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Political (1895) Department.

ORDINARY MS.

G.O., No. 820

DATED 6th Dec. 1895

INDEXED.

[Despatch Abstract.]

CALICUT - CANNANORE AND SHORANUR-COCHIN RAILWAY SURVEYS.

Communicating to the Resident in Travancore and Cochin Proceedings, Public Works Department (Railway), ordering that the reports and plans and estimates of the -- be forwarded to the Government of India.

BACK PAPERS.

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

FURTHER PAPERS.

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

No. 1740

RAILWAY.

Govt. of {1895} Madras.

PUBLIC WORKS.

Order. R. Wr No. 820 d/6 Dec '95

Communicated to the Resident in Travancore and Cochin

Chas Wrs 5.12.95

Dated November, 18th.

Recd. 4/12/95 *Encl.* 1

G.O. No. 774 R., 18th Nov. 1895.

NOVEMBER.

CHIEF SECRETARY
-4 DEC 1895
GOVERNMENT OF MADRAS

To Cob 6/12

The Resident in T&C (SC&O). Desp to 11/12

He Return surplus
Spare copies
CS

Repeat Enc bbr 6/12 Done bbr 6/12

Calicut-Cannanore and Shoranur-Cochin Railway Surveys

Ordered that the reports, plans and estimates of the —, with a note thereon by the Consulting Engineer for Railways, be forwarded to the Government of India.

WITH ORDER

Appendix to G.O., Nos. 774 and 775 R., dated 18th November 1895.

From the Officiating Chief Engineer, Madras Railway Company, to the Agent and Manager, Madras Railway Company, dated Rayapuram, 15th October 1895.

SUBJECT—*West Coast Surveys.*

I have the pleasure to forward herewith the Calicut-Cannanore and Shoranur-Cochin survey plans and sections, with reports, estimates and appendices, as detailed in the accompanying list, prepared in accordance with the Government of India rules for railway projects.

2. These surveys were commenced under the writer's supervision, who handed them over to Mr. A. B. Strange, under whose direction the field work was chiefly done and completed, and the office work estimates and reports were finally prepared by Mr. C. R. Dallas, who was obliged to leave before these were printed.

3. Mr. Dallas's reports explain fully what he has done, and ample provision has been made by him for building a first-class broad gauge railway throughout for both lines, taking cuttings with a base of 26 feet, with slopes of 2 to 1, and banks, 20 feet wide on top, with similar slopes; pitching has been provided to banks wherever they pass through wet cultivation, &c., and a very liberal allowance has been made for ballasting and bridging large rivers, including the provision of roadways on these for carts and passenger traffic.

4. The total estimate for the Calicut-Cannanore line amounts to Rs. 1,06,13,767 or Rupees 1,80,310 a mile. These figures have been reduced under my instructions in the manner shown in the note by Mr. Otto affixed to Mr. Dallas's report, to a total of Rs. 90,70,611 or Rs. 1,53,739 per mile, by (1) altering all earthwork slopes to 1½ to 1; (2) taking a base of 20 feet for cuttings, which is quite sufficient; (3) omitting pitching for banks through paddy fields; (4) flooring only two bridges for cart traffic; (5) reducing the waterway allowed for large bridges; (6) altering the types of stations and shortening the lengths of loop lines at the smaller ones to 1,200 feet; (7) providing fewer engine-sheds and turn-tables.

5. These alterations, while reducing the cost of the line very considerably, will not affect its carrying capacity, and for the reduced sum a thoroughly efficient broad-gauge railway may be constructed and furnished with rolling-stock.

6. A reference to the estimate abstract will show that the chief items of expenditure are (*a*) Earthwork, (*b*) Land, (*c*) Permanent-way, (*d*) Bridges.

The rainfall of the country passed through is very heavy, averaging 123 inches a year, that at the principal stations being given as follows:—

	INCHES.
Calicut	118·13
Tellicherry	131·43
Cannanore	122·05

As a consequence the amount of bridging necessary is very large, viz., minor bridges, 1,694 lin. feet, or 29 feet per mile; major bridges, 4,040 lin. feet, or 68 feet per mile. The banks have also to be kept at least 10 feet above ground-level, so as to be 3 feet above flood-level, and large provision for drainage of cuttings, station-yards, &c., has had to be made.

7. The land passed through consists chiefly of gardens with houses, cocoanut topes and paddy-fields, and is consequently most valuable, and is estimated by the Revenue officials to be worth Rs. 718·17 per acre, or Rs. 20,900 a mile of railway. The land for the Madras-Bezwada line, it may be stated, is valued at Rs. 59 per acre, or Rs. 1,549 a mile, just one-thirteenth part of the above, so that land for the Calicut-Cannanore Railway will cost about thirteen times as much as that required for the Madras-Bezwada Railway.

8. Permanent-way is also a very heavy item, Rs. 42,354 a mile, including sidings; owing chiefly to the very low rate of exchange now prevailing, this also greatly enhances the cost of all items imported from England, such as bridges, rolling-stock, station machinery, &c.; landing charges on the West Coast are also high.

9. Assuming that the line from Calicut to Cannanore can be made for Rs. 90,70,611, and that the traffic thereon would be equal to the local traffic between Pódanúr and Calicut, which amounted to Rs. 4,83,473 for the half-year ending 31st December 1894, and deducting 50 per cent. for working expenses, the net receipts would be Rs. 4,355 per mile, or Rs. 2,56,945 for 59 miles, which would give a return of 2·8 per cent. per annum on the outlay due to local traffic only; but considering how much more densely populated and richer the country between Calicut and Cannanore is, than that between Pódanúr and Calicut, and also the large import and export on the coast, that at Tellicherry being about Rs. 1,45,34,612 and Cannanore Rs. 37,77,337, an addition of 50 per cent. may, it would seem, be fairly added to the above return, which would bring it up to 4·2 per cent. at the very least.

Besides this direct return there would also, it is believed, be a considerable addition to the through traffic on the main line of the Madras Railway between Calicut and Pálghat. The Calicut Extension Railway, 9 miles long, opened in 1889, cost Rs. 2,22,222 a mile, and gives a net return on the outlay of between 6 and 7 per cent.

10. On the Shoranur-Cochin Extension it might be thought that a free use of curves would reduce the banks and cuttings considerably, but this is not the case. The physical features of the country show small patches of terraced cultivation surrounded by low laterite hills. It is not possible by using curves freely to wind in and out of the comparatively flat terraced cultivation, and to avoid the hills, as the cultivation is not in continuous stretches, but in broken up and isolated patches; consequently long straight lines give as good a section as a series of curves and have the additional advantage of reducing the length of construction to a minimum.

11. The index plan is not accurate in all its details, as it is taken from the map prepared by the Survey of India 80 years ago, and the topographical features are of the most meagre and inaccurate description. Even the large and important river Alwaye is incorrectly drawn, and crossings of the river are consequently shown very much askew when they are nearly at right angles. There is no other map in existence, and it was not possible for the Survey party to prepare their own index plan, as Government rules require a stretch of country 5 miles on each side of the centre line to be shown. The Survey of India map has been consequently used as the index, but its topographical details must be accepted with great caution. Hills are shown where no hills exist, and hills are omitted or shown as very small hillocks where there are in reality chains of hills 5 or 6 miles long. These omissions are most noticeable in the country between Keelamad and Perrambayur.

12. The remarks made in paragraphs 2 and 3 apply also to this survey; and the total estimate for this branch, 73 miles long, amounts to Rs. 1,51,12,809, or Rs. 2,07,021 a mile; this has been reduced as shown in the note in a similar manner to the Calicut-Cannanore estimate to Rs. 1,21,48,507, or Rs. 1,66,418 a mile, and if as Mr. Dallas recommends, that the direct line *viâ* Alwaye, 63½ miles long, be adopted, there will be a saving in length of 10 miles, and a saving in money on Mr. Dallas's estimate of at least Rs. 20,70,210, or on the reduced estimate of Rupees 16,64,180; and as the Alwaye river crossing on the direct line is also most favourable for bridging, this route appears to be the proper one to adopt. Moreover, the section shows that the heaviest work is on the portion proposed to be omitted. A branch line could hereafter be made from Alwaye to Perrambayur.

13. The cost in this case of earthwork, land, permanent-way, and bridges, is also very high. The country between Shoranur and Trichúr is hilly and difficult, as pointed out in the report and shown by plans and sections, and the banks throughout have to be kept high to bring them above flood-level, as described in paragraph 6.

14. The cost of land is excessive, as most of that south of Wadakancheri is occupied by gardens, cocoanut topes or rice flats, and the Revenue authorities have valued it as worth on an average Rs. 798·83 per acre, or Rs. 28,633 per mile of railway.

15. The rainfall of the country traversed by this railway is excessive, averaging 124 inches per annum, the rainfall at the following stations being—

	INCHES.
Shoranur	104·33
Trichúr	150·99
Cochin	117·03

This consequently renders the provision of a very large length of bridging necessary, amounting to—

Minor bridges, 2,432 lin. feet, or 33 feet per mile.
Major bridges, 3,780 „ or 52 „

16. Permanent-way, rolling-stock, station machinery, girders, &c., are costly, owing, as pointed out in paragraph 8, to the low rate of exchange and high landing charges.

17. Assuming that the direct line from Shoranur to Cochin *viâ* Alwaye, 63½ miles long, is made, its cost will be, adopting the figures of the reduced estimate, Rs. 1,05,67,543, or Rupees 1,66,418 per mile, and taking the traffic receipts on it to be equal to those received between Pódanúr and Calicut, that is Rs. 4,83,473 for the half-year ending 31st December 1894, which seems a reasonable assumption, deducting 50 per cent. for working expenses, the net receipts for local traffic only on 63½ miles would amount to Rs. 2,76,542, equal to a return of 2·6 per cent. on the outlay, Rs. 1,05,67,543.

18. To these figures must be added at least 50 per cent. to cover anticipated extra traffic from Cochin, a fair assumption when it is considered that the export and import traffic of this port amounts to Rs. 50,76,809 a year. It is a large and flourishing port, and it is one week's journey nearer to Europe than Madras. Add then 50 per cent. to the above figures and the net return will be 3·9 per cent. on the outlay; along with which there will be a considerable addition to the through traffic of the main line of the Madras Railway.

19. The Calicut-Cannanore extension will traverse a densely populated country and will pass through or close to several large towns and numerous villages, as shown in table, page 9 of the Survey report.

20. The Shoranur-Cochin extension also runs through a thickly inhabited country, as shown by the statement, Appendix No. VI of the report, the population ranging from 400 to 800 per square mile; so that taking the character of the country served by the proposed lines, there is great room for a large development of these resources and expansion of traffic after these lines have been in operation for a short time.

LIST OF PLANS AND SECTIONS, REPORTS AND ESTIMATES.

Calicut-Cannanore Extension.

Report in detail.
Estimates in detail.
Appendices I, II, III, IV and V, giving Traffic and Statistics and Trade returns.

Drawings.

I. Index plan and section.
II. Alignment plans and sections from mile 0 to mile 59.
III. Type drawings of major bridges.
IV. Do. of minor bridges.
V. Do. of ballast, permanet-way, banks and cuttings.

LIST OF PLANS AND SECTIONS, REPORTS AND ESTIMATES.

Shoranur-Cochin Extension.

Report in detail.
Estimates in detail.
Appendices I, II, III, IV, V, VI and VII, giving Traffic and Statistics and Trade returns.

Drawings.

I. Index plan and section.
II. Alignment plans and sections from mile 0 to mile 59.
III. Do. of alternative route from Koruttee, mile 43½, to Alwaye, mile 53.
IV. Type drawings of major bridges.
V. Do. of minor bridges.
VI. Do. of ballast, permanent-way, banks and cuttings.

1740

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Railway.

Read the following papers :—

NOTE BY THE CONSULTING ENGINEER FOR RAILWAYS.

Calicut-Cannanore and Shoranur-Cochin Railway Projects.

In dealing with the estimates and plans generally, the two projects (which are submitted in a very complete form) may first be considered together as far as main features are concerned.

2. *Location.*—In this the Chief Engineer has taken a ruling grade of 1/150 and ruling curve of $2\frac{1}{2}^\circ$ = 2,292′ radius for the Calicut-Cannanore line and 1/150 grade and 3° = 1,910′ radius curve for the Shoranur-Cochin line.

3 This decision I consider open to doubt. The main line of the Madras Railway has grades of 1/62, 1/80 and 1/100, the last being very frequent, and the pyhsical features of the branches are correctly described as rough and broken country involving high banks and deep cuttings.

4. I think, therefore, grades of 1/100 compensated for curves (which should be limited to, say, 5° = 1,146′ radius) whereby the very high banks would be reduced and the hills avoided would result in a very much cheaper line and quite easy enough to take all the traffic offering with their ordinary engines, and suggest when these branches are passed for construction, the deputation of an Engineer to re-align and regrade them on the lines abovenamed. Any further survey would be a useless expenditure at present.

5. *Land.*—This is a very heavy item, but is so far encouraging that a country where the acreage value is Rs. 718 will, without doubt, pay handsomely for a railway.

6. The plans do not show how the land is taken up for the side cuttings, but I believe that if a depth of only 18 inches or 24 inches is allowed to be dug, the land so located may be resold at not much below its original cost; this will necessitate a greater width of land at first, but the final result will be great economy.

7. *Earthwork*—Should be of the same section as on the main line which passes through similar soil and has stood well for many years; the jetties at Ernacolum on the Shoranur-Cochin branch should be built by the Cochin State, and the 5″ wrought iron screw-piles, now in the Madras Railway stores, might be used for this purpose.

8. *Bridges.*—The amount of bridging per mile is on the northern branch 29 + 68 = 97′ per mile; on the southern branch 33 + 52 = 85′ per mile.

This compares with the East Coast Railway, Madras-Bezwada length, which is estimated at 76′ per mile.

1895
Dept.
Enclos. No. 1
To 1740
C. No.

From the Agent and Manager, Madras Railway Company, to the Consulting Engineer for Railways, dated Madras, 11th November 1895, No. 5490 W./1008.

With reference to my 5490 W./966 of the 29th ultimo, forwarding copies of the estimates for the suggested extensions of the Madras Railway to Cannanore and Cochin, I have the honour to ask that the Government will pass orders upon the proposals submitted. These extensions are referred to by my Board in their letters No. 843, dated 28th November 1890, paragraph 14, and No. 911, dated 4th January 1895, to my address and No. 7759 of 19th March 1894, addressed to the Under Secretary of State for India for the construction of feeder branch lines.

2. The estimates forwarded to you are for first-class standard gauge railways, but if the banks and cuttings are lowered and surplus stores of the Madras Railway are freely used, it will doubtless be possible to reduce considerably the estimate as stated by Mr. Stoney.

3. Since my Board's last letter on the subject was written, I understand that one of the Guaranteed Railways in the north of India has raised money in England on debenture loan at two and a half per cent., and doubtless my Board will be able to carry out whatever has been done by the London representatives of a northern railway.

4. I would therefore suggest, if the construction of the proposed lines by the Madras Railway is viewed favourably by the Government of India, that the financial arrangements be settled in England between the Secretary of State and my Board.

5. The Government is aware that during the past half-year the Company has declared surplus profits, and although these profits are not large, still they represent interest upon some 30 lakhs of rupees.

6. The Western Coast or Malabar district is well cultivated and densely populated and I believe the traffic prospects to have been rather under than over stated.

ORDER—No. 774 R., dated 18th November 1895.

Ordered that the above, with the report and estimates of the Calicut-Cannanore and Shoranur-Cochin Railway Surveys, be forwarded to the Government of India with the following letter.

[Here enter No. 775 R., dated 18th November 1895.]

(True Extract.)

F. Stoney

Under Secy. to Govt., P.W.D.,
Railway Branch.

To the Agent and Manager, Madras Railway.
" Examiner, Railway Accounts, Madras.
" Revenue Department.
" Political Department, for communication to the Resident in Travancore and Cochin.

Exd. T. K. Narayana Aiyangar.
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