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RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

Regd. } *Spare copies*

G.O., No. 1399 Ry., 6th December November 1899.

December

NOVEMBER.

Pamban Branch, South Indian Railway

Directing that the plans, reports and estimates of the — prepared by the Engineer-in-Chief of the Railway, be forwarded for the orders of the Government of India, in view to the selection of the best route.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following papers :—

G.O., Nos. 529-30 Ry., dated 5th August 1897.
" " 968-69 " " 28th July 1898.
" No. 1349 Ry., dated 2nd November 1898
" " 476 " " 26th April 1899.
" " 580 " " 15th May 1899.
" " 634 " " 3rd June 1899.

Read also the following papers :—

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 29th September 1899, No. 970.

With reference to the instructions conveyed in Madras Government Order No. 968 Ry., dated 28th July 1898, regarding the survey of the South Vaigai route for a line of metre gauge railway from Madura to Pamban with a branch to Sivaganga, I have the honour to forward two sets of the plans and sections, for the survey which has been made by the officers of this Company from Madura to Mandapam, together with 90 copies each of an estimate for the construction of the line, and of a report upon the project in which—pages 10 to 13—is embodied the report of a traffic survey made by an officer of the Traffic department of the Company. The type drawings to accompany the above will be forwarded later on.

2. The plans and estimate now sent are for a line on the *south* bank of the Vaigai river, the desirability of which route has been already urged by the Agent of this Company (*vide* Madras Government Order No. 869 Ry., dated 27th June 1898), and I need not therefore go into the matter again. *The favour of early orders is requested upon the route to be finally adopted.*

3. On page 3 of the estimate is given a comparative statement of the estimate now prepared by Mr. Michell and that submitted in 1895 by Mr. Shadbolt, from which it will be seen that after deducting the cost of locomotives and rolling stock (for which Mr. Shadbolt did not make any provision) from Mr. Michell's estimate, the cost of the line as now located is Rs. 57,841 per mile against the Rs. 41,774 of Mr. Shadbolt's estimate, the difference being chiefly due to land and formation being greatly under-estimated in the latter estimate, and to the amount for stations and buildings in the new estimate, including the junction arrangements at Madura not provided for in the estimate of 1895, and the interlocking of signals at stations.

4. In the Engineer-in-Chief's report he alludes, at the foot of page 5, to the *class* of permanent-way having been decided upon; but this is not the case as will be seen from the accompanying pamphlet containing the whole of the correspondence that has taken place on this question.

5. The plan and estimate for the Sivaganga branch will follow.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 9th November 1899, No. 1103.

I have the honour to forward the plans and estimate for the Sivaganga branch of the Pamban branch, with an explanatory note on the differences between Mr. Shadbolt's estimate for the line on the north bank of the Vaigai and the estimate now prepared by Mr. Michell for the line located on the south bank. The difference amounts to Rs. 39,48,331, the details of which are given on page 1 of the note.

2. In Mr. Shadbolt's estimate no provision was made for rolling stock. This item has in the new estimate been estimated at Rs. 12,80,410; so that the comparison has to be made on Rs. 26,67,921, of which figure land and ballast and permanent-way make up nearly one half. The cost of converting Madura into a junction station has been included in the revised estimate; this work amounts to Rs. 2,24,714. Mr. Shadbolt made no provision for any junction arrangements, beyond the small sums of Rs. 1,342 and Rs. 2,036 for staff quarters and station machinery respectively; whereas a line on the north bank would necessitate either the alterations to Madura now proposed, with the cost of doubling the South Indian Railway Vaigai Bridge, or a new station at the junction north of the Vaigai. His estimate is also very much below the mark under main heads III—Formation, and VIII—Stations and Buildings. Nothing is provided for channel and road diversions, for pitching slopes of embankments in tanks, nor for the temporary first ballast. The stations did not provide sufficient accommodation for the estimated traffic. In the estimate now submitted these extra works amount to Rs. 5,29,689, and this added to the increase in value of the permanent way (which is of the same type in both the estimates), to the provision of stone ballast throughout, and to the more liberal valuation of land, totals up to a sum of Rs. 17,60,914 out of the increase of Rs. 26,67,921. The line on the south bank passes through a more populous and better cultivated country and shortens the route for through passengers by about 9 miles, well worth a considerable additional expenditure.

3. The branch by the south bank of the Vaigai including Sivaganga is 2·98 miles longer than that of the line surveyed by Mr. Shadbolt, but the length of the line over which through passengers would have to travel is reduced from 100 miles to 91·33 miles or a distance of 8·67 miles. The extra cost of the line due to this extra length, taking the figures of the new estimate, is Rs. 2,35,137.

4. The estimate for the main line of the Pamban Branch was sent forward to you in advance of that for the Sivaganga Branch in accordance (as I understood from the Engineer-in-Chief) with your wish verbally expressed to him; I was also desirous of getting off a portion of the work before I left for Simla.

ESTIMATES FOR THE PAMBAN BRANCH, SOUTH INDIAN RAILWAY.

Note by the Consulting Engineer for Railways, Madras, dated 15th November 1899.

The Agent of the South Indian Railway Company has now sent in Mr. T. Michell's plans, estimates, and reports, on the project for connecting Madura station of the South Indian Railway with the sea at Mandapam, near Toni Torai, a small village at the Indian end of the narrow chain which includes the islands of Rameswaram and Manar, and the shoals and islands called Adam's Bridge, that stretch across the straits between India and Ceylon.

2. The criticisms likely to be applied to the present estimate will naturally be greatly influenced by the view taken by the critic of the value of the earlier estimate prepared four years ago by Mr. E. I. Shadbolt. In some respects Messrs. Shadbolt's and Michell's estimates are comparable, in other respects not. Thus, for example, no rolling stock was provided in Mr. Shadbolt's estimate, the idea presumably being that 1,000 miles of well stocked line might be expected to be able to work the additional trains required on 100 miles of extension without providing itself with more additional rolling stock than might be contemplated with equanimity in view of the extra traffic likely to come from the extension to the parent line. Again Mr. Shadbolt's estimate contained no provision for junction arrangements, which are now estimated as likely to cost 2¼ lakhs. Land was undoubtedly seriously underestimated by Mr. Shadbolt. Mr. Michell moreover contemplates a better provision for ballast; and experience has dictated the insertion of certain rates on a higher scale for other items of the estimate.

3. But the chief difference between the former and the latter project which makes it difficult to fairly compare them is that, while Mr. Shadbolt contemplated running 100 miles of a circuitous line to the sea, *viâ* a not very important town of some 6,000 inhabitants called Sivaganga, Mr. Michell proposes to reach the same objective by a line shorter by 9 miles, through a much more fertile and all-round better country than that through which Mr. Shadbolt, under the instructions of this Government, proposed to run.

4. Mr. Michell furnishes a separate estimate for a branch to connect Sivaganga with the Madura-Pamban line. Whether this separate branch is a thing of immediate urgency or not is a matter for Government to decide. For the present, and for the purpose of this note, I shall assume that the construction of the short Sivaganga Branch is not urgent and that the primary objective is Mandapam on the sea opposite Pamban. I shall therefore compare Mr. Michell's estimate of the cost of reaching Mandapam from Madura with Mr. Shadbolt's.

5. Mr. Michell has taken it for granted that in any case Sivaganga is, as lawyers say, "of the essence of the contract," and has submitted an Explanatory Note on the differences between his estimate as a whole, including the branch, and Mr. Shadbolt's. But as there is no immediate necessity for the railway to go to Sivaganga at all, at least until the prospects of traffic are such as to justify the connection of this or any other fair sized village with the main line at the cost of 10 or 11 lakhs, all that is necessary is to compare the cost of the two routes connecting Madura with the sea at Mandapam. If we supply Mr. Shadbolt's omission of rolling stock at Mr. Michell's rate per mile, we get the following comparison :—

Mr. Shadbolt's estimate of the cost of connecting Madura with Mandapam, near Toni Torai	Rs. 55,81,784
Mr. Michell's estimate of the cost of connecting Madura with Mandapam, near Toni Torai	„ 71,99,515

Thus there is an increase of about 30 per cent. over the earlier estimate, while if we compare the two estimates per mile, the increase is very much greater, *viz.*, 40 per cent.

6. I propose now to compare the mileage cost, item by item, as estimated by Mr. Michell with that estimated by Mr. Shadbolt. It seems needless to point out that the fact of one estimate having been made at an earlier date than the other implies for it no status of superior accuracy. I would not therefore take the earlier one so seriously were it not that in all the correspondence which has taken place

on the subject of the Pamban branch of the South Indian Railway for some years past, whether in connection with proposals for its promotion by a private Company or by the South Indian Railway Company, it has been taken for granted that it would be an exceptionally cheap line, *viz.*, that the sea could be reached at a cost, including rolling stock, of perhaps 50 lakhs. Now we are told by a new estimator that it cannot be reached far less than 72 lakhs, and it stands to reason that the two principal parties to the contract, *viz.*, Government and the Company, will want to know the reason why. There seems to me to be no doubt that the first estimate was seriously insufficient, in several respects, for a line certain to be used as the main line route for fast trains to Ceylon. That estimate omitted to take into consideration certain items the cost of which would in any case have had to be shown in the books of the South Indian Railway, even if excluded from the books of the branch. Certain additional expenditure will also be ascribable, and very properly so, to the fact that the revised alignment now passes through a far better cultivated, and therefore more expensive, country; and after all, however important may be considerations of serving the through traffic between termini, much of the success of even a short 100-mile extension must necessarily depend on the sort of country passed through, and whether the expenditure is or is not to serve the needs of the cultivators. I proceed now to institute a comparison, item by item, between Mr. Shadbolt's estimate and Mr. Michell's of the cost of getting from Madura to Mandapam.

7. I. Preliminary Expenses.—Mr. Shadbolt put down the cost of survey at Rs. 438 per mile, while Mr. Michell has very properly added not only the cost of an old survey made ten years ago, but also of that just completed, and has found that as a fact it has cost Rs. 1,172 per mile. This is a high figure for an easy country, but it is a fact, and must therefore be accepted.

II. Land.—That 100 miles of land for a railway could be acquired for rupees one lakh was undoubtedly a wrong estimate. It may conceivably cost every penny of Mr. Michell's figure, *viz.*, Rs 5,84,178; and anyhow it will cost what it will cost; there is no way open to the Engineers of controlling its cost, which will depend on the Government Civil officers who also furnished the information on which the estimate was based. Mr. Shadbolt's figures per acre were undoubtedly insufficient. I doubt whether Mr. Michell's figures are inordinately high. It has already been incidentally mentioned that many miles of the new alignment pass through land through which it is worth while running a railway instead of, as the early alignment did, over high arid land. The only chance of effecting any appreciable economy is to take up land for a single line for the present; for it will certainly be 20 or 30 years before the Pamban branch, situated as it is at the tail end of the system, need be doubled, and even if by that time the price of land per acre should have doubled itself, which is unlikely, it will be cheaper to defer the taking up of extra land until the necessity for it arises. Land plans are now being made for a double line. To reduce the width to that requisite for a single line may save ¾ to 1 lakh; I doubt if it is worth while.

III. Formation.—If the two estimates, see page 3 of the earlier and page 7 of the later book, be compared it will be found that whereas as a fact the actual *quantity* of bank and cutting per mile of the former is some 6 or 7 per cent. in excess of that in the latter, the latter estimate contains a large number and value of items, aggregating about Rs. 3,00,000, which do not appear in the former at all. The obvious alternative is either that Mr. Shadbolt forgot them or did not think them necessary, or else that Mr. Michell has very properly inserted them as being essential items in the cost of a stable line. The latter is certainly in my opinion the only tenable alternative, as a perusal of the items in question will make clear. A railway cannot be carried through a country like that under reference, in which there is nearly as large an area, during part of the year, of water in irrigation tanks as of dry land, without the expenditure of a considerable sum on stone pitching; roads must be diverted and metalled, channels must be diverted, etc., etc. But the largest item taken account of by Mr. Michell, though omitted by Mr. Shadbolt, is Rs 1½ lakhs for sand to be spread at first on the banks before they have consolidated sufficiently to allow of regular ballast being laid without serious waste and loss. Mr. Shadbolt put this sand, at the rate of 6 cb. ft. per foot run, into his ballast estimate, and then

added only 4 cb. ft. per foot run of stone ballast—a provision which obviously is quite insufficient if it is intended to represent all the capital likely sooner or later to be spent on the item at the cost of capital. It may not seem to matter very much whether the first layer of sand be included in the earthwork or in the ballast item of the estimate; but in view of the fact that it all disappears into the bank in the first three or four years, it seems proper that, as has been done by Mr. Michell, it should be put into the earthwork estimate. In view of these considerations, I elect to reject Mr. Shadbolt's figure for earthwork of Rs. 3,323 per mile, and to accept Mr. Michell's figure, Rs. 6,424, which after all is a comparatively low figure, being only £428 per mile.

IV. Bridgework.—Mr. Shadbolt's estimate is Rs. 4,811 per mile, Mr. Michell's Rs. 5,209. The two, however, are not readily comparable, because the former contemplates bridging a comparatively important river, the Vaigai, while the latter, by starting from the south end of Madura station instead of from a mile or two north of it, avoids that river altogether. But, *per contra*, the route now selected passes for many miles through a country full of tanks, that is through a country better worth making a railway in, and consequently more frequently intersected by channels which must necessarily be bridged. Considering the length of carriage for all lime and stone, I do not think that it will be found that Mr. Michell's rates for masonry, *viz.*, Rs. 35 and Rs. 45 per 100 cb. ft., are inordinately high. Some of his other rates seem high, but my experience is that to keep on persuading oneself that work *will* be done at low rates is only the policy of the foolish ostrich, and that by the time trains are running and completion reports closed the rates of finished work are usually found to work out to a considerably higher figure than the office person guessed at. I do not think that there will be any saving worth troubling about in Mr. Michell's estimate of the cost of bridgework. The estimate allows for new 40-ft. girders, but actually it is proposed for each span to use three of the girders lately taken out of the Nellore-Gudur section of the South Indian Railway.

V. Fencing.—For this item, which besides fencing proper includes road crossings and mile and grade posts, Rs. 1,189, or under £90, per mile, is not unduly high. Mr. Shadbolt thought Rs. 898 would serve. As a fact the later estimator has taken account of two important items—land boundary stones and palings for Madura station—which found no place in the earlier estimate.

VI. Electric Telegraph.—No mention of this was made in the first estimate. The South Indian Railway Company are in the habit of fixing their own instruments.

VII. Ballast and Permanent-way—(*a*) *Ballast.*—Both estimates provide for the same *quantity* of ballast, *viz.*, 10 cb. ft. per foot run; but while, as already explained, the earlier estimate contemplated the debit to this sub-head of 6 cb. ft. of sand and 4 of stone, the later one considers that inasmuch as the sand will very soon disappear into the bank, and as it is better that cheap sand should so disappear rather than dear stone, it is right that the cost of the sand should go into the sub-head *earthwork*, and that the sub-head *ballast* should contain full provision for the regular section of stone ballast to be ultimately used. As a fact, however, nearly the whole of the pot sleeper road of the South Indian Railway is laid on sand ballast of not nearly so good a quality as that obtainable on the Pamban branch. I am therefore of opinion that except for a skin of stone ballast to keep the sand from being blown away, say 2 cb. ft. per foot run, the permanent ballast may very well be of the same quality as the sand topping entered in the item earthwork. As the sand topping has been entered in the earthwork estimate at an average rate of Rs. 21 per 1,000 cb. ft., it can certainly be done when trains are running very much more cheaply, so there ought to be a saving of fully three lakhs under the head ballast.

(*b*) *Permanent way.*—Mr. Michell has estimated the cost of his rails, sleepers, and fastenings 25 per cent. higher than Mr. Shadbolt. An attempt was made to cut down this item by the use of wooden sleepers for which, for reasons given, the Agent of the Company, the Government Consulting Engineer, and the Government of India expressed a strong preference; and Mr. Michell had estimated this type at the rate of Rs. 18,152 per mile, or about 2,000 per mile less than Mr. Shadbolt's estimate. The Board of Directors however, on the advice of their Consulting Engineer,

expressed a strong preference for the type of permanent way in general use throughout their system, and Mr. Michell thus found it necessary to raise his estimate to Rs. 25,122 per mile, a figure involving an extra expenditure of nearly 6½ lakhs in getting from Madura to Pamban. This extra expenditure will involve interest amounting to nearly Rs. 20,000 per annum, to meet which nearly Rs. 200 per mile per annum of saving must be effected in maintenance charges. There is no question but that the more expensive road will be the better road, and it is for the business partners, Government and the Company, to agree whether or not it is worth while once for all to pay more money for the better article. The Government of India have been influenced by considerations of the possibility of its ultimately becoming necessary to connect up the broad-gauge system of India with that of Ceylon by converting to standard gauge the metre-gauge Pamban branch, a possibility which naturally enough the Company cannot be expected to contemplate with equanimity. Personally I think that if ever the broad-gauge connection of India and Ceylon comes off, it will be brought about by restoring the old gauge on the Trichinopoly-Erode branch (an alternative metre route across the chord, through country further to the west which needs opening up, being provided between Dindigul and Erode) and by constructing a new broad-gauge line from Trichinopoly through the Pudukottai, Devekottai, Ramnad country to Pamban. If it should turn out that the Pamban branch is never converted, and I think its conversion is extremely unlikely in spite of the Government of India having ordered all its bridge masonry to be made fit for the broad-gauge, the Company's preference for the more expensive type of permanent way will in my opinion have been justified. When money is scarce people like to get to their objective quickly and cheaply; but I cannot think that in this particular case the choice of the more expensive type of road will result in the opening of the Pamban branch being appreciably deferred. Mr. Mitchell's rates for permanent-way materials will probably not be very closely worked to in detail. They are high as compared with the rates of a year ago, but low just now. It is possible, and I think likely, that rates will fall again, and it might be wholesome to make enquiries in the United States. Rails may perhaps be got for £5-18-0 per ton if contracts are not placed in too great a hurry; but there ought, I think, to be a saving on £4-16-0 per ton for cast iron sleepers. The worst of it is that, with a view to leading out material for the bridges, it is somewhat urgently necessary that there should be no undue delay in the supply of permanent way. The rate for laying is not too high; nor is Rs. 500 per mile unduly high for maintenance pending opening for traffic; though properly speaking this last item ought to be covered by the rates of masonry and of other things for the sake of which money is to be spent on keeping trains running. To sum up I would not venture to reduce the rate Rs. 22,728 per mile for permanent way, which, when sidings are added for Madura junction and other stations, works up to Rs. 25,122 for the distance between termini. I may mention that the booked capital cost per mile of the item *Ballast and permanent way* of the open section of the South Indian Railway is only Rs. 18,000, out of which if, say, Rs. 3,000 be deducted for ballast, Rs. 15,000 remains as the cost of permanent way proper. The Board of Directors cannot after this plead ignorance of what they are facing in insisting on an expensive type of road in these days of high prices.

VIII.—Stations and Buildings.—Mr. Michell has provided for this an average rate of Rs. 6,005; whereas the average throughout the whole of the South Indian Railway Company's system is Rs. 6,779, a rate which covers the cost of head-quarter offices, large junctions, old fashioned and expensive stations, etc., etc. A reference to Appendix G of Volume II of the Annual Administration Report on Indian Railways will show that while on some lines, *e.g.*, the metre-gauge section of the E.B.S.Ry. and the Rajputana-Malwa Ry., this item runs up to Rs. 10,000 per mile, it is as low on some lines, *e.g.*, the Mysore State Railway, as Rs. 3,000. There are few sub-heads which afford so large a scope as this for extravagance or economy. Some Rs. 63,000 worth of the proposed expenditure is due to the assumption that a junction will at once be necessary at Tirupachatti, whereas, as already suggested, the proposed branch to Sivaganga may very well take its turn with proposed branches to the numerous other towns of its size in the Madras Presidency which lie within eight or ten miles of a railway, or at least may await the completion to the sea of the Pamban branch.

Again, including the two termini Mr. Michell has six watering stations in 91 miles, while five, Madura, Tirupachatti, Paramakudi, Ramnad, and Mandabam, would be a reasonable number in this perfectly level country where an average of 25 or even 30 miles between water columns is not an excessive distance, so saving Rs. 10,000, at least temporarily, pending traffic developments. Minor savings are undoubtedly possible throughout, and if I put these at Rs. 500 for intermediate stations, I get another Rs. 6,000 off the estimate, or a total of Rs. 80 000. I consider that Rs. 5,000 per mile may with care and economy be made to amply suffice for the equipment of the Pamban branch with stations and offices, staff quarters, and station machinery for several years to come. This is the figure of the Cawnpore-Achnera section; it is just double the figure for the South Indian Railway Company's own branch, the Mayavaram-Muttupet Railway, though I recognise of course that the present estimate debits the cost of junction arrangements to the branch, instead of to the parent line as was done in the case of Mayavaram junction. It is however pretty certain that, on so important an extension as this is, the full estimated figure, Rs. 6,000 per mile will sooner or later be spent.

IX. Plant.—The provision for this item, Rs. 672 per mile, may stand.

XI. Rolling Stock.—Here again I consider that the estimate is an inordinately high one. The opportunity of starting a new branch is naturally a somewhat tempting one for adding to the rolling stock of the system. But it is rather extravagant to ask for a considerably higher rate per mile, for the rolling stock of a 90-mile extension of the through main line of an eleven hundred mile system, than the booked capital rate on the main line The stock of the great Rajputana-Malwa Ry. stands at only Rs. 11,600; that of the Bengal and North-Western Ry., T rhoot section, at Rs. 6,600; that of the Cawnpore-Achnera at Rs. 6,200, that of the Southern Mahratta Ry. at Rs. 9,500. I certainly am of opinion that Government and the Company need not contemplate a higher expenditure on this item for many years to come than Rs. 10,000 per mile, and this is liberal. Mr. Michell has caused some confusion by putting the entire provision for rolling stock, *viz.*, Rs. 12,80,410, into the estimate for the Madura-Pamban line and none into that for the Sivaganga branch. His rate for the combined line and branch comes to Rs. 12,431 per mile.

XII. General Charges.—Rs. 7,688 for this item is high. But that is an incident, 1st, of the short length of lines under construction by the Company at one time, and, 2nd, of funds for the work being likely to be allotted at a slower rate than they *could* be spent by the available staff. This item must stand.

8. The savings above contemplated, in the expenditure to be primarily incurred within the first few years after opening, are as follows:—

Land say	Rs.	75,000
Ballast	,,	3,00,000
Stations, etc.	,,	91,000
Rolling stock	,,	3,68,000
Total ...	Rs.	8,34 000

If these savings can be effected in the primary outlay, it will be possible to reach Pamban, or rather the sea at Mandapam, from Madura, for an expenditure of Rs. 63,66,000. This may be compared with Mr. Shadbolt's figure Rs. 41,78,000, and if to this latter we add Rs. 10,000 per mile for rolling-stock, and Rs. 4,00,000 for land notoriously underestimated, we get Rs. 55,78,000 as the figure to be substituted for Mr. Shadbolt's if it is to be fairly comparable with Mr. Michell's. I have no hesitation in accepting Rs. 63$\frac{2}{3}$ lakhs as the figure which ought to be accepted by Government and by the Company as the probable outlay to be incurred *at first* on the construction and opening of a very high class extension, by the most suitable route, from Madura to Pamban.

9. I now pass to the question of the Sivaganga branch, which Mr. Michell has estimated at Rs. 9,26,276. But if this branch is to be built it will be necessary to re-insert the sum of Rs. 63,000 cut out from VIII. Stations and Buildings on account of the Tirupachatti junction and to add Rs. 10,000 per mile for rolling stock. The

stipulation that no more than Rs. 5,000 per mile shall be spent on stations and buildings gives a saving of Rs. 10,000, on land we may perhaps save Rs. 15,000, and on ballast Rs. 35,000. Net result Rs. 10½ lakhs for the Sivaganga branch 11·65 miles long, equipped with rolling stock. Now it is a very important question whether this heavy expenditure is justifiable for the sake of the trade of a town of 6,000 inhabitants and of the country around it. The branch will certainly bring into touch with the South Vaigai route a large area of country which would otherwise be cut off, more or less, from access to it, because of the Vaigai river in which now-a-days, since the completion of the Periyar scheme, water flows for more days in the year than formerly. Still Rs. 10½ lakhs is a heavy outlay.

10. The considerations which led this Government to the choice of the South Vaigai route instead of the circuitous Sivaganga route will be found recorded in Proceedings, No. 968 Ry., dated 28th July 1898. The route was fully accepted by the Company's Board in their letter to their Agent, No. 216, dated 29th July 1898. The Board's decision was based on a Note by their Agent, dated the 18th May 1898. In its letter to the Government of India, No. 969 Ry., dated 28th July 1898, this Government strongly recommended that the branch should be built simultaneously with the main line. The wisdom of the selection of the South Vaigai route, that is, of the route on which Mr. Michell's present estimate is based, has been fully endorsed by the local Civil officers Its importance also in shortening by 9 miles the through route between India and Ceylon has greatly influenced this Government in its choice of routes; and while to me there seems to be no question of its superior advantages, I do not lose sight of the value of its connection by means of the Sivaganga branch with the country lying north of the Vaigai. But it is obvious that the decision whether the branch should or should not be made at once, at a cost of Rs. 10,50,000, must chiefly depend on the amount of money which can annually be made available. For it seems to be all important that the through connection of Madura with the sea should be *first* effected; the branch can follow at any time as money becomes available.

11. There is I think no doubt that the anxiety of the Company to get the branch made, and the Vaigai bridged as far west as Tirupachatti, is due to a hope that the future inevitable connection of the Pamban line with the Tanjore District Board lines may thereby be prejudiced in favour of Tirupachatti, and that the much dreaded short-circuiting may thereby be made less formidable. But the true remedy is in the construction of the proposed Trichinopoly-Tirukoilur chord line, and there is the great probability also that the Tanjore District metre lines will not extend south of Devikotta where they will probably in the distant future join the broad gauge Ceylon connection, from Dindigul to Ramnad. The only sort of railway policy which, in my opinion, is worthy of adoption by a Government invested with its control or direction is a policy which, instead of confining itself to a search for methods of bettering the existing ~~railway systems~~ administrations, searches for the betterment of the connection of markets and produce financially for areas. Such a policy, if consistently pursued, cannot fail in the end to be also for the best interests of the Railway Administrations.

Madras,
15th November 1899.

Francis J. E. Spring,
Consulting Engineer for Rys.

Order—No 1399 Ry., dated 6th December November 1899.

The Government of India will be addressed.

[Here enter No 1400 Ry., dated 6th December November 1899.]

(True Extract.)

Francis J. E. Spring,
Secretary.

Exd. T. K. Narayana Aiyangar.

No. 1400 Ry., 6th November 1899.

PUBLIC WORKS DEPARTMENT.

Railway.

LETTER—from

FRANCIS J. E. SPRING, ESQ., C.I.E.,
Secretary to the Government of Madras,
Public Works Department,
Railway Branch,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

In my letter, No. 969 Ry., dated 28th July 1898, the Government of India were offered an expression of opinion in regard to the most suitable route from Madura to Pamban. For reasons which will be found fully set forth in this Government's Proceedings, No. 968 Ry., dated 28th July 1898, the south Vaigai route was recommended in preference to that by the north bank of the Vaigai and Sivaganga which had been adopted by Mr. Shadbolt.

2. In your reply, No. 1356 R.C., dated the 17th September 1898, sanction was given to survey the route recommended; and although the choice between the two routes was one to be determined rather on the general considerations advanced by this Government in its letter, No. 969 Ry. of 28th July 1898, than on consideration of estimated cost, the Government of India intimated its intention to reserve its decision in regard to the two routes until they should have been placed in possession of plans and estimates.

3. In my letter, No. 293 Ry., dated the 15th March 1899, the Government of India were urged to allow work to be started on the eastern part of the line and to permit indents for English stores to go forward. The reply to this was your endorsement No. 650 R.C., dated the 14th April 1899, communicating a copy of the Government of India's telegram to the Secretary of State, No. 649 R.C., dated 14th April 1899, in which sanction was asked to the commencement of preliminary operations on the Madura-Pamban and Tinnevelly-Quilon Railways; and this was followed up by your telegram No. 740 R.C. of the 24th April 1899 permitting work to proceed and allotting a grant.

4. Since that date land acquisition and all preliminary arrangements for construction staff, contracts, etc., have been in progress; and all through the Engineer-in-Chief of the South Indian Railway Company has been busy with the survey and preparation of a project for the alternative alignment, in concert with this Government's Consulting Engineer. The result is the set of plans and sections and the project estimates and reports here with forwarded, as per margin. These plans, estimates and reports were received under cover of letters from the Agent, South Indian Railway, which are embodied in the accompanying copy of Proceedings of this Government, No. 1399 Ry., dated the 6th November 1899, and they are fully reviewed in the Consulting Engineer's note, dated the 15th November 1899.

1. Index plans with detail plans and section of Madura-Mandapam section and Sivaganga Branch.
2. Sivaganga Branch—
   Abstract of estimates ... 60 copies.
   Report on the project ... 60 „
3. Madura-Mandapam section—
   Abstract of estimates ... 60 „
   Report on the project ... 60 „
4. Explanatory note ... ... 60 „

5. In arriving at a decision in regard to the choice of routes the Government of India should not attach any weight to the fact that Mr. Michell's estimate is largely in excess of Mr. Shadbolt's, for the excess is a matter which, except in regard to one or two minor items, is quite apart from the question of routes. Had an estimate been framed by Mr. Michell on Mr. Shadbolt's alignment, it must necessarily have been fully as largely in excess of the earlier estimate as is that based on the new alignment. The earlier estimate was in many respects utterly inadequate for the requirements of a line, which, when open, will be the main line of the South Indian Railway towards Ceylon. Moreover, as explained in the reports and in the Consulting Engineer's note, it failed to take account of rolling-stock, entirely under-estimated the cost of land, and in many other respects, as well as in details of rates, fell far short of sufficiency.

6. The considerations which induced this Government to come to the decision that its own original choice of the route *vid* Sivaganga was a mistaken choice will be found, as already explained, fully set forth in this Government's Proceedings, No. 968 Ry., dated 28th July 1899. His Excellency in Council therefore directs me to suggest that these considerations, and these alone—for considerations of estimate do not appreciably affect the question—be taken account of by the Government of India in endeavouring to arrive at a decision to change a route originally fixed by this Government on what are now admitted to be inadequate information, and subsequently rejected after most careful enquiry and deliberation.

7. The conclusion come to by this Government's Consulting Engineer in his note embodied in the accompanying Proceedings, No. 1399, dated 6th November 1899, is that the sea can be reached from Madura at a cost of 63 or 64 lakhs for a distance of 91 miles and that if even it is decided to make a 12-mile branch across the Vaigai to Sivaganga, it can be made for 10 or 11 lakhs. Should money be plentiful, this Government will be glad to secure the simultaneous construction of the Sivaganga branch with the main branch. But if, as seems probable, there should be any difficulty in the provision of adequate funds for full progress and for the full employment of the staff, His Excellency in Council will be content to see all available efforts expended on the pushing through of the line from Madura to the sea.

I have the honour to be,
Sir,
Your most obedient servant,

Secretary.

Fort St. George,
6th November 1899.

Despatched on 6/12/99

Exd. T. K. Narayana Aiyangar.

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. }
} 1899.
Regd. }

Enclosures

Spare copies

Letter, No. 1400 **Ry.,** 6th December **November 1899.**

December

NOVEMBER.

Pamban Branch, South Indian Railway

Forwarding, for orders, the plans, reports and estimates of the — prepared by the Engineer-in-Chief of the Railway, in view to the selection of the best route.

27-6-25 B I

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

Explanatory Note on the differences between Mr. Shadbolt's Estimate, and the Revised Estimate prepared for the construction of the Pamban Branch.

SOUTH INDIAN RAILWAY.

PAMBAN BRANCH.

Explanatory Note on the differences between the Estimate now submitted for sanction and that submitted by Mr. Shadbolt.

—:o:—

Mr. Shadbolt's line is 100 miles in length and runs on the north bank of the Vaigai, passes through Sivagunga and crosses the Vaigai at the 52nd mile, to reach Paramakudi (mile 53·62) on the south bank and continues onwards to Toni Torai. The estimated cost is Rs. 41,77,460, or Rs. 41,774 per mile.

The present line runs on the south bank of the Vaigai, the portion between Madura and Paramakudi (miles 44·51) being a new trace. From the latter place Mr. Shadbolt's line is followed to Toni Torai. The length of the main section is 91·33 miles. The branch to Sivagunga is taken off at Tiruppachettu (miles 19·66) and the length is 11·65 miles. The total length of the main section and the branch is 102·98 miles and is estimated to cost Rs. 81,25,791, or Rs. 78,905 per mile.

The following table is a comparison of the estimate prepared by Mr. Shadbolt and the one now submitted for sanction :—

Heads of Account.	Mr. Shadbolt's Original Estimate 100·18 miles.		Revised Estimate 102·98 miles.		More in Revised Estimate.	
	Total cost.	Per mile.	Total cost.	Per mile.	Total cost.	Per mile.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1. Preliminary Expenses ...	44,000	440	1,11,567	1,083	67,567	643
2. Land ...	1,04,530	1,045	6,48,116	6,294	5,43,586	5,249
3. Formation ...	3,32,382	3,324	6,72,931	6,534	3,40,549	3,210
4. Bridgework ...	4,81,201	4,812	7,03,800	6,834	2,22,599	2,022
5. Fencing etc. ...	89,865	898	1,19,348	1,159	29,483	261
6. Electric Telegraph ...	...	...	3,946	38	3,946	38
7. Ballast & Permanent Way ...	23,30,373	23,304	30,96,630	30,070	7,66,257	6,766
8. Stations and Buildings ...	3,62,109	3,621	6,16,590	5,987	2,54,481	2,366
9. Plant ...	33,000	330	90,490	879	57,490	549
10. Ferries ...	...	...	...	...	...	...
11. Rolling Stock ...	...	...	12,80,410	12,433	12,80,410	12,433
12. General charges ...	4,00,000	4,000	7,81,963	7,594	3,81,963	3,594
Total ...	41,77,460	41,774	81,25,791	78,905	39,48,331	37,131

PRELIMINARY EXPENSES.

Revised estimate	Rs. 1,11,567
Original estimate	„ 44,000
More in Revised estimate	Rs. 67,567

The revised estimate includes, under the recent orders of Government, the expenditure incurred in the surveys of the line in 1886, 1895, and 1899; the original estimate provides only for the work done in 1895.

LAND.

Revised estimate ...	...	Rs. 6,48,116
Original estimate ...	...	„ 1,04,530
More in Revised estimate ...	...	Rs. 5,43,586

The excess is due to three causes 1st, to the present route passing almost entirely through valuable lands and wet cultivation and crossing a large number of feeder and irrigation channels, 2nd, to provision being made for compulsory acquisition under the Act, and compensation for buildings and trees (96,313), and 3rd, the salaries and allowances of the Revenue Staff engaged in handing over the land (Rs. 23,270). The revised estimate also includes Rs. 39,020 for additional land required at Madura Junction.

The original route passes for several miles through waste lands of laterite soil and high dry and stony ground and the estimate provides for the cost of the land only.

The following is a comparison of the acreage:—

	Total Acreage. Acres.	Average Rate. Per acre. Rs.	Area per Mile. Acres.
Original route	2,000	52	20
Present route	1,951	235	19

The rates entered in the revised estimate are those which have been obtained from the Collector of Madura. The following table will show the vast differences between the rates adopted in the two estimates :—

Description.	Original Estimate per Acre. Rs.	Present Estimate per Acre.
Waste ...	20	Rs. 50
Dry cultivation ...	50	Rs. 150 general rate and Rs. 1,500 per acre for 5 acres on Main section.
Wet cultivation ...	100	Rs. 450 on Branch line.
Irrigation cultivation ...	...	Rs. 300.
Do. and do. garden ...	...	Rs. 400, Rs. 450 and Rs. 500.
Garden ...	200	5 acres on Main section Rs. 900 & 5 acres on Branch Rs. 600 each.
Plantation ...	...	4 acres on Main section Rs. 1,500 per acre.
Village ...	...	2 acres on Branch at Rs. 1,000 per acre.

EARTHWORK.

Revised estimate ...	...	Rs. 6,72,931
Original estimate ...	...	„ 3,32,382
More in Revised estimate ...	...	Rs. 3,40,549

The cause of the excess is due 1st, to difference in rates for banks and cuttings, as detailed below, and 2nd, to provision in the revised estimate for the following special items:—

Channel diversions ...	...	Rs. 9,700
Road diversions ...	...	„ 34,500
Boulder pitching in Tanks ...	...	„ 71,400
Ballasting line with sand and laterite for 2 years ...	...	„ 1,59,375
Sidings in Madura Junction ...	...	„ 2,211
		Rs. 2,77,186

The rates are :—

	Original Estimate per 1,000c.ft. Rs.	Revised Estimate per 1,000 c. ft. Main Section. Rs.	Revised Estimate per 1,000 c. ft. Branch. Rs.
Banks	5	6	7
In Station Sidings	...	6	10
Cuttings	15	10	15

MAJOR BRIDGES.

Revised estimate ...	...	Rs. 2,11,591
Original estimate ...	...	„ 1,45,683
More in Revised estimate ...	...	Rs. 65,908

The total length of waterway provided in the revised estimate is 1,360 feet against 1,020 feet in the original one, or a total increase of 340 ft. The increase is due to the Vaigai Bridge being estimated for 20-40 ft. Girders, against 13-40 ft. Girders, and the Upar Bridge 6-40 ft. spans, against 9-20 ft. spans in the original estimate.

Excepting the Vaigai, for which a special design is prepared, the quantities in the other bridges are calculated from Stone's Tables of bridges and culverts.

The difference between the two estimates will now be dealt with in detail.

RAMNAD TANK SPILL 3-20 FEET GIRDERS.

Original estimate ...	...	Rs. 9,451
Revised estimate ...	...	„ 9,413
Less in Revised estimate ...	...	Rs. 38

In the original estimate, the height of bank is taken at 13 feet and depth of foundations at 6 feet. In the revised estimate these are 11 feet and 8 feet respectively.

RAMNAD TANK ESCAPE, 5-40 FEET GIRDERS.

Revised estimate ...	...	Rs. 31,010
Original estimate ...	...	„ 25,884
More in Revised estimate ...	...	Rs. 5,126

In the original estimate the height of bank is 9 feet and depth of foundations 8 feet. In the revised estimate the height of bank is 14 feet, but the depth of foundations is the same as in the original estimate.

TIRUPALANI CHANNEL, 3-20 FEET GIRDERS.

Revised estimate ...	...	Rs. 8,089
Original estimate ...	...	„ 6,820
More in Revised estimate ...	...	Rs. 1,269

In the original estimate the height of bank is 8 feet and depth of foundations 6 feet, whereas in the revised estimate there are 9 feet and 8 feet respectively.

VAIGAI, 20-40 FEET GIRDERS.

Revised estimate ...	... Rs.	1,23,054
Original estimate ...	... ,,	85,177
More in Revised estimate ...	... Rs.	37,877

The Vaigai river is a deltaic one, which decreases in size as it proceeds on its course on reaching the plains, owing to irrigation feeders being taken off from its bed. The present crossing of the river is 26 miles above the original one at Paramakudi.

In the original estimate the Vaigai bridge is designed for 13 spans of 40 feet girders, the quantities being calculated from Stone's Tables; the height of bank is 16 feet and depth of foundations 12 feet. In the revised estimate the bridge is designed for 20 spans of 40 feet girders, the piers and abutments being sunk on wells, and consequently the rates for work differ. The height of bank is 16 feet and depth of foundations 15 feet.

UPAR, 6-40 FEET GIRDERS.

Revised estimate ...	... Rs.	40,025
Original estimate ...	... ,,	18,351
More in Revised estimate ...	... Rs.	21,674

The waterway in the revised estimate is increased by 60 feet. The original estimate is for a 9·20 feet bridge in a 9 feet bank and the depth of foundations is 6 feet. The revised estimate provides for a 6-40 feet span, the height of bank being 13 feet and depth of foundations 12 feet.

For the Vaigai bridge special rates have been allowed, and the following table shows the differences in rates adopted for the other bridges in the two estimates :—

Particulars.	Original Estimate. Rs.	Revised Estimate. Rs.	Remarks.
Excavation dry 1,000 c. ft. ...	...	10	Not provided in original estimate.
Do. wet ,, ...	40	35	
Filling and Backing ,, ...	...	15	Not provided in original estimates.
Girders, Exchange &c. Ton. ...	...	70	See remark against Girders.
Do. carriage errection ,, ...	30 & 45	30	Rs. 30 for 20 ft. Girders, Rs. 45 for 40 ft. Girders.
Pitching 100 c. ft. ...	...	8	Not provided in original estimate. Upar bridge in revised estimate not provided with pitching.
Girders (English charges) Tons. ...	212	130	In the revised estimate, the Indian charges *viz.* $\frac{1}{10}$th freight. Insurance Port dues &c., are kept separate from the English charges F. O. B. and $\frac{1}{20}$th freight. From the rate adopted in the original estimate it would appear that the English and Indian charges are grouped together.

The weight of Girders is also different in the two estimates, as will be seen from the table given below :—

	Original Estimate. Weight per spans.	Revised Estimate. Weight per spans.
	Tons.	Tons.
20 feet Girders	2·65	3·047
40 feet Girders	9·03	10·187

MINOR BRIDGES.

Revised estimate ...	... Rs.	4,92,209
Original estimate ...	... ,,	3,35,518
More in Revised estimate ...	... Rs.	1,56,691

As previously stated the present line passes through valuable land, wet cultivation and crosses a number of feeder and irrigation channels. The total length of waterway provided for Minor Bridges in the revised estimate is 1,909 feet or 18·53 feet per mile against 1,524 feet or 15·24 feet per mile in the original estimate. The following are the differences in the rates adopted in the two estimates :—

Particulars.	Original Estimate. Rs.	Revised Estimate. Rs.	Remarks.
Excavation wet 1,000 c. ft....	...	25	Not provided in original estimate.
Dry filling and backing ...	...	15	
Girders Ton ...	212	*210	*English Rs. 135, Indian Rs. 75.
Stoneware pipes Lin. feet ...	2	...	Not provided in revised estimate.

The following table shows the description of bridges and length of waterway adopted in the two estimates :—

Particulars.	Original Estimate, Waterway. Feet.	Revised Estimate Waterway. Feet.
Stoneware pipes—1 foot	75	...
Slabs 2 feet	192	390
Do. 3 ,, ...	96	375
Do. 4 ,, ...	84	...
Arches 6 ,, ...	222	...
Do. 12 ,, ...	96	...
Girders 6 ,, ...	552	* 444
Do. 12 ,, ...	216	600
Do. 20 ,, ...	60	100
Total ...	1524 1591	1,909

* Trough plates.

The weights of the Girders in the two estimates compare as under:—

	Original Estimate, Weight per span. Tons.	Revised Estimate Weight per span. Tons.
6 feet Girders	0·43	*1·350
12 feet Girders	1·29	1·147
20 feet Girders	2·65	3·047

* Trough plates.

The following table is a comparison of rates:—

	Original Estimate, Rate per Ton. Rs.	Revised Estimate, Rate per Ton. Rs.	Remarks.
Rails	75	88·42	
Fish plates	108	118·42	
Fish bolts, &c.	272	250·77	
Cast iron pot sleepers... ...	77	71·99	
Tie bars	104	114·68	
Gibs and Cotters	104	232·00	
Cushions Oak	54	...	Not used now.
Keys, wooden	54	Rs. 60 per 1,000	

STATIONS AND OFFICES.

Revised estimate ... ... Rs. 1,70,882
Original estimate ... ... „ 1,11,664

More in Revised estimate ... ... Rs. 59,218

The revised estimate includes an item of Rs. 28,336, for the additional accommodation required at Madura. The original estimate provides for 15 stations of which 14 are 3rd class and one (Mandapam) is 2nd class.—The revised estimate provides for the same number of stations but the classification is different, 11 are 3rd class, 2 of 2nd class ordinary, (Sivagunga and Ramnad) one of 2nd class special (Mandapam) and one special type (Tiruppachettu Junction.)

The following is a comparison of the provision made in the two estimates for each type of station:—

Particulars.	3rd Class.				2nd Class Ordinary.				2nd Class Special.				Special.			
	Original Estimate.		Revised Estimate.		Original Estimate.		Revised Estimate.		Original Estimate.		Revised Estimate.		Original Estimate.		Revised Estimate.	
	Quantity.	Rate.	Quantity.	Rate.	Quantity.	Rate.	Quantity.	Rate.	Quantity.	Rate.	Quantity.	Rate.	Quantity.	Rate.	Quantity.	Rate.
		Rs.		Rs.		Rs.		Rs.				Rs.				Rs.
Station Buildings Sq.ft.	1,000	1·50	1,440	1·40	2,500	1·50	2,160	1·46	...	...	2,940	1·50	...	...	2,160	1·46
Passenger platform „	24,000	·04	14,400	·12	24,000	·04	14,400	·12	...	...	14,400	·12	...	...	40,500	·11
Goods do. „	1,500	·76	7,000	·10	36,000	·16	9,200	·38	...	...	9,200	·38	...	...	10,000	·37
Platform fence Rft.	700	2·00	600	2·25	700	2·25	600	2·25	...	...	600	2·25	...	...	900	2·25
Name Boards No.	2	25·00	2	25·00	2	25·00	2	25·00	...	...	2	25·00	...	...	2	25·00
Latrine for Natives „	...	400	...	836	...	400	...	836	...	...	...	836	...	...	8	836
Do. for Europeans „	...	...	...	...	...	...	...	567	...	...	...	567	...	...	...	567
Lamp posts „	6	25·00	6	25·00	6	25·00	6	25·00	...	...	6	25·00	...	...	6	25·00
Yards and approaches ...	1,000	...	...	...	3,000	...	...	...	...	...	...	...	...	...	...	...
Gates ...	1	125	1	125	2	125	1	125	...	...	2	125	...	...	3	125
Well 6 ft. diameter ...	...	800	...	500	...	800	...	500	...	...	...	500	...	...	...	500
Points shelter No	2	40	2	40	8	40	2	40	...	...	8	40	...	...	6	40
Goods shed Sq. ft	1,000	1	300	1	4,000	1	2,500	1	...	...	1,250	1	...	...	300	1

Station Buildings. In the original estimate, the East Coast Railway type is adopted for 3rd class stations, the outside dimensions are 40 ft. × 25 ft.=1,000 sq. ft. For the Mandapam Station the dimensions are 100 ft. × 25 ft.=2,500 sq. ft. In the revised estimate South Indian Railway types have been followed, the area of a 3rd class station being 48 ft. × 30 ft.=1,440 sq. ft. For 2nd class station 72 ft. × 30 ft.=2,160 sq. ft. and for Tiruppachettu 98 ft. × 30 ft.=2,940 sq. ft.

Passenger Platforms. In the original estimate platforms at all stations are estimated for 600 ft. × 40 ft.=24,000 sq. ft. and flush with rails. The revised estimate provides for a platform for 2nd and 3rd class station 600 ft. × 24 ft.=14,400 sq. ft. all platforms being one foot above rails. The chief cause of the increase is due to provision for "curbing".

Goods Platforms. The original estimate provides platforms 100 ft. × 15 ft.=1,500 sq. ft. for Sivagunga, Paramakudi and Ramnad and for Mandapam a platform 600 ft. × 60 ft.=36,000 sq. ft. In the revised estimate, excepting Madura East, platforms are provided at all stations the third class stations being 200 ft. × 35 ft.=7,000 sq. ft. 2nd class station 230 ft. × 40 ft.=9,200 sq. ft. The difference in rates is that in the revised estimate, the platforms of 3rd class stations are not provided with "coping"and in the other stations "Kutcha" masonry is estimated for.

Platform Fence. The original estimate provides a fence of corrugated steel uprights 700 ft. for each station, whereas in the revised estimate steel pale fencing is provided 600 ft. for all stations except Tiruppachettu for which 900 ft. is allowed.

Native Latrines. The original estimate provides "Horbury's" type of latrine of 4 units, in the revised estimate the South Indian Railway type is followed.

European Latrines. These are provided in the revised estimate at Tiruppachettu Junction, Mandapam and Sivagunga.

Station Wells. The original estimate is for a lump sum, the revised estimate is calculated from a type.

Goods Sheds. The original estimate provides accommodation for 1,000 sq. ft. at Sivagunga, Paramakudi, and Ramnad and 4,000 sq. ft. for Mandapam. In the revised estimate the accommodation for 3rd class stations, as well as Tiruppachettu Junction is fixed at 300 sq. ft., Ramnad at 25,000 sq. ft., Mandapam and Sivagunga at 1,250 sq. ft. each.

Yards and approaches. This is not provided in the revised estimate.

STAFF QUARTERS.

Revised estimate ... ... Rs. 1,80,881
Original estimate ... ... „ 1,11,157

More in Revised estimate ... ... Rs. 69,724

The revised estimate provides a sum of Rs. 65,128, for additional quarters required for the Locomotive staff at Madura Junction against Rs. 1,342 in the original estimate which is for quarters for the Station Master and menials. The quarters in the original estimate are from East Coast Railway types, those in the revised estimate are from South Indian Railway types. The original estimate provides Rs. 54,288, for quarter for Gang coolies on the line but this has not been allowed for in the revised estimate, because this class of labor will be drawn from the adjoining village where they have their houses; again in the original estimate, provision is made for quarters for 2 Permanent Way Sub-Inspectors, but on the South Indian Railway quarters are not built for these men as the majority being natives, they can find accommodation in the villages and towns near the line. Quarters for one Permanent Way Inspector have been provided in the revised estimate. The chief cause of the excess is 1st, provision for quarters for Assistant Station Masters at all stations except Madura East, and 2nd for additional accommodation for the Locomotive and Traffic Staff. The original proposal was to locate the running staff at Mandapam, but the revised proposal provides accommodation at Tiruppachettu Junction, Mandapam and Sivagunga.

STATION MACHINERY.

Revised estimate ... ... Rs. 2,64,827
Original estimate ... ... „ 1,39,288

More in Revised estimate ... ... Rs. 1,25,539

The original estimate provides Rs. 2,036 for accommodation at Madura Junction against Rs. 25, 240, in the revised estimate :—

The following is a comparison between the two estimates:—

		Original Estimate.		Revised Estimate.	
		Quantity.	Rate. Rs.	Quantity.	Rate. Rs.
Station Ashpits	No.	8	1,078	10	847
Locomotive do.	„	2	1,078	3	847
Water Columns	„	9	875	13	799
Piping	L. ft..	3,400	2·33	7,370	2·30
Water Tanks (Total Capacity)	C. ft.	6,314	2·73	11·205	3·13
Locomotive Well	No.	4	1,000	3	1,500
		1	2,000	2	2,000
		...	...	1	2,500
Pumps	Sets.	5	698	6	850
Switches and Crossings	„	99	317	88	564
Signals Main	„	16	495	28	5,059
Do. Distant	„	31	612	29	
Engine Shed	Sq. ft.	3,920	3	8,000	2·55
Engine Turntable	No.	1	5,400	3	4,627
Scotch Blocks	„	48	15	26	15
Buffer stops	„	24	60	26	60
Engine lifts	„	...	...	3	500
Weighing Machines	...	31	250	17	250
Dating Presses	...	15	35	...	...
Fuel Stages	...	...	...	3	540

Ashpits. The difference is principally that more timber is allowed for in the revised estimate and also cement plastering. The rate for masonry in the original estimate is Rs. 45 against Rs. 22 in the revised estimate.

Water Columns. The original estimate cost of a water column is higher than in the revised estimate, but the charges for erection and carriage are much higher in the latter than the former estimate.

Water tanks. The original estimate provided for 4 iron tanks with a capacity of 1,024 cubic feet each, built on masonry pillars and one Tank House with a cast iron tank (2,218 cubic feet) on a masonry house with 2 rooms. The revised estimate provides for 5 cast iron tanks with a capacity of 364 cubic feet for each, on masonry pillars, 5 cast iron tanks capacity 760 cubic feet, 2 cast iron tanks capacity 1,606 cubic feet each, and 1 cast iron tank 2,367 cubic feet all on masonry towers.

Locomotive Wells. The original estimate provides for 4 wells, 12 feet diameter and one of 20 feet diameter. The revised estimate is for 3 wells 12 feet diameter, 2—16 feet diameter, and 1-20 feet diameter.

Pump. The increase is chiefly due to a different kind of pump being estimated for.

Switches and Crossings. The original estimate provides for one type crossings only viz. 1 in 8½ and switches 9 feet. The revised estimate provides for 2 types. Crossings 1 in 8½ switches 9 feet, Crossings 1 in 12 and switches 12 feet. Stoney's Patent handles have also been provided.

Signals. The difference is due to different kinds of signals being estimated for—the original estimate is for timber posts and special fittings from England. The revised estimate is for List and Morse's signals.

Engine Sheds. The original estimate provides for one shed only for 4 Engines at Mandapam. The revised estimate provides for sheds for one engine at Tiruppachettu and Sivagunga and for 4 engines at Mandapam.

Engine Turn table. The cost of the Turn-table and the masonry work is much lower than the original estimate.

Engine Lifts. Not provided in original estimate.

Weighing Machines. The original estimate provides for 2 machines for each station except Mandapam for which 3 are allowed. The revised estimate provides one machine for all stations except Tiruppachettu and Mandapam where two are allowed for each station.

Dating passes. This is an item of Station and Office Furniture.

Fuel Stages. Not provided in original estimate.

PLANT ENGINEERING.

Original estimate	Rs.	12,000
Revised estimate	„	9,529
Less in Revised estimate	Rs.	2,471

The original estimate is based on a mileage rate of Rs. 120 per mile. The revised estimate is worked out according to the gangs that will be engaged and the number of tools that will be required.

PLANT CONSTRUCTION.

Revised estimate Rs. 55,000

This head of account was not in force when the original estimate was prepared.

PLANT LOCOMOTIVE.

Revised estimate	Rs.	4,500
Original estimate	„	1,000
More in Revised estimate	Rs.	3,500

The original estimate is based on a mileage rate of Rs. 60 per mile. The revised estimate is for a lump sum according to expenditure incurred in previous constructions on the South Indian Railway.

PLANT, CARRIAGE AND WAGGON.

Revised estimate ... ... Rs. 3,000

This is not provided in the original estimate.

STATION AND OFFICE FURNITURE.

Revised estimate ...	...	Rs. 18,461
Original estimate ...	...	„ 15,000
More in Revised estimate ...	...	Rs. 3,461

A mileage rate of Rs. 150 per mile is provided in the original estimate. The revised estimate is worked out according to the practice on previous constructions on the South Indian Railway.

ROLLING STOCK.

Revised estimate ... ... Rs. 12,80,410

This is not provided in the original estimate, the assumption being that no separate stock would be required.

GENERAL CHARGES.

Revised estimate ...	...	Rs. 7,81,963
Original estimate ...	...	„ 4,00,000
More in Revised estimate ...	...	Rs. 3,81,963

The original estimate is based on mileage rates from actual expenditure on open lines. The revised estimate is prepared for the requirements of the work and the period it will be under construction.

TRICHINOPOLY,
20th October 1899.

T. MICHELL,
Engineer-in-Chief.

Public Works (1899) Departmen

RAILWAY BRANCH.

G.O., No. 1399-1400 Ry

DATED 6th Decr 1899

Proof 80

[Despatch Abstract.]

South Indian Ry

Pamban Branch Report including Sivaganga Section

Directing that the plans, reports, & estimates of the — prepared by the Engr in Chief, Ry, be forwarded for the orders of the Govt of India, in view to the selection of the best route

Forwarding the plans, reports, & estimates — prepared by the Engr-in-Chief in view to the selection of the best route

Indexed.

[P. W. Dy. 192—15-9-99.]

BACK PAPERS.

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

FURTHER PAPERS.

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

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

Regd. *Spare copies*

G.O., No. 1399 Ry., 6th December 1899.

DECEMBER.

Pamban Branch, South Indian Railway

Directing that the plans, reports and estimates of the — prepared by the Engineer-in-Chief of the Railway, be forwarded for the orders of the Government of India, in view to the selection of the best ro[illegible]

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following papers :—

G.O., Nos. 529–30 Ry., dated 5th August 1897.
" " 968–69 " " 28th July 1898.
" No. 1349 Ry., dated 2nd November 1898
" " 476 " " 26th April 1899.
" " 580 " " 15th May 1899.
" " 634 " " 3rd June 1899.

Read also the following papers :—

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 29th September 1899, No. 970.

With reference to the instructions conveyed in Madras Government Order No. 968 Ry., dated 28th July 1898, regarding the survey of the South Vaigai route for a line of metre gauge railway from Madura to Pamban with a branch to Sivaganga, I have the honour to forward two sets of the plans and sections, for the survey which has been made by the officers of this Company from Madura to Mandapam, together with 90 copies each of an estimate for the construction of the line, and of a report upon the project in which—pages 10 to 13—is embodied the report of a traffic survey made by an officer of the Traffic department of the Company. The type drawings to accompany the above will be forwarded later on.

2. The plans and estimate now sent are for a line on the *south* bank of the Vaigai river, the desirability of which route has been already urged by the Agent of this Company (*vide* Madras Government Order No. 869 Ry., dated 27th June 1898), and I need not therefore go into the matter again. *The favour of early orders is requested upon the route to be finally adopted.*

3. On page 3 of the estimate is given a comparative statement of the estimate now prepared by Mr. Michell and that submitted in 1895 by Mr. Shadbolt, from which it will be seen that after deducting the cost of locomotives and rolling stock (for which Mr. Shadbolt did not make any provision) from Mr. Michell's estimate, the cost of the line as now located is Rs. 57,841 per mile against the Rs. 41,774 of Mr. Shadbolt's estimate, the difference being chiefly due to land and formation being greatly underestimated in the latter estimate, and to the amount for stations and buildings in the new estimate, including the junction arrangements at Madura not provided for in the estimate of 1895, and the interlocking of signals at stations.

4. In the Engineer-in-Chief's report he alludes, at the foot of page 5, to the *class* of permanent-way having been decided upon; but this is not the case as will be seen from the accompanying pamphlet containing the whole of the correspondence that has taken place on this question.

5. The plan and estimate for the Sivaganga branch will follow.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 9th November 1899, No. 1103.

I have the honour to forward the plans and estimate for the Sivaganga branch of the Pamban branch, with an explanatory note on the differences between Mr. Shadbolt's estimate for the line on the north bank of the Vaigai and the estimate now prepared by Mr. Michell for the line located on the south bank. The difference amounts to Rs. 39,48,331, the details of which are given on page 1 of the note.

2. In Mr. Shadbolt's estimate no provision was made for rolling stock. This item has in the new estimate been estimated at Rs. 12,80,410; so that the comparison has to be made on Rs. 26,67,921, of which figure land and ballast and permanent-way make up nearly one half. The cost of converting Madura into a junction station has been included in the revised estimate; this work amounts to Rs. 2,24,714. Mr. Shadbolt made no provision for any junction arrangements, beyond the small sums of Rs. 1,342 and Rs. 2,036 for staff quarters and station machinery respectively; whereas a line on the north bank would necessitate either the alterations to Madura now proposed, with the cost of doubling the South Indian Railway Vaigai Bridge, or a new station at the junction north of the Vaigai. His estimate is also very much below the mark under main heads III—Formation, and VIII—Stations and Buildings. Nothing is provided for channel and road diversions, for pitching slopes of embankments in tanks, nor for the temporary first ballast. The stations did not provide sufficient accommodation for the estimated traffic. In the estimate now submitted these extra works amount to Rs. 5,29,689, and this added to the increase in value of the permanent way (which is of the same type in both the estimates), to the provision of stone ballast throughout, and to the more liberal valuation of land, totals up to a sum of Rs. 17,60,914 out of the increase of Rs. 26,67,921. The line on the south bank passes through a more populous and better cultivated country and shortens the route for through passengers by about 9 miles, well worth a considerable additional expenditure.

3. The branch by the south bank of the Vaigai including Sivaganga is 2·98 miles longer than that of the line surveyed by Mr. Shadbolt, but the length of the line over which through passengers would have to travel is reduced from 100 miles to 91·33 miles or a distance of 8·67 miles. The extra cost of the line due to this extra length, taking the figures of the new estimate, is Rs. 2,35,137.

4. The estimate for the main line of the Pamban Branch was sent forward to you in advance of that for the Sivaganga Branch in accordance (as I understood from the Engineer-in-Chief) with your wish verbally expressed to him; I was also desirous of getting off a portion of the work before I left for Simla.

ESTIMATES FOR THE PAMBAN BRANCH, SOUTH INDIAN RAILWAY.

Note by the Consulting Engineer for Railways, Madras, dated 15th November 1899.

The Agent of the South Indian Railway Company has now sent in Mr. T. Michell's plans, estimates, and reports, on the project for connecting Madura station of the South Indian Railway with the sea at Mandapam, near Toni Torai, a small village at the Indian end of the narrow chain which includes the islands of Rameswaram and Manar, and the shoals and islands called Adam's Bridge, that stretch across the straits between India and Ceylon.

2. The criticisms likely to be applied to the present estimate will naturally be greatly influenced by the view taken by the critic of the value of the earlier estimate prepared four years ago by Mr. E. I. Shadbolt. In some respects Messrs. Shadbolt's and Michell's estimates are comparable, in other respects not. Thus, for example, no rolling stock was provided in Mr. Shadbolt's estimate, the idea presumably being that 1,000 miles of well stocked line might be expected to be able to work the additional trains required on 100 miles of extension without providing itself with more additional rolling stock than might be contemplated with equanimity in view of the extra traffic likely to come from the extension to the parent line. Again Mr. Shadbolt's estimate contained no provision for junction arrangements, which are now estimated as likely to cost $2\frac{1}{4}$ lakhs. Land was undoubtedly seriously underestimated by Mr. Shadbolt. Mr. Michell moreover contemplates a better provision for ballast; and experience has dictated the insertion of certain rates on a higher scale for other items of the estimate.

3. But the chief difference between the former and the latter project which makes it difficult to fairly compare them is that, while Mr. Shadbolt contemplated running 100 miles of a circuitous line to the sea, *viâ* a not very important town of some 6,000 inhabitants called Sivaganga, Mr. Michell proposes to reach the same objective by a line shorter by 9 miles, through a much more fertile and all-round better country than that through which Mr. Shadbolt, under the instructions of this Government, proposed to run.

4. Mr. Michell furnishes a separate estimate for a branch to connect Sivaganga with the Madura-Pamban line. Whether this separate branch is a thing of immediate urgency or not is a matter for Government to decide. For the present, and for the purpose of this note, I shall assume that the construction of the short Sivaganga Branch is not urgent and that the primary objective is Mandapam on the sea opposite Pamban. I shall therefore compare Mr. Michell's estimate of the cost of reaching Mandapam from Madura with Mr. Shadbolt's.

5. Mr. Michell has taken it for granted that in any case Sivaganga is, as lawyers say, "of the essence of the contract," and has submitted an Explanatory Note on the differences between his estimate as a whole, including the branch, and Mr. Shadbolt's. But as there is no immediate necessity for the railway to go to Sivaganga at all, at least until the prospects of traffic are such as to justify the connection of this or any other fair sized village with the main line at the cost of 10 or 11 lakhs, all that is necessary is to compare the cost of the two routes connecting Madura with the sea at Mandapam. If we supply Mr. Shadbolt's omission of rolling stock at Mr. Michell's rate per mile, we get the following comparison :—

Mr. Shadbolt's estimate of the cost of connecting Madura with

run, the permanent ballast may very

entered in the item earthwork. As the sand topping has been entered in the earthwork estimate at an average rate of Rs. 21 per 1,000 cb. ft., it can certainly be done when trains are running very much more cheaply, so there ought to be a saving of fully three lakhs under the head ballast.

(*b*) *Permanent way.*—Mr. Michell has estimated the cost of his rails, sleepers, and fastenings 25 per cent. higher than Mr. Shadbolt. An attempt was made to cut down this item by the use of wooden sleepers for which, for reasons given, the Agent of the Company, the Government Consulting Engineer, and the Government of India expressed a strong preference; and Mr. Michell had estimated this type at the rate of Rs. 18,152 per mile, or about 2,000 per mile less than Mr. Shadbolt's estimate. The Board of Directors however, on the advice of their Consulting Engineer,

on the subject of the Pamban branch of the South Indian Railway for some years past, whether in connection with proposals for its promotion by a private Company or by the South Indian Railway Company, it has been taken for granted that it would be an exceptionally cheap line, *viz.*, that the sea could be reached at a cost, including rolling stock, of perhaps 50 lakhs. Now we are told by a new estimator that it cannot be reached far less than 72 lakhs, and it stands to reason that the two principal parties to the contract, *viz.*, Government and the Company, will want to know the reason why. There seems to me to be no doubt that the first estimate was seriously insufficient, in several respects, for a line certain to be used as the main line route for fast trains to Ceylon. That estimate omitted to take into consideration certain items the cost of which would in any case have had to be shown in the books of the South Indian Railway, even if excluded from the books of the branch. Certain additional expenditure will also be ascribable, and very properly so, to the fact that the revised alignment now passes through a far better cultivated, and therefore more expensive, country; and after all, however important may be considerations of serving the through traffic between termini, much of the success of even a short 100-mile extension must necessarily depend on the sort of country passed through, and whether the expenditure is or is not to serve the needs of the cultivators. I proceed now to institute a comparison, item by item, between Mr. Shadbolt's estimate and Mr. Michell's of the cost of getting from Madura to Mandapam.

7. I. Preliminary Expenses.—Mr. Shadbolt put down the cost of survey at Rs. 438 per mile, while Mr. Michell has very properly added not only the cost of an old survey made ten years ago, but also of that just completed, and has found that as a fact it has cost Rs. 1,172 per mile. This is a high figure for an easy country, but it is a fact, and must therefore be accepted.

II. Land.—That 100 miles of land for a railway could be acquired for rupees one lakh was undoubtedly a wrong estimate. It may conceivably cost every penny of Mr. Michell's figure, *viz.*, Rs 5,84,178; and anyhow it will cost what it will cost; there is no way open to the Engineers of controlling its cost, which will depend on the Government Civil officers who also furnished the information on which the estimate was based. Mr. Shadbolt's figures per acre were undoubtedly insufficient. I doubt whether Mr. Michell's figures are inordinately high. It has already been incidentally mentioned that many miles of the new alignment pass through land through which it is worth while running a railway instead of, as the early alignment did, over high arid land. The only chance of effecting any appreciable economy is to take up land for a single line for the present; for it will certainly be 20 or 30 years before the Pamban branch, situated as it is at the tail end of the system, need be doubled, and even if by that time the price of land per acre should have doubled itself, which is unlikely, it will be cheaper to defer the taking up of extra land until the necessity for it arises. Land plans are now being made for a double line. To reduce the width to that requisite for a single line may save $\frac{3}{4}$ to 1 lakh; I doubt if it is worth while.

III. Formation.—If the two estimates, see page 3 of the earlier and page 7 of the later book, be compared it will be found that whereas as a fact the actual *quantity* of bank and cutting per mile of the former is some 6 or 7 per cent. in excess of that in the latter, the latter estimate contains a large number and value of items, aggregating about Rs. 3,00,000, which do not appear in the former at all. The obvious alternative is either that Mr. Shadbolt forgot them or the cost of obtaining them necessary [illegible] junctions, of [illegible]ed and expensive stations, etc., etc. A reference to Appendix G of Volume II of the Annual Administration Report on Indian Railways will show that while on some lines, *e.g.*, the metre-gauge section of the E.B.S.Ry. and the Rajputana-Malwa Ry., this item runs up to Rs. 10,000 per mile, it is as low on some lines, *e.g.*, the Mysore State Railway, as Rs. 3,000. There are few sub-heads which afford so large a scope as this for extravagance or economy. Some Rs. 63,000 worth of the proposed expenditure is due to the assumption that a junction will at once be necessary at Tirupachatti, whereas, as already suggested, the proposed branch to Sivaganga may very well take its turn with proposed branches to the numerous other towns of its size in the Madras Presidency which lie within eight or ten miles of a railway, or at least may await the completion to the sea of the Pamban branch.

added only 4 cb. ft. per foot run of stone ballast—a provision which obviously is quite insufficient if it is intended to represent all the capital likely sooner or later to be spent on the item at the cost of capital. It may not seem to matter very much whether the first layer of sand be included in the earthwork or in the ballast item of the one estimate; but in view of the fact that it all disappears into the bank in the first three or four years, it seems proper that, as has been done by Mr. Michell, it should be put into the earthwork estimate. In view of these considerations, I elect to reject Mr. Shadbolt's figure for earthwork of Rs. 3,323 per mile, and to accept Mr. Michell's figure, Rs. 6,424, which after all is a comparatively low figure, being only £428 per mile.

IV. Bridgework.—Mr. Shadbolt's estimate is Rs. 4,811 per mile, Mr. Michell's Rs. 5,209. The two, however, are not readily comparable, because the former contemplates bridging a comparatively important river, the Vaigai, while the latter, by starting from the south end of Madura station instead of from a mile or two north of it, avoids that river altogether. But, *per contra*, the route now selected passes for many miles through a country full of tanks, that is through a country better worth making a railway in, and consequently more frequently intersected by channels which must necessarily be bridged. Considering the length of carriage for all lime and stone, I do not think that it will be found that Mr. Michell's rates for masonry, *viz.*, Rs. 35 and Rs. 45 per 100 cb. ft., are inordinately high. Some of his other rates seem high, but my experience is that to keep on persuading oneself that work *will* be done at low rates is only the policy of the foolish ostrich, and that by the time trains are running and completion reports closed the rates of finished work are usually found to work out to a considerably higher figure than the office person guessed at. I do not think that there will be any saving worth troubling about in Mr. Michell's estimate of the cost of bridgework. The estimate allows for new 40-ft. girders, but actually it is proposed for each span to use three of the girders lately taken out of the Nellore-Gudur section of the South Indian Railway.

V. Fencing.—For this item, which besides fencing proper includes road crossings and mile and grade posts, Rs. 1,189, or under £90, per mile, is not unduly high. Mr. Shadbolt thought Rs. 898 would serve. As a fact the later estimator has taken account of two important items—land boundary stones and palings for Madura station—which found no place in the earlier estimate.

VI. Electric Telegraph.—No mention of this was made in the first estimate. The South Indian Railway Company are in the habit of fixing their own instruments.

VII. Ballast and Permanent-way.—(*a*) *Ballast.*—Both estimates provide for the same *quantity* of ballast, *viz.*, 10 cb. ft. per foot run; but while, as already explained, the earlier estimate contemplated the debit to this sub-head of 6 cb. ft. of sand and 4 of stone, the later one considers that inasmuch as the sand will very soon disappear into the bank, and as it is better that cheap sand should so disappear rather than dear stone, it is right that the cost of the sand should go into the sub-head *earthwork*, and that the sub-head *ballast* should contain full provision for the regular section of stone ballast to be ultimately used. As a fact, however, nearly the whole of the pot sleeper road of the South Indian Railway is laid on sand ballast of not nearly so good a quality as that obtainable on the Pamban branch. I am therefore of opinion that except for a skin of stone ballast to keep the sand from being blown away, say 2 cb. ft. per foot run, the permanent ballast may properly well be of the same quality as the sand topping entered in the item earthwork. As the sand topping has been entered in the earthwork estimate at an average rate of Rs. 21 per 1,000 cb. ft., it can certainly be done when trains are running very much more cheaply, so there ought to be a saving of fully three lakhs under the head ballast.

(*b*) *Permanent way.*—Mr. Michell has estimated the cost of his rails, sleepers, and fastenings 25 per cent. higher than Mr. Shadbolt. An attempt was made to cut down this item by the use of wooden sleepers for which, for reasons given, the Agent of the Company, the Government Consulting Engineer, and the Government of India expressed a strong preference; and Mr. Michell had estimated this type at the rate of Rs. 18,152 per mile, or about 2,000 per mile less than Mr. Shadbolt's estimate. The Board of Directors however, on the advice of their Consulting Engineer,

expressed a strong preference for the type of permanent way in general use throughout their system, and Mr. Michell thus found it necessary to raise his estimate to Rs. 25,122 per mile, a figure involving an extra expenditure of nearly 6½ lakhs in getting from Madura to Pamban. This extra expenditure will involve interest amounting to nearly Rs. 20,000 per annum, to meet which nearly Rs. 200 per mile per annum of saving must be effected in maintenance charges. There is no question but that the more expensive road will be the better road, and it is for the business partners, Government and the Company, to agree whether or not it is worth while once for all to pay more money for the better article. The Government of India have been influenced by considerations of the possibility of its ultimately becoming necessary to connect up the broad-gauge system of India with that of Ceylon by converting to standard gauge the metre-gauge Pamban branch, a possibility which naturally enough the Company cannot be expected to contemplate with equanimity. Personally I think that if ever the broad-gauge connection of India and Ceylon comes off, it will be brought about by restoring the old gauge on the Trichinopoly-Erode branch (an alternative metre route across the chord, through country further to the west which needs opening up, being provided between Dindigul and Erode) and by constructing a new broad-gauge line from Trichinopoly through the Pudukottai, Devekottai, Ramnad country to Pamban. If it should turn out that the Pamban branch is never converted, and I think its conversion is extremely unlikely in spite of the Government of India having ordered all its bridge masonry to be made fit for the broad-gauge, the Company's preference for the more expensive type of permanent way will in my opinion have been justified. When money is scarce people like to get to their objective quickly and cheaply; but I cannot think that in this particular case the choice of the more expensive type of road will result in the opening of the Pamban branch being appreciably deferred. Mr. Mitchell's rates for permanent-way materials will probably not be very closely worked to in detail. They are high as compared with the rates of a year ago, but low just now. It is possible, and I think likely, that rates will fall again, and it might be wholesome to make enquiries in the United States. Rails may perhaps be got for £5-18-0 per ton if contracts are not placed in too great a hurry; but there ought, I think, to be a saving on £4-16-0 per ton for cast iron sleepers. The worst of it is that, with a view to leading out material for the bridges, it is somewhat urgently necessary that there should be no undue delay in the supply of permanent way. The rate for laying is not too high; nor is Rs. 500 per mile unduly high for maintenance pending opening for traffic; though properly speaking this last item ought to be covered by the rates of masonry and of other things for the sake of which money is to be spent on keeping trains running. To sum up I would not venture to reduce the rate Rs. 22,728 per mile for permanent way, which, when sidings are added for Madura junction and other stations, works up to Rs. 25,122 for the distance between termini. I may mention that the booked capital cost per mile of the item *Ballast and permanent way* of the open section of the South Indian Railway is only Rs. 18,000, out of which if, say, Rs. 3,000 be deducted for ballast, Rs. 15,000 remains as the cost of permanent way proper. The Board of Directors cannot after this plead ignorance of what they are facing in insisting on an expensive type of road in these days of high prices.

VIII.—Stations and Buildings.—Mr. Michell has provided for this an average rate of Rs. 6,005; whereas the average throughout the whole of the South Indian Railway Company's system is Rs. 6,779, a rate which covers the cost of head-quarter offices, large junctions, old fashioned and expensive stations, etc., etc. A reference to Appendix G of Volume II of the Annual Administration Report on Indian Railways will show that while on some lines, *e.g.*, the metre-gauge section of the E.B.S.Ry. and the Rajputana-Malwa Ry., this item runs up to Rs. 10,000 per mile, it is as low on some lines, *e.g.*, the Mysore State Railway, as Rs. 3,0[illegible] There are few sub-heads which afford so large a scope as this for extravagance or economy. Some Rs. 63,000 worth of the proposed expenditure is due to the assumption that a junction will at once be necessary at Tirupachatti, whereas, as already suggested, the proposed branch to Sivaganga may very well take its turn with proposed branches to the numerous other towns of its size in the Madras Presidency which lie within eight or ten miles of a railway, or at least may await the completion to the sea of the Pamban branch.

Again, including the two termini Mr. Michell has six watering stations in 91 miles, while five, Madura, Tirupachatti, Paramakudi, Ramnad, and Mandabam, would be a reasonable number in this perfectly level country where an average of 25 or even 30 miles be temporarily, pending traffic developments. Minor savings are undoubtedly possible throughout, and if I put these at Rs. 500 for intermediate stations, I get another Rs. 6,000 off the estimate, or a total of Rs. 80,000. I consider that Rs. 5,000 per mile may with care and economy be made to amply suffice for the equipment of the Pamban branch with stations and offices, staff quarters, and station machinery for several years to come. This is the figure of the Cawnpore-Achnera section; it is just double the figure for the South Indian Railway Company's own branch, the Mayavaram-Muttupet Railway, though I recognise of course that the present estimate debits the cost of junction arrangements to the branch, instead of to the parent line as was done in the case of Mayavaram junction. It is however pretty certain that, on so important an extension as this is, the full estimated figure, Rs. 6,000 per mile will sooner or later be spent.

IX. Plant.—The provision for this item, Rs. 672 per mile, may stand.

XI. Rolling Stock.—Here again I consider that the estimate is an inordinately high one. The opportunity of starting a new branch is naturally a somewhat tempting one for adding to the rolling stock of the system. But it is rather extravagant to ask for a considerably higher rate per mile, for the rolling stock of a 90-mile extension of the through main line of an eleven hundred mile system, than the booked capital rate on the main line. The stock of the great Rajputana-Malwa Ry. stands at only Rs. 11,600; that of the Bengal and North-Western Ry., Tirhoot section, at Rs. 6,600; that of the Cawnpore-Achnera at Rs. 6,200, that of the Southern Mahratta Ry. at Rs. 9,500. I certainly am of opinion that Government and the Company need not contemplate a higher expenditure on this item for many years to come than Rs. 10,000 per mile, and this is liberal. Mr. Michell has caused some confusion by putting the entire provision for rolling stock, *viz.*, Rs. 12,80,410, into the estimate for the Madura-Pamban line and none into that for the Sivaganga branch. His rate for the combined line and branch comes to Rs. 12,431 per mile.

XII. General Charges.—Rs. 7,688 for this item is high. But that is an incident, 1st, of the short length of lines under construction by the Company at one time, and, 2nd, of funds for the work being likely to be allotted at a slower rate than they *could* be spent by the available staff. This item must stand.

8. The savings above contemplated in the expenditure to be primarily incurred within the first few years after opening, are as follows:—

Land, say	Rs.	75,000
Ballast	„	3,00,000
Stations, etc.	„	91,000
Rolling stock	„	3,68,000
Total	Rs.	8,34,000

If these savings can be effected in the primary outlay, it will be possible to reach Pamban, or rather the sea at Mandapam, from Madura, for an expenditure of Rs. 63,66,000. This may be compared with Mr. Shadbolt's figure Rs. 41,78,000, and if to this latter we add Rs. 10,000 per mile for rolling-stock, and Rs. 4,00,000 for land notoriously underestimated, we get Rs. 55,78,000 as the figure to be substituted for Mr. Shadbolt's if it is to be fairly comparable with Mr. Michell's. I have no hesitation in accepting Rs. 63⅔ lakhs as the figure which ought to be accepted by Government and by the Company as the probable outlay to be incurred *at first* on the construction and opening of a very high class extension, by the most suitable route, from Madura to Pamban.

9. I now pass to the question of the Sivaganga branch, which Mr. Michell has estimated at Rs. 9,26,276. But if this branch is to be built it will be necessary to re-insert the sum of Rs. 63,000 cut out from VIII. Stations and Buildings on account of the Tirupachatti junction and to add Rs. 10,000 per mile for rolling stock. The

stipulation that no more than Rs. 5,000 per mile shall be spent on stations and buildings gives a saving of Rs. 10,000, on land we may perhaps save Rs. 15,000, and on ballast Rs. 35,000. Net result Rs. 10½ lakhs for the Sivaganga branch 11·65 miles long, equipped with rolling stock. Now it is a very important question whether this heavy expenditure is justifiable for the sake of the trade of a town of 6,000 inhabitants and of the country around it. The branch will certainly bring into touch with the South Vaigai route a large area of country which would otherwise be cut off, more or less, from access to it, because of the Vaigai river in which now-a-days, since the completion of the Periyar scheme, water flows for more days in the year than formerly. Still Rs. 10½ lakhs is a heavy outlay.

10. The considerations which led this Government to the choice of the South Vaigai route instead of the circuitous Sivaganga route will be found recorded in Proceedings, No. 968 Ry., dated 28th July 1898. The route was fully accepted by the Company's Board in their letter to their Agent, No. 216, dated 29th July 1898. The Board's decision was based on a Note by their Agent, dated the 18th May 1898. In its letter to the Government of India, No. 969 Ry., dated 28th July 1898, this Government strongly recommended that the branch should be built simultaneously with the main line. The wisdom of the selection of the South Vaigai route, that is, of the route on which Mr. Michell's present estimate is based, has been fully endorsed by the local Civil officers. Its importance also in shortening by 9 miles the through route between India and Ceylon has greatly influenced this Government in its choice of routes; and while to me there seems to be no question of its superior advantages, I do not lose sight of the value of its connection by means of the Sivaganga branch with the country lying north of the Vaigai. But it is obvious that the decision whether the branch should or should not be made at once, at a cost of Rs. 10,50,000, must chiefly depend on the amount of money which can annually be made available. For it seems to be all important that the through connection of Madura with the sea should be *first* effected; the branch can follow at any time as money becomes available.

11. There is I think no doubt that the anxiety of the Company to get the branch made, and the Vaigai bridged as far west as Tirupachatti, is due to a hope that the future inevitable connection of the Pamban line with the Tanjore District Board lines may thereby be prejudiced in favour of Tirupachatti, and that the much dreaded short-circuiting may thereby be made less formidable. But the true remedy is in the construction of the proposed Trichinopoly-Tirukoilur chord line, and there is the great probability also that the Tanjore District metre lines will not extend south of Devikotta where they will probably in the distant future join the broad gauge Ceylon connection, from Dindigul to Ramnad. The only sort of railway policy which, in my opinion, is worthy of adoption by a Government invested with its control or direction is a policy which, instead of confining itself to a search for methods of financially bettering the existing railway administrations, searches for the betterment of the connection of markets and produce areas. Such a policy, if consistently pursued, cannot fail in the end to be also for the best interests of the Railway Administrations.

Madras,
15th November 1899.

Francis J. E. Spring,
Consulting Engineer for Rys.

Order—No. 1399 Ry., dated 6th December 1899.

The Government of India will be addressed.

[Here enter No. 1400 Ry., dated 6th December 1899.]

(True Extract.)

Francis J. E. Spring,
Secretary.

Exd. T. K. Narayana Aiyangar.

...ue available staff. This item must stand.

...The savings abo... ...a slower rate ...
within the ... Indian Railway...

VII R

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

Regd. *Spare copies*

Letter, No. 1400 Ry., 6th December 1899.

DECEMBER.

Pamban Branch, South Indian Railway

Forwarding, for orders, the plans, reports and estimates of the — prepared by the Engineer-in-Chief of the Railway, in view to the selection of the best route.

RAILWAY.

Government of Madras.

PUBLIC WORKS.

Recd.	1897.	*Enclosures*
Regd.		*Spare copies*

G.O., Nos. $\frac{529}{A}$, 530 R., 5th August 1897.

AUGUST.

Madura-Pamban Railway

Letter to the Government of India forwarding, with the views of the Government of Madras, copy of a letter from the Agent, South Indian Railway, submitting certain proposals for the construction and working of the — and other railways.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers:—

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—Ootacamund, 11th June 1896, No. 509 R.

I am directed to invite attention to my No. 793 R. of 23rd November 1895, forwarding the plans and estimates for the Madura-Pamban project and making certain recommendations on the subject, and to enquire how the matter stands, and whether this Government can do anything to forward the same.

2. I am to add that His Excellency the Governor in Council considers that it is very desirable that this line should be undertaken at as early a date as possible, and that, as Messrs. Wallace Brothers' concession will expire on 26th July 1896, it would seem desirable to open negotiations with the South Indian Railway unless it is intended to extend the period of the concession which it is hoped is not the case.

From—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Simla, 14th July 1896, No. 1027 R.C.

I am directed to acknowledge the receipt of your letter, No. 509 R., dated 11th June 1896, enquiring how the question of the construction of the proposed Madura-Pamban Railway stands and suggesting that, as Messrs. Wallace Brothers' concession will lapse on the 26th July 1896, it would seem desirable to open negotiations with the South Indian Railway Company.

2. In reply I am to enclose, for the information of the Government of Madras, a copy of the Government of India's despatch * to the Secretary of State which shows the present state of the project and of the negotiations for its construction, and to say that the prosecution of the whole scheme for a railway to connect India with Ceylon depends upon an agreement between the Secretary of State for India and the Secretary of State for the Colonies as to the financial support to be given to the project.

* No. 8, Railway, dated 5th February 1896.

ENCLOSURE TO ABOVE LETTER.

Despatch from—The Government of India, Public Works Department.
To—The Right Hon'ble the Secretary of State for India.
Dated—Calcutta, 5th February 1896, No. 8 Railway.

With despatch No. 56, Railway, dated 29th June 1893, Lord Kimberley forwarded, for our consideration, an application from Messrs. Wallace Brothers for a concession for the construction of a railway from Tanjore or Madura, or both places, to the boundary of the Indian Empire at or near the island of Ramesvaram in connection with a scheme for connecting India with Ceylon by a railway across Adam's Bridge.

2. We replied in despatch No. 57, Railway, dated 12th September 1893, that as Sir E. J. Reed's Ship-canal Syndicate held a preferential right to construct the Madura-Pamban railway, Messrs. Wallace Brothers' application could not be considered until the former withdrew or negotiations with them ended. We were then informed by correspondence accompanying Lord Kimberley's despatch, No. 58, Public Works, dated 30th November 1893, that Sir E. J. Reed's Syndicate had no wish to stand in the way of any substantial parties offering to make the railway from Madura to Colombo provided that, in the concession to the railway, due provision was made for the Ship-canal and Rail-road Syndicates acting in concert.

3. After consulting the Government of Madras, who were in favour of the proposal for connecting the railway system of India and Ceylon on certain conditions, we replied, in our despatch, No. 31, Railway, dated 5th June 1894, that we had no objection to Messrs. Wallace Brothers being given a preferential right for a period not exceeding two years, to construct the Madura-Pamban line pending a thorough investigation of the complete scheme and provided that their final proposals are satisfactory.

We learnt from your Lordship's telegram of the 18th November 1895 that a provisional concession for two years, expiring on the 26th July 1896, had been granted to Messrs. Wallace Brothers.

4. We are now in possession of the results of the survey carried out in the cold weather of 1894–95; and enclose a copy of the survey report and estimates of the cost of construction of the Madura-Pamban railway, together with a copy of the letter of the Government of Madras giving cover to the same.

The line will be 100·18 miles in length, and the cost is estimated at Rs. 41,77,460, being at the rate of Rs. 41,774 per mile, excluding provision for rolling stock.

We are advised, however, that the line, excluding rolling stock, is not likely to be constructed for less than Rs. 45,000 per mile, but, on the information available, there appears to be reason for expecting that the net traffic earnings will reach to 4½ per cent. on this enhanced cost of construction.

5. We would, therefore, ask your Lordship to continue the negotiations with Messrs. Wallace Brothers, and arrange, if possible, for an extension of the line through to Colombo as desired by the Government of Madras. We should add that we have no information available as to the cost or earnings of the Ceylon portion of the project, and that we are not prepared to accept any financial responsibility for that part of the scheme.

6. In paragraph 3 of despatch No. 58, Public Works, dated 30th November 1893, Lord Kimberley desired to be acquainted with the results of the investigation of Palk's Straits which was about to be undertaken by the Government Marine Survey officers; this has only recently been completed, and we now enclose two copies of the Chart of the new survey of Palk's Straits, together with two copies of the Hydrographic Notice by the officer in charge of the Marine Survey of India.

ENCLOSURE NO. 1 TO DESPATCH NO. 8 RY., DATED 5TH FEBRUARY 1896.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—23rd November 1895, No. 793 R.

In continuation of my No. 742 R. of 7th November 1895, I am directed to forward the report, plans, sections and estimate of the Madura-Pamban project with a note by the Consulting Engineer.

2. This project is submitted with the fullest support of this Government as it is clearly shown that it is an exceptionally cheap line to build and has much greater possibilities than the Mayavaram-Mutupet branch which already returns 4½ per cent. on capital expended. Should it, however, be decided to make this branch a part of the main through line to Ceylon, the town of Sivaganga could be served by a branch and the main line taken more directly between Madura and Pamban.

3. With reference to this extension, I am to say that it is the opinion of His Excellency the Governor in Council that it is highly desirable that it should be constructed by the agency of the South Indian Railway rather than by a private firm.

4. This opinion has been consistently advanced by this Government for extensions of the Madras railway, and seeing that most of the southern main lines of India are already constructed, the same policy should, it is thought, be adopted in the case of the South Indian as well as in other large companies.

5. It will be noted that letter, No 1404 C. of 30th March 1894, from this Government, laid especial stress on the offer to Messrs. Wallace Brothers being made to cover the whole project between Madura and Colombo including the Adam's Bridge connection, as it was considered undesirable that a private company should have concessions of short branches leaving the construction of the least profitable and most expensive work to the Government.

6. This Government is anxious that this point should be again impressed on the Secretary of State, and I am to request that this letter be laid before him, and that he be requested by telegram not to grant provisional concessions for portions of the Madura-Colombo project.

7. It is not understood whether the concession to Messrs. Wallace Brothers mentioned in paragraph 3 of despatch No. 31 of 1894, to the Secretary of State, was intended to apply to the whole or part of the project; if there is any uncertainty, therefore, about this, I am to ask that the views of this Government, as expressed above, may have full consideration so that the South Indian Railway may have the opportunity of undertaking this highly desirable and profitable branch at an early date.

ENCLOSURE No. 2. TO DESPATCH No. 8 RY., DATED 5TH FEBRUARY 1896.

MADURA-PAMBAN RAILWAY SURVEY.

Note by the Consulting Engineer for Railways, dated Madras, 29th October 1895.

Location.—The orders given by the Madras Government were that the line should run from the South Indian Railway main line on the left bank of the Vaigai river generally, following the road to Sivaganga, thence to Mana Madura and Paramagudy, from whence two routes were to be examined either crossing the Vaigai at Paramagudy, or keeping to the left bank and crossing the Vaigai at Ramnad. The Pamban channel and island to Rameswaram to be examined but not surveyed in detail. Mr. Turner, Collector of Madura, to be specially consulted.

2. The previous history of the former surveys, and the reasons given for adopting the Sivaganga route, are given in the report, which, with the plans and estimate, is submitted in a very complete form.

3. The alignment from Paramagudy to Ramnad on the right bank of Vaigai has been chosen in preference to that on the left bank. Mr. Shadbolt, however, does not compare the advantages of a bridge across the Vaigai at Paramagudy with a causeway over the same river near Ramnad which has been strongly advocated by the Hon'ble Mr. Bliss and the Hon'ble Colonel Pennycuick.

4. I am strongly in favour of a bridge across at Paramagudy instead of a causeway near Ramnad, for the following reasons:—

Mr. Shadbolt points out that the Periya Kanuvayi tank has been constructed where the river originally divided into three channels; moreover, any line passing to the east of this tank crosses all the drainage nearly at right angles, and to render the line secure it should be lowered as a causeway for a distance of about $1\frac{3}{4}$ miles in three places (see Index section sheet No. 3, marked in red), if not for the whole distance.

5. The cost of a metre-gauge line causeway as put in near Trichinopoly and elsewhere is about Rs. 30 per foot run, as compared with the bridge which is Rs. 160 per foot run; therefore, the causeway should not exceed five times the length of any bridge it is intended to substitute. In this the Paramagudy bridge is estimated to cost Rs. 85,000 against Rs. 2,70,000 for the causeway, but I consider Mr. Shadbolt's estimate of the discharge of the river 18,370 cubic feet per second as against Mr. Geoghegan's estimate of 36,500 cubic feet, too low, and prefer increasing the 520 feet of waterway to 600 feet, which, at Rs. 160, is Rs. 96,000. Even thus it is only about one-third of the cost of a causeway such as, I believe, would be necessary. There is nothing to show in Mr. Geoghegan's report how the discharge was arrived at. Mr. Shadbolt provides for bridging the channel which is here very well defined, and the existence of mud walls along the banks show that this river does not overflow its banks.

6. The lengths of the two lines are nearly equal, 24 miles; but near Ramnad the northern line will have to cross the drainage of the country to reach the town, while the southern line is located parallel to the drainage and follows the road, affording a good site for the Ramnad station.

7. As a minor point in the alignment near Madura, I think it will be necessary to construct the triangle as the engine-changing station will be at the present South Indian Railway Madura station, and the question of running through trains from Madras or local ones from Madura cannot be decided for some years.

8. *Gradients and curves, construction and engineering*—Call for no remarks, except that I approve of the type of permanent-way, namely, 50-lb. rails on 70-lb cast-iron pot sleepers.

9. The rates for stone-work of all kinds are, I think, too low, considering the long lead, and they should be increased by 10 per cent. The cost of the land also appears insufficient.

10. *Traffic.*—I do not agree that either the Jalarpet-Podanur or Cuddalore-Madura sections of the Madras and South Indian Railways, respectively, are so comparable under this head as the Mayavaram-Mutupet branch, which also agrees closely with this line as to its capital cost per

mile. The cost of the Mayavaram-Mutupet line is up to date Rs. 24,17,000, that is, Rs. 44,760 per mile. Its earnings for one year, September 1894 to September 1895 (after being opened six months), average Rs. 86 per mile week; this is 10 per cent. on the capital which, at net receipts of $\frac{4.5}{10.0}$, gives $4\frac{1}{2}$ per cent. This may certainly be expected, and, in addition thereto, is the passenger, pilgrim traffic to Rameswaram.

11. Taking into consideration the extra waterway required over the Vaigai and the low rates for stone-work, I consider the line will cost Rs. 43,000 per mile, or Rs. 43,00,000. It must be remembered that the Mayavaram-Mutupet line was laid with second-hand permanent-way, costing Rs. 12,500 per mile, and the bridging Rs. 16,200 per mile as against Rs. 5,000 and Rs. 23,300 per mile, respectively, in Mr. Shadbolt's estimate.

12. Mr. Geoghegan's estimate for 1887 for the southern route is here given by mile for comparison, with the remark that the former was an approximate estimate.

Head of account.		Shadbolt.	Geoghegan.	Difference.
		RS.	RS.	RS.
Preliminary expenses	.. Rate per mile.	400	1,000	+ 600
Land	.. ,, ,,	1,000	4,000	+ 3,000
Construction	.. ,, ,,	9,000	13,000	+ 4,000
Ballast and Permanent-way	,, ,,	23,000	20,000	− 3,000
Stations and buildings	.. ,, ,,	3,500	6,500	+ 3,000
Plant	.. ,, ,,	300	2,000	+ 1,700
Rolling stock ..	.. ,, ,,	..	8,000	+ 8,000
Establishment ..	.. ,, ,,	4,000	5,000	+ 1,000
	Total ..	41,200	59,500	+ 18,300

13. Mr. Shadbolt has examined the country beyond the Pamban Pass, Island of Rameswaram, Adam's Bridge, and Manar Island. Mr. Waring, Chief Engineer, Ceylon, has also investigated the same route.

Comparative Estimate of Cost.

Sections between Pamban Pass and Manar Island.	Length.	Shadbolt.	Waring.
	MILES.	RS.	RS.
Pamban Strait Reef	1	10,50,000	4,50,000
,, Swing Bridge	0	3,00,000	
Ramesvaram Island	20	10,00,000	9,50,000
Adam's Bridge	21	2,49,00,000	2,55,00,000
Manar Island	17	8,50,000	9,50,000

The Government of India has been addressed forwarding the note and suggesting that a detailed survey should be undertaken as soon as practicable, and criticism of the project is deferred until the detailed survey has been completed.

ENCLOSURE No. 3. TO DESPATCH No. 8 RY., DATED 5TH FEBRUARY 1896.

From—The Officer in charge of the Marine Survey of India.
Dated—Bombay, 30th July 1895.

PALK STRAIT.

The following remarks relating to Palk Strait are derived from the survey in 1895 by Commander C. F. Oldham, R.N., and the officers of the Marine Survey of India.

[*All Bearings are Magnetic. Variation in* 1895 1°*E.*]

PALK STRAIT, so named after the Dutch Governor who first navigated it, separates Ceylon from the south-east part of the peninsula of Hindustan and at its entrance, between Point Palmyra and Point Calimere, is about 34 miles in width. The old Dutch navigators mention

6. This Government ;

tary

hree passages through the strait, the southern one of which, between the north coast of Ceylon and the shoals to the northward, is the original Palk Strait. To the south-west, Palk Strait opens out into a considerable sheet of water, stretching about 60 miles in that direction, and about the same distance further to the south-east, known as Palk Bay, having over it depths of from 6 to 7 fathoms with a muddy bottom. Palk Bay washes the north coast of Ceylon on its eastern, and the coast of Tanjore and Madura on its western side.

The islands of Rameswaram and Manar with their shoal connection known as Adam's Bridge, form a broken breakwater at the head of Palk Bay, dividing its waters from those of the Gulf of Manar; the Pamban Pass between Rameswaram island and the Hindustan Coast, making a narrow connecting channel.

There are two recognized entrances into Palk Bay—one, between Point Calimere and the northern end of the middle banks, has from 21 to 24 feet of water; the other (Palk Strait proper), between the south banks and the north coast of Ceylon, has a depth of not less than 30 feet at low water when crossing the northern end of the Pedro shoals, in the eastern part of the strait; and near the western limit of the strait, at about 5 miles north-westward of Karativu, there is a clear channel with a depth of not less than 33 feet at low water. There are other places where vessels might cross the banks in depths of 20 to 24 feet, but being out of sight of land there is no guide to them, and therefore they are not recommended.

JAFFNA PENINSULA, the northern coast of which borders the south side of Palk Strait, is the chief of the four districts comprised in the Northern Province of Ceylon, the others being Manar, Mullaitivu and Vavuniya. Jaffna district had, in 1891, a population of 279,636, chiefly Tamils. Jaffna, the principal town and port, is the residence of the Agent for the Northern Province. The other ports in Jaffna district are Point Pedro, Valluvedditurai, Kankasanturai, and Kaits.

Communications.—The town of Point Pedro is connected by telegraph through Kankasanturai, Jaffna, and Manar, with Colombo and the Indian system of telegraphs.

The steamers of the Ceylon Steam Ship Company generally make two voyages each round the Island of Ceylon in a month, one proceeding southward and the other northward round the island. They call at Kankasanturai during the south-west monsoon, or from the middle of February to the middle of October, and at Jaffna during the north-east monsoon. Point Pedro is visited at both seasons.

The British India Steam Navigation Company's steamers call generally at Kankasanturai, during the south-west monsoon on Saturdays, on their return from Negapatam to Colombo. During the north-east monsoon they call sometimes at Jaffna and occasionally at Kaits.

Mail Coach.—There is a mail coach service between Point Pedro, Kankasanturai and Jaffna, and between Jaffna and Matali, from which place there is a railway to Kandy.

Trade.—The trade of the Northern Province is carried on through the ports already mentioned, and the ports of Manar, Pesalai, and Vankalai in the district of Manar, and Mullaitivu on the east coast.

Exports.—In 1894 the exports were valued at Rs. 15,61,148, the principal being tobacco, chanks, palmyra timber, elephants, beche-de-mer, and jaggery; other exports are cocoanuts, dried fish, honey and salt.

Imports.—In 1894 the imports were valued at Rs. 33,16,602, the chief being paddy, rice, cotton goods, curry stuff, grain, earthenware, jewellery, iron bars, castor oil and sugar.

THE JAFFNA PENINSULA is low, formed of coral and sand, its northern coast being generally protected by a narrow fringe reef; low coral cliffs and sandhills being occasionally visible. Trees from 70 to 90 feet in height line the northern coast, and can be seen from the deck of a ship, at a distance of about 14 miles.

POINT PEDRO, in latitute 9° 49′ 40″ N., longitude 80° 14′ 50″ E., forms the north-eastern point of the Peninsula. The town and port of the same name, where there is a custom house and several bungalows on the beach, is situated about three-quarters of a mile westward of the point; the custom house with its red roof being a conspicuous mark near the landing place.

The port is open from about the middle of February to the middle of October. During 1894 it was visited by 360 vessels of 32,341 tons. Nineteen country craft of 1,412 tons belong to the port.

Supplies.—There is a native market, where fowls and vegetables can be procured; sheep and bullocks can be obtained by giving notice.

COAST.—From Point Pedro the coast trends west and W.N.W., a distance of 2⅓ miles to Point Palmyra, then W.S.W. and west 4½ miles to Tondaimanar. A fringe reef lines the coast and extends from a half to one cable from the shore; outside this the water deepens rapidly to the 5-fathom line, which is about 3 cables from the beach. The coast is lined with palmyra and cocoanut plantations, and a good road leads from Point Pedro along the coast to the westward.

VALLUVEDDITURAI, situated 2½ miles west of Point Palmyra, is a port where vessels of from 30 to 250 tons are built. A break in the reef affords good entrance to boats. There is a considerable village and native market where fresh provisions may be obtained.

TONDAIMANAR, situated two miles west of Valluvedditurai, is marked by a cliff 25 feet high, half a mile to the westward of which is the entrance to a backwater which forms a gap when viewed from the northward. From Tondaimanar the coast trends W.S.W., West, and W. by N. to Kankasanturai; the reef along this coast does not close to the beach, but the 5-fathom line extends half a mile from the shore; vessels should not approach within this distance.

KANKASANTURAI is the chief port of call for steamers during the S.W. monsoon; they commence calling in February or March and continue to October.

Four vessels of 233 tons are owned locally, and in 1894 the port was visited by 510 vessels of 79,518 tons, carrying paddy and rice chiefly. There is a custom house, the custom officer being Master Attendant for the port.

Two stone piers in ruins will be noticed on the beach, on the western of which is built the lighthouse. A small wooden pier, which can be used by boats during the S.W. monsoon, has been built on the beach. Cargo boats which are anchored off the beach can be obtained for landing cargo during fine weather.

Supplies.—Water can be obtained and fresh provisions if notice is given.

Anchorage may be obtained off Kankasanturai in 5 fathoms sand and mud, with the lighthouse bearing S.S.W., distant 3½ cables; and the rocky point about 1½ miles west of the lighthouse just shutting in the distant point. Vessels are recommended not to anchor to the westward of the lighthouse as the bottom is foul in that direction.

LIGHT.—On the western ruined pier is a column 73 feet in height, coloured white, from which is exhibited, at an elevation of 75 feet above the sea, a fixed green light, visible in clear weather a distance of 14 miles. The light is obscured by trees on bearings north of east.

Tides.—It is high water, full and change at Kankasanturai at 7 hours 35 minutes; springs rise 3 feet, neaps rise 2 feet, neaps range 1¼ feet.

The Coast from Kankasanturai curves to the southward as far as Karativu; it is fringed by a coral reef and bordered with palmyra and cocoanut trees. One and a half mile west of Kankasanturai is a conspicuous cliff 26 feet high, and nearly a mile further is a Roman Catholic church in course of construction.

Soundings.—Westward of the church the 3-fathom line recedes from the shore, and off Matakal (marked by a conspicuous sandhill) is 2 miles from the coast.

Rock.—A patch of coral, with 11 feet of water over it, lies off Matakal with the conspicuous sandhill bearing S. 42° E., distant 1¾ miles, and the cliffy point near Kankaranturai N. 88° E.; inside the patch the bottom is uneven and foul.

The islands, off the N.W. side of Jaffna Peninsula, extending for 12 miles to the S.W. are a cluster of low coral islands separated by narrow shallow channels, only navigable by boats. Further to the S.W. is Delft Island or Neduntivu separated from the other islands by a good channel, 4 miles broad.

KARATIVU, the northern island of the group, is separated from Jaffna Peninsula by a shallow passage a third of a mile broad; it is a low coral island covered with trees, the highest being on the N.W. extreme. A sandhill 20 feet high with some palms on it, situated on the N.E. point, is conspicuous when viewed from the north-westward. At the entrance to the channel between Karativu and the mainland there are numerous shoals and rocks, closing the channel to anything but boats.

ELUVAITIVU, 2 miles in length S. by W. and N. by E. and about 3 cables broad, lies south-westward of Karativu; it is low and covered with trees about 70 feet high; between it and Karativu is the entrance to the port of Kaits.

Shoals.—A shoal with a depth of 3½ to 3¾ fathoms over it lies 5¼ miles N. 21° W. from the north extreme of Eluvaitivu, in latitude 9° 47′ 45″ N., longitude 79° 47′ 5″ E.; another, with a depth of 3¼ fathoms over it, lies N. 1° E., distant 4½ miles from the same island in latitude 9° 47′ 30″ N., longitude 79° 49′ E. Between these shoals and Eluvaitivu are numerous patches composed of hard sand, having depths of 2 to 3½ fathoms over, and with 4 to 5 fathoms between them. These shoals are probably composed of coral covered with sand.

Caution.—Vessels proceeding to Palk Bay or Jaffna should steer to pass about one mile to the northward of the northern shoal.

KAITS situated on the northern side of the island of Velani and south of Karativu, is an open port throughout the year, but the S.W. monsoon is the busiest season, there being then sometimes as many as 30 to 40 vessels in the anchorage at the same time. The entrance lies across the flats between Karativu and Eluvaitivu. Fort Hammonheil is the quarantine station for the port. The port was visited, in 1894, by 460 vessels of 17,475 tons. Country crafts are hauled up and repaired here.

Supplies.—There is a small town, and a limited quantity of fresh provisions can be obtained.

Anchorage.—The small country vessels lie in the outer anchorage in 2½ to 3 fathoms, and discharge part of their cargo before proceeding to the inner anchorage. Steamers should anchor in 4 fathoms sand, with the north point of Eluvaitivu bearing S.E. distant about one mile.

...ree *Directions.*—Small vessels when making for Kaits harbour from the eastward should, after ...passing the north end of Karativu, keep about 2 miles from the coast, until Fort Hammonheil, on the S.W. point of Karativu bears S.E. by S., when steer for it until about a mile distant, a vessel will then be in 9 feet, smooth water, and should steer round the fort at a distance of from 1 to 3 cables, care being taken, when the fort has been rounded, to keep on the north side of the harbour until past a bungalow there situated. The best anchorage is off the custom house in about 2 fathoms mud.

ANALATIVU, lying to the S.W. of Eluvaitivu, is $2\frac{1}{4}$ miles long by one mile broad; part of the island is covered with trees 70 to 80 feet high. On its north-east and south sides are small islets 15 feet high, which appear to be joined to it when the island is viewed from the westward.

Shoal ground, with $3\frac{1}{2}$ to 4 fathoms water over it, lies $1\frac{1}{2}$ miles west of the north point of Eluvaitivu, and extends southward off the north-west side of Analativu from half to one mile.

NAINATIVU lies $1\frac{3}{4}$ miles south of Analativu; it is $2\frac{1}{2}$ miles long by half a mile broad, and has trees about 70 feet high on it; it is bordered on its western side by a narrow fringe reef.

Shoal water, with depth of $2\frac{3}{4}$ to 4 fathoms, extends three-quarters of a mile from its western shore, but to the south-west the 5-fathom line approaches to within 4 cables.

DELFT OR NEDUNTIVU, south-west of Nainativu, and separated from it by a channel 4 miles broad, is the large island of Delft or Neduntivu. It is 6 miles long north-west and south-east with an average width of 3 miles. High trees are situated on its north-east and western sides; in the centre is grass land and low trees about 20 feet high. From a distance to the northward it looks like two islands. It is steep-to, except on the north side where shoal water under 5 fathoms extends in a point 6 miles to the northward.

A beacon 40 feet high is situated on the south-east side of the island; it marks the site of the station used by the Great Trigonometrical Survey of India when triangulating between India and Ceylon.

Channel.—Between the Neduntivu shoal and the shoal water off Nainativu is a clear channel one and three quarters of a mile broad, having in its narrowest part a depth of not less than 5 fathoms.

Directions.—When clear of West channel, and intending to proceed to Jaffna using Delft channel steer S. 5° E., fixing the position by using the tangents of the trees on the islands; when at the northern entrance to the channel, the tall trees on the north-east of Delft should be visible bearing south, when steer for them, until the south point of Nainativu bears E. $\frac{1}{4}$ N., then a S.E. course will take a vessel clear into Palk Bay.

Middle Banks.—From a position about $5\frac{1}{2}$ miles S.E. $\frac{1}{4}$ S. from the beacon on Point Calimere the middle banks which are formed of hard sand, extend in patches in a southerly direction for $7\frac{1}{2}$ miles, with uneven soundings of from $1\frac{1}{4}$ to 3 fathoms and deeper water between. The shoalest water found was 8 feet on the northern patch, and 10 feet on the second, $6\frac{3}{4}$ and 9 miles distant, respectively, S. 18° E., from the beacon on Point Calimere. On the western part of the third patch there is also a depth of 11 feet.

South Banks consist of four shoals with less than 3 fathoms on them, the northern and shoalest with $2\frac{1}{2}$ fathoms on it, lies 13 miles N.N.W. from Kankasanturai lighthouse. The others extend $4\frac{1}{4}$ miles to the southward, and have depths of from $2\frac{3}{4}$ to 3 fathoms water over them. From the south banks depths of $3\frac{1}{4}$ to 5 fathoms extend 12 miles S.W. $\frac{1}{2}$ W; to the channel leading into Palk Bay, and to the eastward joining the northern part of the Pedro shoals.

Middle Channel.—Between the middle and south banks is a channel 5 miles broad with a least depth of $3\frac{1}{4}$ fathoms, and in the centre of this channel in latitude 10° 3′ 30″ N. is a deeper passage, one mile broad, carrying not less than $3\frac{3}{4}$ fathoms; this channel is out of sight of land, therefore latitude is the only guide.

Directions—East Channel is a 5-fathom passage across the shoal water connecting the south banks and Pedro shoals. Vessels making Palk Strait from the north-eastward should steer for a position in latitude 10° 3′ N., longitude 80° 8′ E., the tops of the trees between Point Pedro and Tondaimanar will then be visible, and a south course may be steered for Tondaimanar gap, not less than 5 fathoms should be met with in this channel; when the depth increases a course may be shaped for Kankasanturai, or Point Pedro, as necessary.

West Channel.—After passing Kankasanturai, the lighthouse must not be brought to bear east of E. by S. until Eluvaitivu is well open of Karativu, and the conspicuous sandhill at Matakal, bearing S. 36° E., the shoal off the latter place will then be passed and a course can be steered to enter the West Channel.

At the east entrance to the West Channel with the 20 feet sandhill on the north-east point of Karativu, bearing S. 54° E., and Fort Hammonheil (which shows out clear of Karativu against the low land of Kaits), bearing S. 10° E., a vessel should steer N. 80° W. 6 miles through West Channel, when a course may be shaped for Delft Channel or Pamban.

Currents—Tides.—During the months of February, March and April, no current was observed in Palk Strait. The tidal streams were very regular, changing every six hours, the flood setting to the eastward, and the ebb to the westward, between the shoals. From the West Channel to Delft Island the tide sets with the general direction of the coast, the flood setting northerly and and north-easterly, and the ebb southerly and south-westerly; the strength at springs being nearly a knot.

Wind and Weather.—In Palk Bay, as in the Gulf of Manar, the south-west winds generally commence about the middle of April with fine clear weather. Early in May, the south-west monsoon blows fresh, and continues until about the middle of August, when it moderates, gradually dying away about the end of September; the sky then becomes overcast, and about the 10th of October the north-east monsoon commences, with hard squalls from different quarters accompanied by heavy rain, thunder and lightning, which weather continues during the month. The wind then becomes steady from the north-east, but during the months of November, December and January, there are frequent gales and much rain. In the early part of February, the north-east winds take off, and regular sea and land breezes set in which continue until the middle of March, when calms prevail for several days, and the heat increases until the return of the south-west winds in April.

POINT CALIMERE forms the northern point of entry to Palk Bay, and the southernmost point of the Coromandel Coast. A beacon 33 feet high with two arms painted white is situated on the point, and one cable S.S.W. is a steel mast, carrying a light; $3\frac{1}{2}$ cables to the southward and surrounded by water is the ruin of a beacon. About 3 miles westward of the point are the Kodigiri bungalows, formerly much resorted to during the hot weather. At about 5 miles N. by W. $\frac{1}{2}$ W. from the point, and a mile in shore, are two dark looking pagodas, in shape like oblong haystacks, which when in line bear west. A sand bank, dry at low water, inside which trading boats find shelter in bad weather, extends about one and a half miles N.E. by E. of Calimere beacon.

The three-fathom bank extends N.E. by N. and S.W. by S. at a distance of one and a half miles S.E. from Point Calimere, and 5 miles S.S.W. from the point; it then turns westward at about 4 miles from the coast.

Shoal.—In the channel between middle banks and the three-fathom line off Point Calimere, and S. 30° E., $4\frac{1}{2}$ miles from the beacon, is a shoal with a depth of $2\frac{3}{4}$ fathoms over it; it is composed of hard sand, extends 4 cables east and west, and is about 3 cables broad.

LIGHT.—A fixed pale red light, elevated about 55 feet above high water, and visible in clear weather from 6 to 9 miles, is exhibited from a steel mast (about 45 feet high) on Point Calimere. At the foot of the mast is a box painted white, which contains the lantern during the day and is a conspicuous object.

Forest Reserve.—At Point Calimere and in the vicinity is a forest reserve, apparently under the control of the Collector of the district. Here are many hundreds of antelope, spotted deer, and wild pig; they are strictly preserved, the officers employed in the survey being refused permission to either land, or shoot in the neighbourhood.

DIRECTIONS.—In rounding Point Calimere from the eastward, by the channel north of the middle bank, and immediately south of Point Calimere, the position of a vessel may be obtained by cross bearings of the two pagodas to the northward of the point, and of the beacon or steel mast; prior to shaping a south-westerly course clear of the three fathom coast bank on the north side, and the detached two-and-three-quarter fathom patch on the south. A depth of more than 21 feet cannot, however, be relied upon. Careful attention must be paid to the lead.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—Ootacamund, 3rd September 1896, No. 737 R.

I am directed to acknowledge the receipt of your letter, No. 1027 R.C., dated 14th July 1896, forwarding a copy of the Government of India's despatch to the Secretary of State expressing its views on the Madura-Pamban project and on the negotiations for its construction.

2. In reply I am to state that if, as is understood, the negotiations with Messrs. Wallace Brothers have ceased, this Government again strongly urges that the construction of the Madura-Pamban Railway should be entrusted to the South Indian Railway without further delay, if, as is believed, that Company is willing to construct it on reasonable terms; and if not, then that it should be constructed by the State as soon as practicable.

From—Messrs. J. H. Tozer & Son., Ry. Plant Contrs, Iron and Steel Merchants, &c.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Railway Branch.
Dated—Finsbury Pavement, London, E.C., July 1896.

We have the honour to request the favour of your placing our application for constructing the Madura-Pamban Railway before His Excellency the Governor of Madras in Council.

2. We are aware that the Engineer-in-Chief has made the estimate Rs. 41,774 per mile, but we think this estimate should be increased. For example, no electric telegraph has been allowed for, a *sine qua non* in all such undertakings, this item would probably cost Rs. 1,000 a mile or a lakh of rupees for the 100 miles. Again, small workshops are necessary at Paramakundi, the site of the proposed large bridge over the Vaigai river; this has not been taken into account in the estimate. There appears to be a scarcity of kankar for lime-burning in all the districts passed through except near Madura, in that case the cost of masonry would be increased. It is not known if the stone ballast proposed to be put on the sand ballast after construction is included in the ballast account or not. Moreover, it is evident that the total cost of Rs. 6,000 for locomotive under heading IX of Plant is not sufficient. Taking these and other matters into consideration, we think that 45 lakhs of rupees will be required for constructing the line, and we propose to raise 50 lakhs, inclusive of interest during two years of construction and necessary expenses for formation of Company, administration, &c.

3. We would beg to enquire if the land would be granted free of cost according to Circular No. 924 R.C. of 15th September 1893 of Government of India.

4. As this branch scheme would be worked by the South Indian Railway and would be of great service to the Government of Madras as also to pilgrims, we hope that His Excellency in Council will be pleased to grant us a 4 per cent. guarantee in rupees, or in preference a 3 per cent. guarantee in sterling, as it is known that the Government of India have lately sanctioned a 4 per cent. guarantee in rupees to a through line in the northern part of India.

5. We would beg to enquire if the concession granted to Mr. Gale for ...irection for ...between. The Cannanore Railway has lapsed or not, and if so whether a provisional ond, 6¾ and 9 miles be granted to us. ...on the western part of the

6. We would ... request the favour of being supplied wi...ms on them, the northern and the Madras Government consider to be urgently required. ...annasanturai lighthouse. The ...om 2¾ to 3 fathoms water over ...d 12 miles S.W. ½ W; to the ...e northern part of the Pedro

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...channel 5 miles broad with a ...itude 10° 3′ 30″ N. is a deeper ...hannel is out of sight of land,

From—The Joint Secretary to the Government of Madras, ...d water connecting the south
To—The Secretary to the Government of India, Public Wor...th-eastward should steer for a
Dated—Ootacamund, 3rd September 1896, No. 738 R. ...rees between Point Pedro and ...d for Tondaimanar gap, not ...lepth increases a course may

In continuation of my No. 737 R. of this date, I be...nust not be brought to bear
an application by Messrs. James H. Tozer and Son of Finsbu...the conspicuous sandhill at
constructing the Madura-Pamban Railway on a guarantee ...passed and a course can be
or 3 per cent. in sterling and to state that the Governmen...
applicants and is not prepared to recommend the application ...hill on the north-east point
construction of this project should be entrusted to the South I...ut clear of Karativu against
...W. 6 miles through West

Orders as to the reply to be sent are solicited.

From—The Secretary to the Governm...nt of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Calcutta, the 22nd December 1896, No. 1958 R.C.

I am directed to acknowledge the receipt of your letters Nos. 737 and 738 R., dated 3rd September 1896, regarding the construction of the Madura-Pamban Railway.

2. In reply to the latter I am to say that the Government of India accept the views of the Government of Madras with regard to the application of Messrs. Tozer & Son for the construction of the line, and I am to request that the firm may be informed that their proposals which involve either a 4 per cent. rupee or a 3 per cent. sterling guarantee are not such as can be entertained.

3. With reference to your letter No. 737 R., dated 3rd September 1896, I am to forward, for information, the enclosed copy of a despatch from the Secretary of State from which it will be seen that the concession granted to Messrs. Wallace Brothers has lapsed. I am, however, to state for the information of His Excellency the Governor in Council that it has now been arranged, with the approval of the Secretary of State, that no addition will be made to the railway schemes which were recommended for sanction by the conference which met at Simla last summer until after a similar meeting has been held next year. At that meeting the relative claims of schemes for all parts of India will be considered, and it is desirable that any scheme, the early construction of which is required, should be submitted without delay to the Government of India for examination though final sanction must be postponed as above stated. I am also to observe that the orders of the Secretary of State are not understood to restrict the construction of the Madura-Pamban Railway to the direct agency of the South Indian Railway Company with funds supplied by the Secretary of State. The amount of these funds is limited, and there is little chance of their being available for this scheme until after 1899, but the line might be undertaken on branch line terms by a Company subsidiary to the South Indian Railway Company, at an earlier date, and the Government of India would be glad to receive and consider any suggestion in that direction.

Forest r... ENCLOSURE TO THE ABOVE LETTER.
the control of the... and wild pig; they... Right Hon'ble the Secretary of State for India.
permission to either lan... Right Hon'ble the Governor-General of India in Council.
DIRECTIONS.— ...don, 15th October 1896, No. 95-Ry.
middle bank, and ...
by cross bearings o... ...ject. *Lapse of the concession granted to Messrs. Wallace Brothers.*
mast; prior to sha... ...rmed by my telegram of the 22nd September that the concession
side, and the detache... ...-ar... granted to Messrs. Wallace Brothers in connec-
21 feet cannot, howeve... ...rch 1896. ...tion with the Indo-Ceylon Railway project has
...July 1896. ...definitely lapsed, and I now forward for your
...gust 1896. ...information copy of the correspondence * which
...the receipt of your Railway letter No. 8, dated the 5th
From—The Joint Secretary
To—The Secretary to the ...Messrs. Wallace Brothers were unable to make any definite
Dated—Ootacamund, 3rd ...scheme outside Indian territory, but requested that they might
...ction from Madura to the Pamban channel on the lines of the
I am directed to ack...t of the 17th April last.
July 1896, forwarding a... the terms of your letter of the 5th February last, and to the
of State expressing its v...ment of Madras that provisional concessions should not be granted
for its construction. ...olombo project, I decided not to entertain Messrs. Wallace's
...d their concession, which accordingly lapsed on the 26th July last.
2. In reply I am to ... early construction of the Madura-Pamban section, I forward for
Wallace Brothers have c... your information copy of a report † which, at
struction of the Madura-... ...1896. the request of the Government of Madras, I
Railway without further ... obtained from Mr. Upcott while on furlough in
it on reasonable terms; ...ting the employment of the South Indian Railway as the best
soon as practicable. ...the line.

From—Messrs. J. H. T...
To—T...

Council, this Government may be favoured with a copy of the recommendations made by the conference which met at Simla last summer, in so far as they relate to railway schemes within or connected with this Presidency.

2. As regards the construction of the Madura-Pamban Railway by a Company subsidiary to the South Indian Railway Company, I am to say that this Government will be glad to see it carried out by such agency, and I hope to address you again on the subject shortly.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 13th February 1897, No. 178.

Referring to the correspondence ending with my letter No. 850 of the 14th September 1896 on the subject of the Madura-Pamban Railway, I have the honour to forward herewith an extract from this Company's Managing Director's letter No. 182 of the 15th January 1897, together with the copies of the papers therein referred to.

ENCLOSURES.

No. 1.

EXTRACT from letter from the Board of Directors, South Indian Railway.
To—The Agent, South Indian Railway.
Dated—London, 15th January 1897, No. 182.

On 27th November 1896, the Board addressed a letter, of which a copy is enclosed, to the Secretary of State for India, with reference to the construction and working of this proposed branch. In acknowledging the receipt of this, Sir Horace Walpole states—15th December 1896, No. 2169-P.W.—copy herewith—that a copy of the Board's letter has been forwarded for the information and consideration of the Government of India.

No. 2.

From—The Board of Directors, South Indian Railway Company.
To—The Secretary of State for India, India Office.
Dated—55, Gracechurch Street, E.C., 27th November 1896, No. 483.

The Directors understand that the provisional concession granted to Messrs. Wallace Brothers for the construction, amongst other things, of a railway between Madura and Pamban has recently lapsed. They have also reason to believe that the Government of India have been approached by another mercantile firm in view to the grant to them of a concession for the construction of the railway in question.

In these circumstances, the Board of the South Indian Railway Company express a hope that the Secretary of State in Council will not come to a decision on the applications referred to, until they have been afforded an opportunity of expressing their views, and of making proposals for the construction and working of the Madura-Pamban Railway which would form an extension or branch of the South Indian main line.

The length of the proposed railway is 100 miles, and the cost as estimated by Mr. Shadbolt, the Government Engineer-in-Chief in charge of the Survey, is Rs. 41,77,460, exclusive of rolling stock.

No. 3.

From—The Secretary of State for India.
To—The Board of Directors, South Indian Railway Company.
Dated—India Office, Whitehall, London, S.W., 15th December 1896, No. 2169-P.W.

I am directed by the Secretary of State for India to acknowledge receipt of your letter, No. 483, of the 27th November 1896, relative to the construction and working by the South Indian Railway Company of the proposed Madura-Pamban Railway.

In reply I have to inform you that a copy of your letter has been forwarded for the information and consideration of the Government of India.

Again,

Extract from letter from the Agent, South Indian Railway.
To—The Board of Directors, South Indian Railway Company.
Dated—17th March 1897, No. 525.

I have placed in the post packet a copy of a letter from Messrs. Best & Co. of Madras, enquiring whether, in the event of their floating a Company for the construction of the Madura-Pamban Railway, this administration will consent to construct and work the line in terms of Government of India Circular No. 514 R.C., dated 17th April, 1896. Should the terms of this Resolution be not acceptable *in toto*, Messrs. Best & Co. ask whether this Company is prepared to accept certain modifications to the same, and if so to be informed on what conditions the Company will undertake construction and working. Messrs. Best & Co. also state that, should the Company decide to act in concert with them in the matter on terms mutually acceptable, they propose to form a Company which will receive a dividend of $3\frac{1}{2}$ per cent, or a higher return if the net earnings of the branch are sufficient, in accordance with the provisions of paragraph 2 VI (*b*) of the above Circular, a copy of which was sent to you with my letter No. 484 of 2nd June 1896. The Madura-Pamban Railway was surveyed in 1895 by Mr. E. I. Shadbolt, whose estimates and report were forwarded to you with my letter No. 461, dated 24th December 1895. From these papers it will be seen that the line will be unusually cheap to construct, while its traffic prospects are very favorable. Mr. Shadbolt estimates the cost per mile at Rs. 41,774, excluding rolling stock; but this figure was considered too low by the Consulting Engineer for Railways, Madras, who raised it to Rs. 43,000. Accepting the higher figure and taking working expenses at 60 per cent. of the gross earnings (which percentage makes fair provision for rolling stock) the following rate of interest on the Capital outlay will be derived from the gross earnings shown below:—

3	per. cent	on capital outlay	requires	Rs. 62	per mile	per week.
4	„	„	„	„ 83	„	„
5	„	„	„	„ 103	„	„
6	„	„	„	„ 124	„	„
7	„	„	„	„ 145	„	„
8	„	„	„	„ 165	„	„
9	„	„	„	„ 186	„	„
10	„	„	„	„ 207	„	„

Mr. Shadbolt considers that the traffic of the line will eventually reach Rs. 240 per mile per week, and even considering this estimate as over sanguine there can be no doubt that the extension will be extremely remunerative. Messrs. Best & Co. propose to raise the necessary capital under the terms applicable to feeder lines; but it is open to question whether a length of railway, which forms portion of an important through route, and which, on opening for traffic, will become a main line section, can be considered as a feeder line. It seems to me that the Madura-Pamban line should properly form an integral portion of this undertaking, and that it is neither to the advantage of Government or of this Company for a section of line owned by a third Agency to be interpolated in the direct through route between India and Ceylon. The necessary capital for the line can doubtless be raised either by Government or this Company, without the help of a subsidiary Company, and on terms more advantageous to the State than those proposed by Messrs. Best & Co. Should, however, these views not commend themselves either to Government or the Board, I think this Company should co-operate with Messrs. Best & Co. The Madura-Pamban Railway will undoubtedly attract a good deal of traffic from the Madura-Tuticorin section, but it must produce extra traffic over the system which will more than compensate for the loss it causes.

Extract from letter from the Board of Directors, South Indian Railway.
To—The Agent, South Indian Railway Company.
Dated—15th April 1897, No. 189.

With your No. 525 you forward copy of a letter, dated 13th March 1897, from Messrs. Best & Co., Madras, enquiring upon what terms the Company would construct and work this branch in the event of their floating a Company and raising the necessary capital. On the 11th March Messrs. Best & Co. placed before the Board, direct, their views and proposals, in reference to this projected railway, which they had embodied in a letter addressed to the Government of India. These proposals were generally approved by the Directors and Messrs. Best & Co. were so informed by letter, dated 31st March 1897 and acknowledged by them on 3rd April. A copy of the correspondence is forwarded for your information.

From—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Govt. of Madras, P.W. Dept., Railway Branch.
Dated—Simla, 5th April 1897, No. 552 R.C.

With reference to paragraph 2 of your letter, No. 37 R., dated 18th January 1897, I am directed to forward, for the information of the Government of Madras, a copy of the despatches, from and to the Secretary of State, marginally noted, regarding the proposed railway from Madura to Pamban and its construction by a Company under "Branch line terms."

From Secretary of State No. 111 R., dated 17th December 1896.
To Secretary of State No. 35 R., dated 24th March 1897.

2. I am also to forward a copy of an application from Messrs. Best & Co., Madras, for a concession for the construction of this railway under the terms of Public Works Department Resolution, No. 514 R.C., dated 17th April 1896, and to request that the Government of India may be furnished with the opinion of the Government of Madras upon this application together with any communication that the Agent, South Indian Railway Company, may, under instructions of the Board of Directors, be prepared to make, in respect of the construction and working of the Branch Railway in the manner proposed in paragraph 3 of Messrs. Best & Co's. letter, which involve the acceptance by the Company of the conditions of Public Works Department Resolution No. 514 R.C., of the 17th April 1896.

Letter dated 13th March 1897 and enclosure.

3. The favour of a very early reply is requested.

Enclosures.

No. 1.

Despatch—from the Right Hon'ble the Secretary of State for India.
To—His Excellency the Right Hon'ble the Governor-General of India in Council.
Dated—India Office, London, 17th December 1896, No. 111 Ry.

With reference to my Railway Despatch, No. 95, of the 15th October 1896, and with special reference to the last paragraph thereof, I transmit herewith, for the information of your Excellency's Government, copy of a letter * from the Directors of the South Indian Railway Company, expressing a hope that no decision will be come to in regard to the construction of the Madura-Pamban Railway until they have been afforded an opportunity of expressing their views, and of making proposals for the construction and working of the line in question, which would form an extension or branch of their main line.

* No. 483, of 27th November 1896.

2. I shall be glad to be furnished with your views on the Board's letter now forwarded.

No. 2.

From—The Board of Directors, South Indian Railway Company.
To—The Under Secretary of State for India.
Dated—55, Gracechurch Street, London, E.C., 27th November 1896.

The Directors understand that the provisional concession granted to Messrs. Wallace Brothers for the construction, amongst other things, of a railway between Madura and Pamban has recently lapsed. They have also reason to believe that the Government of India have been approached by another mercantile firm in view to the grant to them of a concession for the construction of the railway in question.

In these circumstances, the Board of the South Indian Railway Company express a hope that the Secretary of State in Council will not come to a decision on the application referred to until they have been afforded an opportunity of expressing their views, and of making proposals for the construction and working of the Madura-Pamban Railway, which would form an extension or branch of the South Indian main line.

The length of the proposed railway is 100 miles, and the cost, as estimated by Mr. Shadbolt, the Government Engineer-in-Chief in charge of the Survey, is Rs. 41,77,460, exclusive of rolling stock.

No. 3.

Despatch from—The Government of India, Public Works Department.
To—The Right Hon'ble the Secretary of State for India.
Dated—Calcutta, 24th March 1897, No. 35 Railway.

We have the honour to acknowledge the receipt of your Lordship's Railway despatch No. 111, dated 17th December 1896, enclosing copy of a letter from the Directors of the South Indian Railway Company in which they express a hope that no decision will be come to in regard to the construction of the Madura-Pamban Railway until they have been afforded an opportunity of submitting their views and of making proposals for the construction and working of the line which would form an extension or branch of their main system.

2. The concession granted to Messrs. Wallace Brothers in connection with the same project, extended into Ceylon, we learnt from your Lordship's Railway Despatch No. 95, dated 15th October 1896, had definitely lapsed on the 26th July 1896.

3. The Madura-Pamban project was considered at the conference which assembled in Simla last autumn, and we would invite attention to the remarks recorded on pages 72—74 of statement I, forming appendix 2 to enclosure No. I of our Railway despatch No. 76, dated 4th November 1896. It will be seen that although the Conference were of the opinion that it would be preferable to construct the branch as an integral part of the South Indian Railway system, yet that the impossibility of providing funds for the purpose within the next three years left them no alternative but to postpone the project, if to be carried out in the manner proposed, until funds could be made available. Accordingly no provision for this line was made in the forecast of outlay on capital account for the three years ending 1898–99, forwarded with our Financial despatch No. 327, dated 4th November 1896.

4. We have, however, to forward, for your Lordship's information, a copy of correspondence * which has taken place on the subject with the Government of Madras from which it will be seen that we are prepared to receive and consider suggestions for the construction of this line on "Branch line terms."

* Letter from the Government of India, to the Government of Madras, No. 1958 R.C., dated 22nd December 1896.
Letter from the Government of Madras, to the Government of India, No. 37 R., dated 18th January 1897.

No. 4.

From—Messrs. Best & Co., Madras.
To—The Secretary to the Government of India, Public Works Department.
Dated—13th March 1897.

In continuation of our letter of 22nd September last, and in anticipation of the Government of India shortly notifying the Madura-Pamban Railway as one for which tenders will be considered for its construction by the agency of a private Company, we have the honour to submit herewith our application for the concession to form such a Company, on the under-noted terms,

From—Extract from letter from the [illegible]
To—The
Dated—The Consulting Engineer for Railways, Madras.
To—The Agent, South Indian Railway, Trichinopoly.
Dated—Ootacamund, 28th May 1897, No. 36/O.

With reference to my letter No. 278 R., dated the 22nd April 1897, on the subject of the Madura-Pamban Railway project, I am instructed to forward, for the information of your Board of Directors, a copy of a letter from the Government of India, No. 837 R.C., dated the 20th May 1897, and to request that this Government may be furnished with your Board's views on the subject with the least practicable delay.

Extract from letter from the Agent, South Indian Railway Company.
To—The Managing Director, South Indian Railway Company.
Dated 1st June 1897, No. 536.

In continuation of the paragraph on this subject in my letter No. 525, dated 17th March 1897, I have to inform you that the Government of India has no objection to the Board being invited to submit proposals for the promotion of a subsidiary branch company for the construction and working of the Madura-Pamban Railway without the intervention of any special firm of promoters and as alternative to the proposals of Messrs. Best & Co. The Government of India, however, states that if the proposed subsidiary company has any direct financial connection with the South Indian Railway Company, otherwise than through the rebate clause of Resolution No. 514 R.C., of 17th April 1896, the scheme must wait its turn for a place in the railway programme of all India. I have placed in the post packet copies of the correspondence which I have received on this subject, and request to be favoured with early instructions.

From—The Agent, South Indian Railway.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Trichinopoly, 24th June 1897, No. 664/2768.

In reply to your letter No. 278 R., dated 22nd April 1897, I have the honour to inform you that, in March last, Messrs. Best & Co. addressed the Board of Directors of the South Indian Railway in respect to the terms which this Company would accept for the construction and working of the Madura-Pamban Railway. Messrs. Best & Co. were informed that the South Indian Railway Company were prepared to construct the line upon terms similar to those upon which the Bombay, Baroda and Central India Railway are understood to be constructing the Ahmedabad-Prantej-Oodeypore line, but subject to examination and discussion, if need be, of the agreements in that case. As regards the terms upon which this Company would work the Madura-Pamban line, Messrs. Best & Co. were advised that these would probably be not less than the same percentage as the South Indian Railway itself (including this and all other branches) is from time to time worked at, plus 5 per cent. for the use of rolling stock.

2. I understand from the accompanying extract from the Managing Director's letter, No. 192, dated 4th June 1897, that the Board desire these terms to be quoted to the Government of India in answer to its reference embodied in paragraph 2 of your letter under reply.

3. I would, however, invite your attention to the fact that at the time when this letter No. 192, dated 4th June 1897, was written, the Board were in ignorance of the invitation of the Government of India regarding the submission of proposals, for the promotion of a subsidiary branch railway Company, to undertake the construction and working of the Madura-Pamban Railway. I have little doubt that the Board will be able to offer this branch Company terms practically the same as those prescribed in Government of India, Public Works Department Resolution No. 514 R.C., dated 17th April 1896.

[illegible] again,

Enclosure.

Extract from letter from the Board of Directors, South Indian Railway Company.
To—The Agent, South Indian Railway.
Dated—London, 4th June 1897, No. 192.

The paragraph under this heading in Board's letter No. 189, of 15th April 1897, will have enabled you to reply to the reference from the Government of India as to the proposals relating to this railway made by Messrs. Best & Co., conveyed in your letter of 28th April, No. 531.

Order—No. 426 R., dated 1st July 1897.

Ordered to be forwarded to the Government of India in continuation of paragraph 5 of letter No. 277 R., dated 22nd April 1897.

Endorsement—No. 427 R., dated 1st July 1897.

Forwarded.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 22nd July 1897, No. 753.

In continuation of my letter No. 745, dated 20th July 1897, I have the honour to inform you that I have received the following telegram from the Managing Director:—

"Even assuming some delay in commencing work, Board are willing to undertake *en bloc* the three lines—Madura-Pamban, Palghat-Dindigul, British portion Tinnevelly-Quilon—as integral portions of South Indian; also construct Travancore portion at cost and work same at 50 per cent., provided first two years' maintenance charged to Capital. Communicate Government to ensure consideration Simla conference in August."

2. I presume this telegram is in reply to the message I wired at your request, and of which I sent you a copy in my letter above quoted, although it does not deal specifically with the matter raised in Government of India letter No. 837 R.C., dated 20th May 1897.

3. Will you kindly communicate the Board's telegram embodied in the first paragraph of this letter to the Government of India in time to admit of its consideration at the approaching railway conference.

Telegram from—The Secretary to the Government of India, Public Works Dept.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Simla, 14th July 1897, No. 1192 R.C.

Your letter, numbered and dated as follows: 427 R., 1st instant. Please expedite reply to my letter numbered and dated as follows: 837 R.C., 20th May last, paragraph 2, Madura-Pamban.

Telegram from—The Joint Secy. to the Govt. of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department, Simla.
Dated—23rd July 1897, No. 17 B.

Your wire 1192 R.C., 14th instant. Agent, South Indian, has received following wire from Board. Begins. Even assuming some delay in commencing work Board are willing to undertake *en bloc* the three lines—Madura-Pamban, Palghat-Dindigul, British portion Tinnevelly-Quilon—as integral portions of South Indian; also construct Travancore portion at cost and work same at 50 per cent., provided first two years' maintenance charged to Capital. Communicate Government to ensure consideration Simla conference. Message ends. Views of this Government shall be communicated as early as possible.

From—Extract from letter from the [illegible]
To—The [illegible]

Dated—

Telegram from—The Consulting Engineer for Railways.
To—The Agent, South Indian Railway, Trichinopoly.
Dated—Madras, 29th July 1897, No. 69 C.

Your 753, 22nd instant. Please wire whether your Board will consent to their offer being held good if accepted in respect of each line separately.

Telegram from—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 31st July 1897.

Your 69 C., of 29th instant. Managing Director telegraphs. Message begins. Board would take Pamban line to begin with and the others either now or when called upon on the terms of offer, of which the object is to secure to this Company all three lines mentioned. Message ends.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—Trichinopoly, 30th July 1897, No. 776.

Referring to your telegram No. 69 C., of yesterday, which ran as under:—

"Your 753, 22nd instant. Please wire whether your Board will consent to their offer being held good if accepted in respect of each line separately."

I have the honour to inform you that the following telegram was despatched yesterday to the Managing Director of this Company in London.

"Wire instructions [illegible] Board consent their offer being held good if accepted in respect each line separately."

To this I have received a reply, of which I subjoin a copy, and which I communicated to you by telegram this morning:—

"Board would take Pamban line to begin with and the others either now or when called upon on the terms of offer of which the object is to secure to this Company all three lines mentioned."

ORDER—No. $\frac{529}{A}$ R., dated 5th August 1897.

Ordered that the Government of India be addressed.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department, Simla.
Dated—5th August 1897, No. 530 R.

In continuation of the correspondence ending with my No. 427 R., dated 1st July 1897, and in confirmation of my telegram No. 17 B., dated the 23rd July 1897, I am directed to forward, for the orders of the Government of India, a copy of a letter from the Agent, South Indian Railway, No. 753, dated the 22nd July 1897, submitting certain important proposals for the construction and working of the Madura-Pamban, Tinnevelly-Quilon and Palghat-Dindigul Extensions; and, with reference to the first only of these projects, to communicate the following remarks as embodying the views of the Government of Madras. The other projects shall form the subject of separate communications.

2. A reference to my letter No. 332 R., dated the 10th May 1897, which dealt with the general railway programme of this Presidency, will show that the Madura-Pamban line was placed near the top of the list giving the order in which it was preferred that the several projects referred to therein should be commenced; because, as expressed in paragraph 7 of that letter, it is considered by this Government to be one

of the most important in the interests of the development of this Presidency. Again, in my letter No. 277 R., dated the 22nd April 1897, the Government of India were strongly urged to commit the construction and working of this extension, if not to the South Indian Railway themselves, at least to a Branch Line Company subsidiary to them, with a view to the avoidance of the many difficulties inseparable from the intervention of an independent and comparatively small interest in a main through line of communication.

3. His Excellency the Governor of Madras in Council does not lose sight of the disadvantage attaching to the method now proposed by the South Indian Railway Company for financing this extension, namely, that if it is to form an integral part of the South Indian Railway it must wait for a place in the Railway programme for all India. A reference to the Honourable Mr. Trevor's Memorandum, dated the 26th March 1897, leads this Government to fear that if it has to wait for a place its chances of being constructed in the immediate future are but small. I am desired, however, to urge that, if circumstances should arise which would render it possible to give a very early place in the programme to the Madura-Pamban extension, it may be borne in mind by the Government of India that this Government would much prefer that it should be constructed as an integral part of the South Indian Railway, out of, presumably, State Guaranteed Debentures, than that it should be constructed by a Branch Line Company, however intimately connected with the parent line.

4. Failing the possibility of compliance with the wish of this Government as expressed above, His Excellency the Governor in Council would adhere to the opinion already expressed that it is much to be desired that every encouragement should be given to the South Indian Railway Company to form a Branch Line Company subsidiary to itself, with, as pointed out in paragraph 3 of your letter No. 837 R.C., of the 20th May 1897, no other financial connection with the parent Company than through the rebate clauses of the Resolution No. 514 R.C., of 17th April 1896.

I have the honour to be,
Sir,
Your most obedient servant,

FRANCIS J. E. SPRING,
Joint Secretary.

Ed. W. D'Mons.

1897.

10 No. 529 A

Fr—ract from letter from the
To—Th—
Dat—

RAILWAY.

Government {1898} at Madras.

PUBLIC WORKS.

Recd. } 1898. Enclosures

—d. Spare copies

G.O., Ns. 968, 969 Ry., 28th July 1898.

JULY.

Madura-Pamban Railway

The Government of India addressed on the subject of the best alignment for, and the method of financing, the —,

No. 968 letter No. 837 R.C., dated 20th May 1897, that the Government objection to the Board of the South Indian Railway Company being invited to consider the above proposal of the Government of Madras, as alternative to Messrs. Best & Co's. application; but you were at the same time reminded that if the proposed subsidiary company had any direct financial connection with the South Indian Railway Company, except through the rebate clause of the branch line terms, the scheme would have to wait for a place in the railway programme for all India.

Simultaneously with the receipt of your letter No. 530 R., dated 5th August 1897, conveying the offer of the Board of the South Indian Railway Company to undertake this and the other lines *en bloc* as integral parts of the South Indian Railway, intimation was received from Messrs. Best & Co. that they had been informed by the Board of the South Indian Railway Company of their willingness to join that firm in their scheme for the formation of an independent subsidiary Company for the construction and working of the Madura-Pamban Railway on branch line terms, and that the Board had also communicated this information to the Secretary of State.

10. With the foregoing explanatory remarks, I am to communicate the decision of the Government of India upon the collective proposals submitted by the Board of the South Indian Railway Company in their telegram of July 1897 to their Agent (a copy of which was received with the latter's letter No. 753, dated 22nd July 1897), for dealing *en bloc* with the three lines.—

Palghat-Dindigul. | Madura-Pamban. | Tinnevelly-Quilon.

11. *Palghat-Dindigul.*—The Government of India, while disposed to favour the construction of a metre gauge rather than a standard gauge railway through that district, are unable at present to pass any orders in regard to this scheme which requires careful consideration in many aspects and in the light of information not yet available.

12. *Madura-Pamban.*—As already explained and reiterated in paragraph 9 above, unless the South Indian Railway Company definitely accept some such arrangement as that proposed by Messrs. Best & Co., the construction of this line, in the immediate or even near future, is entirely out of the question and it must therefore wait for a place in the general programme for all India, which so far as can be foreseen may not be found for many years to come, a result which the Government of India would view with much regret.

13. *Tinnevelly-Quilon.*—As also explained in the foregoing paragraph 8 the Government of India still prefer the arrangements previously proposed by them that the Tinnevelly-Quilon Railway should be constructed upon the branch line terms. As, however, those arrangements do not appear to meet with the approval of the Board of the South Indian Railway Company, and as their alternative proposal for the construction of the British portion of this line as an integral part of the South Indian Railway, even though that course may involve some delay in commencing the work, has the support of the Government of Madras, I am to say that, recognizing the necessity for meeting the legitimate wishes of the Travancore Durbar for the development of their country, and with the desire to meet so far as possible the views of the Government of Madras and of the South Indian Railway Company, the Government of India are willing to see this line untertaken on the following modified conditions, provided that the Travancore Durbar assent to them and that the South Indian Railway Company also accept them.

The Government of India are prepared to recommend to the Secretary of State that the South Indian Railway Company should raise the whole of the money required for the construction of the entire line from Tinnevelly to Quilon at $2\frac{1}{2}$ per cent. in sterling under the guarantee of the Government of India, the Travancore Durbar underwriting that guarantee to the extent of the cost of the line in their own territory, and that the South Indian Railway Company should construct the whole line including the rolling-stock at cost price and then work it on completion as a portion of their existing system at the same rate of working expenses as obtains on their whole line including the branch railway and other branches which may hereafter be added to it, the cost of maintenance for two years after opening being debited to capital.

Any surplus profits obtained by working the branch on the above conditions would, after deducting the share payable to the South Indian Railway Company, be divided as originally proposed between the Government of India and the Travancore Durbar in proportion to the lengths of the sections of the line in their respective territories. Under these arrangements assuming that, including rolling-stock and maintenance for two years, the British section will cost Rs. $28\frac{1}{2}$ lakhs for 45 miles, the Travancore section Rs. $83\frac{1}{2}$ lakhs for $58\frac{1}{2}$ miles, the capital will be raised by the South Indian Railway Company at $2\frac{1}{2}$ per cent. and the working expenses of the South Indian Railway will remain nearly stationary, the results to the Government of India, the Travancore State, and the South Indian Railway, may be expected to show a loss in the third year after the opening of the line, as explained in Case I below, to be superseded a few years later according to the moderate estimate contained in Case II, by surplus profits divisible between all parties :—

	Per mile per week.	
	Case I.	Case II.
	Rs.	Rs.
Estimated gross earnings, Travancore State section ...	50	100
Do. do. British	115	175
Do. gross receipts of the whole branch line ...	4,21,000	7,14,000
Do. net do. do. ...	1,85,000	3,14,000
Deduct interest charges	2,80,000	2,90,000
Estimated surplus profit of the whole branch line ...	— 95,000	+ 24,000
Do. share, Travancore State	— 71,000	+ 11,000
Do. do. Government of India	— 20,000	+ 9,000
Do. do. South Indian Railway about $\frac{1}{6}$ surplus or deficit	— 4,000	+ 4,000

These results, which are worked out on the supposition, that Rs. 4 lakhs of extra capital for the rolling-stock will be required in Case II, and that the South Indian Railway will share the net deficit as against Government and the total surplus profit in the usual proportions, show that the possibility of the South Indian Railway incurring serious loss will be very small indeed whilst the liabilities incurred by the Travancore Durbar will not be unduly burdensome to that State which will still obtain a large share of the high traffic returns expected from the British section of the line.

It will also be noticed that in the calculations no account is taken of the incremental traffic brought into the main line of the South Indian Railway the earnings from which it has not been found possible to estimate.

14. I am also to say that the Government of India in agreeing to the modified conditions proposed in the last paragraph for the Tinnevelly-Quilon Branch wish it to be clearly understood that the arrangements made for the construction of this and the Madura-Pamban Railway must stand or fall together; they are not disposed to consider any proposals for the construction of the latter which do not contemplate that the former should also be put in hand almost simultaneously.

15. The Government of India regard themselves as pledged by the proposals made in their letter, No. 1304 R.C., dated 2nd September 1896, and accepted by the Travancore Durbar, to use their best endeavours to carry the scheme for the construction of the Tinnevelly-Quilon Railway through at as early a date as possible, upon terms that will not be inequitable either to the South Indian Railway Company or to the Durbar, and they are therefore prepared, with a view to ensure this, to admit the cost of the British portion of the scheme within their general programme of railway construction, and will endeavour to find the funds for it within the next two years. It must, however, be understood that the concessions now made are final and the largest that the Government of India are prepared to make, and I am to express the hope of His Excellency the Governor-General in Council that they will meet with the support of His Excellency the Governor of Madras in Council, and will also be acceptable to the Travancore Durbar and to the South Indian Railway Company.

16. In conclusion, I am to request that the further views of the Government of Madras, the Travancore Durbar, and the South Indian Railway Company, may be communicated to the Government of India as soon as possible.

No. 968 Letter

You were ...—No. 1111 R., dated 10th December 1897.

...ernment of India will be addressed with regard to the Madura-Pamban Railway.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—Madras, 10th December 1897, No. 1118 R.

I am directed to acknowledge the receipt of your letter, No. 1746 R.C., dated the 22nd October 1897, and with reference to those parts of it relating to the Madura-Pamban Railway to communicate the following remarks.

2. In my letter, No. 1034 R., dated the 25th November 1897, I explained the reasons which have induced this Government to defer for the moment their acceptance or refusal of the terms proposed in paragraph 13 of your letter under reply for the financing of the Tinnevelly-Quilon Railway. A perusal of these reasons will sufficiently explain why it is not possible to agree to that line being put in hand almost simultaneously with the Madura-Pamban as stipulated in paragraph 14 of your letter under reply. If the Travancore Durbar should be so ill-advised as to hold out in their determination not to adopt the southern route, a full season of survey work must be carried out before any construction work can be begun on the hill section of the northern route; and as the present season is rather far advanced, and as no arrangements of any sort have been made, it seems as if work could scarcely be begun, on the hill section at least, before the end of the rains of 1899. If on the other hand the Durbar should happily agree to the adoption of the southern route, the country to be traversed is so comparatively easy, that very little delay need occur before work is begun. There is reason to hope that this question of the selection of route may shortly be settled. But meanwhile no useful object is served in deferring action for the financing of the Madura-Pamban line pending the settlement of the route of the Tinnevelly-Quilon line with which it has no geographical or traffic connection.

3. As regards the proposed method of financing the Madura-Pamban line, I am directed to say that while still adhering to the opinion already expressed in my letter, No. 530 R., of the 5th August 1897, viz., that it would be far preferable, were it possible, that this important link in the through route between India and Ceylon should form an integral part of the South Indian Railway, His Excellency the Governor in Council recognizes the limitations imposed by present financial conditions, and will no longer oppose the intervention of a Branch Line Company for the raising of the necessary capital; and this the more readily inasmuch as a careful perusal of the Secretary of State's agreements about the Ahmedabad-Parantej Railway, with that Company and with the Bombay, Baroda and Central India Company, respectively, seems to make it plain that the non-intervention of the capital-raising Company in the management of the working of their property by the working Company can be sufficiently safeguarded.

4. The Agent, South Indian Railway Company, will now be asked whether his Board consent to endeavour to at once make arrangement with a Branch Line Company for the raising of the capital required for the Madura-Pamban line on the basis of the rebate clauses of the branch line terms. The Agent's reply, when received, shall at once be communicated to the Government of India.

From—The Consulting Engineer for Railways, Madras.
To—The Agent, South Indian Railway.
Dated—10th December 1897, No. 3777.

I have the honour to acknowledge the receipt of your letter, No. 753, dated the 22nd July 1897, submitting an important proposal from your Board of Directors that the South Indian Railway Company should undertake *en bloc* the construction and working of the Madura-Pamban, Tinnevelly-Quilon, and Palghat-Dindigul Railways.

2. These proposals were forwarded to the Government of India early in August with the comments of the Government of Madras, and were duly considered at the Railway Conference which was held this year in Simla. The reply of the Government of India, No. 1746 R.C., dated the 22nd October 1897, has now been received, and I have the honour, under the orders of Government, to forward a copy of it for your and your Board's information.

3. All consideration of the Palghat-Dindigul line must for the present be laid aside. Enough is not known as yet as to what would be the most suitable agency for its construction and working or as to the most favourable alignment. It is hoped that inquiries now on foot may lead to a settlement of all doubts on these important points.

4. Certain paragraphs of the Government of India's letter contain proposals for the financing and terms of working of the Tinnevelly-Quilon Railway. But I must inform you that the old question of the superior advantages of the southern route over the northern has lately again been re-opened, and that there appears some prospect of the former being agreed to by the Durbar. Should this hope be justified I need scarcely say that the whole question of the financing of the Travancore line will assume a different aspect, and will be very much easier of solution. Meanwhile I shall be glad to be furnished with any opinion which you and your officers may be in a position to give expression to, as regards the relative advantages of the two routes, the southern route being for the present supposed to end on the extensive backwater navigation system.

5. It now remains to deal with the Government of India's decision in regard to the method of financing the Madura-Pamban line, and in this connection I invite your careful perusal of the pair of agreements about the Ahmedabad-Parantej line, between the Secretary of State, and that Company, and the Bombay Baroda and Central India Company, respectively. It seems to me that under some such terms of agreement as those referred to, which will be found in the Director-General of Railways' Administration report for the year 1895–96, Part II, it will be possible to ensure the non-interference of a Branch Line Company with the working of the branch by the parent line. Such being the case, the intervention of such a Company, even as a link in so important a chain of through communication as that connecting India with Ceylon, becomes of less account than would be the case had they power of interference in details, and the more so if the Branch Line Company are, in their Board of Direction, intimately connected with the parent Company.

6. I am informed now by the Government of Madras, and am instructed to convey the information to you for communication to your Board, that His Excellency the Governor in Council will be prepared to support any suitable arrangement which your Board may come to, on the basis of the Ahmedabad-Parantej terms, for the raising of the capital required for the Madura-Pamban line through the agency of a Branch Line Company.

7. I shall be glad to receive as early as possible an expression of your Board's views in regard to these the latest proposals for the financing of the Madura-Pamban line. Further action in regard to the Tinnevelly-Quilon line must for the present be deferred, and all idea of doing anything just at present to promote the Dindigul-Palghat line will have to be definitely set aside.

Extract from letter from—The Agent, South Indian Railway.
To—The Board of Directors.
Dated—15th December 1897, No. 564.

Railway Extensions.

With reference to the paragraph under this heading in my letter, No. 545, dated 3rd August 1897, I have placed in the packet copies of letter, No. 3777, dated 10th December 1897, from the Consulting Engineer for Railways, and of letter, No. 1746 R. C., dated 22nd October 1897, from the Government of India. Reading these

No. 968 R

You were ...ters together it will be seen that, pending settlement of the route to be adopted ...ernm... ...r the Tinnevelly-Quilon Railway, the Board is not asked to decide on the modified ...b... propositions formulated by the Government of India in paragraph 13 of its letter above referred to. In the meantime, however, the Government of Madras is desirous of receiving the Board's views on its proposals for so financing the Madura-Pamban Railway as to prevent the working agency being unduly interfered with by the Subsidiary Company. The situation of this line as a link in the through connection between India and Ceylon renders it very necessary that it should be controlled by the same authorities as control the South Indian Railway. As pointed out by the Consulting Engineer the insertion of the following clause extracted from the Contract, dated 13th March 1896, between the Secretary of State and the Ahmedabad-Parantej Railway Company (Limited) should efficiently guard the interests of the through route:—

"21. All the business connected with the management and maintenance of the said railway and conducting traffic thereon, including police and telegraphs and telegraphic appliances, shall in all respects, as far as practicable, be carried on in the same manner and subject to the same regulations and control by the Secretary of State as the like business on the Rajputana-Malwa Railway, and the Company shall not interfere or be concerned with such business."

Non-interference would be further assured by a close connection between the Working and Subsidiary Companies, a policy which, I hope, may commend itself to the Board.

From—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W.Dept., Ry. Branch.
Dated—Calcutta, 17th January 1898, No. 90 R.C.

I am directed to acknowledge the receipt of your letter, No. 1118 R., dated 10th December 1897, on the subject of the financing by a Branch Line Company, under the auspices of the South Indian Railway, upon the rebate terms of Government of India Resolution, No. 514 R.C., dated 17th April 1896, of the proposed Madura-Pamban Railway independently of the scheme for the construction of the proposed Tinnevelly-Quilon Railway.

2. In reply I am to say that the Government of India will await the views of the Board of the South Indian Railway Company on the proposed financing of the Madura-Pamban Railway by a Branch Line Company, but that they are of opinion that before work is commenced on this line the South Indian Railway Company should give an undertaking to construct a railway from Tinnevelly to the neighbourhood of either Quilon or Trivandrum, or other suitable terminus, either by the northern or southern route as may be decided by the Government of India, whenever called upon to do so, upon the terms and conditions stated in paragraph 13 of Public Works Department letter, No. 1746 R.C., dated 22nd October 1897.

Order—No. 167 R., dated 31st January 1898.

The terms for the construction and working of the Tinnevelly-Travancore Railway have long formed the subject of correspondence by this Government with the Travancore Durbar through the Resident, and with the South Indian Railway Company through their Agent. The correspondence with the Travancore Durbar culminated in the acceptance by the Durbar, as communicated in letter from the Resident, No. 3105, of the 12th October 1896, of the terms offered in Government of India letter, No. 1304 R.C., dated the 2nd September 1896. To validate this acceptance, however, it was essential that the concurrence of the third party, viz., of the South Indian Railway Company, should be secured; but this concurrence it has not so far been found possible to obtain. Negotiations have however progressed, and in connection with the Company's desire to obtain a concession for another branch railway in which they are interested, certain new terms have been put forward by the Government of India and these are now communicated *verbatim* (as per margin) to the Resident.

Extract from Government of India letter, No. 1746 R.C., dated 22nd October 1897.

* * * *

"The Government of India . . . . . found possible to estimate."

* * * *

2. The Resident will understand that the acceptance by ... ...rust terms, which are very much more favourable than those already accepted by them, and which are only rendered possible by the greater facility with which at the present time money can be raised by Railway Companies on the security of a State guarantee, can lead to practical action only in the event of their acceptance also by the South Indian Railway Company whose Agent has been asked to communicate his Board's decision if possible by telegraph.

3. The Resident is also informed that in offering the above conditions for the acceptance of the Railway Company the Government of India define the Travancore line as "a railway from Tinnevelly to the neighbourhood of either Quilon or Trivandrum or other suitable terminus either by the northern or southern route as may be decided by the Government of India." As regards this question of choice of routes this Government will be glad to receive an early expression of the wishes of the Travancore Durbar.

4. The Government of India will also be addressed.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—Madras, 31st January 1898, No. 168 R.

I am directed to acknowledge the receipt of your letter, No. 90 R. C., dated the 17th January 1898, in which you communicate the opinion of the Government of India that before work is commenced on the Madura-Pamban line an undertaking should be obtained from the South Indian Railway Company to construct and to work a railway from Tinnevelly to a suitable terminus in Travancore, to be later selected, whenever called upon to do so, upon the terms and conditions stated in paragraph 13 of your letter, No. 1746 R. C., of the 22nd October 1897.

2. In reply I am desired to inform you that the conditions have been laid before the Travancore Durbar, and the South Indian Railway Company, for consideration and acceptance, and that the result shall in due course be communicated to the Government of India.

3. I am instructed to say that the Government of India's suggestion that the opportunity of the South Indian Railway Company's desire to obtain the working of the Madura-Pamban line should be availed of in order to secure their acceptance of fair terms for the working of the less promising Tinnevelly-Quilon line, has the entire approval and concurrence of His Excellency the Governor in Council.

4. The question of route for access to Travancore is still under the Durbar's consideration, and when a decision has been arrived at the Government of India shall be duly informed.

From—The Consulting Engineer for Railways, Madras.
To—The Agent, South Indian Railway Company.
Dated—31st January 1898, No. 302.

In continuation of my letter, No. 3777, dated the 10th December 1897, and with reference to the paragraph headed "Railway extension" in your letter to your Board of Directors, No. 564, dated the 15th December 1897, I have the honour to inform you that Government has decided that before work can be allowed to begin on the Madura-Pamban Railway your Company must give an undertaking to construct a railway, whenever called upon to do so, from Tinnevelly to the neighbourhood of either Quilon or Trivandrum or other suitable terminus, either by the northern or the southern route as Government may decide, upon the following terms and conditions, as expressed by the Government of India.

"The Government of India are prepared to recommend to the Secretary of State that the South Indian Railway Company should raise the whole of the money required for the construction of the entire line from Tinnevelly to Quilon at 2½ per cent. in sterling under the guarantee of the Government of India, the Travancore Durbar underwriting that guarantee to the extent of the cost of the line in their own territory, and that the South Indian Railway Company should construct the whole

No. 96...

...ters together it will be seen that, pending settlement of the route to be adopted
You ...r the Tinnevelly-Quilon Rail...stock & Board is not asked then work it on completion as a
ernm... ...proposition of their existing system at the...nt of India of working expenses as obtains on
b... ...their whole line including the branch Railway and other branches which may here-
abo... ...after be added to it, the cost of maintenance for two years after opening being debited
of ... to capital.

"Any surplus profits obtained by working the branch on the above conditions would, after deducting the share payable to the South Indian Railway Company, be divided as originally proposed between the Government of India and the Travancore Durbar in proportion to the lengths of the sections of the line in their respective territories. Under these arrangements assuming that, including rolling-stock and maintenance for two years, the British section will cost Rs. 28½ lakhs for 45 miles, the Travancore section Rs. 83½ lakhs for 58½ miles, the capital will be raised by the South Indian Railway Company at 2½ per cent. and the working expenses of the South Indian Railway will remain nearly stationary, the results to the Government of India, the Travancore State, and the South Indian Railway, may be expected to show a loss in the third year after the opening of the line, as explained in Case I below, to be superseded a few years later according to the moderate estimate contained in Case II, by surplus profits divisible between all parties:—

	Per mile per week. Case I.	Case II.
	RS.	RS.
Estimated gross earnings, Travancore State section.	50	100
Do. do. British	115	175
Do. gross receipts of the whole branch line.	4,21,000	7,14,000
Do. net do. do.	1,85,000	3,14,000
Deduct interest charges	2,80,000	2,90,000
Estimated surplus profit of the whole branch line...	— 95,000	+ 24,000
Do. share, Travancore State	— 71,000	+ 11,000
Do. share, Government of India	— 20,000	+ 9,000
Do. share, South Indian Railway about ⅙ surplus or deficit	— 4,000	+ 4,000

"These results, which are worked out on the supposition, that Rs. 4 lakhs of extra capital for the rolling-stock will be required in Case II, and that the South Indian Railway will share the net deficit as against Government and the total surplus profit in the usual proportions, show that the possibility of the South Indian Railway incurring serious loss will be very small indeed whilst the liabilities incurred by the Travancore Durbar will not be unduly burdensome to that State which will still obtain a large share of the high traffic returns expected from the British section of the line.

"It will also be noticed that in the calculations no account is taken of the incremental traffic brought into the main line of the South Indian Railway the earnings from which it has not been found possible to estimate."

2. I have the honour to request that I may be favoured with a very early expression of your Board's views in regard to this proposal. It would be very desirable that, if they accept it, they should telegraph to that effect, in order that by the time of the receipt of their reply to your No. 564 of the 15th December 1897, I may be in a position to acquaint Government with the conclusions arrived at.

Extract from letter from—The Agent, South Indian Railway.
To—The Board of Directors.
Dated—2nd February 1898, No. 571.

Madura-Pamban and Tinnevelly-Quilon Railways.

Adverting to the paragraph under this heading in my letter, No. 564, of 15th December 1897, I forward among the enclosures to this letter a copy of letter, No. 302, dated 31st January 1898, from the Consulting Engineer for Railways to the Government of Madras, in which he asks to be favoured with an early expression (by telegram if possible) of the Board's views in regard to the proposals of the Government of India as expressed in paragraph 13 of their letter No. 1746 R.C., dated 22nd October 1897, of which a copy was sent to you with my letter above quoted.

Extract from letter from—The ...d that the accers...
To—The Agent, South Indian Railway ...rust
Dated—11th February 1898, No. 204. ...2

Your letters, No. 545, of 3rd August 1897, and No. 564, of 15th December 1897, together with the letter, dated 10th December, from the Consulting Engineer for Railways, and Government of India letter No. 1746 R.C., of 22nd October 1897, have been considered by the Board.

It is observed that the Board are requested not to decide on the modified propositions formulated by the Government of India in paragraph 13 of their letter above quoted, pending the settlement of the route to be adopted for the proposed extension into Travancore territory. In the anticipation that some decision has already been, or may soon be, arrived at with regard to this route, and with the view of placing the Board in a position to deal with the matter without delay, you are desired to give your own views fully upon the whole subject.

In reply to the question of the Madras Government, and assuming the Madura-Pamban line to be constructed by a subsidiary company, it is not thought that there will be any difficulty in financing the company upon such lines as will prevent the working agency being unduly interfered with by the subsidiary company, and a clause similar to that (No. 21) in the Ahmedabad-Parantej Contract will probably be sufficient to meet the object in view.

Extract from letter from—The Agent, South Indian Railway.
To—The Board of Directors.
Dated—9th March 1898, No. 576.

Madura-Pamban and Tinnevelly-Quilon Railways.—In continuation of the paragraph under this heading in my letter, No. 571, dated 2nd February 1898, and with reference to your telegram of 3rd March 1898, "Board's 204 Seedsman (send without delay) report extensions," I beg to offer the following remarks on the proposals embodied in paragraphs 12, 13, 14 and 15 of letter No. 1746 R.C., dated 22nd October 1897, from the Government of India.

Madura-Pamban Railway.—There are, I believe, no serious obstacles to the acceptance of the proposals of the Government of India in respect to this branch, though it is to be regretted that its construction as an integral portion of the South Indian Railway undertaking is discouraged.

Tinnevelly-Quilon Railway.—As regards the proposals for working this line, it will be observed that any insufficiency of net earnings to meet the guaranteed interest will in the first place be divided between the Imperial and Travancore Governments proportionately to the cost of the lengths of line in their respective territories, and, in the second place, that the South Indian Railway is required to bear such share of the deficit chargeable to the Government of India as is represented by the ratio of the Company's capital to that of the Government of India in the South Indian Railway. In other words, the Company is asked to assist in paying interest on the Tinnevelly-Quilon Railway capital due to itself under a Government guarantee from its share of the surplus profits of the Undertaking. This contribution, however, is never likely to be large and is therefore comparatively of small financial importance. The proposals of the Government of India for the division of surplus profits, should they be ever realized, are favourable to the Company, which takes its share before the division is made between the Imperial and Travancore Governments. The Government of India mentions in its proposals that no account has been taken of the value of the extra traffic produced on the parent line by the ...nnevelly-Quilon Railway, but I have to point out that the loss, which may aris... ...m the insufficiency of the percentage payment for working to cover actua... ...ing expenses, has also been neglected. Government has doubtless assumed that ... ...cent. of the gross earnings of a line should fairly meet the expenditure on working ... ...d in most cases the assumption would be accurate. The Tinnevelly-Quilon Rail... ...being an administrative rather than a traffic line, I do not think this assumption ...vill prove correct for many years to come,

line including [illegible] In my letter to you, No. 528, dated 7th April 1897, I estimated that it would porting e[illegible]s. 80 per mile per week to work the line, and on this assumption the Chief after Auditor has prepared the accompanying statements, (based on the actual figures for ed as the half-year ended 30th June 1897) to show the effect to the Company of working bar in the Tinnevelly-Quilon Railway on the terms now offered by the Government of India. ritorie Briefly the following results are anticipated :—

Gross earnings of the Tinnevelly-Quilon Railway—

Per mile per week Rs.	78.	Half-yearly ; loss to Company ...	Rs.	28,212
„ „ „	94.	„ „ ...	„	23,393
„ „ „	132.	„ „ ...	„	8,088

The first and third cases correspond to cases I and II of the tabular statement embodied in paragraph 13 of Government of India letter No. 1746 R.C., dated 22nd October 1897, and case II is that anticipated by me in my letters Nos. 497 and 528, dated 1st September 1896 and 7th April 1897, respectively. The incremental traffic from the Tinnevelly-Quilon Railway will be a set-off against this loss, but it is quite impossible to frame any forecast of what this reduction is likely to be. To compensate for a loss to the Company of Rs. 25,000 per half-year the gross value of the derived traffic must be about Rs. 2,80,000 half-yearly or, say, one-sixteenth of the whole gross receipts of the undertaking, and I think it may be confidently assumed that the incremental traffic will not have this value. It might be possible by the most rigid economy to reduce working expenses below Rs. 80 per mile per week, but as each rupee per mile per week only represents about Rs. 500 per half-year to the company, it is obvious that a very considerable reduction would be necessary to bring the Company's loss to a reasonable figure. It must also be remembered that the Tinnevelly-Quilon Railway cannot be worked without increasing our outlay on "stores" and other suspense balances. To meet this further loss no compensation is suggested by Government, and I therefore specially refer to the point as the Board desired it should not be lost sight of when dealing with Working Agreements.

Though the terms now offered by the Government of India are decidedly more liberal than those formulated previously, they bear much heavier on Government and the Company than on the Travancore State. Taking everything into consideration, I cannot see how the Company could fail to lose heavily by accepting the proposals now under consideration, and were it not that the Tinnevelly-Quilon Railway is to be considered as financially connected with the Madura-Pamban line, no other course would seem open but to decline the terms now offered. The complexion of affairs, however, will be very materially changed if the latter railway is worked by a Company closely connected with the South Indian Railway Company, and though perhaps a somewhat over-sanguine view has been taken of the traffic prospects of the Madura-Pamban line, I am inclined to think that the derived traffic from it and the Tinnevelly-Quilon Railway taken together would secure the Company against loss. This opinion is of course pure surmise on my part, as no data in respect to this derived traffic can be obtained, and will, I hope, be accepted with the hesitation with which it is tendered. Should the Board agree to the terms of the Government of India, I would suggest that a clause should be inserted in the Agreement to secure for the Provident Institution the calculation of its additional contribution on the net earnings of these worked lines as well as on those of the Undertaking.

I have placed in the packet a copy of a letter, dated 5th February 1898, from the Chief Auditor, together with printed copies of its four accompanying statements.

From—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Simla, 1st April 1898, No. 17 R.P.

With reference to your letter, No. 168 R., dated the 31st January 1898, I am directed to enquire what progress has been made in the negotiations for the construction of the proposed Madura-Pamban and Tinnevelly-Quilon Railways.

Telegram from—The Joint Secy. to the Govt. of Madras, P. W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—11th April 1898, No. 1 A.

Your 17 R.P., April 1st. Agent, South Indian, has received wire from Board. Begins. Accept Government proposals but hope Pamban may be integral part of undertaking. Message ends. Negotiations with Travancore Durbar now nearly completed. Will reply fully when copy received of Board's letter to Agent and when Travancore's official proposals made.

Read the following :—

G.O., No. 650 Ry., dated 28th April 1898.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Madras.
Dated—26th April 1898, No. 371.

With reference to your telegram No. 15 C., of the 21st April 1898, I have the honour to forward herewith two copies of the Managing Director's letter, No. 209, dated 7th April 1898, containing the acceptance, by the Board of Directors of the South Indian Railway Company, of the modified proposals of Government regarding the Madura-Pamban and Tinnevelly-Quilon Extensions, and beg to invite attention to the concluding paragraph thereof.

Enclosure.

From—The Managing Director, South Indian Railway Company, Ld.
To—The Agent, South Indian Railway.
Dated—London, 7th April 1898, No. 209.

In reply to Board's letter No. 204, dated 11th February 1898, and to their telegram of 3rd March 1898—

"Board's 204, send without delay report extensions,"

the Board have now had before them your views, as expressed in your No. 576 of 9th March 1898, upon the proposals of the Government of India contained in their letter No. 1746 R.C., of 22nd October 1897.

2. After full consideration of the whole subject the Board have decided to accept the modified proposals of the Government, formulated in that letter, as regards the Madura-Pamban and Tinnevelly-Quilon Extensions. These are shortly—

(*a*) That the Company should construct the Tinnevelly-Quilon Railway, including rolling stock, at cost price, the money required being raised under a sterling guarantee of the Government of India at the rate of 2½ per cent. per annum.

(*b*) That the Company should work the line as a portion of their existing system at the same rate of working expenses as obtains on their whole line, including the branch railway and other branches which may hereafter be added to it.

The Board consider that the contract should contain a clause to the effect that in the event of its hereafter being proved by the officers of the South Indian Railway Company, to the satisfaction of the Government, that there is an actual loss on working the branch at that rate, the rate shall be raised to such a point as may be calculated to cover working expenses.

(*c*) That the cost of maintenance of the line for two years after opening shall be debited to Capital.

(*d*) The net deficit as against Government, and the total surplus profit, to be divided between the Government and the Company in the usual proportions as stated—excluding, for the purposes of such division, the Capital provided for this branch. The proposal as to the Travancore Government underwriting a proportion of the guarantee affects the Government of India and the Travancore State only, and, therefore, need not be imported into any Agreement between the Government and the Company.

RAILWAY.

Government {1898} of Madras.

PUBLIC WORKS.

Recd. } 1898. *Enclosures*

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G.O., No. 1349 Ry., 2nd November 1898.

NOVEMBER.

Madura-Pamban Railway

Communicating to the Agent, South Indian Railway, letter from the Government of India sanctioning the estimates of the cost of surveying and staking out the section of the — from Madura to Paramagudi and the branch line from Sembarayendal to Sivaganga, and for staking out the centre line of the section from Paramagudi to Toni Torai, and allotting funds for the works.

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd.	} 1899.	*Enclosures*
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G.O., No. 476 Ry., 26th April 1899.

APRIL.

Madura-Pamban Railway

Communicating to the Agent, South Indian Railway, letter from the Government of India sanctioning the revised estimate of Rs. 41,803 for surveying and staking out the sections of the —.

Budget Estimate.

	1898-99.	1899-1900.
Survey Expenses.	Rs.	Rs.
Centre line pegs, &c., 42½ miles × 68 Rs.	2,890	..
Preliminary trace of Sivaganga branch	750	..
Centre line pegs, &c. 13½ miles × 68	..	918
Preparing estimate and printing the same, half cost	..	250
	3,640	1,168
Plant.		
Tents as per estimate	1,528	..
Instruments as per estimate	4,203	..
Credits to be given on completion	..	3,153
	5,731	3,153
Establishment.		
Engineer-in-Chief and office establishment (December 1898 to February 1899)	3,430	..
,, ,, (March to May 1899)	..	2,392
1 Engineer (December 1898 to February 1899) at .. .. Rs. 600	1,233	..
1 ,, (January and February 1899) at .. .. ,, 500	295	..
1 ,, (February to May 1899) at .. .. ,, 500	322	1,500
1 ,, (January to May 1899) at .. .. ,, 500	581	1,200
1 ,, (December 1898—January and February 1899) at .. .. .. ,, 400	486	..
1 Surveyor (December 1898—January 1899) at .. .. ,, 250	160	..
1 ,, (December to April 1899) at .. .. ,, 150	416	300
1 ,, (March to April 1899) at .. .. ,, 150	..	300
1 Assistant Surveyor (January 1899 to April 1899) at .. .. .. ,, 150	85	90
1 Clerk (December 1898 to May 1899) at .. .. ,, 45	65	105
35 Lascars (December 1898 to April 1899) at .. .. ,, 35	694	560
Travelling allowances .. .. ,, 8	500	1,300
Contingencies	300	700
	8,567	8,447
Abstract.		
Survey expenses	3,640	1,168
Plant	5,731	3,153
Establishment	8,567	8,447
	17,938	6,462
	Total ..	24,400

Revised estimate for staking out the centre line from Paramagudi to Toni Torai, including the survey of the island of Rameswaram and Pamban Reef—Estimated length 47 miles.

	Rs.	Rs.	Rs.
Survey Expenses.			
Centre line pegs centre line stones, bench marks, fixing ditto and lock-spitting, ... Rs. 68 × 47	3,196		
Preparing estimates and printing the same, half cost	250		3,446
Plant.			
Tents—			
1 Swiss cottage tent	355		
1 Hill tent	270		
8 Servants' pals	445		
1 Necessary tent	33		
1 Swiss cottage tent, half cost	275		
Instruments.			
2 Theodolites at .. .. Rs. 600	1,200		
2 Levels at .. .. ,, 400	800		
4 Levelling staves at .. .. ,, 50	200		
3 Sets scales at .. .. ,, 10	30		
36 Ranging rods at .. .. ,, 3	108		
4 Measuring chains at .. .. ,, 10	40		
Other items of plant	1,500		
Engineer-in-Chief office furniture, half cost	175		
Do. do. Instruments, half cost	150		
	4,203	1,378	
Deduct—75 per cent. on value of stores returned ..	3,152		
		1,051	2,429
Establishment.			
Engineer-in-Chief establishment (December to February 1899), Rs. 6,859, half cost	3,430		
March to May 1899, Rs. 4,784, half cost	2,392		
1 Engineer (December 1898 to April 1899) at .. .. Rs. 500	2,162		
1 Surveyor (January to April) at .. .. ,, 125	455		
1 Clerk (,,) .. .. ,, 115	505		
21 Lascars (,,) .. .. ,, 40	193		
Travelling allowance .. .. ,, 8	691		
Contingencies	700		
	1,000		
			5,706
		Total ..	17,403

Budget Estimate.

	1898-99.	1899-1900.
	500	2,946
Survey expenses		
Plant.	1,378	..
Tents as per estimate	4,203	..
Instruments as per estimate	..	3,152
Credits to be given on completion		
Establishment.	3,430	..
Engineer-in-Chief and office establishment (December to February 1899)	..	2,392
,, ,, (March to May 1899)		
Field Establishments.	1,162	1,000
1 Engineer (December 1898 to April 1899) at .. .. Rs. 500	205	250
1 Surveyor (January to April 1899) at .. .. ,, 125	275	230
1 ,, (,,) .. .. ,, 115	113	80
1 Clerk (,,) .. .. ,, 40	355	336
28 Lascars (,,) .. .. ,, 8	400	300
Travelling allowances	300	700
Contingencies	12,321	5,082
Abstract.	500	2,946
Survey expenses	5,581	3,152
Plant	6,240	5,288
Establishment	12,321	5,082
Total ..	17,403	

Order—No. 277 Ry., dated 9th March 1899.

The Government of India will be addressed.

From—The Joint Secretary to the Govt. of Madras, P.W. Dept., Railway Branch.
To—The Secretary to the Government of India, Public Works Department, Simla.
Dated—Madras, 9th March 1899, No. 278 Ry.

With reference to the estimates amounting to Rs. 27,692 for surveying and staking out the two sections of the Madura-Pamban Railway, sanctioned in Government of India, Public Works Department, letter No. 1587 R.C., dated 22nd October 1898, I am directed to forward, herewith, a copy of letter from the Agent, South Indian Railway, No. 183, dated 27th February 1899, submitting revised estimates of the cost of the survey, amounting to Rs. 41,803 as under:—

	Rs.
(1) Madura to Paramagudi with the branch to Sivaganga	24,400
(2) Paramagudi to Toni Torai, and for surveying the island of Rameswaram and the Pamban Reef	17,403
Total ...	41,803

2. The excess over the sanction already accorded is due to provision being now made for the whole salary of the Engineer-in-Chief for the months December 1898 to February 1899 and half salary for the months February 1899 to May 1899, the other half being debitable to the Travancore Railway. The estimate provides for the very necessary survey of the island of Rameswaram and Pamban Reef. and it is anticipated that the work will be completed in May next. Under these circumstances I am to recommend that the estimates now submited may be sanctioned.

Read also the following paper:—

From—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Simla, 14th April 1899, No. 644 R.C.

I am directed to acknowledge the receipt of your letter No. 278 Ry., dated the 9th March 1899, and in reply to convey the sanction of the Government of India to the revised estimate therewith forwarded amounting to Rs. 41,803, of the cost of surveying and staking out the undermentioned sections of the Madura-Pamban Railway:—

	Rs.
(1) Madura to Paramagudi with branch to Sivaganga	24,400
(2) Paramagudi to Toni Torai, and for surveying the island of Rameswaram and the Pamban Reef	17,403
Total ...	41,803

2. The sanction herein accorded, which is in supersession of that accorded in Public Works Department letter No. 1587 R.C., dated 22nd October 1898, to an estimate amounting to Rs. 27,692 on account of the surveys in question, has been registered as No. 3 Railway Surveys of 1899–1900.

Order—No. 476 Ry., dated 26th April 1899.

Communicated to the Agent, South Indian Railway.

(True Extract.)

Francis J. E. Spring,
Joint Secretary.

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

Exd. T. K. Narayana Aiyangar.

Form No. (2).

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

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G.O., No. 580 Ry., 15th May 1899.

MAY.

Madura-Pamban Railway

Communicating to the Agent, South Indian Railway, and the Examiner, Guaranteed Railway Accounts, for information, letter from the Government of India sanctioning, with remarks, certain allotments to meet capital outlay on the — during the current financial year.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following papers :—

G.O., No. 386 Ry., dated 7th April 1899.

Read the following papers :—

G.O., Nos. 277–78 Ry., dated 9th March 1899.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—Madras, 15th March 1899, No. 293 Ry.

Since the receipt of your letter, No. 1356 R.C., dated the 17th September 1898, the only subjects of correspondence between this Government and the Government of India in regard to the Madura-Pamban Railway have been survey staff and survey estimates. It is understood that, before addressing the Secretary of State again about sanction to start construction, the Government of India are awaiting the receipt of an estimate of the cost of the route recommended by this Government in my letter, No. 969 Ry., dated the 28th July 1898. The survey parties are now at work, and it is hoped that the new estimates, framed by the Engineer who will be responsible for the construction of the line, will reach this Government in time to permit of the receipt from the Government of India of orders to proceed with the construction of the line from end to end as soon as practicable after next monsoon.

2. Meanwhile, the accompanying forecast of an expenditure during 1899–1900, amounting to Rs. 40 lakhs, has been received by this Government from the South Indian Railway Company's Agent. For the purpose for which it is required the forecast may be accepted for what it purports to be, viz., as sufficient to allow of a judgment being arrived at as to probable expenditure during the year if a grant can be allotted at once and if early permission to send forward English indents can be accorded.

3. This Government is unaware to what extent the Government of India is empowered to allow indents to be sent forward and work on the parts of the route which are not in dispute to be started. It seems, however, to be reasonable that if it has been decided that Madura and Pamban are to be connected in the early future, permission should now be accorded, the sanction of the Secretary of State being obtained by telegraph, if necessary, for indents being immediately sent home. It also seems to this Government to be not unreasonable that permission should be given, on the basis of Mr. Shadbolt's estimate treated as a preliminary estimate, for work to be started on the eastern part of the route, the re-alignment of which is not suggested.

4. If such permission could be given, and if an allotment of funds could be made, a great deal of useful work might be done and much time otherwise to be wasted might be saved by the despatch of English indents, and the commencement of work from the Pamban end of the line.

5. I am directed therefore to suggest that a total grant of 20 lakhs be preliminarily allotted, viz., 6 lakhs for Indian cash outlay, 10 lakhs for English indents, and 4 lakhs for Indian stores. and that sanction, as above suggested, be accorded at as early a date as can be secured by the use, if necessary, of the telegraph for obtaining the Secretary of State's permission.

Ex

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways.
Dated—Trichinopoly, 17th April 1899, No. 353.

Madura-Pamban Railway.

With reference to my letters No. 183 of 27th February 1899, and No. 284 of 30th March 1899, I have the honour to inform you that the re-surveying and re-staking out of this line are far advanced. The field work of section No. 2 Paramakudi to Toni Torai has been completed, and the preparation of the land plans is in progress. On section No. 1 from Madura to Paramakudi, the field work is complete and the survey of the branch to Sivaganga is now being undertaken. The plan and section and the land plans will all be ready by about the middle of May for submission to Government.

The sanction for survey work on No. 1 section expires in May and for No. 2 section at the end of this month, so that unless funds are allotted for construction purposes, the staff I have been at so much trouble to collect will have to be dispensed with. It is impossible by the end of May to make the working drawings for the bridges, etc., and to submit the revised detailed estimate for the construction of the line, these must follow, but if funds are allotted for construction work the staff now employed can be retained and arrangements made to start collection of materials, to carry out preliminary work necessary to construction, and to start earthwork on waste lands. I have, therefore, to request that you will urge as far as you can that I may be put in funds for the commencement of work.

Order—No. 452 Ry., dated 21st April 1899.

The Government of India will be addressed.

From—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
To—The Secretary to the Government of India, Public Works Department.
Dated—Madras, 21st April 1899, No. 453 Ry.

In continuation of my letter, No. 293 Ry., dated 15th March 1899, I am directed to forward, herewith, copy of a letter, No. 353, dated 17th April 1899, from the Agent, South Indian Railway, requesting to be put in funds for the commencement of work on the Madura-Pamban Railway.

G.O., No. 476 Ry., dated 26th April 1899.

Read also the following papers :—

Telegram from—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Simla, 24th April 1899, No. 740 R.C.

My letter numbered and dated as follows : 650 R.C., 14th instant. Secretary of State wires 21st instant—Begins: your telegram of 14th instant. Madura-Pamban Railway, Tinnevelly-Quilon Railway. You may commence work at once—Ends. Grants of 10 lakhs, Madura-Pamban Railway, and 7 lakhs, Tinnevelly-Quilon Railway, are given.

Telegram from—The Consulting Engineer for Railways, Madras.
To—The Agent, South Indian Railway.
Dated—Madras, 25th April 1899, No. 2 C.

No. 580 Ry., 15th May 1899.

From—The Secretary to the Government of India, Public Works Department.
To—The Joint Secretary to the Government of Madras, P.W. Dept., Ry. Branch.
Dated—Simla, 3rd May 1899, No. 96 A.R.

With reference to your letter, No. 453 Ry., dated 21st April 1899, and in confirmation of Government of India, Public Works Department, telegram No. 740 R.C., dated 24th idem, I am directed to convey the sanction of the Government of India to the following allotments to meet capital outlay on the Madura-Pamban and Tinnevelly-Quilon Railways during the current financial year :—

	Rs.
Madura-Pamban Railway	10,00,000
Tinnevelly-Quilon „	7,00,000

2. I am to add that the grant of Rs. 11,000 given in budget orders, No. 10/B.O. A.R., dated the 21st March 1899, for the Madura-Pamban Railway survey is hereby withdrawn. Any outlay incurred on this account should be charged against the allotment now made for the construction of the line.

Order—No. 580 Ry., dated 15th May 1899.

Communicated to the Agent, South Indian Railway, and the Examiner, Guaranteed Railway Accounts, for information and guidance.

(True Extract.)

Francis J. E. Spring,
Joint Secretary.

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

Exd. A. Rungasawmy Aiyangar.

Form No. (2).

SERIAL No. 40

Public Wo.

Railway Branch.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Read the following

Letter from the Government of India, Public Works Department, No. 938 R. C., dated the 25th May 1899.

In continuation of correspondence ending with Government of India letter No. 96 A. R., dated the 3rd May 1899, I am directed to say that the Government of India desire that the masonry of all bridges on the Madura-Pamban Railway may be built of such dimensions as to enable broad gauge superstructures to be hereafter placed upon them with a minimum of extra cost, should it at any future time be decided to convert the railway from metre to broad gauge, and I am to request that the Agent, South Indian Railway may be asked to instruct the Engineer-in-Chief of the Madura-Pamban Railway accordingly.

2. It is presumed that the extra cost of doing this will be but trifling.

Order thereon:-No. 634 Ry., dated 3d June 1899.

A copy of these orders will be forwarded to the Agent, South Indian Railway Company, for guidance.

(True Extract)

J. C. Lyle.
Under Secretary.

The Consulting Engineer for Railways.

No. 80/0, dated the 3rd June 1899.

Forwarded to the Agent, South Indian Railway.

(Signed) J. C. Lyle,
for Consulting Engineer for Railways.

Despatched on 3/6/99

No.

Government of Madras,

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

To

The Secretary to the Government of India,

Public Works Department,

Sir,

In my Ltr No. 969. Ry. dtd 28th July 98 the Govt of India were requested to express their opinion in regard to the most suitable route from Madras to Bezwada. The reasons which were to be fully set forth in the Govt Proceedings No. 968. Ry. dtd 28th July 98, for the Satte Vaigai route was recommended in preference to that by the North bank of the Vaigai and Sivaganga which had been adopted for the Shoranur-Shalt.

2.- In your reply No. 1356. R.C. dtd the 17th Sept. 1898, Sanction was given to surveying the route recommended; and although the choice between the two routes was not to be determined until the general considerations advanced by this Government in its Ltr. No. 969. of 28th July 98. than a consideration of estimated cost, the Govt of India intimated their intention to reserve its decision in regard to the two routes until they should have been placed in possession of plans and estimates.

The reply to this was conveyed in your endorsement No. 650. R.C. dtd the 14th Sept 99, communicating the sanction of the Govt of India telegram to the Govt of Madras No. 649. R.C. dated 14th Sept 99, which sanction was subject to the commencement of preliminary operations on the Vaigai Bridge Plan No. 7-A and this was followed by your telegram No. 770. R.C. of the 24th Sept. granting leave to proceed with letting a grant.

3 In my letter No. 293. Ry. dated the 15th March 1899 the Govt of India have agreed to allow work to be started on the Southern part of the line and to permit letting for Cycle stone to go forward. The reply

that date land acquisition and all preliminary arrangements
staff, contracts, &c. have been in progress: and all through
Engineer in Chief of the S.I.R. Co. has been busy with the survey and preparation of a project for the alternative alignment, in concert with the Govt. Consulting Engineer. The result is the set of plans and sections and the project estimates and reports herewith forwarded, as per margin. These plans estimates and reports were received under cover of letters from the Agent S.I.Ry which are included in the accompanying N.W.P. Proceedings of this Govt. No. dated the Nov. 99, and they are fully reviewed in the Cons. Engr's Note dated the 15th Nov. 99.

5. In arriving at a decision in regard to the choice of routes the Govt. of India should not attach any weight to the fact that Mr Mitchell's estimate is largely in excess of Mr Shadbolt's. for the excess is a matter which, except in regard to one or two minor items is quite apart from the question of routes. Had an estimate been framed by Mr Mitchell on Mr Shadbolt's alignment, it must necessarily have been fully as largely in excess of the earlier estimate as is that based on the new alignment. The earlier estimate was in many respects utterly inadequate for the requirements of a line which when open will be the main line of the S.I.R. towards Ceylon. Moreover, as explained in the Reports and in the Cons. Engr's note, it failed to take account of rolling stock, entirely underestimated the cost of land, and in many other respects, as well as in details of rates, fell far short of sufficiency.

6. The considerations which induced this Govt. to come to the decision that its original choice of the route via Sivaganga was a mistaken choice will be found, as already explained, fully set forth in this Govt. Proceedings No 968.R. July 28th 99. His Excellency in Council therefore directs me to suggest that these considerations, and these alone, for considerations of estimate do not specially affect the question, be taken account of by the Govt. of India in proceeding to arrive at a decision to change a route originally fixed by this [illegible] what are now admitted [illegible] and subsequently rejected after most careful enquiry and deliberation.

7. The conclusion come to by this Govt. [illegible] is that [illegible] included in the accompanying Proceedings No. dated Nov. 97, is that the line can be made [illegible] Madura at a cost of 63 or 64 lakhs, and that if it is decided to make a 12 mile branch across the Vaigai to Sivaganga it can be made for 10 or 11 lakhs. [illegible] the simultaneous construction of the Sivaganga branch with the main branch. But if, as seems probable, there should be any difficulty [illegible] be the best employment of the staff. H.E. in Council will be content to see the [illegible] effort expended in pushing through.

I have the [illegible] FHS 23/11/99

Project estimate of the Pamban Branch, S.I.Ry.

PUBLIC

RAILWAY BRANCH.

C. No. 5099 NOTE FOR H.E.

There seems no necessity to circulate farther than H.E. because it has been gone into Council so thoroughly on previous occasion, and there have been no new development.

I have put up for H.E.'s approval a draft of a letter to India which I think says all that there is any need to say.

A great deal of delay has been caused by the Company's having combatted the Govt. of India's desire to make a change from the use of a wooden sleeper road, and after several months correspondence the Govt. of India have sanctioned the use of an iron sleeper road. This interfered with any payment in England on account of indents this year, so the Company have been obliged to forfeit, or rather to relinquish, 4 lakhs out of their 10 lakh grant.

Land is now being made over by the Civil officers and work has been started in several places on the undisputed or Eastern section, and contracts given for most of the works. Work will be in full swing on 25 or 30 miles of the line in a month more, and can be put in full swing on the remainder of the line the moment the Govt. of India see fit to reply to this letter.

FHS

I have approved the draft, but I think it would be advisable that Hon. Members should see it.

A.G.H. 29.11.99

Circulate to H.Ms

FHS 30/11/99

Seen. [illegible] 30.11.99

Seen HWB 1-12-99

C. for 1/12

R 30/11 HWB 30/11 R 1/12/99

SOUTH INDIAN RAILWAY COMPANY, LIMITED.

PAMBAN BRANCH.

ESTIMATE

OF THE

COST OF CONSTRUCTION.

SURVEY OF 1899.

TRICHINOPOLY:

BRANCH "ECLIPSE" PRESS.

1899.

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

ESTIMATE

OF THE

COST OF CONSTRUCTION.

SURVEY

OF

1899.

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SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

:o:

Explanatory Note to Estimates.

As the present estimate works out to a rate of Rs. 78,830 per mile being far in excess of that prepared by Mr. Shadbolt in 1895 the following notes are submitted :—

1. Preliminary Expenses. The present amount includes the whole of expenditure incurred on the two previous surveys, in 1886 Rs. 27,475, and in 1895 Rs. 43,661. The actual rate per mile of the present survey is at present Rs. 393, and this will be further reduced to about Rs. 365 per mile when credits for instruments &c., are given.

2. Land. The present estimate is based on the rates given by the Collector of Madura. The acreage from Madura to Paramakudi (mile 45) is assumed to be 16 per mile. From Paramakudi to Mandapam the acreage has been taken from the land plans. The average rate per acre is Rs. 238 whilst Mr. Shadbolt's rate is only Rs. 52. The previous line went through more waste land than the present one, 849 acres against 295 acres, but the rate now is Rs. 50 against Rs. 20 in the previous estimate. No allowance was made in the previous estimate for compulsory acquisition under the Act nor for the services of the Revenue staff to be employed in valuing and giving over the line.

The present estimate is 5 times more than the original one. The extra land required for the re-arrangement of the Madura Junction is also included.

3. Formation. The earthwork quantities given are taken from the section and are not calculated from average heights of banks as in the previous estimate.

No provision was made previously for road diversions, channel diversions, pitching the sides of banks in tanks and service roads. The estimate includes a sum of Rs. 1,49,000 for ballasting the line and maintaining it till the banks are well consolidated.

The estimate rate for earthwork has been raised from Rs. 5 to Rs. 6 per 1,000 c. ft. as the former one was not considered sufficient.

Earthwork in connection with the re-arrangement of Madura Junction is also included.

4. Bridgework. As the Vaigai river is crossed on the branch line it is not included in this estimate. All the quantities have been taken from Stone's Bridge and Culvert Tables. The excess in the minor bridges estimate is due to the new line passing through irrigated lands for the whole distance between Madura and Paramakudi (mile 45) instead of over dry lands as in the northern route *via* Sivagunga.

5. Fencing. The excess is principally due to the provision for the diversion of the public road at Madura Junction.

6. Electric Telegraph. The present estimate provides for station connection wires, instruments and batteries for which nothing was provided originally.

7. Ballast. Provision is made in this estimate for the supply of stone ballast for the full section and not for part sand and stone as previously estimated. This causes an increase of Rs. 1,584 per mile.

8. Permanent Way. The permanent way is the same type as in previous estimate *viz.* 50 lb. rail with cast iron pot sleepers. Extra provision is made for breakages in pot sleepers amounting to about 9 tons per mile and for a 19 lbs. tie bar against a 6 lb. one originally provided causing an increase of over 11 tons or a total of 18·78 tons per mile. The estimate is prepared according to the instructions given in the Director General's quarterly price lists of stores ; the revised Indian Charges causing an increase of Rs. 2,336 per mile chiefly due to freight, insurance and landing charges not being included in the previous estimate ; the English Charges are in excess due to the higher rate for supply of permanent way, the price per ton of rails being Rs. 88·42 against Rs. 75 in the former estimate. The total difference per mile of permanent way English Charges being Rs. 2,369 in excess. Provision has also been made for the additional sidings at Madura Junction which were not previously estimated for.

9. Stations and buildings. The present estimate provides for all the staff quarter accommodation, station machinery &c., required to equip the line, the quantities being chiefly obtained from the type drawings which are proposed to be adopted. The estimate also provides for additional station accommodation and quarters for the staff at Madura Junction.

10. Plant. Provision has been made for "Construction" plant which is the chief item causing the rate per mile to be increased from Rs. 330 of the previous to Rs. 672 in the present estimate.

11. Ferries &c. Nil.

12. Rolling Stock. No provision was made previously for Locomotive and Carriage equipment the present figures have been furnished by the Locomotive Superintendent of the South Indian Railway Company.

13. General Charges. The estimate provides for the completion of the main line, and the line to the island of Rameswaram.

The rates adopted are shown in the following list:—

LIST OF RATES.

	Per.	Rs.
Formation.		
Earthwork	1,000 c. feet	6-0-0
Pitching Banks	100 s. feet	8-0-0
Ballast.		
Sand (temporary)	~~100 s. feet~~ 1000 c. feet	4-0-0
Broken stone	100 „	8-0-0
Bridgework.		
Excavation dry	1,000 c. feet	10-0-0
„ wet	1,000 „	35-0-0
Concrete	100 „	20-0-0
Masonry in foundation	100 „	35-0-0
„ Superstructure	100 „	45-0-0
„ Slabs	100 „	80-0-0
„ Coping	100 „	80-0-0
„ Ashlar	100 „	100-0-0
„ Bridge flooring	100 „	25-0-0
Dry stone work	100 „	20-0-0
Pitching	100 „	12-0-0
Petty iron work	cwt.	15-0-0
Wood work	~~c. feet~~ C foot	5-0-0
Erection of girders.		
6 feet to 20 feet	ton	30-0-0
40 feet	„	45-0-0
Work in buildings.		
Excavation &c.	1,000 c. feet	8-0-0
Concrete	100 „	20-0-0
Brick-work	100 „	37-0-0
Masonry	100 „	40-0-0
Concrete flooring	100 s. feet	25-0-0
Lime plaster	100 „	~~2-8-0~~ 3-0-0
Roofing, Mangalore tiles	100 „	20-0-0
„ Galvanised iron complete	100 „	25-0-0
Wood work	~~c. feet~~ C foot	5-0-0
Doors and windows 1st class	s. feet	~~1-12-0~~ 2-0-0
„ „ „ 2nd class	„	~~1-0-0~~ 1-8-0
Sundry.		
Metalling	100 s. feet	25-0-0
Platform Fence	~~l. foot~~ L. foot	2-4-0

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

Form E. I. GENERAL ABSTRACT.

HEADS OF ACCOUNT.	Total cost in Rupees.			
	Sub-Heads.		Main Heads.	
	Total cost.	Rate per mile.	Total cost.	Rate per mile.
I. Preliminary Expenses.	...	...	1,06,995	1,172
(*a*) Survey Expenses	15,689	172		
(*b*) Plant	8,527	94	...	...
(*c*) Establishment	82,779	906	...	...
II. Land.	5,84,178	6,399	...	...
			5,84,178	6,399
III. Formation.	...	...	5,86,731	6,424
(*a*) Earthwork	5,86,731	6,424		
(*b*) Tunnels	...	...	...	...
IV. Bridgework.	...	...	...	...
(*a*) Major Bridges	48,512	531	4,75,754	5,209
(*b*) Minor Bridges	4,27,242	4,678	...	...
V. Fencing.	...	...	1,08,623	1,189
(*a*) Fencing	31,752	348		
(*b*) Road Crossings	70,679	773	...	...
(*c*) Mile and Gradient Posts	6,192	68	...	...
VI. Electric Telegraph.	3,417	37	3,417	37
VII. Ballast and Permanent Way.	...	...	27,41,336	30,016
(*a*) Ballast	4,46,941	4,894		
(*b*) Permanent Way	22,94,395	25,122	...	...
VIII. Stations and Buildings.	...	...	...	...
(*a*) Stations and Offices ...	...	...	5,48,501	6,005
orkshops, Store buildings &c.	1,48,402	1,624		
taff Quarters	...	...	...	...
ation Machinery	1,66,820	1,827	...	...
IX.	2,33,279	2,554	...	...
	...	...	61,416	672
(*a*) gineering ...				
(*b*) nstruction	8,400	92	...	...
(*c*) otive	30,000	328	...	...
(*d*) ge and Wagon	4,500	49	...	...
(*e*) and Office furniture	3,000	33	...	...
(*f*) s and Boats	15,516	170	...	...
X. Fe	...	...	...	...
	...	...	...	...
(*a*)	...	...	...	...
(*b*) idges	...	...	...	...
Carried forward...	...	...	52,16,951	57,123

HEADS OF ACCOUNT.	Total cost in Rupees.			
	Sub-Heads.		Main Heads.	
	Total cost.	Rate per mile.	Total cost.	Rate mile
Brought forward ...	...	...	45,80,415	50,7
XI. Rolling-stock.	...	...	12,80,410	14,0
(*a*) Locomotive	3,00,060	3,285	...	...
(*b*) Carriage and wagon...	9,80,350	10,734	...	...
XII. General Charges.	...	...	7,02,154	7,6
(*a*) Direction	1,36,091	1,490	...	...
(*b*) Engineering	4,42,759	4,848	...	...
(*c*) Stores	52,704	577	...	...
(*d*) Audit and Accounts	48,451	530	...	...
(*e*) Medical and Sanitation	22,149	243	...	...
(*f*) Locomotive	...	...	...	...
(*g*) Traffic	...	...	...	...
Total Expenditure ...			65,62,979	...
Do. Rate per mile ...			...	71,5

			78,500	30,21,502
T	,460	41,774	71,99,5	
Net Increase...				30,22,055

37,056

HEADS OF ACCOUNT.	TOTAL COST IN RUPEES.			
	Sub-Heads.		Main Heads.	
	Total cost.	Rate per mile.	Total cost.	Rate per mile.
Brought forward...	...	...	52,16,951	57,125
XI. Rolling-stock.	...	...	12,80,410	14,019
(a) Locomotive ...	3,00,060	3,285	...	...
(b) Carriage and wagon ...	9,80,350	10,734	...	...
XII. General Charges.	...	...	7,02,154	7,688
(a) Direction ...	1,36,091	1,490	...	...
(b) Engineering ...	4,42,759	4,848	...	...
(c) Stores ...	52,704	577	...	...
(d) Audit and Accounts ...	48,451	530	...	...
(e) Medical and Sanitation ...	22,149	243	...	...
(f) Locomotive ...	...	...	...	...
(g) Traffic ...	...	...	...	...
Total Expenditure ...			71,99,515	...
Do. Rate per mile ...			...	78,830

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

COMPARATIVE GENERAL ABSTRACT.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

Main heads of Account.	Mr. Shadbolt's Original Estimate 100·18 miles.		Present Revised Estimate 91·33 miles.		More in Revised Estimate.		Less in Revised Estimate.		
	Total cost.	Per mile.	Total cost.	Per mile.	Total cost.	Per mile.	Total cost.	Per mile.	
1. Preliminary Expenses ...	44,000	440	1,06,995	1,172	62,995	732	...	...	
2. Land ...	1,04,530	1,045	5,84,178	6,399	4,79,648	5,354	...	...	
3. Formation ...	3,32,382	3,324	5,86,731	6,424	2,54,349	3,100	...	...	
4. Bridgework ...	4,81,201	4,812	4,75,754	5,209	...	397	5,447	...	
5. Fencing etc. ...	89,865	898	1,08,623	1,189	18,758	291	...	...	
6 Electric Telegraph ...	...	...	3,417	37	3,417	37	...	...	
7. Ballast and Permanent Way.	23,30,373	23,304	27,41,336	30,016	4,10,963	6,712	...	...	
8. Stations and Buildings ...	3,62,109	3,621	5,48,501	6,005	1,86,392	2,384	...	...	
9. Plant ...	33,000	330	61,416	672	28,416	342	...	...	
10. Ferries etc. ...	...	...	...	...	...	...	...	...	
11. Rolling Stock ...	...	...	12,80,410	14,019	12,80,410	14,019	...	...	
12. General Charges ...	4,00,000	4,000	7,02,154	7,688	3,02,154	3,688	...	...	
Total ...	41,77,460	41,774	71,99,515	78,830	30,27,502	37,056	5,447	...	
				Net Increase...	30,22,055	37,056			

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

LIST OF ARTICLES REQUIRED FROM ENGLAND.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

Description.	Quantity.	English Cost.			Rate of Exchange.	English cost in Rupees.	Indian Charges.	Total.	Date by which delivery is required.
		F. O. B.	⅛ths. Freight.	Total.					
		£.	£.	£.		Rs.	Rs.	Rs.	
1. Girders for Major Bridges ...	69·22 Tons.	719	138	857	at Rs. 15·05 per £.	12,895	949	13,844	
2. Do. Minor Bridges ...	152·10 „	1,768	213	1,981		29,813	2,129	31,942	
3. Fencing ...	16·02 Miles.	1,409	176	1,585		23,854	1,746	25,600	
4. Permanent Way ...	99·49 „	98,495	28,852	1,27,347		19,16,572	1,93,210	21,09,782	
5. Station Machinery ...	as per R. VI.	3,839	237	4,076		61,341	790	62,131	
6. Plant and Workshop Machinery ...	...	...	...	...		...	...	...	
7. Locomotives ...	10 No.	18,489	820	19,309		2,90,610	5,205	2,95,815	
8. Coaching Stock ...	48 „	26,539	584	27,123		4,08,200	1,146	4,09,346	
9. Goods Stock ...	175 „	31,426	1,344	32,770		4,93,190	2,336	4,95,526	
Total ...		1,82,684	32,364	2,15,048		32,36,475	2,07,511	34,43,986	

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

ABSTRACT ESTIMATE.

I. PRELIMINARY EXPENSES.

	Survey of 1886.	Survey of 1895.	Survey of 1899.	Totals.
	Rs.	Rs.	Rs.	Rs.
(*a*) Survey Expenses ...	3,470	7,409	4,810	15,689
(*b*) Plant ...	1,669	2,409	4,449	8,527
(*c*) Establishment ...	22,336	33,843	26,600	82,779
Total Rs. ...	27,475	43,661	35,859	1,06,995

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

II. LAND.

Description.	Quantity.	Rate.	Per.	Amount.
	Acres.	Rs.	Acra.	Rs.
Waste	295	50	„	14,750
Dry cultivation	815	150	„	1,22,250
Irrigation cultivation	104	300	„	31,200
Irrigation and garden	195	400	„	78,000
„ „ „	76	450	„	34,200
„ „ „	222	500	„	1,11,000
Garden	5	900	„	4,500
Dry cultivation	5	1,500	„	7,500
Plantation	4	1,500	„	6,000
Total for 91 miles ...	1,721	238		4,09,400
Compensation for Buildings	...	...	...	15,000
			Total.	4,24,400
Additional land for Madura Junction ...	9·68	4,000	Acre.	38,720
Extra for Compulsory Acquisition	...	15	Cent.	63,660
Compensation for trees ... Miles...	91	100	Mile.	9,100
Clearing Shrubs prickly pear &c., at Madura Junction	...	...	...	300
Salaries of Revenue Staff for one year.				
Deputy Collectors ... ... No...	2	450	Month.	10,800
Revenue Inspectors ... ... „ ...	4	50	„	2,400
Clerks ... ... „ ...	8	25	„	2,400
Peons and Chainmen ... ... „ ...	20	7	„	1,680
Travelling allowances of above ... Months...	12	200	„	2,400
Furniture and Stationery for do.	...	...	...	500
			Total ...	5,56,360
Contingencies ...	...	5	Cent.	27,818
			Grand Total Rs. ...	5,84,178

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

III. FORMATION. a. Earthwork.

Description.		Quantity.	Rate.	Per.	Amount.
			Rs.		Rs.
Banks.					
Main line	c. ft.	4,68,00,000	6	1,000 c. ft.	2,80,800
Station sidings	„	20,30,000	6	„	12,180
Station sidings at Madura Junction ...		2,01,000	11	„	2,211
Cutting.					
Main line	„	1,50,000	10	„	1,500
Channel Diversions (*10 Miles.*)					
Earthwork	c. ft.	14,00,000	5	„	7,000
New sluices for Tanks	No.	3	200	Each.	600
Road Diversions (*5 Miles.*)					
Earthwork	c. ft.	20,00,000	5	1,000 c. ft.	10,000
Metalling	sq. ft.	60,000	25	100 sq. ft.	15,000
New 12 ft. arch road bridges	No.	3	2,000	Each.	6,000
Boulder Pitching.					
In Tanks	sq. ft.	11,00,000	6	100 sq. ft.	66,000
Clearing Line	Miles.	90	50	Mile.	4,500
Service road	„	50	80	„	4,000
Ballasting line with Sand and laterite for 2 years including charges for leading same	c. ft.	50,00,000	25	1,000 c. ft.	1,25,000
Do. do. East of Ramnad	„	24,00,000	10	„	24,000
				Total ...	5,58,791
Contingencies ...	...		5	cent.	27,940
			Grand Total Rupees ...		5,86,731

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

IV. BRIDGEWORK.

a. Major Bridges.

No.	Mileage.	Opening.			Amount.			Remarks.
		No.	Length	Kind.	Indian.	English.	Total.	
			Feet.		Rs.			
1	62·53	3	20	Girders.	8,225	1,188	9,413	Ramnad Tank Spill.
2	62·94	5	40	,,	24,388	6,622	31,010	Ramnad Tank Escape.
3	84·79	3	20	,,	6,901	1,188	8,089	Tirupulani Channel.
	Total ...	39,514			8,998	48,512		

IV. BRIDGEWORK.

b. Minor Bridges.

Particulars.	Amount.		
	Indian.	English.	Total.
	Rs.	Rs.	Rs.
Cost of 329 Minor Bridges as shewn in Detailed Estimate.	4,06,708	20,534	4,27,242

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

V. FENCING ETC.

a. Fencing.

Description.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Wire Fencing				
At 1 Flag station ... Miles...	·49			
,, 4 Second class stations ... ,, ...	4·47			
,, 6 Third class stations ... ,, ...	5·57			
,, Tiruppachettu Junction... ,, ...	1·26			
,, Mandapam ... ,, ...	1·55			
,, Sundry places ... ,, ...	2·66			
Total ...	16·00	1,600–0–0	Mile.	25,600
Boundary stones ... No....	2,000	0–8–0	Each.	1,000
Steel pale fence for Compound wall and boundary stones for Madura Junction ...	...	...	...	3,640
			Total Rs...	30,240
Contingencies ...	...	5–0–0	Cent.	1,512
		Grand Total Rs. ...		31,752
English Charges Rs. 16,829				
Indian Charges ,, 14,923				

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)

(Miles 91·33.)

ABSTRACT ESTIMATE.

V. FENCING ETC.

b. Road Crossings.

Description.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Level Crossings 2nd class	17	1,044	Each.	17,748
Do. do. 3rd class	94	332	„	31,208
Footpath crossings	7	26	„	182
Diversion of Public Road at Madura Junction	...	...	...	21,541
English Charges Nil.		Grand Total Rs. ...		70,679

V. FENCING ETC.

c. Mile and Gradient Posts.

Description.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Mile posts ... ... No....	91	7—0—0	Each.	637
Gradient Posts ... ... „ ...	164	15—0—0	„	2,460
Numbering Telegraph Posts ... „ ...	2,000	0—8—0	„	1,000
Tangent Pillars	72	25—0—0	„	1,800
			Total Rs. ...	5,897
Contingencies ...	...	5—0—0	Cent.	295
English Charges Nil.		Grand Total Rs. ...		6,192

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)

(Miles 91·33.)

ABSTRACT ESTIMATE.

VI ELECTRIC TELEGRAPH.

Quantity.		Particulars.	Rate. Rs.	Per.	Amount. Rs.	Total. Rs.
1·25	Miles.	Station connection Wires ...	575	Mile.	644	
29	No.	Instruments and Batteries ...	90	Each.	2,610	
					3,254	
		Contingencies at ...	5	Cent.	163	
						3,417

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

ABSTRACT ESTIMATE.

VII. BALLAST AND PERMANENT WAY. — **a. Ballast.**

Description.		Quantity.	Rate.	Per.	Amount.
			Rs.		Rs.
Main Line	Miles.	91·33			
Sidings in—					
Silaiyuman	,,	·44			
Tirupuvanum	,,	·44			
Tiruppachettu	,,	1·36			
Mana Madura	,,	·44			
Parttibanur Road	,,	·44			
Paramakudi	,,	·44			
Manjur	,,	·44			
Sattirakkudi	,,	·44			
Ramnad	,,	·99			
Valantaravai	,,	·44			
Uchipalli	,,	·44			
Mandapam	,,	1·85			
Total miles		99·49	4,224	Mile.	4,20,246
Stone Ballast in sidings Madura Junction	c. ft.	1,76,000	40	1,000 c. ft.	7,040
				Total Rs. ...	4,27,286
Less Credit for Ballast removed at Madura Junction.		...	...	...	1,628
				Total Rs. ...	4,25,658
Contingencies ...		...	5	Cent.	21,283
				Grand Total Rs. ...	4,46,941

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

ABSTRACT ESTIMATE.

VII. BALLAST AND PERMANENT WAY. — **b. Permanent Way.**

Description.		Quantity.	Rate.	Per.	Amount.
English Charges.			Rs.		Rs.
Main Line	Miles.	91·33			
Sidings in—					
Tiruppachettu	,,	1·36			
Ramnad	,,	0·99			
Mandapam	,,	1·85			
Nine other stations	,,	3·96			
	Total ...	99·49	19,246	Mile.	19,14,785
Indian Charges	Miles ..	99·49	3,482	,,	3,46,424
Permanent Way in sidings Madura Junction ...		1·70	...	,,	33,186
Total English and Indian Charges ...			22,674	...	22,94,395

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)

(*Miles 91·33.*)

VIII. STATIONS AND BUILDINGS.

a. Stations and Offices.

Name of Stations.	Station Buildings.	Passenger Platforms.	Goods Platforms.	Native Latrines.	European Latrines.	Wells 6' Diam.	Goods Sheds.	Name Boards.	Lamp Posts.	Gates.	Points Shelters.	Platform Fencing.	Over Bridge.	Approach Road.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Madura Junction ...	10,706	3,147	...	2,511	390	...	...	304	447	53	...	3,053	7,071	654	28,336
Madura East ...	2,015	1,787	...	836	...	500	300	50	150	125	80	...	...	...	5,843
Silaiyuman ...	2,015	1,787	719	836	...	500	300	50	150	125	80	1,350	...	...	7,912
Tirupuvanum ...	2,015	1,787	719	836	...	500	300	50	150	125	80	1,350	...	...	7,912
Tiruppachettu Junction ..	3,150	4,428	3,700	836	567	...	300	50	150	375	240	2,025	...	...	15,821
Mana Madura ...	2,015	1,787	719	836	...	500	300	50	150	125	80	1,350	...	...	7,912
Parttibanur Road ...	2,015	1,787	719	836	...	...	300	50	150	125	80	1,350	...	...	7,412
Paramakudi ...	2,015	1,787	719	836	...	500	300	50	150	125	80	1,350	...	...	7,912
Manjur ...	2,015	1,787	719	836	...	...	300	50	150	125	80	1,350	...	...	7,412
Sattirakkudi ...	2,015	1,787	719	836	...	500	300	50	150	125	80	1,350	...	...	7,912
Ramnad ...	3,150	1,787	3,473	836	...	500	2,500	50	150	125	80	1,350	...	...	14,001
Valantaravai ...	2,015	1,787	719	836	...	...	300	50	150	125	80	1,350	...	...	7,412
Uchipalli ...	2,015	1,787	719	836	...	500	300	50	150	125	80	1,350	...	...	7,912
Mandapam ...	4,410	1,787	3,473	836	567	...	1,250	50	150	500	320	1,350	...	...	14,693
Total ...	41,566	29,019	17,117	13,379	1,524	4,000	7,050	954	2,397	2,303	1,440	19,928	7,071	654	1,48,402

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)

(*Miles 91·33.*)

VIII. STATIONS AND BUILDINGS.

c. Staff Quarters.

Name of Stations.	Station Masters.	Assistant Station Masters.	P. W. Inspector.	Loco. Foreman.	Loco. Store Clerks.	Carriage and Wagon Examiner.	Drivers Double Unit.	Running Room Drivers and Guards.	Eurasian Firemen 8 Units.	Eurasian and Native Firemen 4 Units.	Menials 4 Units.	Native Firemen 2 Units.	Cleaners 4 Units.	Native Firemen 6 Units.	Sweepers 1 Unit.	Fencing to Staff Quarters Madura Junction.	Watering arrangements to Staff Quarters.	Approaches to Staff Quarters.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Madura Junction ...	...	...	...	...	...	...	17,442	...	27,630	6,996	...	...	...	...	...	2,062	682	316	55,128
Madura East ...	1,159	...	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	3,110
Silaiyuman ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Tirupuvanum ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Tiruppachettu Junction ...	1,159	1,059	4,342	...	1,059	...	...	8,276	...	...	1,467	3,198	1,467	1,067	484	...	...	...	23,578
Mana Madura ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Parttibanur Road ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Paramakudi ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Manjur ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Sattirakkudi ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Ramnad ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Valantaravai ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Uchipalli ...	1,159	1,059	...	...	...	...	...	...	...	...	1,467	...	...	...	484	...	...	...	4,169
Mandapam ...	1,159	1,059	...	4,342	1,059	5,039	15,030	8,276	...	...	1,467	...	2,200	3,199	484	...	...	...	43,314
Total ...	15,067	12,708	4,342	4,342	2,118	5,039	32,472	16,552	27,630	6,996	19,071	3,198	3,667	4,266	6,292	2,062	682	316	1,66,820

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

VIII. STATIONS AND BUILDINGS.

d. Station Machinery.

Name of Stations.	Ashpits.	Water Columns.	Piping.	Tanks.	Wells.	Hand Pumps.	Points and Crossings.	Signals.	Engine Sheds.	Buffer Stops and Scotch Blocks.	Turntables.	Engine Lifts.	Weighing Machines.	Fuel Stages.	Carriage Repairing Shed.	Approach to Weigh Bridge.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Madura Junction ...	2,258	...	...	3,577	...	...	15,657	6,101	...	788	...	...	...	...	14,283	224	42,888
Madura East ...	...	...	...	...	500	...	...	3,500	...	...	...	...	...	...	...	...	4,000
Silaiyuman ...	...	...	...	...	500	...	1,524	3,500	...	75	...	...	250	...	...	...	5,849
Tirupuvanum ...	...	...	...	...	500	...	1,524	3,500	...	75	...	...	250	...	...	...	5,849
Tiruppachettu Junction ...	2,541	2,397	4,200	7,480	2,000	850	4,872	5,250	4,325	525	4,627	500	500	540	...	...	40,607
Mana Madura ...	...	...	...	...	500	...	1,524	3,500	...	75	...	...	250	...	...	...	5,849
Parttibanur Road ...	1,694	1,598	1,970	3,378	1,500	850	1,524	3,500	...	75	...	...	250	...	...	...	16,339
Paramakudi ...	...	...	...	...	500	...	1,524	3,500	...	75	...	...	250	...	...	...	5,849
Manjur ...	1,694	1,598	1,970	3,378	1,500	850	1,524	3,500	...	75	...	...	250	...	...	...	16,339
Sattirakkudi ...	...	...	...	...	500	...	1,524	3,500	...	75	...	...	250	...	...	...	5,849
Ramnad ...	...	...	...	...	500	...	3,384	3,500	...	375	...	...	250	...	...	...	8,009
Valantaravai ...	1,694	1,598	1,970	3,378	1,500	850	1,524	3,500	...	75	...	...	250	...	...	...	16,339
Uchipalli ...	...	...	...	...	500	...	1,524	3,500	...	75	...	...	250	...	...	...	5,849
Mandapam ...	3,388	2,397	6,370	9,253	2,500	850	7,104	3,500	11,760	375	4,627	500	500	540	...	...	53,664
Total...	13,269	9,588	16,480	30,444	13,000	4,250	44,733	53,351	16,085	2,738	9,254	1,000	3,500	1,080	14,283	224	2,33,279

English Charges ...	71,224
Indian do. ...	1,62,055

PAMBAN BRANCH.

ENGLISH CHARGES.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

VIII. STATIONS AND BUILDINGS.

d. Station Machinery.

Name of Stations.	Ashpits.	Water Columns.	Piping.	Tanks.	Wells.	Hand Pumps.	Points and Crossings.	Signals.	Engine Sheds.	Buffer stops and Scotch Blocks.	Turntables.	Engine Lifts.	Weighing Machines.	Fuel Stages.	Carriage Shed.	Total.
		Rs.			Rs.	Rs	Rs.	Rs.	Rs.		Rs.		Rs.			Rs.
Madura Junction	...	...			...	...	9,135	5,092	...	...	...	...	...	...	11,193	25,420
Madura East	...	...			...	...	...	1,610	...	...	...	...	...	...	...	1,610
Silaiyuman	...	...			...	...	516	1,610	...	...	...	...	250	...	...	2,376
Tirupuvanum	...	...			...	...	516	1,610	...	...	...	...	250	...	...	2,376
Tiruppachettu Junction	...	767			697	1,623	2,415	...	...	2,128	...	500	...	...	...	8,130
Mana Madura	...	...			...	...	516	1,610	...	...	...	...	250	...	...	2,376
Parttibanur Road	...	511			697	...	516	1,610	...	...	...	...	250	...	...	3,584
Paramakudi	...	...			...	...	516	1,610	...	...	...	...	250	...	...	2,376
Manjur	...	512			697	...	516	1,610	...	...	...	...	250	...	...	3,585
Sattirakkudi	...	...			...	...	1,131	1,610	...	...	...	...	250	...	...	2,376
Ramnad	...	...			697	...	516	1,610	...	...	...	...	250	...	...	2,991
Valantaravai	...	511			...	...	516	1,610	...	...	...	...	250	...	...	3,584
Uchipalli	...	...			...	...	516	1,610	...	...	...	...	250	...	...	2,376
Mandapam	...	767			...	697	2,361	1,610	...	...	2,129	...	500	...	...	8,064
Total	...	3,068	...	...	...	3,485	18,894	26,827	...	...	4,257	...	3,500	...	11,193	71,224

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

IX. PLANT. a. Engineering.

Items.	Particulars.	Quantity.	Rate.	Per.	Amount.
			Rs.		Rs.
1	Gangmen's tools, for 30 Sections of 3 miles each	30	225	Section.	7,650
	(As per detailed abstract.)				
2	Trollies, per P. W. Inspector ...	2	175	Each.	350
				Total Rs. ...	8,000
	Contingencies at 5 per cent		...	...	400
				Grand Total Rs. ...	8,400

			Rs.
Materials from England	...	...	7,980
Do. do. India	...	...	420
	Total Rs.	...	8,400

IX. PLANT. b. Construction.

Particulars.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Construction Plant	...	Lump Sum.	...	30,000

			Rs.
Materials from England	...	...	10,000
Do. do. India	...	...	20,000
	Total Rs.	...	30,000

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

IX. PLANT. c. Locomotive.

Particulars.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Locomotive Plant	...	Lump Sum.	...	4,500

			Rs.
Materials from England	...	...	4,500
Do. do. India	...	...	Nil.
	Total Rs.	...	4,500

IX. PLANT. d. Carriage and Wagon.

Particulars.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Carriage and Wagon Plant	...	Lump Sum.	...	3,000

			Rs.
Materials from England	...	...	3,000
Do. do. India	...	...	Nil.
	Total Rs.	...	3,000

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

ABSTRACT ESTIMATE.

IX. PLANT.

e. Station and Office Furniture.

Items.	Particulars.	Quantity.	Rate.	Per.	Amount.
			Rs.		Rs.
1	3rd Class Stations, as per detailed Estimate	9	977	Each.	8,793
2	Flag Station	1	500	,,	500
3	Tiruppachettu Station	1	1,828	,,	1,828
4	Ramnad do.	1	1,828	,,	1,828
5	Mandapam do.	1	1,828	,,	1,828
				Total Rs. ...	14,777
	Contingencies at 5 per cent ...	...	...	...	739
				Grand Total Rs. ...	15,516

		Rs.
Materials from England say	...	... 9,500
Do. do. India „	...	... 6,016
	Total Rs.	... 15,516

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

ABSTRACT ESTIMATE.

XI. ROLLING STOCK.

a. Locomotive.

	Particulars.	Quantity.	Rate.	Per.	Amount.
			Rs.		Rs.
1	Passenger Engines "O." Class ...	4	29,850	Each.	1,19,400
2	Goods and Mixed do. "F" „ ...	6	28,535	...	1,71,210
	Totals ...	10	...	Rs.	2,90,610
3	Landing Charges ...	...	...	...	5,000
4	Erecting do. ...	...	...	...	4,000
					2,99,610
5	Contingencies on Rs. 9,000 @ 5% Indian Charges	...	...	...	450
				Total Rs.	3,00,060

		Rs.
Materials from England	... ...	2,90,610
Expenditure in India	... ...	9,450
	Total Rs.	3,00,060

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

XI. ROLLING STOCK.

b. Carriage and Wagon.

	Particulars.	Quantity.	Rate.	Per.	Amount.
					Rs.
1	Coaching Stock—				
	1st and 2nd Class Bogie Composites ...	8		Each.	83,600
	3rd Class Bogie Carriages ...	24		,,	1,92,960
	Female do. do. ...	4		,,	32,400
	Bogie Postal Composite Vans ...	4		,,	33,880
	Do. Composite Passenger do. ...	8		,,	65,360
	Total ...	48			4,08,200
2	Goods Stock—				
	Iron covered goods Bogie Wagons ...	75		,,	2,43,750
	High sided Bogie Wagons, iron ...	50		,,	1,52,500
	Bogie Timber trucks ...	4		,,	15,280
	Iron Ballast Wagons ...	35		,,	46,900
	Goods Brake Vans ...	10		,,	28,650
	Special Bogie Wagons for conveyance of loads of 25 tons ...	1		,,	6,110
	Total ...	175			4,93,190
3	Landing Charges ...	...		Total Rs....	9,01,390
4	Erecting do. ...	...		...	3,000
5	Contingencies at 5 per cent on Rs. 75,200 Indian Charges ...	...		...	72,200
				...	3,760
				Total Rs....	9,80,350

	Rs.
Materials from England... ...	9,01,390
Expenditure in India	78,960
Total Rs.	9,80,350

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

ABSTRACT ESTIMATE.

XII. GENERAL CHARGES.

	Salaries and Allowances.	Quarters.	Office Accommodation.	Electric Telegraph, Rent and Maintenance.	Totals.
	Rs.	Rs.	Rs.	Rs.	Rs.
a. Direction ...	96,544	...	8,647	...	1,36,091
b. Engineering ...	3,71,926	30,415	7,853	1,397	4,42,759
c. Stores ...	45,197	2,127	1,717	...	52,704
d. Audit and Accounts ...	43,086	...	1,773	...	48,451
e. Medical and Sanitation ...	15,885	1,378	2,058	...	22,149
f. Locomotive ...	...	...	...	...	...
g. Traffic ...	...	...	...	...	...
Total ...	5,72,638	33,920	22,048	1,397	7,02,154

	Provident Fund Bonus.	Government audit and control.	Office Expenses.	Instruments.
	Rs.	Rs.	Rs.	Rs.
a. Direction ...	267	25,826	4,257	550
b. Engineering ...	3,161	...	17,988	10,019
c. Stores ...	...	...	3,663	...
d. Audit and Accounts ...	399	...	3,193	...
e. Medical and Sanitation ...	...	...	632	2,196
f. Locomotive ...	...	...	...	...
g. Traffic ...	...	...	...	...
Total ...	3,827	25,826	29,733	12,765

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

Major Bridge No. 1. Mile 62·53.

3 spans of 20 ft. girders.

Height of Bank = 11 ft. Depth of foundations = 8 ft.

IV. BRIDGEWORK. **1. Major Bridges.**

Item.	Quantity.	Rate.	Per.	Amount.	Total.
Indian Charges.		Rs.		Rs.	
Excavation dry ...	4,872	10	1,000 c. ft.	49	
Do. wet ...	4,872	35	„	171	
Concrete ...	2,437	20	100 c. ft.	487	
Masonry in foundations ...	7,629	35	„	2,670	
Do. in superstructure ...	3,849	45	„	1,732	
Coping ...	157	80	„	126	
Flooring ...	2,827	25	„	707	
Girders (Exchange and Port dues etc.) ...	9·14	70	Ton.	640	
Do. Carriage and Erection...	9·14	30	„	274	
Petty iron work ...	3·56	15	Cwt.	53	
Timber ...	131	4	C. ft.	524	
Pitching ...	5,000	8	100 c. ft.	400	
				7,833	
Contingencies ...	...	5	Cent.	392	
Total Indian Charges ...					8,225
English Charges.	Tons.				
Girders (f. o. b. + ⅛ freight) ...	9·14	130	Ton.	...	1,188
				Grand Total Rs. ...	9,413

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

Major Bridge No. 2. Mile 62·94.

5 spans of 40 ft. girders.

Height of Bank=14 ft. Depth of foundations = 8 ft.

IV. BRIDGEWORK. **1. Major Bridges.**

Item.	Quantity.	Rate.	Per.	Amount.	Total.
Indian Charges.		Rs.		Rs.	
Excavation dry ...	8,945	10	1,000 c. ft.	89	
Do. wet ...	8,945	35	„	313	
Concrete ...	4,472	20	100 c. ft.	894	
Masonry in foundations ...	24,119	35	„	8,442	
Do. in superstructure ...	8,105	45	„	3,647	
Coping ...	246	80	„	197	
Flooring ...	11,218	25	„	2,805	
Girders (Exchange and Port dues etc.) ...	50·94	70	Ton.	3,566	
Do. Carriage and Erection...	50·94	30	„	1,528	
Petty Iron work ...	8·16	15	Cwt.	122	
Timber ...	304	4	C. ft.	1,216	
Pitching ...	5,104	8	100 c. ft.	408	
				23,227	
Contingencies ...	...	5	Cent.	1,161	
Total Indian Charges ...					24,388
English Charges.	Tons.				
Girders (f. o. b. + ⅛ freight) ...	50·94	130	Ton.	...	6,622
				Grand Total Rs. ...	31,010

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

Major Bridge No. 3. Mile 84·79.

3 spans of 20 ft. girders.

Height of Bank = 9 ft. Depth of foundation = 8 ft.

IV. BRIDGEWORK.

1. Major Bridges.

Item.	Quantity.	Rate.	Per.	Amount.	Total.
Indian Charges.		Rs.		Rs.	
Excavation dry ...	4,239	10	1,000 c. ft.	43	
Do. wet ...	4,239	35	,,	148	
Concrete ...	2,119	20	100 c. ft.	424	
Masonry in foundations ...	6,815	35	,,	2,385	
Do. in superstructure ...	2,762	45	,,	1,243	
Coping ...	141	80	,,	113	
Flooring ...	2,194	25	,,	549	
Girders (Exchange and Port dues etc.) ...	9·14	70	Ton.	640	
Do. Carriage and Erection...	9·14	30	,,	274	
Petty Iron work ...	3·56	15	Cwt.	53	
Timber ...	131	4	C. ft.	524	
Pitching ...	2,200	8	100 c. ft.	176	
				6,572	
Contingencies ...	...	5	Cent.	329	
Total Indian Charges ...					6,901
English Charges.					
Girders (f. o. b. + ⅘ freight) ...	Tons. 9·14	130	Ton.	...	1,188
			Grand Total Rs. ...		8,089

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

IV. BRIDGEWORK.

Details of English and Indian Charges for Bridge Girders.

Particulars.	Weight.	Rate f. o. b. in England per ton.	English Cost at Par.			Indian Cost.					Total English and Indian.
			F. o. b. Cost.	⅘ Freight at 34sh. per ton.	Total.	Exchange at Rs. 15 per £.	⅕ freight at 15d. per rupee.	Insurance on foregoing	Port dues at Rs. 7 per ton.	Total.	
	Tons.	£. s. d.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Minor Bridge Girders ...	152·10	12 0 0	120	14	135	60	6	1	7	75	208
Major do. do. 20 ft.	18·28	11 10 0	115	14	130	57	6	1	7	70	200
Do. do. do. 40 ft.	50·94	11 2 6	111	@ 40 sh. 16	127	56	7	1	7	71	198

	Tons.	Cwt.	Qrs.	lbs.	Tons.
Weight of one span of 40 feet girders =	10	3	3	0	= 10·187.
,, ,, ,, 20 ,, ,, =	3	0	3	21	= 3·047.
,, ,, ,, 12 ,, ,, =	1	2	3	21	= 1·147.
,, ,, ,, 6 ft. Trough Plate	1	7	0	0	= 1·350.

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

MINOR BRIDGES.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

FORM E. II.

No.	Mileage.	Class.	Span.	No. of Spans.	Height of Bank.	Excavation.		Concrete.	Masonry.		Coping.	Flooring.	Timber.	Slabs.	Dry filling and backing.	Girder carriage and erection.	Petty Ironwork.	Girders.
						Wet.	Dry.		Foundation and drop walls.	Superstructure.								
			ft.		ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	sq. ft.	c. ft.	c. ft.	c. ft.	Tons.	Cwt.	Tons.
2	0·34	Girder.	12	1	8·1	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0·29	1·15
5	0·66	T. P.	6	1	8·2	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
6	0·69	„	6	1	6·7	836	836	836	896	1,301	91	222	20	—	1,424	1·35	0·29	1·35
10	1·33	Girder.	12	2	10·2	2,042	2,042	1,634	2,722	2,764	129	1,141	57	—	2,661	2·29	1·00	2·29
11	1·65	T. P.	6	1	5·7	737	737	737	790	1,041	83	168	20	—	1,088	1·35	0·29	1·35
12	1·80	„	6	1	9·1	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0·29	1·35
13	1·84	„	6	1	9·0	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1 35	0·29	1 35
21	3·45	Girder.	12	1	3·7	840	840	672	1,066	610	67	165	28	—	512	1·15	0·29	1.15
23	3 54	„	12	1	7·1	1,233	1,233	986	1,529	1,295	91	370	28	—	1,424	1 15	0·29	1·15
31	4·38	„	12	2	7·5	1,712	1,712	1,369	2,343	1,925	113	834	57	—	1,792	2·29	1 00	2·29
35	4·78	„	12	2	7·1	1,558	1,558	1,246	2,162	1,517	105	693	57	—	1,424	2·29	1 00	2·29
39	5·31	„	12	1	7·9	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0·29	1·15
40	5·44	„	12	2	7·9	1,712	1,712	1,369	2,343	1,925	113	834	57	—	1,792	2·29	1·00	2·29
48	6·93	„	12	1	5·1	964	964	771	1,211	806	75	225	28	—	784	1·15	0·29	1·15
52	7·37	„	12	1	4·5	840	840	672	1,066	610	67	165	28	—	512	1·15	0·29	1·15
53	7·49	T. P.	6	1	6·3	737	737	737	790	1,041	83	168	20	—	1,088	1·35	0·29	1·35
54	8·03	„	6	1	7·4	836	836	836	896	1,301	91	222	20	—	1,424	1·35	0·29	1·35
63	9·15	Girder.	20	1	5·4	1,355	1,355	903	2,000	788	75	353	43	—	784	3·05	0·64	3·05
68	9·68	T. P.	6	1	4·7	645	645	645	689	814	75	122	20	—	784	1·35	0·29	1·35
69	9·97	T. P.	6	1	5·7	737	737	737	790	1,041	83	168	20	—	1,088	1·35	0·29	1·35
73	10·84	„	6	1	7·7	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
83	12·38	Girder.	12	1	7·1	1,233	1,233	986	1,529	1,295	91	370	28	—	1,424	1·15	0·29	1·15
92	14·01	T. P.	6	4	4·6	1,240	1,240	1,239	1,583	1,372	117	431	83	—	784	5·40	2·42	5·40
94	14·34	Girder.	12	3	8·3	2,044	2,044	1,635	2,984	2,256	127	1,214	86	—	1,792	3·44	1·71	3·44
95	14·62	T. P.	6	1	8·7	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0 29	1·35
98	14·93	„	6	1	4·1	558	558	558	595	618	67	83	20	—	512	1·35	0 29	1·35
107	16·01	„	6	1	7·3	836	836	836	896	1,301	91	222	20	—	1,424	1.35	0·29	1·35
115	17·14	„	6	1	9·0	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0·29	1·35
116	17·19	Girder.	12	2	10·2	2,042	2,042	1,634	2,722	2,764	129	1,141	57	—	2,661	2·29	1·00	2·29
117	17·27	„	12	2	5·4	1,272	1,272	1,018	1,828	978	89	433	57	—	784	2·29	1·00	2·29
118	17·83	T. P.	6	1	9 0	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0·29	1·35
121	18·20	„	6	2	4·6	843	843	843	987	1,000	89	225	41	—	784	2·70	1·00	2·70
122	18·51	„	6	1	9·1	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0·29	1·35
126	19·44	„	6	2	2·3	750	750	750	888	755	81	155	41	—	512	2·70	1·00	2·70
129	20·48	„	6	1	7.2	836	836	836	896	1,301	91	222	20	—	1,424	1·35	0·29	1·35
130	20·79	„	6	1	4·2	558	558	558	595	618	67	83	20	—	512	1·35	0·29	1·35
136	21·62	„	6	3	7·4	1,256	1,256	1,256	1,514	1,881	119	562	62	—	1,424	4·05	1·71	4·05
137	21·96	Girder.	20	1	5·3	1,355	1,355	903	2,000	788	75	353	43	—	784	3·05	0·64	3·05
144	22·67	T. P.	6	1	3·8	558	558	558	595	618	67	83	20	—	512	1·35	0·29	1·35
148	23·01	Girder.	12	2	5·9	1,411	1,411	1,129	1,991	1,256	97	558	57	—	1,088	2·29	1·00	2·29
149	23·22	T. P.	6	1	5·7	737	737	737	790	1,041	83	168	20	—	1,088	1·35	0·29	1·35
172	26·92	„	6	1	6·1	737	737	737	790	1,041	83	168	20	—	1,088	1·35	0·29	1·35
173	27·30	Girder.	12	1	7·1	1,233	1,233	986	1,529	1,295	91	370	28	—	1,424	1·15	0·29	1·15
174	28·84	„	12	1	8·2	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0 29	1·15
178	29·79	T. P.	6	1	8·4	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
179	30·34	„	6	1	14·7	1,840	1,840	1,832	1,956	5,000	155	954	20	—	5,885	1·35	0·29	1·35
182	31·04	„	6	1	5·4	645	645	645	689	814	75	122	20	—	784	1·35	0·29	1·35
183	31·42	„	6	1	6·5	836	836	836	896	1,301	91	222	20	—	1,424	1·35	0·29	1·35
188	32·91	„	6	1	6·4	737	737	737	790	1,041	83	168	20	—	1,088	1·35	0 29	1·35
189	33·17	Girder.	20	1	8·8	2,111	2,111	1,407	2,939	1,916	107	794	43	—	2,201	3·05	0·64	3·05
190	33·78	T. P.	6	1	11·0	1,290	1,290	1,290	1,381	2,755	123	520	20	—	3,178	1·35	0·29	1·35
193	34·12	„	6	1	7·8	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
194	35·30	„	6	1	7·7	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
197	36·19	Girder.	12	1	10·1	1,693	1,693	1,355	2,074	2,317	115	647	28	—	2,661	1·15	0·29	1·15
198	36·22	„	12	1	10·2	1,693	1,693	1,355	2,074	2,317	115	647	28	—	2.661	1·15	0·29	1·15
199	37·43	T. P.	6	1	7·0	836	836	836	896	1,301	91	222	20	—	1,424	1·35	0·29	1·35
205	38·28	Girder.	12	1	8·0	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0·29	1·15
206	38·78	„	12	1	6·9	1,233	1,233	986	1,529	1,295	91	370	28	—	1,424	1·15	0·29	1·15

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

FORM E. II.

MINOR BRIDGES.—(*Continued.*)

No.	Mileage.	Class.	Span.	No. of spans.	Height of Bank.	Excavation.		Concrete.	Masonry.		Coping.	Flooring.	Timber.	Slabs.	Dry filing and backing.	Girder carriage and erection.	Petty Ironwork.	Girders.
						Wet.	Dry.		Foundation and drop walls.	Superstructure.								
			ft.		ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	c. ft.	sq. ft.	c. ft.	c. ft.	c. ft.	Tons.	cwt.	Tons.
207	38·88	Girder	20	1	10·4	2,322	2,322	1,548	3,204	2,299	115	925	43	—	2,661	3·05	0·64	3·05
208	38·96	,,	12	1	7·3	1,233	1,233	986	1,529	1,295	91	370	28	—	1,424	1·15	0·29	1·15
209	39·48	T. P.	6	1	5·3	645	645	645	689	814	75	122	20	—	784	1·35	0·29	1·35
210	40·14	,,	6	1	7·5	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0 29	1·35
214	41·40	,,	6	1	8·1	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
220	42·17	Girder	20	1	7·6	1,908	1,908	1,272	2,686	1,576	99	672	43	—	1,792	3·05	0·64	3·05
235	44·11	T. P.	6	3	5·9	1,145	1,145	1,145	1,396	1,515	111	446	62	—	1,088	4·05	1·71	4·05
237	45·32	,,	6	1	4·5	558	558	558	595	618	67	83	20	—	512	1·35	0·29	1·35
239	46·33	Girder	12	1	6·3	1,095	1,095	876	1,366	1,033	83	293	28	—	1,088	1·15	0·29	1·15
242	46·99	,,	12	1	5·5	964	964	771	1,211	806	75	225	28	—	784	1·15	0 29	1·15
244	48·14	,,	12	1	9·9	1,693	1,693	1,355	2,074	2,317	115	647	28	—	2,661	1·15	0·29	1·15
252	50·62	,,	12	1	10·3	1,693	1,693	1,355	2,074	2,317	115	647	28	—	2,661	1·15	0·29	1·15
254	52·29	T. P.	6	1	9 8	1,167	1,167	1,167	1,251	2,325	115	434	20	—	2,661	1·35	0·29	1 35
256	52·58	Girder	12	1	7·8	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0·29	1·15
257	53·37	,,	12	1	4 7	964	964	771	1,211	806	75	225	28	—	784	1·15	0·29	1·15
258	53·67	T. P.	6	1	7·7	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
262	55·46	Girder	12	1	5·9	1,095	1,095	876	1,366	1,033	83	293	28	—	1,088	1·15	0·29	1·15
273	57·75	T. P.	6	1	5·1	645	645	645	689	814	75	122	20	—	784	1·35	0·29	1·35
274	57·85	Girder	12	1	6·2	1,095	1,095	876	1,366	1,033	83	293	28	—	1,088	1·15	0·29	1·15
281	59·05	Girder.	12	3	5·9	1,728	1,728	1,382	2,616	1,479	111	823	86	—	1,088	3·44	1·71	3·44
288	60·81	T. P.	6	1	8·8	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0·29	1·35
293	61·24	,,	6	3	5·1	1,042	1,042	1,041	1,305	1,186	103	328	62	—	784	4·05	1·71	4·05
299	63·25	,,	6	1	9·4	1,051	1,051	1,051	1,126	1,942	107	355	20	—	2,201	1·35	0·29	1·35
300	63·97	,,	6	1	8·1	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
307	65·09	,,	6	1	8·4	940	940	940	1,008	1,602	99	285	20	—	1,792	1·35	0·29	1·35
313	66·78	,,	6	1	3 3	558	558	558	595	618	67	83	20	—	512	1·35	0·29	1·35
314	67·08	,,	6	1	3·6	558	558	558	595	618	67	83	20	—	512	1·35	0·29	1·35
319	70·04	,,	6	1	4·6	645	645	645	689	814	75	122	20	—	784	1·35	0·29	1·35
320	70·20	,,	6	2	4·5	843	843	843	987	1,000	89	225	41	—	784	2·70	1·00	2·70
323	70·97	Girder.	12	1	7·9	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0·29	1·15
326	78·67	T. P.	6	1	4·0	558	558	558	595	618	67	83	20	—	512	1·35	0·29	1·35
327	79·36	Girder.	12	1	8·4	1,379	1,379	1,103	1,702	1,594	99	454	28	—	1,792	1·15	0·29	1·15
1	Culvert	Flat top	2	1	5·0	437	437	583	—	1,021	53	—	—	42	—	—	—	—
135	Similar	,,	...	...	...	58,995	58,995	78,705	—	137,835	7,155	—	—	5,670	—	—	—	—
1	Culvert	,,	2	2	5·0	542	542	723	—	1,220	61	—	—	84	—	—	—	—
22	Similar	,,	...	...	...	11,924	11,924	15,906	—	26,840	1,342	—	—	1,848	—	—	—	—
1	Culvert	,,	3	1	5·0	485	485	643	—	1,069	55	—	—	78	—	—	—	—
60	Similar	,,	...	...	...	29,100	29,100	38,580	—	64,140	3,300	—	—	4,640	—	—	—	—
1	Culvert	,,	3	2	5·0	628	628	833	—	1,310	65	—	—	144	—	—	—	—
18	Similar	,,	...	...	...	11,304	11,304	14,994	—	23,580	1,170	—	—	2,592	—	—	—	—
		Total Quantities ...				214,227	214,227	239,555	122,320	387,731	21,737	33,769	2750	15,098	136,240	152·10	44·18	152·10
		Add for Extra work in foundations ...				61,160	61,160	—	122,320	—	—	—	—	—	—	—	—	—
		Grand Total Quantities ...				275,387	275,387	239,555	244,640	387,731	21,737	33,769	2750	15,098	136,240	152·10	44·18	152·10
		Rates. Rs.				25 per 1,000	10 per 1,000	20 per 100	35 per 100	45 per 100	80 per 100	25 per 100	4	80 per 100	15 per 1,000	30	15	English 135 / Indian. 75
		Amount Rs...				6,885	2,754	47,911	85,624	174,479	17,390	8,442	11000	12,080	2,044	4,563	663	20534 / 11408

Total amount Rs...	4,05,777
Extension of 3 feet Slab drain at Madura Junction...	794
Extension of 1 foot open drain at Madura Junction...	326
	4,06,897
Contingencies at 5 per cent...	20,345
Grand Total Rs...	4,27,242

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

Cost of materials for 1 mile of Fencing.

V. FENCING.

Particulars.	Quantities to be delivered per mile of Single Fence.	Charges incurred in England. Cost free on board at Port in England. Per ton of material.			Per mile of Single Fence.			Sea freight calculated at 30 sh. per ton, % of the total charges.			Insurance at ·33 per cent.			Total English Charges.			English charges converted into Indian currency at exchange 13 Pence to a Rupee.		
	Tons.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£.	s.	d.	Rs.	a.	p.
Cast Iron straining pillars ...	1·15	5	2	6	5	17	11	...	...	...	...	...	...	...	..	..	...	...	...
Galvanized Iron straining screws ...	·09	22	7	6	2	0	3	...	...	...	...	...	...	...	...	...	...	...	...
Cast Iron Bases ...	5·64	4	10	0	25	7	7	...	...	...	...	...	...	...	...	...	...	...	...
Wrought Iron Fencing Bars..	1·77	6	12	6	11	14	6	...	...	...	...	...	...	...	...	...	...	...	...
Do. do. Wedges...	·06	14	7	6	0	17	3	...	...	...	...	...	...	...	...	...	...	...	...
Wire 7 strand No. 13 B.W.G.	·78	14	10	0	11	6	2	...	...	...	...	...	...	...	...	...	...	...	...
Do. No. 15 do.	·74	15	0	0	11	2	0	...	...	...	...	...	...	...	...	...	...	...	...
Total ...	10·23	...	...	...	68	5	8	12	5	6	0	4	6	80	15	8	1491	0	0

Cost.—(*Continued.*)

Particulars.	Unit.	Quantity.	Rate. Rs.	a.	p.	Amount. Rs.	a.	p.	Total. Rs.	a.	p.
Amount of English Charges ...	...	...	...	...	...	1491	0	0	...	...	...
Freight Remaining Charges ...	...	...	...	...	...	57	0	0	...	...	...
Landing charges for above materials ...	Ton.	10·23	3	4	0	33	0	0	...	...	...
Loading and Unloading ...	...	10·23	0	12	0	8	0	0	...	...	...
Carriage to site ...	Ton. Miles.	300	0	6	0	9	0	0	...	...	...

Cost of one mile of single fence Rs. 1,598–0–0.

Materials from England	...	Rs. 1,491
Expenditure in India	...	„ 107
	Total Rs....	1,598

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

LEVEL CROSSING 2ND CLASS.

V. FENCING. **b. Road Crossings.**

Description.			Quantity.	Rate.	Per.	Amount.
				Rs.		Rs.
Earthwork in approaches ...	C. ft.		24,000	5-8-0	1,000 C. ft.	132
Metalling on roadways ...	Sq. ft.		3,000	4-0-0	100 Sq. ft.	120
12 ft. iron gates ...	Pair.		1	150-0-0	Pair.	150
3 ft. iron wicket gates ...	„		1	76-0-0	„	76
Steel pale fence ...	L. ft.		48	2-4-0	L. ft.	108
Guard rails, chairs, etc. ...	Set.		1	65-0-0	Set.	65
Gateman's Hut ...	No.		1	343-0-0	Each.	343
					Total Rs.	994
Contingencies ...	...		...	5-0-0	Cent.	50
					Grand Total Rs.	1,044

English Charges Nil.

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

LEVEL CROSSING 3RD CLASS.

V. FENCING.

b. Road Crossings.

Description.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Earthwork in approaches C. ft.	20,000	5-8-0	1,000 C. ft.	110
Metalling roadway Sq. ft.	2,400	4-0-0	100 Sq. ft.	96
Posts and chains 9 feet Set.	1	65-0-0	Set.	65
Guard rails, chairs, etc. ,,	1	45-0-0	Set.	45
			Total Rs...	316
Contingencies ...	...	5-0-0	Cent.	16
English Charges Nil.			Grand Total Rs...	332

FOOTPATH CROSSING.

Description.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Earthwork C. ft.	2,400	5-8-0	1,000 C. ft.	13
Old 40 lb. rail posts Lin. yd.	9⅓	1-4-0	Lin. yd.	12
			Total Rs...	25
Contingencies ...	...	5-0-0	Cent.	1
English Charges Nil.			Grand Total Rs. ...	26

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ESTIMATE.

Cost of one mile of Ballast.

VII. BALLAST AND PERMANENT WAY. **a. Ballast.**

Description.	Quantity.	Rate.	Per.	Amount.
	C. ft.	Rs.		Rs.
Stone at 10 C. ft. per Lin. foot ...	52,800	8	100 c. ft.	4,224
			Total Rs.	4,224

DETAILS OF BALLAST.

Width { At Top = 7 ft. 6 in. / At bottom = 10 ft. 6 in.

Depth { Outside rails = 1 ft. 2 in. / Between ,, = 1 ft. 0 in.

Area of Cross Section = 10 Sq. ft.

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

DETAILED ESTIMATE.

Cost of one mile of Permanent Way.

Steel Rails, Bull headed, 50 lbs. per yard on Cast iron pot sleepers.

VII. BALLAST AND PERMANENT WAY. b. Permanent Way.

ITEM.	Quantity.	Rate.	Per.	Amount.	Total.
English Charges.	Tons.	Rs.		Rs.	Rs.
Rails	78·57	88·42	Ton.	6,947	
Fish plates	4·67	118·42	„	553	
Fish bolts etc.	0·65	250·77	„	163	
Cast iron pot sleepers	130·38	71·99	„	9,387	
Tie bars	16·62	114·68	„	1,906	
Gibs and cotters	1·25	232·00	„	290	
		Total English Charges.			19,246
Indian Charges.					
½th Freight Insurance and Landing Charges ...	232·14	...	Ton.	1,942	
Keys Wooden	3·57	60	1,000	120	
Carriage of materials average lead 48 miles at ½ anna per ton	235·71	1·5	Ton.	354	
Laying Road	1	400	Mile.	400	
Maintenance till opening	1	500	„	500	
			Total...	3,316	
Contingencies ...	...	5	Cent.	166	
		Total Indian Charges			3,482
		Grand Total English and Indian Charges ..			22,728

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(Gauge 3 ft. 3⅜ in.)
(Miles 91·33.)

DETAILED ESTIMATE.

Weight of Material in one mile of Permanent Way.

Steel Rails 50 lbs. per yard on Cast iron pot sleepers.

VII. BALLAST AND PERMANENT WAY. b. Permanent Way.

Material.	Units.	Weight.	No. required per mile including Waste.	Weight.	Remarks.
		lbs.		Tons.	
Rails	No.	...	356	78·57	
Fish plates	Pair.	28·00	374	4·67	
Fish bolts with nuts and washers	Set of 4.	3·75	392	0·65	
Cast iron pot sleepers	Pair.	140·00	2,086	130·38	
Tie bars	Each.	19·00	1,960	16·62	
Gibs and cotters	Pair.	1·40	2,000	1·25	
Keys Wooden	„	4·00	2,000	3·57	
	Total weight in one mile ...			235·71	

NOTE.—136 pot sleepers equal to 7 per cent of the quantity in a mile have been added. 3 per cent represents breakages in landing and 4 per cent breakages in banks and diversions.

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

DETAILED ABSTRACT.

Estimate for one Maintenance gang, consisting of 1 Maistry, 7 coolies and 1 keyman. Section = 3 miles.

IX. PLANT. **a. Engineering.**

Particulars.	Quantity.	Rate.	Per.	Amount.
		Rs.		Rs.
Augers, Screw ½ inch ..	2	1 0 0	Each.	2
Do. ⅝ „ ...	2	1 0 0	„	2
Crow-bars, iron ...	10	3 0 0	„	30
Boards, sighting ...	1	3 0 0	„	3
Blocks do. ...	2	1 0 0	„	2
Beaters, ballast ...	10	1 8 0	„	15
Chisel, cold ...	1	1 0 0	„	1
Flags, red and green ...	4	0 4 0	„	1
Gauge, steel standard ...	1	13 0 0	„	13
Do. Iron do. ...	2	3 8 0	„	7
Hammers, Sledge, 7 lbs. ...	1	3 0 0	„	3
Do. Keying ..	1	2 0 0	„	2
Do. Hand, 3 lbs. ...	2	1 8 0	„	3
Jim Crows ...	1	80 0 0	„	80
Lamps, Hand signal ..	2	11 0 0	„	22
Levers, wooden ..	1	5 0 0	„	5
Levels spirit ...	1	2 0 0	„	2
Mamooties ..	6	1 8 0	„	9
Padlocks ...	2	4 0 0	„	8
Set, cold ...	1	3 0 0	„	3
Shovels ...	10	1 8 0	„	15
Spanners, fish-bolt ...	1	3 0 0	„	3
Do. fish double ended ...	1	6 0 0	„	6
Badges, platelayers ...	9	2 0 0	„	18
			Total Rs. ...	255

		Rs.
Materials from England	... ...	240
Do. do. India	... ...	15
Total Rs.	...	255

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

Estimate for Equipment of one 2nd class Station, with Waiting Room accommodation.

IX. PLANT. **e. Station and Office Furniture.**

Description.	Quantity.	Rate.	Per.	Amount.
		Rs. a. p.		Rs.
Almirah ..	1	45 0 0	Each.	45
Benches ...	2	15 0 0	„	30
Buckets iron galvanized ...	2	1 8 0	„	3
Do. iron for Latrine ...	1	3 0 0	„	3
Box, cash, Tin ..	1	4 0 0	„	4
Boards Notice ...	12	3 0 0	„	36
Boards, goods loading ...	1	14 0 0	„	14
Do. Cattle do. ...	1	14 0 0	„	14
Bell, station ...	1	4 0 0	„	4
Box, Ticket ...	1	11 0 0	„	11
Clock, Dial ...	3	43 0 0	„	129
Chairs ...	18	4 8 0	„	81
Commodes ...	4	10 0 0	„	40
Cans, Oil, Tin ...	4	0 8 0	„	2
Case, Ticket ..	1	68 0 0	„	68
Drums, Oil (6 gallons) ...	4	10 0 0	„	40
Easy chairs ...	4	15 0 0	„	60
Filter stand, Iron ..	3	4 0 0	„	12
Lamp, Hanging ..	6	23 0 0	„	138
Do. Wall ...	8	11 0 0	„	88
Do. Reading ...	6	26 0 0	„	156
Do. Ticket Collectors ..	1	2 0 0	„	2
Do. Hand signal ..	6	11 0 0	„	66
Do. Post ...	6	10 0 0	„	60
Lanterns common ...	2	1 0 0	„	2
Ladder Lamp ...	1	9 0 0	„	9
Machine weighing ...	1	235 0 0	„	235
Mirrors ...	2	15 0 0	„	30
Press letter copying with stand ...	1	56 0 0	„	56
Press Ticket dating ..	1	26 0 0	„	26
Punkah, complete ..	1	25 0 0	„	25
Safe, Cash Iron ...	1	105 0 0	„	105
Scale, scoop ..	1	10 0 0	„	10
Stools, Office ...	2	2 0 0	„	4
Stand for towels ...	4	2 0 0	„	8
Tables, with drawers ...	4	15 0 0	„	60
Tables, Round ...	2	20 0 0	„	40
Tub, Wooden ...	1	12 0 0	„	12
Tub, Bathing ...	2	12 0 0	„	24
Trollies Hand Sack ..	2	13 0 0	„	26
Wash, Hand stands and Crockery ...	2	25 0 0	„	50
			Total Rs. ...	1,828

		Rs.
Materials from England	... ...	1,097
Expenditure in India	... ...	731
Total Rs.	...	1,828

SOUTH INDIAN RAILWAY CO., LD.

PAMBAN BRANCH.

(*Gauge 3 ft. 3⅜ in.*)
(*Miles 91·33.*)

Estimate for Equipment of one 3rd class Station.

IX. PLANT.

e. Station and Office Furniture.

Particulars.	Quantity.	Rate.	Per.	Amount.
		Rs. a. p.		Rs.
Almirah ...	1	45 0 0	Each.	45
Bucket, iron galvanized ...	2	1 8 0	"	3
Do. do. for latrine ...	1	3 0 0	"	3
Cash-box, tin ...	1	4 0 0	"	4
Notice boards ...	6	3 0 0	"	18
Goods loading gangways ...	1	14 0 0	"	14
Bell, for station ...	1	4 0 0	"	4
Ticket box ...	1	11 0 0	"	11
Clock ...	1	43 0 0	"	43
Chairs ...	2	4 8 0	"	9
Oil-cans, tin ...	4	0 8 0	"	2
Ticket case ...	1	68 0 0	"	68
Oil-drums ...	2	10 0 0	"	20
Filter ...	1	4 0 0	"	4
Lamp, Hanging ...	2	23 0 0	"	46
Do. Wall ...	4	11 0 0	"	44
Do. Reading ...	1	13 0 0	"	13
Do. Ticket Collectors ...	1	2 0 0	"	2
Do. Hand signal ...	6	11 0 0	"	66
Do. Post ...	6	10 0 0	"	60
Lanterns ...	2	1 0 0	"	2
Ladder, for lamps ...	1	9 0 0	"	9
Ticket press, dating ...	1	26 0 0	"	26
Letter, copying press ...	1	56 0 0	"	56
Cash Safe iron ...	1	105 0 0	"	105
Scales, scoop ...	1	10 0 0	"	10
Stools, office ...	2	1 8 0	"	3
Tables do. ...	2	15 0 0	"	30
Tubs, Wooden ...	1	9 0 0	"	9
Trolly, Sack ...	1	13 0 0	"	13
			Total Rs. ...	977

		Rs.
Materials from England	...	... 682
Do. do. India	...	... 295
Total Rs.		... 977

ENC. No. 3 TO E. R's. C. No. 5099 OF 1939
LETTER No. 970 D 29/9/22
FROM A.

Reg: no 22 M.P

9 24

After crossing the river the road goes through some flat country, and then ascends at a very steep gradient (about 1 in 50) and undulates for some miles.

Instead of keeping to the side of the road I propose to locate the line as shown in dotted red on the plan; it will cross the road about ¾ mile beyond the river, then skirt alongside a-valley so as to get an easy gradient up to where it approaches the road in the 16th mile.

Propos alignmen for line north of -lakada.

The new alignment will entail, for about a mile, heavier bridging than will be required on the main road, which is bridged by arched culverts on this section, but we shall be compensated by having easier grades and less earthwork.

The proposed diversions I have made will serve the dis-tri- equally as well as the present road.

I have instructed Mr. Marini to locate the line from the 16th mile to Royachoti on the same principles that I have adopted for the first half of the line, the chief towns or villages along the road being considered as objective points.

Line fro 16th mil to Roya- -choti.

According to the amended rules for the Preparation of Projects it is necessary to submit, even for a Preliminary survey, a rough plan of the country showing villages and na--tural features 500 feet on each side of the line, and all im--portant waterways must be surveyed for one mile, up and down stream for one mile. This will necessitate more survey work than was originally intended to be done - judging by the pres--ent estimate.

Survey operation

The country through which the road passes is undulating, and in parts a lot of small jungle trees has to be cut, and it is not so easy to survey and locate a line as if it were in the plains. Already 6 weeks have been spent on the work done, and I do not consider Mr. Marini has wasted any time on it.

The present estimate allows survey expenses at the rate

of

1054

of Rs 20/- per mile - the actual expenses to date work out to Rs 40/- per mile; besides the time allotted for the field work with the staff is not sufficient to complete the work, including the staking out of a new line between Kalikiri and Mahal as already recommended, ~~and~~ doing the extra survey work along the line, and surveying the rivers a mile up and down stream, I compute the field work will take 4 months to com--plete and am submitting a revised estimate herewith for fa--vor of sanction being obtained.

No provision was made for the Assistant Engineer to pre--pare the estimates in the office, this I have made in the re--vised estimate.

I request ~~me~~ favor that early sanction be obtained to the proposals in my report and to the passing of the estimate.

Engineer-in-Chief's office,
Trichinopoly 18th October 1899.

Engineer-in-Chief.

Accompaniments: 2 J.A.

for Ag Agent

ENC. No. 2 TO E. R's. C. No. 5606 OF 1932
LETTER No. 1052 Of 22.10.99
FROM A

11 Pa.

South Indian Railway Co. Ltd.

Kalikiri Royachoti Railway Extension

Estimated Length 32 Miles

Estimate for making a Survey & Section of the 2 feet gauge Branch feeder line from Kalikiri to Royachoti.

	Rs	Rs	Rs
I Preliminary Expenses			
(a) Survey Expenses			
Cutting line peps and fixing same clearing Jungle and other expenses in the field 32 Miles at Rs 40/- per mile		1280	
Cartage, Stationery, Printing project Estimates and other Contingent Charges		600	
			1880
b. Plant:			
Tents			
Swiss Cottage tent with Carpets No 1	430		
Campaign tent No 1	120		
Pals No 6 at Rs 52/8/-	315.		
Necessary tent No 1	35		
	900		
Deduct:			
Credit on account of Tents to be sold or taken back into S. I. Ry accounts at 75% of issue price	675		225
Instruments			
Theodolite No 1	190		
Level No 1	90		
Levelling staves No 2	80		
Compass prismatic No 1	50		
Box instrument Mathematical No 1	60.		
Edges straight steel No 1	20		
Other items of Plant including furniture	320		
Carried Over	800	225	1880

	Rs	Rs	Rs
Plant (Continued)	800	225	1880
Instruments (Continued)			
Deduct-			
Credit on account of instruments to be sold or taken back into S.I. Ry accounts after Completion of work at 87½ % of issue price	700		
		100	
			325
C. Establishment.			
Salaries and allowances.			
1 assist: Engineer for 4 months at Rs 400 per annum		1600	
1 Surveyor for 4 months at Rs 135 "		540	
1 Apothecary for 4 months at Rs 50 "		200	
1 Clerk for 4 months at Rs 40 "		160	
13 Lascars for 4 months at Rs 8 "		416	
Travelling and other allowances and Expenses.		451	
Head Quarters.			
Preparing project Estimates			
1 assist: Engineer for 2 months at Rs 400 per annum		800	
2 Estimators for 2 months at Rs 60 each "		240	
1 Draftsman for 2 months at Rs 40 "		80	
2 Tracers or Clerks for 2 months at Rs 20 each "		80	
			4567
Grand Total	Rs		6772

Engineer-in-Chief's Office
Trichinopoly 18th October 1877

E.S. Alexander.
for Engineer-in-Chief

Compared
JA

H. Le Mesurier
for Ag Agent

J.A.

ENC. No. 1 TO C.E. C. No. 5606 OF 1899
LETTER No. 1052 DATED 23 10 99
FROM A

URGENT.

No. 1052

South Indian Railway Co., Ld.,

AGENT'S OFFICE,

Trichinopoly, 23rd October 1899

SERIAL No. 12

To E. Rly 27.10.99

From Ag

RECEIVED 26 OCT. 1899 MADRAS.

5606 26.10.99

The Agent,

SOUTH INDIAN RAILWAY.

To

The Consulting Engineer for Railways,

~~MADRAS.~~

Ootacamund 19

Sir,

With reference to your letter No. 263/O dated 1st. September 1899 regarding the survey for a Light Railway from Kalikiri to Royachoti I have the honor to forward a copy of a Report by the Engineer-in-Chief for Surveys and Construction on an inspection he has made of the proposed alignment, together with the tracings referred to therein, and shall be obliged by your informing me whether Mr. Michell's proposals are approved.

I also forward for favor of sanction a Revised Estimate, amounting to Rs 6,772/- for the cost of the Survey in supersession of that (for Rs 3,700) embodied in Madras Government Order No. 874/Ry dated 7th August 1899, and shall be glad to receive early intimation of of the same being sanctioned, as well as of an increased allotment being provided to meet the enhanced outlay.

I have the honor to be
Sir
Your most obedient Servant
J. W. Le Mesurier
for Ag. Agent

4 Enclosures by book post by Mld.

No. 3303.
27.10.99.

RECEIVED
Regn. No. 658
27 OCT. 1899
Enclosures
RAILWAY ACCOUNTS, MADRAS

C.R.

Is there any technical reason why the Orders should not be issued from S.I.R. Revenue?

I have heard from Smith D.O. that they will sanction grants from Revenue for Surveys. It cannot give any more Imperial grants.

If Agent S.I.R. is ordered to start the entire Rs 30000 (to be procured when work is begun) is there any need to address him?

FWS
27/10/99.

C.R.

When may we expect orders on the 6 months estimate just gone up?

FWS.
30/10/99

I have drafted a letter which will prevent work being stopped and which will keep things moving until India issues orders about the 6-month estimate. Does C.R. see anything technically wrong with the draft. — Will it suit Govt. Audit Office?

FWS
30/10/99

E.R.

There is no objection to funds for one work being obtained partly from one and partly from another source, but the revised estimate will require the sanction of the Govt. of India and when sending this forward it may be mentioned that further funds will be provided by Revenue and that the six months estimate which was placed at Rs 7000 should be altered accordingly, as the whole amount is small, perhaps it would be better to relinquish the grant under head 41 and charge all expenditure to S. I. Ry. Revenue.

JSR 30/10/99

E.R. 30/10/99.

Regn.

From The Agent, South Indian Railway, Trichinopoly.
To The Consulting Engineer for Railways, Madras.
Dated
Received
No.
Enclosure.

JSR 30/10/99

FWS 30/10/99

E.R. There is no objection except that would be one of excess over estimate, when incurred.

JSR 30/10/99

Southern Mahratta Railway Company.

AGENT'S OFFICE,

Dharwar, 3rd November 1899

No. 8243 / 9381

GOVT. EXAMINER'S OFFICE
S.M.RY
6 NOVEMBER 1899
REG No 2002

To

The Consulting Engineer
for Railways,
MADRAS.

(Through the Consulting Engineer for Railways, Bombay, and the Government Examiner, Dharwar.)

Sir,

With reference to your letter No. 337/0, dated the 6th October 1899, received under endorsement No. 7660, dated the 17th Idem, from the Consulting Engineer for Railways, Bombay, I have the honour to forward herewith an estimate, amounting to Rs. 20,550/- prepared in accordance with the suggestions made by you for the surveys of the following Feeder Lines in the Madras Presidency:-

1. Hospet-Kottur ——— 35 miles.
2. Bellary-Rayadrug ——— 33 "
3. Narasaraopet-Pondugal ——— 45 "

I have the honour to be,
Sir,
Your most obedient servant.

Major, R.E.,
Agent.

(Enclo:) with one spare copy of estimate.
M.V.

12580
to 3/11/99

Dated Dharwar 6th November 1899

Transmitted

R. Vaclen

Government Examiner
S M-Ry accounts

GCA
6/99

RECEIVED
CONSULTING ENGINEER FOR RAILWAYS
6 NOV. 1899
MADRAS.

No 8221 of 1899
Consulting Engrs Department
Bombay 13 November 1899

Forwarded to the Consulting Engineer
for Railways. Madras

for Offg: Consulting Engineer for Rys:

Estimate of the new railway (1) from Naspet to Kottur (2) Bellary to Rayadrug and (3) Harasaraopet to Paidugal a distance of 113 miles.

Abstract of Estimate (Rs: 182 per mile)

20 Sp

Main head	Minor heads	Total of each	Grand Total
Preliminary Expenses	Survey Expenses	200	
	Survey Plant	5150	
	Establishment and office requirements.	15200	20,550

Establishment - Distribution

(a) Field work Rs: 12,384
(b) Office " 2,816
Total 15,200

Details of Estimates
Survey Expenses.

Items	Amount	Total	Remarks
Pegs, flags &c.			
Pucca pillars, bench marks &c.			
Clearing jungle from traverse line	200		
		200	

Survey Plant.

Items	Amount	Total	Remarks.
Small Tools			
Camp equipage and furniture	3,000		21 Sets
Picking Centre line	"		
Cart hire	150		
Mathematical instruments	2,000	5,150	

Establishment.

Items	No.	Rate	Per	for	Amount	Total
Executive Engineer	1	800/-	month	8 months	6,400	
Surveyor	1	250/-	-do-	-do-	2,000	
-do-	1	150/-	-do-	-do-	1,200	
Draftsmen	2	50/-	-do-	-do-	800	
Tracers	2	25/-	-do-	-do-	400	
Clerk	1	60/-	-do-	-do-	480	
-do-	2	30/-	-do-	-do-	480	
Khallasies	6	8/-	-do-	-do-	384	
Cash Guards	4	8/-	-do-	-do-	256	
Stationery		50/-	-do-	-do-	400	
Travelling allowance		300/-	-do-	-do-	2,400	
						15,200

Abbas Ali
Chief Engineer

Light Railways feeder railways for the Nilgiri Railway.

Note of the Govt. of Madras Rly. Dept. dated 16-11-99

1 — In their Rly Dept Letter No 18-31-1 dated the 18th Sept. 95 the Govt of India requested & were furnished with a list of such lines under the Light Railways Project for the Nilgiris, arranged in order of their Constructive value, with a view to their forming a subject to what extent, & in what order, the several proposed lines might be extended, with a view to the possibility of some, to effect a saving in the cost of the railway of Nilgiris equal to the cost of their construction, & so justify the big bridges within the category of lines on which the Nilgiris minimum Grant might be expended.

2 — Certain long and thoughtful considered this Govt. replied, by its Rly Dept Letter No. 169. A. Rly. dated 22nd March 1898, putting forward a programme of six short light railways, aggregating 186 miles in length, ranging from 16 miles to 45 miles, purporting to fulfil the conditions imposed by the Govt. of India for the acceptance of the claims of Nilgiris lines to the following are the lines recommended.

Order	From	To.	Length
1	Hosgut	Kothur	35
2	Kallikini	Bogathati	32
3	Mosappur	Thennagini	16
4	Tingapatur	Krishnagini	25
5	Bellary	Bongadeg	33
6	Narsinagut	Pandagut	45

3 — Is it seemed to this Government to be most desirable that some extent should as soon as possible be available the cost of these lines, & that enabling at least Madras to know in regard to the possibility of making them light railways instead of bringing them into the list of lines for which the District Boards might make themselves financially responsible, an attempt has been made to get them surveyed. The results of this attempt have been as follows.

4.— 1. Hosgut - Kottur 35 miles.
5. Bellary - Proyedrug 33 "
6. Narsapet - Pondyal 45 "

When the S.M.R.C. t which these three lines would form feeders — by which they would be worked. ~~Lieut~~ Major Ryder in April 99 t furnish an estimate for these surveys, they furnished two alternative estimates, one of the most reconnaissance t cost Rs 1,910. — the other of a regular engineer project t cost Rs 33.600. We then asked the Agent S.M.R.C. t estimate for something not so cursory as a reconnaissance, and yet less expensive than a regular project survey. The result was that he has now sent in a fresh survey estimate amounting t Rs 20.550 for the 113 miles, or at the rate of Rs 182 per mile. For this the Govt. of India sanction — a grant must be obtained.

2. Kalikiri - Rayachoti 32 miles.

~~The Govt. of India~~, in their No. 220 A.R. dated the 24th July 99, sanctioned the Govt. of India
estimate for Rs 3,700 — letter-grant for Rs 4000 for this survey, t be worked by the S.M.R.C.

The survey party was formed on the 17th Aug. 99 — is still in the field. It has found that the existing track, a so-called road, ~~is~~ will make no alteration
~~would be~~ at a little ~~cost~~ labour — skilled engineering — which even if it could be made good ~~would not~~ be worth carrying
line off the road must therefore be found, — the staging estimate for it, — the project, will cost Rs. 6772. The alternative estimate would be less made out for Rs 4000
— the survey is in progress. The Govt. of India must be shortly asked to sanction the revised estimate — t allot the additional grant. The estimate will come t Rs 212 per mile.

6.— 3. Nagargam - Shamapur. 16 miles.

The Nandyal R.C. have put in an estimate for the survey of this line amounting t Rs. 4763. — the Govt of India have sanctioned it — have allotted a grant of Rs 5000.

7.— 4. Trimpiter – Kinchengiri. 25 miles.

An estimate for a survey of this line, inclusive of an alternative Palchen, amounting to Rs. 11362 was sanctioned by the Govt. of India in April last; a grant of Rs 5000 for the current year, to be supplemented if necessary, was made for the purpose. The survey party are in the field.

8.— It will be convenient here to repeat what was said about these six lines in letter to the Govt. of India No. 167.A. Rec. of March 22nd. 1898.

(Here quote paras 8 to 12 inclusive of that letter.
Small print.)

9.— The action which has been taken to obtain surveys & estimates of these six short railway lines is detailed above. Lest it will be convenient to summarise it here by repeating that estimates have been sanctioned & grants made for the two lines, Nos. 3 & 4, which will form feeders to the Northern R.C. Similarly No. 2 which will form a feeder to the S.I.R.C. has also had survey estimate sanctioned & the grant - grant; but it is now found that it will cost 8/9000 instead of Rs 4000 as the Govt. of India must be written to. We have not yet addressed the Govt. of India on the subject of the surveys of Nos. 1.5.6. which will form branches of the S.M.R. They may now be addressed in regard to these three lines.

10.— It is very important that surveys & projects should be in preparation simultaneously for all these little 2'.6" railways; for if it is proposed to design them on one uniform principle & at the lowest cost consistent with their safety they may in ordering some & passing for the others would like to be assured of this in future years. By getting them all done at one time supervision will be easier & more effective; & designs will be more uniform. The whole affair is really a temporary small one, yielding 186 miles of little railways of local interest, and Govt. is making every effort to promote their construction by mitigating special legislative

be understood that, though the programme now put forward appears to be the best, yet it is liable to modification if it should turn out that certain other lines, the Kurnool branch for example, are less likely to be promoted by companies than there is now reason to anticipate. It should also be understood that the present list is not exhaustive, but is merely the limited list that has been asked for by the Government of India.

8. *The Hospet-Kóttúr Railway.*—The first item on the preference list is a line about 35 miles in length, southwards from Hospet, a station of the Southern Mahratta Railway, to Kóttúr, a distributing centre for four or five taluks which give much trouble in famine times. It has from time to time been proposed that a line about 66 miles in length should cross from Hospet southwards to the Mysore State Railway at Devangiri. It has been urged that the southern part of this line would form a valuable feeder to the Mysore line, while its northern part would provide the protection so much needed in Eastern Bellary. After full consideration, however, it has been decided that it is expedient that famine requirements must have first consideration, and that all that is necessary for famine purposes being 35 miles of a two-foot gauge railway from Hospet to Kóttúr, the Government of India should be asked to admit this short line as of primary importance in the famine railway scheme. It has therefore been accorded the first place on the list now submitted.

9. *The Kalikiri-Rayachóti Railway.*—A tract which in times of scarcity gives, perhaps, nearly as much cause for anxiety as that just referred to, is the central part of the Cuddapah district lying between the Rénigunta-Pákalá-Dharmavaram section of the South Indian Railway and the North-West section of the Madras Railway. Various schemes, marked No. V on the map, have from time to time been put forward for crossing this tract as well as a part of the Kurnool district, by a line running southward from Nandyal station of the Southern Mahratta Railway through Yerraguntla station of the Madras Railway to Kalikiri on the South Indian Railway. But, on a review of all the local circumstances of the districts intended to be served by such a line, it has been decided that all that at present is necessary, in the interests of famine protection, is a branch on the two-foot gauge, about 35 miles in length, from the South Indian Railway in the neighbourhood of Kalikiri, or Pfleru, to Ráyachóti. This line has been given the second place in order of preference.

10. *The Tiruppattúr-Krishnagiri Ry.* (and the *Morappur-Dharmapuri Ry.*).—North-Western Salem has always, in times of scarcity, given rise to much anxiety. It has from time to time been proposed to make it safe by a line from Bangalore through Hosúr to Morappur station on the Madras Railway. This Government, however, are of opinion that all immediate famine purposes will be sufficiently well served if its two chief centres of distribution, Krishnagiri and Dharmapuri, are connected with the Madras Railway;—the former by 25 miles of a two-foot line to Tiruppattúr, and the latter by 16 miles of a two-foot line to Morappur station, both lines being, as far as possible, laid on district roads. It would appear from a glance at the map as if the country served by the Jalarpet-Krishnagiri line were already sufficiently near to the Bangalore branch of the Madras Railway to be protected thereby. But such is not the case, for a roadless range of hills intervenes.

11. *The Bellary-Rayadrug Railway.*—The south-eastern parts of Bellary district, which this line is intended to serve, draw their supplies in ordinary years from the Anantapur side, from places which in famine years are unable to afford them the grain which they need for themselves. It is then most desirable that their trade centre, Rayadrug, should be connected with Bellary town, which is a large enough centre of distribution to be trusted not to fail of supplies now that it is connected with the Kistna delta. With a view of serving Rayadrug as well as the parts of Mysore territory which lie south of it, schemes have been put forward for 110 miles of line to connect Bellary with Holalkiri. But this Government considers that for famine-relief purposes Rayadrug and its adjoining taluks will be sufficiently safeguarded if the proposed 33 miles of two-foot gauge line be laid southward, for the most part along existing roads, from Bellary to Rayadrug. This project has been allotted the fifth place in the programme.

12. *The Narsaraopet-Pondugal Railway.*—The north-western part of the Kistna district of which the centre of trade is Pondugal, on the border of the Nizam's territory, is always a cause of apprehension in famine years. The tract proposed to

be served is isolated from the Bellary-Kistna section of th
Railway by a line of hills, through which passes the road on w
to lay 45 miles of a two-foot gauge railway.

4. The leading idea throughout has been to select the areas most liable to give rise to anxiety in times of scarcity, and then to connect the actual trade distributing centres of such areas with the nearest railway; if practicable, for reasons of economy, along an existing road. It has been borne in mind that the share of the famine grant which will be made available for the several Presidencies and Provinces is not, from a railway construction point of view, likely to be large and it has been thought best to obtain a considerably greater mileage of a sufficiently good thing, rather than a comparatively small mileage of the best possible thing, and so, in the next few years, to secure protection for as many of the famine areas as possible. Thus, the adoption for these short famine branch lines of one or other of the narrower gauges appeared to be the wisest policy; and so, after full consideration of the work that can be done by both gauges with properly designed rolling stock, and upon information of the nature of the rolling stock of the Barsi and Howrah tramways, it has been decided that the two-foot gauge will fully meet all the requirements, even in famine times, of the list of lines now sent forward. For not only does it seem certain that in times of scarcity the narrow gauge is quite capable of throwing a sufficiency of food into such sparsely-peopled tracts, but also that, in ordinary years, the more cheaply the railway can be built, the more likely it is to give some return for its capital cost over and above its working expenses. The possibility also of laying the narrow gauge along existing roads with little or no alteration of bridges, and consequently at between Rs. 20,000 and Rs. 25,000 per mile, has largely influenced this Government in coming to the decision arrived at.

5. In the accompanying map of this Presidency the railway projects which have come within the scope of the present enquiry are indicated by the thin red lines. The selected projects, or selected portions of or variations of them, are indicated by thickening the red lines. Their places in order of the preference accorded to them by this Government are as follows:—

Order of preference.	Number on map.	Railway. From	Railway. To	Length in miles.
1st	I	Hospet	Kóttúr	35
2nd	V	Kalikiri	Ráyachóti	32
3rd	VI	Morappur	Dharmapuri	16
4th	VI	Tiruppattúr	Krishnagiri	25
5th	II	Bellary	Rayadrug	33
6th	XIII	Narsaraopet	Pondugal	45
			Total mileage ..	186

6. It is not easy to estimate to what extent the money which was spent during former famines, on works and gratuitous relief in the districts which it is now proposed to protect, might have been saved if the lines that are now projected had been in existence. The question is complicated by the fact that in many cases it is not so much that the grain is absent, as that the means of paying for it cannot be earned by the hereditary labouring classes on whom falls the chief brunt of high prices. But a good idea of the importance of opening up the tracts now selected, by connecting their chief distributing trade centres with the neighbouring main lines of railway, may be inferred from the statement that, in the famine years of 1876–78, a sum of about 70 lakhs was spent upon relief works, and of about 30 lakhs on gratuitous relief, in the taluks which it is now proposed to supply with improved communications,—communications, which will not, it is estimated, cost much more than half of the sum so spent, and which will, there is every reason to hope, be fructuous in ordinary years by reason of their cheapness.

7. The six projects shall now be treated of in regular order, an attempt being made to indicate, in each case, the reasons for the selection. The appendices attached to this letter (Appendices I—IV) contain the statistics which have been collected as the results of the recent enquiries, and it is hoped that they will be found to contain all the information required by the Government of India to allow of their forming a judgment as to the wisdom of the selections. This Government desire that it should

having for its object a local guarantee or a local raising of money, to take the place of action on similar lines of the ordinary famine grant. We have of opinion that the ~~test~~ last the part of India can be expected to do, pending the successful issue of this part's scheme, is to grant the cooperating small sum required for the survey; a sum which, as each line is taken in hand a borrowed capital, will be recouped.

11.— But should the part fail to persuade the District Boards to have the burden of a guarantee or of a loan for these lines, we should it therefore become necessary to construct them out of Indian Revenue from the famine insurance grant. The need for so doing will probably only become evident when a famine is inevitable; and in the absence of a complete survey we suggest a lesson, that famine lines, ~~which probably~~ may yet materially projected before the lines can be of any use for famine purposes. A glance at the table of famine affected districts in the District programme will show how very large an amount money may be spent on relief measures as not only would suffice to cover the lines on the faulty orthography necessary for the survey, but as would suffice to complete and equip the lines themselves.

278

J W S

16/II/98

Read the following

G.O. 169 and 169 A. Revenue. Dated 22nd March 98. Submitting to the Govt. of India a list of six selected light feeder famine railways.

" 874. Rly. Aug 7th 99. Communicating to the Agent S.I.R.C. the Govt of India's sanction to the retention & allotment of a grant for the survey of the projected Kuthiri Royakota Light Rly.

" 469. Rly. April 25th 99. Communicating to the Agent M.R. the Govt of India's sanction to the retention & allotment of a grant for the survey of the projected light Railway from Tirpatur to Krishnagiri.

" 742. Rly. July 7th 99. communicating to the Agent M.R. the Govt of India's sanction to the retention & allotment of a grant for the survey of the projected light Railway from Mayavaram to Thanjavur.

Read also the following correspondence with the S.I.R.C.

Print —— Series. 8. 9, 12 with enclosures of the Kuthiri Royakota cases.

Read also the following correspondence with the S.M.R.C.

Print —— Series. 1. 2 with enclosures to demi-official letter. 3, 4, 5. and the current, with enclosures.

Read also. The following Note of the Engr. for Rly. Reviews, dated 16-11-99.

Order. No 1396 R of 4-12-99.

The Govt. of India will be addressed.

280

FWS
Secy.
16/11/99

Print very large

FWS
16/11/99

Form No 10. A.

No. 1397 R

Government of Madras,

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

To

The Secretary to the Government of India,

Public Works Department,

4th December 1899.

Sir,

I am directed to forward herewith a copy of the Govt. Proceedings, No. 1396 R dated the 4th Dec. 99, in reply to the letter from the Govt. of India in the Rev. & Agricultural Dept. noted in the margin and to state that the Govt. of Madras are unable to accept the proposal of the Govt. of India to withdraw the Kalahasti Railway project.

2. The Proceedings in question contain, inter alia, the correspondence which has occurred in regard to the Kalahasti Railway project in connection with the grant of land and 220 A.R. by the Govt. of India in their letter No. 1388 Rc dated the 19th & 24th July 1899 respectively.

3. The correspondence in question occupies pages 2 to 6 of the accompanying Proceedings. It will be found summarised in para 5 of the Govt. Order at the end of the year which it will be seen that a grant of Rs. 7000 will be necessary instead of the Rs. 4000 already allotted. Of this the Govt. of India have been already made aware in the Statement attached to their letter No. 1238 R dated 28-10-99.

4. Under the circumstances fully explained in the Proceedings

His Excellency the Governor in Council has no hesitation in strongly recommending that the additional grant asked for may be allotted and that the revised Survey Estimate as given at page 6 of the Proceedings may be sanctioned.

4.— Meanwhile the S.I.R.C. have been authorised, in anticipation of this sanction now asked for, not to postpone the Survey party re-inspection but to press on and get the work finished at the lowest cost of Revenue pending the issue of the grant of India of the grant already allotted, from Rs 4000 to Rs 7000.

I have &

FMG

23/11/99

Form No 10. A.

No. 1398 R

Government of Madras,

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

To

The Secretary to the Government of India,

Public Works Department,

4th December 1899.

Sir,

In accompanying copy of this Govt. Proceedings, No. 1396 R dated the 4th December 99, the reference to the survey of the light railway which is report to progress under the Govt. of India in the Rev. & Agricultural Dept. was put forward in connection with the Govt. Rev. Dept. letter No. 169 A. dated the 22nd March 1898.

2. The Proceedings in question contain, inter alia, the correspondence which has occurred with the S.M.R.C. & with the Govt. Engr for Rly. Boards, on the subject of the three members of the group in question which will form feeders to the S.M.R. viz.

1. Hosgot, Northern 35 miles
5. Bellary Roydrug, 33 "
6. Narsampet Pandgal, 45 "

It will be seen from pages 6 to 9 of the Proceedings, & from para 4 of this Govt. Engr Note at the end of them, that the Agent S.M.R.C. has submitted an estimate amounting to Rs. 20,550 for surveying the three lines, aggregating 113 miles in length, on the principle suggested by this Govt. Engr. in his letter to the Agent No. 370/a dated the 6th Oct. 99.

3.- It seems unnecessary to repeat here the arguments and the considerations advanced in Rev. Dept. Ltr. No. 169-A of March 22nd 98 in favour of the construction of these six short famine railways at the cost, should it be available, of the Famine Insurance Grant. But meanwhile it seems to this Govt to be essential that some idea should be formed of the probable cost of them, and that projects should be ready for them in order that if an emergency should arise it may be possible to put this construction in hand without the loss of a season.

4.- I am therefore desired to strongly recommend that the S.M.R. Co's survey estimate should be sanctioned & that a grant, to be expended during the current financial year should be allotted. The expenditure of a smaller sum on a cheap reconnaissance is not recommended in the case of such long short lines.

5. From a perusal of the Bombay Govt Ltr No. 7314 dated the 27th Sept. 99 it will be seen that it is in deference to the wishes of the Bombay Govt. that this application is for funds for expenditure by the S.M.R.C. it is being made by this Govt.

4. The gauge to be adopted will naturally to a great extent be dependent on the Contour of country - therefore on probable cost per mile. The chief Consideration is that there a four miles, instead of one or two, should be made for one block of papers. So that capital bears a reasonable proportion to probable earnings from traffic offering. If, consistently with this principle, metre gauge lines can be got, so much the better: failing that, the lines must be on a narrower gauge and must be viewed as little better sorts of District roads rather than railways.

Form No. 14.

PUBLIC WORKS DEPARTMENT,

RAILWAY BRANCH.

C. No.

Draft letters attd.
H.E.H.
29.11.99

NOTE FOR H.E. the Governor

I put up for H.E's approval, drafts of 2 letters to India, urging them to allot grants to enable us to get some idea of the probable cost of the six little famine lines proposed in this Govt' Rev. Dept. letter No. 169-A of the 22nd March 1898

2.- I am anxious to get them all surveyed out of hand so that we may know where we are.

3. Full particulars of the history of the attempts to get surveys made of all six lines will be found in the printed proceedings leading up to the two draft letters.

26/4/99

3 proof Rs 25/11/R.

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

Regd. *Spare copies*

G.O., No. 1396 Ry., 4th November 1899.

Draft

NOVEMBER.

Please return this Copy.

Light Famine Feeder Railways for the Madras Presidency

Ordering that the Government of India be addressed on the subject of the —.

Note Please attach to each letter a copy of the proceedings

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following papers:—

G.O., Nos. 169 and 169 A, Revenue, dated 22nd March 1898, submitting to the Government of of India a list of six selected light feeder famine railways.

G.O., No. 874 Ry., dated 7th August 1899, communicating to the Agent, South Indian Railway, Company, the Government of India's sanction to an estimate and allotment of a grant for the survey of the projected Kalikiri-Rayachoti light railway.

G.O., No. 469 Ry., dated 25th April 1899, communicating to the Agent, Madras Railway, the Government of India's sanction to an estimate and allotment of a grant for the survey of the projected light railway from Trippattur to Krishnagiri.

G.O., No. 742 Ry., dated 7th July 1899, communicating to the Agent, Madras Railway, the Government of India's sanction to an estimate and allotment of a grant for the survey of the projected light railway from Morappur to Dharmapuri.

Read also the following papers:—

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Ootacamund.
Dated—Trichinopoly, 22nd August 1899, No. 850.

With reference to correspondence ending with Madras G.O., No. 874 Ry., dated 7th August 1899, regarding the survey for preparing a project for a light railway from Kalikiri to Rayachoti, I have the honour to request that I may be favoured at an early date with the detailed instructions promised in your letter No. 20/O. of 9th May 1899.

From—The Consulting Engineer for Rys., Madras.
To—The Agent, South Indian Railway.
Dated—Ootacamund, 1st Sept. 1899, No. 263/O.
} Copy to the Agent, Madras Railway Company, with No. 264/O., dated 1st September 1899.

I have the honour to acknowledge the receipt of your letter No. 850, dated the 22nd August 1899, in which you ask for the detailed instructions, promised in my No. 20/O. of 9th May 1899, in regard to the Kalikiri-Rayachoti line. When the suggestion that the line should be surveyed was first made it was in contemplation that all these cheap famine feeders should be made on the 2-ft. gauge, with a view to economy of construction. Since then however the Government of India have expressed a wish that as a general rule the 2′ 6″ gauge should be adhered to. As a carefully equipped line on that gauge, with engines and rolling-stock light enough for the traffic to be expected, can be made as cheaply, Rs. 22,000 to Rs. 25,000 per mile, as to be likely to pay in ordinary years; and as, moreover, there are undoubted advantages in being able to exchange with, or sell off to, neighbouring lines, when rolling-stock must be altered either in quality or in quantity to suit alterations of traffic; it is considered best that the project should be prepared for the 2′ 6″ gauge. As you doubtless have, or can have, access to the details of the projected Madura tramways, and as Mr. Crighton has seen the Tezpur tramway which to my mind is the best model

for light cheap feeders, and as also the 2′ 6″ Parlakimedi line now nearly completed is not too far off for a visit of inspection, it seems less necessary that I should go into details than if your projected line were to be on the 2-ft. gauge.

2. The first thing to do is to obtain an accurate survey of the existing road in order to ascertain whether it can or ought not to be adhered to. If possible to adhere to it, much primary capital expenditure may be saved; and if the traffic should hereafter warrant your doing so you could leave the road in places so as to improve curves and grades. The first essential however, until traffic proves itself deserving of better, is that engines should creep over the road at 10 miles per hour dragging what vehicles will just suffice for the traffic. Slow speeds like this mean that even culverts made in the usual District fashion may in most cases be left unaltered, except for a cushion of earth, or a couple of beams, beneath the sleepers.

3. The gradients to be adopted will depend chiefly on existing road gradients, and if these are and must remain stiff the engines must be designed accordingly. The Barsi and Tezpur engines are both exceedingly good in their way but of totally different types, fit the one for stiff grades and heavy loads, and the other for 1 in 100 and easier. As regards curves, you naturally will not use stiff curves if you can get easy ones without much expenditure; 100-ft. radius is good enough for the Tezpur engines; on the other hand there is no use in spending money to ease curves of 358-ft. radius on the 2′ 6″ gauge; but, naturally, you will get as good curves as the road permits between these two extremes. Rather, however, than inordinately lengthen the curved parts of the road it will be best as a rule to make 358-ft. the maximum radius.

4. Pending the development of goods traffic I think bogie stock would be a mistake; the unit is too large. I do not think that for an unproved traffic you can much improve on the Tezpur stock. As it seems probable that at first no more than one engine will be in steam at a time, three engines ought apparently to suffice until the traffic demands more. Similarly one upper class composite carriage will run with each train, so three of that class ought probably to suffice. Thirds will depend on the probable traffic offering, and neither this class nor covered goods waggons need be cut too fine.

5. The principle governing the whole design and estimate of these little railed-roads is that extreme cheapness of first equipment, with the possibility of unwastefully improving the equipment, at any time hereafter, should be steadily borne in mind. It is not of course essential that a purely famine line should pay interest on capital as well as working expenses; but efforts should be made to design it so cheaply, consistently always with economy of maintenance, that it *will* pay interest. Your Company will naturally look for their profit chiefly to the access of traffic to the main line which may always be trusted to follow the substitution of a light railway for carts along any district road.

6. I shall in a few days send you a memorandum, now in the press, in which the whole subject of these railed-roads is very fully dealt with.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Ootacamund.
Dated—Trichinopoly, 23rd October 1899, No. 1052.

With reference to your letter No. 263/O., dated 1st September 1899, regarding the survey for a light railway from Kalikiri to Rayachoti, I have the honour to forward a copy of a report by the Engineer-in-Chief for Surveys and Construction on an inspection he has made of the proposed alignment, together with the tracings referred to therein, and shall be obliged by your informing me whether Mr. Michell's proposals are approved?

I also forward, for favour of sanction, a revised estimate, amounting to Rs. 6,772, for the cost of the survey in supersession of that (for Rs. 3,700) embodied in Madras G.O., No. 874 Ry., dated 7th August 1899, and shall be glad to receive early intimation of the same being sanctioned, as well as of an increased allotment being provided to meet the enhanced outlay.

Enclosure No. 1.

Report of Inspection by the Engineer-in-Chief, Construction Branch, South Indian Railway Company, Limited, of the Kalikiri-Rayachoti Light Feeder Railway Survey, on the 12th and 13th October 1899.

Orders for Survey.—Orders were received from the Acting Agent in his No. R. 1657-41/116 of the 31st July 1899 to commence a survey of the above line.

Instructions to Mr. G. Marini, Assistant Engineer.—On the 31st August Mr. G. Marini, Assistant Engineer, was directed to take charge of the survey, and the following general instructions were given him:—

1*st.*—To survey for the proposed tramway from Kalikiri station on the Pakala-Dharmavaram section of the South Indian Railway to the town of Rayachoti about 32 miles to the north, along or near the present road which runs between these places.

2*nd.*—The survey was to be a point to point traverse locating the line to the best advantage near the road, curves to be of 4° (1,432·5 feet radius) as far as possible, but no curve to be greater than 24° (238 feet radius).

3*rd.*—A survey of the road to be made, and for 100 feet on each side to show boundaries of fields, &c., and his special attention was invited to the instructions contained in the rules for the preparation of railway projects, chapter IV, pages 3 to 7.

4*th.*—Bench marks were to be put in at least every half mile, and at the site of all important bridges.

Survey operations commenced on the 3rd September, and on the 12th instant the line had been located, surveyed, levelled and check levelled up to the town of Kalakada—a distance of 14 miles or nearly half way to Rayachoti.

Description of road to the 16th mile.—The present road starts from the eastern end of the Kalikiri station yard and runs for 10 miles in a fairly straight line to the village of Mahal (marked Chennaravukottapulli on map); it is about 15 feet wide, very little metalled, and is not bridged. For the most of the way it passes over partly decomposed gneiss rock.

The road was laid out on the shortest route principle, and to put a railway alongside would entail needless expense.

On leaving the station at chain 9 it descends into a valley to chain 15, and at chain 25 it begins to ascend to chain 86, rising 88 feet in 61 chains. From this point the road crosses a series of spurs and valleys till within half a mile of the village of Gundlur, where the ground is fairly level to the village of Mahal near where we propose to cross the Bahadu river.

I have enclosed a section of the proposed line from chain 9 to chain 252, about 5 miles, which shows the continuous steep gradients we should have to contend with by keeping the line as at present located. But besides this we should have to put up a regular series of bridges in the valleys crossed, which would entail great expense, and would probably make the cost prohibitive.

Proposed route for line between Kalikiri and Mahal.—On the accompanying plan I have shown where I strongly recommend the line to be placed.

It would leave the present road near chain 20, and diverge to the right, skirting around the high ground past the village of Ootkandlapulle, and then gradually ascend till about half a mile to the east just opposite chain 90, at a grade of 1 in 100; from this point the line would be practically a ridge one all the way with easy grades to Mahal, and would cost but little to construct, as the works would be light; and, as it goes chiefly through jungle, the cost of land will be small.

Re-survey of Kalikiri-Mahal section recommended.—I strongly recommend that sanction be given for a survey of this line to be made joining our present line near Mahal village; it will of course exceed our present survey estimate, but it will amply repay in saving of earthwork and bridgework. I may note that between Kalikiri and Mahal there is not a single hamlet near the road which will not be as equally well served by the new proposed route.

Station site for Mahal.—The station site chosen by Mr. Marini at Mahal is a very good one.

I propose to have a small station in the 5th mile where the line will cross the road leading to several villages on the right, and the village of Medikurti on the left, which is situate on the banks of the Bahadu river.

The Bahadu river.—The Bahadu river is crossed just beyond the village of Mahal, and the site selected is the best; the river will not be an expensive one to cross as rock is near the surface, and excellent building stone abounds in the district.

Location of line from Mahal to Kalakada (mile 14).—The through road from Kalikiri joins the main road from Chittoor to Rayachoti at mile 148½ from Madras main road mileage. Though Mr. Marini had located a line along the road to Kalakada, I directed him to start again at the fixed crossing over the Bahadu, and take the red dotted line shown in the plan; it will give easier gradients, be cheaper to construct both in earthwork and bridgework, and it will avoid crossing a valley into which the road has a steep descent about half a mile south of Kalakada.

Kalakada Station site.—The station site for Kalakada will be at the south side of the village on open ground in a very convenient situation.

The Satyavati Nadi.—The line will cross the road just at the entrance to the village, and turn sharp to the left, and cross the Satyavati Nadi at an excellent place where the river is narrow, and the founds of rock near the surface. After crossing the river the road goes through some flat country, and then ascends at a very steep gradient (about 1 in 50), and undulates for some miles.

Proposed alignment for line north of Kalakada.—Instead of keeping to the side of the road I propose to locate the line as shown in dotted red on the plan; it will cross the road about ¾ mile beyond the river, then skirt alongside a valley so as to get an easy gradient up to where it approaches the road in the 16th mile. The new alignment will entail, for about a mile, heavier bridging than will be required on the main road, which is bridged by arched culverts on this section, but we shall be compensated by having easier grades and less earthwork. The proposed diversions I have made will serve the district equally as well as the present road.

Line from 16th mile to Rayachoti.—I have instructed Mr. Marini to locate the line from the 16th mile to Rayachoti on the same principles that I have adopted for the first half of the line, the chief towns or villages along the road being considered as objective points.

Survey operations.—According to the amended rules for the preparation of projects it is necessary to submit, even for a preliminary survey, a rough plan of the country showing villages and natural features 500 feet on each side of the line, and all important waterways must be surveyed for one mile, up and down stream for one mile. This will necessitate more survey work than was originally intended to be done—judging by the present estimate. The country through which the road passes is undulating, and in parts a lot of small jungle trees have to be cut, and it is not so easy to survey and locate a line as if it were in the plains. Already 6 weeks have been spent on the work done, and I do not consider Mr. Marini has wasted any time on it.

The present estimate allows survey expenses at the rate of Rs. 20 per mile, the actual expenses to date work out to Rs. 40 per mile; besides the time allotted for the field work with the staff is not sufficient to complete the work, including the staking out of a new line between Kalikiri and Mahal as already recommended, doing the extra survey work along the line, and surveying the rivers a mile up and down stream, I compute the field work will take 4 months to complete, and am submitting a revised estimate herewith for favour of sanction being obtained. No provision was made for the Assistant Engineer to prepare the estimates in the office, this I have made in the revised estimate. I request favour that early sanction be obtained to the proposals in my report and to the passing of the estimate.

—

Enclosure No. 2.

Estimate for making a survey and section of the 2′6″ gauge feeder line from Kalikiri to Rayachoti. Estimated length 32 miles.

		Rs.	Rs.	Rs.
(*a*) *Survey Expenses*—				
Centre pegs, clearing jungle, &c., 32 miles, at Rs. 40 per mile			1,280	
Cartage, stationery, printing project estimates and other contingent charges ..			600	1,880
(*b*) *Plant*—				
Swiss cottage tent with carpets, No. 1		430		
Campaign tent, No. 1		120		
Pals, No. 6, at Rs. 52½		315		
Necessary tent, No. 1		35		
Less credits at 75 per cent. of issue price		*— 675*	225	
Instruments—				
Theodolite, No. 1		190		
Level, No. 1		90		
Levelling staves, No. 2		80		
Compass prismatic, No. 1		50		
Box instrument mathematical, No. 1		50		
Edges straight steel, No. 1		20		
Other items of plants including furniture		320		
Less credits at 87½ o/o of issue price		*— 700*	100	325
(*c*) *Establishment*—				
1 Assistant Engineer for 4 months, at Rs. 400 per mensem			1,600	
1 Surveyor for 4 months, at Rs. 135 per mensem			540	
1 Apothecary for 4 months, at Rs. 50 per mensem			200	
1 Clerk for 4 months, at Rs. 40 per mensem			160	
13 Lascars for 4 months at Rs. 8 per mensem			416	
Travelling and other allowances and expenses			451	
1 Assistant Engineer for 2 months, at Rs. 400 per mensem, preparing project ..			800	
2 Estimators for 2 months, at Rs. 60 each per mensem .. ,, ,, ..			240	
1 Draftman for 2 months, at Rs. 40 per mensem .. ,, ,, ..			80	
2 Tracers or clerks for 2 months, at Rs. 20 each per mensem ,, ,, ..			80	4,567
Grand Total ..				6,772

From—The Consulting Engineer for Railways, Madras.
To—The Consulting Engineer for Railways, Bombay.
Dated—Ootacamund, 26th April 1899, No. 8/O.

Amongst six proposals put forward by the Madras Government a year ago for short 2-ft. feeder railways to penetrate the interior of selected famine tracts, the survey of two has been undertaken by the Madras Railway Company to which they will form feeders. Of the remaining four, three would form feeders of the Southern Mahratta Railway. The following are the three referred to :—

Hospet-Kottur	... ...	35 miles.
Bellary-Rayadrug	... ...	33 "
Narasaraopet-Pondugal	...	45 "

2. Judging from experience of the Jorhat State Railway in Assam and of the Howrah-Ampta and Howrah-Shewanhali Railways in Bengal, these three little 2-foot railways if laid on the existing district roads ought not to cost more, when fully equipped, than from Rs. 22,000 to Rs. 25,000 per mile. Interest on the higher of these sums at 3 per cent. comes to less than Rs. 15 per week, and net earnings would cover this (even were working expenses to form 70 per cent. of gross earnings) if Rs. 50 per mile per week could be earned. But money just now is worth less than 3 per cent., judging by the rate, 2½ per cent. at which some recent debentures have been placed; and working expenses may, with care, be brought down perhaps to 60 per cent. of earnings; and on this basis, a line costing Rs. 22,000 per mile need only earn Rs. 37 per mile per week to pay its way.

3. I shall be glad if you can see your way to enquiring whether, in view of the traffic which, especially in famine years, these branches would bring to the main line, the Southern Mahratta Railway Company would see their way to promoting their construction. Meanwhile, pending their making enquiries as to traffic prospects, would the Agent offer to have them surveyed and projects prepared for them at the cost, primarily, of a grant under the head "Miscellaneous Railway expenditure," to be obtained by application of the Madras Government to the Government of India, who have already allotted such a grant for one of the group of 2-ft. lines which the Madras Railway Company have offered to survey. If so, I shall be glad to receive early estimates of the cost of the surveys so that the Government of India may be pressed for a grant.

4. Particulars regarding the projects referred to will be found in the accompanying copy of appendices Nos. II, III and IV of a letter, No. 169A, dated the 22nd March 1898, from the Madras Government to the Government of India.

From—The Officiating Consulting Engineer for Railways, Bombay.
To—The Consulting Engineer for Railways, Madras.
Dated—Bombay, 24th August 1899, No. 6699.

With reference to your letter No. 8/O., dated 26th April 1899, I have the honour to forward, herewith, a copy of a letter No. 8243/7074, dated 15th August 1899, and of its enclosures, from the Agent, Southern Mahratta Railway Company, and to request the favour of your furnishing me with two copies each of the appendices of your letter under reference, one copy being for the records of my office.

Enclosure.

From—The Agent, Southern Mahratta Railway Company.
To—The Consulting Engineer for Railways, Bombay.
Dated—15th August 1899, No. 8243/7074.

With reference to your memorandum No. 3609, dated 27th May 1899, forwarding copy of a letter No. 8/O., dated 26th April 1899, from the Consulting Engineer for Railways, Madras, I have the honour to forward, herewith, approximate estimates, amounting to Rs. 1,910 and Rs. 33,660, respectively, for (1) reconnaisance and (2) pucca surveys of the following feeder lines in the Madras Presidency :—

(1)	Hospet-Kottur	35 miles.
(2)	Bellary-Rayadrug	33 "
(3)	Narasaraopet-Pondugal	45 "

2. I have no objection to arranging for these surveys being made on the condition that—
(*a*) the cost of survey is to be met by funds obtained by the Madras Government;
(*b*) the question of whether the line should be made a 2-foot or metre gauge is left open; this as I am inclined to think that, for a branch from a metre gauge, a 2-foot gauge would be a mistake.

* * * * *

4. I shall be obliged if you will obtain and furnish this office with a copy of each of the appendices referred to in the Madras Consulting Engineer's letter quoted above.

From—The Consulting Engineer for Railways, Madras.
To—The Consulting Engineer for Railways, Bombay.
Dated—Ootacamund, 13th September 1899, No. 295/O.

In reply to your letter No. 6699, dated the 24th August 1899, I have the honour to enclose, for record in your own office, a copy of the Madras Government Proceedings, Nos. 169 and 169-A, Revenue, dated 22nd March 1898. For the information of the Agent, Southern Mahratta Railway, I beg to enclose a copy of the appendices (viz., pages 7, 8 and 9 only of No. 169-A) asked for in your letter under reply.

2. With reference to the remark of the Agent, Southern Mahratta Railway, as contained in his letter No. 8243/7074 of the 15th August 1899, I shall be prepared, *if necessary*, to recommend the Madras Government to apply to the Government of India for a grant to be spent by the Southern Mahratta Railway on the surveys under reference. I should have supposed, however, that the application to the Government of India for a grant would go in the usual course from the Government, not of Madras, but of Bombay. The Government of India has already allotted grants to the Madras and South Indian Railway Companies on this Government's application for the surveys of other of the famine feeder projects, as per margin, referred to in the printed Proceedings, Nos. 169 and 169-A of 22nd March 1898. I shall be obliged by your letting me know whether the Government of Bombay will apply for the grants for the three surveys which form the subject of your letter, or whether it is desired that the application should go from the Madras Government.

	Rs.
By Madras Railway Company—	
Tirupatur-Krishnagiri	5,000
Morappur-Dharmapuri	5,000
By South Indian Railway Company—	
Kalikiri-Rayachoti	4,000
Under accounts head "Miscellaneous Railway expenditure."	

3. With reference to the Agent's objections to building short branches on a gauge different from that of the present line, I need only remark that if the branch line need only be saddled with a capital outlay of Rs. 25,000 per mile, there seems no need to try and cheapen it by narrowing the gauge. If, however, the country should be at all rough, or the district road bridges not very sound, the loads and curves of the narrow gauge are more likely to prove suitable than those of the metre gauge.

4. I have the honour to invite a perusal of the accompanying memorandum entitled "*Railed Roads*" in which the subject under reference is fully dealt with. A copy for the use of the Agent, Southern Mahratta Railway, is also enclosed.

From—The Officiating Consulting Engineer for Railways, Bombay.
To—The Consulting Engineer for Railways, Madras.
Dated—Bombay, 27th September 1899, No. 7314.

With reference to your letter No. 295/O., dated 13th September 1899, I have the honour to inform you that, since the three proposed feeder lines lie wholly in the Madras Presidency, the Government of Bombay would prefer that the application to the Government of India for grants to be spent by the Southern Mahratta Railway on the three surveys referred to should go from the Government of Madras as originally suggested by you.

2. I beg to advise that a copy of your aforesaid letter and accompaniments have been forwarded to the Agent, Southern Mahratta Railway Company, for consideration of the remarks contained in paragraph 3 of the former.

From—The Consulting Engineer for Railways, Madras.
To—The Agent, Southern Mahratta Railway (*thorugh* the Consulting Engineer, Bombay, with reference to his letter No. 7314, dated 27th September 1899).
Dated—Ootacamund, 6th October 1899, No. 337/O.

With reference to your letter to the Consulting Engineer for Railways, Bombay, No. 8243/7074 of the 15th August 1899, I beg to inform you that that officer prefers that the Madras Government should apply to the Government of India for funds for the three surveys referred to inasmuch as the lines lie within the Madras Presidency. With this view I concur; but before making an application on the basis of either of the estimates accompanying your letter above referred to, I shall ask you to be kind enough to furnish me with another sort of estimate, formed on the basis of the following suggestions which govern the preparation of estimates for similar work being done by other Railway Companies in this Presidency:—

2. The survey estimate to cover the making of a complete survey and levels of the roads or routes proposed to be utilized, on a scale of 400 feet to one inch, sufficient to allow of curves and grades to be fixed, and accurate enough to permit of the actual staking out of the centre line hereafter when sanction to construction is received. The survey estimate to cover the cost of notes being made of all existing road works, culverts, &c., likely to be run over. The survey estimate to cover the cost of the preparation of an estimate on the basis of the above data.

3. You will see that I do not propose to ask for enough money to actually stake outthe lines, because this can always be done by the construction men, and because if done now all trace of the staking out may possibly be obliterated before the commencement of construction work is sanctioned. Attention is invited to the remarks on this and other subjects connected with railways of the class contemplated in the memorandum entitled "*Railed Roads*" of which copies will by this time doubtless have reached you, but of which for ready reference I enclose a copy.

From—The Agent, Southern Mahratta Railway Company.
To—The Consulting Engineer for Railways, Madras (*through* the Consulting Engineer for Railways, Bombay, and the Government Examiner, Dharwar).
Dated—Dharwar, 3rd November 1899, No. 8243/9381.

With reference to your letter, No. 337/O., dated the 6th October 1899, received under endorsement, No. 7660, dated the 13th idem, from the Consulting Engineer for Railways, Bombay, I have the honour to forward herewith an estimate, amounting to Rs. 20,550, prepared in accordance with the suggestions made by you for the surveys of the following feeder lines in the Madras Presidency:—

1. Hospet-Kottur ... ... 35 miles.
2. Bellary-Rayadrug ... ... 33 ,,
3. Narasaraopet-Pondugal ... ... 45 ,,

ESTIMATE, RS. 182 PER MILE.

Main head.	Minor heads.	Total of each.	Grand Total.
		Rs.	Rs.
Preliminary expenses ..	Survey expenses	200	20,550
	Survey plant	5,150	
	Establishment and office requirements ..	15,200	

Establishment Schedue.

Items.	Number.	Rate. Rs. per mensem.	Amount. Rs.	Total. Rs.
Executive Engineer for eight months ..	1	800	6,400	15,200
Surveyor ,, ,, ..	1	250	2,000	
Do. ,, ,, ..	1	150	1,200	
Draftsmen ,, ,, ..	2	50	800	
Tracers ,, ,, ..	2	25	400	
Clerk ,, ,, ..	1	60	480	
Do. ,, ,, ..	2	30	480	
Khallasies ,, ,, ..	6	8	384	
Cash guards ,, ,, ..	4	8	256	
Stationery	..	50	400	
Travelling allowance	..	300	2,400	

NOTE BY THE CONSULTING ENGINEER FOR RAILWAYS, MADRAS, DATED 16TH NOVEMBER 1899.

Light Famine Feeder Railway for the Madras Presidency.

In their Revenue Department letter, No. 18-31-1, dated the 18th September 1895, the Government of India expressed a wish to be furnished with a list of a limited number of railway projects for this Presidency, arranged in order of their protective value, with a view to their forming a judgment to what extent, and in what order, the several proposed lines might, within a reasonable number of years, be expected to effect a saving in the cost of the relief of famine equal to the cost of their construction, and so justify their being brought within the category of lines on which the Famine Insurance grant might be expended.

2. After long and thoughtful consideration this Government replied, by its Revenue Department letter, No. 169A., Revenue, dated 22nd March 1898, putting forward a programme of six short, light cheap railways, aggregating 186 miles, and varying in length from 16 miles to 45 miles purporting to fulfil the conditions imposed by the Government of India for their reception into the class of Famine Insurance lines. The following are the lines recommended:—

Order.	From	To	Length.
			MILES.
1	Hospet	Kottur	35
2	Kalikiri ..	Rayachoti	32
3	Morappur	Dharmapuri	16
4	Tiruppatur	Krishnagiri	25
5	Bellary	Rayadrug	33
6	Narasaraopet ..	Pondugal	45

3. As it seemed to this Government to be most desirable that some estimate should as soon as possible be available of the cost of these lines, and that something should at least be known in regard to the possibility of making them on the light, cheap railed-road standard, or at least of bringing them into the list of lines for which the District Boards might make themselves financially responsible, an attempt has been made to get them surveyed and to prepare projects for them. The results of this attempt have been as follows:—

4. When the Southern Mahratta Railway Company to which No. 1, Hospet-Kottur, 35 miles, No. 5, Bellary-Rayadrug, 33 miles and No. 6, Narasaraopet-Pondugal 45 miles, would form feeders, and by which they would be worked, were requested in April 1899 to furnish an estimate for their survey, they furnished two alternative estimates, one for the merest reconnaisance to cost Rs. 1,910, and the other for a regular complete project to cost Rs. 33,660. We then asked the Agent, Southern Mahratta Railway Company, to estimate for something not so cursory as a reconnaisance, and yet less expensive than a regular project survey. The result is that he has now sent in a fresh survey estimate, amounting to Rs. 20,550 for the 113 miles, or at the rate of Rs. 182 per mile. For this the Government of India's sanction, and a grant, must be obtained.

5. In their No. 220-A.R., dated the 24th July 1899, the Government of India sanctioned an estimate for Rs. 3,700, and allotted a grant for Rs. 4,000, for the survey to be made by the South Indian Railway Company of No. 2, the Kalikiri-Rayachoti, 32 miles. The survey party was formed on the 17th August 1899, and is still in the field. It was soon found out however that it would be of little or no use to lay rails on the existing track, or so-called road, which makes no attempt at avoiding hills and hollows, and which even if its levels were good would not be worth using. A line off the road must therefore be found, and the Company estimates that to find it, and to make a project, will cost Rs. 6,772. The six-month-estimate meanwhile has been made out for Rs. 7,000 and the survey is in progress. The Government of India must be definitely asked to sanction the revised estimate and to allot the additional grant. The estimate only comes to Rs. 212 per mile.

6. The Madras Railway Company have put in an estimate for the survey of No. 3, the Morrapur-Dharmapuri, 16 miles, amounting to Rs. 4,763, and the Government of India have sanctioned it and have allotted a grant of Rs. 5,000.

No. 1396 Rr., 4 November 1899.

PUBLIC WORKS DEPARTMENT.

Railway.

LETTER—from

FRANCIS J. E. SPRING, ESQ., C.I.E.,
Secretary to the Government of Madras,
Public Works Department,
Railway Branch,

TO

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

The accompanying copy of this Government's Proceedings, No. 1396, dated the 4th November 1899, has reference to the group of six light famine lines which, in reply to enquiries made by the Government of India in the Revenue and Agricultural Department, were put forward in an order of preference in this Government's Revenue Department letter, No. 169A., dated the 22nd March 1898.

2. The Proceedings in question contain, *inter alia*, the correspondence which has occurred in regard to the Kalikeri-Rayachoti survey since an estimate for that survey was sanctioned and a grant allotted by the Government of India in your letters Nos ~~dated the~~ 1388 R.C and 220 A.R dated 19 and 24 July 1899 respectively.

3. The correspondence in question occupies pages 2 to 6 of the accompanying Proceedings, and will be found summarised in paragraph 5 of the Consulting Engineer's note at the end of them, from which it will be seen that a grant of Rs. 7,000 will be necessary instead of the Rs. 4,000 already allotted. Of this the Government of India have been already made aware in the six months' estimate which reached you with my No. 1238 dated 28 October 1899.

4. Under the circumstances so fully explained in the Proceedings, His Excellency the Governor in Council has no hesitation in strongly recommending that the additional grant asked for may be allotted and that the revised survey estimate, as given on page 6 of the Proceedings, may be sanctioned.

5. Meanwhile the South Indian Railway Company have been authorised, in anticipation of the sanction now asked for, not to disperse the survey party *re-infecta* but to press on and get the work finished at the temporary cost of Revenue pending the increase by the Government of India of the grant already allotted, from Rs. 4,000 to Rs. 7,000.

I have the honour to be,
SIR,
Your most obedient servant,

Secretary.

FORT ST. GEORGE,
4th November 1899.

Exd. A. Rungasawmy Aiyangar.

Despatched on 5/11/99

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. Enclosures

Regd. } Spare copies

Letter, No. 1397 Ry., 4th December November 1899.

NOVEMBER.

Light Famine Feeder Railways for the Madras Presidency

Forwarding a copy of Proceedings on the subject of the — and recommending that the revised estimate for the Kalikeri-Rayachoti survey be sanctioned and an additional grant allotted.

No. 1398 Ry., 4th December November 1899.

PUBLIC WORKS DEPARTMENT.

Railway.

LETTER—from

FRANCIS J. E. SPRING, ESQ., C.I.E.,
Secretary to the Government of Madras,
Public Works Department,
Railway Branch,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

The accompanying copy of this Government's Proceedings, No. 1396, dated the 4th December November 1899, has reference to the group of six light famine lines, which, in reply to enquiries made by the Government of India in the Revenue and Agricultural Department, were put forward in an order of preference in this Government's Revenue Department letter, No. 169A, dated the 22nd March 1898.

2. The Proceedings in question contain, *inter alia*, the correspondence which has occurred with the Southern Mahratta Railway Company and with the Consulting Engineer for Railways, Bombay, on the subject of the three members of the group in question which will form feeders to the Southern Mahratta Railway, viz.—

1.	Hospet-Kottur	35 miles.
5.	Bellary-Rayadrug	33 „
6.	Narsaraopet-Pondugal	45 „

It will be seen from pages 6 to 9 of the Proceedings, and from paragraph 4 of this Government's Consulting Engineer's note at the end of them, that the Agent, Southern Mahratta Railway Company, has submitted an estimate, amounting to Rs. 20,550, for surveying the three lines, aggregating 113 miles in length, on the principles suggested by this Government's Consulting Engineer in his letter to the Agent, No. 3500, dated the 6th October 1899.

3. It seems unnecessary to repeat here the arguments used and the considerations advanced in Revenue Department letter, No. 169A of 22nd March 1898, in favour of the construction of these six short famine railways at the cost, should it be available, of the Famine Insurance Grant. But, meanwhile, it seems to this Government to be essential that some idea should be formed of the probable cost of them, and that projects should be ready for them in order that if an emergency should arise it may be possible to put their construction in hand without the loss of a season.

4. The gauge to be adopted will naturally to a great extent be dependent on the contour of country and therefore on practicable cost per mile. The chief consideration is that three or four miles, instead of one or two, should be made for one lakh of rupees, so that capital cost may bear a reasonable proportion to probable earnings from traffic offering. If, consistently with this principle, metre gauge lines can be got, so much the better; failing that, the lines must be on a narrower gauge and must be viewed in better sorts of district roads rather than in railways.

No. 1398 Ry., 4th November 1899.

5. From a perusal of the Bombay Consulting Engineer's letter, No. 7314, dated the 27th September 1899, it will be seen that it is in deference to the wishes of the Bombay Government that though this application is for funds for expenditure by the Southern Mahratta Railway Company it is being made by this Government.

6. I am therefore directed to strongly recommend that the Southern Mahratta Railway Company's survey estimate should be sanctioned and that a grant, to be expended during the current financial year, should be allotted. The expenditure of a smaller sum on a cheap reconnaissance is not recommended in the case of such very short lines.

I have the honour to be,
Sir,
Your most obedient servant,

omit

Secretary.

Fort St. George,
November 1899.

4th Dec.

26/11/99

Despatched on 5/12/99

Exd. Shaik Karim.

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

Regd. } *Spare copies*

Letter, No. 1398 **Ry.,** 4th Dec **November 1899.**

December

NOVEMBER.

Light Famine Feeder Railways for the Madras Presidency

Forwarding a copy of Proceedings on the subject of the — and recommending that the estimate for the surveys of certain famine feeder lines of the Southern Mahratta Railway be sanctioned and grant allotted.

9-7-32 II

23/1/[illegible]

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. }
} 1899.
Regd. }

Enclosures

Spare copies

G.O., No. 1396 Ry., 4th December 1899.

DECEMBER.

(A)

Light Famine Feeder ~~Railways for the Madras Presidency~~ branches of the South Indian & Southern Mahratta Railway

Ordering that the Government of India be addressed on the subject of ~~the~~ certain —.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read again the following papers:—

G.O., Nos. 169 and 169 A, Revenue, dated 22nd March 1898, submitting to the Government of of India a list of six selected light feeder famine railways.

G.O., No. 874 Ry., dated 7th August 1899, communicating to the Agent, South Indian Railway Company, the Government of India's sanction to an estimate and allotment of a grant for the survey of the projected Kalikiri-Rayachoti light railway.

G.O., No. 469 Ry., dated 25th April 1899, communicating to the Agent, Madras Railway, the Government of India's sanction to an estimate and allotment of a grant for the survey of the projected light railway from Trippattur to Krishnagiri.

G.O., No. 742 Ry., dated 7th July 1899, communicating to the Agent, Madras Railway, the Government of India's sanction to an estimate and allotment of a grant for the survey of the projected light railway from Morappur to Dharmapuri.

Read also the following papers:—

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Ootacamund.
Dated—Trichinopoly, 22nd August 1899, No. 850.

With reference to correspondence ending with Madras G.O., No. 874 Ry., dated 7th August 1899, regarding the survey for preparing a project for a light railway from Kalikiri to Rayachoti, I have the honour to request that I may be favoured at an early date with the detailed instructions promised in your letter No. 20/O. of 9th May 1899.

From—The Consulting Engineer for Rys., Madras.
To—The Agent, South Indian Railway.
Dated—Ootacamund, 1st Sept. 1899, No. 263/O.
} Copy to the Agent, Madras Railway Company, with No. 264/O., dated 1st September 1899.

I have the honour to acknowledge the receipt of your letter No. 850, dated the 22nd August 1899, in which you ask for the detailed instructions, promised in my No. 20/O. of 9th May 1899, in regard to the Kalikiri-Rayachoti line. When the suggestion that the line should be surveyed was first made it was in contemplation that all these cheap famine feeders should be made on the 2-ft. gauge, with a view to economy of construction. Since then however the Government of India have expressed a wish that as a general rule the 2′ 6″ gauge should be adhered to. As a carefully equipped line on that gauge, with engines and rolling-stock light enough for the traffic to be expected, can be made as cheaply, Rs. 22,000 to Rs. 25,000 per mile, as to be likely to pay in ordinary years; and as, moreover, there are undoubted advantages in being able to exchange with, or sell off to, neighbouring lines, when rolling-stock must be altered either in quality or in quantity to suit alterations of traffic; it is considered best that the project should be prepared for the 2′ 6″ gauge. As you doubtless have, or can have, access to the details of the projected Madura tramways, and as Mr. Crighton has seen the Tezpur tramway which to my mind is the best model

for light cheap feeders, and as also the 2′ 6″ Parlakimedi line now nearly completed is not too far off for a visit of inspection, it seems less necessary that I should go into details than if your projected line were to be on the 2-ft. gauge.

2. The first thing to do is to obtain an accurate survey of the existing road in order to ascertain whether it can or ought not to be adhered to. If possible to adhere to it, much primary capital expenditure may be saved; and if the traffic should hereafter warrant your doing so you could leave the road in places so as to improve curves and grades. The first essential however, until traffic proves itself deserving of better, is that engines should creep over the road at 10 miles per hour dragging what vehicles will just suffice for the traffic. Slow speeds like this mean that even culverts made in the usual District fashion may in most cases be left unaltered, except for a cushion of earth, or a couple of beams, beneath the sleepers.

3. The gradients to be adopted will depend chiefly on existing road gradients, and if these are and must remain stiff the engines must be designed accordingly. The Barsi and Tezpur engines are both exceedingly good in their way but of totally different types, fit the one for stiff grades and heavy loads, and the other for 1 in 100 and easier. As regards curves, you naturally will not use stiff curves if you can get easy ones without much expenditure; 100-ft. radius is good enough for the Tezpur engines; on the other hand there is no use in spending money to ease curves of 358-ft. radius on the 2′ 6″ gauge; but, naturally, you will get as good curves as the road permits between these two extremes. Rather, however, than inordinately lengthen the curved parts of the road it will be best as a rule to make 358-ft. the maximum radius.

4. Pending the development of goods traffic I think bogie stock would be a mistake; the unit is too large. I do not think that for an unproved traffic you can much improve on the Tezpur stock. As it seems probable that at first no more than one engine will be in steam at a time, three engines ought apparently to suffice until the traffic demands more. Similarly one upper class composite carriage will run with each train, so three of that class ought probably to suffice. Thirds will depend on the probable traffic offering, and neither this class nor covered goods waggons need be cut too fine.

5. The principle governing the whole design and estimate of these little railed-roads is that extreme cheapness of first equipment, with the possibility of unwastefully improving the equipment, at any time hereafter, should be steadily borne in mind. It is not of course essential that a purely famine line should pay interest on capital as well as working expenses; but efforts should be made to design it so cheaply, consistently always with economy of maintenance, that it *will* pay interest. Your Company will naturally look for their profit chiefly to the access of traffic to the main line which may always be trusted to follow the substitution of a light railway for carts along any district road.

6. I shall in a few days send you a memorandum, now in the press, in which the whole subject of these railed-roads is very fully dealt with.

From—The Agent, South Indian Railway.
To—The Consulting Engineer for Railways, Ootacamund.
Dated—Trichinopoly, 23rd October 1899, No. 1052.

With reference to your letter No. 263/O., dated 1st September 1899, regarding the survey for a light railway from Kalikiri to Rayachoti, I have the honour to forward a copy of a report by the Engineer-in-Chief for Surveys and Construction on an inspection he has made of the proposed alignment, together with the tracings referred to therein, and shall be obliged by your informing me whether Mr. Michell's proposals are approved?

I also forward, for favour of sanction, a revised estimate, amounting to Rs. 6,772, for the cost of the survey in supersession of that (for Rs. 3,700) embodied in Madras G.O., No. 874 Ry., dated 7th August 1899, and shall be glad to receive early intimation of the same being sanctioned, as well as of an increased allotment being provided to meet the enhanced outlay.

Enclosure No. 1.

Report of Inspection by the Engineer-in-Chief, Construction Branch, South Indian Railway Company, Limited, of the Kalikiri-Rayachoti Light Feeder Railway Survey, on the 12th and 13th October 1899.

Orders for Survey.—Orders were received from the Acting Agent in his No. R. 1657-41/116 of the 31st July 1899 to commence a survey of the above line.

Instructions to Mr. G. Marini, Assistant Engineer.—On the 31st August Mr. G. Marini, Assistant Engineer, was directed to take charge of the survey, and the following general instructions were given him:—

1*st.*—To survey for the proposed tramway from Kalikiri station on the Pakala-Dharmavaram section of the South Indian Railway to the town of Rayachoti about 32 miles to the north, along or near the present road which runs between these places.

2*nd.*—The survey was to be a point to point traverse locating the line to the best advantage near the road, curves to be of 4° (1,432·5 feet radius) as far as possible, but no curve to be greater than 24° (238 feet radius).

3*rd.*—A survey of the road to be made, and for 100 feet on each side to show boundaries of fields, &c., and his special attention was invited to the instructions contained in the rules for the preparation of railway projects, chapter IV, pages 3 to 7.

4*th.*—Bench marks were to be put in at least every half mile, and at the site of all important bridges.

Survey operations commenced on the 3rd September, and on the 12th instant the line had been located, surveyed, levelled and check levelled up to the town of Kalakada—a distance of 14 miles or nearly half way to Rayachoti.

Description of road to the 16th mile.—The present road starts from the eastern end of the Kalikiri station yard and runs for 10 miles in a fairly straight line to the village of Mahal (marked Chennaravukottapulli on map); it is about 15 feet wide, very little metalled, and is not bridged. For the most of the way it passes over partly decomposed gneiss rock.

The road was laid out on the shortest route principle, and to put a railway alongside would entail needless expense.

On leaving the station at chain 9 it descends into a valley to chain 15, and at chain 25 it begins to ascend to chain 86, rising 88 feet in 61 chains. From this point the road crosses a series of spurs and valleys till within half a mile of the village of Gundlur, where the ground is fairly level to the village of Mahal near where we propose to cross the Bahadu river.

I have enclosed a section of the proposed line from chain 9 to chain 252, about 5 miles, which shows the continuous steep gradients we should have to contend with by keeping the line as at present located. But besides this we should have to put up a regular series of bridges in the valleys crossed, which would entail great expense, and would probably make the cost prohibitive.

Proposed route for line between Kalikiri and Mahal.—On the accompanying plan I have shown where I strongly recommend the line to be placed.

It would leave the present road near chain 20, and diverge to the right, skirting around the high ground past the village of Ootkandlapulle, and then gradually ascend till about half a mile to the east just opposite chain 90, at a grade of 1 in 100; from this point the line would be practically a ridge one all the way with easy grades to Mahal, and would cost but little to construct, as the works would be light; and, as it goes chiefly through jungle, the cost of land will be small.

Re-survey of Kalikiri-Mahal section recommended.—I strongly recommend that sanction be given for a survey of this line to be made joining our present line near Mahal village; it will of course exceed our present survey estimate, but it will amply repay in saving of earthwork and bridgework. I may note that between Kalikiri and Mahal there is not a single hamlet near the road which will not be as equally well served by the new proposed route.

Station site for Mahal.—The station site chosen by Mr. Marini at Mahal is a very good one.

I propose to have a small station in the 5th mile where the line will cross the road leading to several villages on the right, and the village of Medikurti on the left, which is situate on the banks of the Bahadu river.

The Bahadu river.—The Bahadu river is crossed just beyond the village of Mahal, and the site selected is the best; the river will not be an expensive one to cross as rock is near the surface, and excellent building stone abounds in the district.

Location of line from Mahal to Kalakada (mile 14).—The through road from Kalikiri joins the main road from Chittoor to Rayachoti at mile 148½ from Madras main road mileage. Though Mr. Marini had located a line along the road to Kalakada, I directed him to start again at the fixed crossing over the Bahadu, and take the red dotted line shown in the plan; it will give easier gradients, be cheaper to construct both in earthwork and bridgework, and it will avoid crossing a valley into which the road has a steep descent about half a mile south of Kalakada.

Kalakada Station site.—The station site for Kalakada will be at the south side of the village on open ground in a very convenient situation.

The Satyavati Nadi.—The line will cross the road just at the entrance to the village, and turn sharp to the left, and cross the Satyavati Nadi at an excellent place where the river is narrow, and the founds of rock near the surface. After crossing the river the road goes through some flat country, and then ascends at a very steep gradient (about 1 in 50), and undulates for some miles.

Proposed alignment for line north of Kalakada.—Instead of keeping to the side of the road I propose to locate the line as shown in dotted red on the plan; it will cross the road about ¾ mile beyond the river, then skirt alongside a valley so as to get an easy gradient up to where it approaches the road in the 16th mile. The new alignment will entail, for about a mile, heavier bridging than will be required on the main road, which is bridged by arched culverts on this section, but we shall be compensated by having easier grades and less earthwork. The proposed diversions I have made will serve the district equally as well as the present road.

Line from 16th mile to Rayachoti.—I have instructed Mr. Marini to locate the line from the 16th mile to Rayachoti on the same principles that I have adopted for the first half of the line, the chief towns or villages along the road being considered as objective points.

Survey operations.—According to the amended rules for the preparation of projects it is necessary to submit, even for a preliminary survey, a rough plan of the country showing villages and natural features 500 feet on each side of the line, and all important waterways must be surveyed for one mile, up and down stream for one mile. This will necessitate more survey work than was originally intended to be done—judging by the present estimate. The country through which the road passes is undulating, and in parts a lot of small jungle trees have to be cut, and it is not so easy to survey and locate a line as if it were in the plains. Already 6 weeks have been spent on the work done, and I do not consider Mr. Marini has wasted any time on it.

The present estimate allows survey expenses at the rate of Rs. 20 per mile, the actual expenses to date work out to Rs. 40 per mile; besides the time allotted for the field work with the staff is not sufficient to complete the work, including the staking out of a new line between Kalikiri and Mahal as already recommended, doing the extra survey work along the line, and surveying the rivers a mile up and down stream, I compute the field work will take 4 months to complete, and am submitting a revised estimate herewith for favour of sanction being obtained. No provision was made for the Assistant Engineer to prepare the estimates in the office, this I have made in the revised estimate. I request favour that early sanction be obtained to the proposals in my report and to the passing of the estimate.

—

Enclosure No 2.

Estimate for making a survey and section of the 2′6″ gauge feeder line from Kalikiri to Rayachoti. Estimated length 32 miles.

	Rs.	Rs.	Rs.
(*a*) *Survey Expenses*—			
Centre pegs, clearing jungle, &c., 32 miles, at Rs. 40 per mile		1,280	
Cartage, stationery, printing project estimates and other contingent charges ..		600	1,880
(*b*) *Plant*—			
Swiss cottage tent with carpets, No. 1	430		
Campaign tent, No. 1	120		
Pals, No. 6, at Rs. 52½	315		
Necessary tent, No. 1	35		
Less credits at 75 per cent. of issue price	—675	225	
Instruments—			
Theodolite, No. 1	190		
Level, No. 1	90		
Levelling staves, No. 2	80		
Compass prismatic, No. 1	50		
Box instrument mathematical, No. 1	50		
Edges straight steel, No. 1	20		
Other items of plants including furniture	320		
Less credits at 87½ o/o of issue price	—700	100	325
(*c*) *Establishment*—			
1 Assistant Engineer for 4 months, at Rs. 400 per mensem		1,600	
1 Surveyor for 4 months, at Rs. 135 per mensem		540	
1 Apothecary for 4 months, at Rs. 50 per mensem		200	
1 Clerk for 4 months, at Rs. 40 per mensem		160	
13 Lascars for 4 months, at Rs. 8 per mensem		416	
Travelling and other allowances and expenses		451	
1 Assistant Engineer for 2 months, at Rs. 400 per mensem, preparing project ..		800	
2 Estimators for 2 months, at Rs. 60 each per mensem .. ,, ,, ..		240	
1 Draftsman for 2 months, at Rs. 40 per mensem .. ,, ,, ..		80	
2 Tracers or clerks for 2 months, at Rs. 20 each per mensem ,, ,, ..		80	4,567
Grand Total ..			6,772

From—The Consulting Engineer for Railways, Madras.
To—The Consulting Engineer for Railways, Bombay.
Dated—Ootacamund, 26th April 1899, No. 8/O.

Amongst six proposals put forward by the Madras Government a year ago for short 2-ft. feeder railways to penetrate the interior of selected famine tracts, the survey of two has been undertaken by the Madras Railway Company to which they will form feeders. Of the remaining four, three would form feeders of the Southern Mahratta Railway. The following are the three referred to :—

Hospet-Kottur	35	miles.
Bellary-Rayadrug	33	"
Narasaraopet-Pondugal ...	45	"

2. Judging from experience of the Jorhat State Railway in Assam and of the Howrah-Ampta and Howrah-Shewanhali Railways in Bengal, these three little 2-foot railways if laid on the existing district roads ought not to cost more, when fully equipped, than from Rs. 22,000 to Rs. 25,000 per mile. Interest on the higher of these sums at 3 per cent. comes to less than Rs. 15 per week, and net earnings would cover this (even were working expenses to form 70 per cent. of gross earnings) if Rs. 50 per mile per week could be earned. But money just now is worth less than 3 per cent., judging by the rate, $2\frac{1}{2}$ per cent. at which some recent debentures have been placed; and working expenses may, with care, be brought down perhaps to 60 per cent. of earnings; and on this basis, a line costing Rs. 22,000 per mile need only earn Rs. 37 per mile per week to pay its way.

3. I shall be glad if you can see your way to enquiring whether, in view of the traffic which, especially in famine years, these branches would bring to the main line, the Southern Mahratta Railway Company would see their way to promoting their construction. Meanwhile, pending their making enquiries as to traffic prospects, would the Agent offer to have them surveyed and projects prepared for them at the cost, primarily, of a grant under the head "Miscellaneous Railway expenditure," to be obtained by application of the Madras Government to the Government of India, who have already allotted such a grant for one of the group of 2-ft. lines which the Madras Railway Company have offered to survey. If so, I shall be glad to receive early estimates of the cost of the surveys so that the Government of India may be pressed for a grant.

4. Particulars regarding the projects referred to will be found in the accompanying copy of appendices Nos. II, III and IV of a letter, No. 169A, dated the 22nd March 1898, from the Madras Government to the Government of India.

From—The Officiating Consulting Engineer for Railways, Bombay.
To—The Consulting Engineer for Railways, Madras.
Dated—Bombay, 24th August 1899, No. 6699.

With reference to your letter No. 8/O., dated 26th April 1899, I have the honour to forward, herewith, a copy of a letter No. 8243/7074, dated 15th August 1899, and of its enclosures, from the Agent, Southern Mahratta Railway Company, and to request the favour of your furnishing me with two copies each of the appendices of your letter under reference, one copy being for the records of my office.

Enclosure.

From—The Agent, Southern Mahratta Railway Company.
To—The Consulting Engineer for Railways, Bombay.
Dated—15th August 1899, No. 8243/7074.

With reference to your memorandum No. 3609, dated 27th May 1899, forwarding copy of a letter No. 8/O., dated 26th April 1899, from the Consulting Engineer for Railways, Madras, I have the honour to forward, herewith, approximate estimates, amounting to Rs. 1,910 and Rs. 33,660, respectively, for (1) reconnaisance and (2) pucca surveys of the following feeder lines in the Madras Presidency :—

(1) Hospet-Kottur	35	miles.
(2) Bellary-Rayadrug	33	"
(3) Narasaraopet-Pondugal	45	"

2. I have no objection to arranging for these surveys being made on the condition that—
(*a*) the cost of survey is to be met by funds obtained by the Madras Government ;
(*b*) the question of whether the line should be made a 2-foot or metre gauge is left open; this as I am inclined to think that, for a branch from a metre gauge, a 2-foot gauge would be a mistake.

* * * * *

4. I shall be obliged if you will obtain and furnish this office with a copy of each of the appendices referred to in the Madras Consulting Engineer's letter quoted above.

From—The Consulting Engineer for Railways, Madras.
To—The Consulting Engineer for Railways, Bombay.
Dated—Ootacamund, 13th September 1899, No. 295/O.

In reply to your letter No. 6699, dated the 24th August 1899, I have the honour to enclose, for record in your own office, a copy of the Madras Government Proceedings, Nos. 169 and 169-A, Revenue, dated 22nd March 1898. For the information of the Agent, Southern Mahratta Railway, I beg to enclose a copy of the appendices (viz., pages 7, 8 and 9 only of No. 169-A) asked for in your letter under reply.

2. With reference to the remark of the Agent, Southern Mahratta Railway, as contained in his letter No. 8243/7074 of the 15th August 1899, I shall be prepared, *if necessary*, to recommend the Madras Government to apply to the Government of India for a grant to be spent by the Southern Mahratta Railway on the surveys under reference. I should have supposed, however, that the application to the Government of India for a grant would go in the usual course from the Government, not of Madras, but of Bombay. The Government of India has already allotted grants to the Madras and South Indian Railway Companies on this Government's application for the surveys of other of the famine feeder projects, as per margin, referred to in the printed Proceedings, Nos. 169 and 169-A of 22nd March 1898. I shall be obliged by your letting me know whether the Government of Bombay will apply for the grants for the three surveys which form the subject of your letter, or whether it is desired that the application should go from the Madras Government.

	Rs.
By Madras Railway Company—	
Tirupatur-Krishnagiri	5,000
Morappur-Dharmapuri	5,000
By South Indian Railway Company—	
Kalikiri-Rayachoti	4,000
Under accounts head "Miscellaneous Railway expenditure."	

3. With reference to the Agent's objections to building short branches on a gauge different from that of the present line, I need only remark that if the branch line need only be saddled with a capital outlay of Rs. 25,000 per mile, there seems no need to try and cheapen it by narrowing the gauge. If, however, the country should be at all rough, or the district road bridges not very sound, the loads and curves of the narrow gauge are more likely to prove suitable than those of the metre gauge.

4. I have the honour to invite a perusal of the accompanying memorandum entitled "*Railed Roads*" in which the subject under reference is fully dealt with. A copy for the use of the Agent, Southern Mahratta Railway, is also enclosed.

From—The Officiating Consulting Engineer for Railways, Bombay.
To—The Consulting Engineer for Railways, Madras.
Dated—Bombay, 27th September 1899, No. 7314.

With reference to your letter No. 295/O., dated 13th September 1899, I have the honour to inform you that, since the three proposed feeder lines lie wholly in the Madras Presidency, the Government of Bombay would prefer that the application to the Government of India for grants to be spent by the Southern Mahratta Railway on the three surveys referred to should go from the Government of Madras as originally suggested by you.

2. I beg to advise that a copy of your aforesaid letter and accompaniments have been forwarded to the Agent, Southern Mahratta Railway Company, for consideration of the remarks contained in paragraph 3 of the former.

From—The Consulting Engineer for Railways, Madras.
To—The Agent, Southern Mahratta Railway (*thorugh* the Consulting Engineer, Bombay, with reference to his letter No. 7314, dated 27th September 1899).
Dated—Ootacamund, 6th October 1899, No. 337/O.

With reference to your letter to the Consulting Engineer for Railways, Bombay, No. 8243/7074 of the 15th August 1899, I beg to inform you that that officer prefers that the Madras Government should apply to the Government of India for funds for the three surveys referred to inasmuch as the lines lie within the Madras Presidency. With this view I concur; but before making an application on the basis of either of the estimates accompanying your letter above referred to, I shall ask you to be kind enough to furnish me with another sort of estimate, formed on the basis of the following suggestions which govern the preparation of estimates for similar work being done by other Railway Companies in this Presidency:—

2. The survey estimate to cover the making of a complete survey and levels of the roads or routes proposed to be utilized, on a scale of 400 feet to one inch, sufficient to allow of curves and grades to be fixed, and accurate enough to permit of the actual staking out of the centre line hereafter when sanction to construction is received. The survey estimate to cover the cost of notes being made of all existing road works, culverts, &c., likely to be run over. The survey estimate to cover the cost of the preparation of an estimate on the basis of the above data.

3. You will see that I do not propose to ask for enough money to actually stake out the lines, because this can always be done by the construction men, and because if done now all trace of the staking out may possibly be obliterated before the commencement of construction work is sanctioned. Attention is invited to the remarks on this and other subjects connected with railways of the class contemplated in the memorandum entitled "*Railed Roads*" of which copies will by this time doubtless have reached you, but of which for ready reference I enclose a copy.

From—The Agent, Southern Mahratta Railway Company.
To—The Consulting Engineer for Railways, Madras (*through* the Consulting Engineer for Railways, Bombay, and the Government Examiner, Dharwar).
Dated—Dharwar, 3rd November 1899, No. 8243/9381.

With reference to your letter, No. 337/O., dated the 6th October 1899, received under endorsement, No. 7660, dated the 13th idem, from the Consulting Engineer for Railways, Bombay, I have the honour to forward herewith an estimate, amounting to Rs. 20,550, prepared in accordance with the suggestions made by you for the surveys of the following feeder lines in the Madras Presidency:—

1. Hospet-Kottur ... ... 35 miles.
2. Bellary-Rayadrug ... ... 33 ,,
3. Narasaraopet-Pondugal ... ... 45 ,,

ESTIMATE, RS. 182 PER MILE.

Main head.	Minor heads.	Total of each.	Grand Total.
		Rs.	Rs.
Preliminary expenses ..	Survey expenses	200	20,550
	Survey plant	5,150	
	Establishment and office requirements ..	15,200	

Establishment Schedule.

Items.	Number.	Rate. Rs. per mensem.	Amount. Rs.	Total. Rs.
Executive Engineer for eight months ..	1	800	6,400	15,200
Surveyor ,, ,, ..	1	250	2,000	
Do. ,, ,, ..	1	150	1,200	
Draftsmen ,, ,, ..	2	50	800	
Tracers ,, ,, ..	2	25	400	
Clerk ,, ,, ..	1	60	480	
Do. ,, ,, ..	2	30	480	
Khallasies ,, ,, ..	6	8	384	
Cash guards ,, ,, ..	4	8	256	
Stationery	..	50	400	
Travelling allowance	..	300	2,400	

NOTE BY THE CONSULTING ENGINEER FOR RAILWAYS, MADRAS, DATED 16TH NOVEMBER 1899.

Light Famine Feeder Railways for the Madras Presidency.

In their Revenue Department letter, No. 18-31-1, dated the 18th September 1895, the Government of India expressed a wish to be furnished with a list of a limited number of railway projects for this Presidency, arranged in order of their protective value, with a view to their forming a judgment to what extent, and in what order, the several proposed lines might, within a reasonable number of years, be expected to effect a saving in the cost of the relief of famine equal to the cost of their construction, and so justify their being brought within the category of lines on which the Famine Insurance grant might be expended.

2. After long and thoughtful consideration this Government replied, by its Revenue Department letter, No. 169A., Revenue, dated 22nd March 1898, putting forward a programme of six short, light cheap railways, aggregating 186 miles, and varying in length from 16 miles to 45 miles, purporting to fulfil the conditions imposed by the Government of India for their reception into the class of Famine Insurance lines. The following are the lines recommended:—

Order.	From	To	Length.
			MILES.
1	Hospet	Kottur	35
2	Kalikiri	Rayachoti	32
3	Morappur	Dharmapuri	16
4	Tiruppatur	Krishnagiri	25
5	Bellary	Rayadrug	33
6	Narasaraopet	Pondugal	45

3. As it seemed to this Government to be most desirable that some estimate should as soon as possible be available of the cost of these lines, and that something should at least be known in regard to the possibility of making them on the light, cheap railed-road standard, or at least of bringing them into the list of lines for which the District Boards might make themselves financially responsible, an attempt has been made to get them surveyed and to prepare projects for them. The results of this attempt have been as follows:—

4. When the Southern Mahratta Railway Company to which No. 1, Hospet-Kottur, 35 miles, No. 5, Bellary-Rayadrug, 33 miles and No. 6, Narasaraopet-Pondugal 45 miles, would form feeders, and by which they would be worked, were requested in April 1899 to furnish an estimate for their survey, they furnished two alternative estimates, one for the merest reconnaisance to cost Rs. 1,910, and the other for a regular complete project to cost Rs. 33,660. We then asked the Agent, Southern Mahratta Railway Company, to estimate for something not so cursory as a reconnaissance and yet less expensive than a regular project survey. The result is that he has now sent in a fresh survey estimate, amounting to Rs. 20,550 for the 113 miles, or at the rate of Rs. 182 per mile. For this the Government of India's sanction, and a grant, must be obtained.

5. In their No. 220-A.R., dated the 24th July 1899, the Government of India sanctioned an estimate for Rs. 3,700, and allotted a grant for Rs. 4,000, for the survey to be made by the South Indian Railway Company of No. 2, the Kalikiri-Rayachoti branch, 32 miles. The survey party was formed on the 17th August 1899, and is still in the field. It was soon found out however that it would be of little or no use to lay rails on the existing track, or so-called road, which makes no attempt at avoiding hills and hollows, and which even if its levels were good would not be worth using. A line off the road must therefore be found, and the Company estimates that to find it, and to make a project, will cost Rs. 6,772. The six-month-estimate meanwhile has been made out for Rs. 7,000 and the survey is in progress. The Government of India must be definitely asked to sanction the revised estimate and to allot the additional grant. The estimate only comes to Rs. 212 per mile.

6. The Madras Railway Company have put in an estimate for the survey of No. 3, the Morrapur-Dharmapuri, 16 miles, amounting to Rs. 4,763, and the Government of India have sanctioned it and have allotted a grant of Rs. 5,000.

7. An estimate for a survey of No. 4, the Tirupatur-Krishnagiri, 25 miles, with an alternative to Patchur, amounting to Rs. 11,362 was submitted by the Madras Railway Company, and was sanctioned by the Government of India in April last; and a grant of Rs. 5,000 for the current year, to be supplemented if necessary, was made for the purpose. The survey party are in the field.

8. It will be convenient here to repeat what was said about these six lines in our letter to the Government of India, No. 167-A. Rev., of March 22nd, 1898:—

8. *The Hospet-Kottur Railway.*—The first item on the preference list is a line about 35 miles in length, southwards from Hospet, a station of the Southern Mahratta Railway, to Kottur, a distributing centre for four or five taluks which give much trouble in famine times. It has from time to time been proposed that a line about 66 miles in length should cross from Hospet southwards to the Mysore State Railway at Devangiri. It has been urged that the southern part of this line would form a valuable feeder to the Mysore line, while its northern part would provide the protection so much needed in Eastern Bellary. After full consideration, however, it has been decided that it is expedient that famine requirements must have first consideration, and that all that is necessary for famine purposes being 35 miles of a 2-ft. gauge railway from Hospet to Kottur, the Government of India should be asked to admit this short line as of primary importance in the famine railway scheme. It has therefore been accorded the first place on the list now submitted.

9. *The Kalikiri-Rayachoti Railway.*—A tract which in times of scarcity gives, perhaps, nearly as much cause for anxiety as that just referred to, is the central part of the Cuddapah district lying between the Renigunta-Pakala-Dharmavaram section of the South Indian Railway and the North-West section of the Madras Railway. Various schemes, marked No. V on the map, have from time to time been put forward for crossing this tract as well as a part of the Kurnool district, by a line running southward from Nandyal station of the Southern Mahratta Railway through Yerraguntla station of the Madras Railway to Kalikiri on the South Indian Railway. But, on a review of all the local circumstances of the districts intended to be served by such a line, it has been decided that all that at present is necessary, in the interests of famine protection, is a branch on two-foot gauge, about 35 miles in length, from the South Indian railway in the neighbourhood of Kalikiri, or Pileru, to Rayachoti. This line has been given the second place in order of preference.

10. *The Tiruppattur-Krishnagiri Railway* (and the *Morappur-Dharmapuri Railway*).—North Western Salem has always, in times of scarcity, given rise to much anxiety. It has from time to time been proposed to make it safe by a line from Bangalore through Hosur to Morappur station on the Madras Railway. This Government, however, are of opinion that all immediate famine purposes will be sufficiently well served if its two chief centres of distribution, Krishnagiri and Dharmapuri, are connected with the Madras Railway;—the former by 25 miles of a 2 ft. line to Tiruppattur, and the latter by 16 miles of a 2 ft. line to Morappur station, both lines being, as far as possible, laid on district roads. It would appear from a glance at the map as if the country served by the Jalarpet-Krishnagiri line were already sufficiently near to the Bangalore branch of the Madras Railway to be protected thereby. But such is not the case, for a roadless range of hills intervenes.

11. *The Bellary-Rayadrug Railway.*—The south-eastern parts of Bellary district, which this line is intended to serve, draw their supplies in ordinary years from the Anantapur side, from places which in famine years are unable to afford them the grain which they need for themselves. It is then most desirable that their trade centre, Rayadrug, should be connected with Bellary town, which is a large enough centre of distribution to the trusted not to fail supplies now that it is connected with the Kistna delta. With a view of serving Rayadrug as well as the parts of Mysore territory which lie south of it, schemes have been put forward for 110 miles of line to connect Bellary with Holalkiri. But this Government considers that for famine-relief purposes Rayadrug and its adjoining taluks will be sufficiently safeguarded if the proposed 33 miles of 2 ft. gauge line be laid southward, for the most part along existing roads, from Bellary to Rayadrug. This project has been allotted the fifth place in the programme.

12. *The Narasaropet-Pondugal Railway.*—The north-western part of the Kistna district of which the centre of trade is Pondugal, on the border of the Nizam's territory, is always a cause of apprehension in famine years. The tract proposed to be served is isolated from the Bellary-Kistna section of the Southern-Mahratta Railway by a line of hills, through which passes the road on which it is now proposed to lay 45 miles of a 2 ft. gauge railway.

9. The action which has been taken to obtain surveys and estimates of these six short selected lines has been detailed above, but it will be convenient to summarise it here by repeating that estimates have been sanctioned and grants made for the two lines, Nos. 3 and 4, which will form feeders to the Madras Railway Company. Similarly No. 2, which will form a feeder to the South Indian Railway Company, has had its survey estimates sanctioned and has got a grant; but it is now found that it will cost Rs. 7,000 instead of Rs. 4,000, so the Government of India must be written to.

We have not yet addressed the Government of India on the subject of the surveys of Nos. 1, 5, 6, which will form branches of the Southern Mahratta Railway. They may now be addressed in regard to these three lines.

10. It is very important that surveys and projects should be simultaneously in preparation for all these little 2′ 6″ railed roads; for it is proposed to design them on one uniform principle and at the lowest cost which is consistent with their paying their way in ordinary years and proving fit for the extra work which is likely to be demanded of them in famine years. By getting them all done at one time, supervision will be easier and more effective, and design will be more unifrom. The whole affair is really comparatively small one, *viz.*, 186 miles of little railways of local interest, and this Government is making every effort to promote their construction by instigating special legislation having for its object a local guarantee or a local raising of money, to take the place of a guarantee by the Imperial Government; and I think that the least the Government of India can be expected to do, pending the successful issue of this Government's scheme, is to grant the comparatively small sum required for the surveys; a sum which, as each line is taken in hand on borrowed capital, will be recouped.

11. But should this Government fail to persuade the District Boards to bear the burden of a guarantee or of a loan for these lines, and should it therefore become necessary to construct them out of Indian Revenues from the Famine Insurance Grant, the need for so doing will probably only become evident when a famine is inevitable; and in the absence of a complete survey and project, a season, and that a famine season, may quite conceivably elapse before the projected lines can be of any use for famine purpose. A glance at the table of previous famine outlay in the districts proposed to be served by these six little lines will show how very easily as much money may be spent on relief measures as would suffice not only to cover ten times over the paltry outlay necessary for the survey, but to complete and equip the lines themselves.

Order—No. 1396 Ry., dated 4th December 1899.

The Government of India will be addressed.

[Here enter Nos. 1397–98 Ry., dated 4th December 1899.]

(True Extract.)

Francis J. E. Spring,
Secretary.

Rad. T. K. Narayana Aiyangar.

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. }1899. *Enclosures*

Regd. *Spare copies*

Letter, No. 1397 Ry., 4th December 1899.

DECEMBER.

transfer of the Lotti Ghat to Southern Mahratta Railway

Light Famine Feeder ~~Railways for the Madras Presidency~~

Forwarding a copy of Proceedings on the subject of ~~the~~ — and recommending that the revised estimate for the Kalikeri-Rayachoti survey be sanctioned and an additional grant allotted.

certain

PUBLIC WORKS DEPARTMENT.

Railway.

LETTER—from

FRANCIS J. E. SPRING, ESQ., C.I.E.,
Secretary to the Government of Madras,
Public Works Department,
Railway Branch,

To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

The accompanying copy of this Government's Proceedings, No. 1396 Ry., dated the 4th December 1899, has reference to the group of six light famine lines which, in reply to enquiries made by the Government of India in the Revenue and Agricultural Department, were put forward in an order of preference in this Government's Revenue Department letter, No. 169A., dated the 22nd March 1898.

2. The Proceedings in question contain, *inter alia*, the correspondence which has occurred in regard to the Kalikeri-Rayachoti survey since an estimate for that survey was sanctioned and a grant allotted by the Government of India in your letters Nos. 1388 R.C. and 220 A.R., dated 19th and 24th July 1899, respectively.

3. The correspondence in question occupies pages 2 to 5 of the accompanying Proceedings, and will be found summarised in paragraph 5 of the Consulting Engineer's note at the end of them, from which it will be seen that a grant of Rs. 7,000 will be necessary instead of the Rs. 4,000 already allotted. Of this the Government of India have been already made aware in the six-months'-estimate which reached you with my No. 1238 Ry., dated 28th October 1899.

4. Under the circumstances so fully explained in the Proceedings, His Excellency the Governor in Council has no hesitation in strongly recommending that the additional grant asked for may be allotted and that the revised survey estimate, as given on page 5 of the Proceedings, may be sanctioned.

5. Meanwhile the South Indian Railway Company have been authorised, in anticipation of the sanction now asked for, not to disperse the survey party *re-infecta* but to press on and get the work finished, at the temporary cost of Revenue, pending the increase by the Government of India of the grant already allotted, from Rs. 4,000 to Rs. 7,000.

I have the honour to be,
Sir,
Your most obedient servant,

FRANCIS J. E. SPRING,
Secretary.

FORT ST. GEORGE,
4th December 1899.

Exd. A. Rungasawmy Aiyangar.

RAILWAY.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*
Regd. *Spare copies*

Letter, No. 1398 Ry., 4th December 1899.

DECEMBER.

Light Famine Feeder ~~Railways for the Madras Presidency~~

Forwarding a copy of Proceedings on the subject of ~~the~~ — and recommending that the estimate for the surveys of ~~certain famine feeder lines of~~ the Southern Mahratta ~~Railway~~ be sanctioned and grant allotted.

PUBLIC WORKS DEPARTMENT.

Railway.

Letter—from

Francis J. E. Spring, Esq., c.i.e.,
Secretary to the Government of Madras,
Public Works Department,
Railway Branch,

To

The Secretary to the Government of India,
Public Works Department.

Sir,

The accompanying copy of this Government's Proceedings, No. 1396 Ry., dated the 4th December 1899, has reference to the group of six light famine lines, which, in reply to enquiries made by the Government of India in the Revenue and Agricultural Department, were put forward in an order of preference in this Government's Revenue Department letter, No. 169A, dated the 22nd March 1898.

2. The Proceedings in question contain, *inter alia*, the correspondence which has occurred with the Southern Mahratta Railway Company and with the Consulting Engineer for Railways, Bombay, on the subject of the three members of the group in question which will form feeders to the Southern Mahratta Railway, viz.—

1.	Hospet-Kottur	35 miles.
5.	Bellary-Rayadrug	33 „
6.	Narsaraopet-Pondugal	45 „

It will be seen from pages 6 to 9 of the Proceedings, and from paragraph 4 of this Government's Consulting Engineer's note at the end of them, that the Agent, Southern Mahratta Railway Company, has submitted an estimate, amounting to Rs. 20,550, for surveying the three lines, aggregating 113 miles in length, on the principles suggested by this Government's Consulting Engineer in his letter to the Agent, No. 370/0, dated the 6th October 1899.

3. It seems unnecessary to repeat here the arguments used and the considerations advanced, in Revenue Department letter, No. 169A of 22nd March 1898, in favour of the construction of these six short famine railways at the cost, should it be available, of the Famine Insurance Grant. But, meanwhile, it seems to this Government to be essential that some idea should be formed of the probable cost of them, and that projects should be ready for them, in order that if an emergency should arise it may be possible to put their construction in hand without the loss of a season.

4. The gauge to be adopted will naturally to a great extent be dependent on the contour of country and therefore on practicable cost per mile. The chief consideration is that three or four miles, instead of one or two, should be made for one lakh of rupees, so that capital cost may bear a reasonable proportion to probable earnings from traffic offering. If, consistently with this principle, metre gauge lines can be got, so much the better; failing that, the lines must be on a narrower gauge and must be viewed as better sorts of district roads rather than as railways.

5. From a perusal of the Bombay Consulting Engineer's letter, No. 7314, dated the 27th September 1899, it will be seen that it is in deference to the wishes of the Bombay Government that, although this application is for funds for expenditure by the Southern Mahratta Railway Company, it is being made by this Government.

6. I am therefore directed to strongly recommend that the Southern Mahratta Railway Company's survey estimate should be sanctioned and that a grant, to be expended during the current financial year, should be allotted. The expenditure of a smaller sum on a cheap reconnaissance is not recommended in the case of such very short lines.

I have the honour to be,
Sir,
Your most obedient servant,

Francis J. E. Spring,
Secretary.

Fort St. George,
4th December 1899.

Exd. Shaik Karim.

net earning would cover this (when were working expenses from 70 % of gross earnings), if Rs. 50 per mile per week could be earned.

But money just now is worth less than 3 per cent. judging by the rate, 2½ % at which some recent debentures have been placed ~~at 2½~~; and working expenses may, with care, be brought down perhaps to 60 % of earnings. And on this basis, a line costing Rs 22000 per mile need only earn Rs. 37 per mile per week to pay its way.

3.— I shall be glad if you can see your way to enquiring whether in view of the traffic which, especially in famine years, these lands would bring to the main line, the S.M.R.C. would see their way to promoting their construction. Meanwhile, pending their making enquiries as to traffic prospects, would the Govt offer to have them surveyed and project prepared for them at the cost, primarily, of a grant under the head "Miscellaneous Railway Expenditure", to be obtained by application of the Madras Govt. to the Govt of India, who have already allotted such a grant for one of the gauges of 2 ft. line which the Madras R. C. have offered to survey. If so I shall be glad to receive early estimates of the cost of the surveys so that the Govt. of India may be moved for a grant.

4.— Particulars regarding the projects referred to will be found in the accompanying copy of Appendices Nos II, III & IV of a letter No. 169 A. dated the 22nd March 98. from the Madras Govt to the Govt. of India.

Send forwd 7.8.9 enclosures of the letter.

I have &

7 Encls

Encl 3

26/4/99

Personal copy 9/5/99

Despatched on

No. 850 SERIAL No. 9

South Indian Railway Co., Ld.,

AGENT'S OFFICE,

TRICHINOPOLY, 22nd August 1899.

Rec'd 24.8.99

From

The AGENT,

SOUTH INDIAN RAILWAY,

To

Encls 4440 29/8/99

The CONSULTING ENGINEER FOR RAILWAYS,

~~MADRAS.~~

Sir,

Potacamund

With reference to correspondence ending with Madras Government Order No 874 Railway dated 7th August 1899 regarding the Survey for preparing a project for a light Railway from Kalikiri to Royachoti I have the honor to request that I may be favored at an early date with the detailed instructions promised in your letter No. 20/0 of 9th May 1899.

Page 1 of 2 pp.

I have the honor to be.
Sir
Your most obedient servant

W. H. Spaeding
Ag:. Agent.

Mad

net earnings would cover this (even were working expenses from 70 % of

From
The Agent,
South Indian Railway,
Trichinopoly,

To
The Consulting Engineer for
Railways,
Madras.

Dated
Received } 18

No.
Enclosure.

15 8p

Copy of letter No. 8243/7074 of 15th August 1899 from the Agent, SM Railway Company to the Consulting Engineer for Railways Bombay.

With reference to your Memo: No.3609, dated 27th May 1899, forwarding copy of a letter No.8/0, dated 26th April 1899, from the Consulting Engineer for Railways, Madras, I have the honor to forward herewith approximate estimate amounting to Rs.1910 and Rs.33,660/-, respectively, for (1) reconnaisance and (2) pucca surveys of the following feeder lines in the Madras Presidency:-

(1) Hospet-Kottur----- -----,-35 miles

(2) Bellary-Rayadrug--- - --- 33 "

(3) Narasaraopet-Pondugal---- 45 "

2. I have no objection to arranging for these surveys being made on the condition that

(a) the cost of survey is to be met by funds obtained by the Nadras Government.

(b) the question of whether the line should be made a 2 feet or metre gauge is left open, this as I am inclined to think that, for a branch from a Metre Gauge, a 2 feet gauge would be a mistake.

Do not print 7 Pls 11/11/99 attached

3. In connection with this please see estimated cost of Kurnool Line as given in para.6 of my letter No.21, dated 19th May 1898, to our Board of Directors, of which a copy is enclosed.

4. I shall be obliged if you will obtain and furnish this office with a copy of each of the appendices referred to in the Madras Consulting Engineer's letter quoted above.

---------oOo---------

net earnings would cover this (when were working expenses from 70 % of

SERIAL

No. 6699 1899.

SERIAL No. 2

OFFICE OF CONSULTING ENGINEER FOR RAILWAYS:

Bombay, 24 August 1899.

To

The Consulting Engineer for Railways.
Madras.

140

Sir,

With reference to your letter No. 810, dated 26th April 1899, I have the honor to forward, herewith, a copy of a letter No. 8243/7074 dated 15th August 1899 and of its enclosures from the Agent, S.M. Railway Company, and to request the favour of your furnishing me with 2 copies each of the Appendices of your letter under reference, one copy being for the records of my office.

I have the honor to be,
Sir,
Your Most Obdt. Servant,

D. Strong

For Offg. Consg. Engineer for Rys.

D. Accepg.-

3401 Copy of Agent's letter No. 7074 of 15/8/99 & enclosures.

Serial 6 of Cash Relief Famine Papers

Number when the Cover used in the 50 cases I asked for of my "Railway Roads" papers.

7 Vs
7/9

Form No. 1.

Reminders.

Reply No. 1052
dated 23/10/99

No. 263
C

SERIAL
No. 9

Coty *Madras,* the 15th Septr 1899.

From

THE CONSULTING ENGINEER FOR RAILWAYS,

MADRAS,

To

THE AGENT ~~AND MANAGER, M. Ry.~~

" " S. I. Ry.

~~" " H. H. THE N. G. S. Ry.~~

" " AND CHIEF ENGR., N. Ry.

" " S. M. Ry.

" ENGR.-IN-CHIEF, B. M. Ry.

~~" MANAGER, E. C. Ry.~~

No 264 C dated 1/9/99.
Copy forwarded to the Agent & Manager Southern Ry. with copies of G.O. Nos 469 Ry dy 25.4.99 & 768 Ry dy 12.7.99.

Despatched on 1/9/99

SIR,

I have the honour to acknowledge the receipt of your letter No. 850 dated the 22nd Aug. 99. in which you ask for the detailed information promised in my No. 20/C of 7th May 99, in regard to the Kulitalai Rajendram line. When the suggestion that the line should be managed was first made it was in contemplation that all these changes from meter gauge should be made on the 2ft. 6in. gauge, with a view to economy of construction. Since then however the Govt. of India have expressed a wish that as a general rule the 2:6" gauge should be altered to 3ft 6in. As a carefully equipped line on that gauge, with engines and rolling stock light enough for the traffic to be expected, can be made as cheap, Rs 22000 to Rs 25000 per mile, as the light 3ft gauge in ordinary cases; and as, moreover, there are undoubted advantages in being able to exchange with or sell off to neighbouring lines, when rolling stock must be altered either in quality or in quantity to suit alterations of traffic; it

considered best that the project should be prepared for the 2'.6" gauge.

As you doubtless have, or can have, access to the details of the projected Aberdeen Tramways, and as Mr Coghlan has seen the Glasgow tramway which to my mind is the best model for light cheap railways, and as also the 2'.6" Portobello line was nearly completed & is not too far off for a visit of inspection, it seems less necessary that I should go into details than if your project line were to be on the 2-ft. gauge.

2.- The first thing to do is to obtain an accurate survey of the existing road in order to ascertain whether it can or ought not to be adhered to. If possible to adhere to it, much promising capital expenditure may be saved; and if the traffic should hereafter warrant doing so you could lower the road in places so as to improve curves and gradients. The first essential however, until traffic proves steady increase of better, is that engines should creep over the road at 10 miles per hour dragging what vehicles will just suffice for the traffic. Above speeds like this mere fact would exhaust mind in the usual District fashion may in most cases be left unaltered except for a cushion of earth, or a couple of beams beneath the sleepers.

3.- The gradients to be adopted depend chiefly on existing road gradients, and if these are and must remain stiff the engines must be designed accordingly. The Baxi & the Glasgow engines are both exceedingly good in their way but of totally different types, fit the one for stiff grades and heavy loads, & the other for 1 in 100 and easier. As regards curves, you naturally will not use stiff curves, if you can get easy ones without much expenditure; 100 ft. radius is good enough for the Glasgow engines and there is no use in spending money to have curves of 358 ft. radius on the 2'6" gauge;

but, naturally, you will get as good curves as the road permits between the two extremes. Rather sharper than [illegible] straighten the curved parts of the road it will be best to make 358 ft. the maximum radius.

4.- Reading the development of goods traffic I think begin steadily would be a mistake. You want to [illegible] for an UNPROVED improved traffic you can much improve on the Glasgow stock. As it seems probable that at first no more than one engine will be in steam at a time, three engines ought apparently to suffice until the traffic demands more. Starting one upon close enquiries will pass with each train no more of that class ought probably to suffice. Things will depend on the probable traffic offering, and neither this class nor covered goods need be cut too fine.

5.- The principle governing the whole design & estimate of these little railed-roads is their extreme cheapness of first equipment with the possibility of unwastefully improving the equipment at any time hereafter should be steadily borne in mind. It is not of course asserted that a young promising line should pay interest on capital on well on working expenses; but efforts should be made to design it so cheaply, & consistently also with economy of maintenance, that it will pay interest. Your Company will naturally look for your first chiefly to the access of traffic to your main line which may always be trusted to follow the substitution of a light railway for carts along any distant road.

6.- I shall in a few days send you a memorandum now in the press, in which the whole subject of these railed roads is very fully dealt with.

Yours & Fleet 31/5/97

Despatched on 1/9/97

Considered best that the project should be [illegible] the 2' [illegible]

Form No. 1/C

No. 295/0

GENERAL No. 3

168 Ooty Madras, Tue 13th Septr 1899.

From

THE CONSULTING ENGINEER FOR RAILWAYS,

MADRAS,

Reminders. —

To The Chief Engr for Rys. Madras

SIR,

Reply No. 7314

dated 27/9/99.

I have the honour to refer to your letter No. 6699. dated the 24th Aug. 99. I have the honour to enclose, for record in your office, a copy of the Madras Govt. Proceedings No. 169. Revenue. Dated 22nd March 1898. (vide page 7 & 8 of No. 169-A) for the information of the Agent S.M.R. I beg to enclose a copy of the Appendix (vide page 7 & 8 of No. 169-A) called for in your letter under reply.

2. With reference to the remarks of the Agent S.M.R. as contained in his letter No: 8243/7074 of the 15th Aug. 99, I shall be grateful if necessary to recommend the Madras Govt. to apply to the Govt. of India for a grant to the Agent of the S.M.R. on the sources under reference. I should have supported, however, that the application to the Govt of India for a grant would go in the usual course from the Govt. not of Madras but of Bombay. The Govt. of India have already allotted grant to the Madras & S.I.R. Co. on their Govts application, for the survey of other of the Famine feeder projects referred to in the Govt. Proceedings No. 169 & 169A of Madras. I shall be obliged if you will move me know whether the Govt of Bombay will apply for the survey also for the subject of your letter, for the grant, or whether it is desired that the application should go from the Madras

By Madras R.C.

	Rs.
Tuticorin-Kadampuli	5,000
Mayavaram-Mannargudi	5,000

By S.I.R.Co.

Kalkudi-Mayaveram	4000

Under Account Head "Miscellaneous Engineering".

3. With reference to the Agent's objection to building that branch on a gauge different from that of the parent line, I need only remark that if the branch line need only be saddled with a capital outlay of Rs 25000 per mile, there seems no need to try to change it by running the gauge. If however the country should be at all rough, or the District Road bridges not very sound, the branch will certainly suit the narrow gauge no more likely to pass suitable than that of the metre gauge.

4. I have the honor to invite a perusal of the accompanying Memorandum entitled "Railed Roads" in which the subject under reference is fully dealt with. Copy for the use of the Agent S.M.R. is also enclosed.

I have &

Fls

11/3/99

Despatched on 13/9/99

Encls: 6

SERIAL
No. 49

No. 7314 1899.

OFFICE OF CONSULTING ENGINEER FOR RAILWAYS:

Bombay, 27 September 1899.

To

178

The Consulting Engineer for Railways
Madras.

Sir,

S.3 case Straffet-Rottenburg
Tuticorin line

With reference to your letter No. 295/0 dated 13th September 1899, I have the honor to inform you that since the three proposed feeder lines lie wholly in the Madras Presidency the Government of Bombay would prefer that the application to the Government of India for grants to be spent by the S. M. Railway on the three surveys referred to should go from the Government of Madras, as originally suggested by you.

2. I beg to advise that a copy of your aforesaid letter and accompaniments have been forwarded to the Agent, S. M. Railway Company, for consideration of the remarks contained in para. 3 of the former.

3401

I have the honor to be,
Sir,
Your Most Obdt Servant,
L. Howard
for Offg: Consg: Engineer for Rys.

Form No. 1/C

No. 337/O

SERIAL No. 5

Coty Madras, the 6th Octr 1899.

From

THE CONSULTING ENGINEER FOR RAILWAYS,

MADRAS,

188

Reminders.

To

The Engr S. M. Ry.

Through the Con Engr. Bailey with reference to his letter No. 7314. dated 27th Sept. 99

SIR,

Reply No. 8243/9381
dated 3/11/99.

With reference your letter to the Con Engr. for Rys. Bailey. No. 8243/7074 of the 15th Aug. 99. I beg to inform you that the Hon'ble Govt. have sanctioned the sum of Rs 2000 for funds for the three surveys referred to in the line letter to the Madras Railway Co. dated 27th Sept. 99. I shall ask for the sanction of the estimate accompanying your letter above referred to. ~~I shall ask for~~ to be kindly ~~obliged~~ sent to furnish me with another set of estimates, framed on the basis of the following suggestions which govern the preparation of estimates for Similar work being done by other Railway Companies in this Presidency.

The Survey Estimate to cover the making of a complete survey in detail of the roads or routes proposed to be utilized, on a scale of 400 ft to an inch sufficient to allow of curves and gradients to be fixed, and of the accurate ~~accurate~~ ~~survey~~ of the sections showing out of the centre line thereafter when sanction to construction is received. The Survey Estimate to cover the cost of notes being made of all existing roads and tracks, which it may be necessary to be improved. The survey estimate to cover the cost of the preparation of an estimate on the basis above laid down.

You write me that I do not suppose to make any enquiry about stocks at the time, because this can only be done by the contractors men. and because if done now all those of the stocking will very possibly be obliterated before the commencement of construction work is started. Attention is invited to the remarks on this subject contained with regard to the above mentioned Railway, in the Memorandum attached "Rules Procedure" of which copies will be sent to you. Let me know if you require any further information.

Encls: one

Yours &c.

J.H.S.

3/10/99

Despatched on 6/10/99.

6 Sp

Report of Inspection by the Engineer-in-Chief, Construction Branch, South Indian Railway Company Limited, of the Kalikiri - Royachoti Light Feeder Railway Survey on the 12th and 13th October 1899.

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Orders for survey.

Orders were received from the Acting Agent in his No. R. 1657/$\frac{41}{116}$ of the 31st July 1899 to commence a survey of the above line.

Instructions to Mr.G.Ma-rini, Assis-ant Engi-neer.

On the 31st August Mr. G. Marini, Assistant Engineer, was directed to take charge of the survey and the following general instructions were given him.

1st. To survey for the proposed tramway from Kalikiri station on the Pakala - Dharmaveram section of the South In-dian Railway to the town of Royachoti about 32 miles to the north along or near the present road which runs between these places.

2nd. The survey was to be a point to point traverse lo-cating the line to the best advantage near the road, - curves to be of 4° (1432.5 feet radius) as far as possible, but no curve to be greater than 24° (238 feet radius).

3rd. A survey of the road to be made, and for 100 feet on each side to show boundaries of fields &c, and his special attention was invited to the instructions contained in the Rules for the Preparation of Railway Projects chapter IV, pages 3 to 7.

Bldg R

4th. Bench marks were to be put in at least every half mile, and at the site of all important bridges.

Survey operations commenced on the 3rd September, and on the 12th instant the line had been located, surveyed, levell-ed and check levelled up to the town of Kalakada - a dis-tance of 14 miles or nearly half way to Royachoti.

The

The present road starts from the eastern end of the Ka- Description
-likiri station yard and runs for 10 miles in a fairly of Road for
straight line to the village of Mahal (marked Chennaravukotta the 16½
-pulli on map); it is about 15 feet wide, very little metall- miles.
-ed and is not bridged. For the most of the way it passes
over partly decomposed gneiss rock.

The road was laid out on the shortest route principle,
and to put a railway alongside would entail needless expense.

On leaving the station at chain 9 it descends into a
valley to chain 15, and at chain 25 it begins to ascend to
chain 86, rising 88 feet in 61 chains. From this point the
road crosses a series of spurs and valleys, till within half
a mile of the village of Gundlur, where the ground is fairly
level to the village of Mahal near where we propose to cross
the Bahadu River.

I have enclosed a section of the proposed line from
chain 9 to chain 252 about 5 miles, which shows the conti-
-nuous steep gradients we should have to contend with by keep-
-ing the line as at present located.

But besides this we should have to put up a regular
series of bridges in the valleys crossed, which would entail
great expense, and would probably make the cost prohibitive.

On the accompanying plan I have shown where I strongly Proposed
recommend the line to be placed. route for

It would leave the present road near chain 20 and di- line between
-verge to the right skirting around the high ground past the Kalikiri &
village of Ootkandlapulle, and then gradually ascend till Mahal (mile
about half a mile to the east just opposite chain 90 at a
grade of 1 in 100; from this point the line would be practi-
-cally a ridge one all the way with easy grades to Mahal, and
would cost but little to construct, as the works would be
light, and, as it goes chiefly through jungle, the cost of land
will be small.

I strongly recommend that sanction be given for a sur- Resurvey of
-vey

survey of this line to be made joining our present line near Mahal village; it will of course exceed our present survey estimate, but it will amply repay in saving of earthwork and bridgework. Kalikiri Mahal se -tion re -commend

I may note that between Kalikiri and Mahal there is not a single hamlet near the road which will not be as equally well served by the new proposed route.

The station site chosen by Mr. Marini at Mahal is a very good one. Station s for Mahal

I propose to have a small station in the 5th mile where the line will cross the road leading to several villages on the right and the village of Medikurti on the left, which is situate on the banks of the Bahadu river.

The Bahadu river is crossed just beyond the village of Mahal, and the site selected is the best; the river will not be an expensive one to cross as rock is near the surface, and excellent building stone abounds in the district. The Bahadu river.

The through road from Kalikiri joins the main road from Chittoor to Royachoti at mile 148½ from Madras main road mile- -age. Location line fro Mahal to Ka -lakada. (mile 14)

Though Mr. Marini had located a line along the road to Kalakada, I directed him to start again at the fixed cross- -ing over the Bahadu, and take the red dotted line shown in the plan; it will give easier gradients, be cheaper to con- -struct both in earthwork and bridgework, and it will avoid crossing a valley into which the road has a steep descent about half a mile south of Kalakada.

The station site for Kalakada will be at the south side of the village on open ground in a very convenient situation. The line will cross the road just at the entrance to the vil- -lage, and turn sharp to the left, and cross the Satyavati Nadi at an excellent place where the river is narrow, and the founds of rock near the surface. Kalakada Station sit The Satya- -vati Nadi.

After