

Public Works (1895) Department.

RAILWAY BRANCH.

G.O., No. 877. R

DATED 19th December

[Despatch Abstract.]

Standard dimensions. — Letter to the Govt. of India forwarding the opinions of the Consulting Engineer and of the agents of Railways under the control of this Government on the draft lists of — received from the Govt. of India.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
	589	R	19-9-95				

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

The maximum angles of curvature given above do not apply to curves in station yards.

Ballast and Permanent Way.

II. BALLAST AND PERMANENT WAY.

	A	B
	Absolute for any railway.	For railways over which the Government of India exercise control unless otherwise laid down by special orders in each case.
Ballast—		
(8) Minimum width of ballast at level of foot of rail ...	10 ft. 0 in.	11 ft. 0 in. ✓
(9) Minimum depth of ballast below sleepers ...	4 inches.	8 inches. ✓
N.B.—These minimum dimensions may be relaxed in the case of a line being opened to traffic before the banks have settled.		

Sleepers—

Minimum dimensions for timber cross sleepers—				
(10) Length ...	...	...	9 ft. 0 in.	9 ft. 6 in. ✓
(11) Breadth ...	...	...	8 inches.	9 inches. ✓
(12) Depth ...	...	...	5 inches.	5 inches. ✓
(13) Minimum area in cross section ...	...	...	48 inches.	50 sq. in. ✓
(14) Minimum number of cross sleepers per mile ...	...	...	1760	1760 ✓

N.B.—On bridges where the cross sleepers rest directly on longitudinal girders, the sleepers are to be spaced not more than 2 ft. 6 in. apart, centre to centre, and are to be not less than 6 inches deep exclusive of any notching which may be required on the underside to allow for the cover plates, camber, etc.

Rails—

(15) Maximum clearance of guard rail opposite nose of crossings ...	...	...	1½ inch.	1½ inch. ✓
(16) Minimum clearance of switch rails and of guard rail for crossings ...	...	...	1½ inch.	1½ inch. ✓
(17) Minimum clearance of guard rail for curves and level crossings ...	...	...	2 inches.	2 inches. ✓
N.B.—The maximum clearance for curves and level crossings will vary according to the radius of curve.				
(18) Minimum depth of space for wheel flange, from rail level ...	...	...	1½ inch.	1½ inch. ✓

Fixed Structures—In Stations.

III. FIXED STRUCTURES—IN STATIONS.

(See also Diagram No. 1.)

A

B

Absolute for any railway.

For railways over which the Government of India exercise control unless otherwise laid down by special orders in each case.

Platforms—

- (19) Standard horizontal distance from centre of track to face of platform wall or nosing (if any)...

5 ft. 6 in.

5 ft. 6 in. ✓

N.B.—The upper edge of the nosing or coping to platform wall is to be finished to form an arris, without any rounding or chamfer.

If the platform be on a curve, the horizontal distance from centre adjacent track is to be increased as follows:—

For a curve of 8 degrees	(716 ft. rad.)	allow 5½ in. extra.
" " 6 "	(955 ft. rad.)	" 4 in. "
" " 4 "	(1432 ft. rad.)	" 2½ in. "
" " 2 "	(2865 ft. rad.)	" 1½ in. "

and for other curves in proportion.

- (20 a)—Maximum height above rail level for any passenger platform ...

2 ft. 9 in.

2 ft. 9 in. ✓

- (20 b)—Minimum height above rail-level for high passenger platforms ...

2 ft. 6 in.

2 ft. 6 in. ✓

- (21 a)—Maximum height above rail-level for low passenger platforms ...

1 ft. 2 in.

1 ft. 2 in. ✓

- (21 b)—Minimum height for any passenger platform ...

Flush with rail level.

Flush with rail level. ✓

Norm.—No platform is admissible of any height between 1 ft. 2 in. and 2 ft. 6 in. above rails. Every halting place must have a platform either raised or flush, which must be of standard platform length and ramped at ends. Flush platforms at unimportant halting places need not extend in width more than 16 feet from centre of track. Low platforms may have a curb instead of a platform wall, but a slope, falling towards the rails, steeper than 1 in 20 must not be used.

- (22) Maximum height above rail level for goods, carriage, and horse loading platforms ...

3 ft. 6 in.

3 ft. 6 in. ✓

N.B.—The ends of all platforms must be ramped, the slope being not steeper than 1 in 6.

Buildings—

- (23) Minimum horizontal distance of any building from the edge of a passenger platform ...

18 ft. 0 in.

30 ft. 0 in. ✓

N.B.—For an island platform, where it would be undesirable to allow the full width here specified, a plan shewing the arrangements proposed is to be submitted to the Government of India for special sanction.

- (24) Minimum horizontal distance from centre of track to any structure in the vicinity of a passenger platform (but not on a platform), within a height of 12 feet from rail level ...

9 ft. 0 in.

9 ft. 0 in. ✓

N.B.—This rule does not apply to point levers between tracks, to water cranes, or to loading gauges. (See items Nos. 38, 45 and 77.) For extra allowance on sharp curves see Item No. 19.

Fixed Structures—In Stations.

III. FIXED STRUCTURES—IN STATIONS—*continued.*

	A	B
	Absolute for any railway.	For railways on which Government exercise control unless otherwise laid down in each case by special orders.
Pillars, Lamps, &c.—		
(26) Minimum horizontal distance from edge of platform to pillars, columns, lamps or similar isolated structures within a height of 12 feet from rail level ...	6 ft. 0 in.	6 ft. 0 in. ✓
Roofs, Over-bridges, &c.—		
(27) Minimum height above rail level, at centre of track, of tie-rods or underside of any continuous roof or covering in <i>passenger</i> stations ...	20 ft. 0 in.	20 ft. 0 in. ✓
(28) Minimum height above rail level at centre of track for passenger foot-bridges crossing the line in stations...	16 ft. 6 in.	18 ft. 6 in.
(29) Minimum height above rail level for telegraph wires crossing the line, or above surface of road where carried over roads within the boundary of a station ...	20 ft. 0 in.	20 ft. 0 in.

Fixed Structures—Out of Stations.

IV. FIXED STRUCTURES—OUT OF STATIONS.

(See also Diagram No. 2.)

A	B
Absolute for any railway.	For railways on which Government exercise control unless otherwise laid down in each case by special orders.

Buildings, &c.—

- | | | | | | |
|---|-----|-----|-----|-------------|---------------|
| (30) Minimum horizontal distance from centre of track to any structure, out of stations, from 1 foot above rail level to a height of 11 ft. 6 in. above rail level. (See diagram No. 2.) | ... | ... | ... | 6 ft. 6 in. | 7 ft. 0 in. ✓ |
| <p><i>N.B.</i>—Under this entry any material stacked by the side of the line is to be considered a structure in the sense in which the word is here used.</p> | | | | | |
| (30a) Minimum horizontal distance from centre of track from 1 foot above rail level to 10 feet 6 inches above rail level to any part of a girder carrying the track, and not designed for 5 ft. 6 in. gauge loads ... | ... | ... | ... | 6 ft. 6 in. | 6 ft. 6 in. ✓ |
| (30b) Minimum horizontal distance from centre of track from rail level to 1 foot above rail level ... | ... | ... | ... | 4 ft. 5 in. | 4 ft. 5 in. ✓ |

Where the line is on a curve the horizontal distance of a fixed structure from the centre of adjacent track is to be increased as follows:—

For a curve of 8 degrees (716 ft. rad.)	allow 5½ in. extra.
" " 6 " (955 ft. rad.)	" 4 in. "
" " 4 " (1432 ft. rad.)	" 2½ in. "
" " 2 " (2865 ft. rad.)	" 1½ in. "

and for other curves in proportion.

Over-Bridges, &c.—

- | | | | | |
|--|-----|-----|--------------|----------------|
| (31) Minimum height above rail level at centre of track for over-bridges out of stations ... | ... | ... | 12 ft. 6 in. | 14 ft. 6 in. ✓ |
| (31a) Minimum height above rail level at centre of track for over-head bracing of girders carrying the track, and not designed for 5 ft. 6 in. gauge loads ... | ... | ... | 12 ft. 6 in. | 12 ft. 6 in. ✓ |
| (32) Minimum height above rail level for telegraph wires crossing the line, or above surface of road where carried over roads at level crossings ... | ... | ... | 20 ft. 0 in. | 20 ft. 0 in. ✓ |

N.B.—The minimum horizontal distance, from the centre line of nearest track, at which a telegraph post may be erected, is the total height of the post plus seven feet. Also, where the line is in cutting, a telegraph post erected on the berm must be at a distance from the edge of the cutting of not less than the total height of the post.

Tunnels—

- (33) For minimum dimensions, see diagram No. 3. ✓

Station Yards.

V. STATION YARDS.

A. Absolute for any railway.
B. For railways on which Government control is exercised; control is otherwise laid down in each case by special orders.

Spacing of Tracks—

(34) Minimum distance of tracks centre to centre—			
Track nearest platform to next track ...	...	12 ft. 6 in.	16 ft. 7 in. ✓
All other tracks in station yards ...	...	12 ft. 6 in.	15 ft. 6 in. ✓

Points and Crossings—

(35) Minimum radius of curve ...	...	400 feet.	478 feet. ✓
(36) Standard crossings ...	...	—	1 in 6. ✓
		—	1 in 8½. ✓
		—	1 in 12. ✓
(37) Standard lengths for tongue rails ...	...	—	9 ft. 0 in. ✓
		—	12 ft. 0 in. ✓
(38) Minimum horizontal distance from centre of track to point handle, indicator or any part of point apparatus above rail level ...	...	7 ft. 0 in.	7 ft. 0 in. ✓

N.B.—A point handle may not, in any position, be within seven feet of the centre line of nearest track; a clear distance of seven feet is also to be preserved from centre of nearest track to any part of the point apparatus, fixed or movable, above rail level. An arrangement involving the placing of a point handle between tracks should be avoided as far as practicable; but where this arrangement is adopted, the point handle must work parallel with the rails, not at right angles thereto.

Accommodation—

(39) Minimum length for passenger platform ...	...	600 feet. ✓
(40) Minimum clear available length of siding at any roadside station which may be used as a crossing station ...	...	1200 feet. ✓

N.B.—The 'available length' of siding (whether the line be curved or straight) terminates where the distance between the centre line of the siding and the centre line of an adjacent track begins to be less than 12 feet 6 inches.

The point at which the 'available length' terminates should be marked on the ground in a conspicuous manner.

On any section of a railway having a ruling gradient heavier than 1 in 100, or on which the length of trains is limited by other considerations, the length of platform and sidings may (with the sanction of the Government of India) be reduced to such an extent as may appear advisable. But for each such special case the sanction of Government is to be obtained to the proposal before work is commenced.

Station Machinery.

VI. STATION MACHINERY.

	A	B
	Absolute for any railway.	For railways on which Government exercise control unless otherwise laid down in each case by special orders.
Water Tanks—		
Minimum height for bottom of tank above rail level at water column:—		
(41) For watering engines	—	20 ft. 0 in. ✓
(42) For washing out engines	—	30 ft. 0 in. ✓
(43) Minimum distance from centre of track to face of tank house when adjacent to a passenger platform ...	18 ft. 0 in.	30 ft. 0 in. ✓
(44) Minimum capacity of tank at any station ...	—	1000 c. ft. ✓
Water Cranes—		
(45) Minimum distance in the clear from centre of track to nearest part of water column from 1 foot above rail level	7 ft. 0 in.	7 ft. 0 in. ✓
(46) Standard height above rail level for discharge orifice of water crane jib	—	12 ft. 0 in. ✓
(47) Standard internal diameter for piping from tank to water crane	—	6 inches. ✓
N.B.—This diameter should be increased where the same pipe serves two or more water columns likely to be used at the same time.		
Ash-Pits, etc.—		
(48) Minimum clear length at bottom for ash-pits in Station Yards	—	50 ft. 0 in. ✓
(49) Standard average depth for ash-pits in Station Yards ...	—	3 ft. 6 in. ✓
(50) Standard depth for examining pits for carriages and wagons	—	3 ft. 0 in. ✓
Engine Running Sheds—		
Minimum width for Running-Sheds inside in the clear:—		
(51) For two lines of rail	—	45 ft. 0 in. ✓
(52) For one line of rail	—	28 ft. 0 in. ✓
(53) Minimum distance centre to centre of tracks in Running Sheds	10 ft. 6 in.	17 ft. 0 in. ✓
Running shed doorways:—		
(54) Minimum width	12 ft. 6 in.	15 ft. 0 in. ✓
(55) Minimum height, if flat at top	12 ft. 6 in.	14 ft. 6 in. ✓
(56) Minimum height to crown of arch, if with semi-circular arch	13 ft. 6 in.	16 ft. 0 in. ✓
(57) Standard average depth for wash-out pits in Running Sheds	—	3 ft. 0 in. ✓
(58) Standard average depth for repairing pits in Running Sheds	—	3 ft. 0 in. ✓
Turntables—		
(59) Minimum diameter for Engine turntables	—	36 ft. 0 in. ✓
(60) Minimum diameter for Carriage or Wagon turntables ...	—	14 ft. 0 in. ✓
Traversers—		
(61) Minimum length for Carriage or Wagon traversers ...	—	14 ft. 0 in. ✓
Weigh-bridges—		
(62) Minimum length for weigh-bridges for ordinary stock ...	—	14 ft. 0 in. ✓
(63) Minimum weighing power for weigh-bridges for ordinary stock	—	12 tons. ✓

Locomotive Engines.

VII. LOCOMOTIVE ENGINES.

	A	B
	Absolute for any railway.	For railways on which Government exercise control unless otherwise laid down in each case by special orders.
Maximum moving dimensions—		
(64) The maximum moving dimensions laid down on page 8 for Carriages and Wagons apply also to Locomotive Engines. (See also diagram No. 1.)		
Weight on a pair of wheels—		
(65) Maximum under any circumstances ...	8 tons.	8 tons. ✓
(66) Maximum per foot of diameter ...	2'67 tons.	2'67 tons. ✓
Weight per foot run of wheel base—		
(67) Maximum for either engine or tender separately, in the case of tender engines ...	2'00 tons.	2'00 tons. ✓
(68) Maximum for tank engines ...	2'67 tons.	2'67 tons. ✓
Weight per foot run over buffers—		
(69) Maximum for engine and tender together, in the case of tender engines ...	1'125 tons.	1'125 tons. ✓
(70) Maximum for tank engines ...	1'333 tons.	1'333 tons. ✓
Total gross weight—		
(71) Maximum for engine and tender together, in the case of tender engines ...	46 tons.	46 tons. ✓
(72) Maximum for tank engines ...	32 tons.	32 tons. ✓

N.B.—The weights given above are the maximum permissible under any circumstances with engine in working order and full load of fuel and water.

In exceptional cases, engines of weights in excess of the specification given above may be used under the special sanction of the Government of India. Such special sanction must be obtained *before* the engines are ordered, and the application for sanction must be accompanied by a diagram of the proposed engine giving full particulars, and by a certificate by the Government Inspector that the bridges on the section over which the engines are intended to work, are of sufficient strength.

Carriages and Wagons.

VIII. CARRIAGES AND WAGONS.

		A	B
		Absolute for any railway.	For railways on which Government exercise control unless otherwise laid down in each case by special orders.
Maximum moving dimensions. (See also diagram No. 1)—			
Maximum width:—			
(73)	From rail level to a height of 2 ft. 9 in. above rail level	...	...
(74)	From a height of 2 ft. 9 in. above rail level to a height of 10 feet above rail level	...	...
		These items are specially considered separately.	
<i>N.B.</i> —These heights are to be taken with the vehicle unloaded and buffer centres at the maximum height of 1 ft. 11 in. from rail level. For further details see Diagram No. 1.			
Maximum height from rail level:—			
(75)	For unloaded vehicle at centre	...	11 ft. 0 in.
(76)	For unloaded vehicle at sides	...	10 ft. 2 in.
Loading gauge for goods:—			
(77)	Maximum width	...	8 ft. 8 in.
(78)	Maximum height from rail level at centre	...	11 ft. 1 in.
(79)	Maximum height from rail level at sides	...	10 ft. 3 in.
Maximum gross weight—			
(80)	On any pair of wheels	...	7 tons.
(81)	Per foot run over buffers	...	0.8 ton.
<i>N.B.</i> —The weights given above are the maximum permissible under any circumstances, with the vehicle fully loaded. The weight on a pair of wheels includes the weight of the wheels, axles, axle-boxes and springs.			
Wheel base—			
(82)	Maximum rigid wheel base for passenger vehicles	...	13 ft. 0 in.
(83)	Maximum rigid wheel base for goods vehicles	...	12 ft. 0 in.
Buffers and Couplings—			
(84)	Standard distance apart for centres of buffers	...	—
(85)	Maximum height above rail level for centres of buffers for unloaded vehicles	...	1 ft. 11 in.
(86)	Minimum height above rail level for centres of buffers for fully loaded vehicles	...	1 ft. 9 in.
Height for Floors—			
(87)	Maximum height above rail level for floor of any vehicle unloaded (with 2 ft. 4 in. wheels)	...	3 ft. 1 in.
(88)	Minimum height above rail level for floor of passenger vehicle fully loaded (with 2 ft. 0 in. wheels)	...	2 ft. 5½ in.
(89)	Minimum height above rail level for floor of goods vehicle fully loaded (with 2 ft. 0 in. wheels)	...	2 ft. 5 in.
Wheels and Axles—			
(90)	Standard wheel gauge, or distance apart for all wheel flanges	...	3 ft. 0½ in.
(91)	Standard diameter on the tread for new wheels	...	2 ft. 4 in.
(92)	Maximum projection for flange of worn tyre below rail level	...	1½ inches.
Roof Lamps—			
(93)	Standard diameter inside in the clear for rings of carriage roof lamps	...	8½ inches.
(94)	Standard diameter for carriage roof lamps at level of ring	...	8 inches.

Enclosure to letter No. 936 R. C. of 1895.

Note prepared in the office of the Consulting Engineer to the Government of India for State Railways, dated 8th July 1895.

WIDTH OF PLATFORMS—BOTH GAUGES.

Item 23 of the standard dimensions lays down the distance of a *building* from the edge of platform, but does not lay down any minimum clear width of platform.

Opinions may be invited as to whether it is necessary to lay this down, and if so, what the distance should be.

WIDTH OF VEHICLES—BOTH GAUGES.

Items 73 and 74 of standard dimensions now lay down certain widths for vehicles as follows:—

		Ft.	In.
5 ft. 6 in. gauge—	Up to 4 ft. 4 in. above rail level	...	10 0
	From 4 ft. 4 in. up to top	...	10 6
Metre gauge—	Up to 2 ft. 9 in. above rail level	...	8 2
	From 2 ft. 9 in. up to top	...	8 6

The diagrams to which reference is made, impose the following additional restrictions:—

5 ft. 6 in. gauge.—Between a height of 4 ft. 4 in. and 8 ft. 3 in. above rail level, the body of a coaching or goods vehicle must not exceed 9 ft. 0 in. outside. Door handles, handrails, lamps, and other isolated fittings, also the outside framing in the case of a goods vehicle, and the projecting window in the case of a brake-van, may extend beyond the body of the vehicle up to a maximum width over all of 10 ft. 6 in. which must not be exceeded under any circumstances.

Metre gauge.—Between a height of 2 ft. 9 in. and 6 ft. 9 in. above rail level, the limit is 7 ft. 9 in. with the same conditions, the extreme limit being 8 ft. 6 in.

In Government of India, Public Works Department, Circular No. 2 Ry., of 3rd May 1894, the extreme width over open doors, including all fastenings, was fixed at 14 ft. 0 in. and 12 ft. 6 in. on the two gauges, respectively, certain special classes of vehicles being excepted.

The Committee of Locomotive and Carriage Superintendents have, on several occasions, drawn attention to the inconvenience and apparent anomaly of the restrictions imposed in these diagrams.

Perhaps the strongest argument is that the outer framing of goods vehicles may project up to the extreme limit, and that on the 5 ft. 6 in. gauge there are many existing vehicles which actually measure 10 ft. 6 in. over framing, and that these vehicles run over all lines in India. Also that, on both gauges, goods are allowed to be loaded in open wagons to the extreme limit of width, but the body, which is the useful part of a covered vehicle, is restricted to less than 9 ft. on standard and 7 ft. 9 in. on metre gauge, these being the dimensions *outside* the body.

Another point is that goods vehicles, including their framing, may be actually wider than passenger vehicles.

D.L.S. 1
6574/95

The Locomotive Committee consider that certain specific *outside* dimensions should be laid down, and at their Madras meeting in 1893 (Vol. V, page 30) recommended the following:—

For the 5 ft. 6 in. gauge:—

(a) From a height of 1 ft. above rail level to roof level, a width of 10 ft. may be built up to without any restriction whatever, provided the conditions elsewhere laid down regarding width over open doors are not exceeded.

(b) From floor level to roof level, isolated fittings, such as railings, door handles, open ventilators, &c., may be permitted to extend for a total width of 10 ft. 6 in., but that no solid obstruction, such as framing of vehicles, be allowed beyond 10 ft.

(c) That continuous projections, such as sunshades or the eaves of roof, be allowed to extend for a total width of 10 ft. 6 in. between a height of 8 ft. 3 in. and 11 ft. 6 in. as at present, and that the projecting window or caboose of a brake-van be allowed for this width down to floor level.

(d) That side lamps, and nothing else, be allowed to project for a total width of 11 ft.

For the metre gauge:—

(a) From a height of 1 ft. above rail level to roof level, a width of 8 ft. 2 in. may be built up to without any restriction whatever, provided the conditions elsewhere laid down regarding width over open doors are not exceeded.

(b) From floor level to roof level, isolated fittings, such as railings, door handles, open ventilators, &c., may be permitted to extend for a total width of 8 ft. 6 in., but that no solid obstruction, such as framing of vehicles, be allowed beyond 8 ft. 2 in.

(c) That continuous projections, such as sunshades or the eaves of roof, be allowed to extend for a total width of 8 ft. 6 in. between a height of 6 ft. 9 in. and 10 ft. 2 in. as at present, and that the projecting window or caboose of a brake-van be allowed for this width down to floor level.

(d) That side lamps, and nothing else, be allowed to project for a total width of 9 ft.

As far as gauge alone is concerned, the experience of other countries shows that there can be no serious objections to these or even greater widths; but we have to deal with the fact that on existing double lines in India the tracks are only 12 feet centres, that many goods vehicles are more than 13 ft. 6 in. and passenger stock 13 feet over open doors, and therefore side lamps projecting to 11 ft. might be struck by an open door of a train on the other line, while if the side lamps were restricted to 10 ft. 6 in. as at present, there would be difficulty in seeing them from the footplate if the bodies of vehicles were 10 ft. wide. Further, at many stations there are high platforms at less than the standard distance of 5 ft. 6 in. from centre of track, but this is not likely to cause inconvenience if the width of body is restricted as proposed to the present width over steps. It also seems necessary that the width over open doors of passenger vehicles be restricted to something appreciably less than 13 ft. 6 in., so that an open door cannot strike a vehicle on the other line.

With these exceptions, there does not appear to be any reason why the width of vehicles should not be increased. It is at least desirable that the standard width should be an over all dimension, and opinions on the subject may be invited.

[For Heads of Departments.]

No. 956 R.C.

GOVERNMENT OF INDIA.
PUBLIC WORKS DEPARTMENT.
RAILWAY CONSTRUCTION.

To

THE GOVERNMENTS OF MADRAS, BOMBAY AND BENGAL.
THE CHIEF COMMISSIONERS OF BURMA AND ASSAM.
THE RESIDENTS AT HYDERABAD AND IN MYSORE.
THE AGENT TO THE GOVERNOR GENERAL IN RAJPUTANA.
THE DIRECTOR GENERAL OF RAILWAYS.
THE CONSULTING ENGINEERS TO THE GOVERNMENT OF INDIA FOR RAILWAYS,
CALCUTTA, LUCKNOW AND ASSAM.

Simla, the 7th August 1895.

SIR,

It having been represented that the standard dimensions to be observed on 5' 6" and metre gauge railways in India, published under Circulars No. 5 Railway and 7 Railway, dated the 15th July and 10th August 1892, are in some instances in excess of actual requirements, especially in the cases of branch or feeder lines, the Government of India have had under consideration the advisability of publishing revised schedules for each gauge, arranged in two lists as follows, *vis.*—

A.—Absolute maximum and minimum dimensions for any railway, which it is intended to enforce by legislative enactment, if necessary, and which may not be infringed under any circumstances.

B.—Maximum and minimum dimensions which may not be infringed without the special sanction of the Government of India.

2. I am accordingly to forward herewith draft lists of standard dimensions for each gauge arranged as above stated, and to request the favour of your opinion and the opinions of Agents and Managers of railways under your control on the same.

A copy of a note prepared in the office of the Consulting Engineer to the Government of India for State Railways, dealing with certain specified items, on which opinions are also invited, is enclosed at the same time.

I have the honour to be,

SIR,

Your most obedient Servant,

Under Secretary.

Documents accompanying.

Draft lists of standard dimensions for railways in India, 5' 6" and metre gauges.

Copy of note prepared in the office of the Consulting Engineer to the Government of India for State Railways, dated 8th July 1895.

6974

Encl 3

Dec 13. 9. 95

No 589. R. dated 12. 9. 95

PUBLIC WORKS DEPARTMENT.

RAILWAY BRANCH. 2

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following

Letter from the Govt. } No. 956 R.C. 77. 12. 95
of Secy to Govt. — }

Communicated
to the Agents Messrs
South Indian Railways
etc the Engineer in Chief
Nilgiri Railway for form
of opinion.

Well
19
9 R

By
Messrs Messrs Messrs
— 1. Agent S. & R. —
— 2. Engineer in Chief Nilgiri R.
6 Copies sent to Messrs
Messrs Messrs
Messrs Messrs

25/9

*Accompaniment to letter from the Government of Madras,
No. 877 R., dated 19th December 1895.*

From the Agent, South Indian Railway, to the Consulting Engineer for Railways,
dated Trichinopoly, 26th November 1895, No. 1043.

With reference to G.O. No. 589 R., dated 18th September 1895, I have the honour to state that, in my opinion and with the exceptions noted below, I consider the proposed modifications in the standard dimensions observable on metre gauge railways very desirable.

I.—FORMATION.

*Single line and double line—Minimum width of Formation—items, 1, 2, 3, 4—*Earthwork is done so cheaply in this country and the extra width in a gullet of a cutting or the base of an embankment will add so little to the cost of the line that I would recommend the minimum width of 14 feet and 26 feet for cuttings and 16 feet and 28 feet for embankments be adhered to; the extra space is of great convenience to the workmen.

II.—BALLAST AND PERMANENT WAY.

Item 14—Minimum number of cross sleepers to a mile.—The spacing of sleepers should not, in my opinion, be less than 2' 9" centre to centre, or 11 sleepers to a 30 feet rail, especially as by item 11 the width of sleeper may be reduced to 6 inches, and by item 65 the weight on a pair of wheels is to be retained at 8 tons—with 1,760 sleepers to the mile; the unsupported length of rail would be over 2½ feet, and for a light railway a 35 lb. or even smaller section of rail would probably be used.

Buildings—Item 23.—For the same reason as given for items 1, 2, 3, 4, I recommend that the minimum horizontal distance of any building from the edge of the platform be made 20 feet instead of 18 feet—a 20-feet platform is none too wide.

III.—FIXED STRUCTURES IN STATIONS.

Items 27, 28.—I would recommend that item 27 be reduced to 17' and item 28 increased to this figure; covered ways are expensive structures, and as long as the tie rods of roof trusses are above the height of a man standing on a carriage, they will be sufficiently high.

IV.—FIXED STRUCTURES OUT OF STATIONS.

Buildings, &c.—Item 30.—I consider the dimension of 7 feet should be adhered to; the only structure this increase from 6½ feet would effect, would be gates closing across the line.

V.—STATION YARDS.

Spacing of Tracks—Item 34.—I would keep the minimum distance of the centre of track nearest platform to the centre of the next track 15 feet; the spacing would then admit of the placing of a water column between these tracks in the event of new watering stations being required after the opening of a railway. Stations are generally placed where the earthwork is light and the expense of the extra 2½ feet would be light.

Bf.
No 589 R. dated 19.9.95

25/9

Points and Crossings—Item 85.—The minimum radius of curve should not in my opinion be reduced especially, as by items 82 and 83 it is proposed to increase the rigid wheel base for passenger and goods vehicles.

VI.—STATION MACHINERY.

Item 53.—If doorways are 12½ feet wide, the spacing of tracks centre to centre in running sheds cannot be less than 14 feet unless a girder is used spanning both tracks, and this would not cheapen the building.

As regards the suggestions contained in the note by the Consulting Engineer to the Government of India for State Railways, enclosed with Government of India letter, No. 956 R.C., dated 7th August 1895, I share his opinion that the standard width should be an over-all dimension.

From the Agent and Manager, Madras Railway, to the Consulting Engineer for Railways, dated Madras, 27th November 1895, No. 7016/1054 B.

With reference to Government of India No. 956 R.C., dated 7th August 1895, received with Madras G.O. No. 589 R., dated 19th September 1895, I have the honour to state that the proposals in the draft lists of standard dimensions with respect to sections I to VI meet with the approval of the officers of this Company.

With regard to sections VII and VIII, I forward herewith copy of a letter from the Company's Locomotive Superintendent with enclosure, to which I beg to invite attention.

ENCLOSURE.

From the Locomotive Superintendent, Madras Railway, to the Agent and Manager, Madras Railway Company, dated Perambur, 12th October 1895, No. 1504/1217 B.

[Your No. 7016/8428 of the 26th ultimo.]

Revised schedules of standard dimensions.

The sections in the Circular accompanying G.O. No. 589, dated 19th September 1895, which chiefly concern this department are Nos. VII and VIII dealing with locomotive engines and carriages and wagons, and excepting in these two sections, there does not seem to be very much which calls for remark from me.

2 It has never been apparent to me why the maximum weights carried on Indian standard gauge railways should, as is the case, have been fixed so much lower than those of trains which are in daily running on both English and American lines, in both of which countries, further, the narrower gauge of 4' 8½" obtains.

3. I enclose for your information a copy of a letter I recently addressed to the Secretary of the Committee of Locomotive and Carriage Superintendents, in reply to a note which had been submitted by the Consulting Engineer to Railways (with the Government of India) for discussion by the Committee, and in which he suggests the desirableness of limiting the loads of future rolling stock to a maximum which he bases upon the present 12-ton load carried on wheels 3' 6" diameter as marking the high tide of extreme "practice."

4. I fully recognize the fact that it would be impossible, save at very great expenditure, to go very far beyond present standards, either in outside dimensions or weight so far as existing lines are concerned; but since the figures given in schedule A are, as I understand it, ultimate maxima which may be worked up to in special circumstances on, say, future lines sufficiently strongly equipped to admit of their introduction, it seems to me to be a great pity not to fix these so as to accord more nearly with present English and American practice, since, further, my departure from schedule B will at all times require the special sanction of the Government of India and as this sanction would of course be withheld, excepting where the circumstances of the line would justify a departure from schedule B, public safety would seem to be amply safeguarded, and there would still be a hope that at some future date Indian railways would, so far as any rate on the more recently constructed ones go, be dealing with loads more nearly approaching the carrying capacity of the gauge.

5. As bearing also upon this question, I would refer you to my letter No. B. 855-893 of the 26th October 1894 to your address, an extract from which is also quoted in my letter of the 21st May 1895, to the Secretary of the Locomotive and Carriage Superintendents' Committee mentioned above. As I have stated in paragraph 16 of the latter letter, it is not possible, without departing from the existing maximum standards, to build covered wagons, even up to the 24 tons maximum gross load, which will carry more than about 14 to 16½ tons, the minimum weight to which such a wagon could probably be built being about 8 tons. This would give a proportion of dead to paying load of, say, 1 to 2. Such a wagon would, in all probability, be well able to carry, without the slightest increase in dead weight, loads up to, say, 20 tons; but this would be rendered impossible, not because the running gear of the wagon or the wagon itself was not strong enough, but because the maximum weight which the standard dimensions allow to be carried on four wheels is 24 tons.

6. I do not for a moment forget in putting forward the proposition to allow, where possible, substantial increase in the maximum loads, that to do so would, probably in some cases, mean increase in bridge and permanent-way sections; but I submit that the fact that existing lines are not heavily enough built to carry such loads should not be a bar to all future progress on future lines.

7. It will probably be said that, if this proposition were carried out, it would interfere with the interchangeability of stock, but I would point out that this could always be got over by, in cases where such was absolutely necessary, limiting the load of these heavy wagons while running on the older and weaker lines to such lower limit as might be required. The increase would, it seems to me, be a step in the right direction and, if made, other steps would, as time went on, naturally follow in due course.

8. Holding these views, then, I would suggest that the following alterations should be made in sections VII and VIII.

Section VII.—Schedule A.

	TONS.
No. 65. Maximum under any circumstances	19
No. 66. Do. per foot diameter	4
No. 71. Do. for engine and tender together in the case of tender engine	100

Section VIII.—Schedule A.

No. 80. Maximum gross weight or any pair of wheels	14
--	----

9. With regard to the maximum outside dimensions Nos. 73 and 74, section VIII, which are specially referred to in the Consulting Engineer's note accompanying the circular, I am strongly of opinion that the dimensions, as put forward at the Madras meeting of the Locomotive and Carriage Superintendents' Committee—*viz.* (a), (b), (c) and (d) at the top of page 2 of the Consulting Engineer's note—should be sanctioned as they stand.

10. The object of the gap, which the existing rules prescribe shall be left in the width of all vehicles, is that the driver shall be able to see, through it, the side lamps from the engine; but, since the rules also permit door handles, cuspis tatic, the cabooses of brake-vans and the outside framing of goods vehicles to project out to the full width of 10' 6", the gap is practically useless, for the presence of a single vehicle with a cuspis cooler or a projecting caboose renders it impossible for the driver to see the tail lights at all. The Committee, therefore, after very full discussion, arrived at and recommended the limits proposed, and with these I thoroughly concur.

11. In the new Circular, No. 74 (a) sanctioned under Government of India Circulars Nos. 5 and 7 Railway of the 15th July and 10th August 1892, respectively, and limiting the width over open doors seems to have been omitted. I am of opinion that the present maximum, *viz.* 14' over open doors, should be adhered to and with regard to the objection to this and to the suggestion that side lamps should be allowed to project up to a maximum of 11 feet, raised in the penultimate paragraph of the Consulting Engineer's note, I would point out that the risk of the lamps being struck by an open door on a passing train would only exist on a double line laid to the old standard of 12-foot centres, and that this risk could be at all times eliminated by locking the doors on the offside of all passenger trains—a procedure which is, I believe, even at present very general, if not universal.

12. It is in my opinion most necessary on the score of safety that a driver shall be able at all times to see the side lamps of his train, and, unless the committee's recommendation that they shall be allowed to project beyond the maximum of 10' 6" be agreed to, there seems to be no way of ensuring this end.

13. I would further recommend that, in addition to the special vehicles mentioned in the note to No. 74 (a) referred to above, *viz.*, horse boxes, luggage vans and brake vans, which are allowed to be constructed with doors measuring in excess of 14' over all when open, that as

is proposed in my letter No. B 667/1093, of the 7th ultimo to your address, permission may also be granted to build covered carriage trucks with doors which, when open, shall not exceed 16 feet 6 inches over all, this being the width to which horse box doors are now made.

18. I am very glad to see that an increase has been entered in schedule A in the length of rigid wheel base permitted for carriages No. (62). I would, however, suggest that this maximum shall be further increased to 20 feet, which is the general standard wheel base for 6 wheel passenger coaches in approved English practice. This would allow of a vehicle being built to 30 feet in over all length, and would effect a very great improvement both in the running of the vehicle and in the amount of accommodation provided.

Copy of a letter from the Locomotive Superintendent, Madras Railway Company, to the Secretary, Committee of Locomotive and Carriage Superintendents, Public Works Department, dated 21st May 1895, No. 1022 B/774.

With reference to Resolution No. 3-0 regarding the note submitted to the committee by the Consulting Engineer for Railways, dated November 1894, I have the honour to make the following remarks.

2. I take it that in considering this question the Consulting Engineer proposes to discuss it from an entirely abstract point of view, ignoring alike the strength or capacity of existing girders or rails or the weights and proportions of engines or rolling stock now running and to deal with the matter apart altogether from present conditions, with the object of fixing possible maxima for future guidance, and leaving the details as to increase of girder or rail section or of modification of design of rolling stock to be worked out, if necessary, at a subsequent date, the present object being to arrive at an agreement, so far as is possible, as to the relative ratios to be followed between gauge of railway and the fixed ultimate carrying capacity of the standard and metre gauge lines, respectively.

3. On this assumption it would be very interesting in dealing with the question to compare figures showing in terms of the various equations given in the Consulting Engineer's note, the actual practice at present existing in England and other countries using the 4-8½ gauge and, if this could be done, to see how far the principles set forth in paragraph 3 of the note are borne out by it or whether it is the case that English practice has already gone beyond the limit it is now proposed to fix.

4. I much regret I have not sufficient reliable information at hand to enable me to make this comparison, but I believe it to be a fact that upon many English as well as American Railways, engines are working daily with axle loads of 17 tons, while in some cases even this limit has been passed and loads of 18 and 19 tons are not uncommon. I do not know, in all cases, the diameters of the wheels carrying these loads; but the Metropolitan District Railway have engines with driving wheels 5' 9" diameter carrying 18 tons and over, while compound engines built by the Baldwin Company under Vanolains patent are specified as carrying 83,860 lb. on two pairs of coupled drivers or 41,930 lb. = 18.72 tons on each axle.

5. If the axle loads for these two classes of engines were fixed by the equations given in paragraph 3 of the Consulting Engineer's letter, they would be instead of as quoted:

For the Metropolitan engines which would, I presume, be classed as mixed engines ... $L_m = \frac{10 D}{3.5} = 16.43$ TONS.

For the Baldwin Compound engines classed as express engines ... $L_x = \frac{10 D}{4} = 16.25$

6. With regard to the absolute maximum proposed in the last section of paragraph 3, it would seem from the above figures that $L = \frac{12.6}{3}$ would more nearly represent present English and American practice. This would give an absolute maximum weight to be carried on any axle upon the 4-8½ gauge of 18.8 tons, and if adopted for India, would admit of axle loads up to a maximum of 22 tons—a limit of load which is probably higher than is at all events, at present, a necessity.

7. How the wagon and carriage loads would work out, I regret, I have no data to enable me to ascertain but, I fancy in this respect, Indian practice would compare favourably and that the gross wagon loads carried in this country are fully equal to, if not in excess of, loads ruling, at any rate, in England.

8. Coming, however, to the general principle which it is sought to establish, namely, that the load carried upon any wheel must vary as its diameter, I regret, I am not quite able to follow the argument; nor is it apparent to me why, as the Consulting Engineer states, it should be accepted that the goods vehicle wheels now being put into broad gauge service with 12 ton axle loads and 3-6 wheels mark the high tide of "extreme practice."

9. It is acknowledged *ad initio* that the formulae are empirical and although it must not doubt be admitted that the smaller the diameter of the wheel the more nearly is the condition of the theoretical knife edge approached, the margin of safety that exists, even allowing for this and under the most unfavourable conditions between the actual weight thrown upon the rail and the stress at which either rail or tyre would crush, is so ample that the necessity for limiting the load upon this score does not to myself appear to need consideration.

10. It is possible that as in wheels of large diameter the spokes are longer; they will be more elastic and consequently the strain thrown upon the permanent-way will be to some extent diminished, but I can scarcely think that this obtains to any great extent or that it is of sufficient moment to render it a matter of necessity that the ratios between the diameter of the wheel and the load carried shall follow the strict sliding scale laid down.

11. Rails which are hard enough and strong enough to bear a live load of 19 tons on an engine wheel should not, I think, suffer, at any rate, to any appreciable extent, under similar loads when, and if necessary, carried on wheels of smaller diameter under goods wagons. An increased wagon load meaning as it will a heavier train per foot run will doubtless necessitate a heavier proportionate girder section on the larger bridges, but this is a matter of detail only, and, if the abstract proposition is granted, will admit of ready solution.

12. It is evident that in fixing ultimate maxima it is a necessity that the loading of the train shall be, so to speak, homogeneous, and that these maxima shall be such that the heavy loads of the one engine and the lighter loads of the string of wagons shall not throw unequal strains upon bridges or permanent-way. What the ultimate loading should be is not to my mind at present very clear, but I certainly do not consider it should, so far as engine wheels are concerned, be less for the 5-6 gauge than has been adopted apparently with success in England and other countries for the 4-8½ gauge, and for the rest the matter seems to me to be rather a question of traffic convenience than of wagon or bridge design.

13. I append an extract of a note * I wrote in October last to the Agent and Manager of this line calling attention to the manner in which, as it seems to me the hands of builders of broad gauge stock are tied by the existing Government standard dimensions and how it is or should be far easier to obtain better results upon metre gauge lines when the conditions regulating the design of vehicles are much less stringent.

14. I am aware that to now allow the same proportionate overhang of sides, &c., upon standard gauge lines would be a matter of much difficulty, as it would in many cases necessitate extensive and expensive alterations of station buildings, bridges and other fixed structures; but none the less the fact remains that under standing orders metre gauge lines can build longer and wider wagons, and as a consequence, wagons which will give a better ratio of paying to dead load than can the broad gauge lines and the latter are therefore and must necessarily continue to be severely handicapped in this respect.

15. Were this not so and were we, on the contrary, able to work up to the same proportionate figures, the limit of load would seem to me to be a matter, as I have said, chiefly of traffic convenience, and it should be immaterial from a haulage or even a permanent-way point of view whether the full load of the engine was made up of a comparatively short train of heavily loaded wagons or a longer one consisting of lighter units.

16. I believe the general consensus of traffic opinion would favour load units for the bulk of the stock of about the present maxima, or, say, wagons carrying respectively 12 and 14 tons, but as was clearly brought out in the discussion at Calcutta and further by inspection of wagons that have recently been built to the 12-ton axle limit by the East Indian Railway, it is only with extreme difficulty due in great measure, I believe, as I have pointed out in paragraph 13, to the stringency of the present fixed dimensions that this can be done.

17. To relax the leading fixed dimensions is now probably scarcely possible, but considerable assistance would be afforded were the very low limit fixed in the case of wagons for weight per foot run, raised to an extent which would not throw upon the bridges a strain greater than that now caused by the limit fixed for Locomotives and further, if the maximum wagon axle load could also be raised on lines possessing permanent-way strong enough to admit of such being done to a maximum, which in like manner, would produce a strain not greater than the ultimately approved maximum engine load.

- Note by the Consulting Engineer for Railways, Madras.

Standard Dimensions.

The words "absolute for any railway" should be defined, whether they are or are not to have retrospective effect.

Standard gauge.

10. Circular No. 12 R. of 1895 lays down 8'-11" with minimum capacity of $3\frac{1}{2}$ cubic feet; this is more than the capacity of 9'-6" $\times$ 9" $\times$ 5".
 30 b. is new and approved.
 40. The former length of 1,600 feet should be adhered to.
 65. This is exceeded already and should be raised to 16 tons.
 The Locomotives of the East Coast are over standard of 15 tons.
 83 is new and approved.
 92. The rules laid down for axles in Director-General of Railways No. 818 S., of 5th July 1895, should be inserted here.

Metre gauge.

- (8) Approved.
 (22) The reason of this increase of 3" is not apparent.
 (31 a) Approved.
 (40) Should remain as before 1,600 feet.
 (65) This is exceeded already and should be raised to 8 $\frac{1}{2}$ tons. The South Indian Railway engines have 8 tons 6 cwt. on their driving axle.
 (80) This increase from 6 to 7 tons was not contemplated when journal size was fixed at 7" $\times$ 3 $\frac{1}{2}$ " vide Director-General of Railways No. 818 S., of 5th July 1895, although the Government of India order is dated circular 11 R. of 24th June 1895.

In reply to the note by the Consulting Engineer to Government of India, I agree with him that the standard width should be an over all dimension and follow the recommendations of the Locomotive Committee of 1893.

MADRAS,
 18th December 1895.

(Signed) F. R. UPCOTT,
 Consulting Engineer for Railways.

R. Form No. 12.

SERIAL

No. 10

No. 877 R

Government of Madras.

PUBLIC WORKS DEPARTMENT,
 RAILWAY BRANCH.

To

THE SECT. TO THE GOVT. OF INDIA,

P. W. DEPARTMENT.

Calcutta

19th December 1895.

Sir,

I am directed to forward herewith the opinions of the Consulting Engineer for Railways and of the Agents of the railways under the control of the Government on the draft lists of standard dimensions received with your letter No. 956 R.C. of 7th Aug 1895.

Documents received.
 Opinions of Cons. Eng. & Agents
 19th Dec 95
 Despt. in R. office
 on 21. 12. 95

D. H.

F. R. U. 19
12 95

I have received from the
 Secy. for P. W. Dept.

Bf.
No 877 L. dated 19.12.95

W4 8/1/96