2572.

Govt. of India.

PUBLIC WORKS

Dated Received 28/9/90

13th March 90 355.672.

Substitution of the 50 lbs for 41/4 lbs rails on the S I Ry.

Report of the Cfor Rys on the subject of the — ton sleepers, ordered for the ports of the Bay of Bengal.

Substitution of the 50 lbs for 41/4 lbs rails on the S I Ry.

Copy report of the Cfor Rys on the subject of the — ton sleepers.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railways.

Read the following paper :—

From Colonel B. M. PEMBERTON, R.E., Secretary to the Government of India, Public Works Department (Railway—Stores), to the Joint Secretary to the Government of Madras, Railway Branch, Public Works Department, dated Simla, the 17th June 1889, No. 86-R. S.

In continuation of Public Works Department endorsement No. 70-R.C., dated 28th January 1889, I am directed to forward copy of a Despatch No. 39, Ry., dated 18th April 1889, from Her Majesty's Secretary of State for India, together with copy of the Memorandum received therewith, by Sir A. Rendel, K. C. I. E., on the question of the relative economy in the use of light and heavy rails.

2. It will be observed that His Lordship desires that special inquiry may be made on the subject of the substitution of 50 lb. for 41¼ lb. rails on the South Indian Railway which was duly authorized by the Government of India in Public Works Department No. 310-R. C., dated 25th April 1884. I am therefore to request that, with the permission of His Excellency the Governor in Council, a report on the subject may be submitted detailing the exact state of the permanent way on the South Indian Railway at the present time and showing the distribution of the 40⅓, 35½, 41 and 68 lb. rails over the various sections of the line, and the traffic they have to carry, with reasons for the necessity of renewing each kind of rail with 50 lb. rails on the sections where this has been decided upon. A similar report on the sleepers should also accompany and I am to say that the Government of India desires that the question of confining the substitution of the 50 lb. rails for the 41 lb. rails to the more heavily worked sections of the line may be carefully considered in consideration of the high amount of maintenance charges on the South Indian Railway during the past 3 or 4 years referred to in Sir A. Rendel's Memorandum.

3. I am also to invite attention to the remarks under the head "Permanent way" in the Consulting Engineer's Half-yearly Inspection Notes on the South Indian Railway for the two periods of 1886, in the first of which the average renewals are estimated at not less than 50 miles per annum while in the latter the proposed rate of renewals is mentioned as 100 miles per annum. It seems probable that the first remark referred to miles of railway and the latter to miles of rails and I am to inquire whether this is the case and whether there has been any definite programme of renewal, and what considerations have governed the quantity renewed each half-year.

4. As a matter of fact, however, 189¾ miles of line seem, according to paragraph 18 of the Inspection Report for the half year ended 31st December 1888, to

have been actually relaid with 50 lb. steel rail up to the 28th February 1889, which gives an average for 38 months, of about 60 miles of railway per annum.

5. The figures noted on the margin, which have been extracted from the half-yearly Inspection Reports from 1st January 1886, to 20th February 1889, shew the renewals that were carried out during each half year of the period under reference.

	Miles of line renewed.	
	During half year.	To end of half year.
1st half, 1886	23	23
2nd half, 1886	21½	44½
1st half, 1887	Nil	44½
2nd half, 1887	56¼	100¾
1st half, 1888	33½	134¼
2nd half, 1888	31¼	165½
January and February 1889 ...	24¼	189¾

ENCLOSURES.

Despatch from Her Majesty's Secretary of State for India, to the Government of India, dated 18th April 1889, No. 39.

[Memorandum by Sir A. Rendel on light and heavy rails.]

With reference to the questions which have been discussed in recent correspondence as to the advisability of using 41-lb. steel rails for the new lines now being constructed in Madras by the South Indian Railway Company, I transmit herewith, for your Excellency's information, copy of a Memorandum* by Sir Alexander Rendel, K.C.I.E., Consulting Engineer for State Railways, on the relative economy in using 50-lbs., and 41-lbs. rails.

* Dated 19th March 1889.

I have to request, with reference to this memorandum, that the operations on the South Indian Railway Company may be specially inquired into, and that in all cases where new lines have to be laid, or where existing lines have to be renewed, the facts and observations contained in the memorandum may receive due consideration.

Memorandum by Sir A. Rendel, dated 19th March 1889.

I hear rumours of an attack to be made on the light rails hitherto in use on Indian metre gauge railways. That Engineers should have a strong preference for a heavy rail is only natural. We all like—whether Engineers or not—things substantial and strong, specially where the payment for them does not fall on our own shoulders. The real question here, however, is how best to combine economy of capital with economy of revenue. In a wealthy country we can afford to indulge in that subtle form of extravagance which is euphemistically termed "economy in the long run," but in a poor country like India it has always seemed to me that the economy of the moment, which is certain, is the thing to be secured, and that the economy of the future, which is uncertain, had better be left to take care of itself. The American practice, in a word, is to be preferred for India to the English.

The following remarks on the rails used on the Rajputana and South-Indian Railways may at the present moment be of some use.

According to the returns given in the analysis of Working, Appendix 4, there were on the Rajputana Railway on the 30th June 1885, the line being then 1,412 miles long, 1,622 miles of 40-lb. iron rails (811 miles of railway) and 50 miles 36-lb. iron rails (25 miles of railway), and they had then been in the road an average of about 8½ years.

The rest of the line was laid with steel rails, steel having been substituted for iron when the fall in the price of steel admitted of its use. Of this material there were in the road, on the 30th June 1885, 1,494 miles of 41¼-lb. rails (747 miles of railway), of the average age of three years, about 31 miles of 36-lb. rails of the average age of five years, and about nine miles of 50-lb. rails quite new.

By the 30th June 1888, when the length of the line had been increased by amalgamations to 1,664 miles, the length of iron rails in use had been reduced to 1,296 miles of 40-lb. rails, of the average age of about 11½ years; the quantity of 36-lb. iron rails was rather increased; and the length of steel rails amounted to 2,078 miles of 41¼-lb. rails of the average age of six years, 28 miles of 36-lb. rails of the average age of eight years, and 282 miles of 50-lb. rails averaging 1½ years old.

Therefore, during the three years, 326 miles of 40-lb. iron rails were replaced by 273 miles of 50-lb. rails and 53 miles of 41¼-lb. steel rails.

But it must not be supposed that the 326 miles of iron rails thus taken out of the road were of no further use. The chief reason for taking them out was that it had been determined, rightly or wrongly that the traffic of the Rajputana was or would be so great that a heavier rail, which must of course be of steel because iron was no longer manufactured, was or would be necessary to carry it on the sections on which either the gradients or the traffic were heaviest. This heavier rail must obviously be laid in considerable continuous lengths, and to allow of this the old rails must of course be removed in similar lengths. In such cases the old rails after removal are returned to store at a valuation, which is rarely too high, to be re-issued if in good condition, for ordinary maintenance in the parts of the road not laid with 50-lb. rails, or sold if in bad condition. In such good condition were the 326 miles of rails taken up, that I find their store value is stated by the Engineer at no less than three fifths of the value of the rails which replaced them. Allowing for the greater weight of the 50-lb. rail, this valuation implies that the rails which they replaced were as a whole but little worn, and shows that, if the 50-lb. rail had not been introduced, the bulk of them would still be in the road.

The case against even the 40-lb. iron rail on the Rajputana seems, under these circumstances, to be very meagre, and to be wholly non-existent against the 41¼-lb. steel rail. No doubt the heavy traffic of the Rajputana, and the low price of rails for some years past, justified the Government, in a measure, in yielding to the pressure put upon it some five years ago in India, to adopt a 50-lb. rail on, at any rate, its heaviest sections. For my own part I would rather have seen a better sleeper introduced, for it is the sleeper on this line which has in my opinion been the chief cause of trouble, and not the rail. The creosoted fir originally sent out from England for the Rajputana was as bad and short-lived a sleeper as can be laid. But we had then no option. Practically there was no other kind of sleeper available at a reasonable cost. We can do better now, and the sooner we do it the better for the rails, for nothing tends to damage rails, and to shorten their life, more than weak sleepers. The iron rails were also supplied during the last years of the manufacture of iron rails, when quality had fallen to its lowest point, and inspection was beaten by practices little to the credit of the trade. The 41¼-lb. steel rails were very good, and have evidently so far given no trouble. But with all its faults the maintenance of the Rajputana permanent way has not been costly, and even if there has been some extravagance in respect to the 50-lb. rail, as I think there has been both in weight and quantity, it is an extravagance which the traffic on this line can afford, and perhaps justify, and which, if some reasonable check be kept on it in the future, may be readily condoned.

Referring to Analysis of Working No. 8, Table A, and charging the maintenance of the permanent way with half the total cost of "General Superintendence," with the whole of "Maintenance and Renewal of Permanent Way," which includes sleepers and ballast, and with four fifths of "Loss by Exchange," of "Loss on Stores," and of "Freight on Stores," I find that the cost of keeping up the permanent way and ballast on the Rajputana line, including the relaying with 50-lb. rails, averaged, during the three years ending 30th June 1888, Rs. 404 per mile of track per annum, including sidings, Rs. 1·31 per 1,000 gross ton miles moved over the line, and Rs. 5·25 approximately per 1,000 ton miles of net traffic.

I doubt very much if a better account would have been shown had the line been originally laid with 50-lb. steel or iron rails, and we should, of course, have had a much larger capital to pay dividend upon; for it must be remembered that in a the early days of the Rajputana, rails cost on the average, speaking from memory, about 11*l.* a ton in England, whereas the rails, lately bought for the line have not cost on the average more than 4*l.* 10*s.* a ton. The case, in fact, in this respect is curiously illustrative of the superiority of economy in first cost over "economy in the long run."

Turning now to another metre gauge line, the South Indian, I find the following:—

The analysis of working this line for the first half of 1888 is not in my possession, and I can only review the three years ending 31st December 1887.

The length of this line on the 30th June 1885 was 662 miles, and, including sidings, it comprised 721 miles of railway, or 1,442 miles of rail. Of this 364·7 miles of rail were 68-lb. iron, 892·8 miles 40⅓-lb. iron, 41 miles 35½-lb. iron, and 143 miles 41-lb. steel. There were no 50-lb. rails then in use. The 40⅓, 35½, and 41-lb. rails are of the same section respectively as the 40, 36, and 41¼-lb. flat-footed rails of the Rajputana. The 68-lb. rail was of the double-headed pattern sent out and used originally, I believe, on broad gauge lines.

At the end of 1887 the length of the South Indian was the same as in June 1885, but its track had increased (by additions to sidings, I presume) to 726½ miles of railway, equal to 1,453 miles of rail, composed of 343½ miles of 68-lb. iron rail, 726 miles of 40⅓-lb. iron rail, 35½ miles of 35½-lb. iron rail, 143½ miles of 41-lb. steel rail, and 204 miles of 50 lb. iron rail

So that in the interval, 21 miles of 68-lb., 167 miles of 40-lb., and 5½ miles of 35½-lb. iron rail had been taken out. The 41-lb. steel rails remained, in regard to length, as before; but, as 20 miles are said to have been taken out in the three years, new 41-lb. steel rails must have been substituted for them. The iron rails taken out were replaced by 204 miles of 50-lb. steel rails.

At the end of the period I am reviewing, the 68-lb. iron rails were 23 years old, the 35½-lb. iron rails 22¾ years, the 40⅛ rails 11 years, and the 41-lb. steel rails 7½ years. It might be said that the great comparative age of the 68-lb. rail showed the advantage of weight, and, of course, the more the wearing surface the longer the rail should last, but the 35½-lb. rails are of the same age. The age of the latter may, perhaps, be accounted for by their situation, though I suspect the quality of the rails, or of the sleepers on which they are laid, or both, have something to do with it. The 40⅛-lb. iron and the 41-lb. steel rail are about the same age as those of the Rajputana, and I have no doubt their removals have been very largely due to the same cause as on that line, namely, the necessity, if a rail of new and heavier section is introduced, of laying it in continuous lengths, removing of course equal lengths, of the old rails, and placing them in store till required for repairing the old line. It would be found, I suspect, on examining the condition of the rails taken out, that, as in the case of the Rajputana, the bulk of them were in good condition, and that, if the 50-lb. rail had not been sanctioned, the whole or nearly the whole of the 20 miles of 41-lb. steel rail and the bulk of the 40-lb. iron rail removed from the road in the three years would have been in it at the present time.

But why, if the Rajputana was content in three years with 282 miles of 50-lb. rails out of a total of 3,793 miles of rail, or 1 mile in 13½, should the South Indian in the same time require 204 miles of 50-lb. rail, or 1 mile in 7? The South Indian traffic will not account for the difference; for, mile for mile, its gross ton mileage is not more than two thirds or its net ton mileage more than half the Rajputana's, and its gradients are not worse, and its sleepers and its age are very much the same. Unless, therefore, we suppose its 40⅛-lb. iron and 41-lb. steel rails to be of worse quality than those sent out for the Rajputana, it is inconceivable that a 50-lb. rail, if wanted at all, should be wanted more or faster on the South Indian than on the Rajputana.

The results of this lavish relaying will be seen in the following figures. Taking the same items of maintenance charge as in the cases of the Rajputana, I find that the cost of keeping up the rails, sleepers, and ballast of the South Indian for the three years ending December 1887 averaged Rs. 636 per mile of track, Rs. 3·24 per 1,000 gross ton miles of traffic, and, approximately, Rs 16 per 1,000 net ton miles of traffic; that is to say, 58 per cent., 150 per cent., and 200 per cent. respectively more than similar charges on the Rajputana; and 1888 will show, I fear, a still worse comparison, for the difference is worst at the end of the period, and is apparently increasing.

If the 50-lb. rail had not been introduced on the South Indian, these differences, I am satisfied, would have been very much less. It is plain, in fact, that the South Indian neither requires nor can afford this rail. The burden of such a rail, if it be confined, as I hope and expect it will be, to the heavier portions of the road, may pass unfelt on lines with a traffic like the Rajputana. On lines like the South Indian it is a burden which, in my opinion, they should not be called on to bear.

My conclusion, therefore, on this question, as regards the Rajputana and South Indian Railways, is that, so far as the 40-lb. iron rail has failed, which is not very far, the failure is mainly due to the quality of the rails and the character of the sleepers; that the 41-lb. steel rail has not failed at all, and meets all the reasonable requirements of even the Rajputana; that a 50-lb. steel rail is condonable on parts of the Rajputana, and on any part, if there be any, of the South Indian which has an equal traffic, but that its general introduction on the South Indian has been the result of a prejudice which has induced a faulty diagnosis, and led to a remedy which is worse than the disease.

ORDER—dated 6th July 1889, No. 756 R., Public Works.

Communicated to the Consulting Engineer for Railways for report.

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

RAILWAY.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated July, 6th.

Recd. *Encl.*

G.O., 6th July 1889, No. 756-R.

JULY.

Materials.
South Indian Railway.

Letter from the Government of India forwarding copy of Despatch from the Secretary of State with a Memo. by Sir A. Rendel on the relative economy in the use of light and heavy rails and requesting to make a special report on the substitution of the 50 lb. for 41¼ lb. rails on the————————also to report on the present state of the permanent way of that line.—Communicated to the Consulting Engineer for Railways for report.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers :—

From the Consulting Engineer for Railways, dated Madras, 17th October 1883, No. 277.

From the Agent, South Indian Railway, to the Consulting Engineer for Railways, dated Negapatam, 18th July 1883, No. 490.

In reply to paragraphs 2 and 3 of your letter, No. 411, of the 13th instant, I have the pleasure to send you the following copy of a report received from the Officiating Chief Engineer :—

"The quantities of the indent are based on a three months' stock for each division and one for six months at head-quarters. By the time this indent is complied with (about twelve months) the stock of 21 feet rails will have been entirely exhausted.

"I presume it will rest with the Government to decide whether the 68 lb. rail is to be maintained, or whether it is gradually to be worked out. My own opinion is that considering the state of efficiency of the greater portion of the 68 lb. road it should not be given up. But whatever is decided on this subject should be decided at once. There are at present 39 miles 50 chains of this road laid with wooden sleepers, and there are very few sound pot-sleepers in stock available for renewal and but very few crossings. Of other material there is ample for some time. In doing away with the 68 lb. rail it must be taken into consideration what is to be done with the cast iron pot-sleepers—these cannot be converted for use with the 40 lb. rail.

"In the event of the 68 lb. rail being decided against, I propose to first convert to the 40 lb. rail between Trichinopoly junction and the fort station (including the station)—the station would give a supply of station machinery, such as points and crossings—and as the material from this portion of the line is exhausted, to carry forward the conversion on the main line from the Trichinopoly junction station."

From the same officer, dated Negapatam, 10th October 1883, No. 731.

Your letter, No. 573, of the 19th ultimo.

I have the pleasure to enclose a copy of the Officiating Chief Engineer's opinion as to the description of permanent-way which he would recommend for adoption in renewing the portion of line between Negapatam and Erode.

2. As the effect upon the rolling stock of a mixed road has been referred to, I called upon the Locomotive Superintendent to report on that point. The following is a copy of Mr. Crighton's remarks :—

"I have to state that the working over mixed roads has not in any way affected the rolling stock so as to be detrimental to it, although there must naturally be a difference in the wear of the tires when having to work on different sizes or sections of rails, and to a certain extent a vehicle running for a considerable time on the broad or 68 lb. rail is benefited by a change of running on the narrow or 40 lb. rail as it enables a more even wear to be got out of the tires.

"As a matter of fact the 40 lb. rail is much more severe in wearing away the tires of the wheels than the 68 lb. rail, as it is much rounder on the table and narrower.

"As regards the locomotives, I have frequently had to change engines which have been for some time employed in running on the 40 lb. rail between Trichinopoly and Madura, to the 68 lb. rail between Trichinopoly and Erode, so as to secure an evenly regulated wear on the surface of the tires; and I found such a course answer the purpose remarkably well.

"My opinion is that it would be advisable to have one uniform section and weight of rail throughout the entire system, and I consider that it would be most advantageous to renew with single headed rails of the Vignole type similar to our present 40 lb. rail, only that it should be of a weight equal to 50 lb. per yard, and such a rail would be most suitable for our rolling stock.

"The present 68 lb. rail measures $2\frac{3}{8}$ inches broad and the 40 lb. rail $1\frac{7}{8}$ inches across the table of the rail, and a 50 lb. rail would give a good average width between these two sizes which would be beneficial to the wear and tear of the rolling stock, and would I think, in the long run, be of advantage to the permanent-way."

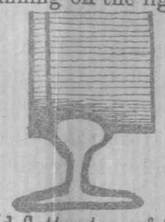
ENCLOSURE.

From the Officiating Chief Engineer, to the Agent, South Indian Railway, dated Trichinopoly, 24th September 1883, No. 2574/1441.

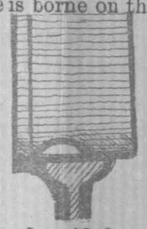
Your No. 9113/1103 of 21st September 1883, *re*-renewals of 68 lb. road.

In my letter, No. B. 421/999, of 17th July 1883, I stated with regard to the 68 lb. road that considering the state of efficiency of the greater portion of it my opinion was it should not be given up, but on further acquaintance with this portion of the line I am inclined to modify this opinion. It was expressed chiefly on account of the state of efficiency of this part of the road, but there are reasons which I now think override this and lead me to suppose that on uniform rail throughout the system would be better than continuing to maintain the mixed road.

The table of the 68 lb. rail and that of the 40 lb. rail are very different, and the wear of the tires of the wheels on the 40 lb. rail must be different from what it is on the 68 lb. rail. The result is that the wheels of the vehicles from running on the lighter and narrower headed rail are worn hollow near the flange thus :



When these wheels come on the wider and flatter top of the 68 lb. rails the hollow does not rest on the rail, but the weight of the vehicle is borne on the outside and inside edges of the rail thus :



causing more rapid wear than would take place if the whole of the rail head took its share of the work.

I therefore recommend that the 68 lb. rail be gradually worked out.

First.— In the event of there being a market for 40 miles of pot-sleepers I would renew with the 41 lb. rail from Trichinopoly junction to Negapatam. There are on this length at present just 40 miles of pots on the main line, there would be a slight excess from sidings, but these might be kept.

Second.—In the event of none being sold, I would recommend renewing the line between Trichinopoly fort and Tanjore. The fort station would give a supply of crossings for renewals on the Erode and Negapatam branches. The pots taken out of this length of line would nearly supply the wants of the Negapatam branch and this and the Erode branch would remain with the broad gauge rails until the time arose for renewing them. This latter proposition will, I believe, be the most economical to adopt. If this should be the decision, the 15 miles of iron sleepers that have been ordered for the 41 lb. rail could be utilized in the new road.

The last paragraph of your letter is reported to by the first part of this letter.

Submitted for the consideration of Government and for transmission to the Government of India.

2. The portion of the South Indian Railway between Erode and Negapatam was originally laid on the 5′6″ gauge and subsequently converted to metre-gauge ; the

68 lb. rails and broad gauge pots being retained. Of this length, for about 39 miles, the rails are laid on timber sleepers and the stock of iron pots is not sufficient to renew these sleepers as they fail.

3. The time has therefore arrived for a decision of the question, what is to be the weight of the rail on this section in future ; if it be decided, as the 68 lb. rails wear out to replace them by 41 lb. steel rails similar to those in use on the rest of the Company's system, it would be well to commence at once, and by replacing the heavy by the light road on a section of the line to provide therefrom material for renewing the rest of the line, and first of all such portions of the road now laid on timber sleepers as may require immediate renewal.

4. The 41 lb. rail has been found sufficient for the traffic on the main line and would doubtless, therefore, equally suffice for the branch lines from Trichinopoly to Erode and Tanjore to Negapatam ; but the question is somewhat complicated by the fact that the heavy cast iron pots now in the road cannot be made available for a 41 lb. rail, and should no market be found for them, the Company would, having laid down the 41 lb. road with the usual sleepers, find themselves left with about 126 miles of heavy pot sleepers on hand.

5. Estimates submitted by the Chief Engineer show that the first cost of renewing 68 lb. rails, the sleepers and tie bars being available, is less than laying a complete permanent way with 41 lb. rails and suitable sleepers.

6. Where the heavy rails are now on timber sleepers and no suitable pots and tie bars are available, it will be cheaper to replace them by the 41 lb. road.

7. There are objections, it will be seen, to a road having rails of so widely different a type and weight, but this need not affect the question at issue, viz., how to provide at once for the gradual renewal of the timber sleepers in 39 miles of road.

8. I recommend that, as proposed by the Officiating Chief Engineer, the portion of the line $33\frac{1}{2}$ miles, between Trichinopoly fort and Tanjore, now laid with the heavy permanent-way be relaid with the 41 lb. rails and sleepers of the type in use on the rest of the line ; the Negapatam and Erode branches remaining, for the present at least, with the heavy permanent-way.

9. This arrangement will leave six miles of timber road unprovided for, but the question how best to provide for the renewal of this portion can be left for decision hereafter.

10. It is thought that the question should be referred to the Government of India for an expression of their views.

ORDER—dated 2nd November 1883, No. 1205 R., Public Works.

Ordered to be forwarded to the Government of India for an expression of their views on the question.

(Here enter No. 1206 R., dated 2nd November 1883.)

(True Extract.)

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
„ Examiner, Railway Accounts.

Exd E. Fernandez.
Spare Copies

RAILWAY.

Govt. of {1883} Madras.

PUBLIC WORKS.

Dated November, 2nd.

Recd. *Encl.*

G.O., 2nd Nov. 1883, No. 1205 R.

NOVEMBER.

Permanent-way, South Indian Railway

An expression of the views of the Government of India ordered to be solicited on the question of the renewal of the —, on the Negapatam-Erode section.

7TH MAY 1884, No. 510 R., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper :—

From Colonel F. S. STANTON, R.E., Deputy Secretary to the Government of India, Public Works Department (Railway Construction), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 25th April 1884, No. 310 R.C.

I am directed to acknowledge the receipt of your letter, No. 1206 R., of the 2nd November 1883, and subsequent reminder, No. 304 R., of the 10th March 1884, regarding the weight of rail to be adopted for future renewals on the Negapatam-Erode section of the South Indian Railway.

2. In reply, I am directed to state that the Government of India agrees in the view that the 68 lb. rails should be gradually replaced by steel rails.

3. The section of steel rails proposed is 41¼ lb. to the yard. If the loads are kept to the original standard this section of rail is doubtless sufficient, but looking to the invariable tendency to increase the rolling load, the Government of India will not object to the wish expressed by the Agent, South Indian Railway, to increase the section to 50 lb. per yard for renewals on the entire line and branches.

ORDER—dated 7th May 1884, No. 510 R., Public Works.

Communicated to the Consulting Engineer for Railways, with reference to proceedings, No. 1205 R., dated 2nd November 1883.

(True Extract.)

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, Railway Accounts.

Exd. E. Fernandez.
Spare Copies

RAILWAY.

Govt. of {1884} Madras.

PUBLIC WORKS.

Dated May, 7th.

Recd.

Encl.

G.O., 7th May 1884, No. 510 R.

MAY.

Permanent-Way, South Indian Railway

Letter from the Government of India expressing opinion as regards the weight of rail to be adopted for future renewals of the — on the Negapatam-Erode section, communicated to the Consulting Engineer for Railways.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following :—

G.O., dated 9th March 1888, No. 201 R., Public Works.

Read the following papers :—

From the Consulting Engineer for Railways, dated Madras, 8th March 1888, No. 72.

From WILLIAM S. BETTS, Esq., Agent, South Indian Railway, to the Consulting Engineer for Railways, dated Trichinopoly, 17th February 1888, No. 126.

I forward, herewith, two indents for the permanent-way material required for the Villupuram-Pakal and Kadiri extension railways, together with a note showing how the weight and rates have been arrived at.

2. In submitting these estimates, the Chief Engineer has reported as follows :—

"Both are for 41 lb. flat-footed steel rails of the pattern in use on the South Indian Railway, but one indent is for transverse steel sleepers, and the other for cast iron pot-sleepers. Not knowing what rate of exchange may be fixed for transactions connected with this undertaking, the estimated amounts are made up in sterling and include the cost in England at our latest prices and freight and insurance to India.

	£
"The cost of the materials with cast iron pot-sleepers, indent No. 1, is ...	322,787
Do. do. with steel cross-sleepers, indent No. 1 A, is ...	300,511
Showing a saving of ...	22,276

in favor of the steel sleepers in port in India.

"A note accompanies the indents showing the data on which the quantities and amounts are made up.

"It is a question whether it would not be advisable to lay 50 lb. rails, at the outset at all events, between Villupuram and Tirupati, over which portion of the line it is probable that heavier traffic will be carried than on the northern portion. The experience of the South Indian Railway Company is that a 41 lb. rail is too light for any but a very moderate traffic.

"It is very important that we should be supplied with permanent-way at the earliest date possible, the saving in carriage of materials alone for the construction of the line will be very considerable if carriage by rail is available."

3. Will you please obtain the orders of Government hereon.

From the same Officer, dated Trichinopoly, 27th February 1888, No. 165.

Referring to my letter No. 126, of 17th instant, I have the pleasure to inform you that tenders for permanent-way material required for the South Indian Railway have been accepted by the Board of Directors in London as under :

	£	s.	d.	
Rails, the Darlington Iron Company	4	0	0	per ton.
Fish-plates do.	5	5	0	"
Tie-bars do.	5	5	0	"
Cast-iron sleepers, Messrs. Head, Wrighton and Company	3	5	0	"
Fish-bolts and nuts, Anderston Foundry, Henderson's patent steel, three-fourths of order	12	15	0	"
Fish-bolts and nuts, Messrs. P. and W. MacLellan, Clutha pattern, steel, one-fourth of order	15	0	0	"

2. I send you this information in order that you may see at what favorable rates the permanent-way material for the Villupuram-Dharmavaram line could be placed if the indent be sent home soon.

From the same Officer, dated Trichinopoly, 1st March 1888, No. 175.

In continuation of my letter No. 126, of the 17th ultimo, I forward two more indents for permanent-way for the Villupuram-Dharmavaram line.

2. The indents previously sent were—

	£
No. 1 for 41 lb. rails on cast iron pot-sleepers	322,787
No. 1 A do. on steel cross-sleepers	300,511

The two indents now sent are—

No. 2.	181 miles from Villupuram to Tirupati, 50 lb. bull-headed rails on cast iron pot-sleepers ... ... 164 miles, Pakal to Dharmavaram, 41 lb. rails on steel sleepers	347,766
No. 3.—The whole line (345 miles) laid with 50 lb. rails on pot-sleepers		385,603

Submitted to Government.

2. It is suggested that the four indents herewith submitted be forwarded to the Government of India, with a view to ascertain which type of permanent-way therein provided for is approved, and whether the indent for the type approved may be provisionally sanctioned and forwarded to the Board of Directors for compliance as soon as the construction of the line is sanctioned.

3. The question raised by the Chief Engineer, whether 50 lb. rails would not be more economical than 40 lb. rails at all events for a portion of the line, was previously raised in a Note from this office, embodied in Proceedings of Government, No. 904 R., 6th December 1886, and in the light of recent experience on the South Indian Railway (where the renewals within 12 years have reached 100 miles per annum) deserves the fullest consideration. In my opinion, it will prove false economy to lay down 40 lb. rails to be worked by the South Indian Railway rolling-stock at the authorised speed.

An exception may possibly be justified on the portion of line between Pakal and Dharmavaram, but, in my opinion, nowhere else on the extensions.

Order—dated 9th March 1888, No. 201 R., Public Works.

Ordered to be forwarded to the Government of India.

(Here enter No. 202 R., dated 9th March 1888.)

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

Endorsement—dated 9th March 1888, No. 202 R., Public Works.

Forwarded.

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

From G. H. D. WALKER, Esq., Under-Secretary to the Government of India, Public Works Department (Railway—Stores), to the Secretary to the Government of Madras, Public Works Department, dated Calcutta, 26th March 1888, No. 127 R.—S.

I am directed to acknowledge the receipt of your No. 202 R., dated the 9th March 1888, forwarding the following alternative indents for permanent-way materials required from England for the Villupuram-Pakal extension of the South Indian Railway and the Kadiri extension of the Cuddapah-Nellore State Railway:

(1) For 41 lb. rails on cast iron pot-sleepers.
(2) For 41 lb. rails on steel cross-sleepers.
(3) For 181 miles (Villupuram to Tirupati) of 50 lb. rails on cast iron sleepers and 164 miles (Pakal to Dharmavaram) of 41 lb. rails on steel sleepers.
(4) For 50 lb. rails on cast iron pot-sleepers.

2. It is observed that these indents are forwarded in order to determine which is the type of permanent-way which had better be adopted, so that when once the railway extensions are sanctioned time may not be lost in discussing this point; but that the indents, being already in the hands of the Board of Directors, may be placed at once as soon as sanction to construction is accorded.

3. In reply, I am to remark that it is doubtful whether the Villupuram-Tirupati section will have a very heavy traffic, but that, if a heavy traffic is expected, it would be economical to lay the line with 50 lb. rails in the first instance.

4. As regards the type of sleepers, I am to observe that the transverse steel sleeper is unsuited to the bull-headed rail, which is the only 50 lb. rail mentioned, and that if this form be used, cast iron pot-sleepers should be used.

5. I am, however, to say that the Government of India is inclined to prefer 50 lb. flat-footed steel rails similar to those used on the renewals of the Rajputana-Malwa Railway and on the Mandalay extension of the Burma State Railway; and that, if this section of rail be adopted, the transverse steel sleeper, with the rail-bed thickened, would, in the opinion of the Government of India, be the best suited to the conditions of the extensions in question.

No. 9 D.

Referred to the Consulting Engineer for Railways for further report in communication with the Chief Engineer of the South Indian Railway.

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

6th April 1888.

G.O., dated 12th June 1888, No. 489 R., Public Works.

Read the following paper:—

From the Consulting Engineer for Railways, dated Madras, 7th June 1888, No. 184.

From WILLIAM S. BETTS, Esq., Agent, South Indian Railway, to the Consulting Engineer for Railways, dated Trichinopoly, 14th May 1888, No. 408.

Your letter No. 244, of the 10th ultimo. The following is a copy of the Chief Engineer's report on the suggestion made in Government of India letter No. 127 R.—S., relative to the type of permanent-way material to be adopted on the Villupuram-Pakal and Kadiri State Railway extensions:

"I send herewith an indent for 50 lb. permanent-way, the rails steel, flat-footed, laid on steel transverse sleepers. If our Consulting Engineer consider the bull-headed form of rail so superior to the flat-footed section as to justify the extra expense, chairs to receive the bull-headed form can easily be provided in the transverse steel sleepers.

"The estimate for 345 miles of permanent-way in the present indent amounts to £381,887. The cost of a bull-headed rail on pot-sleepers for the same length is estimated at £385,603, showing a difference of £3,716 only in favor of the transverse sleeper road; but the difference in favor of the latter is much greater, if the less weight of sleeper and greater facility for carriage, as compared with the cast iron pot-road be taken into account."

2. The revised indent above referred to is herewith sent.

Submitted for the consideration of Government, with reference to Proceedings, dated 6th April 1888, No. 9 D.

2. The Agent, South Indian Railway, submits an indent for permanent-way, which will be required for the Villupuram-Pakal and Tirupati-Dharmavaram lines of the type approved by the Government of India, viz., 50 lb. flat-footed rail on transverse steel sleepers.

3. The Chief Engineer expresses the opinion that a bull-headed rail could, if thought desirable, be used with the transverse sleeper by the provision of suitable chairs to receive it. I doubt, however, if this would be a good combination, and recommend that the Government of India be asked to authorise the transmission to England of the indent now submitted, in view to the Board of Directors being in a position to advertise for tenders so soon as an agreement for the construction of the lines by the South Indian Railway has been concluded and the necessary funds have been provided.

Order—dated 12th June 1888, No. 489 R., Public Works.

Ordered to be forwarded to the Government of India, with reference to their letter No. 127 R.—S., dated 26th March 1888, and with the request that authority may be communicated for the transmission to England of the indent now submitted by the Agent, South Indian Railway.

(Here enter No. 490 R., dated 12th June 1888.)

(True Extract.)

(Signed) W. H. COAKER, Major, R.E.,
Offg. Joint Secy. to Govt., P.W.D.,
Railway Branch.

Endorsement—dated 12th June 1888, No. 490 R., Public Works.

Forwarded.

(Signed) W. H. COAKER, Major, R.E.,
Offg. Joint Secy. to Govt., P.W.D.,
Railway Branch.

Read also the following paper:—

From Major M. C. BRACKENBURY, R.E., Under-Secretary to the Government of India, Public Works Department (Railway—Stores), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 6th July 1888, No. 209 R.—S.

With reference to your No. 490 R., dated the 12th June 1888, I am directed to communicate the sanction of the Government of India to the transmission to England, by the Agent of the South Indian Railway, of the indent therewith received for 50 lb. flat-footed steel rails with fastenings and transverse steel sleepers required for the Villupuram-Pakal and Tirupati-Dharmavaram extensions, in order to enable the Board of Directors to advertise for tenders so soon as an agreement for the construction of these lines by the South Indian Railway has been concluded and the necessary funds have been provided.

2. I am, however, to remark that the cost of the sleepers appears to have been over-estimated according to the latest India Office contracts for steel sleepers, and to suggest, for the consideration of the Agent, that the rate per ton might safely be reduced from £7 to £5, which would effect a saving of about £52,000 in this item alone.

Order—dated 16th July 1888, No. 596 R., Public Works.

Communicated to the Consulting Engineer for Railways, with reference to his endorsement No. 184, dated 7th June 1888.

2. Attention is directed to the suggestion made by the Government of India in para. 2 of their letter read above.

(True Extract.)

(Signed) W. H. COAKER, Major, R.E.,
Offg. Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, Guaranteed Railway Accounts.
" Examiner, Public Works Accounts.

Exd. F. R. Bantleman.
Spare Copies

RAILWAY.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated July, 16th.

Recd.

Encl.

G.O., 16th July 1888, No. 596 R.

JULY.

Villupuram-Pakal and Tirupati-Dharmavaram Extensions

Communicating to the Consulting Engineer for Railways, with remarks, sanction of the Government of India to the transmission, to England, of the indent for 50 lb. flat-footed rail on transverse steel sleepers required for the — of the South Indian Railway.

Proceedings of the Madras Government, Public Works Department, 29th March **1876.**

Read the following papers :—

No. 481. From Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Major-General G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 4th February 1876, No. 71.

With reference to the Proceedings of Government, dated 22nd December 1874, No. 3,606, I have the honor to forward, for the consideration of Government, the accompanying papers relating to the conversion of the Arconum-Conjeveram branch of the South Indian Railway from the 3′ 6″ gauge to the metre gauge, and its extension to Chingleput. I regret that there has been such great delay in furnishing this information, but it will be observed that some essential details have only lately been received from the Agent.

1 Book of revised estimates for line from Chingleput to Conjeveram, and for the conversion of the Arconum-Conjeveram branch.
1 Memorial from the inhabitants of Conjeveram.
1 Letter from the Agent, South Indian Railway, dated 19th June 1875, No. 675.
1 Do. do., dated 19th October 1875, No. 915.
1 Do. do., do. 1st Nov. 1875, No. 951.
1 Do. do., do. 12th Jan. 1876, No. 1,146, with report from Locomotive Superintendent.

2. With regard to the question of conversion, three engineering estimates are submitted ; the first (*a*) showing the expenditure which it will be necessary to incur in putting the existing line into good order, retaining the 3′ 6″ gauge ; the second (*b*) the amount necessary to convert the existing line to the metre gauge, and work it as a branch ; and the 3rd (*c*) the amount required to make the present line as far as possible equal to the other portions of the metre gauge system, on the supposition that it will become a portion of the main line by the construction of the Chingleput-Conjeveram link.

(*a*) Rupees 1,13,827
(*b*) „ 1,33,202
(*c*) „ 1,75,438

3. In the second estimate it is not proposed to alter the location of the line at any point ; but the third provides for the removal of a 10 chain curve in the 17th mile, and for other minor improvements in the alignment. The removal of this curve will necessitate the rebuilding of a small bridge, and carrying the line more directly across the Poonady tank. The object of the curve in the first instance was to serve a proposed station at Great Conjeveram, which was afterwards considered to be unnecessary and has never been built. In the last estimate 2 miles of rails and $6\frac{1}{2}$ miles of new sleepers have been allowed. In the approximate estimate first framed, quantities largely in excess of these were entered, but on a reference from this office the reductions now shown were made. The existing rails weigh $35\frac{1}{2}$ lbs. to the yard, and are of the ordinary metre gauge section. The engines now working the line weigh 14 tons, with $6\frac{1}{2}$ tons on the driving axle ; and, as the rails have been down for upwards of eleven years, it is probable that some renewals will be required.

4. Estimates framed by the Locomotive Department for three alternatives are also submitted ; (1) for putting the existing locomotives and stock into good working order, the 3′ 6″ gauge being retained ; (2) for converting to the metre gauge the present rolling stock, and providing new engines ; (3) for furnishing the line altogether with metre gauge stock of the descriptions now being supplied.

(1) Rupees 60,100
(2) „ 93,100
(3) „ 2,50,400

5. Taking together the amounts under Engineering and Locomotive, the three estimates thus compare :—

(*a*) Line to be put in good order on the existing gauge—

	Rs.
Engineering	1,13,827
Locomotive	60,100
	1,73,927

(*b*) Line to be converted to metre gauge, but kept as a branch, and worked with converted rolling stock and new engines—

	Rs.
Engineering	1,33,202
Locomotive	93,100
	2,26,302

(*c*) Line to be converted to the metre gauge, made a portion of the main line, and furnished entirely with new description of engines and rolling stock—

	Rs.
Engineering	1,75,438
Locomotive	2,50,400
	4,25,838

6. The last estimate of rolling stock is based on the numbers now employed ; but, as explained by the Locomotive Superintendent, these quantities will suffice to work the whole of the line up to Chingleput. As a fact only a small portion of the existing stock is in general use, the remainder being required to meet heavy festival traffic. The amount entered provides a little over Rupees 6,000 per mile for 41 miles ; and about Rupees 1,30,000 should, in case the Chingleput-Conjeveram link is sanctioned, be debited to that estimate. This would reduce the estimate for conversion from Rupees 4,25,838 to Rupees 2,95,838, and a further reduction will also be effected by the value of the old stock. The amount, Rupees 15,000, set down by the Locomotive Superintendent on this account seems small.

7. Comparing the three estimates it may be said that, supposing the Chingleput-Conjeveram link to be undertaken, the cost of converting the existing line and making it almost equal to other portions of the metre gauge system, will exceed by about one lakh of Rupees the sum required to put the line in fair working order on the present gauge, and by about half-a-lakh the sum required to convert the line and work it as a branch with the existing stock and new engines. The latter the Locomotive Superintendent considers absolutely necessary ; and, from the report made by Mr. Sheward on a representation from this office, it will be seen that the present engines are not worth alteration. A portion of the cost of renewals of permanent-way and rolling stock should, it is thought, form a charge against Revenue.

8. For the proposed extension from Conjeveram to Chingleput, a revised estimate, amounting to Rupees 9,57,485, is submitted ; but, taking the proper proportion of rolling stock at Rupees 1,30,000,* instead of Rupees 1,05,700, the total

* *Vide* paragraph 6.

Proceedings of the Madras Government, Public Works Department,
29*th March* 1876.

becomes Rupees 9,81,785, or Rupees 46,750 per mile, and it is thought that the line can be constructed for this amount. The principal reduction is under permanent-way, which is taken at Rupees 8 per lineal yard as against Rupees 9-11-8 in the original estimate. Some revisions have also been made in the rates for masonry.

9. With regard to the financial prospects of the line, the Agent explains that the 18,469 laden carts alluded to in the Secretary of State's Despatch, No. 151, of the 22nd October 1874, represent only the *local* traffic between Conjeveram and Chingleput. The traffic to Madras goes chiefly by the direct road, a small fraction only taking the rail to Arconum and thence by the Madras Railway. The books of the Toll Collector at Conjeveram go to show that, from April 1871 to March 1872, the traffic passing to and from Madras was 54,487 loaded carts and 12,216 animals. There seems every probability that, by quoting reasonable rates, the bulk of this traffic might be carried by rail *via* Chingleput ; in which case, besides contributing to the revenue of the proposed link, it would materially benefit the main line. The proposed line would, it is thought, be a valuable feeder to the main line to the south, as well as to the north ; while the provision of a direct route for traffic to the north and west by the Madras Railway will be a great public advantage. The saving in distance to traffic taking this route will be 38 miles, as follows :—

Chingleput to Madras	35	miles.
Madras to Arconum	43	„
	78	„
Chingleput to Arconmm *via* Conjeveram	40	„
Saving by branch line	38	„

Under this arrangement too the whole of the through goods traffic with the Madras Railway will be dealt with at Arconum, where every facility for the interchange already exists ; whereas, if the connecting link be not constructed, some extra expenditure will be necessary in order to provide for this at Madras.

10. As explained in my letter of the 9th June 1874, No. 344,* the construction of the line from Chingleput to Conjeveram has always been looked upon as a necessary portion of the narrow gauge system. The Agent bases the financial prospects of the line upon the weekly mileage receipts which may be expected. The cost being Rupees 46,750 per mile, and working expenses 50 per cent., the earnings required to pay the guaranteed interest will be Rupees 90 per mile per week. Looking at the productive nature of the country which will be traversed, this does not appear too favorable a view to take of the prospects of the link itself ; while the benefit which it would confer on other parts of the system must be considerable.

* Proceedings of Government, 15th July 1874, No. 1,899.

11. The condition of the locomotives on the Arconum-Conjeveram branch gives cause for considerable anxiety, and steps should be taken to remedy the present state of matters with as little delay as possible. In connection with the proposal to retain the line on the present gauge, it is explained by the Locomotive Superintendent that a good deal of delay and extra expense would be involved in repairing the locomotives, owing to the isolated position of the line ; and it seems in any case better to convert the line to metre gauge, even should it remain a branch as at present. The third proposal, however, involving the extension to Chingleput is, in my opinion, the proper one to adopt, and in this view I trust the Government will concur.

12. It may be urged that the Madras Railway will suffer by the construction of the Chingleput link, but this can only be the case to a very limited extent. During the half-year ending 30th June 1874, the amount of goods traffic passing through Arconum Station was 2,267 tons; and, supposing two-thirds of this to have been to or from Madras, the revenue obtained therefrom by the Madras Railway Company, at the through rate of 6 Pies per ton per mile, would be Rupees 1,983. There would be a certain loss of passenger traffic, but this could never amount to anything considerable. The break of gauge at Arconum is now the great obstacle to goods traffic between Conjeveram and Madras; and, so far as Government interests are concerned, the loss incurred on the Madras Railway, as shown above, would be more than met by the extra traffic which the main line of the South Indian would obtain by the construction of the Chingleput link. This would also attract a large festival traffic from the south, which would probably not otherwise be obtained.

13. In conclusion, it is thought that fair grounds have been shown for the construction of the connecting link between Chingleput and Conjeveram; both as affecting the interests of through and local traffic, and as regards its own financial prospects. The estimates to which sanction is recommended are as follow:—

	Rs.
Construction of new line	9,81,785
Conversion of Arconum-Conjeveram section after deducting proportion of rolling stock due to new line, and allowing for sale of old rolling stock	2,80,838
	12,62,623

From W. S. BETTS, Esq., Agent of the South Indian Railway, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Negapatam, 19th June 1875, No. 675.

Upon receipt of your letter, No. 412, of the 24th December last, I called upon the Chief Engineer to furnish an estimate for the cost of converting the gauge of the Arconum-Conjeveram section from 3 feet 6 inches to 3 feet 3⅜ inches.

Mr. Logan reports as follows in reply thereto:—"To frame a detailed estimate of the cost of converting the Arconum-Conjeveram line would entail a complete new survey and section of the line, and I have no one on my staff at present whom I could spare for that work. I have, from the information available in my office, prepared an approximate estimate sub-divided under the various sub-heads of account, which I believe, if the conversion is carried out, will be found to be very near indeed to the actual expenditure required."

The Chief Engineer has included in this estimate (which amounts to Rupees 2,72,575-7-8) the cost of erecting a permanent telegraph and the expenditure upon way and works which must be incurred, without reference to any alteration of gauge if the line is to continue to be worked for public traffic.

Extensive repairs are required to the rolling stock in use upon the Arconum-Conjeveram section, and these must be executed at once if the 3 feet 6 inches gauge is not altered within a few weeks time. Mr. Lea Hair estimates that at least Rupees 24,000 will be required on this account; but the Locomotive Superintendent is of opinion that this sum is too low, and that when the engines are stripped, it may be found that much more requires to be done than is estimated for.

In consequence of the lower prices ruling in the iron market, Mr. Logan has been able to revise his estimate for the construction of the line between Chingleput and Conjeveram, the total cost of which is now entered at Rupees 9,57,485.

With regard to the financial prospects likely to attend the construction of that section, I wish to offer the following remarks:—

The 18,469 full carts quoted in the Secretary of State's letter represents the local traffic between Chingleput and Conjeveram, and this is so stated in paragraph 34 of Mr. Dibblee's letter, dated 12th January 1871. No traffic from Conjeveram to Madras passes through Chingleput; it travels by the direct road. Mr. Lea Hair reports to me he has examined the books of the late Toll Contractor of Conjeveram, and he finds that, from April 1871 to March 1872, the traffic passing to and from Madras was 54,487 loaded carts and 12,216 laden animals.

If the section between Conjeveram and Chingleput be made, this traffic would be diverted to the main line thence to Madras and to the south, so that in addition to the earnings which it would produce to the new section, it would form a valuable addition to the other portions of the Company's system.

I see no reason why, looking to the unremunerative character of some of the districts through which the Negapatam-Erode section passes, the section between Chingleput and Conjeveram should not show an equal mileage receipt to that realised on the open line. I allude more particularly to the lengths between Tanjore and Trichinopoly and between Caroor and Erode. That mileage rate is not by any means a high figure, and it is much below the rate realised on the Madras Railway. The last statement I have received shows their average rate for this half-year to be Rupees 137 against our rate of Rupees 91.

The gross annual receipts of the Conjeveram-Chingleput section, taking as a basis the result of working the Negapatam-Erode section, would be £12,120, equal to 12 6 per cent. upon the estimated Capital cost. If the working expenses are to be taken at 3 per cent. on Capital, then we should have a net return of upwards of 9½ per cent. If calculated on gross revenue according to the usual English rate of 50 per cent., the net return would be above 6 per cent. The working expenses on the Negapatam-Erode section last year were a little over 60 per cent. of the gross receipts; taking that rate the net return would be about 5 per cent.

The connection by railway of Conjeveram with Chingleput is earnestly desired by the people of the district, and, as an evidence of this desire, I forward herewith a memorial which has been addressed to me.

From D. LOGAN, Esq., Acting Agent of the South Indian Railway, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Trichinopoly, 19th October 1875, No. 915.

With reference to your No. 709 of 16th instant, I have the honor to inform you that the Locomotive Superintendent has reported as follows on the rolling stock of the Arconum-Conjeveram branch:—"I made a hurried and superficial examination of the rolling stock that stood at Arconum on my way down from Madras a few days since, stopping there three hours. The whole of the stock is convertible to the 3 feet 3⅜ inches gauge, with the exception of the engines. The carriage and wagon stock that came out from home has iron sole bars; the other Indian built vehicles have wooden under-frames. For the conversion alone, altering gauge of wheels, &c., roughly, I should say Rupees 60 per vehicle would suffice, but the whole of the stock is in a very shaky condition. The goods wagons require practically rebuilding. The carriage stock from its dimension gives a very unfavorable carrying capacity; some of the third-class holding only twenty-five passengers. All the stock has the usual centre draw gear and outside buffers. The tyres of the goods stock I saw were worn down very thin and require renewal; some of them I pointed out to Mr. Lea Hair as dangerously thin in the flanges. The engines I saw were in a very much worse condition than the wagon stock. I really think the two I saw standing at Arconum are quite unfit to run; they are emphatically all to pieces. Mr. Lea Hair admitted that with the two engines he had working the traffic, it was a constant source of anxiety to him after they left with their trains until he heard of their safe arrival at the end of their 19 miles run. I am of opinion that it would be both politic and economical to restock the line with the metre gauge type of stock. The carriage and wagon stock might be made use of for some time on a branch

line until it fell quite to pieces. The engines I fear are quite beyond any advantageous manipulation. No temporary repairs can be effected to ensure safety; they must come to pieces entirely, when I fancy they will develope a greater want of repairs than they seem to require from external view."

2. With reference to the foregoing, I have requested Mr. Sheward to arrange at once for such a detailed inspection of the locomotives as will enable him to say decisively whether the best engines available for working the traffic are really unfit for use as being too dangerous, or whether they may be used with any degree of safety until the conversion of the line to metre gauge can be effected.

From the Acting Agent of the South Indian Railway, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Trichinopoly, 1st November 1875, No. 951.

WITH reference to your No. 441 of the 1st July last, I have the honor to forward the following estimates:—

No. 1.—Estimate for putting Arconum and Conjeveram branch into better working order, supposing it to remain on the 3 feet 6 inches gauge and not to be converted to the metre (3 feet $3\frac{3}{8}$ inches) gauge, amounting to Rupees 1,13,827.

No. 2.—Estimate for converting line to metre gauge, supposing location to remain as it is, instead of straightening sharp curves, &c., and not allowing for the extra accommodation required if Conjeveram-Chingleput connection is made Rupees 1,33,202.

No. 3.—Estimate for converting line to metre gauge, straightening line, and allowing extra accommodation, &c., on assumption that Chingleput-Conjeveram line is to be sanctioned, when a heavier traffic may be expected and more accommodation required, Rupees 1,75,438.

With reference to your paragraph 2, the Chief Engineer remarks,—"The amount of Rupees 87,125 entered in my original estimate provided only for the construction of one bridge on the 17th mile.

"Para. 3. At the time when my estimate was submitted, I calculated on the extension of the line from Conjeveram to Chingleput being carried out, and in anticipation of increased traffic, I considered it advisable to provide the amount entered in my estimate under the head of permanent-way.

"The rate for this permanent-way might certainly have been taken at eight instead of at ten, but in making up the estimate the fact of our having received later advice from England than those on which the ten rate was fixed, was inadvertently lost sight of."

Relative to paragraph 4, the Locomotive Superintendent will be at Arconum on the 4th or 5th instant; he will then inspect the rolling stock, and his report thereon shall be forwarded as speedily as possible.

From W. S. BETTS, Esq., Agent of the South Indian Railway, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Negapatam, 12th January 1876, No. 1,146.

I FORWARD herewith copy of a letter from the Locomotive Superintendent, in which he answers the questions put by you (No. 790 of the 9th November last) regarding the cost of replacing the rolling stock which has been in use on the Arconum-Conjeveram section.

From the Locomotive and Carriage Superintendent, to the Agent of the South Indian Railway, dated 6th January 1876, No. 52.

YOUR No. 23. I am sorry you should have had to call my attention again to your No. $\frac{7882}{3815}$. This latter letter reached me on 10th November, at a time when my attention was entirely absorbed

Proceedings of the Madras Government, Public Works Department,
29*th March* 1876.

in the push to get out the new stock for opening on 1st January and also the Prince's saloons. You are aware that I have been very much away from head-quarters the last two months arranging for the opening of the new line south. Early in November I met Major Smith in a special going south, and told him verbally that my examination of the Arconum engines had cleared up any immediate doubt of their safety from explosion, which point I understood the Consulting Engineer was most anxious upon. I made a personal examination of the fire-boxes and boilers, and found them in a tolerable condition considering the time they had been at work, the metal had of course reduced by scaling and wear, but for the pressure in them I do not consider that any actual danger of explosion is to be apprehended as yet. As pieces of machinery, they are in a very bad condition and require a total and thorough renewal, including new boilers, new fire-boxes, two new cylinders and others boring out and all motion renewing, new tanks, new smoke-boxes and funnels, new tyres, &c. Major Smith made a note of my remarks, and I concluded the estimates called for could wait until I had time to go into them. I now send you the information called for—

			Rs.
(*a*) Amount required for putting present rolling stock in good working order, the line remaining on the 3 feet 6 inches gauge.	Engines ...	55,000	
	Carriages ...	600	
	Wagons ...	4,500	
			60,100
(*b*) Amount required to put in thorough working order and to convert to the metre gauge the present rolling stock.	Engines ...	84,000	
	Carriages ...	2,600	
	Wagons ...	6,500	
			93,100

and to provide such additions and replacements of engines and vehicles as the Locomotive Superintendent may consider necessary for working the line on the metre gauge.

			Rs.
(*c*) Estimate for stocking the line with new description of engines and vehicles for the metre gauge allowing for the value of the present stock the materials of which could perhaps be utilized or sold.	Engines ...	84,000	
	Carriages...	1,16,500	
	Wagons ...	49,900	
	Total ...	2,50,400	
Allowances for old stock ...		15,000	
			2,35,400

In the case of proposition (*a*), a collateral expenditure which I have not represented in the estimate would have to be incurred in either, (1) sending the requisite machinery to Arconum to carry out the repairs; (2) asking the Madras Railway to do the machine work in their shops at Madras, a very costly process; (3) bring the work down here to Negapatam to do, also expensive in the item of transit charges on Madras Railway. The repairs to the engines I have put at Rupees 55,000. I do not think the work could be done in this country under two years, and in the mean time those engines at work would fail and a general stoppage occur. I would advocate their being placed upon the scrap heap, or sold for whatever will fetch as soon as possible.

In the case of proposition (*b*), the engines are not readily convertible to the metre gauge even if their condition warranted the attempt. They are too far gone to repay such a thorough remodelling as would be needful. My figures under the head engines represent the value of four new engines in place of the existing four now on the line. The carriage and wagon stock is convertible, but the major portion requires entire new timber work, and, as I before stated in my report on this line's stock, the carriages give an unfavorable carrying capacity as compared with our own vehicles on this line. In the items wheels and axles and axle-boxes these would all work in again for the metre gauge at the expense of cutting the axle in the centre and welding up to the right gauge, the axle-boxes would then come in again for use on this branch line until

they wore out and were replaced by our own type of box and wheel; these boxes are mostly of the old grease pattern and are not adapted to the use of oil as our own are (the journals are $5 \times 2\frac{3}{4}$ as compared with our $6\frac{5}{16} \times 3$.)

In the case of proposition (*c*), this appears by far the most practical and in the end the most economical and satisfactory course to adopt. The distances from Conjeveram to Chingleput the junction with our main line is 21 miles, so that the branch Arconum to Chingleput would be 41 miles, about the same amount of stock now upon the 19 miles would be sufficient for the whole 41 miles supplemented at any feast or press of traffic from the stock of the main line. As I have said, I think new engine power imperative. If the line be converted to metre gauge, I can at once provide the locomotive power from Madras, where I have thirteen engines put together, only one of which is in use. All the engine power up to the end of 1876 likely to be required upon the Northern Line between Tanjore and Madras can be easily performed by ten engines. I have thirteen at Madras and four at Cuddalore, equal to seventeen; four can therefore be at once spared for this branch, although three would do the work. I think we should be able to spare carriages enough and stock for the branch. I noticed the trains consisted of four or five carriages and the same number of trucks. Under condition (*b*) I have not included any alteration to the draw and buffing gear which is now the usual side buffers and central drag chain. Tyres are badly needed both for engines and wagon stock; whatever conclusion is arrived at I think the sooner some action is taken the better.

No. 482. From Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Major-General G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 17th March 1876, No. 143.

In continuation of my letter, dated 4th February 1876, No. 71, I have the honor to submit a sketch map showing the lines of the Madras and South Indian Railways and the proposed connecting link between Chingleput and Conjeveram. This will probably be found an assistance in forming a just appreciation of the proposed scheme, and I regret it was not sent with the other papers.

No. 483. From the same officer, dated Madras, 23rd March 1876, No. 148.

In reply to your memorandum, No. 530, dated 22nd March 1876, I have the honor to inform you that the cost of the land required for the extension of the Arconum-Conjeveram line to Chingleput will not, in my opinion, exceed Rupees 40,000.

2. This estimate is arrived at from the actual measurement of land needed, the rate per acre allowed being that estimated by the Collector.

No. 484. Order thereon, 29th March 1876, No. 803.

RAILWAY, No. 51.

Ordered that the above papers be communicated to the Government of India, with reference to despatch from the Secretary of State for India, No. 151, of 22nd October 1874; copy of the letter to the Government of India being sent to the Secretary of State for information.

Proceedings of the Madras Government, Public Works Department,
29th *March* 1876.

2. The Government of India have already supported this Government in recommending the extension of the Arconum-Conjeveram line to Chingleput at a cost of Rupees 10,37,616, being 49,504 per mile for 21 miles including stations, sidings, and rolling stock; the ruling gradient being 1 in 200, as on the line from Madras to Tanjore which it joins at Chingleput. But the sanction of the Secretary of State for India was withheld on the grounds of incompleteness of the information furnished, as regards cost of conversion of the existing line from Arconum to Conjeveram from the $3\frac{1}{2}$ feet gauge to the metre gauge, and as regards probable traffic returns.

3. It will now be intimated that this Government recommend the conversion of the existing line at a net cost of Rupees 2,80,838, of which Rupees 1,75,438 is the amount of the engineering estimate, and Rupees 1,05,400 that of the locomotive estimate, Rupees 1,30,000 of the gross locomotive estimate being chargeable against the extension to Chingleput, and Rupees 15,000 recoverable by value of old stock. A reduction of the original estimate for extension is also proposed to Rupees 9,81,785, including the above locomotive charge; but excluding the cost of land, *viz.*, Rupees 40,000. If this item be taken into account the grand total for the whole line from Arconum to Chingleput will amount to Rupees 13,02,623. It will be noted that, if this undertaking be not carried out at an early date, an expenditure of Rupees 1,73,927 on the existing line will have to be incurred; whereof the locomotive charge of Rupees 60,100 is an urgent one, calling for speedy settlement of the question.

4. The financial prospects are laid down generally in the petition from the inhabitants of Conjeveram, and more specifically in the reports of the railway officers. And the Government of India will be requested to communicate early authority to the immediate conversion of the existing portion to metre gauge on the estimate of Rupees 2,80,828, as emergently demanded by the state of the line and its rolling stock.

(Here enter No. 804, dated 29th March 1876.)

(True Extract.)

(Signed) G. W. WALKER, Major-General, R.E.,
Secretary to Government.

To the Consulting Engineer for Railways.

Exd. E. C. Shunker.
Spare Copies

Govt. of {1876} Madras.

PUBLIC WORKS.

To

THE CONSULTING ENGINEER

FOR RAILWAYS,

Dated March 29th.

Issued

Read. *Encl.*

G. O., 29th March 1876, No. 803.

MARCH.

Nos. 481-484

Conversion of the Arconum—Conjeveram Line from the 3½ feet to the Metre Gauge, South Indian Railway.—Passing orders on papers submitted by the Consulting Engineer for Railways for the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

READ again the following:—

G.O., dated 27th July 1888, No. 611 R., Public Works.

Read the following paper:—

From the Consulting Engineer for Railways, dated Madras, 24th July 1888, No. 237.

Revised indent, amounting to £321,705, for permanent-way materials required for the Villupuram-Dharmavaram State Railway.

Submitted to Government for transmission to Government of India for information.

2. This indent has been revised in accordance with the views of the Government of India in para. 2 of their letter No. 209 R.—S., dated 6th July 1888, embodied in the Proceedings of Government No. 596 R., dated 16th idem, by which a reduction of £52,097 has been affected.

Order—dated 27th July 1888, No. 611 R., Public Works.

Ordered to be forwarded to the Government of India with reference to their letter No. 209 R.—S., dated 6th July 1888.

(Here enter No. 612 R., dated 27th July 1888.)

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

Endorsement—dated 27th July 1888, No. 612 R., Public Works.

Forwarded.

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

READ also the following paper:—

From Major M. C. BRACKENBURY, R.E., Under-Secretary to the Government of India, Public Works Department (Railway—Stores), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 14th August 1888, No. 260 R.—S.

With reference to your No. 612 R., dated the 27th July 1888, I am directed to communicate the sanction of the Government of India to the revised indent therewith

received, amounting to £321,705, for permanent-way materials required from England for the Villupuram-Dharmavaram extension of the South Indian Railway.

2. I am at the same time to invite your attention to Public Works Department No. 209 R.—S., of 6th July 1888, and to the conditions contained therein governing the transmission of this indent to England.

ORDER—dated 28th August 1888, No. 702 R., Public Works.

Communicated to the Consulting Engineer for Railways with reference to his endorsement No. 237, dated 24th July 1888.

2. Attention is directed to para. 2 of the letter read above.

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, Guaranteed Railway Accounts.
" " Public Works Accounts.

Exd. F. R. Bantleman.
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RAILWAY.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated August, 28th.

Recd.

Encl.

G.O., 28th Aug. 1888, No. 702 R.

AUGUST.

Villupuram-Dharmavaram Extension of the South Indian Railway

Letter from the Government of India sanctioning revised indent for permanent-way materials required from England for the —, communicated to the Consulting Engineer for Railways, with remarks.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper :—

Despatch from the Right Honorable VISCOUNT CROSS, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India office, London, 20th December 1888, No. 5 (Railway).

Herewith is transmitted, for information of your Excellency's Government, copy of a despatch and its enclosures, recently addressed by me to the Government of India, in respect to the supply of materials for the railways from Villupuram to Pakal and Tirupati and from Pakal to Dharmavaram.

No. 153 of 20th December 1888.

ENCLOSURES.

Despatch from the Right Honorable VISCOUNT CROSS, Her Majesty's Secretary of State for India, to His Excellency the Most Honorable the Governor-General of India in Council, dated India office, London, 20th December 1888, No. 153 (Railway).

Construction of Railways in Madras for Famine purposes by the South Indian Railway Company.

With reference to para. 2 of my Railway despatch No. 126, dated 31st October 1888, I have now to inform you, that contracts have been entered into by the South Indian Railway Company for the supply of the rails, sleepers, &c., for the railway from Villupuram to Pakal, and Tirupati and from Pakal to Dharmavaram.

2. The cost of the materials will amount to 283,998*l.* 8*s.* 9*d.*, and their despatch will take place so that the first consignment will reach Madras in March next, and the whole will be completed by the end of 1890.

3. It will be recollected that the estimated cost of these stores in the indent was 321,705*l.*, but the actual expenditure has been reduced to 283,998*l.* 8*s.* 9*d.* by the adoption of a lighter rail than that contemplated. The details of the actual as compared with estimated outlay, will be found fully set forth in the accompanying statements, supplied to this office by the company.

4 After fully investigating the subject and ascertaining that on other lines, with a considerably larger traffic than can be for some time expected on these famine lines, a 41-lb. rail had been found sufficient, I came to the conclusion that it was proper, on the score of economy, to reduce the weight of the rails from 51 to 41½ lb., and thus save nearly 38,000*l.* in the first cost of construction.

5. Orders to this effect were consequently passed by me.

No. 1.

South Indian Railway.

Villupuram-Dharmavaram Extension lines, 300 *miles*.

Rails, steel, 50 lb. per yard, and transverse steel sleepers, design B.

Tenders 30th October 1888, not accepted.

TONS.		£	s.	d.	£	s.	d.
27,107	Rails, bull-head section, at 3*l.* 19*s.*				107,072	13	0
1,546	Fish-plates for do. at 5*l.* 7*s.* 6*d.*				8,309	15	0
270	Bolts and nuts, at 12*l.* 2*s.* 6*d.*				3,273	15	0
26,406	Transverse steel sleepers, design B—						
	One half at 6*l.* 10*s.*	85,819	10	0			
	One half at 6*l.* 12*s.* 6*d.*	87,469	17	6			
					173,289	7	6
607	Steel keys for ditto—						
	One half at 6*l.* 10*s.*	1,972	15	0			
	One half at 6*l.* 12*s.* 6*d.*	2,010	13	9			
					3,983	8	9
55,936					295,928	19	3
	Freight on 55,936 tons at, say, 26*s.* 3*d.* per ton				73,416	0	0
	Insurance on 385,000*l.* (295,929*l.* + 10 per cent. = 29,592*l.* + $\frac{4}{5}$ths of 73,416*l.* = 58,733*l.*) at 15*s.* per cent. and duty ...				2,935	12	6
					372,280	11	9
	Cost per mile of railway, 300 miles				1,240	18	8
	Cost per mile of track, 345 miles				1,079	1	6

London,
5th December 1888.

(Signed) H. W. NOTMAN,
Managing Director.

No. 2.

South Indian Railway.

Villupuram-Dharmavaram Extension lines, 300 *miles*.

Steel rails 41¼ lb. and transverse steel sleepers (State Railway pattern) without corrugated clip.

Accepted tenders, 27th November 1888.

TONS.		£	s.	d.	£	s.	d.
22,363	Rails, Vignoles section, at 4*l.* 1*s.*				90,570	3	0
563	Fish-plates for do. at 5*l.* 11*s.*				3,124	13	0
199	Bolts and nuts, 3*l.* 10*s.*				2,686	10	0
23,963	Transverse steel sleepers—						
	One half at 5*l.*	59,912	10	0			
	One half at 5*l.* 1*s.* 6*d.*	60,811	3	9			
					120,723	13	9
447	Steel keys for ditto—						
	One half at 5*l.*	1,117	10	0			
	One half at 5*l.* 1*s.* 6*d.*	1,134	5	3			
					2,251	15	3
47,537					219,356	15	0
	Freight on 47,537 tons at, say, 26*s.* 3*d.* per ton				62,392	6	3
	Insurance on 295,000*l.* (219,357*l.* + 10 per cent. = 21,936*l.* + $\frac{4}{5}$ths of 62,392*l.* = 49,914*l.*) at 15*s.* per cent. and duty ...				2,249	7	6
					283,998	8	9
	Cost per mile of railway, 300 miles				946	13	3
	Cost per mile of track, 345 miles				823	3	8

London,
5th December 1888.

(Signed) H. W. NOTMAN,
Managing Director.

No. 3.

South Indian Railway.

Villupuram-Dharmavaram Extension lines, 300 *miles*.

		£	s.	d.
No. 1	Total amount for permanent way with 50-lb. bull-headed steel rails and transverse steel sleepers, design B, as per tenders sent in on 30th October 1888 (not accepted)	372,280	11	9
No. 2	Total amount for permanent way with 41¼ lb. steel rails, Vignoles section, and transverse steel sleepers, State Railway pattern, per accepted tenders	283,998	8	9
	Difference in favor of the latter ...	88,282	3	0
	Amount of indent 50-lb. steel rail and transverse steel sleeper ...	321,705	0	0
	Cost of permanent way No. 1	372,280	11	9
	Would have exceeded indent by ...	50,575	11	9
	Amount of indent as above	321,705	0	0
	Cost of permanent way No. 2, as accepted	283,998	8	9
	Saving on indent estimate ...	37,706	11	3

London,
5th December 1888.

(Signed) H. W. NOTMAN,
Managing Director.

Order—dated 18th January 1889, No. 54 R., Public Works.

Communicated to the Consulting Engineer for Railways with reference to Proceedings Nos. 596 R. and 702 R., dated 16th July and 28th August 1888.

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
„ Examiner, Guaranteed Railway Accounts.

Exd. J. Henricus.
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RAILWAY.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated January, 18th.

Recd. *Encl.*

G.O., 18th Jan. 1889, No. 54 R.

JANUARY.

Materials

Despatch from the Secretary of State for India forwarding copy of despatch addressed to the Government of India in regard to supply of — for the railways from Villupuram to Pakal and Tirupati and from Pakal to Dharmavaram, communicated to the Consulting Engineer for Railways.

PUBLIC WORKS SECRETARIAT
OOTACAMUND.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers :—

Telegram from the Secretary to the Government of India, Public Works Department, Simla, to the Secretary to Government, Public Works Department, Ootacamund, dated 10th September 1884.

Your 834 of eleventh August. Estimates aggregating Rs. 84,146 sanctioned conditionally. Letter follows.

From Colonel F. S. STANTON, R.E., Deputy Secretary to the Government of India, Public Works Department (Railway Construction), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 10th September 1884, No. 797 R.C.

I am directed to acknowledge the receipt of your No. 834 R., dated 11th August 1884, and in reply, to communicate the sanction of the Government of India to the two estimates aggregating Rs. 84,146 as per margin, which have been rendered necessary on the South Indian Railway to meet the probable increase in traffic on account of the demand for stone in the reconstruction of the Madras Harbour.

	Rs.
1. Proposed rectification in the alignment of the beach line between the General Hospital and Penitentiary, Madras	73,464
2. Forty-two feet turntable at Pallávaram ; tank-house and water-columns at beach	10,682
Total ...	84,146

2. I am, however, to remark that it is probable that some portion of these estimates is fairly chargeable to Revenue, and that the amounts so chargeable should be reported in order to allocate the expenditure.

3. I am also to suggest, for consideration by His Excellency the Governor in Council, whether it would not be well to make such preliminary arrangements with the Madras Harbour Works before any expenditure was incurred, in order to make certain that the outlay incurred by the South Indian Railway Company on account of the project would produce an adequate return.

ORDER—dated 22nd September 1884, No. 935 R., Public Works.

His Excellency the Governor in Council considers that good grounds have been shown in the interests of the public for the immediate commencement of the work provided for in the estimate, amounting to Rs. 73,464 ; the Agent will accordingly be authorised to carry out the work provided for in that estimate.

The suggestion of the Government of India in paragraph 3 of their letter will be referred to the Consulting Engineer for Railways for report, in communication with the Harbour Superintendent on his return from England.

The indents for the station machinery provided for in estimate amounting to Rs. 10,682 may be sent forward for compliance.

Paragraph 2 of Government of India letter will be referred to the Consulting Engineer for further report.

(True Extract.)

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, Guaranteed Railway Accounts.
" Superintendent, Madras Harbour Works.

Exd. A. Aubert.
Spare Copies

RAILWAY.

Govt. of {1884} Madras.

PUBLIC WORKS.

Dated September, 22nd.

Recd. *Encl.*

G.O., 22nd Sept. 1884, No. 935 R.

1016-1015R

SEPTEMBER.

South Indian Railway

Passing orders on letter from the Government of India sanctioning, with remarks, estimates for certain works on the —.

11TH AUGUST 1884, No. 834 R., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

From the Consulting Engineer for Railways, dated Madras, 15th August 1884, No. 203.

From the Acting Agent, South Indian Railway, to the Consulting Engineer for Railways, dated Negapatam, 9th August 1884, No. 618.

Referring to my letter to you, No. 588, of 30th ultimo, and my Board letter, No. 508-A, of the 5th ultimo, I to-day received the following telegram from the Company's Managing Director:—

"If Consulting Engineer concurs absolute necessity through inadequacy existing arrangements, apply Government sanction proposals three four."

This I understand to mean that if you concur in the necessity for the works referred to, I am authorised by the Board to ask for the sanction of Government to them, viz.:—

	RS.
(1) Proposal III of telegram and my Board letter, No. 508-A, estimate No. 748 sent to you with my letter, No. 588, of 30th July 1884	73,464
(2) Proposal IV of telegram and my Board letter, No. 508-A, estimate No. 749 of letter No. 588 to you.	10,682

These estimates are for (1) realigning the Beach line opposite the General Hospital and (2) for providing engine turntable and watering accommodation, respectively; and if you believe, as I do, that the works are necessary, I shall be obliged by your applying for the sanction of Government to their immediate construction.

Extract from a letter from the Agent, South Indian Railway, No. 588, dated 30th July 1884.

With reference to minute No. 33 of the minutes of official meeting No. 3 of 1884, I have the honor to submit, herewith, (original and duplicate), the following estimates:—

* * * * *

	RS.
No. 748.—Proposed rectification in the alignment of the Beach line between General Hospital and Penitentiary, Madras	73,464
No. 749.—Forty-two feet turntable at Pallávaram, tank-house and water-columns at Beach	10,682.

Submitted to Government for transmission to the Government of India.

In G.O., No. 671 R., dated 27th June 1884, sanction was asked for the submission of indents for additional rolling stock necessary to meet the demand for stone from Pallávaram on account of the construction of the Madras Harbour.

Estimates are now submitted for replacing the existing temporary bridge carrying the line over the Buckingham canal by a permanent structure. The present bridge, which consists of 14 pile-trestle openings 15′ from centre to centre, was constructed

by the Harbour Works Department; the level has been twice raised to suit the requirements of the canal traffic; it is purely of a temporary nature; its safety will probably before long become a matter of anxiety, and the substitution of a permanent bridge has always been contemplated.

The present timber bridge is approached from the east by reverse curves of 480 feet radius, and it has been found in practice almost impossible to maintain the permanent-way in gauge with the rolling stock that is now worked over the line. The position of these curves adjoining the bridge makes them the more objectionable.

It is proposed, pending the construction of the permanent bridge, to realign the road at this point, and the permission of the medical authorities has been obtained for the temporary acquisition of part of the hospital grounds for this purpose. With the new bridge these curves will be laid with the radius usual elsewhere on the line.

The estimates now submitted also provide for the erection of a turntable at Pallávaram, the station adjoining the stone quarries; and for a 2,000-gallon water-tank and crane for engines at the Beach.

It is very desirable that no time should be lost in providing the station machinery and in rectifying temporarily the alignment of the road, but the medical authorities have stipulated that this latter work shall not be commenced until the date for the completion of the bridge can be definitely foretold. It is requested therefore that the decision of the Government of India may be communicated by telegraph in order that this work may be put in hand forthwith.

It was, I believe, suggested by the Director-General of Railways on his recent inspection of the South Indian Railway that the permanent bridge should be constructed for a double line with a view to the development of suburban traffic; this suggestion has been complied with.

The estimates, amounting to Rs. 84,146, of which Rs. 50,306 represent Indian, and Rs. 33,840 English expenditure, are recommended for sanction.

Alternative estimates, for doubling the line to Pallávaram inclusive and exclusive, respectively, of the larger bridges, have been prepared and are under consideration, but they are quite independent of the present proposal in which the safety of the public is to some extent involved.

The provision made under item 4, schedule B, of the budget estimate for the double line, will, however, be available for re-appropriation towards the expenditure on the works now proposed. And application for additional funds to provide for their completion within the current official year might, it is thought, be made in view of the permission given in paragraph 5 of Government of India Resolution, No. 183 R.A., dated 12th March 1884.

It will be observed that the Board of Directors have sanctioned the outlay conditionally on my concurrence in the absolute necessity of the works.

I am of opinion that the safety of the travelling public will before long require the substitution of a permanent for the temporary bridge,—that the present sharp curves are only safe at restricted speed, and that the expenditure is absolutely necessary if the harbour traffic is to be efficiently worked.

The provision of a double line over the bridge cannot be deemed "absolutely necessary," but is very desirable, and, in view of the developing suburban traffic, will probably become necessary before long.

Order—dated 11th August 1884, No. 833 R., Public Works.

Ordered to be forwarded to the Government of India for favor of early consideration.

(Here enter No. 834 R., dated 11th August 1884.)

(True Extract.)

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner, Guaranteed Railway Accounts.

Endorsement—dated 11th August 1884, No. 834 R., Public Works.

Forwarded accordingly.

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

Exd. E. Fernandez.
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RAILWAY.

Govt. of {1884} Madras.

PUBLIC WORKS.

Dated August, 11*th*.

Recd. *Encl.*

G.O., 11th Aug. 1884, No. 834 R.

AUGUST.

South Indian Railway

Estimates for certain works on the —, to meet the probable increase in traffic on account of the demand for stone in the reconstruction of the Madras Harbour, forwarded for early consideration of the Government of India.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper :—

Despatch from the Right Honorable the Secretary of State for India, to His Excellency the Right Honorable the Governor-in-Council, Fort St. George, dated India Office, London, 4th December 1884, No. 7, Railway.

I transmit, herewith, for information of your Excellency's Government, copy of communications * which have recently passed between this office and the Board of the South Indian Railway Company, in respect to the preparations to be made on that line for the efficient delivery of stone required for the restoration of the Madras harbour.

* Letter to South Indian Railway (with enclosure) dated 23rd July 1884.
Letter from South Indian Railway (with enclosure) dated 12th November 1884.
Letter to South Indian Railway, dated 3rd December 1884.

2. Mr. Parkes has been informed of the steps which are being taken by the Company in this matter, and will communicate with Mr. Thorowgood with respect to the arrangements for the loading and unloading of the wagons employed in conveying the stone from the quarries to the harbour.

ENCLOSURES.

From J. K. CROSS, Esq., to the Managing Director, South Indian Railway Company, dated India Office, 23rd July 1884, No. 1250-84 P.W.

I am directed by the Secretary of State for India in Council to transmit, for the information of the Board of Directors of the South Indian Railway Company, copy extract of a communication * which has been addressed to this office by Mr. Parkes, Engineer of the Madras Harbour Works, respecting the doubling of a portion of the South Indian Railway, which, in his opinion, is necessary to ensure a sufficient daily delivery of stone required in connection with the harbour works.

* Mr. Parkes' letter, dated 5th July 1884, paragraphs 13—16, inclusive.

With reference to this suggestion of Mr. Parkes, I am desired by the Secretary of State for India to say that he will be glad to be placed in possession of the views of the Board as to the necessity for the doubling of their line, and, should it be necessary, as to the financial arrangements which, in the Board's opinion, will be necessitated thereby.

Extract letter from Mr. Parkes to the Under Secretary of State for India, dated 5th July 1884.

13. There is another object for which immediate arrangements are required, and in which I think a motion on the part of the Secretary of State would be valuable. I allude to the conveyance by the South Indian Railway from Pallávaram, 16 miles south of Madras, of stone for forming the rubble base and the concrete blocks. A portion of the stone hitherto used has been

brought by this route; but, for the future, the whole will be so brought, and the daily quantity required is more than double that formerly delivered.

14. This work is already going on, but at a rate only one-tenth of that ultimately required, and with the present appliances of the South Indian Railway Mr. Beardmore is unable to obtain more. It is therefore obvious that special arrangements will have to be made, and I would submit that our requirements should be made known, through the Secretary of State, to the Company's authorities at home, with a request that special orders be sent out to Madras on the subject.

15. After careful consideration, Mr. Thorowgood and myself have arrived at the conclusion that the organisation should be sufficient for the delivery of 1,200 tons per day, part of which would be loaded into boats at the piers, and part used for making blocks. These 1,200 tons represent 240 wagon-loads, or ten trains, and for carrying on the work efficiently we consider that 200 wagons should be provided and devoted exclusively to the harbour works service. Moreover, we are of opinion, looking to the frequent obstructions by which only half this amount of traffic was formerly impeded, that it will be absolutely necessary to double the line as far as the stone traffic runs parallel with the general traffic, except over two long bridges where the present single line might be made to suffice.

16. I may mention that the quantity of stone required is about 500,000 tons, the delivery of which will be spread over about three years. Under existing arrangements the Company are paid 8½ annas per ton for haulage, and a further considerable charge, of which I do not know the precise amount, has been made by the Company, and allowed by the Government authorities, for repair of wagons. These particulars will show that the work will be on a scale which demands, and will repay, a special organisation.

From HENRY W. NOTMAN, Esq., Managing Director, South Indian Railway Company, to the Under Secretary of State for India, dated 55, Gracechurch Street, London, E.C., 12th November 1884, No. 1206.

On the 24th July last, a letter (P.W. No. 1250) of the previous day's date was received from the Secretary of State for India, transmitting copy extract of a communication which had been addressed to him by Mr. Parkes, Engineer of the Madras Harbour Works, respecting the doubling of a portion of the South Indian Railway, which, in his opinion, is necessary to ensure a sufficient daily delivery of stone required for the harbour works; and the Directors were invited to state their views as to the necessity of doubling the length of line referred to.

This letter was received immediately after the adjournment of the Board (on 22nd July) for the usual autumn recess, but the subject has received attention in the meantime, and I am now instructed to state what action has been taken, and to express the views of the Directors on the question generally.

Shortly after the receipt of the letter under reply, estimates were received from the Company's Chief Engineer in India, in view to the harbour works' stone traffic—

	RS.
1. For doubling the line complete from the Madras harbour to Pallávaram, inclusive of all bridges and culverts, rectifying the alignment of beach line, and building a permanent bridge over Cochrane's canal instead of the present temporary wooden one.	5,45,536
2. As above, omitting to double the Cooum and Adyar bridges, leaving them to be worked over on the single line	4,56,795
3. Rectification of beach line only	73,464
4. For providing an engine turn-table at Pallávaram, and (2) a water tank and column for watering engines at the beach station, Madras	10,682

With the approval of the Government Director, the Agent was authorised by telegram to apply for sanction of Government to carry out proposals 3 and 4, in the event of the Consulting Engineer for Railways concurring in their absolute necessity, as to which the Company's officers were unanimous in opinion, through the inadequacy of the present existing arrangements. This sanction having been given, the work is now in hand, and the turn-table has been ordered under sanctioned indent.

As the rolling stock of the Company is sufficient only for their current requirements, sanctioned indents were sent home for 200 wagons, specially adapted for carrying stone, and four tank locomotives of a more powerful type than those at present in use. Contracts for these were entered into without delay, and it is expected that the first 20 wagons will be ready for shipment towards the end of the current month, and that further deliveries will be made about every fortnight thereafter until completion of the order in February. The locomotives are to be delivered, according to the contract, by 1st March 1885.

It is understood that the maximum delivery of stone per diem at the harbour works required by Mr. Parkes will be 1,200 tons, and the Directors consider that, with the improvement in the line now being effected, and with additional passing places between Madras and Pallávaram, which have also been sanctioned, they will be able, when the additional rolling stock is at work, to convey on the present single line this amount of exceptional and temporary traffic, if proper and sufficient arrangements for the loading and unloading of the stone are made by the harbour works contractors. At all events, they think that this ought to be tried and every effort made to accomplish it before spending so considerable a sum (Rs. 5,45,536) as would be involved in the doubling of the line for 14 miles. In these views they are fortified by the opinions of their Consulting Engineers, as expressed in their report on the subject, dated 13th October 1884, of which a copy is forwarded, herewith, for information.

In that report it is stated:—"We are disposed to think that delays and hindrances to the traffic are more likely to be caused at the points of loading and unloading than in transit. These causes of delay would not be affected by the line being single or double. We think that the traffic required can be carried on the single line."

It has been suggested that, although the harbour works stone traffic, being only temporary, may not of itself justify the expenditure of so large a sum, a permanent purpose would be served and advantage would accrue to the Company by the doubling of this length of line in the facilities that would be afforded for the development of a suburban traffic. The Directors, however, do not consider that the prospects of enhanced traffic from this source are such as would, *per se*, warrant them in undertaking the work.

From CHARLES DOUGLAS FOX, Esq., (for G. B. Bruce, Esq., and self) to H. W. NOTMAN, Esq., dated 5, Delahay Street, Westminster, 13th October 1884.

We have examined the documents forwarded with your letter of 12th August, and also those sent on the 9th of August.

These all have reference to the proposal to rectify defects in the temporary line laid down to the beach at Madras, and to double the railway from Pallávaram to the beach, a distance of about 14 miles, in order to be better able to carry the stores from Pallávaram to the Madras harbour works.

With regard to the improvement suggested in the line to the beach, named as estimate No. 3 in the Acting Agent's letter of 19th July, there appears to be no diversity of opinion as to its absolute necessity, and the same remarks apply to estimate No. 4, which includes an engine turn-table for Pallávaram and locomotive watering arrangements at Madras. We observe that sanction for these works has already been sent by telegram.

In regard to the doubling of the line for 14 miles, in order to be able to carry down to Madras 1,200 tons of stone a day, we think that if that is the only object to be attained, it can be done on the present single line, and that, at all events, it should be tried before spending the large sum of Rs. 5,45,536 to carry the stone traffic, which is only temporary. We are disposed to think that delays and hindrances to the traffic are more likely to be caused at the points of loading and unloading than in transit. These causes of delay would not be affected by the line being single or double. We think that the traffic required can be carried on the single line.

In addition to the plan suggested by Mr. Betts of laying down heavier rails on the existing single line, and having heavier engines so as to carry greater loads in each train, and thus diminish the chances of interruption and irregularity, heavier trains could be drawn by working them with two locomotives each.

The acting Agent, however, suggests that there is a permanent advantage to be gained by doubling the line, inasmuch as it would enable the Company to develop a suburban traffic for which the present single line does not afford facilities. Of this we are not in a position to judge; but, assuming Mr. Logan's view to be correct, the additional purpose to be served would render the doubling of the line from Madras to Pallávaram very desirable.

From J. K. CROSS, Esq., to the Managing Director, South Indian Railway Company, dated India Office, 3rd December 1884, No. 2172-84 P. W.

I am directed by the Secretary of State for India in Council to acknowledge receipt of your letter, No. 1206, dated the 12th of November 1884, detailing the operations which, in the opinion of the Board of the South Indian Railway Company, are sufficient to meet the extra stone traffic which will be thrown on the line for the next few years, in connection with the restoration of the Madras harbour.

In reply, I am desired to inform you that the Board's proposals, which appear to be sufficient for the object in view, are sanctioned, and that the necessary communication will be made to the Government of Madras to that effect.

From the Consulting Engineer for Railways, dated Madras, 17th December 1884, No. 335.

From F. N. THOROWGOOD, Esq., M. Inst., C.E., Superintendent, Madras Harbour Works, to the Consulting Engineer for Railways, dated Madras, 13th October 1884, No. 28 R.:—

I have the honor to acknowledge the receipt of your letter of the 9th instant, No. 818, with enclosures, which I have carefully perused.

2. I fear that I am hardly in a position to say whether the harbour works estimate should bear a proportion of the Capital expenditure incurred by the South Indian Railway in view of the increased stone traffic, that being a point on which the Engineer-in-Chief and framer of the estimate for restoring the harbour must be consulted. Personally, my feeling is that undoubtedly the harbour works should bear a large share of any expenditure which is made in the first instance on their account alone.

3. The estimate for the restoration of the harbour is made on the basis of former work, namely, allowing 6 pies per ton per mile for carriage of stone and allowing the cost of repairs to wagons to be covered by the estimated cost of the stone. I think you will agree that I cannot take upon myself to alter the estimate without the knowledge and approval of Mr. Parkes, but I may state that I believe it would be much better for the Madras harbour if a considerable sum from the estimate for restoration were devoted to any means that will facilitate expeditious delivery of material.

4. It will be remembered that in 1881 the Madras Railway claimed a sum of Rs. 74,000 * as compensation for unremunerative harbour traffic, and the Government of India ordered that this should be paid by the Madras harbour works. Reasoning from this, I think the financial question might be settled independently of myself; but, in the meantime, I will refer your points to Mr. Parkes.

* G.O., No. 2475 W., dated 8th October 1881.

5. I would remark, however, that the present line from the penitentiary to the beach was made at the cost † of the harbour works, and that nothing whatever has been refunded to these works by the South Indian Railway on account of that line, which is wholly in the South Indian Railway's hands. I trust that this will not be taken as a precedent if the harbour works are ordered to bear the cost of doubling the line to Pallávaram.

† Rs. 15,500.

6. In reply to the first section of your paragraph 4, I can guarantee that, if everything works satisfactorily, we can take 600,000 tons of stone from Pallávaram *minus* what has been delivered this year, which is about 30,000 tons.

From the same officer, dated Madras, 12th December 1884, No. 33 R.

In continuation of my letter of the 13th October 1884, No. 28 R., I am now in a position to give you the views of the Engineer-in-Chief of these works on the subject of the stone traffic on the South Indian Railway.

2. I gather from Mr. Parkes that it is intended by the Government Railway authorities at home that the South Indian Railway are to carry harbour works stone at a certain *price per ton*, and the necessary arrangements for so doing will be left to the Company. With reference to the rate to be paid, Mr. Parkes writes: "If in full consideration Government decides that 6 pies per ton per mile is insufficient, I have nothing to say against raising it."

3. I found from experience during the construction of these works that the bills submitted for damage to wagons amounted to such a sum as added $1\frac{1}{2}$ annas per ton to the price of the stone delivered at the beach. This is equivalent to about one pie per ton per mile. It would be a great convenience to all parties, I believe, if in future arrangements the price fixed per ton mile should cover *all* expenses including repairs.

4. The South Indian Railway Company appear to hope for great improvements in the regularity and expedition of loading and unloading trains; and before a fixed rate is arrived at, I must warn them not to expect too much. The loading of trains at Pallávaram can be expedited by having more siding accommodation, and this I am prepared to meet; but, even then, former experience proves to me that at times the coolies *will* leave their work in a body, and without warning, in spite of being bound down by contract, and on such occasions trains must suddenly be cancelled.

5. As to unloading, that work being entirely dependent on the state of the wind, sea and rain, and especially upon the sea, it is impossible to hope for any fixed period in which a train is sure to be unloaded as I shall keep the boats working as long as possible, and doubtless sometimes when the time required to discharge stone will be double that required on a smooth quiet day.

6. It may be argued that to have additional sidings at the beach would do away with the difficulty; but I do not think this will be the case, unless a large margin of empty wagons is allowed. For, supposing a train were run into a new siding on the harbour works, the engine would still have to wait for empties till the boats had discharged the train already in.

7. Again, half of the stone will be required at the north pier and blockyard. This fact is fatal to *smart* punctuality owing to the iron pier railway crossing, which may and does cause a stoppage of work for many times in the day. I will do my best to attain punctuality, but I can state positively beforehand that the South Indian Railway Company must not expect anything like the punctuality of a regular service of passenger trains.

8. I shall be much obliged if you will communicate my ideas to the South Indian Railway Company, if you think it desirable to do so.

From the Agent, South Indian Railway, to the Consulting Engineer for Railways, dated Negapatam, 10th December 1884, No. 927.

Referring to your letter No. 643, of 24th October 1884, a rate of one anna per ton will, I consider, give the Company fair remuneration for the carriage of harbour works stone from Pallávaram to the harbour, the charge to include the cost of all upkeep and repairs to rolling stock and road, with the exception of any damage due to manifest carelessness and neglect on the part of the harbour works employés and contractors.

2. With reference to the Harbour Superintendent's request that we should pay all his outlay on the line of rail laid by him with South Indian Railway material, or what we call the beach line,—from Cochrane's canal to the beach—I do not consider that the Railway Company should be asked to recoup this expenditure, which was incurred on behalf of the harbour works. Had the Company been asked to construct the line, they would undoubtedly either have charged the expenditure direct to the harbour works, or would have demanded a rate for the carriage of stone which would have repaid it.

3. I am aware that the harbour works paid a certain sum towards the repair of wagons damaged by the heavy stone traffic; but, with all this, I doubt if the South Indian Railway made any profit worth mentioning out of the stone traffic at the low rate of 6 pies per ton. The wagons ran empty one way, and the wear and tear caused by the full ones necessitated frequent and heavy renewals of permanent-way.

4. I consider, therefore, that the Company ought not to be asked to pay any of the Rs. 27,132-14-4 named by the Harbour Superintendent as his expenditure on the construction of the beach line.

5. I understand that the Madras Railway Company were paid a sum for the depreciation of their stock in running the harbour works stone traffic, while the South Indian Railway received nothing on this account.

Extract from letter from the Board of Directors, South Indian Railway, dated 7th November 1884, No. 525.

Proposed Doubling of Line from Madras Harbour to Pallávaram, 14 Miles.—This subject having been referred to the Consulting Engineers, a copy of their report, dated 13th October, is sent, herewith, for your information.

The Board concurs in the conclusions come to therein—that the 1,200 tons of stone a day from the Pallávaram quarries required by the Madras harbour works can, with proper and sufficient appliances for loading and unloading, be carried on the present single line; and that, at all events, that course should be tried before spending so considerable a sum as Rs. 5,45,536 on the doubling, for this temporary purpose alone, of the 14 miles of line in question.

With regard to your suggestion that a permanent purpose would be served and advantage gained by doubling the line in the prospective development of a suburban traffic for which the single line does not offer sufficient facilities, the Board does not think that the prospects of an immediately enhanced traffic from this source are such as would justify them, for this purpose by itself, in incurring so large an expenditure, more especially considering that additional passing places at Chetpet and Kódambákam have recently been sanctioned at an estimated cost of Rs. 9,848, and that the facilities for working the local trains over this length of line will thereby be increased.

Submitted to Government, with reference to their proceedings, under date 22nd September 1884, No. 935 R.

2. In those proceedings is recorded a letter* from the Government of India suggesting that, before any Capital expenditure is incurred by the South Indian Railway in connection with the carriage of stone for the Madras harbour works, it would be well to make such arrangements as will ensure to the Company an adequate return on their outlay.

* Dated 10th September 1884, No. 797 R.C.

3. The Government having decided, in the proceedings under reference, that the new bridge over Cochrane's canal is required independently of the harbour works traffic, the outlay to be incurred in connection with the latter is as follows:—

	Rs.
Rolling stock (4 engines and 200 wagons)	3,85,600
Turn-table at Pallávaram, tank-house and water column at beach	10,682

4. A proposal was made some months ago for doubling the line between the beach and Pallávaram, and estimates for the work were framed. Excluding the items already sanctioned (Rs. 73,464 + Rs. 10,682), the estimates are as follows:—

	Rs.
Doubling the line complete	4,61,390
Doubling the line with the exception of the Cooum and Adyar bridges	3,72,649

5. It will be observed from the annexed extract from letter from the Board of Directors that the proposal does not meet with the approval of their Consulting Engineers, and the estimates have not, therefore, been sent forward. The Board are of opinion that 1,200 tons of stone per day can, "with proper and sufficient appliances for loading and unloading, be carried on the present single line;" but the Superintendent, Harbour Works, in his letter dated 16th July 1883, No. 24 R.,* considers that, for prompt and smooth working, a second line will be necessary. In letter dated 13th October 1884, No. 28 R., Mr. Thorowgood expresses his belief that "it would be much better for the harbour works if a considerable sum from the estimate for restoration were devoted to any means that will facilitate expeditious delivery of material;" and in letter dated 12th December 1884, No. 33 R., he warns the Railway Company against too sanguine anticipations of improvement in regularity and expedition in loading and unloading trains.

* Proceedings of Government, dated 27th June 1884, No. 671 R.

6. There appear to be many causes which tend to prevent that regularity which is essential to the satisfactory working of a train service which fully taxes the power of a line; and my own opinion is that it will be found extremely difficult, if not impossible, to convey the tonnage of stone fixed as the average daily delivery. The economical restoration of the harbour depends so much on the supply of stone exactly when required, that it might be considered expedient to incur considerable outlay in ensuring flexibility in the train service. This is a question for the decision of Government in the Public Works Department (General Branch). A second line would undoubtedly be a convenience to the Railway Company in working the suburban traffic, which is beginning to develop, and it would, I think, be worth their while to expend some money in doubling the line, if a fair contribution were made by the harbour works. As matters stand at present, it is not proposed to double the line. The maximum daily total hitherto delivered is 760 tons, carried by five trains of 28 wagons each.

7. The new rolling stock, which is being obtained from England, will improve the conditions of working to some extent, as the engines, being of greater power, will take heavier loads. It is thought undesirable that the harbour works should pay any portion of the cost of this stock, which will eventually be found useful for the general purposes of the railway, and it will be a better arrangement to meet the depreciation of this stock, and comply with the suggestions of the Government of India, by charging an increased rate to cover all contingencies. The rate paid hitherto is 6 pies per ton per mile, and an additional charge of about 1 pie has been levied for repairs to wagons necessitated by the nature of the traffic, making a total of 7 pies per ton per mile.

8. On the completion of the stone traffic on the Madras Railway, the Government of India directed* that a sum of Rs. 74,000 should be charged against the harbour works for loss sustained by the Railway Company in conveyance of material from Ambatúr. This is equivalent to about 2 pies per ton per mile; and, if the same rate were considered equitable in the case of the South Indian Railway, the total charge would be 9 pies per ton per mile. It is proposed, however, not to disturb old accounts, but to charge in future one anna per ton per mile, which would include all repairs except any that may be caused by manifest carelessness or neglect. Mr. Thorowgood expresses his approval of an inclusive charge, and I recommend that the rate of one anna now proposed by the Agent be accepted. It will be observed that Mr. Parkes consents to a higher rate than that hitherto paid, if the Government decide that the former rate is insufficient. The quantity of stone still required is 570,000 tons, which, at one anna per ton per mile for 14 miles, would give a gross return of Rs. 4,98,750. The average rate paid on the whole of the stone carried by the South Indian Railway would then be a little over 9 pies per ton per mile. Considering that the lead is short, and that the trains run empty in one direction, this does not appear more than sufficient to yield a fair profit.

* Proceedings of Government, dated 8th October 1881, No. 2475 W.

9. The next point for consideration is whether the South Indian Railway Company should reimburse the amount expended by the harbour works in constructing the extension from the penitentiary to the beach. Practically, this piece of line, $1\frac{3}{4}$ miles long, has been merged in the South Indian Railway, and Mr. Thorowgood has on more than one occasion suggested repayment of the amount expended by him. This is differently stated as Rs. 27,132-14-4 and Rs. 15,500; the latter being the sum given in his letter now submitted. The conditions under which the extension was undertaken are set forth in proceedings of Government, dated 9th December 1876, No. 3333. They are, briefly, that the harbour works should bear the expense of all earthwork and bridging, and that the Railway Company should lend the permanent-way materials. It was then considered that the work would be temporary, but the time has arrived for constituting it an integral portion of the South Indian Railway. That Company is now building a new bridge over Cochrane's canal, and improving the alignment near it, so that the wooden bridge erected at the cost of the harbour works, and the portion of line abandoned, must in any case be considered temporary, and should not, therefore, be paid for by the Railway Company. Looking to the conditions on which the extension was made, and the unprofitable rate at which the

stone traffic, aggregating 650,000 tons, has been carried, I am of opinion that the amount expended by the harbour works should stand at the debit of that account, and that the line should be made over to the South Indian Railway free of cost.

10. If the proposal made in the preceding paragraph be approved, no action will be necessary on paragraph 2 of Government of India letter, dated 10th September 1884, No. 797 R.C., as the cost of the new bridge, being a first charge in the accounts of the South Indian Railway, will be wholly debitable to Capital.

Note by the Chief Engineer, Public Works Department.

It seems to me that the correct principle in this matter is the one which Mr. Parkes says has been accepted at home, namely, the South Indian Railway to carry the stone at a fixed price per ton, all necessary arrangements for so doing being left to the Company.

2. If the doubling of the line to Pallávaram is desirable in order to insure the proper conveyance of the stone (and it seems to me that it is desirable), the work should, in my opinion, be executed wholly at the cost of the Company, and the rate should be fixed at such figure as will give them a fair return on all items of expenditure.

3. The arrangement made in 1876 for meeting the cost of the beach extension was, in my opinion, far from satisfactory, and not to be adopted as a precedent.

4. So far as the harbour works are concerned, it would, in my opinion, be better that they should pay an enhanced rate per ton per mile, than that they should contribute to the capital Cost of the doubling.

(Signed) J. SHAW-STEWART, Colonel, R.E.,
Chief Engineer, P.W.D.

19th December 1884.

Note by the Consulting Engineer for Railways.

With reference to the above remarks by the Chief Engineer (General Branch), who is of opinion that the line should be doubled, a view in which I fully concur, I may state that, in my opinion, a rate of 1 anna and 6 pies per ton per mile on stone to be in future carried would justify the Railway Company in doubling the line.

2. The cost of this is estimated at Rs. 4,62,000; a rate of 1 anna and 6 pies per ton per mile would give the Company a fair profit, and provide half the Capital outlay to be incurred.

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Consulting Engineer for Railways.

5th January 1885.

ORDER—dated 19th January 1885, No. 66 R., Public Works.

His Excellency the Governor in Council observes that the proposals of the Board of the South Indian Railway Company, which appear to the Secretary of State to be sufficient for the object in view, have been sanctioned, and that the question of doubling the line is not at the present time open to consideration.

2. The further questions raised in these papers, namely, what rate shall be paid to the South Indian Railway for carriage of the stone and whether the outlay debited to the harbour works for the original construction of the line from the penitentiary

to the beach shall be refunded by the South Indian Railway, will be referred to the Engineer-in-Chief of the Harbour Works for his views.

(True Extract.)

(Signed) C. J. SMITH, Lieut.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Superintendent, Madras Harbour Works.
" Examiner, Guaranteed Railway Accounts.

Exd. E. Fernandez.
Spare Copies

RAILWAY.

Govt. of {1885} Madras.

PUBLIC WORKS.

Dated January, 19th.

Recd. *Encl.*

G.O., 19th Jan. 1885, No. 66 R.

JANUARY.

Madras Harbour Works

Orders on correspondence on the subject of the conveyance of stone by the South Indian Railway Company for the restoration of the —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper:—

From the Consulting Engineer for Railways, dated Madras, 26th January 1886, No. 26.

From F. N. THOROWGOOD, Esq., M. INST. C.E., Superintendent, Madras Harbour Works, to the Consulting Engineer for Railways, dated Madras, 16th January 1886, No. 36 R.

In reply to your letter, of 30th October 1885, No. 1071, I regret to state that I have overlooked what Mr. Parkes has said on the subject, and which I received on 17th December 1885.

2. I quote *verbatim* from his letter:—

"If the Railway Company can prove to the satisfaction of the Madras Government that the work is worth one anna per ton per mile, we must pay it and amend the estimate accordingly. I hope, however, they will insist on some rather more direct data than were given by the Madras Railway in a similar case. They assumed that the rate between Ambatúr and Madras would be the same as for their goods traffic over the whole system,—in my opinion a most gratuitous assumption. But it is essentially a question to be decided on the spot, though, when decided, it will be my business to report on its effect on the estimate. So also, as to the cost of the Beach extension, Major Coaker's proposal seems to me anything but reasonable. If the South Indian Railway use the extension, why should we pay for it? Still, that is a question which the local authorities can judge of quite as well as myself, and they have all the data on the spot. As I understand it, we have already paid Rs. 27,132, and the question is whether we are to ask for this sum to be repaid. I cannot answer the question as an abstract one. The answer must depend on circumstances which are not within my knowledge."

3. I have one remark to make on the subject, and that is, that I do not think the increased rate should commence until the new iron wagons commenced to run, which was long after 1st January 1885. Until these new wagons began to run circumstances were precisely similar to what took place in the period from 1877 to 1881, when the 6-pie rate was charged *plus* cost of extraordinary repairs to wagons.

Submitted for the orders of Government, with reference to G.O., dated 19th January 1885, No. 66 R.

2. This office has no further remarks to offer except that, with reference to paragraph 3 of the Superintendent's letter, the 1st July 1885 may, it is thought, be accepted as the date from which the increased rate of one anna per ton per mile shall be paid.

ORDER—dated 6th February 1886, No. 122 R., Public Works.

After full consideration of the circumstances of the case, His Excellency the Governor in Council is of opinion that, with effect from the 1st July 1885, a rate of one anna per ton per mile should be paid to the South Indian Railway for carriage of all stone hauled for the Madras harbour works.

2. Also that the sum of Rs. 27,132-14-4, expended by the Superintendent, Madras Harbour Works, on the railway from the Penitentiary to the Beach, continue to stand at the debit of the Harbour; and that the line should be handed over to the South Indian Railway Company free of cost.

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Superintendent, Madras Harbour Works.
" Examiner, Guaranteed Railway Accounts.
" Examiner, Public Works Accounts.

Exd. E. Fernandez.
Spare Copies

RAILWAY.

Govt. of {1886} Madras.

PUBLIC WORKS.

Dated February, 6th.

Recd. *Encl.*

G.O., 6th Feb. 1886, No. 122 R.

FEBRUARY.

Madras Harbour Works

Rate for carriage of stone by the South Indian Railway for the — fixed at one anna per ton per mile.

18TH JANUARY 1889, No. 54 R., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following paper :—

Despatch from the Right Honorable VISCOUNT CROSS, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India office, London, 20th December 1888, No. 5 (Railway).

Herewith is transmitted, for information of your Excellency's Government, copy of a despatch and its enclosures, recently addressed by me to the Government of India, in respect to the supply of materials for the railways from Villupuram to Pakal and Tirupati and from Pakal to Dharmavaram.

No. 153 of 20th December 1888.

ENCLOSURES.

Despatch from the Right Honorable VISCOUNT CROSS, Her Majesty's Secretary of State for India, to His Excellency the Most Honorable the Governor-General of India in Council, dated India office, London, 20th December 1888, No. 153 (Railway).

Construction of Railways in Madras for Famine purposes by the South Indian Railway Company.

With reference to para. 2 of my Railway despatch No. 126, dated 31st October 1888, I have now to inform you, that contracts have been entered into by the South Indian Railway Company for the supply of the rails, sleepers, &c., for the railway from Villupuram to Pakal, and Tirupati and from Pakal to Dharmavaram.

2. The cost of the materials will amount to 283,998*l.* 8*s.* 9*d.*, and their despatch will take place so that the first consignment will reach Madras in March next, and the whole will be completed by the end of 1890.

3. It will be recollected that the estimated cost of these stores in the indent was 321,705*l.*, but the actual expenditure has been reduced to 283,998*l.* 8*s.* 9*d.* by the adoption of a lighter rail than that contemplated. The details of the actual as compared with estimated outlay, will be found fully set forth in the accompanying statements, supplied to this office by the company.

4 After fully investigating the subject and ascertaining that on other lines, with a considerably larger traffic than can be for some time expected on these famine lines, a 41-lb. rail had been found sufficient, I came to the conclusion that it was proper, on the score of economy, to reduce the weight of the rails from 51 to 41½ lb., and thus save nearly 38,000*l.* in the first cost of construction.

5. Orders to this effect were consequently passed by me.

No. 1.

South Indian Railway.

Villupuram-Dharmavaram Extension lines, 300 *miles.*

Rails, steel, 50 lb. per yard, and transverse steel sleepers, design B.

Tenders 30th October 1888, not accepted.

TONS.		£	s.	d.
27,107	Rails, bull-head section, at 3*l.* 19*s.*	107,072	13	0
1,546	Fish-plates for do. at 5*l.* 7*s.* 6*d.*	8,309	15	0
270	Bolts and nuts, at 12*l.* 2*s.* 6*d.*	3,273	15	0
26,406	Transverse steel sleepers, design B—			
	One half at 6*l.* 10*s.* 85,819 10 0			
	One half at 6*l.* 12*s.* 6*d.* 87,469 17 6			
		173,289	7	6
607	Steel keys for ditto—			
	One half at 6*l.* 10*s.* 1,972 15 0			
	One half at 6*l.* 12*s.* 6*d.* 2,010 13 9			
		3,983	8	9
55,936		295,928	19	3
	Freight on 55,936 tons at, say, 26*s.* 3*d.* per ton	73,416	0	0
	Insurance on 385,000*l.* (295,929*l.* + 10 per cent. = 29,592*l.* + ⅘ths of 73,416*l.* = 58,733*l.*) at 15*s.* per cent. and duty ...	2,935	12	6
		372,280	11	9
	Cost per mile of railway, 300 miles	1,240	18	8
	Cost per mile of track, 345 miles	1,079	1	6

London,
5th December 1888.

(Signed) H. W. NOTMAN,
Managing Director.

No. 2.

South Indian Railway.

Villupuram-Dharmavaram Extension lines, 300 *miles.*

Steel rails 41¼ lb. and transverse steel sleepers (State Railway pattern) without corrugated clip.

Accepted tenders, 27th November 1888.

TONS.		£	s.	d.
22,363	Rails, Vignoles section, at 4*l.* 1*s.*	90,570	3	0
563	Fish-plates for do. at 5*l.* 11*s.*	3,124	13	0
199	Bolts and nuts, 3*l.* 10*s.*	2,686	10	0
23,963	Transverse steel sleepers—			
	One half at 5*l.* 59,912 10 0			
	One half at 5*l.* 1*s.* 6*d.* 60,811 3 9			
		120,723	13	9
447	Steel keys for ditto—			
	One half at 5*l.* 1,117 10 0			
	One half at 5*l.* 1*s.* 6*d.* 1,134 5 3			
		2,251	15	3
47,537		219,356	15	0
	Freight on 47,537 tons at, say, 26*s.* 3*d.* per ton	62,392	6	3
	Insurance on 295,000*l.* (219,357*l.* + 10 per cent. = 21,936*l.* + ⅘ths of 62,392*l.* = 49,914*l.*) at 15*s.* per cent. and duty ...	2,249	7	6
		283,998	8	9
	Cost per mile of railway, 300 miles	946	13	3
	Cost per mile of track, 345 miles	823	3	8

London,
5th December 1888.

(Signed) H. W. NOTMAN,
Managing Director.

No. 3.

South Indian Railway.

Villupuram-Dharmavaram Extension lines, 300 *miles.*

		£	s.	d.
No. 1	Total amount for permanent way with 50-lb. bull-headed steel rails and transverse steel sleepers, design B, as per tenders sent in on 30th October 1888 (not accepted)	372,280	11	9
No. 2	Total amount for permanent way with 41¼ lb. steel rails, Vignoles section, and transverse steel sleepers, State Railway pattern, per accepted tenders	283,998	8	9
	Difference in favor of the latter ...	88,282	3	0
	Amount of indent 50-lb. steel rail and transverse steel sleeper ...	321,705	0	0
	Cost of permanent way No. 1	372,280	11	9
	Would have exceeded indent by ...	50,575	11	9
	Amount of indent as above	321,705	0	0
	Cost of permanent way No. 2, as accepted	283,998	8	9
	Saving on indent estimate ...	37,706	11	3

London,
5th December 1888.

(Signed) H. W. NOTMAN,
Managing Director.

Order—dated 18th January 1889, No. 54 R., Public Works.

Communicated to the Consulting Engineer for Railways with reference to Proceedings Nos. 596 R. and 702 R., dated 16th July and 28th August 1888.

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
„ Examiner, Guaranteed Railway Accounts.

Exd. J. Henricus.
Spare Copies

RAILWAY.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated January, 18th.

Recd. *Encl.*

G.O., 18th Jan. 1889, No. 54 R.

JANUARY.

Materials

Despatch from the Secretary of State for India forwarding copy of despatch addressed to the Government of India in regard to supply of — for the railways from Villupuram to Pakal and Tirupati and from Pakal to Dharmavaram, communicated to the Consulting Engineer for Railways.

India Office,
London, 20th December 1888.

Railway,
No. 153.

To His Excellency The Most Honourable The Governor General of India in Council.

MY LORD MARQUIS,

Construction of Railways in Madras for Famine purposes by the South Indian Railway Company.

With reference to paragraph 2 of my Railway Despatch, No. 126, dated 31st October 1888, I have now to inform you that contracts have been entered into by the South Indian Railway Company for the supply of the rails, sleepers, &c., for the railway from Villuparam to Pakal and Tirupati, and from Pakal to Dharmaveram.

2. The cost of the materials will amount to 283,998*l.* 8*s.* 9*d.*, and their despatch will take place so that the first consignment will reach Madras in March next, and the whole will be completed by the end of 1890.

3. It will be recollected that the estimated cost of these stores in the indent was 321,705*l.*, but the actual expenditure has been reduced to 283,998*l.* 8*s.* 9*d.* by the adoption of a lighter rail than that contemplated. The details of the actual, as compared with estimated outlay will be found fully set forth in the accompanying statements supplied to this Office by the Company.

3.

4. After fully investigating the subject, and ascertaining that on other lines, with a considerably larger traffic than can be for some time expected on these famine lines, a 41-lb. rail had been fonnd sufficient, I came to the conclusion that it was proper, on the score of economy, to reduce the weight of the rails from 51 to 41½ lbs., and thus save nearly 38,000*l.* in the first cost of construction.

5. Orders to this effect were consequently passed by me.

I have the honour to be,
My Lord Marquis,
Your Lordship's most obedient humble Servant,
(Signed) CROSS.

17828. I. 2900.

ENCLOSURES.

No. 1.

South Indian Railway.

Villupuram-Dharmaveram Extension lines, 300 miles.

Rails, Steel, 50 lbs. per yard, and Transverse Steel Sleepers, Design B.

Tenders 30th October 1888, not accepted.

Tons.		£	s.	d.	£	s.	d.
27,107	Rails, bull-head section, at 3*l.* 19*s.*				107,072	13	0
1,546	Fish-plates for ditto, at 5*l.* 7*s.* 6*d.*				8,309	15	0
270	Bolts and nuts, at 12*l.* 2*s.* 6*d.*				3,273	15	0
26,406	Transverse steel sleepers, Design B:—						
	One half at 6*l.* 10*s.*	85,819	10	0			
	One half at 6*l.* 12*s.* 6*d.*	87,469	17	6			
					173,289	7	6
607	Steel keys for ditto:—						
	One half at 6*l.* 10*s.*	1,972	15	0			
	One half at 6*l.* 12*s.* 6*d.*	2,010	13	9			
					3,983	8	9
55,936					295,928	19	3
	Freight on 55,936 tons at, say, 26*s.* 3*d.* per ton				73,416	0	0
	Insurance on 385,000*l.* (295,929*l.*, + 10 per cent. = 29,592*l.* + $\frac{4}{5}$ths of 73,416*l.*, = 58,733*l.*) at 15*s.* per cent. and duty				2,935	12	6
					£372,280	11	9
	Cost per mile of railway, 300 miles, 1,240*l.* 18*s.* 8*d.*						
	Cost per mile of track, 345 miles, 1,079*l.* 1*s.* 6*d.*						

HENRY W. NOTMAN, Managing Director.

London, 5th December 1888.

No. 2.

South Indian Railway.

Villupuram-Dharmaveram Extension lines, 300 miles.

Steel Rails, 41$\frac{1}{4}$-lb. and Transverse Steel Sleepers (State Railway Pattern) without Corrugated Clip.

Accepted Tenders, 27th November 1888.

Tons.		£	s.	d.	£	s.	d.
22,363	Rails, Vignoles section, at 4*l.* 1*s.*				90,570	3	0
563	Fish-plates for ditto, at 5*l.* 11*s.*				3,124	13	0
199	Bolts and nuts, 3*l.* 10*s.*				2,686	10	0
23,963	Transverse steel sleepers :—						
	One half at 5*l.*	59,912	10	0			
	One half at 5*l.* 1*s.* 6*d.*	60,811	3	9			
					120,723	13	9
447	Steel keys for ditto :—						
	One half at 5*l.*	1,117	10	0			
	One half at 5*l.* 1*s.* 6*d.*	1,134	5	3			
					2,251	15	3
47,537					219,356	15	0
	Freight on 47,537 tons at, say, 26*s.* 3*d.* per ton				62,392	6	3
	Insurance on 295,000*l.* (219,357*l.* + 10 per cent. = 21,936*l.* + $\frac{4}{5}$ths of 62,392*l.*, = 49,914*l.*) at 15*s.* per cent. and duty				2,249	7	6
					£283,998	8	9
	Cost per mile of railway, 300 miles, 946*l.* 13*s.* 3*d.*						
	Cost per mile of track, 345 miles, 823*l.* 3*s.* 8*d.*						

HENRY W. NOTMAN, Managing Director.

London, 5th December 1888.

No. 3.

South Indian Railway.

Villupuram-Dharmaveram Extension lines, 300 miles.

		£	s.	d.
No. 1	Total amount for permanent way with 50-lb. bull-headed steel rails and transverse steel sleepers, Design B, as per tenders sent in on 30th October 1888 (not accepted) -	372,280	11	9
No. 2	Ditto, ditto, with 41¼ lb. steel rails, Vignoles section, and transverse steel sleepers, State Railway pattern, per accepted tenders - - - - - -	283,998	8	9
	Difference in favour of the latter - -	88,282	3	0
	Amount of indent 50-lb. steel rail and transverse steel sleeper - - - - -	321,705	0	0
	Cost of permanent way No. 1 - - - -	372,280	11	9
	Would have exceeded indent by - -	50,575	11	9
	Amount of indent as above - - - -	321,705	0	0
	Cost of permanent way No. 2, as accepted - - -	283,998	8	9
	Saving on indent estimate - -	37,706	11	3

HENRY W. NOTMAN, Managing Director.

London, 5th December 1888.

Railway
20th December 1888

Copy
Letter to the Govt of India
No 153 + Enclosures

Mr/pw/1122/89

All communications should be addressed to the Secretary.

No. 70 R.C.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

RAILWAY Construction

SECRETARY TO GOVERNMENT
5 FEB. 89
P.W. DEPARTMENT, MADRAS.

T R

Calcutta, the
~~FORT WILLIAM,~~ 28th January 1889.

The undermentioned paper is forwarded to the Secretary to the Government of Madras, Public Works Department for information.

By order,
W Rivett Carnac
Major R.E.
Under Secretary.

Document referred to.

Copy of Railway Despatch No 153 dated 20th December 1888, from the Secretary of State - Villupuram - Dharmavaram Railway - Contracts entered into by the South Indian Railway Company for the supply of rails and sleepers and the reduction of the weights of the rails from 51 to 41½ lbs effecting a saving of £88,000/-

C.S.

Mdu. 1122

Rly 57/89
En 1.
B

No. 140 R dy 4th Feby/89.

Recorded with reference to Paras 2 & 5 of R. dated 18th January 1889.

K.M.
6/2 D.R.

O.M. 473.

Government House,
Madras. 18th Feb. 89.

My dear Jopp.

His Excellency desires me to send you the enclosed copy of a telegram he despatched to the Secretary of State on the 14th Feb., and would be obliged if you will kindly circulate it for the information of his Honorable Colleagues.

Yours Sincerely
J Rees

Colonel K.A. Jopp R.E.
&c &c &c
Chepauk.

despatch December 20th 1888.
eight of Rail from 5 to 4 1/2
inion lamentable and
ent experience in India.
uld now be paying
t had not been for
ke. If possible pray
ct.

10.2.89.

Your Railway despatch December 20th 1888.
Reduction of weight of Rail from 51 to 41½
lbs is in my opinion lamentable and
against all recent experience in India.
South India would now be paying
5 per cent if it had not been for
similar mistake. If possible pray
change contract.

10.2.89.

18th January 1889.

VCJ
DR.
6/2

6/20/2

8/13/2

No. 904 Rd/6.12.86.
" 596 Rd/16.7.88
" 702 Rd/29.8.88
" 54 Rd/18.1.89

Secy
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20 Feb
24/2
Secy H.E. the C in C.
Cdl
26.2.9

Circ. 18 ii 89 C26/ii

PUBLIC WORKS SECRETARIAT,
RAILWAY BRANCH.

Station Ooty date 10 April 1889.

NOTE.

His Excellency the Governor desires information on the subject of this despatch, and this has been written for.

In the meanwhile, I conclude that the despatch may be recorded, but I am not sure of this.

C. J. Smith 1st A.S.

I see no objection
Such record will not prevent subsequent steps if such should appear desirable.

11/4
C. J. S.
11. 4.

Railway.

No. 1.

Telegram from Governor of Madras to Secretary of State, dated 4th February 1889.

Your Railway despatch of 20th December last. Reduction in weight of rail 51 lbs. 41½ lbs. is in my own opinion lamentable, against all recent experience in India. The South Indian Railway would be now paying 5 per cent. if it had not been for similar mistake. If possible pray change contract.

54 R 18-1-89

India Office.
London, 7th March 1889.

My Lord,

Your Excellency's telegram, marginally quoted, was duly received.

2. The weight (41½ lbs.) of the rails for the lines now in course of construction by the South Indian Railway Company was adopted after careful deliberation on the grounds explained in my despatch, No. 153, Railway, dated 20th December 1888 to the Government of India.

3. I would remind Your Excellency that the rails in question are to be made of steel and not of iron, as was the case with the rails originally laid down on the South Indian line; that it

His Excellency,
The Right Honorable,
The Governor in Council,
Fort St. George.

it is understood that the iron of which the latter were made was defective in quality; and that no complaints have been received of the 41 lb. steel rails which have for some time been in use on other metre gauge lines where the traffic is much greater than it can ever be expected to be on the Madras lines between Villupuram and Dharmavaram. Economy, moreover, is a great object in the construction of these lines.

I have the honor to be,
My Lord,
Your Lordship's most obedient,
humble Servant,

Voss.

G.O. No. 756 R. dy 18. 1. 89.
... 702 R dy 25. 8. 88
... 596 R dy 16. 7. 88

No. 211 R dy 12th April 89.

Recorded with reference to Proc: Rs 54 R dy 18th January 89.

C.H.S. 10. 4. 89

No 15

PWC No 30

Railway

7th March 1889

The Letter to Fort St. George No 1

By 2.4.89

Secretary of State for India

B

No. 211 R dy 12th April 89

6TH JULY 1889, No. 756-R., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railways.

Read the following paper:—

From Colonel B. M. PEMBERTON, R.E., Secretary to the Government of India, Public Works Department (Railway—Stores), to the Joint Secretary to the Government of Madras, Railway Branch, Public Works Department, dated Simla, the 17th June 1889, No. 86-R. S.

In continuation of Public Works Department endorsement No. 70-R.C., dated 28th January 1889, I am directed to forward copy of a Despatch No. 39, Ry., dated 18th April 1889, from Her Majesty's Secretary of State for India, together with copy of the Memorandum received therewith, by Sir A. Rendel, K. C. I. E., on the question of the relative economy in the use of light and heavy rails.

2. It will be observed that His Lordship desires that special inquiry may be made on the subject of the substitution of 50 lb. for 41¼ lb. rails on the South Indian Railway which was duly authorized by the Government of India in Public Works Department No. 310-R. C., dated 25th April 1884. I am therefore to request that, with the permission of His Excellency the Governor in Council, a report on the subject may be submitted detailing the exact state of the permanent way on the South Indian Railway at the present time and showing the distribution of the 40⅓, 35½, 41 and 68 lb. rails over the various sections of the line, and the traffic they have to carry, with reasons for the necessity of renewing each kind of rail with 50 lb. rails on the sections where this has been decided upon. A similar report on the sleepers should also accompany and I am to say that the Government of India desires that the question of confining the substitution of the 50 lb. rails for the 41 lb. rails to the more heavily worked sections of the line may be carefully considered in consideration of the high amount of maintenance charges on the South Indian Railway during the past 3 or 4 years referred to in Sir A. Rendel's Memorandum.

3. I am also to invite attention to the remarks under the head "Permanent way" in the Consulting Engineer's Half-yearly Inspection Notes on the South Indian Railway for the two periods of 1886, in the first of which the average renewals are estimated at not less than 50 miles per annum while in the latter the proposed rate of renewals is mentioned as 100 miles per annum. It seems probable that the first remark referred to miles of railway and the latter to miles of rails and I am to inquire whether this is the case and whether there has been any definite programme of renewal, and what considerations have governed the quantity renewed each half-year.

4. As a matter of fact, however, 189¾ miles of line seem, according to paragraph 18 of the Inspection Report for the half year ended 31st December 1888, to

have been actually relaid with 50 lb. steel rail up to the 28th February 1889, which gives an average for 38 months, of about 60 miles of railway per annum.

5. The figures noted on the margin, which have been extracted from the half-yearly Inspection Reports from 1st January 1886, to 20th February 1889, shew the renewals that were carried out during each half year of the period under reference.

Miles of line renewed.

	During half year.	To end of half year.
1st half, 1886	23	23
2nd half, 1886	21½	44½
1st half, 1887	Nil	44½
2nd half, 1887	56½	100¾
1st half, 1888	33½	134¼
2nd half, 1888	31½	165¾
January and February 1889 ...	24¼	189¾

Enclosures.

Despatch from Her Majesty's Secretary of State for India, to the Government of India, dated 18th April 1889, No. 39.

[Memorandum by Sir A. Rendel on light and heavy rails.]

With reference to the questions which have been discussed in recent correspondence as to the advisability of using 41-lb. steel rails for the new lines now being constructed in Madras by the South Indian Railway Company, I transmit herewith, for your Excellency's information, copy of a Memorandum* by Sir Alexander Rendel, K.C.I.E., Consulting Engineer for State Railways, on the relative economy in using 50-lbs., and 41-lbs. rails.

* Dated 19th March 1889.

I have to request, with reference to this memorandum, that the operations on the South Indian Railway Company may be specially inquired into, and that in all cases where new lines have to be laid, or where existing lines have to be renewed, the facts and observations contained in the memorandum may receive due consideration.

Memorandum by Sir A. Rendel, dated 19th March 1889.

I hear rumours of an attack to be made on the light rails hitherto in use on Indian metre gauge railways. That Engineers should have a strong preference for a heavy rail is only natural. We all like—whether Engineers or not—things substantial and strong, specially where the payment for them does not fall on our own shoulders. The real question here, however, is how best to combine economy of capital with economy of revenue. In a wealthy country we can afford to indulge in that subtle form of extravagance which is euphemistically termed "economy in the long run," but in a poor country like India it has always seemed to me that the economy of the moment, which is certain, is the thing to be secured, and that the economy of the future, which is uncertain, had better be left to take care of itself. The American practice, in a word, is to be preferred for India to the English.

The following remarks on the rails used on the Rajputana and South-Indian Railways may at the present moment be of some use.

According to the returns given in the analysis of Working, Appendix 4, there were on the Rajputana Railway on the 30th June 1885, the line being then 1,412 miles long, 1,622 miles of 40-lb. iron rails (811 miles of railway) and 50 miles 36-lb. iron rails (25 miles of railway), and they had then been in the road an average of about 8½ years.

The rest of the line was laid with steel rails, steel having been substituted for iron when the fall in the price of steel admitted of its use. Of this material there were in the road, on the 30th June 1885, 1,494 miles of 41¼-lb. rails (747 miles of railway), of the average age of three years, about 31 miles of 36-lb. rails of the average age of five years, and about nine miles of 50-lb. rails quite new.

By the 30th June 1888, when the length of the line had been increased by amalgamations to 1,664 miles, the length of iron rails in use had been reduced to 1,296 miles of 40-lb. rails, of the average age of about 11½ years; the quantity of 36-lb. iron rails was rather increased; and the length of steel rails amounted to 2,078 miles of 41¼-lb. rails of the average age of six years, 28 miles of 36-lb. rails of the average age of eight years, and 282 miles of 50-lb. rails averaging 1½ years old.

Therefore, during the three years, 326 miles of 40-lb. iron rails were replaced by 273 miles of 50-lb. rails and 53 miles of 41¼-lb. steel rails.

But it must not be supposed that the 326 miles of iron rails thus taken out of the road were of no further use. The chief reason for taking them out was that it had been determined, rightly or wrongly that the traffic of the Rajputana was or would be so great that a heavier rail, which must of course be of steel because iron was no longer manufactured, was or would be necessary to carry it on the sections on which either the gradients or the traffic were heaviest. This heavier rail must obviously be laid in considerable continuous lengths, and to allow of this the old rails must of course be removed in similar lengths. In such cases the old rails after removal are returned to store at a valuation, which is rarely too high, to be re-issued if in good condition, for ordinary maintenance in the parts of the road not laid with 50-lb. rails, or sold if in bad condition. In such good condition were the 326 miles of rails taken up, that I find their store value is stated by the Engineer at no less than three fifths of the value of the rails which replaced them. Allowing for the greater weight of the 50-lb. rail, this valuation implies that the rails which they replaced were as a whole but little worn, and shows that, if the 50-lb. rail had not been introduced, the bulk of them would still be in the road.

The case against even the 40-lb. iron rail on the Rajputana seems, under these circumstances, to be very meagre, and to be wholly non-existent against the 41¼-lb. steel rail. No doubt the heavy traffic of the Rajputana, and the low price of rails for some years past, justified the Government, in a measure, in yielding to the pressure put upon it some five years ago in India, to adopt a 50-lb. rail on, at any rate, its heaviest sections. For my own part I would rather have seen a better sleeper introduced, for it is the sleeper on this line which has in my opinion been the chief cause of trouble, and not the rail. The creosoted fir originally sent out from England for the Rajputana was as bad and short-lived a sleeper as can be laid. But we had then no option. Practically there was no other kind of sleeper available at a reasonable cost. We can do better now, and the sooner we do it the better for the rails, for nothing tends to damage rails, and to shorten their life, more than weak sleepers. The iron rails were also supplied during the last years of the manufacture of iron rails, when quality had fallen to its lowest point, and inspection was beaten by practices little to the credit of the trade. The 41¼-lb. steel rails were very good, and have evidently so far given no trouble. But with all its faults the maintenance of the Rajputana permanent way has not been costly, and even if there has been some extravagance in respect to the 50-lb. rail, as I think there has been both in weight and quantity, it is an extravagance which the traffic on this line can afford, and perhaps justify, and which, if some reasonable check be kept on it in the future, may be readily condoned.

Referring to Analysis of Working No. 8, Table A, and charging the maintenance of the permanent way with half the total cost of "General Superintendence," with the whole of "Maintenance and Renewal of Permanent Way," which includes sleepers and ballast, and with four fifths of "Loss by Exchange," of "Loss on Stores," and of "Freight on Stores," I find that the cost of keeping up the permanent way and ballast on the Rajputana line, including the relaying with 50-lb. rails, averaged, during the three years ending 30th June 1888, Rs. 404 per mile of track per annum, including sidings, Rs. 1·31 per 1,000 gross ton miles moved over the line, and Rs. 5·25 approximately per 1,000 ton miles of net traffic.

I doubt very much if a better account would have been shown had the line been originally laid with 50-lb. steel or iron rails, and we should, of course, have had a much larger capital to pay dividend upon; for it must be remembered that in a the early days of the Rajputana, rails cost on the average, speaking from memory, about 11*l.* a ton in England, whereas the rails, lately bought for the line have not cost on the average more than 4*l.* 10*s.* a ton. The case, in fact, in this respect is curiously illustrative of the superiority of economy in first cost over "economy in the long run."

Turning now to another metre gauge line, the South Indian, I find the following:—

The analysis of working this line for the first half of 1888 is not in my possession, and I can only review the three years ending 31st December 1887.

The length of this line on the 30th June 1885 was 662 miles, and, including sidings, it comprised 721 miles of railway, or 1,442 miles of rail. Of this 364·7 miles of rail were 68-lb. iron, 892·8 miles 40⅔-lb. iron, 41 miles 35½-lb. iron, and 143 miles 41-lb. steel. There were no 50-lb. rails then in use. The 40⅔, 35½, and 41-lb. rails are of the same section respectively as the 40, 36, and 41¼-lb. flat-footed rails of the Rajputana. The 68-lb. rail was of the double-headed pattern sent out and used originally, I believe, on broad gauge lines.

At the end of 1887 the length of the South Indian was the same as in June 1885, but its track had increased (by additions to sidings, I presume) to 726½ miles of railway, equal to 1,453 miles of rail, composed of 343½ miles of 68-lb. iron rail, 726 miles of 40⅔-lb. iron rail, 35½ miles of 35½-lb. iron rail, 143½ miles of 41-lb. steel rail, and 204 miles of 50 lb. iron rail

So that in the interval, 21 miles of 68-lb., 167 miles of 40-lb., and 5½ miles of 35½-lb. iron rail had been taken out. The 41-lb. steel rails remained, in regard to length, as before; but, as 20 miles are said to have been taken out in the three years, new 41-lb. steel rails must have been substituted for them. The iron rails taken out were replaced by 204 miles of 50-lb. steel rails.

At the end of the period I am reviewing, the 68-lb. iron rails were 23 years old, the 35½-lb. iron rails 22¾ years, the 40⅛ rails 11 years, and the 41-lb. steel rails 7½ years. It might be said that the great comparative age of the 68-lb. rail showed the advantage of weight, and, of course, the more the wearing surface the longer the rail should last, but the 35½-lb. rails are of the same age. The age of the latter may, perhaps, be accounted for by their situation, though I suspect the quality of the rails, or of the sleepers on which they are laid, or both, have something to do with it. The 40⅛-lb. iron and the 41-lb. steel rail are about the same age as those of the Rajputana, and I have no doubt their removals have been very largely due to the same cause as on that line, namely, the necessity, if a rail of new and heavier section is introduced, of laying it in continuous lengths, removing of course equal lengths, of the old rails, and placing them in store till required for repairing the old line. It would be found, I suspect, on examining the condition of the rails taken out, that, as in the case of the Rajputana, the bulk of them were in good condition, and that, if the 50-lb. rail had not been sanctioned, the whole or nearly the whole of the 20 miles of 41-lb. steel rail and the bulk of the 40-lb. iron rail removed from the road in the three years would have been in it at the present time.

But why, if the Rajputana was content in three years with 282 miles of 50-lb. rails out of a total of 3,793 miles of rail, or 1 mile in 13½, should the South Indian in the same time require 204 miles of 50-lb. rail, or 1 mile in 7? The South Indian traffic will not account for the difference; for, mile for mile, its gross ton mileage is not more than two thirds or its net ton mileage more than half the Rajputana's, and its gradients are not worse, and its sleepers and its age are very much the same. Unless, therefore, we suppose its 40⅛-lb. iron and 41-lb. steel rails to be of worse quality than those sent out for the Rajputana, it is inconceivable that a 50-lb. rail, if wanted at all, should be wanted more or faster on the South Indian than on the Rajputana.

The results of this lavish relaying will be seen in the following figures. Taking the same items of maintenance charge as in the cases of the Rajputana, I find that the cost of keeping up the rails, sleepers, and ballast of the South Indian for the three years ending December 1887 averaged Rs. 636 per mile of track, Rs. 3·24 per 1,000 gross ton miles of traffic, and, approximately, Rs 16 per 1,000 net ton miles of traffic; that is to say, 58 per cent., 150 per cent., and 200 per cent. respectively more than similar charges on the Rajputana; and 1888 will show, I fear, a still worse comparison, for the difference is worst at the end of the period, and is apparently increasing.

If the 50-lb. rail had not been introduced on the South Indian, these differences, I am satisfied, would have been very much less. It is plain, in fact, that the South Indian neither requires nor can afford this rail. The burden of such a rail, if it be confined, as I hope and expect it will be, to the heavier portions of the road, may pass unfelt on lines with a traffic like the Rajputana. On lines like the South Indian it is a burden which, in my opinion, they should not be called on to bear.

My conclusion, therefore, on this question, as regards the Rajputana and South Indian Railways, is that, so far as the 40-lb. iron rail has failed, which is not very far, the failure is mainly due to the quality of the rails and the character of the sleepers; that the 41-lb. steel rail has not failed at all, and meets all the reasonable requirements of even the Rajputana; that a 50-lb. steel rail is condonable on parts of the Rajputana, and on any part, if there be any, of the South Indian which has an equal traffic, but that its general introduction on the South Indian has been the result of a prejudice which has induced a faulty diagnosis, and led to a remedy which is worse than the disease.

ORDER—dated 6th July 1889, No. 756 R., Public Works.

Communicated to the Consulting Engineer for Railways for report.

(True Extract.)

(Signed) C. J. SMITH, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

RAILWAY.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated July, 6th.

Recd.

Encl.

G.O., 6th July 1889, No. 756-R.

JULY.

Materials.
South Indian Railway.

Letter from the Government of India forwarding opy of Despatch from the Secretary of State with a Memo. by Sir A. Rendel on the relative economy n the use of light and heavy rails and requesting to ake a special report on the substitution of the 50 lb. r 41¼ lb. rails on the————————also to report on ne present state of the permanent way of that line.— ommunicated to the Consulting Engineer for Rail- ays for report.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers :—

From the Consulting Engineer for Railways, dated Madras, 8th March 1890, No. 168.

From the Consulting Engineer for Railways, dated Madras, 11th April 1889, Circular No. 692.

I have the honor to request that I may be favored with any information you may have on record bearing on the durability of any 41¼ steel rails that have been laid in the lines under your control.

2. It is desired to ascertain what may fairly be reckoned the life of such a rail as compared with that of a 40-lb. iron rail under the same traffic.

3. I shall be obliged if you will inform me whether in your opinion the 41¼ steel rail, is at present prices, as economical in the end as a 50-lb. rail for that section of your line on which you have the least traffic, and that you will kindly state approximately what that traffic amounts to.

4. I write on the assumption that your views have probably been already expressed on the subject and that you can refer me to information already on record.

To the Agent and Chief Engineer,
Southern Mahratta Railway, Dharwar.
„ Agent, Bombay-Baroda and
Central India Railway, Bombay.
„ Manager, Bengal and North-Western Railway, Lahore.
„ Manager, Eastern Bengal Railway, Calcutta.
„ Manager, Tirhoot State Railway, Mozufferpore.

From the Manager and Engineer-in-Chief, Tirhoot State Railway, to the Consulting Engineer for Railways, Madras, dated Mozufferpore, 27th April 1889, No. 2447.

[*Maintenance—Permanent-way.*]

In reply to your Circular No. 692, dated 11th April 1889, I have the honor to state as follows.

2. About 80 miles of 40-lb. iron rails were laid in this line between 1874 and 1876.

3. The majority of these rails have already been renewed, and the remainder are rapidly wearing out, giving an average of under 15 years as the life of these iron rails. The average traffic over them amounted to three trains daily each way.

4. The 40-lb. steel rails, of which we now have about 220 miles, were laid since 1882, and show very little signs of wear. I expect their life will prove to be between 20 and 25 years. All renewals are now being carried out as far as possible with 50-lb. steel rails, which, in my opinion, will be found far more economical in the end.

5. The tendency at present is to increase both the speed and the weight of metre-gauge engines and stock, and I believe that in a few years a 50-lb. rail will be found absolutely necessary to carry the increased weight.

From the Agent and Chief Engineer, Bengal and North-Western Railway Company, to the Consulting Engineer for Railways, Madras, dated Gorakhpur, 7th May 1889, No. 4 P.

In reply to your No. 692, dated 11th April 1889, I have the honor to offer you the following remarks.

2. The rails on this line have not been sufficiently long in use to enable more accurate information of their durability to be supplied. The few 40-lb. iron rails that have been used on this railway, and which were obtained from the Tirhoot State Railway, have proved quite unequal to resisting the wear and tear of our heavy engines over them; some of these rails became unfit to remain in the road, in less than 18 months, whilst the best of them will not have a longer life than five years. I am of opinion, however, that these rails were made of bad material.

3. As regards the wear and tear of the 41¼-lb. steel rails, this has so far been satisfactory. I should say it would be impossible to tell at present whether it would prove to be more economical in the end to have laid 50-lb. instead of 41¼-lb. rails in the first place.

From the Manager, Eastern Bengal State Railway, to the Consulting Engineer for Railways, Madras, dated Sealdah, Calcutta, 17th May 1889, No. 1324 M.

In reply to your Circular No. 692, dated 11th April 1889, I have the honor to give you the following information regarding the metre-gauge lines in this system, though I do not think it will throw any light on the comparison between the life of a 41¼-lb. steel rail and a 40-lb. iron rail.

2. I have three separate metre-gauge lines, the accounts of which are kept distinct:—

(*a*) Northern section, 281 miles, with a traffic averaging 211 rupees a mile a week for the whole year 1888, laid with 40-lb. iron rails 11 years' old at the end of 1888. Heavy F class engines run over this not only with goods trains but with a daily mail at high speed. These rails are too light for this traffic and these engines. They are now being replaced by 50-lb. steel rails.

(*b*) Assam-Behar section, 38 miles, with a traffic averaging 90 rupees a mile a week for the whole year 1888. This is laid with 41¼-lb. steel rails, which were only one year old at the end of 1888. No opinion can therefore be formed of their durability. There are at present no F class engines on this section. So long as they are not required, and the traffic and speed are moderate, this weight of rail should be sufficient, and would be the best rail to lay if a heavy traffic was never anticipated.

(*c*) Dacca section, 86 miles, with a traffic averaging 66 rupees a mile a week for the whole year 1888. This is the lightest traffic on any section of my metre-gauge lines. It is a very poor traffic, and does little more than pay its working expenses. It is laid with 41¼-lb. steel rails, which were three years' old at the end of 1888. The same remarks apply to this section as to the Assam-Behar section, see above.

3. In my opinion a 41¼-lb. steel rail would be good enough for a short branch line which was never likely to carry a heavy traffic. For such a line I think a 41¼-lb. steel rail would be more economical than a 50-lb. steel rail. But nothing less than a 50-lb. steel rail should, I think, be laid on a main line where a high speed and good traffic may be looked for.

4. I have a branch line, 36 miles long, on the 2′ 6″ gauge laid with 25-lb. and 30-lb. iron rails. This line does a small traffic mainly in cooly passengers *en route* to Assam, though it also carries a little goods traffic. The rolling stock is of the tramcar type, of a very good pattern. If you should desire any further information regarding this line, I shall be happy to furnish it.

From the Agent, Bombay-Baroda and Central India Railway, including Rajputana-Malwa Railway, to the Consulting Engineer for Railways, Madras, dated Bombay, 28th June 1889, No. 7809 W.

With reference to your Circular No. 692 of 11th April 1889, I have the honor to forward herewith a copy of a letter No. 3256 of 19th June 1889, from the Engineer-in-Chief of the Rajputana-Malwa Railway, regarding the durability of rails.

2. You will observe that the 41¼-lb. steel rails have not been in the road sufficiently long to enable any accurate comparison with iron rails to be made.

ENCLOSURE.

Copy of letter No. 3256, dated 19th June 1889, from the Acting Engineer-in-Chief, Rajputana-Malwa Railway, Ajmere, to the Agent, Bombay-Baroda and Central India and Rajputana-Malwa Railway, Bombay.

[*Subject.*—Life of Rails.]

In reply to your No. 4915 W., dated 23rd April 1889, forwarding a communication from the Consulting Engineer for Railways, Madras, regarding above, I have the honor to report that the average *age* of 41¼-lb. steel rails on the Abu Division, where this class of rail is oldest, is at present only 8·63 years. I think we may fairly hope that the average life of the rails will be at least double this.

2. The average age of 40-lb. iron rails taken out of the road during second half 1888 on the Bandikin Division, on which these rails are oldest, was 13·45 years, and of those left in the road 13·70 years at end of the half-year. Our statistics show that the average age of the rails both taken out and left in the road are still increasing, and therefore we have not yet arrived at what the average life of our iron rails will be.

3. The 41¼-lb. steel rail is certainly quite up to light traffic, such as we have on our Sindia-Neemuch section where three trains are run daily each way at a through speed of 12 to 14 miles an hour—weight of trains 200 tons including engine. This with reference to para. 3 of the enclosure to your letter.

From the Agent, Bombay-Baroda and Central India Railway including Rajputana-Malwa Railway, to the Consulting Engineer for Railways, dated Bombay, 19th November 1889, No. 13668 W.

I have the honor to forward copy of a letter from the Acting Engineer-in-Chief of the Rajputana-Malwa Railway, No. 4993 of 10th September 1889, and its accompaniment, which furnishes the information asked for in your No. 1461 of 22nd August 1889. I have added two brief notes in the margin.

ENCLOSURES.

Copy of a letter No. 4993, dated 10th September 1889, from the Acting Engineer-in-Chief, Rajputana-Malwa Railway, Ajmere, to the Agent, Bombay-Baroda and Central India Railway.

Relative economy in the use of light and heavy rails.

In acknowledging receipt of your No. W. 10361 of the 27th August last, forwarding, in original, with its enclosure, letter No. 1461 of 22nd August 1889, from the Consulting Engineer for Railways, Madras (herewith returned), and with reference to certain inquiries therein made by the Consulting Engineer, I have the honor to state that the price of second-hand 40-lb. rails was based on the market value at the time of new 40-lb. rails less estimated depreciation; this gave a rate of Rs. 66-3-0 per ton, and for the unserviceable rails fit for structural purposes Rs. 40-12-0 per ton. Of the rails taken out of the road, the proportion of serviceable rails fit for main line to the unserviceable ones was 3 to 1*.

* Or ¾ of the whole.
(Intld.) W.S.S.B.

2. If the 50-lb. rails had not been introduced on this line, I think we may assume that about 70 per cent. of the rails taken out would now be in the road. The percentage of renewals of these rails at the time the relaying with 50-lb. steel rails was commenced was 1·59 miles of rails per annum.

3. A statement showing the cost under the usual sub-headings of keeping up the permanent-way and ballast on this railway during the three years ending 30th June 1888 is herewith sent as requested

I would draw your attention to a mistake that has been made by Sir. A. Rendel. The Rs. 404 quoted in para. 9 of his memorandum of 19th March 1889 is the cost of maintenance for six months and not for one year as therein stated.

4. With reference to the inquiry contained in para. 4 of the Consulting Engineer's letter, I am of opinion that the past experience has shown that the 40-lb. iron rails thus taken out could be accepted as suitable for branch lines where traffic is light and does not exceed, say, 2 or 3 trains † a day each way.

† I would say up to 4 trains a day each way.
(Intld.) W.S.S.B.

BOMBAY-BARODA AND CENTRAL INDIA RAILWAY INCLUDING RAJPUTANA-MALWA RAILWAY.

STATEMENT showing the cost under the usual sub-headings of the cost of keeping up the permanent-way and ballast on the Rajputana-Malwa Railway during the three years ending 30th June 1888.

REFERENCE TO REVENUE ACCOUNTS.		Details.	HALF-YEAR ENDING 31ST DECEMBER 1885.		HALF-YEAR ENDING 30TH JUNE 1886.		HALF-YEAR ENDING 31ST DECEMBER 1886.		HALF-YEAR ENDING 30TH JUNE 1887.		HALF-YEAR ENDING 31ST DECEMBER 1887.		HALF-YEAR ENDING 30TH JUNE 1888.	
Table and main head.	Sub-head.		Per mile of line maintained. (1412·32)	Per mile of track including siding. (1603·61).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1889·74).	Per mile of line maintained. (1538·94).	Per mile of track including siding. (1748·34).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1889·74).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1896·645).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1896·816).
Table IX.		*Maintenance and renewals of Permanent-way.*	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
A-2 ..	1 ..	Wages	171·52	151·06	135·13	121·66	158·21	139·26	144·87	127·13	127·13	133·46	133·46	117·10
	2 ..	Materials { Rails .. .. Ballast .. .. Sleepers	283·62	249·79	129·47	114·03	227·91	200·61	228·31	200·36	227·93	227·93	200·01	
		Total ..	455·14	400·85	264·60	235·69	386·12	339·87	373·18	327·49	361·38	361·38	317·11	
A-1 ..	1 to 6 ..	Half the total cost of general superintendence	..	..	..	..	..	..	..	..	..	..	..	..
A-7 ..	3 ..	Four-fifths of loss by exchange	..	52·095	..	45·65	..	46·705	..	43·34	..	..	43·37	..
	4 ..	Four-fifths of loss on stores	..	..	..	..	..	..	..	..	..	..	..	..
	5 ..	Four-fifths of freight on stores	..	0·424	..	0·016	..	0·376	..	1·576	..	..	..	0·12
			..	32·192	..	23·232	..	27·528	..	28·12	..	..	..	33·648
		Total ..	..	485·661	..	304·588	..	413·727	..	400·526	..	..	394·948	

Average during the three years ending 30th June 1888—

1603·61 × 485·561 = 778650·47521
1607·49 × 421·087 = 676893·14163
1748·34 × 418·727 = 723335·46318
1889·74 × 304·588 = 575592·12602
1896·645 × 400·526 = 759655·63527
1896·816 × 394·248 = 747815·91436

10642·641 778650·47521 = Rs. 400 per mile of track per half-year including sidings.

10642·641

(Signed) W. HARVEY,
Acting Engineer-in-Chief.

From the Agent and Chief Engineer, Southern Mahratta Railway Company, to the Consulting Engineer for Railways, Madras, dated Dharwar, 10th December 1889, No. 2133.

I must apologize for being so long in replying to your queries in regard to 41¼ steel rails.

2. Those which have been longest on the road are on the Bijapur branch; they were laid in 1883 and have had to be renewed as follows:—

1884	0	1887	46
1885	5	1888	87
1886	16	to 31st August 1889	97

The rails have almost all been found broken or split.

3. This amounts to nearly half-a-mile of rails out of 173½ in 6½ years.

4. I am of opinion that 41¼-lb. steel rails are too light for the engines (32-ton) used, and speed of trains. Not only are the rails destroyed, but the cost of maintenance is either increased or the road is maintained in bad order; the comparative ease with which a road with heavier rails is maintained is shown on the Braganza Ghât where the West of India Portuguese Railway and this line are laid with 50-lb. rails.

5. In considering the question of light as compared with heavy rails it should be borne in mind that light rails affects the wear and tear of rolling stock even more than the wear and tear of the permanent-way.

6. It is sometimes suggested that it is better to add to the number of sleepers (say 11 instead of 9 sleepers to a 24-feet rail), but this would come to about the same cost (see comparative estimates attached) and would not give, in my opinion, so good or so durable a road.

7. I have not been called upon to give my opinion on the subject before nor have I found it necessary to make any report on the subject; it was necessary that the capital outlay on these lines should be as low as possible, and the question of using 41-lb. rails was accepted from the outset as settled.

ENCLOSURE.

COMPARATIVE cost of Permanent-way per 23′ 9½″ (8 metre) pair of rails.

41¼-lb. rails with 11 wooden sleepers per pair of rails.

	RS.	A.	P.
Cost of pair of rails	24	12	0
,, 11 sleepers	27	8	0
,, 4 No. fish-plates	0	12	3
,, 8 No. fish-bolts	1	1	5
,, 44 No. dog spikes ...	1	9	6
,, 22 bearing plates ...	0	2	4
Total ...	55	13	6

50-lb. rails with 9 wooden sleepers.

	RS.	A.	P.
Cost of pair of rails	30	0	0
,, 9 sleepers	22	8	0
,, 4 No. fish-plates	0	15	9
,, 8 No. fish-bolts	1	1	5
,, 36 dog spikes	1	5	0
,, 18 bearing plates ...	0	1	10
Total ...	56	0	0

From the Chief Engineer, to the Agent, South Indian Railway, dated Trichinopoly, 10th January 1890, No. C. 60.

Your No. 10216/1225 of the 16th July last.

I enclose herewith a tracing showing—

1*stly*.—The different kinds of permanent-way laid upon the various sections of the line when originally opened for traffic.

2*ndly*.—The same information at the end of the year 1883, that is, about 2½ years previous to the introduction of the 50-lb. rails.

3*rdly*.—The same information at the end of the year 1888.

4thly.—The same information when the 50-lb. material already arranged for shall have been laid. Also statements A and B in manuscript showing the length of main line and sidings and the material with which laid at the end of the years 1883 and 1888, respectively.

2. *Rails.*—Allusion is made in the 2nd paragraph of Colonel Pemberton's letter, dated Simla, 17th January 1889, No. 86 R.S., to 35½ lb., 40⅓ lb., 41 lb., and 68 lb. rails. In this report I allude to both 40⅓ lb. (iron) and 41 lb. (steel) under the one designation of 40-lb. rails, as on the introduction of the 41-lb. steel rails they were used indiscriminately (with one exception) with iron rails for renewals, the one exception being the Chingleput-Conjeeveram Branch on which 41-lb. steel rails were originally laid throughout when this branch was constructed.

3. The 50-lb. rails were first introduced in the year 1886, at which date we had practically no new rails of any description in stock, and were dependent on the material released by the introduction of the 50-lb. rails for renewals on those lengths laid with other rails, viz., 35, 40, and 68 lb.

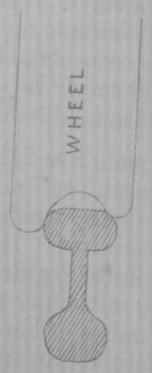
4. The heavy stone traffic for the Madras Harbour Works over the first 13 miles of the line (Madras to Pallávaram) causing continuous and heavy renewals of the 40-lb. rails, the 50-lb. rail was substituted, and as the 40-lb. rails were rapidly wearing out, the substitution was continued on to Chingleput, a further distance of 23 miles.

5. On the 45th and 46th miles, where the line was lowered to form a causeway over which extraordinary floods might pass, the opportunity was taken to substitute 50 for 40-lb. rails, first, as being much more suitable for such a situation, and next because the substitution could be more economically and properly done, while the traffic was being carried past the place on a deviation of the line and there was nothing to interrupt the work.

6. Similarly, on the occasion of other alterations in the way and works necessitating temporary diversions from the main line, the opportunity was taken to substitute 50-lb. rails, and this accounts for the number of isolated points at which the change was made. The other and more continuous lengths were selected chiefly because of the worn state of the rails there, or because of the proximity to the port of supply and the necessity for releasing a stock of unexpended 40-lb. rails for renewals elsewhere over the line.

7. For instance, the lengths of line between Madura and Kaligudi (345 to 365 miles) and between Tataparai and Tuticorin (435 to 444 miles) were renewed with 50-lb. rails, partly because a great number of the 40-lb. rails were in a very bad state and required immediate removal, and partly because the southern portion of the line was in emergent want of stock of 40-lb. rails to maintain it in a safe condition.

8. Again, on the only part of the main line on which the 68-lb. rails existed, Tanjore to Trichinopoly (218 to 250 miles), it was deemed expedient to substitute the 50-lb. rails, partly to get 68-lb. rails for renewals elsewhere, and partly to provide a rail with a section nearer to the 40-lb. one in order to prevent undue wear and tear on wheel tyres and on the heavy rail. It is found that the tyres of engines and carriages get worn hollow (see marginal sketch) by running on the narrow 40-lb. rail head, and when these hollowed tyres run on the broad 68-lb. rail, the effect is that the outside edge of the tyre travels on the outside edge of the rail to the detriment of both, the outside of the rail getting crushed and cut away. By taking out this length of 68-lb. and substituting 50-lb. rails, a nearer approach to similarity of rail section is obtained and injury to tyre and rail avoided.



9. The 35-lb. iron rail on the Arkónam Branch was replaced by the 50-lb. steel rail because, in my opinion, the 35-lb. rail had become unsafe under the existing weight of engines and traffic. This part of the line was originally laid in 1865 with very sharp curves as a tramway along the public road, and never during 16 years had any traffic worth mentioning to try it.

The normal traffic on this isolated piece of tramway consisted of two short trains a day, one each way with small light vehicles and engines.

10. After it became part of the South Indian Railway, and heavier engines and trains began to work over it, the result was that the 35-lb. rails went so rapidly that it was found necessary to remove them to guard against accident. For example, on the 9th September 1887 one of these 35-lb. rails crushed in for about 10 feet of its length owing to want of strength in the vertical web.

The foot or bottom flange of these rails was also found to yield and turn up at the ends and edges.

They were laid on teakwood sleepers.

11. With reference to the steel 41-lb. rails, the line between Chingleput and Conjeeveram (20 miles) was laid with them throughout when the branch was made in 1880-81. These rails have stood well, but they have not been tried by traffic nearly so heavy as on the main line. There were 67 miles of these rails sent out from England, the balance after laying the Chingleput-Conjeeveram—length of 27½ miles of line and sidings—was used in ordinary repairs, here a rail and there a rail, as occasion required, and I have no record of where they are laid, a steel rail being simply substituted for an iron one when the latter was worn out.

Of the 41-lb. steel rails removed from the line by the substitution for the 50-lb. ones, most are in good order after having been in the road for about 5 years.

12. In every case the programme for the substitution of the 50-lb. rail was thought and laid out beforehand with the greatest care and endeavour to avoid all unnecessary expenditure.

13. *Sleepers.*—The 40-lb. rails are laid on creosoted pine sleepers which rapidly decayed, and although there are about 147,482 equal to 83 miles of used sleepers reported in stock available for renewals, many of these sleepers are much cracked, cut into by the rail-foot and pierced with old spike holes and are deteriorating while in stock almost as much as those laid in the line. I do not think we can safely estimate the average life of the creosoted sleepers in stock and in the line at more than 2 years. It is even doubtful if this average life will be attained, for when sleepers have been in use in the line they get cut into by the flat foot of the rails and pierced by the spikes in such a manner as to render them not very fit for renewals.

They are only from 6′ to 6′ 6″ long, so that there is but little space for shifting the rails into fresh places where the original ones become damaged or worn.

14. The time has come therefore when we must elect whether to hold to the 40-lb. or to the 50-lb. rail for future renewals, for it would be manifestly unwise to purchase new sleepers (hard wood or iron) to lay under a rapidly-wearing-out rail which the new sleepers would long outlive to become useless if renewals with a 40-lb. rail were not continued, while if we do not pursue this course and do not continue to renew with 50-lb. permanent-way, we shall before long arrive at a stage where the rails at present in stock will have outlived the stock of sleepers available for maintenance. Under the circumstances and with a line possessing the considerable and steadily increasing traffic of the South Indian Railway, it would surely be unwise not to take the opportunity of replacing the lighter by a heavier and more durable rail.

15. Up to 31st December 1889 there have been laid into the main line 212 miles of 50-lb. bull-headed steel rails, and deducting this from the length (445 miles) of main line laid with 40-lb. rails between Madras and Tuticorin, there remains 233 miles of 40-lb. permanent-way for which 50-lb. rails have to be substituted. It would therefore, in my opinion, under existing circumstances be well within the requirements of the case to continue to relay with 50-lb. rails at the rate of 50 miles per annum. If this is not done we shall probably have to purchase a large number of hard-wood sleepers (teak or pingadu) wherewith to maintain the line in safety as the creosoted pine ones decay. It will soon be seen whether I have over or under estimated the life of the 40-lb. permanent-way still in the line; if overestimated, 50 miles of 50-lb. road per annum will not suffice for the upkeep of the line, if underestimated, the relaying can be diminished or stopped for a time.

16. Referring to Sir A. Rendel's remarks on the estimated value at which rails returned to stock are credited, my experience is that in this as in most cases of

returned stores the materials are liable to be much overpriced. For some time we valued our second-hand rails fit for renewals at Rs. 56 per ton, the rate at which we sold considerable quantities of the useless and worn-out rails, but lately it was decided in a Committee of Government and Railway officers to assess the value of used rails at only half that rate, and our stock of useable rails is now valued at only Rs. 26 per ton. To judge of the present value of any article by the price put upon it when returned to stores would, according to my experience, be most misleading, the tendency almost always being to overprice, seeing that the department returning it is usually anxious to be credited with the highest value obtainable.

17. With reference to Sir A. Rendel's assumption that, on examining the condition of the rails taken out of the line, the bulk of them would be found in good condition, and that if the 50-lb. rail had not been sanctioned, the whole, or nearly the whole, of the 20 miles of 41-lb. steel rail and the bulk of the 40-lb. iron rails removed from the road in the 3 years would have been in it at the present time, he is correct concerning the steel rails, but in error as regards the 40-lb. iron rails. Most of the steel rails are in stock and are being drawn upon for renewals; they would not have been taken out of the line had they not been mixed up with the 40-lb. iron rails as described above (in para. 11 *ante*). With reference to the 40-lb. iron rails, it is true that at the present moment we have accumulated a considerable stock of these, but it was absolutely necessary to accumulate a stock to provide for the maintenance of the 40-lb. road. At one time before this was accomplished the 50-lb. permanent-way came forward from England more slowly than I anticipated, and we were put to such straits owing to want of 40-lb. rails to keep the line in safe running order that I had to strip many of the stations of the serviceable rails in sidings, substituting worn ones to procure what was required. It is so far a matter of opinion and estimate of which those on the ground may probably be allowed to be the best judges, whether or not a larger stock of 40-lb. rails has been removed from the line and placed in stock than is necessary, but there can be no doubt whatever that the measures taken were adopted after very careful consideration and with the desire of all concerned to avoid all unnecessary expenditure.

ENCLOSURES.

A.

SOUTH INDIAN RAILWAY.

ENGINEER DEPARTMENT.

STATEMENT showing length of Rails and Sleepers as laid on 31st December 1883, distinguishing Main Line from Sidings.

	IRON POT ROAD.	WOODEN SLEEPER ROAD.					TOTAL.
		Weight of iron rails.			Weight of steel rails.		
	68 lb. per yard.	68 lb. per yard.	40·3 lb. per yard.	35·5 lb. per yard.	41 lb. per yard.	32 lb. per yard.	
Main Line.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.
Madras to Tuticorin	13 71 0	15 68 0	392 48 53	..	23 11 3	..	445 38 56
Branches.							
(1) Arkónam	..	..	..	18 20 50	20 67 55	..	39 8 5
(2) Pondicherry (Villupuram to Gingee river)	..	..	16 20 0	..	..	..	16 20 0
(3) Negapatam	24 31 89	23 72 11	..	..	..	..	48 24 0
(4) Erode	86 77 92	..	..	..	0 18 54	..	87 16 46
(5) Tinnevelly	..	..	17 72 84½	..	0 18 15½	..	18 11 0
Total ..	125 20 81	39 60 11	426 61 37½	18 20 50	44 35 27½	..	654 38 7
Sidings.							
Main line	0 9 51	3 20 75	34 27 18	..	6 62 67¾	..	44 40 11¾
Arkónam Branch	..	..	..	2 30 80	0 59 77	..	3 10 57
Pondicherry Branch	..	..	0 42 23¾	..	0 5 21	0 1 73	0 49 17¾
Negapatam do.	0 24 13	7 53 69	0 6 30	..	..	..	8 4 12
Erode do.	4 70 76	0 65 46	..	..	..	..	5 56 22
Tinnevelly do.	..	..	1 71 50	..	0 0 66	..	1 72 16
Total ..	5 24 40	11 59 90	36 67 21¾	2 30 80	7 48 31¾	0 1 73	63 72 36½
Grand Total, Main Line and Sidings ..	130 45 21	51 40 1	463 48 59¼	20 51 30	52 3 59¼	0 1 73	718 30 43½

TRICHINOPOLY,
10th January 1890.

(Signed) D. LOGAN,
Chief Engineer.

B.

SOUTH INDIAN RAILWAY.

ENGINEER DEPARTMENT.

STATEMENT showing length of Rails and Sleepers as laid on 31st December 1888, distinguishing Main Line from Sidings.

	STEEL TRANSVERSE SLEEPER ROAD.	IRON POT ROAD.				WOODEN SLEEPER ROAD.								TOTAL.			
	Weight of iron rails.	Weight of iron rails.		Weight of steel rails.		Weight of iron rails.				Weight of steel rails.							
	40·3 lb. per yard.	68 lb. per yard.		40·3 lb. per yard.		68 lb. per yard.		40·3 lb. per yard.		41 lb. per yard.		50 lb. per yard.					
Main Line.	M. CH. LKS.	M. CH. LKS.		M. CH. LKS.		M. CH. LKS.		M. CH. LKS.		M. CH. LKS.		M. CH. LKS.		M. CH. LKS.			
Madras to Tuticorin	5 63 29	15 41 20		6 29 21		..		..		..		143 17 67½		173 57 66½			
Branches.																	
(1) Arkónam	..	..		..		..		..		..		16 72 36		16 72 36			
(2) Pondicherry (Villupuram to Gingee river)	..	..		..		..		..		..		0 13 69		0 13 69			
(3) Negapatam	..	19 19 0		..		..		..		..		10 55 0		10 55 0			
(4) Erode	..	86 77 92		..		..		..		..		..		..			
(5) Tinnevelly	..	..		..		..		..		..		..		..			
Total ..	5 63 29	121 68 12		6 29 21		..		..		..		169 78 62½		32			
Sidings.																	
Main Line	0 55 99	0 12 73		0 4 61		..		..		..		3 43 32		3			
Arkónam Branch	..	..		..		..		..		..		0 9 32					
Pondicherry Branch	..	..		..		..		..		..		..					
Negapatam do.	..	1 63 90		..		..		..		..		0 6 40		6			
Erode do.	..	4 77 72½		..		..		..		..		..		0			
Tinnevelly do.	..	..		..		..		..		..		..					
Total ..	0 55 99	6 74 35½		0 4 61		..		..		..		3 59 4		10			
Grand Total, Main Line and Sidings ..	6 39 28	128 52 47½		6 33 82		..		..		..		173 57 66½		42			

(Signed) D. LOGAN,
Chief Engineer.

TRICHINOPOLY,
10th January 1890.

C.

SOUTH INDIAN RAILWAY.

STATEMENT showing the Number and Mileage of Trains run during the year 1889.

Section.		Mileage of section.	Number of trains.	Mileage.	AVERAGE PER DAY. Number of trains.	AVERAGE PER DAY. Mileage.	Average mileage per train per day.
Madras-Chingleput ..	Special ..	34½	2,618	49,875½	7·17	136·64	19·05
	Ordinary ..	..	..	..	11·00	308·00	28·00
Chingleput-Cuddalore Old Town ..	Special ..	92¾	1,341	82,354	3·67	228·37	62·22
	Ordinary ..	..	..	..	6·00	556·50	92·75
Cuddalore-Trichinopoly ..	Special ..	121¼	1,106	74,452¼	3·03	203·98	67·32
	Ordinary ..	..	..	..	6·00	634·50	105·75
Trichinopoly-Madura ..	Special ..	96	1,143	96,157½	3·13	263·44	84·16
	Ordinary ..	..	..	..	6·00	576·00	96·00
Madura-Tuticorin ..	Special ..	99	1,230	106,701¼	3·37	292·33	86·74
	Ordinary ..	..	..	..	4·00	396·00	99·00
Arkónam Branch ..	Special ..	39	405	8,899	1·10	24·38	22·17
	Ordinary ..	..	..	..	4·00	121·00	30·25
Pondicherry Branch ..	Special ..	24¼	611	14,630¾	1·68	40·08	23·85
	Ordinary ..	..	..	..	4·00	97·00	24·25
Negapatam Branch ..	Special ..	48	384	14,542½	1·05	39·84	37·94
	Ordinary ..	..	..	..	8·00	384·00	48·00
Erode Branch	Special ..	87¼	1,905	43,699¼	5·21	119·72	22·98
	Ordinary ..	..	..	..	8·00	359·00	44·87
Tinnevelly Branch ..	Special ..	18¼	95	1,734	·26	4·75	18·26
	Ordinary ..	..	..	..	8·00	146·00	18·25

NOTE.—During no portion of the year were the Harbour stone trains working to the full extent—1,200 tons per day.

(Signed) W. S. BETTS,
Agent.

TRICHINOPOLY,
22nd February 1890.

Extract from Inspection Report of the South Indian Railway for half-year ended 31*st December* 1885.

Permanent-way.—The permanent-way is in good running order throughout, and the station yards are generally well maintained. Between Madras and Pallávaram, where the traffic has for many years been heavy in connection with the Madras Harbour, the rails and sleepers are wearing out rapidly, and this length should be laid, as soon as possible, with the new permanent-way, consisting of 50-lb. bull-head rail with deep fish-plates on cast-iron pots. A commencement has been made in laying this at Madras, Chingleput, Tanjore and Negapatam; but as the work has to be done between trains, progress is slow, only four or five rail-lengths being done in a day on each face. Special arrangements should be made for expediting the work between Madras and Pallávaram, and I understand that the Chief Engineer concurs in this view.

Extract from Inspection Report of the South Indian Railway for half-year ended 30*th June* 1886.

[This inspection was made between 12th and 22nd July 1886.]

Permanent-way.—The permanent-way shows signs of deterioration. Between Madras and Chingleput this is very marked, and on other sections the line is not, in my opinion, in such good order as on the last inspection. Renewals are being made with the new 50-lb. rails on pot-sleepers, but greater progress is necessary to enable the line to be kept in good running order. The works generally show signs of insufficient personal inspection by Engineers. During the last eighteen months much extra work has been thrown upon all grades, and this has prevented that strict attention to details which is necessary to insure a line being kept up to a high standard. Unless renewals are pushed more vigorously now, a time will arrive when the powers of the staff in this direction will be very severely taxed. The total length of line originally laid with 40-lb. iron rails is 474 miles, of which about 34 miles have been renewed with steel rails of the same

weight. The length of 50-lb. permanent-way laid up to date is 23 miles, so that 57 miles in all have been renewed. The average age of iron rails now in the line is 10 years, and probably all will have to be renewed within the next seven years. The average renewals therefore cannot be taken at less than 50 miles per annum. The wooden sleepers between Negapatam and Trichinopoly, which have been down 23 years, must soon be renewed, and the rails on this length have seen their best days, though with the heavy section (68 lb.) they will not go so rapidly as the lighter ones.

Extract from Inspection Report of the South Indian Railway for half-year ended 30th June 1887.

2. *Permanent-way.*—The permanent-way, considering the heavy renewals in progress, is generally in good order. The new 50-lb. road and much of the old 40-lb. road is as good as it could be made. Portions of it, however, between Vikravándi and Shiyáli and the Pondicherry branch, fell short of the standard attained elsewhere, and should receive special attention.

3. Considerable inconvenience and some extra cost to the Company has been caused by some of the 50-lb. material being sent out *viâ* the Cape instead of by the Canal as was anticipated, and therefore arranged for out here. It has been necessary on this account to send 40-lb. material removed from the Madras end to the line in the neighbourhood of Madura for renewals there, and the programme for the distribution of the 50-lb. way, carefully thought out and embodied in a printed manual issued by the Chief Engineer for the use of the district staff, has been upset.

4. The condition of the 40-lb. road and the heavy renewals still called for continue to justify the forecast of the Chief Engineer as to the Engineering staff and permanent-way material that would be necessary to maintain the line for the next few years.

Submitted to Government with reference to G.O., No. 756 R., dated 6th July 1889.

2. It will be seen that the most favorable verdict on the 40-lb. rail is received from the Rajputana-Malwa Railway where the traffic, held to justify the replacement of this rail, by a heavier rail, is estimated by the Chief Engineer of that line at anything exceeding two or three trains daily and by Major Bissett at anything exceeding four trains each way daily; an estimate which I learn from a demi-official communication applies to the $41\frac{1}{4}$-lb. steel rails.

3. If this be accepted, it appears that the traffic during 1889 on the South Indian Railway justifies a 50-lb. rail everywhere except on the Arkónam and Pondicherry branches and on the main line between Madura and Tuticorin where, however, the traffic has already reached seven trains daily and will certainly increase.

4. There is, as the returns show, a steady development of traffic both over the Madras and the South Indian Railways, and in my opinion the passenger traffic with 2-pie fare on the latter is small compared to the passenger traffic possible with a reduced fare and better train service. The South Indian Railway engines have now some of them a weight of 9 tons on the axle and the speed for mixed and goods trains has been quite recently increased to 25 miles an hour. I am of opinion therefore that eventually the main line should be laid throughout with a 50-lb. rail, and in doing this I would follow the present programme of the Chief Engineer, laying each year only so many 50-lb. rails as are essential to provide second-hand rails for renewal of the rest of the line to a standard of safety and no more.

5. When the main line shall have been laid throughout with the 50-lb. rail, the question may arise whether the $41\frac{1}{4}$-lb. rail will suffice for a time for the branches. It is neither necessary nor desirable to decide this point at present.

6. Similarly I see no necessity at present to decide the question whether a fresh supply of timber sleepers will be necessary in order that the full life of every light rail and sleeper may be worked out. The decision will depend on the actual life of second-hand sleepers and rails made available from time to time, by replacement with the 50-lb. road, for renewals, and upon the price of iron that may happen to rule when the decision is called for.

7. With reference to para. 3 of Government of India letter No. 86 R.T., 17th June 1889—the first estimate of 50 miles per annum was based on the assumption of

regular progress in renewal; the second estimate appears to have been based on the knowledge that no rails had been sent out by the Board and that no renewals could therefore be effected during the current half-year, and on the assumption therefore that the renewals would have to be doubled in order to maintain the estimated regular progress.

ORDER—dated 13th March 1890, No. 355 R., Public Works.

Ordered to be forwarded to the Government of India with reference to its letter No. 86 R.S., dated 17th June 1889.

(Here enter No. 356 R., dated 13th March 1890.)

(True Extract.)

Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

Exd. J. Moses.
Spare Copies

RAILWAY.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated March, 13*th*.

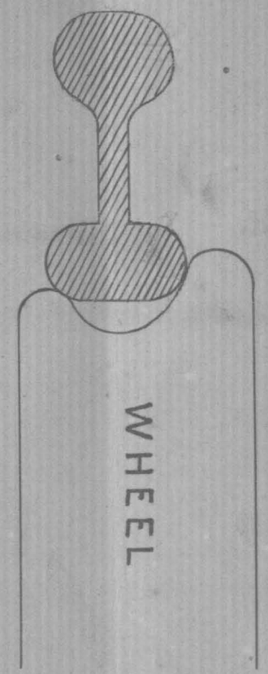
Recd. *Encl.*

G.O., 13th Mar. 1890, No. 355 R.

MARCH.

Substitution of the 50-lb. for 41¼-lb. rails on the South Indian Railway

Report of the Consulting Engineer for Railways on the subject of the — and on sleepers, ordered to be forwarded to the Government of India.



WHEEL

SUPERINTENDENT REVENUE SURVEY 27 MAR 1890

P.W. Secy 2
336-3/90

From the Agent and Chief Engineer, Southern Mahratta Railway Company, to the Consulting Engineer for Railways, Madras, dated Dharwar, 10th December 1889, No. 2133.

I must apologize for being so long in replying to your queries in regard to 41¼ steel rails.

2. Those which have been longest on the road are on the Bijapur branch; they were laid in 1883 and have had to be renewed as follows:—

1884	0	1887	46
1885	5	1888	87
1886	16	to 31st August 1889	97

The rails have almost all been found broken or split.

3. This amounts to nearly half-a-mile of rails out of 173½ in 6½ years.

4. I am of opinion that 41¼-lb. steel rails are too light for the engines (32-ton) used and speed of trains. Not only are the rails destroyed, but the cost of maintenance is either increased or the road is maintained in bad order; the comparative ease with which a road with heavier rails is maintained is shown on the Braganza Ghât where the West of India Portugese Railway and this line are laid with 50-lb. rails.

5. In considering the question of light as compared with heavy rails it should be borne in mind that light rails affects the wear and tear of rolling stock even more than the wear and tear of the permanent-way.

6. It is sometimes suggested that it is better to add to the number of sleepers (say 11 instead of 9 sleepers to a 24-feet rail), but this would come to about the same cost (see comparative estimates attached) and would not give, in my opinion, so good or so durable a road.

7. I have not been called upon to give my opinion on the subject before nor have I found it necessary to make any report on the subject; it was necessary that the capital outlay on these lines should be as low as possible, and the question of using 41-lb. rails was accepted from the outset as settled.

ENCLOSURE.

COMPARATIVE cost of Permanent-way per 23′ 9½″ (8 metre) pair of rails.

41¼-lb. rails with 11 wooden sleepers per pair of rails.	RS.	A.	P.	50-lb. rails with 9 wooden sleepers.	RS.	A.	P.
Cost of pair of rails	24	12	0	Cost of pair of rails	30	0	0
„ 11 sleepers	27	8	0	„ 9 sleepers	22	8	0
„ 4 No. fish-plates	0	12	3	„ 4 No. fish-plates	0	15	9
„ 8 No. fish-bolts	1	1	5	„ 8 No. fish-bolts	1	1	5
„ 44 No. dog spikes ...	1	9	6	„ 36 dog spikes	1	5	0
„ 22 bearing plates ...	0	2	4	„ 18 bearing plates ...	0	1	10
Total ...	55	13	6	Total ...	56	0	0

From the Chief Engineer, to the Agent, South Indian Railway, dated Trichinopoly, 10th January 1890, No. C. 60.

Your No. 10216/1225 of the 16th July last.

I enclose herewith a tracing showing—

1*st*.—The different kinds of permanent-way laid upon the various sections of the line when originally opened for traffic.

2*ndly*.—The same information at the end of the year 1883, that is, about 2½ years previous to the introduction of the 50-lb. rails.

3*rdly*.—The same information at the end of the year 1888.

SUPERINTENDENT REVENUE SURVEY 27 Mar 1890

Public
3353/90

4*thly*.—The same information when the 50-lb. material already arranged for shall have been laid. Also statements A and B in manuscript showing the length of main line and sidings and the material with which laid at the end of the years 1883 and 1888, respectively.

2. *Rails*.—Allusion is made in the 2nd paragraph of Colonel Pemberton's letter, dated Simla, 17th January 1889, No. 86 R.S., to 35½ lb., 40⅔ lb., 41 lb., and 68 lb. rails. In this report I allude to both 40⅔ lb. (iron) and 41 lb. (steel) under the one designation of 40-lb. rails, as on the introduction of the 41-lb. steel rails they were used indiscriminately (with one exception) with iron rails for renewals, the one exception being the Chingleput-Conjeeveram Branch on which 41-lb. steel rails were originally laid throughout when this branch was constructed.

3. The 50-lb. rails were first introduced in the year 1886, at which date we had practically no new rails of any description in stock, and were dependent on the material released by the introduction of the 50-lb. rails for renewals on those lengths laid with other rails, viz., 35, 40, and 68 lb.

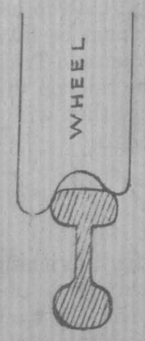
4. The heavy stone traffic for the Madras Harbour Works over the first 13 miles of the line (Madras to Pallávaram) causing continuous and heavy renewals of the 40-lb. rails, the 50-lb. rail was substituted, and as the 40-lb. rails were rapidly wearing out, the substitution was continued on to Chingleput, a further distance of 23 miles.

5. On the 45th and 46th miles, where the line was lowered to form a causeway over which extraordinary floods might pass, the opportunity was taken to substitute 50 for 40-lb. rails, first, as being much more suitable for such a situation, and next because the substitution could be more economically and properly done, while the traffic was being carried past the place on a deviation of the line and there was nothing to interrupt the work.

6. Similarly, on the occasion of other alterations in the way and works necessitating temporary diversions from the main line, the opportunity was taken to substitute 50-lb. rails, and this accounts for the number of isolated points at which the change was made. The other and more continuous lengths were selected chiefly because of the worn state of the rails there, or because of the proximity to the port of supply and the necessity for releasing a stock of unexpended 40-lb. rails for renewals elsewhere over the line.

7. For instance, the lengths of line between Madura and Kaligudi (345 to 365 miles) and between Tataparai and Tuticorin (435 to 444 miles) were renewed with 50-lb. rails, partly because a great number of the 40-lb. rails were in a very bad state and required immediate removal, and partly because the southern portion of the line was in emergent want of stock of 40-lb. rails to maintain it in a safe condition.

8. Again, on the only part of the main line on which the 68-lb. rails existed, Tanjore to Trichinopoly (218 to 250 miles), it was deemed expedient to substitute the 50-lb. rails, partly to get 68-lb. rails for renewals elsewhere, and partly to provide a rail with a section nearer to the 40-lb. one in order to prevent undue wear and tear on wheel tyres and on the heavy rail. It is found that the tyres of engines and carriages get worn hollow (see marginal sketch) by running on the narrow 40-lb. rail head, and when these hollowed tyres run on the broad 68-lb. rail, the effect is that the outside edge of the tyre travels on the outside edge of the rail to the detriment of both, the outside of the rail getting crushed and cut away. By taking out this length of 68-lb. and substituting 50-lb. rails, a nearer approach to similarity of rail section is obtained and injury to tyre and rail avoided.



9. The 35-lb. iron rail on the Arkónam Branch was replaced by the 50-lb. steel rail because, in my opinion, the 35-lb. rail had become unsafe under the existing weight of engines and traffic. This part of the line was originally laid in 1865 with very sharp curves as a tramway along the public road, and never during 16 years had any traffic worth mentioning to try it.

... Railways, dated

Extract from Inspection Report of the S. I. Railway for h. y. ended 31st Dec. 1886.

Permanent-way.—The permanent-way is in good running order throughout, and the station yards are generally well maintained. Between Madras and Pallávaram, where the traffic has for many years been heavy in connection with the Madras Harbour, the rails and sleepers are wearing out rapidly, and this length should be laid, as soon as possible, with the new permanent-way, consisting of 50-lb. bull-head rail with deep fishplates on cast-iron pots. A commencement has been made in laying this at Madras, Chingleput, Tanjore, and Negapatam; but as the work has to be done between trains, progress is slow, only four or five rail-lengths being done in a day on each face. Special arrangements should be made for expediting the work between Madras and Pallávaram, and I understand that the Chief Engineer concurs in this view.

Extract from Inspection Report of the South Indian Railway for h. y. ended 30th June 1886.

[This inspection was made between 12th and 22nd July 1886.]

Permanent-way.—The permanent-way shows signs of deterioration. Between Madras and Chingleput this is very marked, and on other sections the line is not, in my opinion, in such good order as on the last inspection. Renewals are being made with the new 50-lb. rails on pot-sleepers, but greater progress is necessary to enable the line to be kept in good running order. The works generally show signs of insufficient personal inspection by engineers. During the last eighteen months much extra work has been thrown upon all grades, and this has prevented that strict attention to details which is necessary to insure a line being kept up to a high standard. Unless renewals are pushed more vigorously now, a time will arrive when the powers of the staff in this direction will be very severely taxed. The total length of line originally laid with 40-lb. iron rails is 474 miles, of which about 34 miles have been renewed with steel rails of the same weight. The length of 50-lb. permanent-way laid up to date is 23 miles, so that 57 miles in all have been renewed. The average age of iron rails now in the line is 10 years, and probably all will have to be renewed within the next seven years. The average renewals therefore cannot be taken at less than 50 miles per annum. The wooden sleepers between Negapatam and Trichinopoly, which have been down 23 years, must soon be renewed, and the rails on this length have seen their best days, though with the heavy section (68 lbs.) they will not go so rapidly as the lighter ones.

Extract from Inspection Report of the South Indian Railway for h. year ended 30th June 1887.

2. **Permanent-way.**—The permanent-way, considering the heavy renewals in progress, is generally in good order. The new 50-lb. road and much of the old 40-lb. road is as good as it could be made. Portions of it, however, between Vikravándi and Shiyáli and the Pondicherry branch, fell short of the standard attained elsewhere, and should receive special attention.

3. Considerable inconvenience and some extra cost to the company has been caused by some of the 50-lb. material being sent out *viâ* the Cape instead of by the Canal as was anticipated, and therefore arranged for out here. It has been necessary on this account to send 40-lb. material removed from the Madras end to the line in the neighbourhood of Madura for renewals there, and the programme for the distribution of the 50-lb. way, carefully thought out and embodied in a printed manual issued by the Chief Engineer for the use of the district staff, has been upset.

4. The condition of the 40-lb. road and the heavy renewals still called for continue to justify the forecast of the Chief Engineer as to the Engineering staff and permanent-way material that would be necessary to maintain the line for the next few years.

From the Consulting Engineer for Railways, dated Madras, 8th March 1890, No 168.

TH MARCH 1890, No. R., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers :—

From the Consulting Engineer for Railways, dated Madras, 11th April 1889, Circular No. 692.

I have the honor to request that I may be favored with any information you may have on record bearing on the durability of any 41¼ steel rails that have been laid in the lines under your control.

2. It is desired to ascertain what may fairly be reckoned the life of such a rail as compared with that of a 40-lb. iron rail under the same traffic.

3. I shall be obliged if you will inform me whether in your opinion the 41¼ steel rail, is at present prices, as economical in the end as a 50-lb. rail for that section of your line on which you have the least traffic, and that you will kindly state approximately what that traffic amounts to.

4. I write on the assumption that your views have probably been already expressed on the subject and that you can refer me to information already on record.

To the Agent and Chief Engineer, Southern Mahratta Railway, Dharwar.
" Agent, Bombay-Baroda and Central India Railway, Bombay.
" Manager, Bengal and North-Western Railway, Lahore.
" Manager, Eastern Bengal Railway, Calcutta.
" Manager, Tirhoot State Railway, Mozufferpore.

From the Manager and Engineer-in-Chief, Tirhoot State Railway, to the Consulting Engineer for Railways, Madras, dated Mozufferpore, 27th April 1889, No. 2447.

[*Maintenance—Permanent-way.*]

In reply to your Circular No. 692, dated 11th April 1889, I have the honor to state as follows.

2. About 80 miles of 40-lb. iron rails were laid in this line between 1874 and 1876.

3. The majority of these rails have already been renewed, and the remainder are rapidly wearing out, giving an average of under 15 years as the life of these iron rails. The average traffic over them amounted to three trains daily each way.

4. The 40-lb. steel rails, of which we now have about 220 miles, were laid since 1882, and show very little signs of wear. I expect their life will prove to be between 20 and 25 years. All renewals are now being carried out as far as possible with 50-lb. steel rails, which, in my opinion, will be found far more economical in the end.

5. The tendency at present is to increase both the speed and the weight of metre-gauge engines and stock, and I believe that in a few years a 50-lb. rail will be found absolutely necessary to carry the increased weight.

From the Agent and Chief Engineer, Bengal and North-Western Railway Company, to the Consulting Engineer for Railways, Madras, dated Gorakhpur, 7th May 1889, No. 4 P.

In reply to your No. 692, dated 11th April 1889, I have the honor to offer you the following remarks.

2. The rails on this line have not been sufficiently long in use to enable more accurate information of their durability to be supplied. The few 40-lb. iron rails that have been used on this railway, and which were obtained from the Tirhoot State Railway, have proved quite unequal to resisting the wear and tear of our heavy engines over them; some of these rails became unfit to remain in the road, in less than 18 months, whilst the best of them will not have a longer life than five years. I am of opinion, however, that these rails were made of bad material.

3. As regards the wear and tear of the 41¼-lb. steel rails, this has so far been satisfactory. I should say it would be impossible to tell at present whether it would prove to be more economical in the end to have laid 50-lb. instead of 41¼-lb. rails in the first place.

From the Manager, Eastern Bengal State Railway, to the Consulting Engineer for Railways, Madras, dated Sealdah, Calcutta, 17th May 1889, No. 1324 M.

In reply to your Circular No. 692, dated 11th April 1889, I have the honor to give you the following information regarding the metre-gauge lines in this system, though I do not think it will throw any light on the comparison between the life of a 41¼-lb. steel rail and a 40-lb. iron rail.

2. I have three separate metre-gauge lines, the accounts of which are kept distinct:—

(*a*) Northern section, 281 miles, with a traffic averaging 211 rupees a mile a week for the whole year 1888, laid with 40-lb. iron rails 11 years' old at the end of 1888. Heavy F class engines run over this not only with goods trains but with a daily mail at high speed. These rails are too light for this traffic and these engines. They are now being replaced by 50-lb. steel rails.

(*b*) Assam-Behar section, 38 miles, with a traffic averaging 90 rupees a mile a week for the whole year 1888. This is laid with 41¼-lb. steel rails, which were only one year old at the end of 1888. No opinion can therefore be formed of their durability. There are at present no F class engines on this section. So long as they are not required, and the traffic and speed are moderate, this weight of rail should be sufficient, and would be the best rail to lay if a heavy traffic was never anticipated.

(*c*) Dacca section, 86 miles, with a traffic averaging 66 rupees a mile a week for the whole year 1888. This is the lightest traffic on any section of my metre-gauge lines. It is a very poor traffic, and does little more than pay its working expenses. It is laid with 41¼-lb. steel rails, which were three years' old at the end of 1888. The same remarks apply to this section as to the Assam-Behar section, see above.

3. In my opinion a 41¼-lb. steel rail would be good enough for a short branch line which was never likely to carry a heavy traffic. For such a line I think a 41¼-lb. steel rail would be more economical than a 50-lb. steel rail. But nothing less than a 50-lb. steel rail should, I think, be laid on a main line where a high speed and good traffic may be looked for.

4. I have a branch line, 36 miles long, on the 2′ 6″ gauge laid with 25-lb. and 30-lb. iron rails. This line does a small traffic mainly in cooly passengers *en route* to Assam, though it also carries a little goods traffic. The rolling stock is of the tramcar type, of a very good pattern. If you should desire any further information regarding this line, I shall be happy to furnish it.

From the Agent, Bombay-Baroda and Central India Railway, including Rajputana-Malwa Railway, to the Consulting Engineer for Railways, Madras, dated Bombay, 28th June 1889, No. 7809 W.

With reference to your Circular No. 692 of 11th April 1889, I have the honor to forward herewith a copy of a letter No. 3256 of 19th June 1889, from the Engineer-in-Chief of the Rajputana-Malwa Railway, regarding the durability of rails.

2. You will observe that the 41¼-lb. steel rails have not been in the road sufficiently long to enable any accurate comparison with iron rails to be made.

ENCLOSURE.

Copy of letter No. 3256, dated 19th June 1889, from the Acting Engineer-in-Chief, Rajputana-Malwa Railway, Ajmere, to the Agent, Bombay-Baroda and Central India and Rajputana-Malwa Railway, Bombay.

[*Subject.*—Life of Rails.]

In reply to your No. 4915 W., dated 23rd April 1889, forwarding a communication from the Consulting Engineer for Railways, Madras, regarding above, I have the honor to report that the average *age* of 41¼-lb. steel rails on the Abu Division, where this class of rail is oldest, is at present only 8·63 years. I think we may fairly hope that the average life of the rails will be at least double this.

2. The average age of 40-lb. iron rails taken out of the road during second half 1888 on the Bandikin Division, on which these rails are oldest, was 13·45 years, and of those left in the road 13·70 years at end of the half-year. Our statistics show that the average age of the rails both taken out and left in the road are still increasing, and therefore we have not yet arrived at what the average life of our iron rails will be.

3. The 41¼-lb. steel rail is certainly quite up to light traffic, such as we have on our Sindia-Neemuch section where three trains are run daily each way at a through speed of 12 to 14 miles an hour—weight of trains 200 tons including engine. This with reference to para. 3 of the enclosure to your letter.

From the Agent, Bombay-Baroda and Central India Railway including Rajputana-Malwa Railway, to the Consulting Engineer for Railways, dated Bombay, 19th November 1889, No. 13668 W.

I have the honor to forward copy of a letter from the Acting Engineer-in-Chief of the Rajputana-Malwa Railway, No. 4993 of 10th September 1889, and its accompaniment, which furnishes the information asked for in your No. 1461 of 22nd August 1889. I have added two brief notes in the margin.

ENCLOSURES.

COPY of a letter No. 4993, dated 10th September 1889, from the Acting Engineer-in-Chief, Rajputana-Malwa Railway, Ajmere, to the Agent, Bombay-Baroda and Central India Railway.

Relative economy in the use of light and heavy rails.

In acknowledging receipt of your No. W. 10361 of the 27th August last, forwarding, in original, with its enclosure, letter No. 1461 of 22nd August 1889, from the Consulting Engineer for Railways, Madras (herewith returned), and with reference to certain inquiries therein made by the Consulting Engineer, I have the honor to state that the price of second-hand 40-lb. rails was based on the market value at the time of new 40-lb. rails less estimated depreciation; this gave a rate of Rs. 66-3-0 per ton, and for the unserviceable rails fit for structural purposes Rs. 40-12-0 per ton. Of the rails taken out of the road, the proportion of serviceable rails fit for main line to the unserviceable ones was 3 to 1*.

* Or ¾ of the whole.
(Intld.) W.S.S.B.

2. If the 50-lb. rails had not been introduced on this line, I think we may assume that about 70 per cent. of the rails taken out would now be in the road. The percentage of renewals of these rails at the time the relaying with 50-lb. steel rails was commenced was 1·59 miles of rails per annum.

3. A statement showing the cost under the usual sub-headings of keeping up the permanent-way and ballast on this railway during the three years ending 30th June 1888 is herewith sent as requested

I would draw your attention to a mistake that has been made by Sir. A. Rendel. The Rs. 404 quoted in para. 9 of his memorandum of 19th March 1889 is the cost of maintenance for six months and not for one year as therein stated.

4. With reference to the inquiry contained in para. 4 of the Consulting Engineer's letter, I am of opinion that the past experience has shown that the 40-lb. iron rails thus taken out could be accepted as suitable for branch lines where traffic is light and does not exceed, say, 2 or 3 trains † a day each way.

† I would say up to 4 trains a day each way.
(Intld.) W.S.S.B.

BOMBAY-BARODA AND CENTRAL INDIA RAILWAY INCLUDING RAJPUTANA-MALWA RAILWAY.

STATEMENT showing the cost under the usual sub-headings of the cost of keeping up the permanent-way and ballast on the Rajputana-Malwa Railway during the three years ending 30th June 1888.

REFERENCE TO REVENUE ACCOUNTS.			Details.	HALF-YEAR ENDING 31ST DECEMBER 1886.		HALF-YEAR ENDING 30TH JUNE 1887.		HALF-YEAR ENDING 31ST DECEMBER 1887.		HALF-YEAR ENDING 30TH JUNE 1888.	
Table and main head.		Sub-head.		Per mile of line maintained. (1538·94).	Per mile of track including siding. (1748·34).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1889·74).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1896·645).	Per mile of line maintained. (1664·419).	Per mile of track including siding. (1896·816).
Table IX.			*Maintenance and renewals of Permanent-way.*	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
A-1	1		Wages	158·21	139·26	138·13	121·65	144·87	127·13	133·45	117·10
A-2	2	Materials	Rails	227·91	200·61	129·47	114·03	228·31	200·36	227·93	200·01
			Ballast								
			Sleepers								
			Total ..	386·12	339·87	267·60	235·69	373·18	327·49	361·38	317·11
A-1	1 to 6		Half the total cost of general superintendence	..	..	..	..	..	..	..	..
	3		Four-fifths of loss by exchange	..	..	46·705	..	45·65	..	43·34	..
A-7	4		Four-fifths of loss on stores	..	..	..	..	..	..	..	..
	5		Four-fifths of freight on stores ..	..	..	0·376	..	0·016	..	1·576	..
				..	..	27·528	..	23·232	..	28·12	..
			Total ..	..	413·727	..	304·588	..	400·526	..	394·248

Average during the three years ending 30th June 1888—

1603·61	×	485·561	= 778650·47521
1607·49	×	421·087	= 676893·14163
1748·34	×	413·727	= 723335·46318
1889·74	×	304·588	= 575592·12602
1896·645	×	400·526	= 759655·68527
1896·816	×	394·248	= 747815·91436
10642·641			778650·47521 = Rs. 400 per mile of track per half-year including sidings.

10642·641

(Signed) W. HARVEY,
Acting Engineer-in-Chief.

The normal traffic on this isolated piece of tramway consisted of two short trains a day, one each way with small light vehicles and engines.

10. After it became part of the South Indian Railway, and heavier engines and trains began to work over it, the result was that the 35-lb. rails went so rapidly that it was found necessary to remove them to guard against accident. For example, on the 9th September 1887 one of these 35-lb. rails crushed in for about 10 feet of its length owing to want of strength in the vertical web.

The foot or bottom flange of these rails was also found to yield and turn up at the ends and edges.

They were laid on teakwood sleepers.

11. With reference to the steel 41-lb. rails, the line between Chingleput and Conjeeveram (20 miles) was laid with them throughout when the branch was made in 1880-81. These rails have stood well, but they have not been tried by traffic nearly so heavy as on the main line. There were 67 miles of these rails sent out from England, the balance after laying the Chingleput-Conjeeveram—length of 27½ miles of line and sidings—was used in ordinary repairs, here a rail and there a rail, as occasion required, and I have no record of where they are laid, a steel rail being simply substituted for an iron one when the latter was worn out.

Of the 41-lb. steel rails removed from the line by the substitution for the 50-lb. ones, most are in good order after having been in the road for about 5 years.

12. In every case the programme for the substitution of the 50-lb. rail was thought and laid out beforehand with the greatest care and endeavour to avoid all unnecessary expenditure.

13. *Sleepers.*—The 40-lb. rails are laid on creosoted pine sleepers which rapidly decayed, and although there are about 147,482 equal to 83 miles of used sleepers reported in stock available for renewals, many of these sleepers are much cracked, cut into by the rail-foot and pierced with old spike holes and are deteriorating while in stock almost as much as those laid in the line. I do not think we can safely estimate the average life of the creosoted sleepers in stock and in the line at more than 2 years. It is even doubtful if this average life will be attained, for when sleepers have been in use in the line they get cut into by the flat foot of the rails and pierced by the spikes in such a manner as to render them not very fit for renewals.

They are only from 6′ to 6′ 6″ long, so that there is but little space for shifting the rails into fresh places where the original ones become damaged or worn.

14. The time has come therefore when we must elect whether to hold to the 40-lb. or to the 50-lb. rail for future renewals, for it would be manifestly unwise to purchase new sleepers (hard wood or iron) to lay under a rapidly-wearing-out rail which the new sleepers would long outlive to become useless if renewals with a 40-lb. rail were not continued, while if we do not pursue this course and do not continue to renew with 50-lb. permanent-way, we shall before long arrive at a stage where the rails at present in stock will have outlived the stock of sleepers available for maintenance. Under the circumstances and with a line possessing the considerable and steadily increasing traffic of the South Indian Railway, it would surely be unwise not to take the opportunity of replacing the lighter by a heavier and more durable rail.

15. Up to 31st December 1889 there have been laid into the main line 212 miles of 50-lb. bull-headed steel rails, and deducting this from the length (445 miles) of main line laid with 40-lb. rails between Madras and Tuticorin, there remains 233 miles of 40-lb. permanent-way for which 50-lb. rails have to be substituted. It would therefore in my opinion under existing circumstances be well within the requirements of the case to continue to relay with 50-lb. rails at the rate of 50 miles per annum. If this is not done we shall probably have to purchase a large number of hard-wood sleepers (teak or pingadu) wherewith to maintain the line in safety as the creosoted pine ones decay. It will soon be seen whether I have over or under estimated the life of the 40-lb. permanent-way still in the line; if overestimated, 50 miles of 50-lb. road per annum will not suffice for the upkeep of the line, if underestimated, the relaying can be diminished or stopped for a time.

16. Referring to Sir A. Rendel's remarks on the estimated value at which rails returned to stock are credited, my experience is that in this as in most cases of

returned stores the materials are liable to be much overpriced. For some time we valued our second-hand rails fit for renewals at Rs. 56 per ton, the rate at which we sold considerable quantities of the useless and worn-out rails, but lately it was decided in a Committee of Government and Railway officers to assess the value of used rails at only half that rate, and our stock of useable rails is now valued at only Rs. 26 per ton. To judge of the present value of any article by the price put upon it when returned to stores would, according to my experience, be most misleading, the tendency almost always being to overprice, seeing that the department returning it is usually anxious to be credited with the highest value obtainable.

17. With reference to Sir A. Rendel's assumption that, on examining the condition of the rails taken out of the line, the bulk of them would be found in good condition, and that if the 50-lb. rail had not been sanctioned, the whole, or nearly the whole, of the 20 miles of 41-lb. steel rail and the bulk of the 40-lb. iron rails removed from the road in the 3 years would have been in it at the present time, he is correct concerning the steel rails, but in error as regards the 40-lb. iron rails. Most of the steel rails are in stock and are being drawn upon for renewals; they would not have been taken out of the line had they not been mixed up with the 40-lb. iron rails as described above (in para. 11 *ante*). With reference to the 40-lb. iron rails, it is true that at the present moment we have accumulated a considerable stock of these, removed from the line, which are in a sufficiently good condition to be used again; but it was absolutely necessary to accumulate a stock to provide for the maintenance of the 40-lb. road. At one time before this was accomplished the 50-lb. permanent-way came forward from England more slowly than I anticipated, and we were put to such straits owing to want of 40-lb. rails to keep the line in safe running order that I had to strip many of the stations of the serviceable rails in sidings, substituting worn ones to procure what was required. It is so far a matter of opinion and estimate of which those on the ground may probably be allowed to be the best judges, whether or not a larger stock of 40-lb. rails has been removed from the line and placed in stock than is necessary, but there can be no doubt whatever that the measures taken were adopted after very careful consideration and with the desire of all concerned to avoid all unnecessary expenditure.

ENCLOSURES.

A.

SOUTH INDIAN RAILWAY.

ENGINEER DEPARTMENT.

STATEMENT showing length of Rails and Sleepers as laid on 31st December 1883, distinguishing Main Line from Sidings.

	IRON POT ROAD.	WOODEN SLEEPER ROAD.				
	Weight of iron rails.				Weight of steel rails.		Total.
	68 lb. per yard.	68 lb. per yard.	40·3 lb. per yard.	35·5 lb. per yard.	41 lb. per yard.	32 lb. per yard.	
	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.
Main Line.							
Madras to Tuticorin	13 71 0	15 68 0	392 48 53	..	23 11 3	..	445 38 56
Branches.							
(1) Arkónam	..	..	..	18 20 50	20 67 55	..	39 8 5
(2) Pondicherry (Villupuram to Gingee river)	..	..	16 20 0	..	..	..	16 20 0
(3) Negapatam	24 31 89	23 72 11	..	..	..	..	48 24 0
(4) Erode	86 77 92	..	..	..	0 18 54	..	87 16 46
(5) Tinnevelly	..	..	17 72 84½	..	0 18 15½	..	18 11 0
Total ..	125 20 81	39 60 11	426 61 37½	18 20 50	44 35 27½	..	654 38 7
Sidings.							
Main line	0 9 51	3 20 75	34 27 18	..	6 62 67¾	..	44 40 11¾
Arkónam Branch	..	..	..	2 30 80	0 59 77	..	3 10 57
Pondicherry Branch	..	..	0 42 23¾	..	0 5 21	0 1 73	0 49 17¾
Negapatam do.	0 24 13	7 53 69	0 6 30	..	..	..	8 4 12
Erode do.	4 70 76	0 65 46	..	..	..	..	5 56 22
Tinnevelly do.	..	..	1 71 50	..	0 0 66	..	1 72 16
Total ..	5 24 40	11 59 90	36 67 21¾	2 30 80	7 48 31¾	0 1 73	63 72 36½
Grand Total, Main Line and Sidings ..	130 45 21	51 40 1	463 48 59¼	20 51 30	52 3 59¼	0 1 73	718 30 43½

TRICHINOPOLY,
10th January 1890.

(Signed) D. LOGAN,
Chief Engineer.

B.

SOUTH INDIAN RAILWAY.

ENGINEER DEPARTMENT.

STATEMENT showing length of Rails and Sleepers as laid on 31st December 1888, distinguishing Main Line from Sidings.

—	STEEL TRANSVERSE SLEEPER ROAD.	IRON POT ROAD.				WOODEN SLEEPER ROAD.					Total.
	Weight of iron rails.	Weight of iron rails.		Weight of steel rails.		Weight of iron rails.			Weight of steel rails.		
	40·3 lb. per yard.	68 lb. per yard.	40·3 lb. per yard.	41 lb. per yard.	50 lb. per yard.	68 lb. per yard.	40·3 lb. per yard.	35·5 lb. per yard.	41 lb. per yard.	32 lb. per yard.	Bridge rails 56 lb. per yard.	
Main Line.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.	M. CH. LKS.
Madras to Tuticorin	5 63 29	15 41 20	6 29 21	..	143 17 57½	14 1 38	226 66 21	..	33 54 67½	..	0 14 61	445 48 15
Branches.												
(1) Arkónam	..	..	..	..	15 72 36	..	..	1 73 56	21 22 13	..	..	39 8 5
(2) Pondicherry (Villupuram to Gingee river)	..	..	..	..	0 13 69	..	15 51 46	..	0 34 54	..	..	16 19 69
(3) Negapatam	..	19 19 0	..	..	10 55 0	18 30 0	..	..	..	..	..	48 24 0
(4) Erode	..	86 77 92	..	..	..	..	..	..	0 18 54	..	..	87 16 46
(5) Tinnevelly	..	..	..	..	..	..	17 13 20	..	0 77 80	..	..	18 11 0
Total ..	5 63 29	121 58 12	6 29 21	..	169 78 62½	32 31 38	259 50 87	1 73 56	56 47 68½	..	0 14 61	654 47 35
Sidings.												
Main Line	0 55 99	0 12 73	0 4 61	..	3 43 32	3 4 92	36 20 24⅞	..	9 15 83½	..	..	52 77 65⅛
Arkónam Branch	..	..	..	..	0 9 32	..	0 5 94½	1 79 11	1 1 66½	..	..	3 16 4
Pondicherry Branch	..	..	..	..	..	..	0 44 20¼	..	0 8 24½	0 1 73	..	0 54 17¾
Negapatam do.	..	1 63 90	..	..	0 6 40	6 39 96	1 76 10	..	..	..	..	10 26 36
Erode do.	..	4 77 72½	..	..	..	0 78 85	0 3 77	..	..	..	..	6 0 34½
Tinnevelly do.	..	..	..	..	..	..	1 76 87⅝	..	0 2 57½	..	..	1 78 66
Total ..	0 55 99	6 74 35½	0 4 61	..	3 59 4	10 43 73	40 66 35½	1 79 11	10 28 31⅜	0 1 73	..	75 13 23⅜
Grand Total, Main Line and Sidings ..	6 39 28	128 52 47½	6 33 82	..	173 57 66½	42 75 11	300 37 22½	3 72 67	66 75 99⅜	0 1 73	0 14 61	729 60 58⅜

TRICHINOPOLY,
10th January 1890.

(Signed) D. LOGAN,
Chief Engineer.

C.

SOUTH INDIAN RAILWAY.

STATEMENT showing the number and mileage of Trains run during the year 1889.

Section.		Mileage of section.	Number of trains.	Mileage.	AVERAGE PER DAY. Number of trains.	AVERAGE PER DAY. Mileage.	Average mileage per train per day.
Madras-Chingleput	Special ..	34½	2,618	49,876½	7·17	136·64	19·05
	Ordinary ..	..	..	..	11·00	308·00	28·00
Chingleput-Cuddalore Old Town	Special ..	92¾	1,341	82,354	3·67	225·37	62·22
	Ordinary ..	..	..	..	6·00	556·50	92·75
Cuddalore-Trichinopoly ..	Special ..	121¼	1,106	74,452½	3·03	203·98	67·32
	Ordinary ..	..	..	..	6·00	634·50	105·75
Trichinopoly-Madura ..	Special ..	96	1,143	96,157⅜	3·13	263·44	84·16
	Ordinary ..	..	..	..	6·00	576·00	96·00
Madura-Tuticorin ..	Special ..	99	1,230	106,701¼	3·37	292·33	86·74
	Ordinary ..	..	..	..	4·00	396·00	99·00
Arkónam Branch ..	Special ..	39	405	8,899	1·10	24·38	22·17
	Ordinary ..	..	..	..	4·00	121·00	30·25
Pondicherry Branch ..	Special ..	24¼	611	14,630⅝	1·68	40·08	23·85
	Ordinary ..	..	..	..	4·00	97·00	24·25
Negapatam Branch ..	Special ..	48	384	14,542½	1·05	39·84	37·94
	Ordinary ..	..	..	..	8·00	384·00	48·00
Erode Branch ..	Special ..	87¼	1,905	43,699½	5·21	119·72	22·98
	Ordinary ..	..	..	..	8·00	359·00	44·87
Tinnevelly Branch ..	Special ..	19¼	95	1,734	·26	4·75	18·26
	Ordinary ..	..	..	..	8·00	146·00	18·25

NOTE.—During no portion of the year were the Harbour stone trains working to the full extent—1,200 tons per day.

TRICHINOPOLY,
22nd February 1890.

(Signed) W. S. BETTS,
Agent.

P.W. Dept
1002/90.

Form No. 1.

Public Works Department.

Office of Consulting Engineer for Railways,

Madras, 8th March 1890.

Letter from the Consulting Engineer for Rys:, Nº 692 dy 11th April 18
" " Manager and Engineer-in-chief, Tirhoot State Ry, Nº 21
dy 27th April 18
" " Agent and Chief Engineer, Bengal and North Western
Ry. Company, Nº 4P dy 7th May 1889.
" " Manager, Eastern Bengal State Ry, Nº 1324M dy 17th May 18
" " Agent, Bombay Baroda & Central India Ry: Nº 7509W d
29th June 1889, with enclosu
" " Do Nº 13660W dy 19th November 1889, with
enclosu
" " Agent and chief Engineer, Southern Mahratta Ry
Nº 2133, dy 10th December 1889.
" " Chief Engineer, to the Agent, South Indian Ry:
Nº C 60 dy 10th January 1890.

No. 168

Submitted _____ to _____ Government,

with reference to G. O. Nº
756-R, dated 6th July 1889.

Print

2. It will be seen
that the most favor-
able verdict on the 40 lb
rail is received from
the Rajputana Malwa
Railway where the traffic
held to justify the re-
placement of this rail,
by a heavier rail, is esti-
mated by the Chief
Engineer of that line at
anything

anything exceeding 2 or 3 trains daily and by Major Bissett at anything exceeding 4 trains each way daily; an estimate which I learn from a demi official communication applies to the 41/4 lb steel rails.

3. If this be accepted, it appears that the traffic during 1889 on the South Indian Railway justifies a 50 lb rail everywhere except on the Karonam and Pondicherry Branches and on the main line between Madura and Tuticorin where, however, the traffic has already reached 7 trains daily and will certainly increase.

4. There is, as the returns show, a steady development of traffic both over the Madras and the South Indian Railways, and in my opinion the passenger traffic with 2 pie fare on the latter is small compared to the passenger traffic possible with a reduced fare and better train service. The South Indian Railway engines have now some of them a weight of 9 tons on the axle and the speed for mixed and goods trains has been quite recently increased to

25 miles an hour. I am
any of opinion therefore that
tra eventually the main line
Bis should be laid through-
cees out with a 50 lb rail,
I lea and in doing this I
cou would follow the present
to programme of the Chief
3. Engineer; laying each
it year only so many 50
dur lb rails as are essential
Lin to provide second hand
fies rails for renewal of the
whe rest of the line to a
ch standard of safety and
on no more.
bet 5. When the main line
Ins shall have been laid
the throughout with the 50
rea lb rail the question
an may arise whether the

41¼

41¼ lb rail will
suffice for a time for
the branches. It is
neither necessary nor
desirable to decide this
point at present.

6. Similarly I see no
necessity at present to
decide the question
whether a fresh supply
of timber sleepers will
be necessary in order
that the full life of
every light rail and sleeper
may be worked out. The
decision will depend on
the actual life of
second hand sleepers
and rails made avail-
able

able from time to time
by replacement with the
50 the road, for renewals,
and upon the price of
iron that may happen
to rule when the decision
is called for.

3.7. with reference to
para 3 of Government
of India letter No 86 R.T.,
17th June 1889 — the first
estimate of 50 miles per
annum was based on
the assumption of
regular progress in
renewal; the second
estimate appears to
have been based on the
knowledge that no rails
had been sent out by
the Board and that no
renewals could therefore
be effected during the
current half year, and
on the assumption
therefore that the renew-
als would have to be
doubled in order to
maintain the estimated
regular progress.

C. F. Smith Col. R.E.,
Consg: Engr. for Rys.

56756R 6-7-89
" 140R - 7-2-89
- 54R - 18-1-89
- 411R - 12-4-89
- 66R - 19-1-85
- 122R - 6-2-86
- 834R - 11-8-84
- 935R - 22-9-84
- 54R - 18-1-89
- 702R - 28-8-88
- 803 - 29-3-76
- 596R - 16-7-84
- 510R - 7-5-84
" 1205R - 2-11-83
" 256R - 4-3-79
- 997R - 23-12-79
- 290R - 19-5-80
- 441R - 2-8-80
- 675R - 20-11-80
- 709R - 23-8-79
" 574R - 5-7-79
" 458R - 27-5-79
" 257R - 4-3-79

Form No. 3.

A No 355 R Dy 13th March/90

Secs 12 Mar

Ordered to be

forwarded to the Govt.

of India with reference

to its letter No 86 R. S.,

dated 17th June 1889.

H. Co. No 356R of 13th March 1890.

Forwarded

C.J.S.

16. 3. 90

R.

Replied with

letter

12/4

15/4/90

To Mr Consg. Engr for Rys.

11-3-90 R 13-3-90

P.W. Coll. 2502

From

THE CONSULTING ENGINEER

FOR RAILWAYS,

MADRAS,

No. 168

Dated 8th

Received 11 } March 1890.

No. OF ENCLOSURES. /

Subject.

Submitting correspondence re-

the relative economy in the use

of light and heavy rails on

the South Indian Railway.

A

No 355-56 R Dy 13th March/90

R

2572.

Govt. of 18 Madras

PUBLIC WORKS

Rec'd 13th March 90 355-672.

Substitution of the 50 lbs for 41/4 lbs rails on the S I Ry.

Report of the Engr for Rys on the subject of the — ton sleepers, ordered by the Govt of India.

Substitution of the 50 lbs for 41/4 lbs rails on the S I Ry.

Further report of the Engr for Rys on the subject of the — ton sleepers

PUBLIC WORKS DEPARTMENT.

Railway.

No. 257 R.

No. 29.

FROM

THE JOINT SECRETARY TO THE GOVERNMENT OF MADRAS,
Public Works Department, Railway Branch,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
Public Works Department, Railway.

SIR,—I am directed to forward, for the sanction of the Government of India, an indent for permanent-way materials required for renewals and additional works for the South Indian Railway.

2. I am to state that the condition of the permanent-way on the South Indian Railway is such that renewals will have to be effected with the rails sent out for the Pondicherry Branch, and I am to request that, under the circumstances, sanction for the transmission of the indent to the Directors for compliance may be communicated by telegraph.

3. His Grace the Governor in Council requests an expression of the views of the Government of India as to the weight of rail to be hereafter used in renewing that portion of the South Indian Railway Company's system which is now laid with 40 lbs. rails.

4. The Chief Engineer of the Company has expressed his opinion that the 40 lbs. rail is not sufficiently strong for economical use, but His Grace the Governor in Council is of opinion that the experience gained in Northern India will be a valuable guide in deciding the question; and I am to request that any information on the point at the disposal of the Government of India may be forwarded.

I have the honor to be,

Sir,

Your most obedient servant,

(Signed) C. J. SMITH, Major, R.E.,
Ag. Joint Secy. to Govt., P.W.D.,
Railway Branch.

FORT ST. GEORGE,
4th March 1879.

Exd. C. Howarth.
Spare Copies

RAILWAY.

Govt. of {1879} Madras.

PUBLIC WORKS.

To

THE SECRETARY TO THE
GOVERNMENT OF INDIA.

Dated March 4th.

Issued

Recd. *Encl.*

G. O., 4th March 1879, No. 257 R.

MARCH.

No. 29.

FORWARDS for sanction an indent for permanent-way materials required for renewals and additional works for the South Indian Railway, and requests an expression of the views of the Government of India as to the weight of rails.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

27th May 1879, No. 458 R.

Railway.

Read the following paper:—

No. 91. From Major-General J. S. TREVOR, R.E., Officiating Deputy Secretary to the Government of India, Public Works Department, (Railway,) to the Secretary to the Government of Madras, Public Works Department, (Railway,) dated Simla, 28th April 1879, No. 1,714 R.

I AM directed to acknowledge the receipt of your letter No. 257 R, dated the 4th March 1879, and in referring to the telegram dated 19th April 1879, marginally noted, to request that you will report the probable amount of outlay against this sanction for record.

"South Indian can indent for 12 miles steel rails, same section as iron 40 lb. rails. This gives about 41¼ lb. to the yard forward. Tell them to consult Rendel at home on section. Answer about best form and weight of rail for metre gauge will be given on Molesworth's return from England."

2. I am to point out that no indent accompanied your letter under reference.

No. 92. ORDER THEREON, 27th May 1879, No. 458 R.

COMMUNICATED to the Consulting Engineer for Railways who will furnish the report asked for.

2. The Consulting Engineer's attention is directed to paragraph 2.

(True Extract.)

(Signed) J. H. M. SHAW-STEWART, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.
Railway Branch.

To the Consulting Engineer for Railways.

Exd. S. T. Austin.

Spare Copies

RAILWAY.

Govt. of {1879} Madras.

PUBLIC WORKS.

To

THE CONSULTING ENGINEER
FOR RAILWAYS.

Dated May 27th.

Issued

Recd. *Encl.*

G. O., 27th May 1879, No. 458 R.

MAY.

Nos. 91-92.

Indent for Permanent-way materials required for renewals and additional works for the South Indian Railway.—Letter from the Government of India requesting to report the probable amount of outlay against the —, communicated to the Consulting Engineer for Railways.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

5th July 1879, No. 574 R.

Railway.

Read the following:—

No. 4. NOTE.

No. 273.

WITH reference to paragraph 1 of letter from Government of India, No. 1,714 R, dated 28th April 1879, embodied in Proceedings of Government, No. 458 R, dated 27th ultimo, the undersigned has the honor to state that the probable amount of outlay for 12 miles steel rails of the same section as the iron 40 lbs. rails, required by the South Indian Railway, is Rupees 1,29,055-4-8.

MADRAS, 27th June 1879. (Signed) J. H. M. SHAW-STEWART, Col., R.E., Consulting Engineer for Railways.

No. 5. ORDER THEREON, 5th July 1879, No. 574 R.

ORDERED to be forwarded to the Government of India with reference to their letter No. 1,714, dated 28th April 1879.

(True Extract.)

(Signed) J. H. M. SHAW-STEWART, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

Exd. E. C. Shunker.

Spare Copies

RAILWAY.

Govt. of {1879} Madras.

PUBLIC WORKS.

To

THE CONSULTING ENGINEER
FOR RAILWAYS.

Dated July 5th.

Issued

Recd. *Encl.*

G. O., 5th July 1879, *No.* 574 R.

JULY.

Nos. 4-5.

Indent for Permanent-way materials for the South Indian Railway.—Note by the Consulting Engineer for Railways stating the probable amount of outlay against the —, forwarded to the Government of India.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

23rd August 1879, No. 709 R.

Railway.

Read the following paper :—

No. 88. From Major-General J. S. TREVOR, R.E., Officiating Deputy Secretary to the Government of India, Public Works Department, (Railway,) to the Secretary to the Government of Madras, Public Works Department, (Railway,) dated Simla, 30th July 1879, No. 3,188 R.

IN acknowledging the receipt of your No. 575 R., dated the 5th July 1879, reporting Rupees 1,29,055-4-8 as the probable amount of outlay for the 12 miles of steel rails of the same section as the iron 40 lbs. rails required for renewals and additional works on the South Indian Railway, sanctioned in Public Works Department telegram of the 19th April last, I am directed to state that the sanction has been entered in the register of this office as No. 10 S.I.R. of 1879.

2. I am to take this opportunity of forwarding for information copy of a note by the Consulting Engineer to the Government of India for State Railways, dated the 18th July 1879, on the best form and weight of metre gauge rails, promised in Public Works Department telegram above quoted.

MEMORANDUM by the Consulting Engineer to the Government of India for State Railways on the best form and weight of metre gauge rails in connection with letter from the Government of Madras, No. 257 R., of the 4th March 1879.

I AM satisfied with the weight of 40 lbs. for the permanent-way of our metre gauge State Railways. I am also satisfied with the form. I do not know what the section of the South Indian Railway is, and whether it is of a form more liable to crush than the form we have adopted. There appears to me to be nothing in the accompanying case to show that the rails are not sufficiently strong, in fact I am not an advocate for rails heavier than necessary. I consider that too great rigidity leads to excessive wear quite as much as excessive weakness. There is nothing in the papers to indicate that the failure in the lighter rails is caused by their light section, on the contrary it appears that the failure has occurred in certain consignments of inferior iron, and it would be obviously incorrect to draw conclusions from the comparison between rails of different quality. The manufacture of rails of late has deteriorated so very much in England that I have advised that iron rails should be no longer used on the State Railways. I would not advise a reduction of the section in consequence of the substitution of steel for iron, but would retain the old section of 40 lbs. iron rail which will give a slightly heavier section in steel.

I should have been glad to have seen the section of the South Indian Railway and also to have had a report of the manner in which the iron rails have failed.

No. 89. ORDER THEREON, 23rd August 1879, No. 709 R.

COMMUNICATED to the Consulting Engineer for Railways with reference to the under-mentioned Proceedings :—

4th March 1879, No. 256 R.
27th May „ „ 458 R.
5th July „ „ 574 R.

2. The Chief Engineer of the outh Indian Railway Company should be called on to report fully upon the manner i which, and the extent to which, the light rails on the line have failed; and to furni h a section of the rail in use.

(T rue Extract.)

(Signed) J. H. M. SHAW-STEWART, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
» Examiner of Railway Accounts.

Exd. S. T. Austin.
Spare Copies

RAILWAY.

Govt. of {1879} Madras.

PUBLIC WORKS.

To

THE CONSULTING ENGINEER
FOR RAILWAYS,

&c., &c., &c.

Dated August 23rd.

Issued

Recd. *Encl.*

G. O., 23rd August 1879, No. 709 R.

AUGUST.

Nos. 88-89.

Best form and weight of metre gauge rails. —Letter from the Government of India forwarding copy of memorandum by the Consulting Engineer to the Government of India for State Railways on the — , communicated to the Consulting Engineer for Railways.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

20th November 1880, No. 675 R.

Railway.

Read the following paper:—

No. 19. From the Consulting Engineer for Railways, dated Madras, 15th November 1880, No. 290.

From W. S. BETTS, Esq., Agent of the South Indian Railway, to the Consulting Engineer for Railways, dated Negapatam, 8th November 1880, No. 9,803.

YOUR letter No. 790 of the 23rd of August last. The Board having requested their Consulting Engineers to state their opinion on the defective rails and the mode of laying sleepers, the following report has been submitted by Messrs. Bruce and Fox:—

"It is clear from the returns given by the Chief Engineer, that the largest number of defective rails were manufactured by Messrs. Hopper, Radcliffe and Co. Reference to the tests applied when these rails were made does not afford any clue to the reason of this comparative failure, though the records show that some of the rails made by this firm were rejected on account of inferiority. The way in which the rails have failed appears to have been in the crushing or laminating of the head. No doubt the Consulting Engineer to the Government is right in saying that the best way to avoid this in future will be by adopting steel instead of iron rails."

"We still think it would be a great advantage to increase the weight of the rail somewhat, as well as to adopt steel; at the same time the latter alteration, which alone is approved by the Government, will be a material improvement."

"We agree with the Chief Engineer in laying the sleepers with the heart of the wood uppermost, as we believe it adds materially to the life of the sleepers."

SUBMITTED for the information of Government, in continuation of No. 177, dated 19th July 1880.

No. 20. ORDER THEREON, 20th November 1880, No. 675 R.

ORDERED to be forwarded to the Government of India with reference to their letter No. 182 R.C., of the 6th May 1880, and in continuation of Proceedings No. 441 R., dated 2nd August 1880.

(True Extract.)

(Signed) J. SHAW-STEWART, Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

Exd. S. T. Austin.
Spare Copies

RAILWAY.

Govt. of {1880} Madras.

PUBLIC WORKS.

To

THE CONSULTING ENGINEER
FOR RAILWAYS.

Dated November, 20th.

Issued

Recd. *Encl.*

G. O., 20th November 1880, No. 675 R.

NOVEMBER,
Nos. 19-20.

Defective rails and the mode of laying sleepers on the South Indian Railway.—Report on the — ordered to be forwarded to the Government of India.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

2nd August 1880, No. 440 R.

Railway.

Read the following paper:—

No. 3. From the Consulting Engineer for Railways, dated Madras, 19th July 1880, No. 177.

From W. S. BETTS, Esq., Agent of the South Indian Railway, to the Consulting Engineer for Railways, dated Negapatam, 17th July 1880, No. 9,335.

YOUR letter No. 543 of the 7th ultimo.

The Acting Locomotive Superintendent informs me he cannot trace any record in his office of experiments or observations which may have been made by his predecessor to establish the fact that the wear of tyres is greater on the 40 lbs. than on the 68 lbs. rails.

In reply to the 3rd paragraph of your letter, the Chief Engineer has reported as follows :—

"As an experiment I had a mile of permanent-way laid near and to the south of the old Vellar with the round side of the half round sleepers laid uppermost, our practice being to lay the flat side up and the round side down. Our experience with this mile is the sleepers are more difficult to pack, as the ballast has to be removed from the sides above down to the level of the bottom of the sleeper before the sleeper can be packed and beaten up properly, and it is not found that when packed the road keeps in order longer than with the sleepers round side down. The platelayers complain much of the difficulty in packing with the flat side of the sleeper down, and the sleepers get much more damaged and broken in the process than when the round side is down. No difference has been observed in the rate of wear in the rails on flat *versus* round side down."

SUBMITTED for the information of Government with reference to their Proceedings, dated 19th May 1880, No. 290 R.

No. 4. ORDER THEREON, 2nd August 1880, No. 440 R.

ORDERED to be forwarded to the Government of India with reference to their Under Secretary's letter, No. 182 R.C., of 6th May 1880.

(True Extract.)

(Signed) J. SHAW-STEWART, Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

No. 5. (DOCKET No. 441 R., dated 2nd August 1880.)

Forwarded.

(Signed) J. SHAW-STEWART, Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

Exd. E. C. Shunker.
Spare Copies

RAILWAY.

Govt. of {1880} Madras.

PUBLIC WORKS.

To

THE SECRETARY TO THE
GOVERNMENT OF INDIA.

Dated August, 2nd.

Issued

Recd. *Encl.*

G. O., 2nd August 1880, No. 441 R.

AUGUST.

Nos. 3-5.

FORWARDING report on metre gauge rails on the South Indian Railway.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

19th May 1880, No. 290 R.

Railway.

Read the following paper:—

No. 25. From Captain F. FIREBRACE, R.E., Under Secretary to the Government of India, Public Works Department, (Railway Construction,) to the Secretary to the Government of Madras, Public Works Department, (Railway,) dated Simla, 6th May 1880, No. 182 R.C.

REFERRING to your No. 997 R., dated 23rd December 1879, forwarding papers regarding the weight and renewal of metre gauge rails on the South Indian Railway, I am directed to forward for information copy of a memorandum on the subject by the Consulting Engineer to the Government of India for State Railways.

Memorandum by the Consulting Engineer to the Government of India for State Railways on weight of rails, South Indian Railway, dated the 23rd April 1880.

IT does not appear to me that there is any evidence to show that the rails are too light, the proportion of renewals for the last half-year appears to have been somewhat less than ·005 of the total quantity.

2. On reference to the statistics of traffic for the half-year ended 31st December 1878, I find that with a much lighter rail and a heavier wheel load on the Oudh and Rohilkhund Railway the renewals are only ·004; the rails being 36 lbs per yard, and the wheel load 5 tons on the Oudh and Rohilkhund Railway, whereas on the South Indian Railway the rails weigh 40 lbs. per yard and the wheel load is only 3 tons.

3. On the Rajputana State Railway, where the gradients are more trying than on the South Indian Railway, the renewals are ·003 with a 36 lbs. rail, and some of this renewal is due to the steel clips which were sent out with these rails.

4. On the Holkar State Railway the renewals with 36 lbs. rails are only ·003, and on that railway the gradients are still more trying than on the Rajputana Railway. These facts point to the probability that the lightness of the rails is not the cause of the number of renewals. The manufacture of *iron* rails has of late years been so unsatisfactory that several years ago I recommended that the supply of iron rails should be discontinued and steel rails substituted for them in all future orders. I believe that good steel rails will be found satisfactory without increase of weight. I must dissent entirely from the opinion expressed by the Locomotive Superintendent that the "excessive elasticity of the light road is lamentably destructive to tyres."

5. A 40 lbs. rail is not "excessively elastic" with the limits of load adopted on the South Indian Railway, and a rigid permanent-way is more destructive to tyres than an elastic one. It is very possible that the engines may have had their tyres worn more by crushed rails than by sound rails, but the Locomotive Superintendent appears not to have distinguished between cause and effect.

6. The top table of the rail in the section sent appears to be of smaller radius than desirable.

7. It is possible that the placing the sleepers upside down may have some effect on the wear of the rails, and experiments on this point might be made, but I am inclined to think that inferior iron is the cause of the crushing of the rails.

No. 26. ORDER THEREON, 19th May 1880, No. 290 R.

COMMUNICATED to the Consulting Engineer for Railways, whose special attention is drawn to the last paragraph of the memorandum forwarded by the Government of India.

(True Extract.)

(Signed) J. H. M. SHAW-STEWART, Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

Exd. E. C. Shunker.
Spare Copies

RAILWAY.

Govt. of {1880} Madras.

PUBLIC WORKS.

To

THE CONSULTING ENGINEER
FOR RAILWAYS.

Dated May, 19*th*.

Issued

Recd. *Encl.*

G. O., 19*th May* 1880, *No.* 290 R.

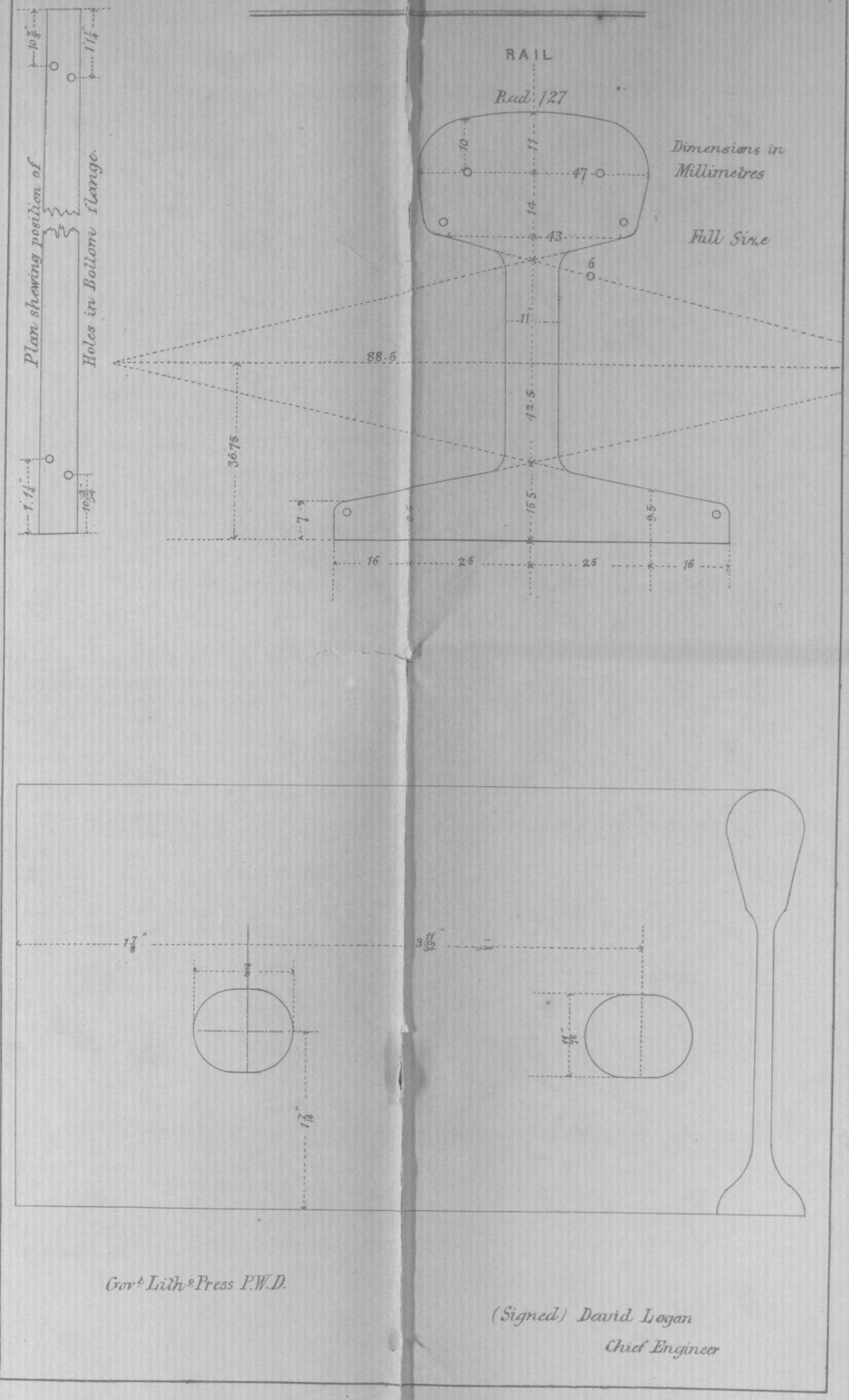
MAY.

Nos. 25-26.

Weight and renewal of metre gauge rails on the South Indian Railway.—Letter from the Government of India forwarding a memorandum by the Consulting Engineer to the Government of India for State Railways on the subject of — communicated to the Consulting Engineer for Railways.

865.A

SOUTH INDIAN RAILWAY COMPANY



Gov^t. Lith^o. Press P.W.D.

(Signed) David Logan
Chief Engineer

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

23rd December 1879, No. 997 R.

Railway.

Read the following paper:—

No. 102. From the Consulting Engineer for Railways, dated Madras, 19th November 1879, No. 437.

From W. S. BETTS, Esq., Agent of the South Indian Railway, to the Consulting Engineer for Railways, dated Negapatam, 1st November 1879, No. 8,189.

YOUR letter No. 1,279 of the 11th September last.

I forward herewith drawing No. 865 A, containing a diagram of the section of our 40-lb rail; a statement showing the number of unserviceable rails removed from the line from the commencement up to the 30th of June last on each section of the line, in the order of its being opened to public traffic, is also submitted.

The following is a copy of the Chief Engineer's report on the subject:—

"From this statement it will be seen that 2,231 rails have been removed up to 30th June 1879.

"On the Northern Extension (217 miles long) 910 rails were removed between the 1st September 1876 and 30th June 1879; and on the Southern Extension, 215 miles long, 1,321 rails were removed between September 1875 and 30th June 1879.

"The wear has shown chiefly in the crushing, spreading or 'brooming' of the heads of the rails, and while not confined to any particular part has occurred chiefly at or near the centre of the length of the rails.

"The deterioration has taken place to the greatest extent near Madras, where the heavy stone traffic for the Harbour Works has told. It will be seen from the accompanying statement that on the Madras-Tindivanum length of 75 miles 815 rails were removed in three years, against 814 taken out of the Trichinopoly-Madura 96 miles in four years.

"The rails have not much substance in them to begin with, and once deterioration begins under the combined influences of traffic and the weather, the number of renewals accumulate in a rapidly increasing ratio.

"In addition to the wear of the rails themselves the reaction on the rolling-stock is injurious. I think the Locomotive Superintendent can tell you of much tyre destruction, due in a great measure to the small amount of bearing surface presented by these thin 40-lb. rails to the weights he has to run upon them.

"It appears to me, therefore, that our experience points to the insufficiency of a 40-lb. rail for use under present traffic, and if that traffic increases to the extent we hope, the frequent renewals will so handicap our returns as to render it impossible to show a flourishing revenue account.

"Even supposing if proved that the quality of the iron now in the line is not in all cases of the best, and that much of the deterioration is due to that cause, I doubt very much if the substitution of better iron, or even of steel, would result in an ultimate economy equivalent to at once adopting a heavier rail for renewals, say of from 50 lbs. to 56 lbs. a yard."

The Locomotive Superintendent reports as under:—

"In replying to this subject I think it might be well to emphasize the fact that our rail is too light beyond any question of mere opinion based upon experience that is not comparative. We have the heavy (68 lbs.) and light (40 lbs.) rail in use. It is an undoubted fact that the excessive elasticity of the light road is lamentably destructive to tyres, so much so that I am forced to change my engines about, giving them a term of work on the heavy rail to equalise their wear. I estimate at least one-fourth of a tyre's wear is saved on the heavier metal. The light rail, coupled with the half-round sleeper being placed round side down, does not stand up under our 6-ton axle load."

SOUTH INDIAN RAILWAY.

ENGINEERING DEPARTMENT.

STATEMENT showing number of Rails renewed up to the half-year ending 30th June 1879 on each Section of the Line as opened up.

Sections.	Rails laid.*	Date of opening.	Number of Miles opened for Traffic.	NUMBER OF RAILS RECEIVED.									
				Half-year ending 31st Dec. 1875.	Half-year ending 30th June 1876.	Half-year ending 31st Dec. 1876.	Half-year ending 30th June 1877.	Half-year ending 31st Dec. 1877.	Half-year ending 30th June 1878.	Half-year ending 31st Dec. 1878.	Half-year ending 30th June 1879.	Total.	Grand Total.
			MS. CHS.										
Madras-Tindivanam Section	1st May 1875.	1st Sept. 1876.	76 3	..	..	20	62	43	98	105	487	815	
Tindivanam-Cuddalore Section	1st Feb. ,,	1st Jan. 1877.	51 77	..	..	..	33	4	13	7	44	101	
Cuddalore-Porto Novo Section	1st June ,,	1st July ,,	17 14	..	..	..	..	..	..	1	10	11	
Porto Novo-Chidambaram Section	1st Jan. 1878.	1st Oct. 1878.	6 66	..	..	..	..	..	..	1	4	5	1,000
Chidambaram-Anaikarai Chattram Section ..	1st July ,,	1st July 1879.	4 40	..	..	..	..	..	..	..	..	..	
Anaikarai Chattram-Shiyali Section ..	1st Aug. 1876.	1st Jan. 1878.	6 1	..	..	..	..	..	..	1	3	4	
Shiyali-Mayaveram Section	1st July ,,	1st July 1877.	12 18	..	..	..	..	..	..	4	1	5	
Mayaveram-Tanjore Section	1st March ,,	15th Feb. ,,	42 34	..	..	..	5	6	17	23	8	59	
Trichinopoly-Madura Section	1st Jan. 1874.	1st Sept. 1875.	97 53	22	28	38	42	77	182	247	178	814	1,321
Madura, Tuticorin and Tinnevelly Section ..	1st June ,,	1st Jan. 1876.	116 60	..	9	25	32	49	47	205	140	507	
Total ..	..	..	431 46	22	37	83	174	179	357	594	875	2,321	2,321

* The date given is the average date for each length.

TRICHINOPOLY,
30th October 1879.

(Signed) D. LOGAN,
Chief Engineer.

PUBLIC WORKS DEPARTMENT, 23RD DECEMBER 1879, No. 997 R. 3

SUBMITTED to Government with reference to their Proceedings dated the 23rd August 1879, No. 709 R.

No. 103. ORDER THEREON, 23rd December 1879, No. 996 R.

ORDERED to be forwarded to the Government of India with reference to paragraph 2 of the memorandum by the Consulting Engineer to the Government of India forwarded with their letter No. 3,188 E. of 30th July 1879.

(True Extract.)

(Signed) J. H. M. SHAW-STEWART, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.

No. 104. (DOCKET No. 997 R., dated 23rd December 1879.)

FORWARDED accordingly.

(Signed) J. H. M. SHAW-STEWART, Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Railway Branch.

Exd. S. T. Austin.
Spare Copies

RAILWAY.

Govt. of {1879} Madras.

PUBLIC WORKS.

To

THE SECRETARY TO THE
GOVERNMENT OF INDIA.

Dated December 23rd.

Issued

Recd. *Encl.*

G. O., 23rd December 1879, No. 997 R.

DECEMBER.

Nos. 102-104.

BEST form and weight of metre gauge rails, South Indian Railway.

F MADRAS.

GOVERNMENT O

EPARTMENT.

PUBLIC WORKS D

No. 256 R.

4th March 1879

Railw

Read the following paper :—

No. 27. Endorsement of the Consulting
7th February 18

From W. S. BETTS, Esq., Agent of the S
Engineer for Railways, dated Nega

I SUBMIT, herewith, for the sanction of
(each in duplicate) upon the Board of Director
to enable the Engineering Department to effe
gauge of the line between Trichinopoly and
material to complete additional siding accomm

The Chief Engineer thus reports upo
requisitions : "Herewith I have the pleasure
way materials and other stores required for t
Erode.

"I also enclose a separate general inde
The 40 lbs. rails and fastenings are require
at existing and new stations, &c. &c.

"The 68 lbs. rails and fastenings are re
tion of these rails are provided for in the e
forthcoming from the existing sidings at Ero
between the point at which the new line bran
length of rails will not be avaiable until the
necessary to have the new Erode Station co
Passoor to Erode is converted, it becomes ne
purpose. The materials set free from the le
renewals hereafter.

"As only a portion of the 68 lbs. ra
conversion estimate, I have thought it be
general indent than to include it in the '
conversion."

The following statement shows how the

"Estimated requirements for renewals u
"For sidings, &c., at the new stations as
"For siding at Mount Copper ...

"Rails available in stock (4½ miles) an
e

"An aggregate of 1¾ miles of rails (t
past twelve months.
"Indent now submitted for ...

* Vandalur.
Kolatur.
Mylum.
Ayanthapuram.
Tittai.
Samianellore.

Engineer for Railways, dated Madras,
9, No. 84.

uth Indian Railway, to the Consulting
atam, 23rd October 1878, No. 6,158.

overnment, indents Nos. 165 and 166
for a supply of permanent-way material
in two operations the alterations of the
Erode, and also to provide sufficient
odation, &c.

the need for sending forward these
to forward an indent for the permanent-
e conversion of gauge, Trichinopoly to

for permanent-way materials for stock.
to meet renewals, extension of sidings

uired for the new Erode Station ; a por-
stimate, but the balance is reckoned as
e, and the portion of the line which lies
hes off and the present siding. As this
conversion is complete, and as it will be
pleted by the time the last length from
essary to obtain more materials for the
gth above specified will be available for

s indented for are provided for in the
er to apply for the whole through the
pecial' indent for items required for the

Chief Engineer arrives at the figures :—

	MILES.
to 31st December 1879 ...	8
per list* at 25 chains each ...	3½
... ...	1
"Total ...	12½
n temporary use (7 miles) ...	11½
"Balance ...	1

k) have been used for renewals during the

...g ... ... Miles 10"

Kalligoody.
Kamarapuram.
Tulukapatti.
Thattaparai.
Ambathoray.

From the same Officer, dated Neg

patam, 21st November 1878, No. 6,291.

YOUR letter, No. 1,358, of the 11t
following opinion expressed by the Chi
a reconsideration of the subject I trust
Government being accorded to English

"My indent was sent in with the
Erode yard and the approach to it.

"I think it desirable that all renew
we have the 68 lbs. rail to the yard ma
same weight of metal. I am of opinio
ciently strong to be used economically,
system where it is not now in use.

"It should be remembered that w
pot-sleepers adapted for the 68 lbs. met
hereafter with 40 lbs. rails the pot-s
altogether.

"I would much rather see the hea
to those parts of the system on which th

"I shall be glad if the general inde

instant. I wish to call your attention to the
Engineer, in which I fully concur. Upon
ou will be able to recommend the sanction of
ndent No. 166 :—

tention to lay in the heavy rail at once in the

ls on the Negapatam-Erode Division on which
erial at present should be renewed with the
that the 40 lbs. to the yard rail is not suffi-
nd I deprecate its extension to portion of the

are now getting out a considerable stock of
ls, and if these (the 68 lbs. rail) be replaced
leepers will in time have to be abandoned

ier rail or some approximation to it extended
e 40 lbs. rail is now laid.

t can be sanctioned as speedily as possible."

From Colonel J. H. M. SHAW-STEWA
to the Agent of the South Ind
1878, No. 1,442.

RT, R.E., Consulting Engineer for Railways,
an Railway, dated Madras, 27th November

ADVERTING to your letter, No. 6,29
observe that the weight of rails to be u
Indian Railway Company was fixed by th

2. If experience has shown that th
I beg that the question may be brought
Government with definite proposals reg
for the existing 40 lbs. rails. I do not
on a side issue, the permanent retention
gauge system ; more especially on a sect
will probably be lighter than on any othe

3. With regard to the stock of p
conversion of gauge there will probably
when necessary. The question can be br

4. I am, therefore, of opinion that
No. 1,358, of the 11th instant, should be
of India.

, dated the 21st instant, I have the honor to
ed on the metre gauge system of the South
e Government of India at 40 lbs. to the yard.

is is not the most economical weight of metal
rward in due course for the consideration of
rding the weight of metal to be substituted
el myself justified in sanctioning, as it were
of 68 lbs. rails on any portion of the metre
n like the Erode Branch, where the traffic
r portion of the Company's lines.

t-sleepers which have been ordered for the
be no great difficulty in disposing of them
ught forward in due course.

an indent, revised as suggested in letter,
rwarded for submission to the Government

From W. S. BETTS, Esq., Agent of th
Engineer for Railways, dated

South Indian Railway, to the Consulting
egapatam, 17th January 1879, No. 6,610.

IN compliance with your letter, No.
herewith, in triplicate, an indent for perm

2. I also forward copy of the Chief
40 lbs. and 68 lbs. material. I trust tha
you will be able to recommend, and that
provision of the heavier material which
economical than the 40 lbs. rails and faste

42, of the 27th November last, I forward,
ment-way material of the 40 lbs. class.

Engineer's report upon the subject of the
, after reading the facts therein recorded,
overnment will be pleased to sanction, the
has proved so much more efficient and
ings.

SOUTH INDIAN RAILWAY.

Letter from the Chief Engineer, to the Agen
No. C 28

Material for Conve

YOUR No. 33.

In support of the opinion which I expressed i
I have the pleasure now to forward the accomp
of 40 lbs. and 68 lbs. rails, respectively, on this li
from which it will be seen how the renewals of 40

The number of renewals with the 40 lbs. r
light rails heads get worn down and are less able

For the current half-year I have provided fo
estimate, and I consider that this number will hav

Comparing the life of 68 lbs. rails with 40 l
appears that during the ten years previous to
opened throughout from Negapatam to Erode) t
portion of the line against 825 renewals of 40 lbs.
poly-Tuticorin Divisions, being 216 renewals of 6
renewals of 40 lbs. rails in three years.

Assuming that the ratio of wear would be equ
be much greater in the lighter rail, there would d
(68 lbs. rails taken at 7 lineal yards each, 40 lbs
2,750 of the 40 lbs. ones equivalent to 46 tons c
weight of metal against the use of such light rails.

SOUTH INDIA RAILWAY.

ENGINEER D ARTMENT.

Abstract of Ren als of Rails.

Description.	Miles of Rails.			Number of Rails Renewals.
	MS.	CHS.	LKS.	
For the half-year ending 30th June 18 6.				
68 lbs. road	359	17	72½	5
40 lbs. road	450	73	56	37
For the half-year ending 31st December 876.				
68 lbs. road	356	69	16½	...
40 lbs. road	625	28	93	116
For the half-year ending 30th June 1 77.				
68 lbs. road	359	28	44½	3
40 lbs. road	830	69	17	166
For the half-year ending 31st December 877.				
68 lbs. road	356	99	42½	...
40 lbs. road	897	46	21	281
For the half-year ending 30th June 1 8.				
68 lbs. road	362	20	53½	11
40 lbs. road	908	12	68	492

TRICHINOPOLY,
14th January 1879.

(Signed) F. F. SMITH,
for Chief Engineer.

To accompany Chief Engineer's letter, No. 134, 14th January 1879, to the Agent.

SUBMITTED for the consideration of overnment, and for transmission to the Government of India.

2. With the first of the above let… rs the Agent, South Indian Railway, submits an indent for permanent-way materials required for renewals and additional works. This indent provides 68 lbs. material of t… e old broad gauge pattern for about 1¾ miles, and 40 lbs. material of the metre gaug… type for 10 miles of line. The bulk of the 68 lbs. material is intended for with a… riew to its being laid on the new line and sidings at Erode, forming the junction … rangements in connection with the conver- sion of the Trichinopoly-Erode Section … the metre gauge.

3. It was suggested to the Ag… t that, as those lines will ultimately form portions of the metre gauge system, it app… ared desirable that the additional permanent- way required should be of the type us… l for the metre gauge, and that renewals on the sections now laid with heavy metals… hould be made with material of that descrip- tion. For this purpose it would be nec… ssary to substitute light for heavy metals on a mile or so of line at a time, and to us… he heavy metals thus removed for renewals. By commencing in this manner at Neg… patam the light metals would be gradually extended to the westward.

4. In his second letter the Agent … quotes the opinion of the Chief Engineer that all renewals on the sections laid with t… e 68 lbs. rails should be made with metals of the same weight. Mr. Logan is of opi… nion that the 40 lbs. rail is not sufficiently strong for economical use, and he would … advocate a heavier rail than that now laid on the metre gauge lines. In reply the … Agent was informed that I did not feel justi- fied in recommending the permanent rete… tion of the 68 lbs. rail on any portion of the metre gauge system, and he was request… d to submit an amended indent providing for 40 lbs. rails only. Both* indents are now submitted for the decision of the Government of India, and for sanction to the one approved.

	RS.	A.	P.
*(a)	1,42,819	6	0
(b)	1,29,055	4	8

5. No definite proposals are submi… ed regarding the weight of metal which the Chief Engineer considers should be sub… ituted for the present metre gauge rail; and before dealing with the general question … it seems desirable to obtain the experience which has been gained in respect to the … durability of this rail on the State Railways in Northern India. The number of re… ewals that are taking place on the South Indian Railway is undoubtedly large, bu… this may be due to individual bad rails or to a faulty consignment from a particular … manufacturer. Specimens of the rails that have failed having been sent to the Con… sulting Engineers in London, Messrs. Bruce and Fox recorded the following remarks … regarding them:—

> "All the samples are instances of imper… fect weld between the main body of the rail and the top slab. It is impossible to … prevent this occurring in isolated cases from the pile not being sufficiently heated. … Our hope is that, as these rails have been out for many years, the Company would ha… ve heard of failures much sooner if there had been many of them."

6. The experience gained in Noth… rn India, where these rails have now been in use for some years, will be a better gui… de in forming a decision on the question now raised. In the following table the figu… es taken from the Review of the Revenue Account of the Rajputana Railway are con… trasted with those given by the Chief Engi- neer in the accompanying papers:—

	Rajputana.		South Indian Railway.	
	Miles of Rail.	No. of Miles renew ed.	Miles of Rail.	No. of Miles renewed.
1876, First half… … … … …	663	225	451	37
„ Second „ … … … … …	675	250	625	116
1877, First „ … … … … …	729	211	831	166
„ Second „ … … … … …	740	267	898	281
1878, First „ … … … … …	…	…	908	492

7. The average age of rails on the … Rajputana line during the last period for which figures are given was 3-2 years, a… d on the South Indian about 2 years. It

will be observed that, while the renewals … n the latter line appear to increase with the age of the rails, this is not the case … n the Rajputana Railway. The speed attained on the South Indian is often far in … xcess of that sanctioned, and this doubt- less has some effect on the life of the rails. … It would be well to ascertain whether on the Rajputana line any systematic chec… is exercised in regard to the maximum speed of trains which might account for the … smaller number of renewals on that line. If not, the only conclusion to be drawn is … hat the South Indian rails are inferior in quality to those obtained for the State lines. … The traffic on the two lines appears to have been about equal, but the gradients a… rather in favor of the Rajputana.

8. It is noteworthy that most of the … ils which at first failed belonged to one consignment. In February 1877 the Chief … Engineer reported as follows:—

> "Failure has occurred generally in isola… l cases and has not been more frequent upon steep gradients or curves than upon f… orable parts of the line."

And again in October 1877:

> "The failure of rails in the line generally … has in his opinion been due to imperfections in individual rails."

9. The difference in cost per mile of li… e, as gathered from the two indents now submitted, is Rupees 8,067, the figures bei… g Rupees 19,091 for heavy, and Rupees 11,024 for light, materials.

10. In connection with this indent a … uestion has arisen regarding the budget allotment for English stores against which i… should be sanctioned in accordance with

Proceedings of Government, 3rd October 1878, No. 946 R.

paragraph 15 of Resolution of the Govern- ment of India, dated 3rd September 1878, No. 3,616 R. Although the indent may be sanctioned in this official year the stores … ill not be supplied until next year. It will be probably found convenient that in… ents be sanctioned against the provision for the year in which they are submitted, a… t will be impossible to fix with certainty the time within which the stores will be sup… lied.

11. To whatever cause the failure o… so large a number of rails on the South Indian Railway may be due there is urgent need of materials for renewals at the present time. The latest consignments of … ils have been of steel, and it is presumed that the indent contemplates a further sup… ly of rails of this description. They will doubtless be found more durable than the … on ones originally laid; and although the experience already gained tends to the co… clusion that a 40 lbs. rail of iron is not sufficiently heavy this may not apply in th… case of steel. Considering the urgency of the matter it is recommended that the … gent be authorised to telegraph to Eng- land for the supply of 10 miles of 40 lbs. st… el rails, leaving the question of the weight to be adopted for further renewals to be de… ided by the Government of India. Unless this step be taken it is probable that the o… ening of the Pondicherry Branch will be delayed, in consequence of the material ord… ed for it being required to meet renewals on the older sections of the line.

(Signed) J. H. … M. SHAW-STEWART, Colonel, R.E., Consulting Engineer for Railways.

No. 28. ORDER THEREON, 4th M… ch 1879, No. 256 R.

HIS GRACE the Governor in Council … of opinion that the Negapatam to Erode Section of the South Indian Railway Co… ny's system should be maintained with rails of the same weight as hitherto (68 … .), and that for the present at least the renewals on the rest of the system should … made with 40 lbs. rails.

2. The question of increasing the w… ht of rails to be hereafter used in renew- ing the line now laid with 40 lbs. rails w… be referred for the views of the Govern- ment of India.

3. The indent for permanant-way ma… rial, providing for 1¾ miles of 68 lbs. rails and for 10 miles of 40 lbs. of rails, am… nting to Rupees 1,42,819-6-0, will be

forwarded for the sanction of the Gover
may be communicated by telegraph.

4. His Grace observes, with regar
to in paragraph 5 of the Consulting Eng
the Consulting Engineers in England, tha
and can well be if the inspection be thor

5. His Grace is of opinion that in
vision for the year in which they are su

(Here enter No. 257

(True

ent of India with a request that the reply

o the consignment of faulty rails referred
er's Note, and to the recorded remarks of
such inferior material ought to be detected,
gh and the tests sufficiently frequent.

nts should be sanctioned against the pro-
itted.

dated 4th March 1879).

xtract.)

(Signed) C. J. SMITH, Major, R.E.,
Ag. Joint Secy. to Govt., P.W.D.,
Railway Branch.

To the Consulting Engineer for Railways.
" Examiner of Railway Accounts.

Exd. C. Howarth.
Spare Copies

RAILWAY.

Govt. of {1879} Madras

PUBLIC WORKS.

To

THE CONSULTING ENGINEER
FOR RAILWAYS,
&c., &c., &c.

Dated March 4th.

Issued

Recd. *Encl.*

G. O., 4th March 1879, *No.* 256 R.

MARCH.
Nos. 27-28.

Indent for permanent-way materials required for renewals and additional works for the South Indian Railway, forwarded for the sanction of the Government of India, and orders passed in regard to the weight of rails.

PUBLIC WORKS SECRETARIAT MADRAS