M.R.O. 1—10,006—28-2-50.

(1) Number of pages

(2) Date of repair

(3) Initials of the Referencer

MADRAS RECORD OFFICE

Government of Madras

Public works. DEPARTMENT

G.O. No. 3078-79 Press

~~B.P. No.~~ ~~Mis.~~

425-6427

Dated 20-12-1873 ~~105~~.

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department, 20th December 1873.

No. 425. Read the following letter from Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 4th November 1873, No. 582:—

ADVERTING to paragraph 9 of my letter* No. 269, dated the 14th May 1873, I have the honour to forward plans and estimates for a line of railway on the metre gauge between Cuddalore and Tanjore, in order to unite the Carnatic Company's line from Madras to Cuddalore with the Great Southern of India Railway Company's system. From Cuddalore to the south bank of the Coleroon, a distance of 28 miles 61 chains, the estimates have been prepared by Mr. Dibblee, the late Chief Engineer of the Carnatic Railway, and for the remaining distance of 61 miles 7 chains by Mr. Logan, the Chief Engineer of the Great Southern of India Railway.

* Proceedings of Government, 7th June 1873, No. 1,579.

2. It will be observed that the plans now submitted are trial surveys only; but, by the aid of the experience gained on the Trichinopoly-Tuticorin extension, now in progress, I am satisfied that the estimates framed on these surveys represent, as nearly as can be foreseen, the actual cost of the work. Further surveys would only entail delay and additional expense. At present the whole of the staff on both lines are employed on construction, and a considerable time must therefore elapse before the services of any of the Engineers can be made available for the preparation of working surveys. Mr. Logan points out the great importance of an early sanction to enable him to proceed with the collection of materials concurrently with the construction work now in hand, so that, as soon as a portion of the latter is completed, no delay may occur in the commencement of the line now under consideration. By this leisurely preparation the building materials will be obtained at advantageous rates, and the Engineers, being thoroughly trained to the system, will be able to work with greater economy. The Government are aware that this portion of line will traverse the richest and most populous province in Southern India; and, independently of completing the narrow gauge communication between Madras and Tuticorin, it will, as Mr. Logan observes, "without doubt contribute largely to the financial success of the Great Southern system."

3. For these reasons I trust that Government will be pleased to dispense with further surveys at present, and that early sanction to the estimates may be accorded. During the progress of construction, when the Engineers on the ground have ascertained accurately the necessary depths of foundations and the required waterways in the various bridges, a revised working estimate will be prepared and forwarded for the approval of Government.

4. The line follows the direction approved by Government in their Order, dated 14th May 1872, No. 1,339A, the junction with the Great Southern of India Railway being effected at 1 mile 20 chains to the east of Tanjore Station. Between Puduchuttrum and the Coleroon river three lines, marked Nos. 1, 2, 3 on the plan, have been surveyed. Mr. Dibblee's estimates were framed for line No. 1; but, after careful consideration, I have no hesitation in selecting line No. 3, as that which will best serve the interests of the district traversed. So strongly does this

route seem to commend itself, that, in considering the estimates, allowance has been made for its adoption, and the revised estimates for which sanction is asked are based upon it. Mr. Dibblee explains in a letter* herewith submitted that, so far as the cost of construction is concerned, there is but little to choose between the three routes; and he is of opinion that the question should be decided solely as to whether the traffic of Porto-Novo is to be served or not. Line No. 1 does not serve Porto-Novo at all; No. 2 crosses the Vellaur river at the head of the back-water, to which point cargo boats can ascend, but runs at some distance from the merchants' godowns; while No. 3, passing close to these latter, affords every facility for conducting the trade of the port. The Revenue Authorities attach great importance to the harbour of Porto-Novo being brought into direct communication with the railway. Affording as it does the best anchorage for ships on this part of the coast, there can be little doubt that, with improved inland communication, the trade of this port will expand largely. The route now recommended will be about 55 chains longer than No. 1; but there will be a saving in earthwork per mile of line; and the bridge over the Vellaur river, being in tidal water, will require a less depth of foundation; so that it is considered that this route may be constructed as cheaply as No. 1, except in the item of permanent-way, for which an addition has been made under that head.

* No 722, dated 14th August 1873.

5. The curves and gradients are favourable. The sharpest curve has a radius of 20 chains, while 85 per cent. of the line is straight, the longest straight being nearly seven miles in length between the 138th and 145th miles from Madras. The steepest gradient is 1 in 200; and, as the recommendation to adopt the same limit upon the Madras-Cuddalore line has been approved of, it will be the ruling gradient between Madras and Tanjore, a distance of 217 miles.

6. The estimates are considered in detail in the accompanying Note, and the various alterations recommended for sanction have the concurrence of Mr. Logan, under whom the Carnatic engineering staff has now been placed in anticipation of the amalgamation of the two Companies. The total amount of the estimates, according to the joint summary prepared in this office, is Rupees 50,31,516, being for a distance of 89 miles 68 chains at the rate of Rupees 56,000 per mile of line including sidings.

NOTE ON THE ESTIMATES FOR THE EXTENSION FROM CUDDALORE TO TANJORE.

Mr. Dibblee's portion from Cuddalore to the south bank of the Coleroon, 28 miles 61 chains.

1. The orginal estimates, as far as the north bank of the Coleroon river, were received in this office in January 1873, but the bed of that river not having been examined it was impossible to submit the project in a complete form. Mr. Dibblee was however enabled to depute an Engineer for this duty early in the year. During April 1873 a meeting was held, at which both Messrs. Logan and Dibblee were present, to consider what alterations were desirable in order to assimilate as nearly as possible the estimates for the two portions of line, and they were returned to be revised accordingly. After an inspection of the whole line during

Proceedings of the Madras Government, Public Works Department, 20th December 1873.

March 1873, in company with the Chief Engineer, it was thought advisable that surveys should be made of the alternative lines between Puduchuttrum and the Coleroon river; and these were completed on the 18th of August.

2. The estimates for bridges have been framed for the height of bank and depth of foundation for each individual work, in the same manner as in Mr. Logan's estimates; and the brickwork has been reduced to Rupees 10 per cubic yard, at which rate the best description of work should be obtained.

I.—Preliminary Expenses.—3. It has been thought sufficient to enter Rupees 500 per mile on this account, on the assumption that the Engineers engaged in staking out and resurveying the line will at the same time be allowed to enter upon construction work. For 28¾ miles this amount will be Rupees 14,375.

If working surveys are required to be prepared before the collection of materials is commenced, an addition under this head will be necessary.

III.—Construction.—1. *Earthwork.*—4. Mr. Dibblee has allowed 3 annas per cubic yard for placing the earth in bank, a separate allowance being made for trimming slopes, turfing, and pitching. On the Trichinopoly-Tuticorin extension the same rate of 3 annas per cubic yard includes these items; and, as contracts for placing the earth in bank and maintaining the same until the line is ballasted are let at from 1¼ to 2 annas per cubic yard, the amounts allowed under trimming slopes, turfing, and pitching have been struck out, and the estimate for earthwork reduced to Rupees 99,060. An allowance of Rupees 300 per mile has been made for widening banks in localities where the ordinary formation width of 12 feet may be considered insufficient.

III. 2.—Bridgework.—1. *Minor Bridges.*—5. The weights of girders are somewhat small compared with those which have been designed in England for the Trichinopoly-Tuticorin extension. This is partly due to the latter bridges being provided with decks composed of longitudinal strips of wrought iron in order to give greater rigidity to the structure. In Mr. Logan's estimates the weights allowed are taken from the plans which have been received from England, and, in order to assimilate Mr. Dibblee's estimates with these, a sum of Rupees 6,000 has been added, and the amount for minor bridges will stand at Rupees 1,13,322. The waterway has been carefully considered, and but little, if any, modification will be necessary.

2.—*Large Bridges.*—6. The large bridges are as follow:—

One bridge of 1-40 feet plate girder.
Two bridges of 2-100 feet lattice girders over the Paravanaur, and the old course of the Coleroon.
One bridge of 7-100 feet lattice girders over the Vellaur.
One bridge of 19-123¾ feet lattice girders over the Coleroon river.

7. For the pier foundations in all these bridges, with the exception of the first named, it is proposed to sink wells of brickwork to be filled with concrete, similar to those which have been approved of for the bridges over the Palar, Pooniaur, and Goodelum rivers. In the present state of the iron market a considerable saving will result from the substitution of these wells for cast iron cylinders; and it is considered that they will form a more reliable and stable foundation.

8. With the exception of one bridge, Mr. Dibblee proposes that the wells should be carried down until the hard substratum is reached; and although, in the case of some of the piers in the Coleroon bridge, this will render a depth of 54 feet necessary, the measure is recommended for sanction in the hope that it will place the foundations beyond risk of injury. The exception is in the case of the bridge over the Vellaur river, which will be within tidal limits, and where the borings give satisfactory proof that the bed of the river is never scoured beyond a moderate depth. At this bridge it is proposed to sink the wells to a depth of 30 feet, which is recommended for sanction.

9. Mr. Dibblee originally proposed for each pier one large cylindrical well with hemispherical ends, the extreme length being 22 feet 8 inches and the width 10 feet; but an alternative design is also submitted by him, consisting of two wells 10 feet external diameter, (the thickness of ring being 1 foot 10 inches,) which will be joined at the level of the water by cut-stone masonry carefully bonded and cramped. It is thought that great difficulty would be experienced in sinking the single well of such large dimensions, and Mr. Logan agrees in recommending for sanction the alternative design of two wells joined together at water level.

10. In Mr. Dibblee's design for completing the piers, the girders are supported on groups of cast iron columns, one group of three columns of 12 inches diameter being placed under each girder. The advantage claimed for the cast iron supports is that they offer but little obstruction to the flow of the water; but Mr. Logan expresses an opinion, which is concurred in, that these columns would be liable to damage, or even fracture, from the impact of trees or other heavy bodies which the rivers bring down when in flood. Piers of brickwork will cost about the same as the cast iron columns, and their adoption is recommended. This measure will diminish the waterway to a small extent, but the provision made will still be ample. In the case of the Coleroon river the road bridge, which is taken as a guide, consists of 40 arches of 50 feet span, making 2,000 lineal feet. The proposed railway bridge is 2,317 feet between abutments; and as the piers, if built of masonry, will occupy 144 feet, the effective waterway will be 2,203 lineal feet. As the railway bridge will also be higher than the existing one, the available waterway will be considerably in excess of what has been found sufficient for a period of years. In sanctioning the indents for ironwork in the bridge over the Palar, in which the substitution of wells for cast iron cylinders has lately received the approval of Government, the question between cast iron columns and masonry for the piers has been left to the decision of the Consulting Engineer in England; and in this case the same discretionary power may be allowed.

11. The rates entered by Mr. Dibblee for ironwork are Rupees 300 and Rupees 200 for wrought and cast iron respectively, inclusive of all charges for fixing. These will probably suffice in the smaller bridges, but in the larger works, where the erection of the lattice girders will be attended with considerable extra expense, it has been deemed advisable to increase these rates to Rupees 350 and Rupees 225 respectively. The addition to the estimates on this account will be Rupees 56,620, bringing the total amount for large bridges to Rupees 5,73,946.

III 5.—Fencing.—12. Fencing on both sides for one-fourth of the length of line has been entered at 12 annas per lineal yard, the rate allowed on the Trichinopoly-Tuticorin extension. Wire will be used in the vicinity of villages and in places where a vegetable fence cannot be grown; but it is hoped that an efficient fence for the exclusion of cattle will be provided along the whole length of line for the amount entered.

Temporary Telegraph. 13.—The cost of a temporary telegraph for use during the construction of the line, at Rupees 50 per mile for erection, and allowing Rupees 600 for equipping stations with single needle instruments, will amount to Rupees 2,037.

14. The revised estimate under the head "Construction of Line" will be as follows:—

		Rs.
1.	Earthwork	99,060
2.	1.—Minor bridges and culverts	1,13,322
	2.—Large bridges	5,73,946
3.	Tunnels	.....
4.	Level crossings	11,790
5.	Fencing	19,932
	Temporary Telegraph	2,037
	Total...	8,20,087

IV.—Ballast and Permanent-way.—15. Mr. Dibblee has estimated for rails weighing 40·3 lbs. per yard, laid on creosoted pine sleepers, and fastened with Ibbotson's patent clips and joints. The latter have however not met with the approval of the Government of India, and may be omitted. In the detailed calculations accompanying Mr. Logan's estimates, a rate of Rupees 8-0-6 per lineal yard of permanent-way is arrived at. This, however, is based on the rate of £10-17-6 per ton, at which contracts were let at the commencement of the year. In the present state of the iron market it is impossible to estimate the actual cost at which the rails will be obtained; but as by the last contracts the price was upwards of £13 per ton, it has been thought advisable to increase Mr. Logan's rate to Rupees 9 per lineal yard, or Rupees 15,840 per mile. Allowing 8 per cent. for sidings, the total length of permanent-way will be 31 miles; and reducing the rate for laying to Annas 8 per lineal yard the estimate will be as follows:—

	Rs.
Ballasting	35,301
Permanent-way, 31 miles, at Rupees 15,840	4,91,040
Laying, 31 miles, at Rupees 880	27,280
Leading permanent-way	21,837
	5,75,458
Contingencies, at 5 per cent.	28,773
Total...	6,04,231

V.—Stations and Buildings.—16. The amount entered for stations and buildings is Rupees 72,214, being, at the rate of Rupees 2,511 per mile. In the

estimates for the line from Madras to Cuddalore, an engine-shed was allowed at Cuddalore at a cost of Rupees 6,370, but no provision was made for Locomotive Workshops. When the line is extended southwards more engine stabling will be necessary, and provision should also be made for minor repairs to the rolling stock. A sum of Rupees 40,000 will be added on this account, bringing the total for "Stations and Buildings" to Rupees 1,12,214. Cuddalore is centrally situated between Madras and Trichinopoly; and, as the speed is not to be restricted to 12 miles per hour as was at one time apprehended, the distances of 128 miles and 123 miles between changing stations will be easily accomplished in a working day of ten hours.

VI.—ELECTRIC TELEGRAPH.—17. The cost of erecting a temporary line of telegraph for use during construction has been allowed for under the head "Construction of line."

VII.—PLANT.—18. This is estimated at 5 per cent. on Items III., IV. and V., and for the revised estimate the amount will be Rupees 76,826.

VIII.—ROLLING STOCK.—19. For "Rolling Stock" a mileage rate of Rupees 4,000 is allowed, which for 28¾ miles will be Rupees 1,15,000. As a liberal allowance under this head was made in the estimates from Madras to Cuddalore, it is thought that the amount here entered will suffice for the extra stock required for working this portion of the line.

IX.—MAINTENANCE.—20. "Maintenance" of the line for two years at Rupees 50 per mile per mensem, making a total of Rupees 34,500, has been allowed. This will, however, be subject to revision when the terms of the contract between the Secretary of State and the amalgamated Company are determined.

X.—ESTABLISHMENT.—21. The amount entered under this head, Rupees 1,35,874, is at the mileage rate sanctioned for the line from Madras to Cuddalore, and may be allowed to stand.

XI.—CONTINGENCIES.—22. The sum of Rupees 7,151 has been entered to provide for unforeseen requirements and office contingencies.

23. The drawings of bridges and buildings are the same as were submitted with the estimates for the line between Madras and Cuddalore, the works on the two portions of line being similar.

Mr. Logan's portion from the Coleroon river to Tanjore, 61 miles 7 chains.

24. The estimates for this portion are prepared in the same manner as the revised estimates for the Southern Extension of the Great Southern of India Railway, and call for little remark. The same plans for bridges are re-submitted, and the designs for "stations and buildings" are such as to bring the total cost of the same within Rupees 4,000 per mile, the sum sanctioned for the Southern Extension. These plans were not ready when the revised estimates for the latter line were forwarded, and are now submitted for the approval of Government. The number of stations is proportionately larger than on the Southern Extension, the average distance between stations being 5½ miles against 12 miles. As, however, there are no terminal works or changing stations (with the exception of a small provision under the latter head at Tanjore for working the line between that station and Negapatam when converted to the metre gauge,) only the ordinary accommodation for passengers and goods has to be estimated for. The arrangements for third-class stations are very similar to the type drawings for intermediate stations on State Railways, and the booking office has been placed clear of the platform so as to save masonry in footings.

25. For "Preliminary expenses" Rupees 500 per mile have been allowed. Under "Construction of Line" a somewhat large expenditure on account of minor bridges and culverts is necessitated by the line traversing wet cultivation, throughout nearly its entire length. There are no large bridges of importance, the greatest extent of waterway provided being in the proposed bridges of 6-50 feet and 5-50 feet girders over the rivers Vennaur and Vettaur. The waterways have been estimated as accurately as possible from the information obtainable, but during the progress of construction further observation may show some minor charges to be necessary.

26. Wire fencing for one-half the length of line on both sides is entered. For the narrow gauge lines sanctioned in this Presidency, wire fencing for one-fourth the length has been allowed; but, owing to the populous character of the country between the Coleroon and Tanjore, it has been thought advisable to increase this allowance. The other half of the line will be provided with a vegetable fence.

27. For erecting a temporary line of telegraph Rupees 50 per mile have been entered, and the cost of equipping stations has been added.

28. The rate allowed by Mr. Logan for permanent-way is Rupees 8-0-6 per lineal yard, calculated on the data for the Southern Extension; but, as explained when considering this point in connection with the Cuddalore-Coleroon portion, it is thought that this should be increased to Rupees 9 per yard, to allow for the enhanced cost of iron. The addition to the estimates on this account will be Rupees 1,19,209, bringing the total for the head "Ballast and Permanent-way" to Rupees 13,43,424.

29. Maintenance of the line for two years at Rupees 50 per mensem is entered, but will be subject to the terms of the contract between the Secretary of State and the amalgamated Company. In the original estimates for the Southern Extension Rupees 75 per mensem were entered under this head, but Mr. Logan now considers that Rupees 50 will be sufficient.

30. Plant is estimated at 5 per cent. on the expenditure under headings III., IV., and V.

31. For rolling stock the sum of 2½ lakhs is entered, being a little over Rupees 4,000 per mile.

32. Establishment is calculated at the mileage rate for the Southern Extension.

(Signed) J. H. M. SHAW-STEWART, Lieut.-Colonel, R.E.,
Consulting Engineer for Railways.

MADRAS,
4th November 1873.

From W. S. BETTS, Esq., Agent of the Great Southern of India Railway, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Negapatam, 20th June 1873, No. 5,077.

I SHALL feel obliged by your obtaining the orders of Government upon the accompanying report and estimate of cost of the northern extension of this Company's line from Tanjore to the river Coleroon near Chellumbrum.

2. MR. Logan estimates the cost of this extension at Rupees 29,97,400-1-4, and I have to point out that there is ample margin for the construction of the proposed line from the funds already raised by my Directors. Adding the estimated cost of the northern to that of the southern extension the sum amounts to about £1,252,300. On the 1st January last the unexpended balance of the Company was £1,393,386.

3. All the major headings of charge have been shown in this estimate. I trust Government will allow the division into sub-heads of Items V., VII., VIII., X. and XI. to stand over until the detailed plans can be prepared.

From the Chief Engineer, to the Agent, Great Southern of India Railway, dated Trichinopoly, 18th June 1873, No. 1,511.

As I have now revised the estimate for the extension of the line north from Tanjore to the river Coleroon near Chellumbrum, I send it in for submission to the Consulting Engineer rather than keep it back until Mr. Dibblee has his piece ready from Cuddalore to join our line at the Coleroon crossing, as my doing so will enable the Consulting Engineer to scrutinize my revision, and see how far it meets the views expressed in his letter to you (No. 187, of 18th April 1873).

2. I have endeavoured to meet these views, in which generally I concur.

3. Preliminary expenses have been reduced on the assumption that the staff employed in staking out and re-surveying the line will at the same time be permitted to enter upon work debitable to construction, building of bungalows, collection of materials, etc.

4. Wire fencing for one-half of the length of the line is estimated for.

5. In the temporary telegraph an additional amount has been entered to cover the cost of each signal station equipment. This addition was not made in the southern extension estimate, as the instruments, etc., were already in stock.

6. It is a great pity that the telegraph line is not from the first put up permanently. This has to be done eventually, and the greater part of the money which goes to put up a temporary line expensive to maintain and only capable of lasting a very short time is thus practically thrown away; for example, Rupees 12,000 have been sanctioned for the southern extension temporary telegraph. Deduct from this about Rupees 1,500 for the distribution of wire and material common to a temporary and a permanent line, and Rupees 10,500 remain as the expenditure which might have gone to the erection of a permanent line at a saving to the guaranteed interest account of Rupees 750 per annum (*i.e.*, Rupees 15,000 at 5 per cent. per annum). I think you will agree with me therefore that a real and substantive economy would result from putting up a permanent line of telegraph at the outset.

7. In permanent-way the price Rupees 8-0-6 per lineal yard has been arrived at from the data used on the southern extension

8. I have allowed Rupees 4,000 per mile for stations and buildings for which I think the line can be started. The details for this item will be forwarded as soon as I can work out the revised station estimates for the southern extension, which are being prepared as quickly as possible.

9. The other items in the estimate do not, I think, require explanation.

10. In sending in this estimate I feel that I cannot too strongly recommend an early sanction to the work being undertaken. The line passes through one of the richest and most populous provinces in the country, and would without doubt contribute largely to the financial success of the Great Southern system, even putting aside any prospect of an extension from the Coleroon to Cuddalore to join the Carnatic Railway.

11. The line of country crossed is chiefly under wet cultivation for nearly three-fourths of the year, and it is of much importance that an early start should be made to the preparation of building materials so as to have all ready to push ahead during the few months when the country is dry.

12. In works thus situated a good deal of money can be saved by early and comparatively leisurely preparation. I say leisurely because it is the push that costs money. Every one hanging about to make money out of the undertaking immediately becomes aware of any urgency in our requirements, and difficulties only to be overcome by delay or by a rise in expenditure immediately start up.

13. If sanction to the undertaking were given soon, I could in an inexpensive way be getting matters in train, and as the works draw to a close on the southern extension, some of the Engineers could be drafted on to the northern line with all the advantage of being trained to the country and to our system, instead of incurring the extra cost and disadvantages of bringing out strangers from England.

From J. T. FISHER, Esq., Agent and Manager of the Carnatic Railway Company, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Madras, 21th July 1873, No. 236.

WITH reference to your letters marginally noted, I have now the honour to submit an estimate for the line from Cuddalore to the Coleroon, re-cast in the form adopted by the Chief Engineer of the Great Southern Company for the portion between the Coleroon and Tanjore, as arranged at the meeting held at your office on the 25th April last.

Dated 28th April, No. 127.
" 26th June, " 168.

2. In this is included the estimate for bridging the Coleroon, a plan of which is also submitted, and provision is likewise made for preliminary expenses, fencing establishment, contingencies, etc., in manner arranged and particularized in your letter above quoted.

3. I also submit a copy of the Chief Engineer's letter, dated 22nd July, No. 624, received with them.

From F. L. DIBBLEE, Esq., Chief Engineer, to J. T. FISHER, Esq., Agent and Manager of the Carnatic Railway Company, dated Madras, 22nd July 1873, No 624.

ADVERTING to your memorandum No. 348, which enclosed a copy of a letter from the Consulting Engineer, No. 127, I have the pleasure to hand you herewith my estimate for the southern extension modified in accordance with the arrangement described by the Consulting Engineer.

2. I obtained from Mr. Logan a copy of one of his estimates, and his method of showing details in the body of the estimate instead of the full calculations in separate schedules has been adopted.

3. The several additions, for probable expenditure on preliminary expenses, for widening embankments, and for erecting a temporary line of telegraph have been made as agreed upon.

4. With regard to masonry, I have expressed the quantities in the superstructure of bridges for each varying height of embankment, and have also increased the depth formerly allowed for foundations to provide for the possibility of having to sink deeper, for which with the reduced price there would be an insufficient margin. Rupees 10 per cubic yard has been entered for masonry.

5. All the other items of the estimate have been dealt with in the manner arranged for the sake of the desired uniformity between our southern extension and the northern extension of the Great Southern line.

6. There will be found accompanying tracing of drawing No. 46 and No. 46A, being a sketch elevation of the bridge over the river Coleroon, and the details for the construction of the piers and abutment. I also enclose a tracing to show the depths of the borings taken across the river and the nature of the material found in the river bed.

7. The girders I propose for this bridge are 123·75 feet from centre to centre of pier being the same as those suggested for the river Palar, the details of the construction of which are left to be decided in England. I have made careful calculations with regard to the spans of these girders, and find that with depth of foundation such as the borings show to be necessary here and the high cost of the piers in proportion to the superstructure of the bridge, it will be cheaper to employ girders such as I propose rather than those of 100 feet.

8 A reference to the drawings will show that I contemplate forming the foundation of the piers and abutments with wells of brickwork, having a bottom curb from which they are carried of iron plates, and strongly bolted together with iron rods and straps from bottom to top. The wells are intended to be finished off at the level of low water with strong well bonded covering stones which will be cramped together over the whole surface of the pier, on top of this the piers will be completed with six cast-iron columns (three under each girder) of 12 inches diameter. With such arrangement as this, I think it will be found that there will be little or no scour caused by the bridge in the most violent floods, as the water will flow freely over the top of the masonry, and the obstruction caused by such columns will be quite inappreciable.

9. I am induced to propose the form of construction above described, and to recommend it for Government sanction, in preference to the iron cylinders which had been suggested for the main line (Madras to Cuddalore) by the enormous increase in the price of iron which has recently occurred, and which will make the cost of the brickwork wells filled with concrete very materially less than iron cylinders, in addition to which is the consideration that the construction of the former will employ the labour and material of the country, whilst the money expended on the iron cylinders will benefit English manufacturers only.

10. The original design for the wells consisted of one large eliptical shaped well to form the whole pier, which I conceive when once sunk to the proper depth in place will make the most firm and reliable structure possible, such a well is shown on the drawing. I have not seen or known of such a well having been made use of, and it may possibly prove to be difficult to get such a large mass of masonry down as deep as is required ; I have therefore shown an alternative design consisting of two circular wells joined together at top which I would recommend should be used if the sinking of the other is found to be too difficult or unnecessarily expensive.

11. The total length of the bridge between abutments is 2,347 feet lineal, and I think it safe to say that this all available waterway, as the 12-inch columns when they stand each by itself will offer no appreciable obstruction to the current of water. In deciding upon this I have been guided by the waterway of the public road bridge situated about one-quarter of a mile above our crossing and which has now withstood the floods and freshes of sixteen years and been found sufficient. The total effective waterway of that bridge is 40 arches of 50 feet each, making 2,000 lineal feet, the total length of bridge between abutments being 2,320 feet lineal ; it appeared to me therefore, if I allowed a length of waterway over that of the existing bridge (27 feet more), that the 300 feet extra opening which the character of the piers affords as compared with the others would give an ample margin to insure safety to our structure.

12. I have not thought it worthwhile to investigate the question of the amount of area drained by this river, as the large size of the numerous branches taken off from it before it reaches the railway, and the great extent of land over which the water is spread for irrigation within the delta, would render all calculation regarding rainfall utterly valueless.

13. It will be seen that the same design for piers has been adopted for the bridges over the Paravanar and Vellaur rivers in preference to those which were formerly estimated for—piers of screw piles. I do not think much saving will be effected by the brickwork wells in substitution for wrought-iron piles (in fact, at the prices formerly entered for iron the estimates will be virtually the same, the economy therefore will be measured by the amount of increase in the cost of iron) ; but the wells will, in my opinion, form a more stable and permanent structure in these rivers where the salt water from the sea backs up at every rise of tide.

14. The plans and sections for the alternative lines which have been surveyed are now being copied and will follow in a few days with some further remarks. It will not be necessary, I think,

Proceedings of the Madras Government, Public Works Department, 20th December 1873.

to make any alteration in the estimate, as the quantities will vary very slightly whichever line may be selected, the bridges being the same in all cases, and the small difference in length being compensated for by there being less earthwork on the lines which are longest.

15. The estimate as it now stands amounts to Rupees 17,91,793, the average per mile being 64,823. The excess over the former estimate is to be accounted for by the addition of the Coleroon bridge and the amount allowed for rolling stock.

From J. T. FISHER, Esq., Agent and Manager of the Carnatic Railway Company, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Madras, 18th August 1873, No. 263.

With reference to my letter, dated the 24th ultimo, No. 236, I have now the honour to submit the tracings of the alternative line near Porto-Novo, referred to in the last paragraph but one of the Chief Engineer's letter, dated 22nd idem, No. 624, enclosed therewith, together with a copy of a further letter from the Chief Engineer, dated the 14th instant, No. 722, on the subject.

From F. L. DIBBLEE, Esq., Chief Engineer, to J. T. FISHER, Esq., Agent and Manager of the Carnatic Railway Company, dated Madras, 14th August 1873, No. 722.

In continuation of my No. 624, I have the pleasure to hand you, herewith, a tracing of the plan of survey, showing the line staked out for the southern extension between Puduchuttrum and the river Coleroon, with the two alternative lines which have been surveyed at the request of the officers of Government; also a tracing of the sections of the line where they differ from that already sent forward.

2. On the plan the line originally surveyed is marked in black (line No. I.), that to the west of it being red (No. II.), and the other green No. III.

3. As regards the crossing of the river Coleroon, the place first selected for No. I is, in my opinion, decidedly preferable, a reference to the sections will show that the width of the river at highest flood is less from bank to bank, and the banks and river-bed being better defined a greater sectional area of waterway can be obtained with the same length of bridge on this site as compared with that on the red line. I think, therefore, that No. I. line should be adopted at the river crossing whatever may be the selection for the other parts. The design submitted for the bridge was prepared for this place ; a line has also been examined (shown in blue) which will connect this with No. II.

4. As far as cost of construction is concerned, I think there appears to be little or no advantage to be gained in one line over another. No. II. will have the least quantity of earth-work mile for mile, and the borings on the river Vellaur show a less depth for foundations ; but, on the other hand, it is somewhat longer than either of the others, and the extra length, with the cost of additional permanent-way, will counterbalance the saving to be effected by the lighter nature of the embankment. On lines I. and III. the depth of material above the hard stratum in the foundations for the Vellaur bridge is greater than at the other crossing, but I think it will be unnecessary to go down to the rock on either of these lines, as the bridge will be in the tide-way where no scour will occur, and 30 feet (the depth of the least boring) will give perfectly secure foundation where such is the case.

5. It appears to me that the selection of route should be decided solely on the question as to whether the traffic of Porto-Novo is to be served by the railway or not. The exports and imports at present are not of very great importance ; but the fact is undoubted that the facilities afforded by the river and backwater as a harbour are greater at Porto-Novo than at any part of the coast in the vicinity, and the possibility of the trade of the place increasing with improved inland communication is worthy of consideration. Line No. II. if built will not serve Porto-Novo at all, and it will not be practicable hereafter to make any improvement in this respect should trade be found to increase, as it never will in any probability be sufficient to pay for a

branch. Line No. I. has the advantage of being a little shorter than either of the others, and it is within reach of a landing place for boats on the backwater, but is at a distance from the merchants' godowns. The line No. III. will serve the town and harbour as well as our railway is capable of doing, the additional cost (from three-fourths of a mile extra length) will, I think, be very trivial, and can easily be outweighed by increased traffic that may possibly arise from greater facilities being afforded to the port, and to already established merchants' godowns.

6. With the above remarks I would suggest that the plans be submitted to Government for their consideration and for a decision as to the route to be adopted.

No. 426. ORDER THEREON, 20th December 1873, No. 3,078.

RAILWAY, No. 50.

WITH this letter the Consulting Engineer for Railways submits plans and estimates for a line of railway from Cuddalore to Tanjore on the route approved in G. O., No. 1,339 A, of 14th May 1872, amounting in the aggregate to Rupees 50,31,516, or at the rate of Rupees 56,000 per mile for a distance of 89 miles 68 chains.

2. The items comprising the estimate are as follow:—

	RS	A.	P.
I.—Preliminary Expenses...	44,918	12	0
II.—Land	.....		
III.—Construction of Line	15,80,714	4	0
IV.—Ballast and Permanent-way	19,47,654	12	0
V.—Stations and Buildings	3,51,214	4	0
VI.—Electric Telegraph	.....		
VII.—Plant	1,88,285	0	0
VIII.—Rolling Stock	3,65,000	0	0
IX.—Maintenance	1,07,805	0	0
X.—Establishment	4,15,044	0	0
XI.—Contingencies	30,880	0	0
Grand Total...	50,31,516	0	0

3. It is observed that the rates originally entered by the Railway Engineers to whom the preparation of the estimates was entrusted have been freely altered by the Consulting Engineer, and that the modifications made, which have for the most part been based on experience gained in dealing with the sanctioned extensions of the same gauge now in course of construction in other parts of Southern India, are fully concurred in by the present Chief Engineer of the Amalgamated Company under whom the works will be eventually carried out. The nature of the alterations is fully explained in the note accompanying Lieutenant-Colonel Shaw-Stewart's letter; and His Excellency the Governor in Council feels confident from the evident care and attention which have been bestowed upon the subject both by the Railway and Government Engineers that the works finally decided on have been judiciously adapted to local circumstances, and that the arrangements generally have been made with an intelligent appreciation of prospective difficulties, and with a due regard to economical considerations.

4. His Excellency the Governor in Council accordingly resolves to recommend to the Government of India that sanction be accorded to the estimates

submitted which have been based on trial surveys, leaving the preparation of working surveys to be undertaken when construction operations now in progress admit of the services of qualified Engineers being made available for the duty.

5. The section of railway now estimated for will form the connecting link between the line from Madras to Cuddalore, and the southern system of lines. Tanjore having been selected as the point of junction with the Great Southern of India Railway, and the important towns of Porto-Novo, Chellumbrum, and Combaconum lying along the route which must be traversed, the direction of the line becomes reduced within very narrow limits. The course between Puduchuttrum and the Coleroon river seems, however, to have been open to some hesitation on the part of the Railway Officials, three alternative routes having been surveyed; but there can be little doubt from a traffic point of view as to the superiority of that numbered 3, which, by embracing Porto-Novo, will bring the inland districts into easy communication with the seaboard at a point where special facilities for foreign trade exist. In other respects none of the three routes appears to possess marked advantages over the others.

6. It is finally remarked that the curves and gradients are on the whole very favourable.

7. The designs for "stations and buildings" on the southern extension of the Great Southern of India Railway, which should have accompanied the revised estimates for that line but are only now submitted, will be forwarded to the Government of India.

(Here enter No. 3,079, dated 20th December 1873.)

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for Railways.

Evd. E. C. Shunker.
Spare Copies

PUBLIC WORKS DEPARTMENT,
FORT ST. GEORGE, 20*th December* 1873.

No. 427. No. 3,079.

FROM

COLONEL G. W. WALKER, R.E.,
Secretary to the Government of Madras,
Public Works Department.

To

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

RAILWAY, No. 51.

SIR,—In forwarding the accompanying copy of the Proceedings of Government under date the 20th December 1873, No. 3,078, I am directed by His Excellency the Governor in Council to request that the estimates of Rupees 50,31,516 for the line of railway from Cuddalore on the narrow gauge therein reviewed may receive the sanction of the Government of India.

2. It will be observed that the estimates have been based on trial surveys, but the Consulting Engineer is confident that the amounts entered are as near the actual expenditure as can be foreseen; and as it is of importance that the collection of materials should be undertaken in a manner calculated to command favourable prices, and so as to utilize to the best advantage the services of the Engineering Staff of the Company who are now employed on constructive operations in other parts of the Presidency, I am to request that the estimates may be accepted in their present form, and early orders passed thereon.

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

Colonel, R.E.,
Secretary to Government.

Exd. E. C. Shunker.

Spare Copies

Railway Department.

CONSULTING ENGINEER'S OFFICE.

No. 582.

From

LIEUT.-COLONEL J. H. M. SHAW STEWART, R.E.,

Consulting Engineer for Railways,

To

COLONEL G. W. WALKER, R.E.,

Secretary to Government,

Public Works Department,

Fort Saint George.

SIR,

Adverting to paragraph 9
of my letter[x] No. 269, dated the
14th May 1873, I have the
honour to forward plans and
estimates for a line of railway
on the metre gauge between
Cuddalore and Tanjore, in order
to unite the Carnatic Company's
line from Madras to Cuddalore
with the Great Southern of
India

[x] Bo: of Govt 7 June/73 No. 269.

India Railway Company's system.
From Cuddalore to the South
bank of the Coleroon, a dis-
tance of 28 miles 61 chains,
the estimates have been pre-
pared by Mr. Dibblee, the
late Chief Engineer of the
Carnatic Railway, and for
the remaining distance of 61
miles 7 chains by Mr. Logan,
the Chief Engineer of the Great
Southern of India Railway.

2 It will be observed
that the plans now submitted are
trial surveys only; but, by the aid
of the experience gained on the
Trichinopoly-Tuticorin extension,
now in progress, I am satisfied
that the estimates framed on
these

these surveys represent, as nearly
as can be foreseen, the actual
cost of the work. Further
surveys would only entail
delay and additional expense.
At present the whole of the
staff on both lines are employ-
ed on construction, and a con-
siderable time must therefore
elapse before the services of
any of the Engineers can be
made available for the
preparation of working surveys.
Mr. Logan points out the great
importance of an early sanction
to enable him to proceed with
the collection of materials con-
currently with the construction
work now in hand; so that as
soon as a portion of the latter

is

is completed, no delay may occur
in the commencement of the
line now under consideration.
By this leisurely preparation
the building materials will be
obtained at advantageous rates,
and the Engineers, being thorough-
ly trained to the system, &
will be able to work with greater
economy. The Government are
aware that this portion of line
will traverse the richest and
most populous province in
Southern India; and, indepen-
dently of completing the narrow
gauge communication between
Madras and Tuticorin, it will,
as Mr. Logan observes, "without
"doubt contribute largely to the
financial

"financial success of the Great
"Southern system."

3 For these reasons, I
trust that Government will be
pleased to dispense with further
surveys at present, and that
early sanction to the estimates
may be accorded. During the
progress of construction, when
the Engineers on the ground
have ascertained accurately the
necessary depths of foundations and
the required waterways in the
various bridges, a revised working
estimate will be prepared and
forwarded for the approval
of Government.

4 The line follows the
direction approved by Government
in

in their order dated 14th May 1872, No. 1339 A; the junction with the Great Southern of India Railway being effected at 1 mile 20 chains to the east of Tanjore station. Between Puducchuttrum and the Coleroon river three lines, marked Nos. 1, 2, 3, on the plan, have been surveyed. Mr. Dibblee's estimates were framed for line No. 1; but, after careful consideration, I have no hesitation in selecting line No. 3, as that which will best serve the interests of the district traversed. So strongly does this route, seem to commend itself, that, in considering the estimates, allowance has been made for its adoption, and the revised estimates for which sanction is asked, are based upon it. Mr. Dibblee explains in a letter herewith submitted that, so far as the cost of construction is concerned, there is but little to choose between the three routes; and he is of opinion that the question should be decided solely as to whether the traffic of Porto Novo is to be served or not. Line No. 1 does not serve Porto Novo at all; No. 2 crosses the Vellaur river at the head of the back-water, to which point cargo boats can ascend, but runs at some distance from the merchants' godowns

× No. 722 dated 14th Augt 1873.

godowns; while № 3, passing close to these latter, affords every facility for conducting the trade of the port. The Revenue authorities attach great importance to the harbour of Porto Novo being brought into direct communication with the railway. Affording as it does the best anchorage for ships on this part of the coast; there can be little doubt that, with improved inland communication, the trade of this port will expand largely.

The route now recommended will be about 55 chains longer than № 1; but there will be a saving in earthwork per mile of line; and the bridge over the Vellaur river, being in tidal water, will require a less depth of foundation; so that it is considered that this route may be constructed as cheaply as № 1, except in the item of permanent way, for which an addition has been made under that head.

5. The curves and gradients are favourable. The sharpest curve has a radius of 20 chains, while 85 per cent of the line is straight, the longest straight being nearly seven miles in length, between the 138 and 145 miles from Madras. The steepest gradient is 1 in 200; and, as the recommendation to adopt the same limit upon the Madras-Cuddalore line has

has been approved of, it will be the ruling gradient between Madras and Tanjore, a distance of 217 miles.

6. The estimates are considered in detail in the accompanying note, and the various alterations recommended for sanction have the concurrence of Mr. Logan, under whom the Carnatic Engineering staff has now been placed, in anticipation of the amalgamation of the two Companies. The total amount of the estimates, according to the joint summary prepared in this office, is Rupees 50,31,516; being for a distance

of 89 miles 68 chains at the rate of Rs 56000 per mile of line including sidings.

I have the honour to be,
Sir,
Your most Obed't Servant,
Mountstuart Scott Moore R.E.
Consg Engr for Railways.

Madras
4th Oct
1873
Encs
Brief Ps

Rate on estimates for
the extension from Cuddalore
to Sanjore.

Mr. Dibden's notation
Same Cuddalore to the south
Pennar of the Coleroon. 28 miles
Coleroon.

The engineer estimates
the cost of the north branch of
the Coleroon river recently
the Collector sir January 1873,
and the cost of that river not
the cost of that river not
having been examined, it was
considered to submit the project
complete form. Mr. Dibden
as completed
was however enabled to depute
an

P. W. 1873 Railways
Rate of Cuddalore River

RAILWAY DEPARTMENT.

From The Consulting Engineer for Railways, 1873 No. 6012.

To

The Secretary to Government,
P. W. Department,
Fort Saint George.

Dated 4th November 1873.
Recd. 5th

Encl. No. 682.

Memorandum
of Cons and estimates
for a line of railway
on the metre gauge
Cuddalore
and Sanjore.

No. 3078-3079-20-12-73

2-12-73

an Engineer for this duty early in the year. During April 1873, a meeting was held, at which both Mess.rs Logan and Dibble were present, to consider what alterations were desirable in order to assimilate as nearly as possible the estimates for the two portions of line, and they were returned to be revised accordingly. After an inspection of the whole line during March 1873, in company with the Chief Engineer, it was thought advisable that surveys should be made of the alternative lines between Cadduchutturai and the Coleroon river; and these were completed on the 18th of August.

2. The estimates for Bridges have

have been framed for the heights of banks and depth of foundation for each individual work, in the same manner as in Mr. Logan's estimate; and the brickwork has been reduced to Rs 10 per cubic yard, at which rate the best description of work should be obtained.

I Preliminary Expenses

3. It has been thought sufficient to enter Rs 500 per mile on this account, on the assumption that the Engineers engaged in staking out and re-surveying the line will at the same time be allowed to enter upon construction work. For 28¾ miles this amount will be

Rupees

Rupees 11,375.

If working surveys are required to be prepared before the collection of materials is commenced, an addition under this head will be necessary.

III. Construction

1. Earthwork.

4. Mr. Dibble has allowed three annas per cubic yard for placing the earth in bank, a separate allowance being made for trimming slopes, turfing, and pitching. On the Trichinopoly-Tuticorin extension the same rate of three annas per cubic yard includes these items; and, as contracts for placing the earth in bank and maintaining the same until the line is bellasted, are let at from one and a quarter to two annas per cubic yard, the amounts allowed under trimming slopes, turfing, and pitching have been struck out, and the estimate for earthwork reduced to £ 99,000. An allowance of £ 300 per mile has been made for widening banks in localities where the ordinary formation width of 12 feet may be considered insufficient.

III. 2. Bridgework.

1. Minor Bridges.

The

5 The weights of girders are somewhat small compared with those which have been designed in England for the Trichinopoly-Tuticorin extension. This is partly due to the latter bridges being provided with decks composed of longitudinal strips of wrought iron in order to give greater rigidity to the structure. Mr Logan's estimates the weights allowed are taken from the plans which have been received from England: and, in order to assimilate Mr Dillon's estimate with these, a sum of Rs 6,000 has been added, and the amount for minor bridges will stand at Rs 113,322. The waterway has been carefully

considered, and but little, if any, modification will be necessary.

2. Large Bridges.

6 The large bridges are as follow:—

One bridge of 1-40 feet plate girder.

Two bridges of 2-100 feet lattice girders over the Paravanaur, and the old course of the Coleroon.

One bridge of 7-100 feet lattice girders over the Vellaur.

One bridge of 19-123¾ feet lattice girders over the Coleroon river.

7 For the pier foundations in

in all these bridges, with the exception of the first named, it is proposed to sink wells of brickwork to be filled with concrete, similar to those which have been approved of for the bridges over the Pelaur, Pennar, and Goodelum rivers. On the present state of the iron market a considerable saving will result from the substitution of these wells for cast iron cylinders; and it is considered that they will form a more reliable and stable foundation.

8. With the exception of one bridge, Mr. Dibble proposes that the wells should be carried down until the hard substratum is reached; and although, in the case of some of the piers in the Coleroon bridge, this will render a depth of 54 feet necessary, the measure is recommended for sanction in the hope that it will place the foundations beyond risk of injury. The exception is in the case of the bridge over the Vellaur river, which will be within tidal limits, and where the borings give satisfactory proof that the bed of the river is never scoured beyond a moderate depth. At this bridge it is proposed to sink the wells to a depth of 30 feet, which is recommended

recommended for sanction.

9 Mr. Dibble originally proposed for each pier one large cylindrical well with hemispherical ends, the extreme length being 22' 8" and the width 10 feet; but an alternative design is also submitted by him, consisting of two wells 10 feet external diameter, (the thickness of ring being 1'10") which will be joined at the level of the water by cut stone masonry carefully bonded and cramped. It is thought that great difficulty would be experienced in sinking the single well of such large dimensions, and Mr. Logan

Logan agrees in recommending for sanction the alternative design of two wells joined together at water level.

10 In Mr. Dibble's design for completing the piers, the girders are supported on groups of cast-iron columns, one group of three columns of twelve inches diameter being placed under each girder. The advantage claimed for the cast-iron supports is that they offer but little obstruction to the flow of the water; but Mr. Logan expresses an opinion, which is concurred in, that these columns would

would be liable to damage, or even fracture, from the impact of trees or other heavy bodies which the rivers bring down when in flood. Piers of brickwork will cost about the same as the cast-iron columns, and their adoption is recommended. This measure will diminish the waterway to a small extent, but the provision made will still be ample. In the case of the Coleroon river the road bridge, which is taken as a guide, consists of 40 arches of 50 feet span, making 2000 lineal feet. The proposed railway bridge is 2347 feet between abutments; and as the piers, if built of masonry, will occupy 144 feet, the effective waterway

waterway will be 2203 lineal feet. As the railway bridge will also be higher than the existing one, the available waterway will be considerably in excess of what has been found sufficient for a period of years. In sanctioning the indents for iron work in the bridge over the Palar, in which the substitution of wells for cast-iron cylinders has lately received the approval of Government, the question between cast-iron columns and masonry for the piers has been left to the decision of the consulting Engineer in England; and in this case the same discretionary

discretionary power may be allowed.

11 The rates entered by Mr. Dibblee for ironwork are ~~Rs~~ 300 and ~~Rs~~ 200 for wrought and cast iron respectively; inclusive of all charges for fixing. These will probably suffice in the smaller bridges, but in the larger works, where the erection of the lattice girders will be attended with considerable extra expense, it has been deemed advisable to increase these rates to ~~Rs~~ 350 and ~~Rs~~ 225 respectively. The addition to the estimates on this account will be ~~Rs~~ 56,620, bringing the total amount for large bridges to

Rupees 5,73,946.

III 5. Fencing.

12 Fencing on both sides for one fourth of the length of line has been entered at twelve annas per lineal yard, the rate allowed on the Trichinopoly-Tuticorin extension. Where will be used in the vicinity of villages, and in places where a vegetable fence cannot be grown, but it is hoped that an efficient fence for the exclusion of cattle will be provided along the whole length of line for the amount entered.

Temporary Telegraph.

The

13 The cost of a temporary telegraph for use during the construction of the line, at ~~Rs~~ 50 per mile for erection, and allowing ~~Rs~~ 600 for equipping stations with single needle instruments, will amount to ~~Rs~~ 2,037.

14 The revised estimate under the head "Construction of Line" will be as follows:—

		~~Rs~~
1.	Earthwork	99,060
2.	1. Minor bridges & culverts	1,13,322
	2. Large bridges	5,73,946
3.	Tunnels	
4.	Level crossings	11,790
5.	Fencing	19,932
	Temporary Telegraph	2,037
	Total	8,20,087

15

IV Ballast & Permanent way.

15 Mr. Dibble has estimated for rails weighing 40.3 ~~lbs~~ per yard, laid on creosoted pine sleepers, and fastened with Abbotson's patent clips and joints. The latter have however not met with the approval of the Government of India, and may be omitted. In the detailed calculations accompanying Mr. Logan's estimates a rate of ~~Rs~~ 8.0.6 per lineal yard of permanent way is arrived at. This, however, is based on the rate of ~~£~~ 10.17.6 per ton, at which contracts were let at the commencement of the year. In the present state of the iron market

market it is impossible to estimate the actual cost at which the rails will be obtained; but as by the last contracts the price was upwards of £13 per ton, it has been thought advisable to increase Mr. Logan's rate to ₹9. per lineal yard, or ₹15,840 per mile. Allowing 8 per cent for sidings, the total length of permanent way will be 31 miles; and, reducing the rate for laying to annas eight per lineal yard, the estimate will be as follows:—

	₹
Ballasting	35,301
Permanent way 31 miles @ ₹15,840	491,040
Laying 31 miles @ ₹880	27,280
Leading permanent way	21,837
	575,458
Contingencies @ 5 per cent	28,773
Total	6,04,231

16

V Stations & Buildings

The amount entered for 16 stations and buildings is ₹2,2114, being at the rate of ₹2,511 per mile. In the estimates for the line from Madras to Cuddalore, an Engine-shed was allowed at Cuddalore at a cost of ₹6,370, but no provision was made for Locomotive workshops. When the line is extended southwards more engine stabling will be necessary, and provision should also be made for minor repairs to the rolling stock. A sum of ₹40,000 will be added on this account, bringing the total for "Stations and Buildings" to ₹1,12,214.

Cuddalore

Cuddalore is centrally situated between Madras and Trichinopoly; and, as the speed is not to be restricted to twelve miles per hour as was at one time apprehended, the distances of 128 miles and 12.3 miles between changing stations will be easily accomplished in a working day of ten hours.

VI. Electric Telegraph.

17 The cost of erecting a temporary line of telegraph for use during construction has been allowed for under the head "Construction of line".

VII. Plant.

18 This is estimated at 5 per cent on items III, IV, & V, and for the revised estimate the amount will be Rs 76,826.

VIII Rolling Stock

19 For "Rolling Stock" a mileage rate of Rs 4,000 is allowed, which for 28¾ miles will be Rs 1,15,000. As a liberal allowance under this head was made in the estimates from Madras to Cuddalore, it is thought that the amount here entered will suffice for the extra stock required for working this portion of the line.

IX Maintenance.

20 "Maintenance

"Maintenance of the line for two years at Rs 50 per mile per mensem, making a total of Rs 34,500 has been allowed. This will, however, be subject to revision when the terms of the contract between the Secretary of State and the amalgamated Company are determined.

X. Establishments.

21. The amount entered under this head, Rs 1,35,874, is at the mileage rate sanctioned for the line from Madras to Cuddalore, and may be allowed to stand.

XI. Contingencies.

22. The sum of Rs 7,151 has been entered to provide for unforeseen requirements and office contingencies.

23. The drawings of bridges and buildings are the same as were submitted with the estimates for the line between Madras and Cuddalore, the works on the two portions of line being similar.

No. Logan's portion from the Coleroon river to Tanjore, 61 miles 7 chains.

24. The estimates for this portion are prepared in the same manner as the revised estimates for the Southern extension of the Great Southern of India Railway, and call for little remark. The same plans for bridges are resubmitted, and the designs for "stations and buildings" are such as to bring the total cost of the same within Rs 4,000 per mile, the sum sanctioned for the Southern extension. These plans were not ready when the revised estimates for the Cutler line were forwarded, and are now submitted for the approval of Government. The number of stations is proportionately larger than on the Southern extension, the average distance between stations being 5½ miles against 12 miles. No, however, there are no terminal works or changing stations, with the exception of a small provision under the latter head at Tanjore, for working the line between that station and Negapatam when converted to the metre gauge,) only the ordinary accommodation for passengers and goods has to be estimated for.

for. The arrangements for "
third-class stations are very simi-
lar to the typedrawings for
intermediate stations on State
Railways; and the booking office
has been placed clear of the
platform so as to save masonry
in footings.

25. For "Preliminary Expenses"
Rs 500 per mile have been allow-
ed. Under "Construction of Line",
a somewhat large expenditure on
account of minor bridges and
culverts is necessitated by the line
traversing wet cultivation, throughout
nearly its entire length. There
are no large bridges of importance,
the greatest extent of waterway pro-
vided being in the proposed bridges
of 6-50 feet and 5-50 feet girders
over the rivers Vennaur and "
Vellaur. The waterways have
been estimated as accurately as
possible from the information
obtainable, but during the "
progress of construction further
observation may show some minor
changes to be necessary.

26. Wire fencing for one
half the length of line on
both sides is entered. For the
narrow gauge lines sanctioned
in this Presidency, wire fencing
for one fourth the length has
been allowed; but, owing to
the populous character of the
country between the Coleroon and
Tanjore, it has been thought advisa-
ble to increase this allowance.

The

The other half of the line will be provided with a vegetable fence.

27. For erecting a temporary line of telegraph ~~Rs~~ 50 per mile have been entered, and the cost of equipping stations has been added.

28. The rate allowed by Mr. Logan for Permanent way is ~~Rs~~ 8.0.6 per lineal yard, calculated on the data for the Southern extension; but, as explained when considering this point in connection with the Cuddalore-Coleroon portion, it is thought that this should be increased to ~~Rs~~ 9 per yard, to allow for the enhanced cost of iron. The addition to the estimates

estimates on this account will be ~~Rs~~ 1,19,209:--, bringing the total for the head "Ballast and Permanent way" to ~~Rs~~ 13,43,424.

29. Maintenance of the line for two years at ~~Rs~~ 50 per mensem is entered, but will be subject to the terms of the contract between the Secretary of State and the amalgamated Company. In the original estimates for the Southern Extension ~~Rs~~ 75 per mensem were entered under this head, but Mr. Logan now considers that ~~Rs~~ 50 will be sufficient.

30. Plant is estimated at 5 per cent. on the expenditure under headings III, IV, and V.

For

31. For Rolling Stock the sum of 2½ lacs is entered being a little over Rs 4,000 per mile.

32. Establishment is calculated at the mileage rate for the Southern extension.

Madras
the Nov.
1873

Lieut. Col. R.E.
Cons. Engineer for Railways

P.W. 6012/73
80

No. 5777

GREAT SOUTHERN OF INDIA RAILWAY.

AGENT'S OFFICE,

NEGAPATAM, 20th June 1873

61/96

From

THE AGENT,
Great Southern of India Railway,

To

The Consulting Engineer
for Railways
Madras

SIR,

I shall feel obliged by your obtaining the orders of Government upon the accompanying Report and Estimate of cost of the Southern Extension of the Company's line from Negapatam to the river Coleroon near Chellumbrum

The Engineer estimates the cost of this Extension at Rs 29,97,400-1-4 and I have to point out that there is ample margin for the construction of the proposed line, from the funds already raised by my Directors. Adding the estimated cost of the Northern to that of the Southern Extension the sum amounts to about £1,252,300. On the 1st January last the unexpended balance of the Company was £ 1,393,386.-

All the major headings of charge have been shewn in this Estimate. Should Government will allow the division into sub

sub heads of items V, VII, VIII, X and XI to stand over until the detailed plans can be prepared.

I have the honor to be
Sir
Your most obedient servant
William Bell
Agent

Grand Northern & India Railway 576

Letter from the Chief Engineer to the Agent dated
Kirkintilloch 18th June 1873 No 1871

In Ulaire now received the Estimate
for the extension of the line north from Langres
to the river Oleiroon near Oberkirchen, &
to the river Ouse near Beckhampton
and it is for extension to the Canal basin
Engineer near Kerr Keep in hand with
Mr Griffiths his plans ready from
his office now in the Colonies
Ordered to proceed during to until enable
evening, in my Engineer to terminus, my
the Committee Engineer for it meets the
remains and his letter to you (No 187
received in April 1873)
at 28 April 1873 Ulaire endeavoured to meet the
Committee generally & owner
owners in which reference have been
preliminary that the staff
the necessary required in staking out various routes
employed in staking out various parts
will at the same time the
line will under upon wrote detailed
instead to enter Kirkintilloch
to continue, Kirkintilloch
collection

&c. 5077

From
The Agent
G.N.I.R.
To
The Consulting Engr
for Railways

Dated 20th June 1873
Recd. 23 "
G.N. No: 2078-20-18-73
P.W. 6012/73. B
9

Forwarding Report
and Estimate of the cost
of the Northern Extension
from Langres to the river
Coleroon

676

collection of materials &c
were fencing for one half of the length
of the line is estimated for

In the Temporary telegraph an
additional amount has been entered to cover
the cost of each Signal Station equipment
This addition was not made in the Southern
Extension Estimate as the instruments were
were already in stock

It is a great pity that the Telegraph
line is not from the first put up permanently
This has to be done eventually and the
greater part of the money which goes to put
up a temporary line - expensive to maintain
and only capable of lasting a very short
time - is thus practically thrown away
For example Rs 12000 have been sanctioned
for the Southern Extension temporary Telegraph
deduct from this about Rs 1500 for the dis-
tribution of wire and material common
to a temporary and a permanent line &
Rs 10500 remain as the expenditure which
might have gone to the erection of a
permanent line at a saving to the
guaranteed interest account of Rs 525
Rs

per annum for Rs 15000 c o/o per annum / 10522 Mg 93.
you will agree with me therefore that a real
and substantial economy would result from
putting up a permanent line of telegraph
at the outset.

The Permanent way the price Rs 8/0/0
per lin: yd has been arrived at from the data
used on the Southern extension

I have allowed Rs 4000 per mile
for stations & buildings for which details
the line can be started. The details for
these items will be forwarded as soon as
I can work out the revised stations —
Estimates for the Southern Extension which
are being prepared as quickly as possible

The other items in the Estimate
do not think require explanation

In sending in this Estimate
I feel that I cannot too strongly recommend
an early sanction to the work being
undertaken. The line passes through one
of the richest and most populous provinces
in the Country and would without doubt
contribute largely to the financial
success

Agent & Manager

236

way be getting matters in train, and at the
works draw to a close on the S. Extension,
some of the Engineers could be despatched
on to the Northern line with all the
advantage of being trained to the
country and to our system, instead
of incurring the extra cost & disadvantage
of bringing out strangers from England

/True copy/
Jas Callaghan
Asst Clerk

J. E. V. Fuller
Asst Manager

CARNATIC RAILWAY CO., (LIMITED)
AGENT AND MANAGER'S OFFICE,
MADRAS, 24th July 1873.

756

No. 236.

FROM

J. T. Fisher Esqr.

AGENT AND MANAGER, CARNATIC RAILWAY Co.,
Madras.

To

Lieut-Col. J. H. Mc Shaw Stewart R.E.

CONSULTING ENGINEER FOR RAILWAY,
Madras.

SIR.

dated 28th April
No. 127.
dated 26th June
No. 168.

With reference to your letters marginally noted, I have now the honor to submit, an Estimate for the line from Cuddalore to the Coleroon, recast in the form adopted by the Chief Engineer of the G. S. & Co. for the portion between the Coleroon and Vanjore, as arranged at the meeting held at your Office on the 25th April last.

In this is included the estimate for Bridging the Coleroon, a plan of which is also submitted, and provision is likewise made for Preliminary expences, fencing Establishment Contingencies &c. in manner arranged and particularized in your letter above quoted.

I also submit a copy of the Chief Engr's letter dated 22d July No. 624. received with them.

I have the honor to be,
Sir,
Your most Obedt Servant.
for J. T. Fisher
Agent & Manager.

Carnatic Railway Co: Limited
Chief Engineer's Office
Madras 22nd Aug. 1873

No: 624

J. Fisher, Esq.
Agent and Manager

Dear Sir

Adverting to your Memorandum No: 3248 which enclosed a Copy of a Letter from the Consulting Engineer No: 127, dated the 16th Instant, forwarding Estimate for the Southern Extension, I shall be much obliged if you will move the Government to direct the necessary steps being taken to have the Estimate duly sanctioned by the Consulting Engineer.

I transmit herewith Plan No: 1. Copy of Memorandum from the Engineer in charge of the Estimate, explaining the method of taking the levels, and the details of the Estimate and the principles on which it has been framed.

In the Estimate submitted by the Consulting Engineer, the following items have been omitted, which I consider should be added, for the reasons stated:

1. Allowance for Preliminary Expenses, - for surveying and laying out the Line of Railway, since commenced, as per Agreement.

2. Interest during construction, - for the Period of Three Years, at 5 per Cent per annum, as per Agreement.

3. Establishment, - for Superintendence during construction.

4. Contingencies, - for miscellaneous Petty Charges.

With regard to the Masonry, Plans and Sections of the Bridges and Culverts, I am of opinion that the Superintendence of Bridges should be entrusted to the Executive Engineer in charge of the Section in which they are situated, and that he should be required to submit the Plans for the Approval of the Chief Engineer.

With regard to the quantities in the Superstructure and Land also estimated, I am of opinion that the Estimate for Permanent Way is sufficient for the purpose, and that the Estimate for Land is sufficient for the present requirements of the Railway.

The Estimate for Land is based on the supposition that the Railway will be fenced throughout with Thorn Hedge, and that the Land will be purchased at Rs: 10/ per Cubic Yard. I am of opinion that the Land should be purchased at Rs: 20/ per Cubic Yard, as the Land is of a valuable description, and that the Railway should be fenced with Iron Fencing.

I am of opinion that the Estimate for Buildings is sufficient for the present requirements of the Railway.

All the other items of the Estimate have been dealt with in the manner arranged, for the Southern Section of the Railway.

I am of opinion that the Estimate for Establishment is sufficient for the present requirements of the Railway.

I am of opinion that the Estimate for Extensions of the Railway should be sanctioned by the Government of India.

Yours faithfully
Southern Line.

Chief Engineer.

Encl: with the Plans accompanying

Form 27

From

The Agent and Manager,
CARNATIC RAILWAY COMPANY,
(LIMITED.)
MADRAS.

To

The Consulting Engineer
for Railways.

DATED 24th Jul. } 1873.
RECD. 24/7/73 }
No. 236.

Forwards an Estimate for the line from Cuddalore to the Coleroon Pier.

P. W. 601/73
4
Lr. Cns. 3078-24 Dec/73

2

tracing of drawing No. 46 and No. 46 A, being a sketch elevation of the Bridge over the River Coleroon and the details for the construction of the Piers and abutment,- I also enclose a tracing to show the depths of the borings taken across the river and the nature of the material found in the River bed.

The Girders I propose for this Bridge are 123.75 ft from centre to centre of Pier being the same as those suggested for the River Palar, the details of the construction of which are left to be decided in England. I have made careful calculations with regard to the spans of these Girders, and find that, with depth of foundation such as the borings show to be necessary here, and the high cost of the Piers in proportion to the Superstructure of the Bridge, it will be cheaper to employ girders such as I propose rather than those of 100 feet.

A reference to the drawings will show that I contemplate forming the foundation of the Piers and abutments with Wells of brickwork,- having a bottom curb from which they are carried of iron plates, and strongly bolted together with iron rods and straps from bottom to top. The wells are intended to be finished off at the level of low water with strong well bonded coursing stones which will be cramped together over the whole surface of the Pier, on top of this the Piers will be completed with 6, cast iron columns 13 under each girder 18 inches diameter. With such arrangement as this, I think it will be found that there will be little or no scour caused by the Bridge in the most violent floods, as the water will flow freely over the top of the Masonry and the obstruction caused by such columns will be quite inappreciable.

I am induced to propose the form of construction above described, and to recommend it for Government sanction, in preference to the Iron Cylinders which had been suggested for the Main line & Madras to Cuddalore by

the enormous increase in the price of Iron which has recently occurred, and which will make the cost of the Brickwork wells filled with concrete very materially less than Iron Cylinders, in addition to which is the consideration that the construction of the former will employ the labor and material of the Country whilst the money expended on the Iron Cylinders will benefit English Manufacturers only.

The original design for the wells consisted of one large Eliptical shaped well to form the whole Pier, which I conceive when once sunk to the proper depth in place, will make the most firm and reliable structure possible, such a well is shown on the drawing. I have not seen or known of such a well having been made use of, and it may possibly prove to be difficult to get such a large mass of masonry down as deep as is required. I have therefore shown an alternative design consisting of two circular wells joined together at top which I would recommend should be used if the sinking of the other is found to be too difficult or unnecessarily expensive.

The total length of the Bridge between abutment is 2347 feet lineal, and I think it safe to say that this all available waterway, as the 12 inch columns when they stand each by itself, will offer no appreciable obstruction to the current of water. In deciding upon this I have been guided by the Waterway of the Public Road Bridge situated about 1/4 Mile above our crossing and which has now withstood the floods and freshes of 16 years and been found sufficient. The total effective waterway of that Bridge is 40 arches of 50 feet each making 2,000 lineal feet, the total length of Bridge between abutments being 2,320 feet lineal, it appeared to me therefore, if I allowed a length of waterway over that of the existing Bridge of 27 feet more, that the 300 feet extra opening which the character of the piers affords as compared with the others, would

give an ample margin to insure safety to our structure.

I have not thought it worth while to investigate the question of the amount of area drained by this River as the large size of the numerous branches taken off from it before it reaches the Railway, and the great extent of land over which the water is spread for irrigation within the delta, would render all calculation regarding rainfall utterly valueless.

It will be seen that the same design for piers has been adopted for the Bridges over the Paraiyanar and Vellaur Rivers in preference to those which were formerly estimated for - Piers of screw piles. I do not think much saving will be effected by the Brickwork wells in substitution for wrought Iron piles - / in fact at the prices formerly entered for Iron the Estimates will be virtually the same, the economy therefore will be measured by the amount of increase in the cost of Iron / but the wells in my opinion form a more stable and permanent structure in these rivers where the salt water from the sea backs up at every rise of tide.

The Plans and Sections for the alternative lines which have been surveyed are now being copied and will follow in a few days - with some further remarks. It will not be necessary I think to make any alteration in the Estimate as the quantities will vary very slightly whichever line may be selected; the Bridges being the same in all cases, and the small difference in length being compensated for by their being less earthwork on the lines which are largest.

The Estimate as it now stands amounts to Rs. 17,91,793 - the average per mile being 64,823. The excess over the former Estimate is to be accounted for by the addition of the Coleroon Bridge, and the amount allowed for Rolling Stock.

/True Copy/ /Signed/ Yours faithfully
Jos. T. Fisher F. L. Dibble
Chief Engineer

P.W. 6012/73
3
Dispatch

S 3
816

CARNATIC RAILWAY CO., (LIMITED)
AGENT AND MANAGER'S OFFICE,
MADRAS, 18 August 1873.

No. 263

FROM J. T. Fisher Esqre.
AGENT AND MANAGER, CARNATIC RAILWAY CO.,
Madras.

TO Lieut Col. J. H. M. Shaw Stewart R.E.
CONSULTING ENGINEER FOR RAILWAY,
Madras.

SIR,

With reference to my letter dated the 24 ulto, No. 236. I have now the honor to submit the tracings of the alternative line near Porto Novo referred to in the last para but one of the Chief Engineers letter dated 22d idem No. 624 enclosed therewith, together with a Copy of a further letter from the Chief Engineer dated the 14 inst. No. 722. on the subject.

I have the honor to be
Sir
Your most Obedt Servant
Jos. T. Fisher
Agent & Manager.

Mar: Rpt. / 1st Dy
Chief Engrs: Office.
Madras 14th August 1873.

No. 722.

J. J. Fisher Esq^re.

Agent & Manager.

My dear Sir,

In continuation of my No: 624 I have the pleasure to hand you herewith a tracing of the plan of Survey showing the line staked out for the Southern Extension between Porto Novo Station and the River Coleroon with the two alternative lines which have been surveyed at the request of the officers of the Court, also a tracing of the sections of the lines which they differ from that already forwarded.

On the Plan the line originally surveyed is marked in black (line No: I.) that to the West of it marked in Red (line No: II) and the other Green No: III.

As regards the crossing of the River Coleroon, being Red (No: II) and the Crossing of the River Coleroon, the place first selected for No: I, is in my opinion decidedly preferable - as reference to the Plan will show that the width of the River at high flood is that the mouths of the banks and river bank to bank, and the banks are much less from bank to bank - as greater portion of the latter depends - as greater portion of the latter depends with the flood being carried with the flood on the line of waterway can be attained with that on this of Bridge on this site as compared with that on the Red line. I think therefore that No: I. line should be adopted at the River crossing which may be the selection.

From

The Agent and Manager,
CARNATIC RAILWAY COMPANY,
(LIMITED.)
MADRAS.

To

The Consulting Engineer
for Railways.

DATED 15th Aug 1873
RECD. 16.

No. 263 -

Forwards Tracing of alternative line near Port Novo with Copy of Chief Engineer's letter

P. W. 6012/73
Register 6 letters
Dft. no. 3070 to

selection for the other parts. The design submitted for the Bridge was prepared for this place, a line has also been examined (shown in blue) which will connect this with No. II.

As far as cost of construction is concerned, I think there appears to be little or no advantage to be gained in one line over another. No. II. will have the least quantity of Earthwork mile for mile, and the borings on the River Vellaun show a less depth for foundations, but on the other hand, it is somewhat longer than either of the others, and the extra length, with the cost of additional permanent way, will counterbalance the saving to be effected by the lighter nature of the embankment. On lines I and III the depth of material above the hard stratum in the foundations for the Vellaun Bridge is greater than at the other Crossing, but I think it will be unnecessary to go down to the rock on either of these lines - as the Bridge will be in the tide way where no scour will occur and thirty feet (the depth of the least boring) will give perfectly secure foundations where such is the case.

It appears to me that the selection of position should be decided solely on the question as to whether the traffic of Porto Novo is to be served by the Railway or not. The Exports and Imports at present

Ord
34
896

No 3078

Proceedings of the Madras Government

Read the following

From the Chief Engr Rys (HE. No 582 of 4 Nov/73.

With this letter the Consulting Engineer for Railways submits plans and estimates for a line of Railway from Cuddalore ~~on the route approved~~ to Salem, amounting in the aggregate to Rs: 50, 31, 516; or at the rate of Rs: 56,000 per mile for a distance of 89 miles 68 Chains.

The items comprising the estimate are as follows:-

in G.O. No: 1339 A of 14th May/72

MGL 28/11

L 1

		Rs. A. P.
I	Preliminary Expenses	44,918-12-"
II	Land	" " "
III	Construction of Line	15,80,714-4-"
IV	Ballast and Permanent Way	1,47,654-12-"
V	Stations and Buildings	3,51,214-4-"
VI	Electric Telegraph	" " "
VII	Plant	1,88,285-"-"
VIII	Rolling Stock	3,65,000-"-"
IX	Maintenance	1,07,805-"-"
X	Establishment	4,15,044-"-"
XI	Contingencies	30,880-"-"
	Grand Total	503151 6-"-"

It is observed that the rates originally entered by the Railway Engineers to whom the preparation of the estimates was entrusted have been freely altered by the Consulting Engineer, and that the modifications made, which have for the most part been based on experience gained in dealing with the sanctioned extensions of the same gauge now in course of construction in other parts of Southern India, are fully concurred in by the present Chief Engineer of the Amalgamated Company under whom the works will be eventually carried out. The nature of the alterations is fully explained in the Note accompanying Lieut Col Shaw Stewart's letter; and His Excellency the Governor in Council feels confident from the evident care and attention which have

been bestowed upon the subject both by the Railway and Government Engineers that the works finally decided on have been judiciously adapted to local circumstances, and that the arrangements generally have been made with an intelligent appreciation of prospective difficulties and with a due regard to economical considerations.

His Excellency the Governor in Council accordingly resolves to recommend to the Government of India that sanction be accorded to the estimates submitted which have been based on trial surveys, leaving the preparation of working surveys to be undertaken when construction operations now in progress admit of the services of qualified Engineers being made available for the duty.

The section of Railway now estimated for will form the connecting link between the line from Madras to Cuddalore, and the Southern system of lines. Sanjore having been selected as the point of junction with the Great Southern of India Railway and

the important towns of Porto Novo, Chillumbrum and Coombaconum lying along the route which must be traversed, the direction of the line becomes reduced within very narrow limits. The Course between Pudduchuttrum and the Coleroon River seems however to have been open to some hesitation on the part of the Railway Officials; three alternative routes having been surveyed; but there can be little doubt from a traffic point of view as to the superiority of that numbered 3, which, by

embracing Porto Novo, will bring the inland districts into easy communication with the Sea board at a point where special facilities for foreign trade exist. In other respects none of the three routes appears to possess marked advantages over the others.

It is finally remarked that the Curves and gradients are on the whole very favorable.

The designs for Stations and Buildings on the Southern Extension of the Great Southern of India Railway which should have accompanied the revised estimates for that line but are only now submitted will be forwarded to the Govt of India.

No. 12 The Consulting Engrs. for Rys.

Despatched 24/12/73

956

No. 3079

To
The Secretary to the
Govt. of India.
P.W. Dept.

Sir,

In forwarding the accompanying copy of the Proceedings of Govt. under date the

No. I am directed by His Excellency the Governor in Council to request that the estimates of Rs: 50,31,576 for the line of Railway from Cuddalore on the narrow gauge therein received may receive the sanction of the Government of India.

It will be observed that the estimates have been based on trial surveys, but the Consulting Engineer is confident that the amounts entered are as near the actual expenditure as can be foreseen; and as it is of importance that the collection of materials should be undertaken in a manner calculated to command favorable prices, and so as to utilize to the best advantage the services of the Engineering Staff of the Company who are now employed on Constructive operations in other parts

of the Presidency, I am to request that the estimates may be accepted in their present form and early orders passed thereon.

Govt.

Despatched with
30 Copies of Jo No
Ex 3078 24/12/73

79 Encls: despd in a box
10/1/74-

2 Encls (Memo & Letter) despd
18/3/74.

c. h: 425.27.

c. 27-11-73

of the Presidency, I am
to request that the
estimates may be ac-
cepted in their present
form and early orders
passed thereon.

G.N.W.

Despatched with
30 copies of G.O.
No 3078 24/12

79 Enclos: desp. in a box
10/1/74 -

2 Enclos (1 desp. + a plan) desp.
18/3/74

N: 425-27.

No. 6012
Govt. of {1873} Madras.
PUBLIC WORKS.

To the Consulting Eng.r
for Railways
&
To the Secretary to the
Govt of India

Dated
Recd.
Encl. 7

G. O. 20th Decr 1873, No 3078-
3079.

Nos. 1195-426 & 427

Railway from Cuddalore to
Tanjore. Passing orders on
letter from the Cons. Eng.r
submitting plans & esti-
mates for a line of Rail-
way from Cuddalore to
Tanjore.

Forwarded for
sanction estimates for a line of
Railway from Cuddalore
to Tanjore.