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MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 872. Press / ~~Mis.~~
573—574

Dated 23. 3. 1871.

Not to be folded or roughly handled

No. 578. Read the following Proceedings of the Government of India in the Public Works Department, (Railway,) dated Fort William, 22nd February 1871, No. 286-R:—

Designs for Engines, Rolling Stock and Rails for Railways on a gauge of 3 feet 3 inches.

Read the following Despatch from the Government of India, to the Secretary of State for India, dated 15th February 1871, No. 13-R.

In continuation of our Despatch No. 2, of 10th January 1871, we have the honour to forward a table and diagram showing the dimensions which we have provisionally fixed for the structures and rolling stock of Railways on a gauge of 3 feet 3 inches to guide the Engineers in the preparation of designs for lines on this gauge.

2. It is a matter of the greatest importance that no unnecessary delay should take place in the construction of the locomotive and rolling stock for the lines which are now in progress, and we therefore beg that immediate steps may be taken for the preparation and transmission to us, as soon as ready, of standard designs for locomotive engines, and for vehicles of all kinds, in accordance with these dimensions, so far as they may be deemed suitable on any further examination and criticism to which your Grace may think fit to submit them in England.

3. As regards locomotives we are disposed to consider that they may be divided into two groups, having, respectively, four wheels and six wheels coupled. The first group might weigh from 8 to 12 tons, and the second from 15 to 18 tons when loaded. It is advisable that there should be as great an uniformity as possible in all locomotive stock, so that the spare parts of different engines may be interchangeable, and in this view, no more varying patterns should be introduced than is absolutely required. As soon as the designs of engines of weights varying within the above limits have been matured, we shall be able to express a more definite opinion on the precise character of the stock that will be most suitable for the several Railways under construction, but for the present it will be sufficient if immediate orders are given for the construction of 12 locomotives of the lighter kind, eight of which should be adapted to burn country coal, and four to burn wood. Two of the former should be shipped to Bombay for use on the Indore Railway, while the remaining ten should be shipped to Calcutta for use on the lines in progress in Upper India. While these locomotives are being constructed, complete designs for engines of other sizes might be prepared, and patterns of them, if approved, might be put in hand. It will be necessary that arrangements for erecting these engines should be made by us, and this subject will be fully considered.

4. The arrangements for building or erecting wagon and carriage stock also need careful consideration, and cannot be finally decided until the designs, which we now request your Grace to procure, have been completed. Experience has shown that wooden vehicles built in England will not stand the wear and tear of traffic in this climate so well as those that are built entirely in India, and if the

vehicles are to be made of wood, they should certainly be constructed in India. But it is quite possible that vehicles made entirely, or in large part, of iron may prove on investigation to be advantageous, and in the preparation of designs for this class of stock we should wish especial attention to be directed to this, and drawings and estimates made of both wooden and iron vehicles and sent to us. A vehicle of each description should be put in hand as a pattern the moment the designs are got out, and shipped to Calcutta as soon as ready, and as the iron-work must, in any case, be procured from England, contracts might be let for the wheels, springs, and axles for 800 vehicles, of which 150 should be for passenger traffic and 650 for goods traffic. In order to enable the designs for the passenger vehicles to be more satisfactorily prepared, we forward a sketch of the arrangements of compartments of different classes of passenger stock that appear to be most suitable.

5. The vehicles which will be first required are ballast and permanent-way wagons, and it will, in our opinion, under present circumstances, be desirable to procure a supply of these as soon as possible from England. We therefore beg that, in addition to the above, 120 ballast wagons and 120 low-sided wagons with flaps, of the dimensions stated in the accompanying Memorandum, may be at once constructed and sent out, 20 of each kind being despatched to Bombay, and the remainder to Calcutta. If they can be made with equal rapidity, it would be advisable that some of these wagons should be built of iron, in order to test them practically in comparison with wooden wagons. If it is not thought expedient to send out the wooden portion of these wagons for the reasons given in paragraph 4, it will still be convenient that one or two complete patterns should go to each of the ports mentioned.

6. The rail which we propose to adopt for general use on the lines under construction is one of a Vignoles section, without chairs, fished at the joints, and weighing 36 lbs. to the yard. The permanent-way will very soon be required on some of the lines, and we therefore beg that contracts may be at once entered into for the supply of rails and fish-plates for 400 miles of railway, of which 50 miles should be shipped to Bombay, and the rest to Calcutta. The details of the fastenings, whether by bolts or spikes, might be simultaneously designed, and arrangements made for procuring them, the depth of the sleeper, 4 inches, being borne in mind.

7. We anticipate no difficulty in procuring the number of sleepers we at present require for the Railways in the Upper Provinces from the forests of India without seeking them abroad, and the rails, engines, and wagons which we now request your Grace to procure will enable us to complete the lines in progress without more delay than is involved in the supply of these articles, while if the preparation of designs for rolling stock and the construction of iron-work for it, be at once set in hand, it will enable the vehicles for public traffic to be placed on the lines as rapidly as they are likely to be wanted.

8. Indents will be sent for each Railway in due course, but in the meantime we beg that immediate action may be taken as requested in this Despatch.

Proceedings of the Madras Government, Public Works Department, 23rd March 1871.

DIMENSIONS TO BE FOLLOWED IN THE CONSTRUCTION OF INDIAN NARROW GAUGE RAILWAYS AND ROLLING STOCK.

GAUGE 3 FEET 3 INCHES.

SINGLE LINE.

	Ft	Ins.
Formation.		
1. Width of formation in bank (a) ...	12	0
2. Minimum width of formation in cutting (b)	16	0
3. ,, radius of curves	330	0
4. Maximum exterior width of masonry under bridges from face to face	12	0
Girder Bridges.	Tons.	
5. Rolling load per foot of track to be assumed in calculations for strength of girders—		
Openings 6 feet to 12 feet in the clear ...	2	
,, 12 ,, to 18 ,, ,, ...	1½	
,, 18 ,, to 50 ,, ,, ...	1	
Additional do. do. for each foot of clear opening above 50 feet (c)	$\frac{5}{16}$	
Ballast.	Ft.	Ins.
6. Minimum depth of ballast below sleeper ...	0	6
7. Maximum width of ,, at top ...	7	0
8. ,, ,, at bottom ...	10	0
Transverse wooden-sleepers.		
9. Standard length of transverse wooden-sleepers	6	0
10. Standard width of base of do.	0	8
11. Minimum width of base ,, ...	0	7
12. ,, depth of do.	0	4
13. ,, width of heart wood at rail-seat ...	0	4
14. ,, area of heart wood in cross-section.	26 sq. in.	
15. Ordinary number of standard sleepers to a mile of track (d)	2,000	
Rails.	lbs.	
16. Flat-footed rail without chairs: joints fished: fastenings, bolts or spikes; ordinary weight per lineal yard	36	
Level-crossings, stations, and fixed structures over line.	Ft.	Ins.
17. Minimum distance from centre to centre of tracks in stations or sheds	11	6
18. Minimum distance from centre to centre of tracks in open line...	10	0
19. Minimum horizontal distance from centre of track to edge of platform	4	6
20. Minimum horizontal distance from centre of track to any structure other than platform (e)	6	3
21. Maximum height above rail-level of passenger platform	0	3
22. Maximum height above rail-level of goods platform	0	10
23. Minimum height above rail-level of over-bridges and similar structures at centre of track	12	0
24. Minimum height above rail-level of do. at a horizontal distance of 6 feet 3 inches from centre of track	8	3
25. Minimum width of doorways of engine-sheds, carriage-sheds, or goods-sheds ...	10	0
Locomotive and Rolling Stock.		
26. Maximum height above rail-level of any part of engine or vehicle	11	3
27. ,, width from out to out of extreme projections of engine or vehicle	8	6
Locomotives.		
28. Maximum rigid wheel base	10	0
29. Minimum diameter of driving wheels ...	3	0
30. Maximum weight on a pair of driving wheels	6 tons.	
31. ,, speed of trains per hour ...	15 miles.	
32. ,, weight of any part of engine shipped for India	9 tons.	
Carriages and Wagons (4 wheeled)	Ft.	Ins.
33. Maximum rigid wheel base	9	0
34. Standard rigid wheel base—		
Coaching vehicles	9	0
Merchandize ,, ...	7	0

(a.)—Side slopes according to soil and climate.
(b.)—Side slopes and width of side-drains to vary with circumstances.

(c.)—Thus 60 feet girders for a single track should be calculated for a rolling load of $50 + 10 \times \frac{6}{16} = 56$ tons.

(d.)—Number to increase proportionately to diminution of width of base of sleepers used.

(e.)—No switches, signal-wires, or structure of any kind to be erected within this minimum distance.

			Ft	Ins.
35.	Maximum gross load per axle		4 to[18].	
36.	Minimum diameter of wheels		2	0
37.	,, ,, of axles		0	3
38.	,, ,, of journals		0	2½
39.	Maximum length of journals		0	6
40.	,, width of steps		1	0
41.	,, width of passenger and goods vehicle-bodies, from out to out		6	6
42.	Maximum height of passenger vehicles at side, inside		6	0
43.	Maximum height of passenger vehicles from inside of floor to top of outer roof ...		7	0
44.	Standard length of passenger vehicles, outside		18	0
45.	Standard lengths of compartments of passenger vehicles from centre to centre—			
	1st and 2nd class		5	10
	3rd class		4	4½
46.	Maximum width of doors of passenger vehicles		2	9
47.	Standard length of goods vehicles, outside...		14	0
48.	Maximum height of covered goods vehicles at side, inside		5	0
49.	,, ,, of do. at centre ...		6	0
50.	,, ,, of high-sided wagons ...		4	0
51.	,, ,, of low-sided wagons ...		1	6
52.	,, ,, of ballast wagons ...		1	0
53.	,, length of ballast wagons ...		12	0
54.	,, width of ,, ,, ...		5	0
55.	Minimum height of floor of all vehicles when loaded		1	3

Bearing springs to be placed under axles.
Draw springs to be combined with one central buffer.

The above dimensions of rolling stock are to be regarded as open to reconsideration when designs for the several classes of vehicles, etc., have been matured in England; but for the present they should guide the Engineers in framing designs for works.

Memorandum explanatory of Table of Standard Dimensions.

Nos. 1 to 16.—The only remark needed is that special attention seems to be requisite to the system of fastening the rail to sleeper, the proposed thickness of sleeper, 4 inches, being duly considered. The precise form and length of rail and nature of fish-plates should be settled in England.

Nos. 21 and 22.—These platform heights are suited to the case of carriages with springs below the axle, and floors 1 foot 3 inches above rail-level. The passenger platform would merely be a space separated from the line by a curb.

Nos. 17 to 55.—These dimensions all hang together, and will be subject to variation if the vehicle dimensions are changed. The question of the form of the tires of wheels, whether they should be cylindrical or conical, and the corresponding form of rail, is left for decision in England.

It is intended that the vehicle designs shall be settled in England, the dimensions given being taken to indicate what now seems suitable.

The dimensions given in Nos. 41, 42, 43, and 45 for the width, height, and length of passenger compartments should not be reduced.

The expediency of placing the springs under the axles, and the floors of any of the vehicles below the tops of the wheels, and the general system of under-framing and draw-springs, and the like, are left for full discussion and decision in England. Attention will naturally be given to the necessity for having all buffers of engines and vehicles on the same level so as to admit of mixed trains.

The ordinary goods vehicle should not weigh when loaded more than 8 tons, and the weight of a covered wagon should, if possible, be kept down to 3 tons.

It is probable that the best course to adopt in obtaining designs will be to allow an open or limited competition, giving a premium for the best, and reserving full power to adopt anything put forward in any design, and to employ any maker.

ORDER.—Ordered, that a copy of the Despatch now read, together with its enclosures, be forwarded to the Governments noted in the margin for information and guidance, with a request that so far as the wants can at present be estimated, indents (without prices) for rails, fastenings, etc., for iron girders and for ballast wagons and locomotives for construction purposes may be submitted without delay for each sanctioned Railway.

N. W. Provinces. | Punjab. | Central India.

Also to the Governments and Administrations noted in the margin for information and guidance in the preparation of the project for the Railways, the surveys of which have been authorized.

Madras. Bombay. Bengal. Oudh. | Central Provinces. British Burmah. Mysore. Hyderabad.

(Signed) J. C. S. WILLIAMS, Major, R.E.,
Deputy Secretary.

No. 574. ORDER THEREON, 23rd March 1871, No. 872.

RAILWAY, No. 51.

COMMUNICATED to the Consulting Engineer for Railways.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Acting Consulting Engineer for Railways.

Lxd. S. T. Augustin.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

RAILWAY

To

No. 286 R.

Dated February 22, 1871.

Received 2 March.

Designs for Engines, Rolling-stock and Rails for Railways on a Gauge of 3 *feet* 3 *inches.*

P. W. D. Press—22-2-71—184.

Govt. of {1871} Madras.

PUBLIC WORKS.

To Chief Consulting Engr
for Railways

Dated

Read

No. G. 923 dated 87

Nos. 573 & 574

Railways