearance for power line crossings including telephone line crossings of Railway tracks.	
1.1	Minimum Clearance from Rail Level for New Power Line Crossing or Crossing Planned for Alteration	
	1. Up to and including 11 KV	Underground
	2. Above 11 KV and up to 33 KV	
	3. Above 33 KV and up to 66 KV	
	4. Above 66 KV and up to 132 KV	15560
	5. Above 132 KV and up to 220 KV	16460
	6. Above 220 KV and up to 400 KV	18260
	7. Above 400 KV and up to 500 KV	19160
	8. Above 500 KV and up to 800 KV	21860
1.2	Minimum Clearance Between Highest Traction Conductor and lowest transmission Line Crossing Conductor	
	1. Up to and including 11 KV	Underground
	2. Above 11 KV and up to 33 KV	
	3. Above 33 KV and up to 66 KV	
	4. Above 66 KV and up to 132 KV	3050
	5. Above 132 KV and up to 220 KV	4580
	6. Above 220 KV and up to 400 KV	5490
	7. Above 400 KV and up to 500 KV	7940
	8. Above 500 KV and up to 800 KV	7940
1.3	Minimum Clearance between any conductor not adequately insulated and any	

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	railway structure under most adverse condition	
	1. Up to and including 650 Volts	2500
	2. Above 650 volts up to and including 33 KV	3700
	3. Above 33 KV up to and including 66 KV	4000
	4. Above 66 KV up to and including 132 KV	4600
	5. Above 132 KV up to and including 165 KV	4900
	6. Above 165 KV up to and including 220 KV	5500
	7. Above 220 KV up to and including 400 KV	7300
	8. Above 400 KV up to and including 500 KV	8200
	9. Above 500 KV up to and including 800 KV	10900
1.4	Minimum height above rail level for telegraph, telephone and other such low-tension wires crossing a railway:	Underground

Note:
a) All heights/clearances are in mm and under maximum sag conditions.
b) If the crossing is provided with a guarding, a minimum clearance of 2000 mm shall be maintained between bottom of the guard wire and the highest traction conductor
c) Power line crossing in yards stations area shall be avoided.

4.2.6	The minimum horizontal distance measured at right- angle to, and from the centre of nearest track to any part of the structure above ground level, carrying electrical conductor crossing a railway line shall be:	3m, or 1.5m away from the toe of embankment/top of cutting, whichever is more.

Note: 1
The structure shall be a "rigid well-founded structure".
Rigid well-founded post/ structure: Any post/structure which is so constructed or guyed as to remain in a vertical position, or failing this to continue to provide the minimum horizontal clearances of 2.135m from the centre of the nearest track, with one or all of the conductors broken or with its conductors attached, when subjected to maximum wind pressure, shall be considered to be a "rigid well-founded post/structure".
The rigid well-founded post/structures, at a distance equal to or more than 3m from the centre of the nearest track as given above, but less than (H+2.135) m, shall be inspected by metros nominated electrical official once in a year jointly with the owner of the post/structure and certify the safety of the structure, keeping appropriate records of inspections. Where, 'H' is the height of post/structure from nearest ground level.

Note:2

If the post/ structure carrying electrical conductors crossing a metro line, is not rigid and well-founded, then the minimum horizontal distance, measured at right angles from the centre of nearest track, shall be equal to height of post/structure above ground level plus 2.135m

4.2.7 The Kinematic Envelope with the size of Pantograph adopted shall be within the Kinematic Envelope shown at figure No. PMSG-1.

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

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28/8/2025
Railway Board

General Manager

CHAPTER - 5

PLATFORM SCREEN DOOR/PLATFORM GATE

5.1 PLATFORM SCREEN DOOR/PLATFORM GATE SETTING OUT DIMENSIONS:

Minimum Platform Screen Door/Platform Gate Width (clear opening)	2000 mm
Minimum Platform Screen Door/Platform Gate Height from PF level	1500 mm
Minimum Platform threshold offset from track centerline - straight track (Underground)	1510 mm
Minimum Platform Screen Door/Platform gate panel offset from track centerline - straight track (Underground)	1525 mm
Minimum Platform threshold offset from track centerline -straight track (Elevated/At Grade)	1520 mm
Minimum Platform Screen Door/Platform gate panel offset from track centerline - straight track (Elevated/At Grade)	1545 mm
Train Stopping Accuracy	± 300 mm

Note:

a) The clearance of Platform Screen Doors/Platform Gates at stations on curves shall be as per Appendix-5.

b) The deflector (if provided) attached to the bottom of sliding door shall be designed in order not to protrude beyond the door threshold.

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

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Railway Board

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Appendix -1

PERMISSIBLE SPEED, CANT AND MINIMUM TRACK SPACING ON CURVES

UNDER GROUND (TUNNELS), ELEVATED AND AT-GRADE SECTIONS

(REFERENCE: PARA 1.1)

RADIUS OF CURVE	CANT	MAXIMUM PERMISSIBLE SPEED	MINIMUM DISTANCE BETWEEN ADJACENT TRACKS See note (a)	
			UNDER GROUND	ELEVATED AND AT- GRADE
metres	mm	kmph	mm	mm
1	2	3	4	5
≥ 3000	15	80	3560	3650
2800	15	80	3560	3650
2400	20	80	3560	3650
2000	20	80	3560	3650
1600	25	80	3560	3650
1500	30	80	3560	3650
1200	35	80	3560	3650
1000	45	80	3560	3700
800	55	80	3600	3700
600	70	80	3600	3750
500	85	80	3650	3750
450	95	80	3650	3800
400	105	80	3700	3800
350	110	75	3700	3800
300	110	70	3750	3850
200	110	55	3850	3950
150*	110	50	4000	4050
150*	0	25	4000	4050
120*	110	45	4000	4150
120*	0	25	4000	4150
100	0	25	4100	4200

Notes:

(a) The track spacing shown in the table above is without any column/structure between two tracks and is with equal cant for both outer and inner tracks.

(b) Track spacing shown in Table above is not applicable to stations which should be calculated depending on specific requirement, but should not be less than as specified in para 2.1

(c) Figures for any intermediate radius of curvature may be obtained by adopting the value for sharper curve.

(d) Cant provided is limited to desirable value of 110 mm.

(e) Maximum cant deficiency is 85 mm.

(f) The track laid in Depots shall be without Cant where the speed is restricted to 25 kmph. The curve of radii 150 m and 120 m with Zero Cant are used in Depot and Depot connection.

(g) The minimum radius of curve shall be kept as per para 1.2 of SOD. The radius for less than 120 m can be provided in Depot with Zero Cant.

(h) The permissible speed in column 3 is 10% lower the Design speed.

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RDSO, Lucknow

Ajay Kumar

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APPENDIX-2

EXTRA HORIZONTAL ALLOWANCE ON CURVES
(CURVATURE EFFECT)
INSIDE OF CURVE

REFERENCE: PARA 1.7.1

RADIUS (metres) R	MID-THROW (28500/R) (mm) (V)	NOSING INCLUDED IN K.E/ STRUCTURE GAUGE FOR TANGENT TRACK (mm) (N)	EXTRA GAUGE TOLERANCE ON CURVES (mm) (G)	EXTRA HORIZONTAL ALLOWANCE ON CURVE (mm) (T_1)	REMARKS
100	285.0	26.0	9.0	268	
120	237.5	26.0	9.0	221	
150	190.0	26.0	9.0	173	
175	162.9	26.0	9.0	146	
200	142.5	26.0	9.0	126	
250	114.0	26.0	9.0	97	(G) EXTRA GAUGE TOLERANCE ON CURVES SHARPER THAN 1000 M RADIUS: 9 mm FOR CURVES WITH RADIUS SHARPER THAN 500 M AND 5mm FOR CURVES WITH RADIUS OF 500 M TO LESS THAN 1000M.
300	95.0	26.0	9.0	78	
350	81.4	26.0	9.0	64	
400	71.3	26.0	9.0	54	
450	63.3	26.0	9.0	46	
500	57.0	26.0	5.0	36	
600	47.5	26.0	5.0	27	
700	40.7	26.0	5.0	20	
800	35.6	26.0	5.0	15	
900	31.7	26.0	5.0	11	
1000	28.5	26.0	0.0	0 to 3	**T_1=V-N+G for V EQUAL TO OR GREATER THAN (N) AND T1= G for V < (N)**
1200	23.8	26.0	0.0	0 to 3	
1500	19.0	26.0	0.0	0 to 3	
1600	17.8	26.0	0.0	0 to 3	
2000	14.3	26.0	0.0	0 to 3	
2400	11.9	26.0	0.0	0 to 3	
2800	10.2	26.0	0.0	0 to 3	
3000 or more	9.5	26.0	0.0	0 to 3	

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Mid throw (in mm) V = (125 x C^2) /R= 28500/R
Where 'C' is the distance between bogie centers = 14.750+0.350=15.100m **OR** 14.750 - 0.350=14.400 m. .
The worst case will be with C=15.100 m
R is the radius of curve in metres.
Mid throw (in mm) V = (125 x C^2) /R= 28500/R

OUTSIDE OF CURVE

REFERENCE PARA 1.7.2

RADIUS (metres) R	END-THROW (35407/R) (mm) Vo	EXTRA GAUGE TOLERANCE ON CURVES (mm) G	EXTRA NOSING DUE TO EXTRA GAUGE TOLERANCE (mm) (EN)	EXTRA HORIZONTAL ALLOWANCE ON CURVE (mm) T_2	REMARKS
100	354.1	9	2.3	365	
120	295.1	9.0	2.3	306	
150	236.0	9.0	2.3	247	
175	202.3	9.0	2.3	214	
200	177.0	9.0	2.3	188	
250	141.6	9.0	2.3	153	
300	118.0	9.0	2.3	129	(G) EXTRA GAUGE TOLERANCE ON CURVES SHARPER THAN 1000 M RADIUS: 9 mm FOR CURVES WITH RADIUS SHARPER THAN 500 M AND 5mm FOR CURVES WITH RADIUS OF 500 M TO LESS THAN 1000M.
350	101.2	9.0	2.3	112	
400	88.5	9.0	2.3	100	
450	78.7	9.0	2.3	90	
500	70.8	5.0	1.3	77	
600	59.0	5.0	1.3	65	
700	50.6	5.0	1.3	57	
800	44.3	5.0	1.3	51	
900	39.3	5.0	1.3	46	
1000	35.4	0.0	0.0	35	
1200	29.5	0.0	0.0	30	**T_2=Vo+G+EN**
1500	23.6	0.0	0.0	24	
1600	22.1	0.0	0.0	22	**EN=Gx0.25555555**
2000	17.7	0.0	0.0	18	
2400	14.8	0.0	0.0	15	
2800	12.6	0.0	0.0	13	
3000 or more	11.8	0.0	0.0	12	

Project Directorate Railway Board
Ajay Kumar Agarwal on 28/8/2025

End Throw (in mm) Vo= (125 x $C_1{}^2$) /R - (125xC^2)/R = 35407/R

Where 'C' is the distance between bogie centers = 14.750+0.350=15.100m OR 14.750-0.350=14.400m .

Worst case will be with C=14.400

'C_1' is length of coach in meters = 22.150 m and 'R' is radius of curve in meters.

Examined and found in order
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RDSO, Lucknow

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APPENDIX-3

CANT EFFECT ON STRUCTURE GAUGE-HORIZONTAL
AT-GRADE AND ELEVATED
REFERENCE: PARA 1.8.2

ALL FIGURES ARE IN mm

Height above rail level measured perpendicular to plane of track. Distance from center line of track to Gauge for tangent track. Structure →					h= 305 ab= 1621				h= 880 ab= 1749				h= 1095 ab= 1749				h= 1130 ab= 1788				h= 2030 ab= 1788				h= 3296 ab= 1808				h= 3775 ab= 1545				h= 6250 ab= 1545			
Cant	Angle α Degrees	Sin α	cos α	tan α	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2
110	4.178	0.073	0.997	0.073	1639	1595	478	242	1809	1681	1061	806	1825	1665	1275	1020	1866	1701	1313	1052	1932	1636	2210	1950	2044	1564	3474	3211	1816	1266	3933	3708	1997	1086	6401	6176
105	3.987	0.070	0.998	0.070	1639	1596	470	245	1806	1684	1052	809	1821	1669	1267	1024	1863	1706	1305	1056	1925	1643	2202	1954	2033	1575	3467	3215	1804	1279	3926	3711	1976	1107	6395	6180
100	3.797	0.066	0.998	0.066	1638	1598	462	247	1804	1687	1044	813	1818	1673	1259	1027	1859	1710	1296	1060	1919	1650	2194	1958	2023	1586	3459	3220	1792	1292	3920	3715	1956	1128	6389	6184
95	3.607	0.063	0.998	0.063	1637	1599	454	250	1801	1691	1036	816	1815	1677	1251	1031	1856	1714	1288	1063	1913	1657	2186	1961	2012	1598	3451	3224	1780	1305	3913	3718	1936	1149	6383	6188
90	3.417	0.060	0.998	0.060	1637	1600	447	253	1799	1694	1028	820	1812	1681	1243	1034	1853	1718	1280	1067	1906	1664	2178	1965	2002	1609	3443	3228	1768	1318	3906	3722	1915	1170	6376	6192
85	3.227	0.056	0.998	0.056	1636	1602	439	256	1796	1697	1020	823	1808	1685	1235	1038	1849	1722	1272	1071	1900	1671	2170	1969	1991	1620	3436	3232	1756	1331	3899	3725	1895	1191	6370	6196
80	3.037	0.053	0.999	0.053	1635	1603	431	259	1794	1700	1012	827	1805	1689	1227	1041	1846	1726	1264	1074	1894	1678	2162	1973	1981	1631	3428	3236	1743	1343	3892	3728	1874	1212	6364	6200
75	2.847	0.050	0.999	0.050	1635	1604	423	262	1791	1704	1004	830	1802	1693	1219	1045	1842	1730	1255	1078	1887	1685	2154	1977	1970	1643	3420	3240	1731	1356	3885	3732	1854	1233	6357	6204
70	2.657	0.046	0.999	0.046	1634	1606	415	265	1788	1707	996	833	1798	1697	1210	1048	1839	1734	1247	1081	1881	1692	2146	1980	1959	1654	3412	3244	1719	1369	3878	3735	1834	1254	6350	6207
65	2.467	0.043	0.999	0.043	1633	1607	407	268	1786	1710	987	837	1795	1701	1202	1052	1835	1738	1239	1085	1874	1699	2138	1984	1949	1665	3404	3248	1707	1382	3871	3738	1813	1275	6344	6211
60	2.277	0.040	0.999	0.040	1632	1608	400	271	1783	1713	979	840	1792	1705	1194	1055	1832	1742	1231	1089	1868	1706	2130	1988	1938	1676	3396	3252	1694	1394	3864	3741	1793	1296	6337	6214
55	2.087	0.036	0.999	0.036	1632	1609	392	274	1780	1716	971	844	1788	1708	1186	1059	1828	1746	1222	1092	1861	1713	2122	1992	1927	1687	3388	3256	1682	1407	3857	3744	1772	1317	6330	6218
50	1.898	0.033	0.999	0.033	1631	1611	384	277	1778	1719	963	847	1785	1712	1178	1062	1825	1750	1214	1096	1855	1720	2114	1995	1917	1698	3380	3260	1670	1420	3850	3747	1752	1338	6323	6221
45	1.708	0.030	1.000	0.030	1630	1612	376	280	1775	1722	955	850	1781	1716	1170	1065	1821	1754	1206	1099	1848	1727	2105	1999	1906	1709	3371	3264	1657	1432	3842	3750	1731	1359	6316	6224
40	1.518	0.026	1.000	0.026	1629	1613	368	282	1772	1726	947	854	1778	1720	1161	1069	1818	1758	1197	1103	1842	1734	2097	2002	1895	1721	3363	3267	1645	1445	3835	3753	1711	1379	6309	6227
35	1.328	0.023	1.000	0.023	1628	1614	360	285	1769	1729	938	857	1774	1724	1153	1072	1814	1762	1189	1106	1835	1741	2089	2006	1884	1732	3355	3271	1633	1458	3828	3756	1690	1400	6302	6231
30	1.138	0.020	1.000	0.020	1627	1615	353	288	1767	1732	930	861	1771	1727	1145	1076	1811	1766	1181	1110	1828	1748	2081	2010	1874	1743	3347	3275	1620	1470	3820	3759	1669	1421	6295	6234
25	0.949	0.017	1.000	0.017	1626	1616	345	291	1764	1735	922	864	1767	1731	1137	1079	1807	1770	1172	1113	1822	1755	2072	2013	1863	1754	3338	3279	1608	1483	3813	3762	1649	1442	6288	6237
20	0.759	0.013	1.000	0.013	1625	1617	337	294	1761	1738	914	867	1764	1735	1129	1082	1803	1773	1164	1117	1815	1761	2064	2017	1852	1765	3330	3282	1595	1495	3806	3765	1628	1463	6280	6239
15	0.569	0.010	1.000	0.010	1624	1618	329	297	1758	1741	905	871	1760	1739	1120	1086	1800	1777	1156	1120	1809	1768	2056	2020	1841	1776	3322	3286	1583	1508	3798	3767	1608	1483	6273	6242
10	0.379	0.007	1.000	0.007	1623	1619	321	300	1755	1744	897	874	1757	1742	1112	1089	1796	1781	1147	1124	1802	1775	2047	2024	1830	1787	3313	3289	1570	1520	3791	3770	1587	1504	6266	6245
5	0.190	0.003	1.000	0.003	1623	1620	313	303	1752	1747	889	877	1753	1746	1104	1092	1792	1785	1139	1127	1795	1782	2039	2027	1819	1798	3305	3293	1558	1533	3783	3773	1566	1525	6258	6248
0	0.000	0.000	1.000	0.000	1621	1621	305	305	1749	1749	880	880	1749	1749	1095	1095	1788	1788	1130	1130	1788	1788	2030	2030	1808	1808	3296	3296	1545	1545	3775	3775	1545	1545	6250	6250

REFER TO FIGURE: PMSG-

E_1=[ab+(h x tan α)] x cos α

F_1=[Ab- (h x tan α)] x cos α

H_1=(Ca/2)+(h / cos α)+(Ab-h x tan α)xsin α

H_2=(Ca/2)+(h/ cos α)-(ab+h x tan α)xsin α

ab=Ab=Distance from center line of vehicle to Structure gauge for Tangent track at height 'h' from rail level

ac=Distance from center line of canted track to Structure Gauge for Tangent track at height 'h' from rail level

bc=hxtanα=Lateral increment due to cant (measured along the line parallel to line joining top of rails).

NOTE: Value of Cant effect at any other location will be calculated by the above formula

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

Project Directorate
Approved
28/8/25
Railway Board

12/08/2025
Vikash Ranjan
General Manager
Delhi

Ajay Kumar
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APPENDIX-3 (TNL)

CANT EFFECT ON STRUCTURE GAUGE-HORIZONTAL
UNDER GROUND SECTIONS (Rectangular Box Tunnel)
REFERENCE: PARA 1.8.2

ALL FIGURES ARE IN mm

Height above rail level measured perpendicular to plane of track ⟶ / Distance from center line of track to Structure Gauge for tangent track. ⟶					h= 165 ab= 1565				h= 305 ab= 1584				h= 880 ab= 1699				h= 1095 ab= 1725				h= 1130 ab= 1725				h= 2030 ab= 1725				h= 3287 ab= 1729				h= 3850 ab= 1220				h= 4838 ab= 1387			
Cant	Angle α	Sin α	cos α	tan α	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2	E_1	F_1	H_1	H_2
110	4.178	0.073	0.997	0.07304	1573	1549	334	106	1603	1558	475	244	1759	1631	1057	809	1801	1641	1273	1022	1803	1639	1308	1057	1869	1573	2206	1954	1964	1485	3460	3208	1498	937	3984	3806	1736	1031	4982	4780
105	3.987	0.070	0.998	0.06971	1573	1550	326	109	1602	1559	467	247	1757	1634	1049	813	1797	1645	1265	1025	1800	1643	1300	1060	1862	1580	2198	1958	1954	1497	3452	3212	1485	950	3979	3809	1721	1048	4976	4783
100	3.797	0.066	0.998	0.06637	1573	1551	319	111	1601	1561	460	250	1754	1637	1041	816	1794	1649	1257	1029	1797	1647	1292	1064	1856	1587	2190	1962	1943	1508	3445	3216	1473	963	3973	3811	1705	1064	4970	4786
95	3.607	0.063	0.998	0.06304	1573	1552	311	114	1601	1562	452	253	1751	1641	1033	819	1791	1653	1249	1032	1793	1651	1284	1067	1850	1594	2183	1965	1933	1519	3437	3220	1460	976	3967	3814	1689	1080	4964	4789
90	3.417	0.060	0.998	0.05971	1573	1553	303	117	1600	1564	444	256	1749	1644	1025	823	1788	1657	1241	1036	1790	1655	1276	1071	1843	1601	2175	1969	1922	1531	3430	3224	1448	989	3961	3816	1673	1097	4958	4792
85	3.227	0.056	0.998	0.05638	1572	1554	296	120	1599	1565	437	258	1746	1647	1017	826	1784	1661	1233	1039	1786	1659	1268	1074	1837	1608	2167	1973	1912	1542	3422	3227	1435	1002	3956	3818	1658	1113	4951	4795
80	3.037	0.053	0.999	0.05305	1572	1555	288	122	1598	1566	429	261	1744	1650	1009	829	1781	1665	1225	1043	1783	1663	1260	1078	1831	1616	2159	1976	1901	1553	3414	3231	1423	1015	3950	3820	1642	1129	4945	4798
75	2.847	0.050	0.999	0.04973	1572	1555	281	125	1598	1567	421	264	1741	1654	1001	833	1778	1669	1217	1046	1779	1667	1252	1081	1824	1623	2151	1980	1891	1564	3407	3235	1410	1028	3944	3823	1626	1145	4939	4801
70	2.657	0.046	0.999	0.04641	1571	1556	273	128	1597	1569	414	267	1738	1657	993	836	1774	1673	1209	1049	1776	1671	1244	1084	1818	1630	2143	1983	1880	1575	3399	3239	1398	1041	3938	3825	1610	1162	4933	4804
65	2.467	0.043	0.999	0.04309	1571	1557	265	130	1596	1570	406	270	1736	1660	985	839	1771	1677	1201	1053	1773	1675	1236	1088	1811	1637	2135	1987	1869	1586	3391	3243	1385	1054	3932	3827	1594	1178	4926	4807
60	2.277	0.040	0.999	0.03977	1571	1558	258	133	1595	1571	398	272	1733	1663	977	842	1768	1681	1193	1056	1769	1679	1228	1091	1805	1643	2127	1990	1859	1598	3384	3246	1373	1067	3926	3829	1579	1194	4920	4810
55	2.087	0.036	0.999	0.03645	1570	1558	250	136	1595	1572	390	275	1730	1666	969	846	1764	1684	1185	1059	1766	1683	1220	1094	1798	1650	2119	1994	1848	1609	3376	3250	1360	1079	3920	3831	1563	1210	4913	4812
50	1.898	0.033	0.999	0.03313	1570	1559	242	139	1594	1574	383	278	1728	1669	961	849	1761	1688	1177	1063	1762	1687	1212	1098	1792	1657	2112	1997	1837	1620	3368	3253	1347	1092	3914	3833	1547	1227	4907	4815
45	1.708	0.030	1.000	0.02981	1570	1560	235	141	1593	1575	375	281	1725	1673	953	852	1757	1692	1169	1066	1758	1691	1204	1101	1785	1664	2104	2001	1827	1631	3360	3257	1335	1105	3908	3835	1531	1243	4900	4818
40	1.518	0.026	1.000	0.0265	1569	1561	227	144	1592	1576	367	283	1722	1676	945	855	1754	1696	1161	1069	1755	1695	1196	1104	1779	1671	2095	2004	1816	1642	3352	3261	1322	1118	3901	3837	1515	1259	4894	4820
35	1.328	0.023	1.000	0.02319	1569	1561	219	147	1591	1577	360	286	1719	1679	937	858	1750	1700	1153	1073	1751	1699	1188	1108	1772	1678	2087	2007	1805	1653	3344	3264	1309	1131	3895	3839	1499	1275	4887	4823
30	1.138	0.020	1.000	0.01987	1568	1562	212	149	1590	1578	352	289	1717	1682	929	862	1747	1703	1145	1076	1748	1703	1180	1111	1765	1685	2079	2011	1794	1664	3336	3268	1297	1144	3889	3841	1483	1291	4880	4825
25	0.949	0.017	1.000	0.01656	1568	1563	204	152	1589	1579	344	292	1714	1685	921	865	1743	1707	1136	1079	1744	1707	1171	1114	1759	1692	2071	2014	1784	1675	3328	3271	1284	1157	3883	3842	1467	1307	4873	4827
20	0.759	0.013	1.000	0.01325	1568	1563	196	155	1588	1580	336	294	1711	1688	913	868	1740	1711	1128	1083	1740	1710	1163	1118	1752	1698	2063	2017	1773	1686	3320	3274	1271	1169	3876	3844	1451	1323	4866	4830
15	0.569	0.010	1.000	0.00993	1567	1564	189	157	1587	1581	329	297	1708	1691	905	871	1736	1715	1120	1086	1737	1714	1155	1121	1746	1705	2055	2021	1762	1697	3312	3278	1259	1182	3870	3846	1435	1339	4860	4832
10	0.379	0.007	1.000	0.00662	1567	1564	181	160	1586	1582	321	300	1705	1694	897	874	1733	1718	1112	1089	1733	1718	1147	1124	1739	1712	2047	2024	1751	1708	3304	3281	1246	1195	3863	3847	1420	1355	4853	4834
5	0.190	0.003	1.000	0.00331	1566	1565	173	163	1586	1583	313	303	1702	1697	889	877	1729	1722	1104	1092	1729	1722	1139	1127	1732	1719	2039	2027	1740	1719	3296	3284	1233	1208	3857	3849	1404	1371	4846	4836
0	0.000	0.000	1.000	0	1565	1565	165	165	1584	1584	305	305	1699	1699	880	880	1725	1725	1095	1095	1725	1725	1130	1130	1725	1725	2030	2030	1729	1729	3287	3287	1220	1220	3850	3850	1387	1387	4838	4838

REFER TO FIGURE: PMSG-2 A (TNL)

E_1=[ab+(h x tan α)] x cos α

F_1=[Ab- (h x tan α)] x cos α

H_1=(Ca/2)+(h / cos α)+(Ab-h x tan α)xsin α

H_2=(Ca/2)+(h/ cos α)-(ab+h x tan α)xsin α

ab=Ab=Distance from center line of vehicle to Structure gauge for Tangent track at height 'h' from rail level

ac=Distance from center line of canted tack to Structure Gauge for Tangent track at height 'h' from rail level.

bc=hxtanα=Lateral increment due to cant (measured along the line parallel to line joining top of rails).

NOTE: Value of Cant effect at any other location will be calculated by the above formula

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

Ajay Kumar
Digitally signed by Ajay Kumar
Date: 2025.08.12 16:23:03 +05'30'

Project Directorate
Approved on
28/8/25
Railway Board

11/08/2025
Vikash Ranjan
General Manager
Rolling Stock (O&M)

File No./2025/Proj./PMRCL/SOD/30/11 (Computer No. 3485030)
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APPENDIX-3A

CANT EFFECT ON KINEMATIC ENVELOPE-HORIZONTAL

AT-GRADE AND ELEVATED SECTIONS

REF: PARA 1.8.1

Height above rail level measured perpendicular to plane of track → / Distance from center line of track to K.E for tangent track. →					h= 165 ab= 1465				h= 880 ab= 1599				h= 1095 ab= 1603				h= 1130 ab= 1638				h= 2030 ab= 1638				h= 3296 ab= 1658				h= 4014 ab= 1225				h= 5018 ab= 880			
Cant	Angle α	Sin α	cos α	tan α	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2
110	4.178	0.073	0.997	0.073	1474	1450	327	113	1659	1531	1050	817	1679	1519	1264	1031	1716	1552	1302	1063	1782	1486	2199	1961	1894	1414	3464	3222	1515	930	4148	3970	1244	513	5124	4996
105	3.987	0.070	0.998	0.07	1473	1450	319	116	1657	1534	1042	820	1676	1523	1257	1034	1713	1556	1294	1066	1776	1493	2192	1964	1884	1425	3456	3226	1502	943	4142	3972	1227	529	5120	4998
100	3.797	0.066	0.998	0.066	1473	1451	312	118	1654	1538	1034	823	1672	1527	1249	1037	1710	1560	1286	1070	1769	1500	2185	1968	1873	1437	3449	3229	1489	957	4137	3975	1211	546	5116	4999
95	3.607	0.063	0.998	0.063	1473	1452	305	121	1652	1541	1027	826	1669	1531	1242	1040	1706	1564	1279	1073	1763	1508	2177	1971	1863	1448	3442	3233	1476	971	4131	3977	1194	563	5111	5001
90	3.417	0.060	0.998	0.06	1473	1453	298	123	1649	1544	1019	829	1666	1535	1234	1043	1703	1568	1271	1076	1757	1515	2170	1974	1852	1459	3434	3237	1463	984	4125	3979	1178	580	5107	5002
85	3.227	0.056	0.998	0.056	1472	1454	290	125	1647	1547	1012	832	1663	1539	1226	1046	1700	1572	1263	1079	1750	1522	2162	1978	1841	1470	3427	3240	1450	998	4120	3982	1162	597	5103	5004
80	3.037	0.053	0.999	0.053	1472	1455	283	128	1644	1551	1004	835	1659	1543	1219	1049	1696	1576	1256	1082	1744	1529	2154	1981	1831	1482	3420	3244	1436	1011	4114	3984	1145	613	5098	5005
75	2.847	0.050	0.999	0.05	1472	1455	276	130	1641	1554	996	837	1656	1547	1211	1052	1693	1580	1248	1085	1737	1536	2147	1984	1820	1493	3412	3248	1423	1025	4108	3986	1129	630	5094	5006
70	2.657	0.046	0.999	0.046	1472	1456	268	132	1639	1557	989	840	1653	1551	1204	1055	1689	1584	1240	1088	1731	1543	2139	1987	1810	1504	3405	3251	1410	1038	4102	3988	1112	647	5089	5007
65	2.467	0.043	0.999	0.043	1471	1457	261	135	1636	1560	981	843	1649	1555	1196	1058	1686	1588	1232	1091	1724	1550	2132	1991	1799	1515	3397	3255	1397	1052	4096	3991	1096	664	5084	5008
60	2.277	0.040	0.999	0.04	1471	1458	254	137	1633	1563	973	846	1646	1559	1188	1061	1682	1592	1225	1095	1718	1557	2124	1994	1788	1526	3390	3258	1384	1065	4090	3993	1079	680	5080	5010
55	2.087	0.036	0.999	0.036	1471	1459	246	140	1630	1566	966	849	1642	1563	1181	1064	1679	1596	1217	1098	1711	1563	2116	1997	1777	1537	3382	3261	1371	1078	4084	3995	1063	697	5075	5011
50	1.898	0.033	0.999	0.033	1470	1459	239	142	1628	1569	958	852	1639	1566	1173	1067	1675	1600	1209	1101	1705	1570	2109	2000	1767	1548	3375	3265	1358	1092	4078	3997	1046	714	5070	5012
45	1.708	0.030	1.000	0.03	1470	1460	232	144	1625	1573	950	855	1635	1570	1165	1070	1671	1604	1201	1104	1698	1577	2101	2003	1756	1560	3367	3268	1345	1105	4072	3999	1030	731	5065	5013
40	1.518	0.026	1.000	0.026	1469	1461	224	147	1622	1576	943	858	1632	1574	1158	1073	1668	1608	1193	1107	1692	1584	2093	2006	1745	1571	3359	3271	1331	1119	4066	4001	1013	747	5060	5013
35	1.328	0.023	1.000	0.023	1469	1461	217	149	1619	1579	935	861	1628	1578	1150	1076	1664	1612	1186	1110	1685	1591	2085	2009	1734	1582	3352	3275	1318	1132	4059	4003	997	764	5055	5014
30	1.138	0.020	1.000	0.02	1468	1462	210	151	1617	1582	927	864	1625	1581	1142	1078	1661	1616	1178	1113	1679	1598	2078	2013	1724	1593	3344	3278	1305	1146	4053	4004	980	781	5050	5015
25	0.949	0.017	1.000	0.017	1468	1463	202	154	1614	1585	919	866	1621	1585	1134	1081	1657	1620	1170	1116	1672	1605	2070	2016	1713	1604	3336	3281	1292	1159	4047	4006	963	797	5045	5016
20	0.759	0.013	1.000	0.013	1468	1463	195	156	1611	1588	912	869	1618	1589	1127	1084	1653	1623	1162	1119	1665	1611	2062	2019	1702	1615	3328	3284	1279	1172	4040	4008	947	814	5040	5016
15	0.569	0.010	1.000	0.01	1467	1464	188	158	1608	1591	904	872	1614	1593	1119	1087	1650	1627	1154	1122	1659	1618	2054	2022	1691	1626	3320	3287	1265	1186	4034	4010	930	831	5034	5017
10	0.379	0.007	1.000	0.007	1467	1464	180	161	1605	1594	896	875	1611	1596	1111	1090	1646	1631	1146	1125	1652	1625	2046	2025	1680	1637	3312	3290	1252	1199	4028	4011	914	847	5029	5018
5	0.190	0.003	1.000	0.003	1466	1465	173	163	1602	1597	888	878	1607	1600	1103	1093	1642	1635	1138	1128	1645	1632	2038	2028	1669	1648	3304	3293	1239	1212	4021	4013	897	864	5024	5018
0	0.000	0.000	1.000	0	1465	1465	165	165	1599	1599	880	880	1603	1603	1095	1095	1638	1638	1130	1130	1638	1638	2030	2030	1658	1658	3296	3296	1225	1225	4014	4014	880	880	5018	5018

REFER TO FIGURE: PMSG-1

$E=[ab+(h \times \tan\alpha)] \times \cos\alpha$

$F=[Ab-(h \times \tan\alpha)] \times \cos\alpha$

$H_1=(Ca/2)+(h / \cos\alpha)+(Ab-h \times \tan\alpha)\times\sin\alpha$

$H_2=(Ca/2)+(h/ \cos\alpha)-(ab+h \times \tan\alpha)\times\sin\alpha$

ab=Ab=Distance from center line of vehicle to K.E for Tangent track at height 'h' from rail level

ac=Distance from center line of canted tack to K.E for Tangent track at height 'h' from rail level.

bc=hxtanα=Lateral increment due to cant(measured along the line parallel to line joining top of rails.

NOTE: Value of Cant effect at any other location will be calculated by the above formula

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

Ajay Kumar
Digitally signed by Ajay Kumar
Date: 2025.08.12 16:23:34 +05'30'

12/08/2025.
Vikash Ranjan
General Manager
Rolling Stock (O&M)

Project Directorate
Approved on 28/8/25
Railway Board

APPENDIX-3A(TNL)

CANT EFFECT ON KINEMATIC ENVELOPE
UNDER GROUND SECTIONS (Rectangular Box Tunnel)
REF: PARA 1.8.1

Height above rail level measured perpendicular to plane of track ⟶ / Distance from center line of track K.E for tangent track. ⟶ to					h= 165 ab= 1465				h= 880 ab= 1599				h= 1095 ab= 1603				h= 1130 ab= 1625				h= 2030 ab= 1625				h= 3287 ab= 1629				h= 3850 ab= 1629				h= 4318 ab= 880			
Cant	Angle α	Sin α	cos α	tan α	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2	E	F	H_1	H_2
110	4.178	0.073	0.997	0.073	1474	1450	327	113	1659	1531	1050	817	1679	1519	1264	1031	1704	1539	1301	1064	1769	1473	2198	1962	1865	1386	3452	3215	1906	1345	4014	3777	1193	564	4426	4298
105	3.987	0.070	0.998	0.070	1473	1450	319	116	1657	1534	1042	820	1676	1523	1257	1034	1700	1543	1293	1067	1763	1480	2191	1965	1854	1397	3445	3219	1893	1358	4007	3780	1179	578	4422	4299
100	3.797	0.066	0.998	0.066	1473	1451	312	118	1654	1538	1034	823	1672	1527	1249	1037	1697	1547	1286	1070	1756	1487	2184	1968	1844	1408	3438	3222	1881	1371	4000	3784	1165	593	4417	4301
95	3.607	0.063	0.998	0.063	1473	1452	305	121	1652	1541	1027	826	1669	1531	1242	1040	1693	1551	1278	1074	1750	1495	2176	1972	1833	1419	3431	3226	1868	1384	3993	3788	1150	607	4413	4302
90	3.417	0.060	0.998	0.060	1473	1453	298	123	1649	1544	1019	829	1666	1535	1234	1043	1690	1555	1270	1077	1744	1502	2169	1975	1823	1431	3424	3230	1856	1397	3986	3792	1136	622	4408	4303
85	3.227	0.056	0.998	0.056	1472	1454	290	125	1647	1547	1012	832	1663	1539	1226	1046	1687	1559	1263	1080	1737	1509	2161	1978	1812	1442	3416	3233	1844	1410	3979	3795	1122	636	4404	4305
80	3.037	0.053	0.999	0.053	1472	1455	283	128	1644	1551	1004	835	1659	1543	1219	1049	1683	1563	1255	1083	1731	1516	2154	1982	1801	1453	3409	3237	1831	1423	3971	3799	1108	650	4399	4306
75	2.847	0.050	0.999	0.050	1472	1455	276	130	1641	1554	996	837	1656	1547	1211	1052	1680	1567	1247	1086	1724	1523	2146	1985	1791	1464	3402	3240	1819	1436	3964	3802	1094	665	4394	4307
70	2.657	0.046	0.999	0.046	1472	1456	268	132	1639	1557	989	840	1653	1551	1204	1055	1676	1571	1240	1089	1718	1530	2139	1988	1780	1475	3394	3243	1806	1449	3957	3806	1080	679	4390	4308
65	2.467	0.043	0.999	0.043	1471	1457	261	135	1636	1560	981	843	1649	1555	1196	1058	1673	1575	1232	1092	1711	1537	2131	1991	1769	1486	3387	3247	1794	1462	3950	3809	1066	694	4385	4309
60	2.277	0.040	0.999	0.040	1471	1458	254	137	1633	1563	973	846	1646	1559	1188	1061	1669	1579	1224	1095	1705	1544	2123	1994	1759	1498	3380	3250	1781	1475	3942	3813	1051	708	4380	4310
55	2.087	0.036	0.999	0.036	1471	1459	246	140	1630	1566	966	849	1642	1563	1181	1064	1666	1583	1216	1098	1698	1550	2116	1997	1748	1509	3372	3253	1769	1488	3935	3816	1037	723	4375	4311
50	1.898	0.033	0.999	0.033	1470	1459	239	142	1628	1569	958	852	1639	1566	1173	1067	1662	1587	1209	1101	1692	1557	2108	2001	1737	1520	3365	3257	1756	1501	3927	3819	1023	737	4370	4312
45	1.708	0.030	1.000	0.030	1470	1460	232	144	1625	1573	950	855	1635	1570	1165	1070	1658	1591	1201	1104	1685	1564	2101	2004	1727	1531	3357	3260	1744	1514	3920	3823	1009	751	4365	4313
40	1.518	0.026	1.000	0.026	1469	1461	224	147	1622	1576	943	858	1632	1574	1158	1073	1655	1595	1193	1107	1679	1571	2093	2007	1716	1542	3349	3263	1731	1527	3912	3826	995	766	4360	4314
35	1.328	0.023	1.000	0.023	1469	1461	217	149	1619	1579	935	861	1628	1578	1150	1076	1651	1599	1185	1110	1672	1578	2085	2010	1705	1553	3342	3266	1718	1540	3905	3829	980	780	4355	4314
30	1.138	0.020	1.000	0.020	1468	1462	210	151	1617	1582	927	864	1625	1581	1142	1078	1648	1603	1178	1113	1666	1585	2077	2013	1694	1564	3334	3269	1706	1553	3897	3832	966	795	4350	4315
25	0.949	0.017	1.000	0.017	1468	1463	202	154	1614	1585	919	866	1621	1585	1134	1081	1644	1607	1170	1116	1659	1592	2070	2016	1684	1575	3327	3273	1693	1566	3889	3836	952	809	4345	4316
20	0.759	0.013	1.000	0.013	1468	1463	195	156	1611	1588	912	869	1618	1589	1127	1084	1640	1610	1162	1119	1652	1598	2062	2019	1673	1586	3319	3276	1680	1578	3882	3839	938	823	4340	4316
15	0.569	0.010	1.000	0.010	1467	1464	188	158	1608	1591	904	872	1614	1593	1119	1087	1637	1614	1154	1122	1646	1605	2054	2022	1662	1597	3311	3279	1668	1591	3874	3842	923	838	4335	4317
10	0.379	0.007	1.000	0.007	1467	1464	180	161	1605	1594	896	875	1611	1596	1111	1090	1633	1618	1146	1125	1639	1612	2046	2025	1651	1608	3303	3282	1655	1604	3866	3845	909	852	4329	4318
5	0.190	0.003	1.000	0.003	1466	1465	173	163	1602	1597	888	878	1607	1600	1103	1093	1629	1622	1138	1128	1632	1619	2038	2028	1640	1619	3295	3285	1642	1617	3858	3848	895	866	4324	4318
0	0.000	0.000	1.000	0.000	1465	1465	165	165	1599	1599	880	880	1603	1603	1095	1095	1625	1625	1130	1130	1625	1625	2030	2030	1629	1629	3287	3287	1629	1629	3850	3850	880	880	4318	4318

REFER TO FIGURE: PMSG-1 (TNL)

E=[ab+(h x tan α)] x cos α
F=[Ab- (h x tan α)] x cos α
H_1=(Ca/2)+(h / cos α)+(Ab-h x tan α)xsin α
H_2=(Ca/2)+(h/ cos α)-(ab+h x tan α)xsin α
ab=Ab=Distance from center line of vehicle to K.E for Tangent track at height 'h' from rail level
ac=Distance from center line of canted tack to K.E for Tangent track at height 'h' from rail level.
bc=hxtanα=Lateral increment due to cant(measured along the line parallel to line joining top of rails.

NOTE: Value of Cant effect at any other location will be calculated by the above formula

Vikash Ranjan
General Manager
Rolling Stock (O&M)

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RDSO, Lucknow

Ajay Kumar
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APPENDIX-4

LATERAL AND VERTICAL SHIFT OF CENTRE OF CIRCULAR TUNNEL FOR DIFFERENT CANT VALUES

(WITH D_1=630 mm)

REFER TO FIGURE: PMSG-3 AND PARA NOs 1.7.1 (B)-b AND 1.7.2 (B)-b

All figures are in mm

Cant	sin α = Cant/1510	Angle α in radians	Angle α	sin α/2	cos α	tan θ= (r-D1) / (g/2)	Angle θ	θ in radians	cos θ	sin θ	Angle (90-θ-α/2) in degrees	Angle (90-θ-α/2) in radians	cos(90-θ-α/2)	sin(90-θ-α/2)	Lateral shift of tunnel centre=X	Vertical shift of tunnel centre=Y	REMARKS
mm			Degrees				Degrees								mm	mm	
110	0.072848	0.072912268	4.177565	0.036448059	0.997343078	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.0953	0.298370069	0.955816897	0.293962682	160	49	
105	0.069536	0.069592585	3.987361	0.034789271	0.997579413	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.1904	0.300029911	0.95532765	0.295548781	153	47	
100	0.066225	0.066273669	3.797202	0.033130771	0.997804704	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.2855	0.301689368	0.954835884	0.297133699	145	45	(a) The cant is provided by raising the outer rail which
95	0.062914	0.062955485	3.607084	0.031472545	0.998018958	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.3806	0.30334846	0.954341598	0.29871745	138	43	will mean, rotating the tunnel about the mid point of
90	0.059603	0.059637995	3.417005	0.029814579	0.998222182	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.4756	0.305007205	0.953844789	0.300300048	131	41	top of inner rail.
85	0.056291	0.056321162	3.226965	0.028156859	0.998414383	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.5706	0.306665622	0.953345455	0.301881506	123	39	
80	0.05298	0.053004949	3.03696	0.026499372	0.998595567	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.6656	0.308323728	0.952843593	0.303461839	116	37	(b) ' X' is lateral shift of the centre of the tunnel
75	0.049669	0.049689319	2.846988	0.024842104	0.99876574	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.7606	0.309981543	0.9523392	0.305041059	109	35	towards inside of the curve
70	0.046358	0.046374236	2.657048	0.02318504	0.998924908	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.8556	0.311639085	0.951832274	0.306619181	101	33	X= [(2 x (r-D_1)/sin θ) x (sin α/2)] x cos (90- θ - α/2)
65	0.043046	0.043059663	2.467137	0.021528168	0.999073076	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	17.9506	0.313296371	0.951322811	0.308196219	94	30	
60	0.039735	0.039745563	2.277253	0.019871473	0.999210249	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.0455	0.314953421	0.950810809	0.309772184	87	28	(c) 'Y' is the vertical shift of the centre of the tunnel (upwards)
55	0.036424	0.0364319	2.087394	0.018214942	0.999336432	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.1404	0.316610253	0.950296264	0.311347092	80	26	Y=[(2 x (r-D_1)/sin θ) x (sin α/2)] x sin (90-θ-α/2) where,
50	0.033113	0.033118637	1.897558	0.016558562	0.999451628	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.2353	0.318266884	0.949779172	0.312920954	72	24	
45	0.029801	0.029805737	1.707743	0.014902317	0.999555842	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.3303	0.319923334	0.949259532	0.314493786	65	22	'r' is internal radius of the circular tunnel=2800 mm
40	0.02649	0.026493165	1.517947	0.013246195	0.999649077	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.4252	0.32157962	0.948737338	0.316065599	58	19	D_1 = depth from rail level to invert of circular tunnel=630 mm
35	0.023179	0.023180884	1.328167	0.011590182	0.999731335	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.5200	0.323235761	0.948212588	0.317636407	51	17	α = angle of rotation=$\sin^{-1}$ (Cant/g) and
30	0.019868	0.019868857	1.138402	0.009934265	0.999802621	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.6149	0.324891774	0.947685278	0.319206224	43	15	θ = angle subtended by line joining top of two rails and the line
25	0.016556	0.016557048	0.948649	0.008278429	0.999862935	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.7098	0.326547679	0.947155404	0.320775062	36	12	joining mid point of top of inner rail and the centre of circular
20	0.013245	0.01324542	0.758907	0.006622662	0.999912281	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.8047	0.328203493	0.946622962	0.322342934	29	10	Tunnel
15	0.009934	0.009933938	0.569173	0.004966949	0.999950659	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.8995	0.329859234	0.946087948	0.323909854	22	7	= $\tan^{-1}$[(r-D_1) / (g/2)] in degrees=
10	0.006623	0.006622565	0.379445	0.003311276	0.999978071	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	18.9944	0.33151492	0.945550359	0.325475835	14	5	70.81587171
5	0.003311	0.003311264	0.189721	0.001655631	0.999994518	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	19.0893	0.333170571	0.945010189	0.327040889	7	2	g= Centre to centre of rails = 1510 mm
0	0	0	0	0	1.0000000	2.87417	70.81587171	1.235970124	0.328605029	0.944467435	19.1841	0.334826203	0.944467435	0.328605029	0	0	

12/08/2025.
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Approved on
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Railway Board

APPENDIX-5

ADDITIONAL CLEARANCE FOR PLATFORMS ON CURVES
UNDER GROUND, ELEVATED AND AT GRADE STATIONS

REF: PARA 2.7

EXTRA CLEARANCE														
RADIUS	INSIDE OF CURVE								OUTSIDE OF CURVE					
	AT CENTRE LINE OF BOGIES				AT EDGE OF OPEN DOOR NEAREST TO C.L. OF BOGIES				AT END OF COACH	AT EDGE OF OPEN DOOR, FARTHEST FROM C.L. OF BOGIES				
	MID THROW =28500/R	NOSING	ADDITIONAL CLEARANCE	ADDITIONAL CLEARANCE (ROUNDED OFF TO NEAREST 5 mm) (i)	THROW =28120/R	NOSING = 13x 0.873/11.05	ADDITIONAL CLEARANCE	ADDITIONAL CLEARANCE (ROUNDED OFF TO NEAREST 5 mm) (ii)	END THROW = 35407/R	THROW =20064/R	NOSING =13x 9.59/11.05	DIFFERENCE BETWEEN N AND N_2	ADDITIONAL CLEARANCE	ADDITIONAL CLEARANCE (ROUNDED OFF TO NEAREST 5 mm) (ii)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R	V	N	V-N	V-N	V_3	N_1	V_3 - (N-N_1)	V_3 - (N-N_1)	V_0	V_4	N_2	N-N_2	V_4-(N-N_2)	V_4-(N-N_2)
Metres	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
1	2	3	4a	4	5	6	7a	7	8	9	10	11	12a	12
3000	9.5	13.00	-3.5	0	9.4	1.03	-2.6	0	12	6.7	11.28	1.7	5.0	5
2800	10.2	13.00	-2.8	0	10.0	1.03	-1.9	0	13	7.2	11.28	1.7	5.4	10
2400	11.9	13.00	-1.1	0	11.7	1.03	-0.3	0	15	8.4	11.28	1.7	6.6	10
2000	14.3	13.00	1.3	5	14.1	1.03	2.1	5	18	10.0	11.28	1.7	8.3	10
1800	15.8	13.00	2.8	5	15.6	1.03	3.6	5	20	11.1	11.28	1.7	9.4	10
1600	17.8	13.00	4.8	5	17.6	1.03	5.6	10	22	12.5	11.28	1.7	10.8	15
1500	19.0	13.00	6.0	10	18.7	1.03	6.8	10	24	13.4	11.28	1.7	11.7	15
1200	23.8	13.00	10.8	15	23.4	1.03	11.5	15	30	16.7	11.28	1.7	15.0	15
1000	28.5	13.00	15.5	20	28.1	1.03	16.1	20	35	20.1	11.28	1.7	18.3	20

NOTES:

1. **For outside of curve**, the difference between clearance required at coach end that at the farthest door edge is less than 25mm. As half width of coach at ends is at least 25 mm less than that at door locations, additional clearance to be provided is additional clerance required at the farthest door edge (column 15)

2. **Values of additional clearances (columns 5, 9 and 15) are rounded off to the nearest 5 mm.**

3. Negative values of additional clearance are taken as Zero in the columns 4 and 8 with rounded off figures.
4. **Extra clearance for curve:**

(a) Inside of curve:

$V = (125C^2/R)=28500/R$ with C=15.10 m for the worst case.

$V_3=[(125)x(15.1^2- 4x0.873^2)/R]=28120/R$

$N_1=Nx(X)/(C_1/2)=13 \times 0.873/11.075=1.02$ mm

Minimum distance 'X' for the nearest edge of an open door from centre line of Bogies is 0.873 metre.

Higher of (i) column 4 and (ii) column 8 shall be adopted

(b) Outside of curve:

$V_0=(125C_1^2/R)-(125C^2/R)=35407/R$ for coach end with C=14.4 metres and C_1=2x11.075 metres

$V_4=125x(19.18x19.18-14.4x14.4)/R = 20064/R$ for farthest edge of end door in open position with C_1=2x9.590=19.18 metres and C=14.40 metres for the worst case.

N_2=Nosing at the farthest edge of an open door=N x (X)/(C_1/2) =13x9.59/11.075mm =11.25 mm

R=Radius of curve in metres

Maximum distance (X) for the farthest edge of open door from centre line of two Bogies=9.590 M

5. **There will be no superelevation on curves in platform Portion.**

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

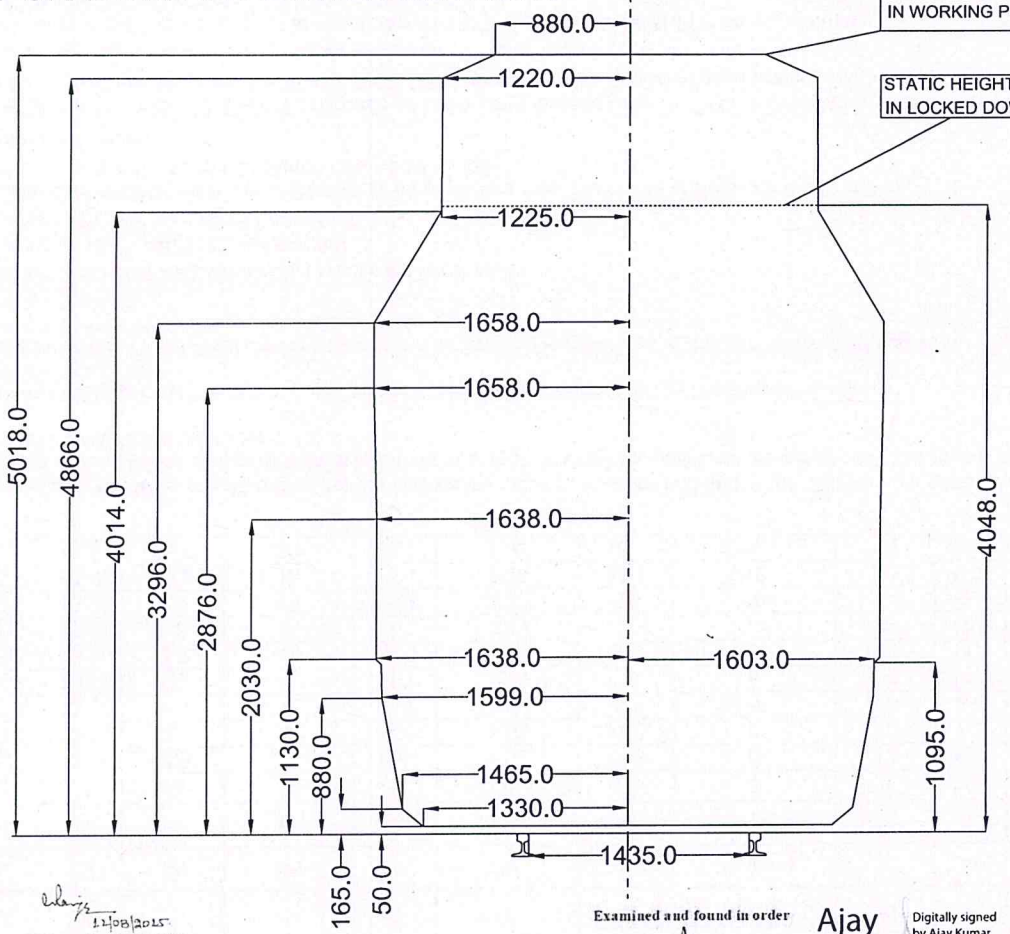
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11/08/2025
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General Manager
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Project Directorate
Approved on
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AT-GRADE AND ELEVATED SECTIONS



NOTES

1. ALL DIMENSIONS ARE IN mm
2. HORIZONTAL AND VERTICAL CLEARANCE DUE TO CURVES, INCLUDING VERTICAL CURVES AND CANT SHALL BE EXTRA
3. KINEMATIC ENVELOPE IS VALID FOR VEHICLES WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION
4. THE CONDUCTOR HEIGHT ABOVE RAIL LEVEL SHALL ALSO TAKE INTO CONSIDERATION PRESCRIBED ELECTRICAL CLEARENCES BETWEEN ALL LIVE OVERHEAD EUIPMENT AND PANTOGRAPH / VEHICLE AND ALL PARTS THEREOF.
5. A TYRE OR ATTACHMENT OF A WHEEL MAY PROJECT BELOW THE MINIMUM HEIGHT OF KINEMATIC ENVELOPE FOR A DISTANCE OF 51 mm INSIDE AND 216 mm OUTSIDE OF THE GAUGE FACE OF THE WHEEL.
6. THE KINEMATIC ENVELOPE IS VALID FOR 90 KMPH VEHICLE SPEED AND WIND SPEED OF 100 KMPH
7. MAXIMUM WIND SPEED OF TRAIN OPERATION:100KMPH
8. MAXIMUM OPERATIONAL SPEED OF ROLLING STOCK: 80 KMPH
9. MAXIMUM HEIGHT OF COACH IS 4048 MM IN PANTOGRAPH LOCKDOWN CONDITION AND MAXIMUM WIDTH OF COACH BODY IS 2900 MM

12/08/2025
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KINEMATIC ENVELOPE

AT-GRADE AND ELEVATED SECTIONS (OUTSIDE STATION)

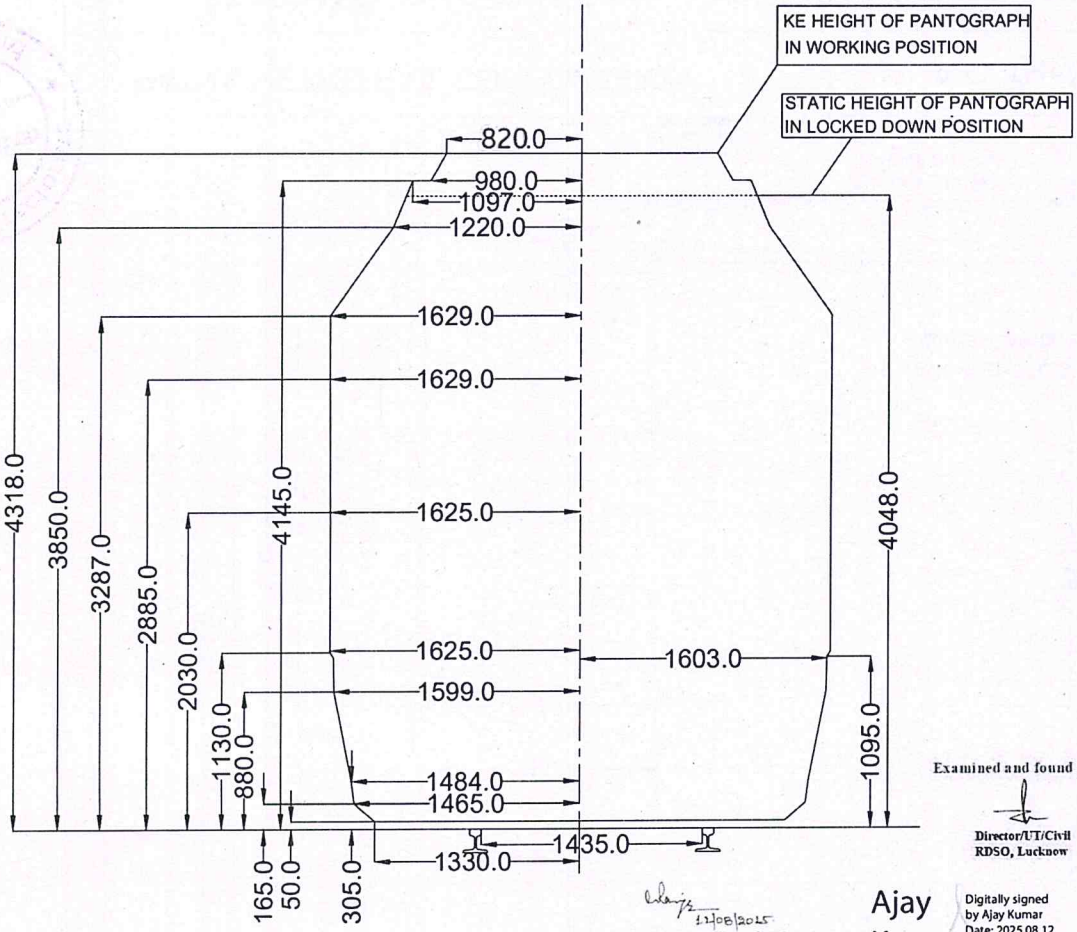
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LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION	25 kV A.C. TRACTION	DATE: - August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-1, REV. 7

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NOTES

1. ALL DIMENSIONS ARE IN mm
2. HORIZONTAL AND VERTICAL CLEARANCE DUE TO CURVES, INCLUDING VERTICAL CURVES AND CANT SHALL BE EXTRA
3. KINEMATIC ENVELOPE IS VALID FOR VEHICLES WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION
4. THE CONDUCTOR HEIGHT ABOVE RAIL LEVEL SHALL ALSO TAKE INTO CONSIDERATION PRESCRIBED ELECTRICAL CLEARENCES BETWEEN ALL LIVE OVERHEAD EUIPMENT AND PANTOGRAPH / VEHICLE AND ALL PARTS THEREOF.
5. A TYRE OR ATTACHMENT OF A WHEEL MAY PROJECT BELOW THE MINIMUM HEIGHT OF KINEMATIC ENVELOPE FOR A DISTANCE OF 51 mm INSIDE AND 216 mm OUTSIDE OF THE GAUGE FACE OF THE WHEEL.
6. THE KINEMATIC ENVELOPE IS VALID FOR 90 KMPH VEHICLE SPEED
7. MAXIMUM OPERATIONAL SPEED OF ROLLING STOCK: 80 KMPH
8. MAXIMUM WIND SPEED FOR TRAIN OPERATION: NIL
9. MAXIMUM HEIGHT OF COACH IS 4048 MM IN PANTOGRAPH LOCKDOWN CONDITION AND MAXIMUM WIDTH OF COACH BODY IS 2900 MM

Examined and found in order
Director/UT/Civil
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KINEMATIC ENVELOPE

UNDER GROUND SECTION (TUNNELS) (OUTSIDE STATION)

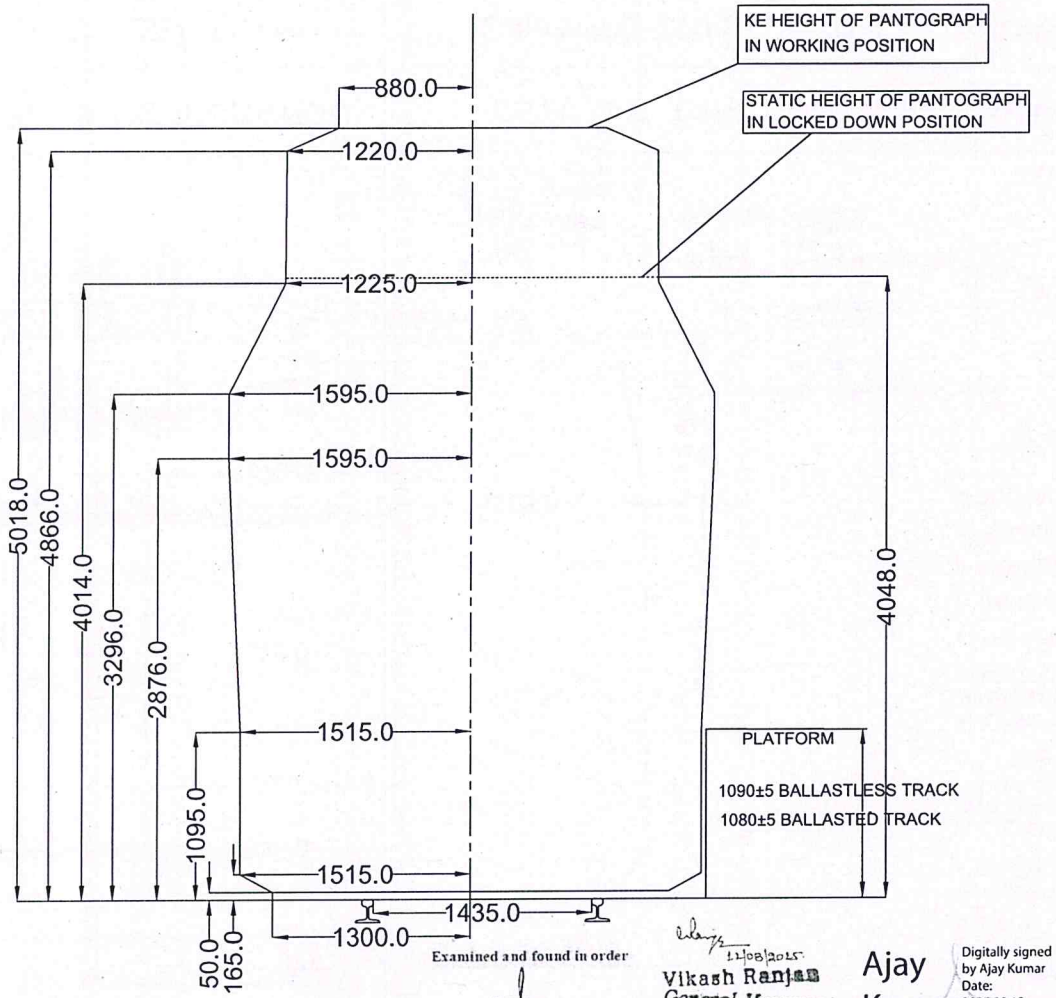
ON

LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION	25 kV A.C. TRACTION	DATE: - August -2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-1(TNL), REV. 7

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NOTES

1. ALL DIMENSIONS ARE IN mm
2. HORIZONTAL AND VERTICAL CLEARANCE DUE TO CURVES, INCLUDING VERTICAL CURVES AND CANT SHALL BE EXTRA
3. KINEMATIC ENVELOPE IS VALID FOR VEHICLES WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION
4. THE CONDUCTOR HEIGHT ABOVE RAIL LEVEL SHALL ALSO TAKE INTO CONSIDERATION PRESCRIBED ELECTRICAL CLEARENCES BETWEEN ALL LIVE OVERHEAD EUIPMENT AND PANTOGRAPH / VEHICLE AND ALL PARTS THEREOF.
5. A TYRE OR ATTACHMENT OF A WHEEL MAY PROJECT BELOW THE MINIMUM HEIGHT OF KINEMATIC ENVELOPE FOR A DISTANCE OF 51 mm INSIDE AND 216 mm OUTSIDE OF THE GAUGE FACE OF THE WHEEL.
6. KINEMATIC VALUE IS VALID FOR 70 KMPH OPERATING SPEED AND WIND SPEED OF 70 KMPH
7. MINIMUM GAP OF 10 MM SHALL BE MAINTAINED BETWEEN KE AND PLATFORM GATE
8. MAXIMUM HEIGHT OF COACH IS 4048 MM IN PANTOGRAPH LOCKDOWN CONDITION AND MAXIMUM WIDTH OF COACH BODY IS 2900 MM

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

11/08/2025

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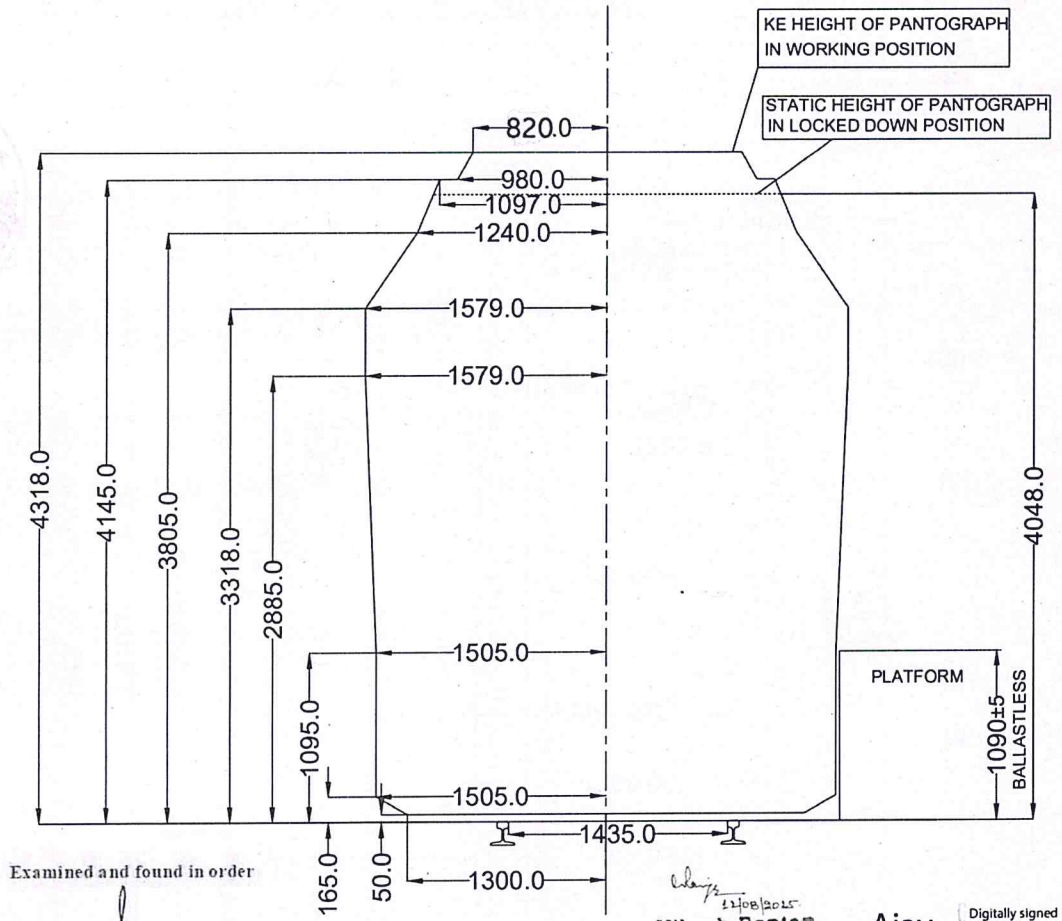
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KINEMATIC ENVELOPE

AT-GRADE AND ELEVATED (PLATFORM)
(PLATFORM SCREEN DOOR/PLATFORM GATE)
ON LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-1A, REV.7

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NOTES

1. ALL DIMENSIONS ARE IN mm
2. HORIZONTAL AND VERTICAL CLEARANCE DUE TO CURVES, INCLUDING VERTICAL CURVES AND CANT SHALL BE EXTRA
3. KINEMATIC ENVELOPE IS VALID FOR VEHICLES WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION
4. THE CONDUCTOR HEIGHT ABOVE RAIL LEVEL SHALL ALSO TAKE INTO CONSIDERATION PRESCRIBED ELECTRICAL CLEARENCES BETWEEN ALL LIVE OVERHEAD EUIPMENT AND PANTOGRAPH / VEHICLE AND ALL PARTS THEREOF.
5. A TYRE OR ATTACHMENT OF A WHEEL MAY PROJECT BELOW THE MINIMUM HEIGHT OF KINEMATIC ENVELOPE FOR A DISTANCE OF 51 mm INSIDE AND 216 mm OUTSIDE OF THE GAUGE FACE OF THE WHEEL.
6. KINEMATIC ENVELOPE IS VALID FOR SPEED OF 70 KMPH OPERATING SPEED
7. MAXIMUM WIND SPEED FOR TRAIN OPERATION: NIL
8. MINIMUM GAP OF 10 MM SHALL BE MAINTAINED BETWEEN KE AND PLATFORM GATE
9. MAXIMUM HEIGHT OF COACH IS 4048 MM IN PANTOGRAPH LOCKDOWN CONDITION AND MAXIMUM WIDTH OF COACH BODY IS 2900 MM
10. PLATEFORM HEIGHT (H) FOR BALLASTLESS TRACK IS 1090±5 MM AND BALLASTED TRACK IS 1080±5 MM.

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

Vikash Ranjan
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KINEMATIC ENVELOPE

UNDERGROUND (PLATFORM)

(PLATFORM SCREEN DOOR/PLATFORM GATE)

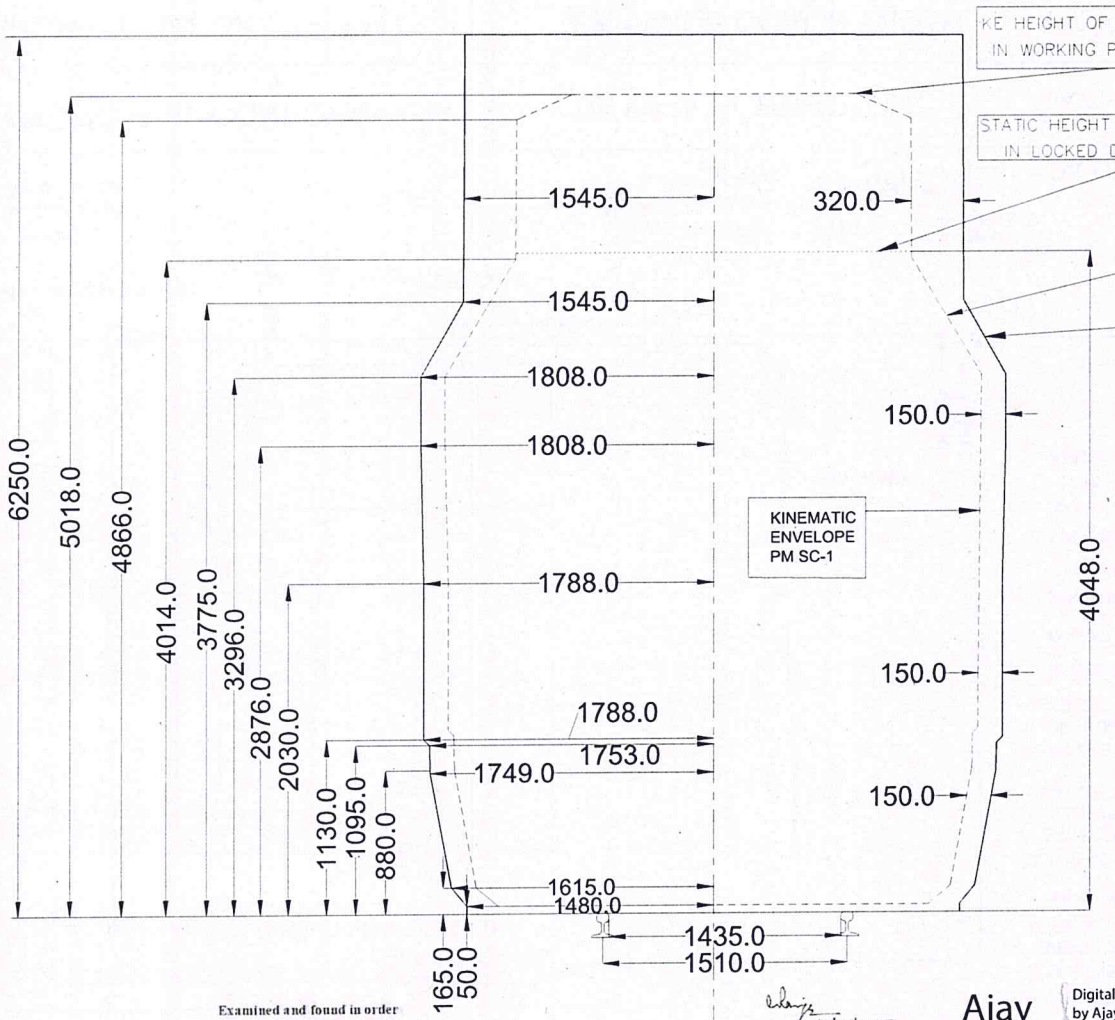
ON LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-1A(TNL), REV. 7

Project Directorate
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AT-GRADE AND ELEVATED SECTIONS



NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. THIS STRUCTURE GAUGE WILL ALSO BE APPLICABLE FOR ROBs/FOBs AT STATIONS WITHOUT THE MAST UNDER THE STRUCTURES.
3. WHERE IT IS NECESSARY TO PROVIDE MAST UNDER THE ROBs/FOBs, THE HEIGHT SHALL BE INCREASED FROM 6250 mm TO 6290 mm. IN CASE THE CONTACT WIRE IS HIGHER, THE HEIGHT OF ROB/FOB SHALL BE INCREASED ACCORDINGLY.
4. MINIMUM CLEARANCE BETWEEN KINEMATIC ENVELOPE AND STRUCTURE GAUGE WILL BE 150 mm. MINIMUM ELECTRICAL CLEARANCE OF 320 mm SHALL BE MAINTAINED BETWEEN 25 KV LIVE PARTS AND THE EARTHED STRUCTURES.
5. MINIMUM CLEARANCE FOR OHE MAST WILL BE 2000 mm IN ELEVATED SECTIONS AND 2150 mm IN AT GRADE SECTIONS.
6. THE KINEMATIC ENVELOPE AND STRUCTURE GAUGE ARE VALID FOR ROLLING STOCK WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION.
7. HORIZONTAL AND VERTICAL ALLOWANCE DUE TO CURVES INCLUDING VERTICAL CURVE AND CANT SHALL BE EXTRA.
8. FOR KINEMATIC ENVELOPE, REFER TO FIGURE NO. PMSG-01.
9. MAXIMUM WIND SPEED OF TRAIN OPERATIONAL : 100 KMPH
10. MAXIMUM OPERATIONAL SPEED OF ROLLING STOCK : 80 KMPH
11. MINIMUM HEIGHT OF STRUCTURE GAUGE WILL INCREASE/DECREASE CORRESPONDING TO THE INCREASE/DECREASE IN THE CONTACT WIRE HEIGHT, AS PERMITTED UNDER CHAPTER-4 OF THIS SOD.

Examined and found in order

Director/LT/Civil
RDSO, Lucknow

11/08/2025
Vikash Ranjan
General Manager
Rolling Stock (O&M)

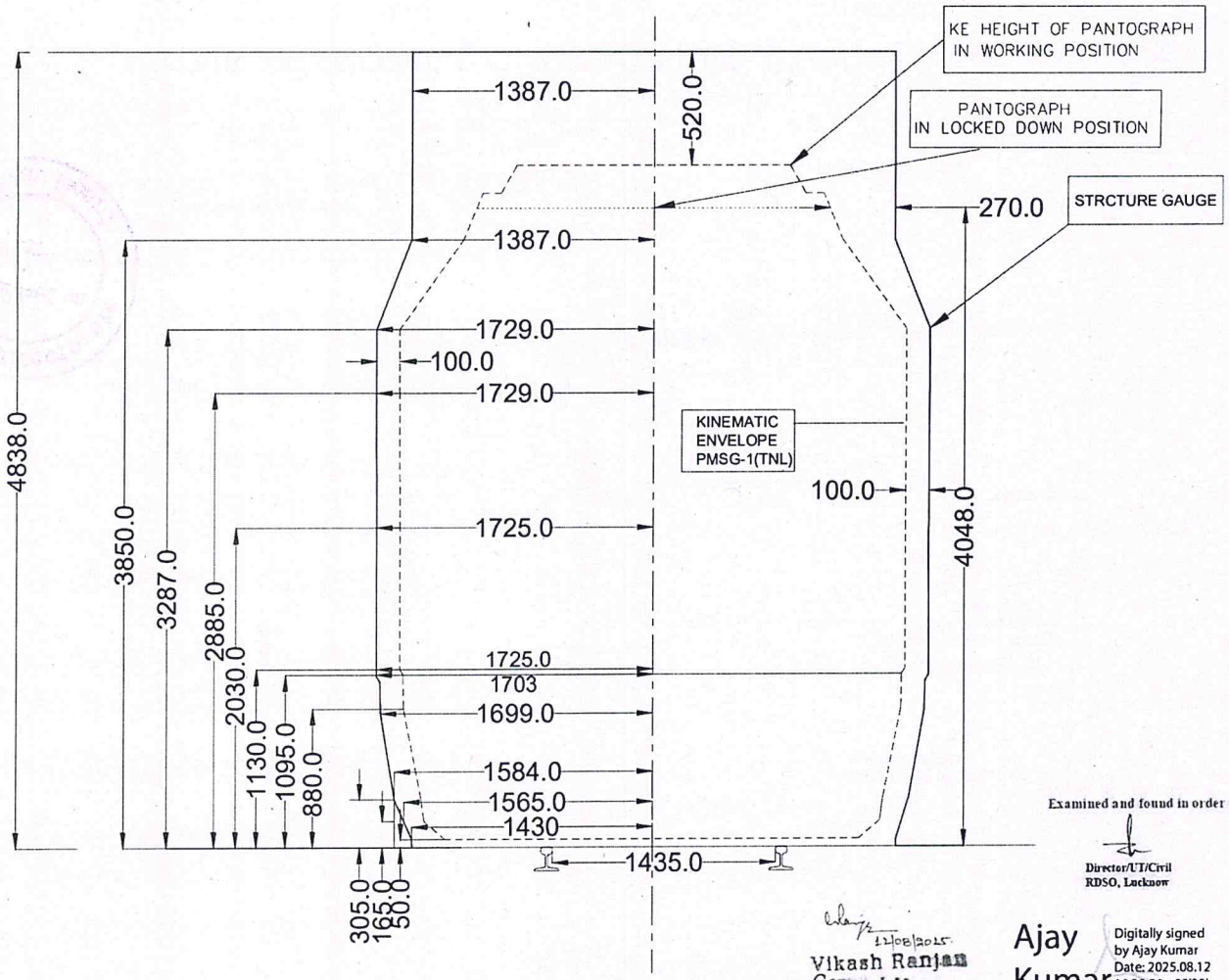
Ajay Kumar
Digitally signed by Ajay Kumar
Date: 2025.08.12 16:29:23 +05'30'

Project Directorate
Approved on
28/8/25
Railway Board

STRCTURE GAUGE
AT-GRADE AND ELEVATED SECTIONS (OUTSIDE STATION)
ON
LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION	25 kV A.C. TRACTION	DATE:- AUGUST 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-2, REV. 8

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NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. HORIZONTAL AND VERTICAL SHIFTS DUE TO CURVES INCLUDING VERTICAL CURVES AND CANT SHALL BE EXTRA.
3. THE KINEMATIC ENVELOPE AND STRUCTURE GAUGE ARE VALID FOR VEHICLES WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION.
4. STRUCTURE GAUGE FOR CURVE DOES NOT INCLUDE LATERAL SHIFT (LEAN) DUE TO CANT.
5. CANT WILL PROVIDE BY RAISING OUTER RAIL ONLY AND SHIFTING OF THE CENTRE OF THE CIRCULAR TUNNEL TOWARDS INSIDE OF THE CURVE AND UPWARDS. THIS WILL BE SAME AS ROTATING THE CIRCULAR TUNNEL ABOUT THE MID POINT OF TOP OF INNER RAIL.
6. MINIMUM CLEARANCE BETWEEN KINEMATIC ENVELOPE AND STRUCTURE GAUGE = 100 mm. THE ELECTRICAL CLEARANCE FROM 25 KV LIVE PARTS AND EARTHED STRUCTURE SHALLBE 270 mm.
7. VERTICAL THROW DUE TO VERTICAL CURVE HAS NOT BEEN SHOWN IN THE FIGURE AND SHALL BE EXTRA.
8. FOR KINEMATIC ENVELOPE, REFER TO FIGURE NO. PMSG-1 (TNL).
9. MAXIMUM OPERATIONAL SPEED OF ROLLING STOCK : 80 KMPH

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

12/08/2025
Vikash Ranjan
General Manager
Rolling Stock (O&M)

Ajay Kumar
Digitally signed by Ajay Kumar
Date: 2025.08.12 16:30:06 +05'30'

STRUCTURE GAUGE

UNDER GROUND SECTION (RECTANGULAR BOX)

(OUTSIDE STATION)

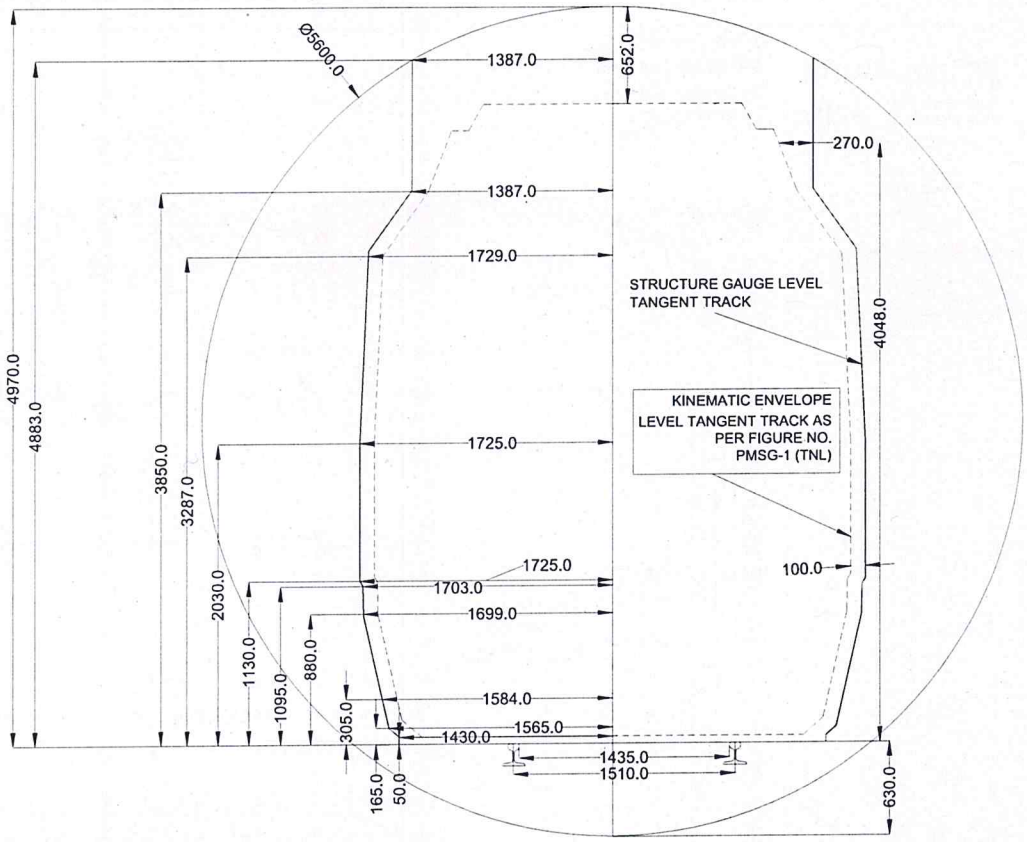
ON

LEVEL OR CONSTANT GRADE TANGENT TRACK

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Project Directorate
Railway Board

PATNA METRO RAIL CORPORATION	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-2A(TNL), REV. 8

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NOTES:-

1. ALL DIMENSIONS ARE IN mm.
2. HORIZONTAL AND VERTICAL SHIFTS DUE TO CURVES INCLUDING VERTICAL CURVES AND CANT SHALL BE EXTRA.
3. THE KINEMATIC ENVELOPE AND STRUCTURE GAUGE ARE VALID FOR VEHICLES WITH SEALED WINDOWS AND DOORS CLOSED WHILE IN MOTION.
4. STRUCTURE GAUGE FOR CURVE DOES NOT INCLUDE LATERAL SHIFT (LEAN) DUE TO CANT.
5. CANT WILL PROVIDE BY RAISING OUTER RAIL ONLY AND SHIFTING OF THE CENTRE OF THE CIRCULAR TUNNEL TOWARDS INSIDE OF THE CURVE AND UPWARDS. THIS WILL BE SAME AS ROTATING THE CIRCULAR TUNNEL ABOUT THE MID POINT OF TOP OF INNER RAIL.
6. MINIMUM CLEARANCE BETWEEN KINEMATIC ENVELOPE AND STRUCTURE GAUGE = 100 mm. THE ELECTRICAL CLEARANCE FROM 25 KV LIVE PARTS AND EARTHED STRUCTURE SHALL BE 270 mm.
7. VERTICAL THROW DUE TO VERTICAL CURVE HAS NOT BEEN SHOWN IN THE FIGURE AND SHALL BE EXTRA.
8. FOR KINEMATIC ENVELOPE, REFER TO FIGURE NO. PMSG-1 (TNL).
9. MAXIMUM OPERATIONAL SPEED OF ROLLING STOCK : 80 KMPH

Project Directorate Railway Board — Approved on 28/8/25

Examined and found in order
Director/UT/Civil
RDSO, Lucknow

11/08/2025
Vikash Ranjan
General Manager
Rolling Stock (O&M)

CIRCULAR TUNNEL 5600 mm DIA

Ajay Kumar
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Date: 2025.08.12 16:30:46 +05'30'

STRUCTURE GAUGE
UNDERGROUND SECTION (CIRCULAR) ON LEVEL OR CONSTANT GRADE TANGENT TRACK
(OUTSIDE STATION)

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-2B (TNL)

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$\tan \theta = (r-D_1)/(g/2)$

$\theta = \tan^{-1} [(r-D_1)/(g/2)]$

$\sin \alpha = \text{cant}/g$

$\alpha = \sin^{-1} (\text{cant}/g)$

Chord $C_1 C_2 = 2 \times [(r-D_1)/\sin \theta) \times (\sin \alpha /2)]$

$X = C_1 C_2 \times \cos (90 - \theta - \alpha/2)$

$= 2 \times [\{(r-D_1)/\sin \theta\} \times (\sin \alpha /2)] \times \cos(90 - \theta - \alpha/2)$

$Y = 2 \times [\{(r-D_1)/\sin \theta\} \times (\sin \alpha/2)] \times \sin (90 - \theta - \alpha/2)$

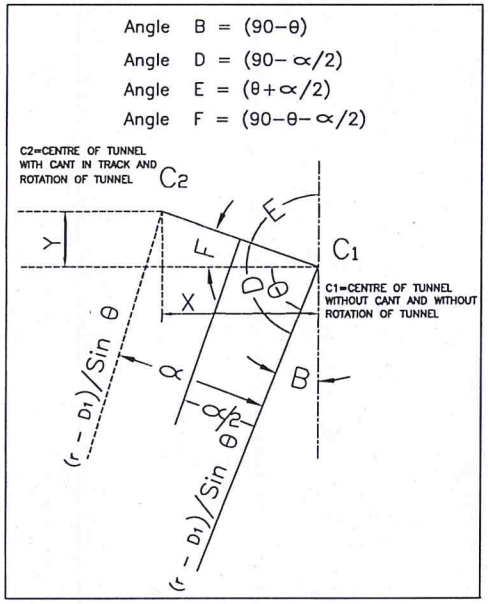
Where 'r' is internal radius of tunnel,

D1 = depth from Rail level to invert of tunnel

g = distance between centres of rails

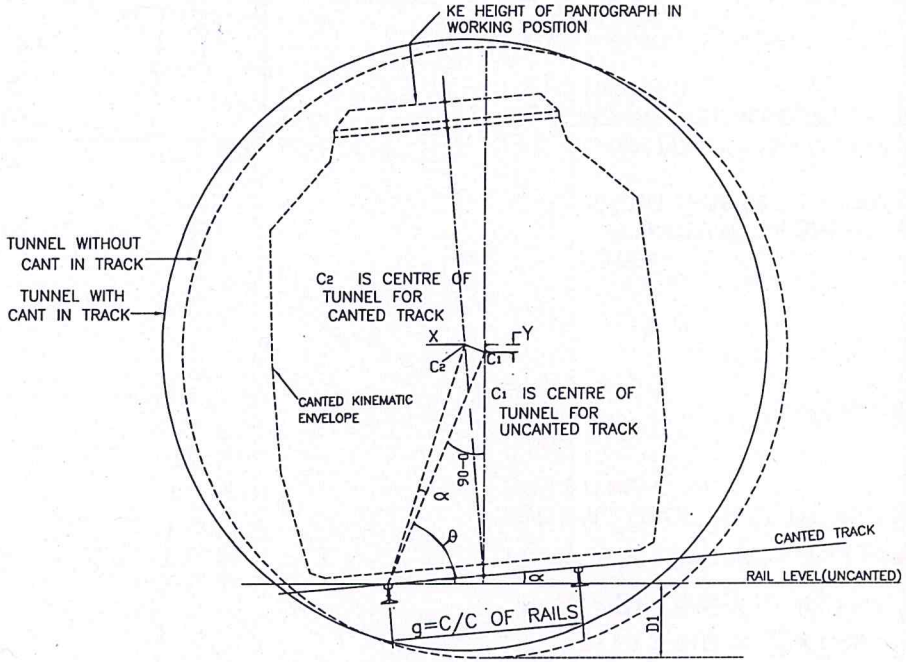
= 1510 mm for STANDARD GAUGE

DETAIL AT CENTRE OF TUNNEL



NOTES:

1. THE CIRCULAR TUNNEL IS ROTATED ABOUT CENTRE OF TOP OF INNER RAIL (GRADE RAIL) FOR CANT.
2. FOR VALUES OF SHIFT 'X' AND 'Y' FOR VARIOUS VALUES OF CANT REFER TO APPENDIX−4
3. REFERENCE PARA 1.7.1(B)−b &1.7.2(B)−b



Examined and found in order

Director/UT/Civil
RDSO, Lucknow

12/08/2025

Vikash Ranjan
General Manager
Rolling Stock (O&M)

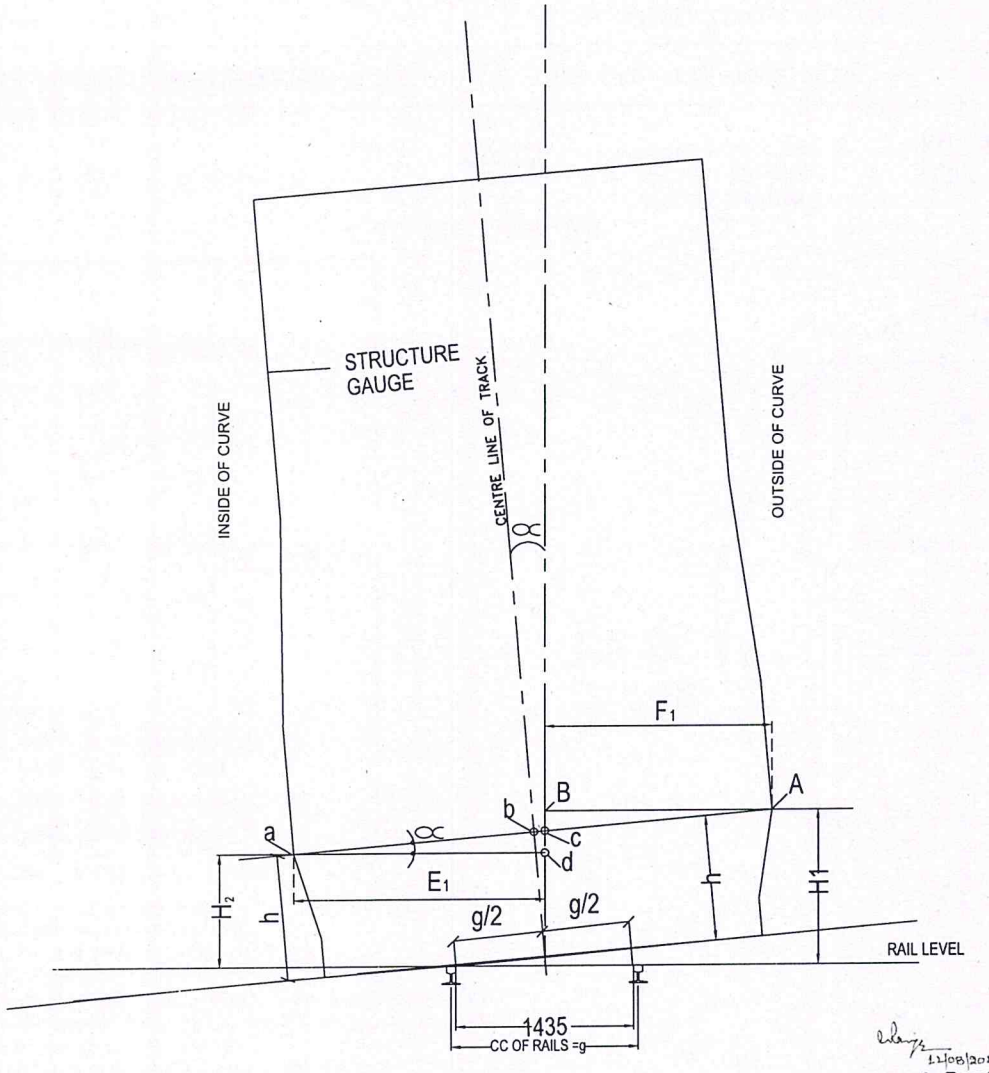
Ajay Kumar
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Date: 2025.08.12 16:31:25 +05'30'

SHIFT OF THE CENTRE OF CIRCULAR TUNNEL DUE TO ROTATION OF TUNNEL TO PROVIDE CANT

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No. PMSG-3
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	

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ab=Ab= Distance from centerline of track to Structure Gauge for level tangent track at any height 'h'

$\sin \propto$ = cant/g

g= 1510 mm for Standard Gauge

Ca = Cant applied

$E_1=[ab+(h \times \tan \propto)] \times \cos \propto$

$F_1=[Ab- (h \times \tan \propto)] \times \cos \propto$

$H_1=(Ca/2)+(h/\cos \propto)+(Ab-h \times \tan \propto) \times \sin \propto$

$H_2 =(Ca/2)+(h/\cos \propto) - (ab+h \times \tan \propto) \times \sin \propto$

FOR VALUES OF E1, F1, H1, AND H2, REFER TO APPENDIX 3 AND 3 (TNL)

NOTES:-

1. STRUCTURE GAUGE FOR AT-GRADE/ ELEVATED SECTION HAS BEEN SHOWN AS A TYPICAL FIGURE

2. THE FORMULAE FOR E_1,F_1,H_1 AND H_2 SHOWN IN THIS FIGURE WILL ALSO APPLY TO UNDER GROUND BOX TUNNELS

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

11/08/2025

Vikash Ranjan
General Manager
Rolling Stock (O&M)

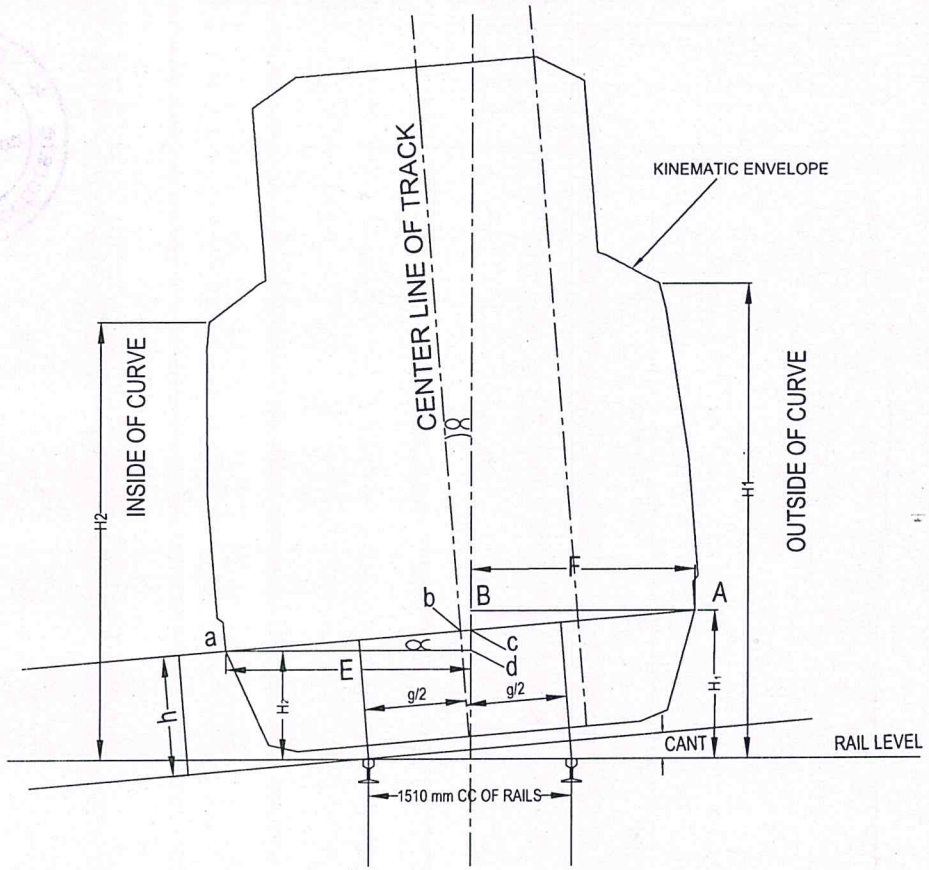
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Date: 2025.08.12 16:32:07 +05'30'

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Approved on
28/8/25
Railway Board

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No. PMSG-4
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	

EFFECT OF CANT ON STRUCTURE GAUGE

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ab=Ab= Distance from centerline of track to Kinematic Envelope for level tangent track at any height 'h'

sin $\propto$= cant / g

g= 1510 mm for Standard Gauge

Ca = Cant applied

$E=[ab+(h \times \tan \propto)] \times \cos \propto$

$F=[Ab- (h \times \tan \propto)] \times \cos \propto$

$H_1=(Ca/2)+(h/\cos \propto)+(Ab-h \times \tan \propto) \times \sin \propto$

$H_2=(Ca/2)+(h/\cos \propto) - (ab+h \times \tan \propto) \times \sin \propto$

FOR VALUES OF E, F, H_1, AND H_2, REFER TO APPENDIX 3A AND 3A(TNL)

NOTES:-

1. KINEMATIC ENVELOPE FOR AT-GRADE/ ELEVATED SECTIONS HAS BEEN SHOWN AS A TYPICAL FIGURE

2. THE FORMULAE FOR E, F, H_1 AND H_2 SHOWN IN THIS FIGURE WILL ALSO APPLY TO UNDER GROUND BOX TUNNELS

3. FOR ELEVATED / AT GRADE STRUCTURE , EXTRA LATERAL ALLOWANCE OF 50 mm OVER THE UNDERGROUND STRUCTURE SHALL BE PROVIDED

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

Vikash Ranjan
General Manager
Rolling Stock (O&M)

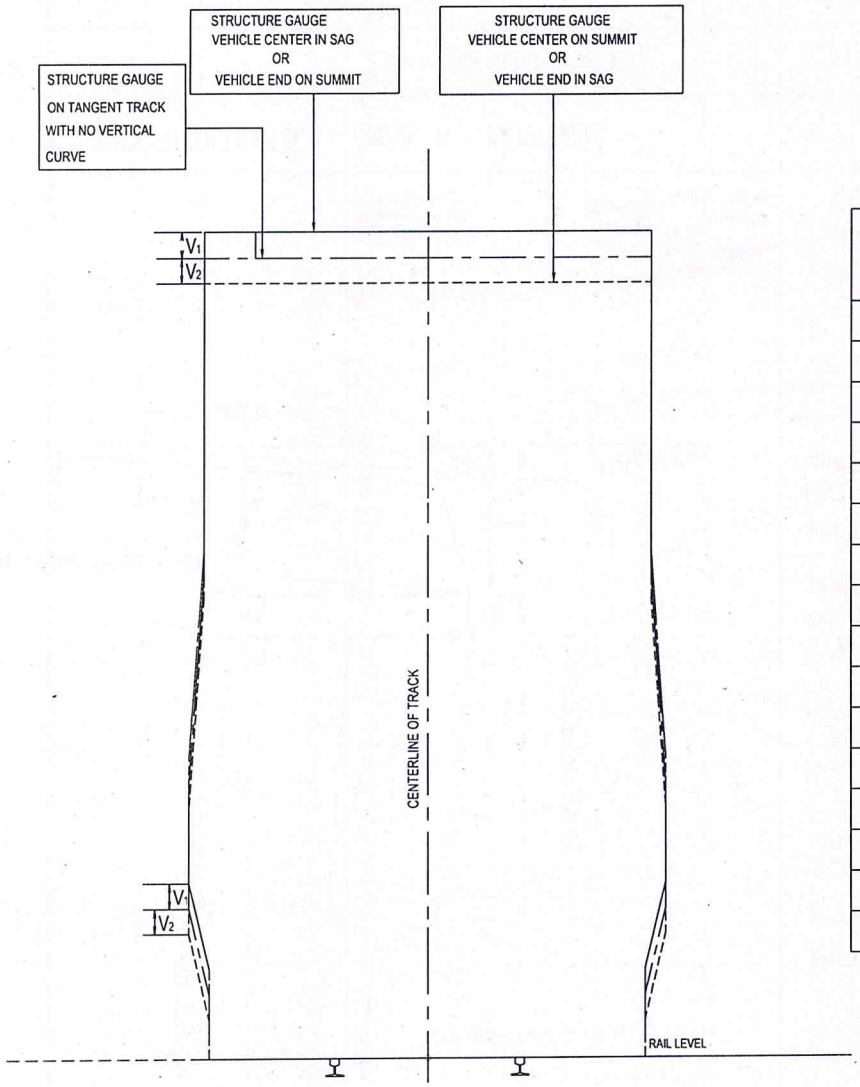
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Date: 2025.08.12 16:32:52 +05'30'

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-4A

EFFECT OF CANT ON KINEMATIC ENVELOPE

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RADIUS OF VERTICAL CURVE(M)	V_1 (mm)	V_2 (mm)
1500	19	23
1600	18	21
1700	17	20
1800	16	19
1900	15	18
2000	14	17
2100	14	16
2200	13	15
2300	12	15
2400	12	14
2500	11	14
2600	11	13
2700	11	13
2800	10	12
2900	10	12
3000	10	11

NOTE:-

1. THE FIGURE IS TYPICAL AND WILL APPLY TO UNDER GROUND, ELEVATED AND AT- GRADE SECTIONS

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

14/08/2025.
Vikash Ranjan
General Manager
Rolling Stock (O&M)

Project Directorate
Approved on 28/8/25
Railway Board

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Date: 2025.08.12 16:33:45 +05'30'

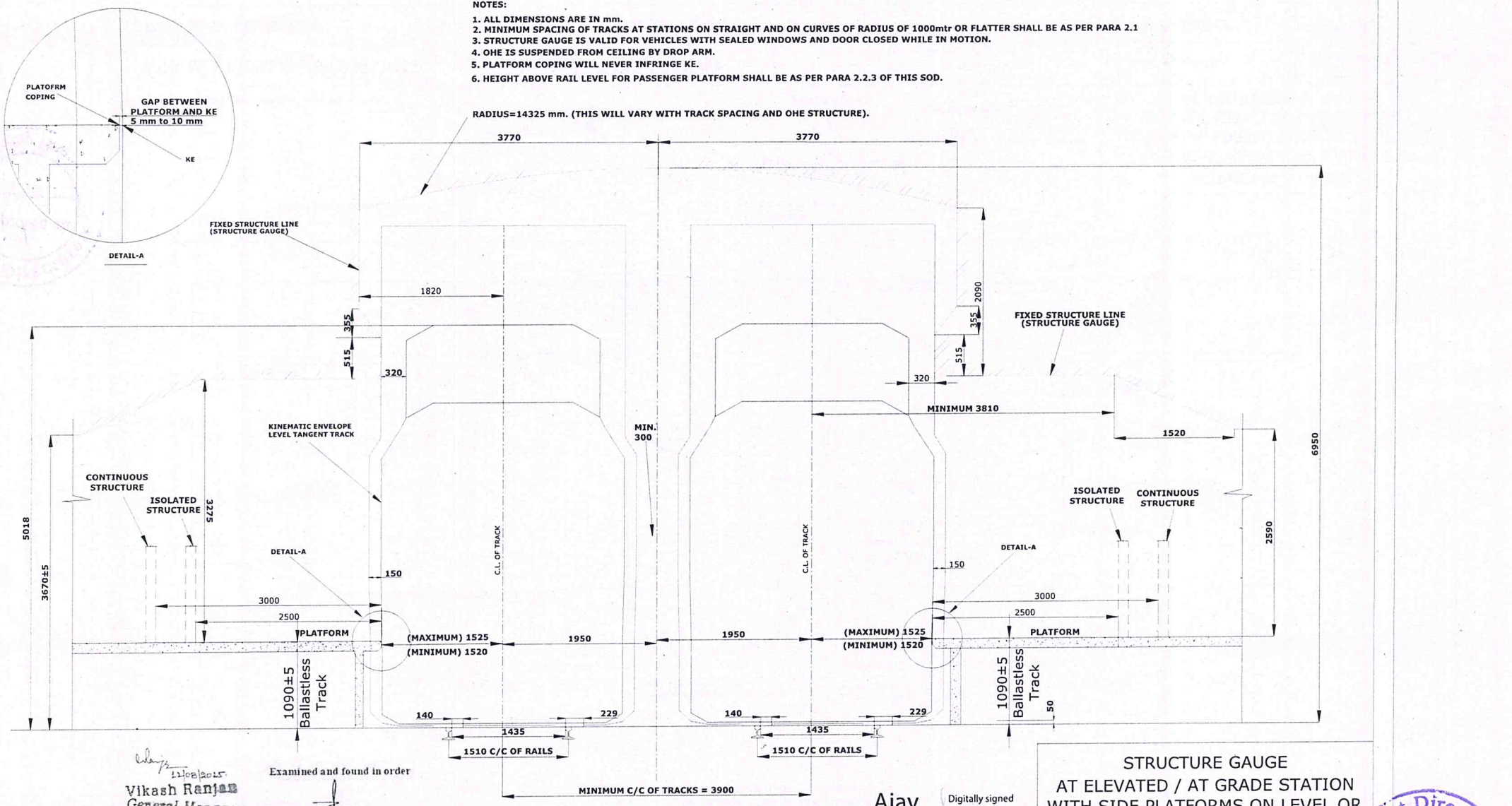
EFFECT OF VERTICAL CURVE
ON
STRUCTURE GAUGE

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-5

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NOTES:

1. ALL DIMENSIONS ARE IN mm.
2. MINIMUM SPACING OF TRACKS AT STATIONS ON STRAIGHT AND ON CURVES OF RADIUS OF 1000mtr OR FLATTER SHALL BE AS PER PARA 2.1
3. STRUCTURE GAUGE IS VALID FOR VEHICLES WITH SEALED WINDOWS AND DOOR CLOSED WHILE IN MOTION.
4. OHE IS SUSPENDED FROM CEILING BY DROP ARM.
5. PLATFORM COPING WILL NEVER INFRINGE KE.
6. HEIGHT ABOVE RAIL LEVEL FOR PASSENGER PLATFORM SHALL BE AS PER PARA 2.2.3 OF THIS SOD.



Vikash Ranjan
General Manager
Rolling Stock (O&M)

Examined and found in order
Director/UT/Civil
RDSO, Lucknow

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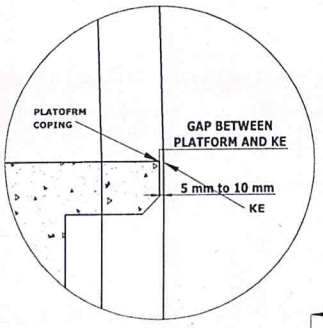
NOTE: THE STRUCTURE LINE IS THE OUTERMOST LINE OF THE STRUCTURE

STRUCTURE GAUGE AT ELEVATED / AT GRADE STATION WITH SIDE PLATFORMS ON LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No. PMSG-6
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	

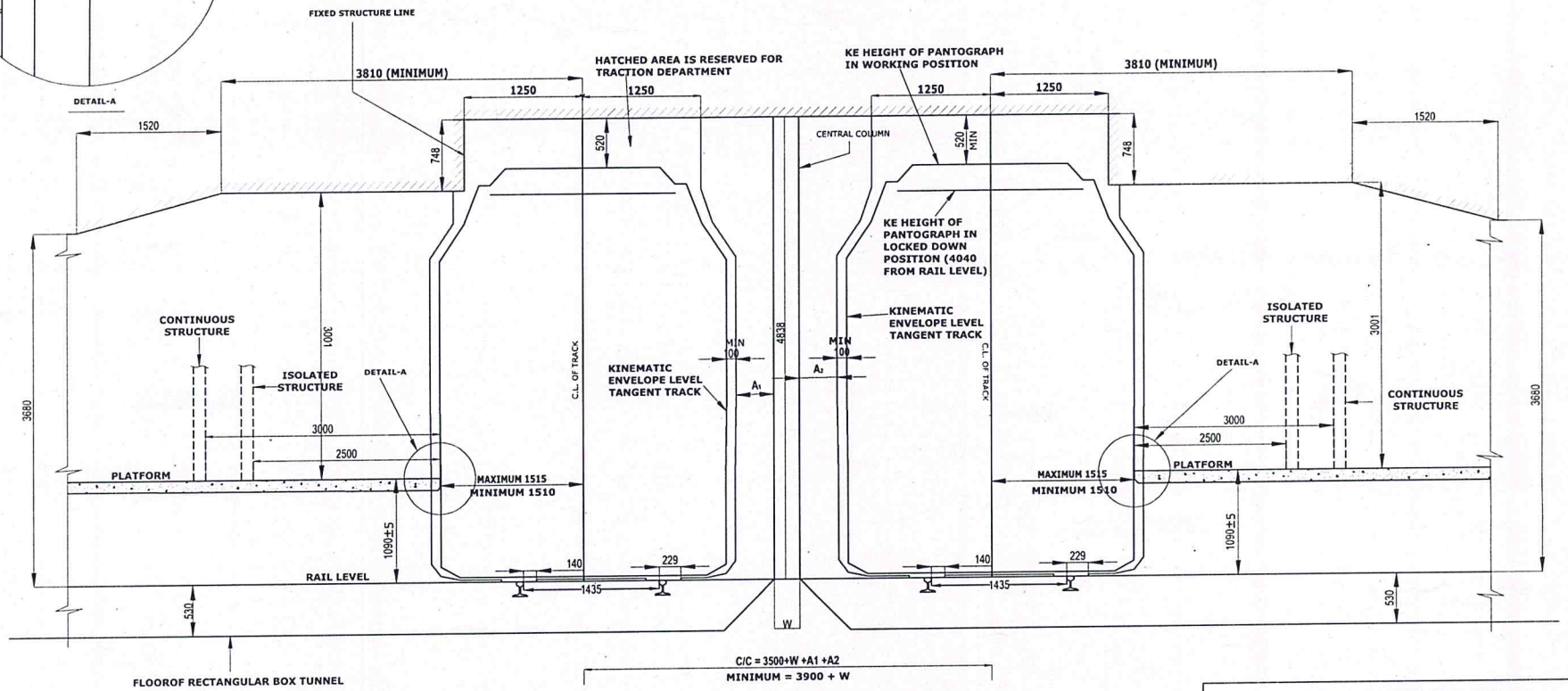
Project Directorate Approved 28/8/25 Railway Board

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DETAIL-A

NOTES:
1. ALL DIMENSIONS ARE IN mm.
2. MINIMUM SPACING OF TRACKS AT STATIONS ON STRAIGHT AND ON CURVES OF RADIUS OF 1000mtr OR FLATTER SHALL BE AS PER PARA 2.1
3. STRUCTURE GAUGE IS VALID FOR VEHICLES WITH SEALED WINDOWS AND DOOR CLOSED WHILE IN MOTION.
4. CLEARANCES 'A1' AND 'A2' FOR SERVICES ARE INDICATIVE.
5. FOR KINEMATIC ENVELOPE, REFER TO FIG. PMSG-1(TNL).
6. PLATFORM COPING WILL NEVER INFRINGE KE.
7. TRACK IN STATION SHALL BE BALLASTLESS.



Vikash Ranjan
General Manager
Rolling Stock (O&M)

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

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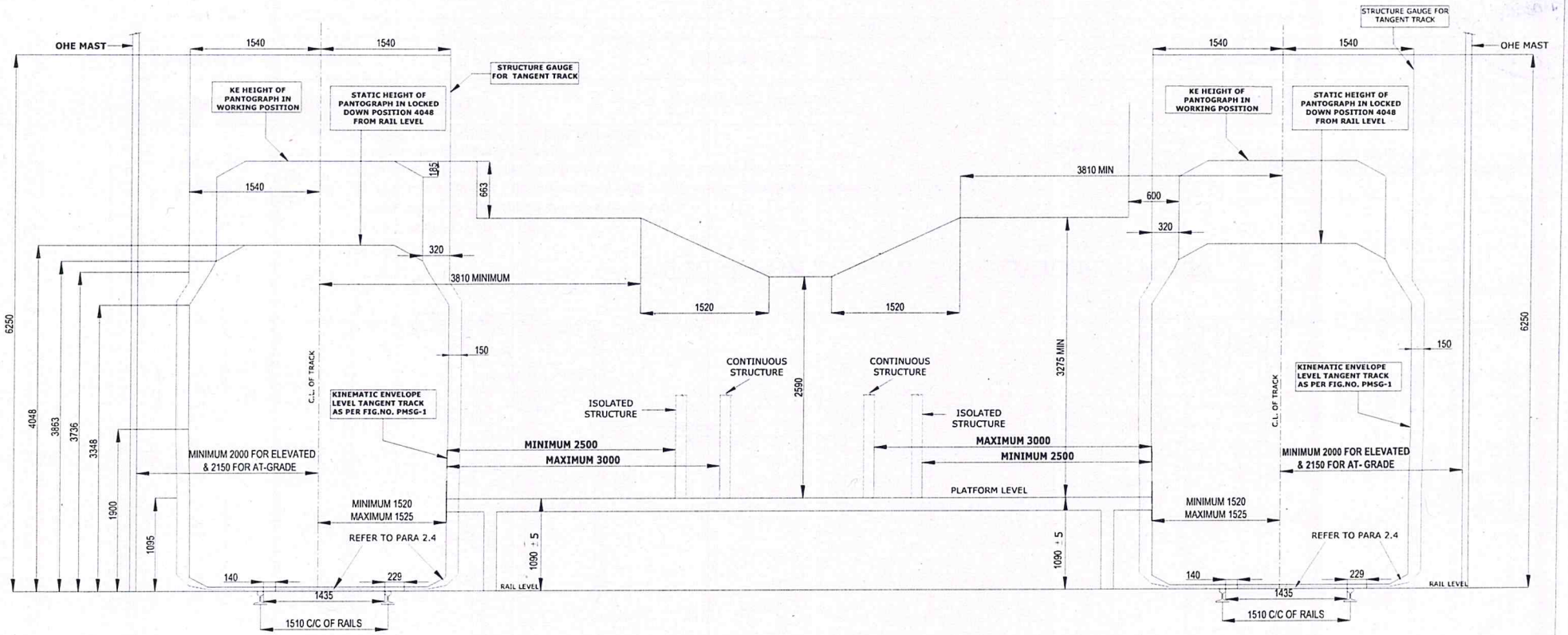
Project Directorate
Approved on
28/8/25
Railway Board

NOTE: THE STRUCTURE LINE IS THE OUTERMOST LINE OF THE STRUCTURE

STRUCTURE GAUGE AT UNDER GROUND STATION WITH SIDE PLATFORMS RECTANGULAR BOX TUNNEL ON LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-6(TNL)

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TYPICAL FOR 8.0 m WIDE ISLAND PLATFORM

NOTES :

a) All Dimensions are in mm.

b) Horizontal Allowance due to curves shall be extra.

c) Structure gauge is valid for vehicles with sealed windows and doors closed while in motion.

d) Distance of platform coping from center of track as the para 2.2.

e) Platform Coping will never infringe KE.

f) Track in station area shall be ballastless.

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

14/08/2025

Vikash Ranjan
General Manager
Rolling Stock (O&M)

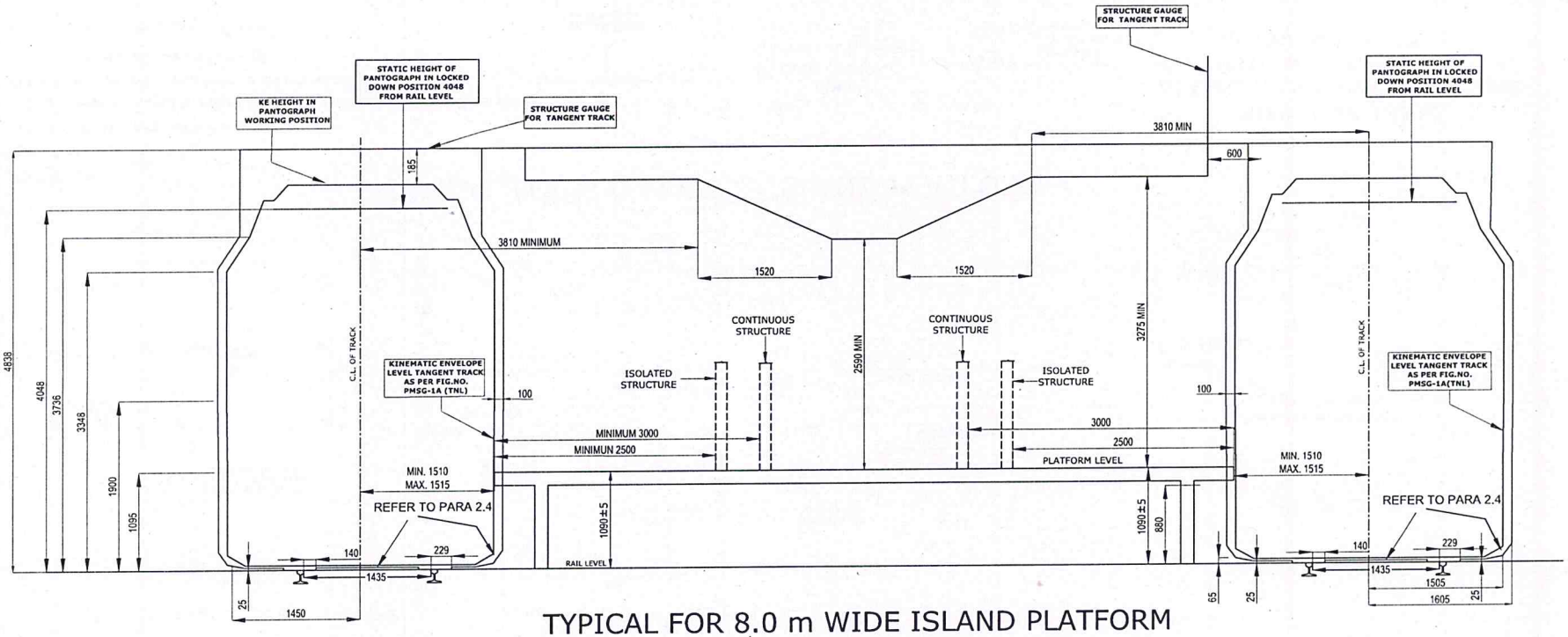
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Date: 2025.08.12 16:36:15 +05'30'

STRUCTURE GAUGE
AT ELEVATED STATION WITH ISLAND PLATFORM ON LEVEL OR CONSTANT GRADE TANGENT TRACK

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- July 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-7

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TYPICAL FOR 8.0 m WIDE ISLAND PLATFORM

NOTES :

1) All Dimensions are in mm.
2) Allowances for Horizontal curves shall be extra.
3) Structure gauge is valid for vehicles with sealed windows and doors closed while in motion.
4) Distance of platform coping from center of track as the para 2.2.
5) Platform Coping will never infringe KE.
6) Track in stations area shall be ballastless.

11/08/2025
Vikash Ranjan
General Manager
Rolling Stock (O&M)

Ajay Kumar
Digitally signed by Ajay Kumar
Date: 2025.08.12 16:37:01 +05'30'

PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-7 (TNL)

STRUCTURE GAUGE AT UNDERGROUND STATION WITH ISLAND PLATFORM ON LEVEL OR CONSTANT GRADE TANGENT TRACK

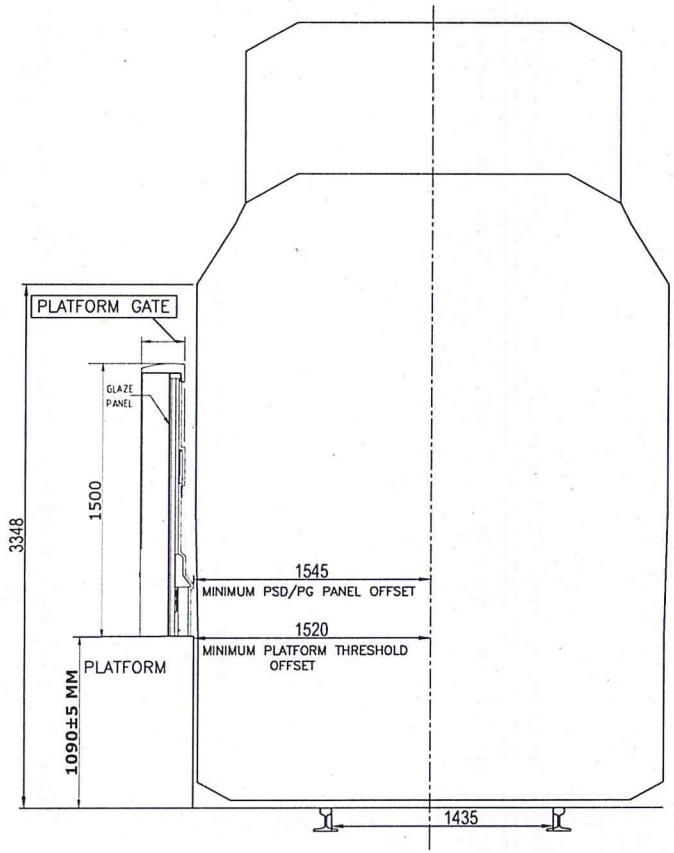
47

Examined and found in order

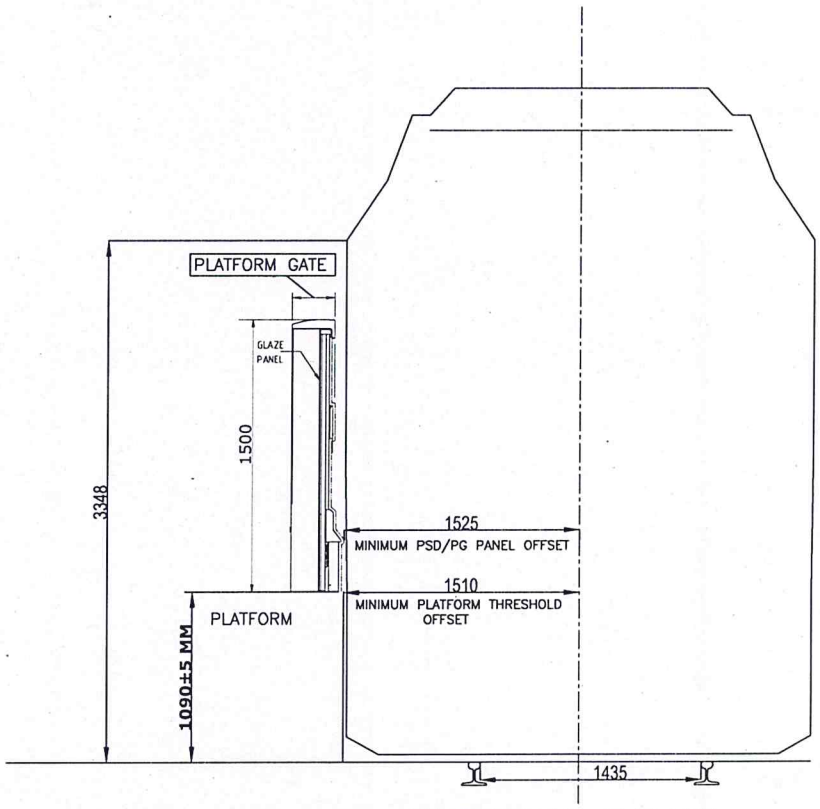
Director/UT/Civil
RDSO, Lucknow

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Project Directorate
Approved
28/8/25
Railway Board



AT–GRADE AND ELEVATED PLATFORM



UNDERGROUND–PLATFORM

Examined and found in order

Director/UT/Civil
RDSO, Lucknow

12/08/2025

Vikash Ranjan
General Manager
Rolling Stock (O&M)

NOTES

1. ALL DIMENSIONS ARE IN mm.
2. MINIMUM GAP OF 10 mm SHALL BE MAINTAINED BETWEEN KE AND PLATFORM GATE.
3. FOR DETAIL DRAWING, PLEASE REFER FIGURE NO. PMSG–1A AND PMSG–1A (TNL).
3. TRACK IN STATIONS SHALL BE BALLASTLESS.

Ajay Kumar
Digitally signed by Ajay Kumar
Date: 2025.08.12 16:37:50 +05'30'

PLATFORM SCREEN DOOR/PLATFORM GATE ON LEVEL OR CONSTANT GRADE TANGENT TRACK			
PATNA METRO RAIL CORPORATION LTD.	25 kV A.C. TRACTION	DATE:- August 2025	FIGURE No.
STANDARD GAUGE (1435 mm)	2.9m WIDE COACH WIDTH	SCALE: NOT TO SCALE	PMSG-8 , Rev. 7

Project Directorate
Approved on
28/8/25
Railway Board

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