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# MADRAS RECORD OFFICE

## Government of Madras

*Public Works*

DEPARTMENT

|          |         |     |       |
|----------|---------|-----|-------|
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| Dated    | 7-12-74 | 195 |       |

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,  
\*7th December 1874.*

No. 124. 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, 13th November 1874, No. 692 :—

ADVERTING to the letter from the Government of India, dated the 12th June 1874, No. 1,294 R., I have the honor to submit, for the consideration of Government, a letter\* from the Agent of the South Indian Railway, giving cover to a report by the Chief Engineer, in which the several points noticed by the Government of India are dealt with.

2. It will be seen that, in designing the girders, the Company's Consulting Engineers have been obliged to increase considerably the weight of iron as estimated by Mr. Dibblee, the Carnatic Company's late Chief Engineer.

3. Mr. Logan explains the nature of the well foundations proposed for the large bridges, and states that, with one exception, they are all to be taken down to a hard substratum. As explained in paragraph 8 of the Note which accompanied my letter\* dated the 4th November 1873, No. 582, the exception is in the case of the Vellaur bridge, which

\*Vide Procs., Madras Government, 20th December 1874, No. 3,078.

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. Floorings and protective works will be provided for all bridges where the foundations are not taken down to a hard substratum.

4. With reference to the design for the Coleroon bridge, Mr. Logan furnishes approximate estimates which show that, in the item of cost, there is likely to be little difference between a structure consisting of nineteen 120 feet openings and one of twenty-three 100 feet openings. He recommends that the 120 feet openings be adhered to for reasons which have my entire concurrence.

5. Mr. Logan mentions further, in connection with the Coleroon bridge, that, upon examining the locality a few months ago, we arrived at the conclusion that the proposed bridge might without risk be reduced in length, and that eighteen openings of 120 feet would provide amply for the waterway. He alludes, on the other hand, to the bridge over the Guddelum river, situated on the section between Madras and Cuddalore, where the waterway originally proposed consisted of eight 100 feet openings. It was afterwards decided to add one opening; and the result of recent experience has shown that it will be advisable to have there ten 100 feet openings. In the cases of these two bridges the waterway has formed the subject of close investigation, and I am satisfied as to the propriety of the revised proposals. In order to avoid delay I have authorized the Agent to forward to his Board an indent for the additional girders required at the Guddelum bridge.

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7th December 1874.*

6. Mr. Logan tenders his assurance that all proposals for waterway will be carefully reconsidered, not only when the working estimates are prepared, but at every opportunity that offers for testing the sufficiency of those proposals. Upon this point the Government need have no apprehensions.

7. As will be seen from paragraph 50 of the Note which accompanied my letter\* of the 4th October 1872, No. 533, the question as to the number of engine stations necessary between Madras and Tanjore has not been lost sight of; and I am inclined to agree with the Agent that the proper course will be to have one principal changing station at Cuddalore, with smaller intermediate ones at Chingleput and Combaconum, to which places it is probable there will be considerable local traffic. If this is decided on, engine stables and turn-tables will of course be necessary there.

8. As regards the exact location of the line, Mr. Logan explains that although the original survey was called a "trial" one, it was the result of careful examination of the country. He also explains the circumstances which have retarded the progress of the working survey and section, and forwards a tracing\* which shows what may be accepted as practically the exact location of the line. I have had opportunities of making careful examinations of the whole country to be traversed by the railway in company with both the late and the present Chief Engineers, and I am satisfied that, in carrying out the works, there will be little or no deviation from the revised line as marked on the tracing now forwarded. The general alignment has been already accepted by the Governments of Madras and India, and I do not hesitate to say that the route now fixed upon represents the best mode of giving effect to those views.

9. Drawings\* of the girders for the large bridges are also forwarded by the Chief Engineer, who explains that until the entire line shall have been staked out and the working plans completed, he will not be able to submit the revised estimate called for by the Government of India. According to Mr. Logan's calculations, the completion of these operations will yet occupy some months; and he expresses a hope that, with the information now before them, the Government will feel justified in according sanction to the original estimates, in order to allow of the indents being sent to England without delay.

From W. S. BETTS, Esq., Agent of the South Indian Railway, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Negapatam, 3rd November 1874, No. 197.

I FORWARD herewith copy of a report (No. 7,759) which I have this afternoon received from the Chief Engineer, in reply to your letter No. 349 (altered to 59) of the 20th of July last, and

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7th December 1874.*

regret that so much delay has occurred in supplying the information called for by the Government of India.

2. I consider that one locomotive changing station between Madras and Trichinopoly will be sufficient; should short local trains have to be run, small sheds may be required at Chingleput, Combaconum, and Tanjore; provision can be made in the estimates for these.

*Letter from the Chief Engineer, to the Agent, dated Trichinopoly, 30th October 1874, No. 7,759.*

*Madras G. O. No. 1,876 of 13th July.*

YOUR No. 2,186 of 23rd July, with copy of Government Consulting Engineer's letter No. 349 of 20th July.

With reference to the exact location of the line, I have done all in my power with the force at my command to push this work. Partly owing to the weakness of this, and partly owing to the fact that nearly all the land, not grown over with topes and villages, is covered with water, being under wet cultivation, the progress of the working survey and section has been slow. During the next month I hope to have an aggregate of about 60 miles pegged out; and about the end of the year the centre line of the remainder similarly completed.

2. I now forward a tracing, No. 120, to show what is practically the exact location of the line.  
3. The red line represents that upon which the estimates under reference were framed.  
4. The deviations adopted and to be adopted from this in locating the line, are shown in full and dotted black lines respectively. Most of the deviations from the so-called trial lines were discussed by me with Colonel Shaw-Stewart on the ground, and I think he can bear me out in stating that the tracing No. 120 represents practically the actual location of the line.

5. As explained in my No. 3,253-2,570 of 23rd July last, although the red line was designated a trial one, it is in reality the result of a careful study of the country and of several trial lines, so that there has been little need or room for alteration, except, for instance, as at Sheally, in shifting the line a few chains more to the east, to place the station nearer to the town.

6. With reference to girders, I forward herewith, as directed in paragraph 10 of Colonel Drummond's letter, the drawings of girders for the large bridges. The piers of all the large bridges (100 and 120 feet span) are each to be carried on two wells of 12 feet external diameter, the piers themselves being of brickwork 8 feet thick.

With reference to paragraph 4 of Colonel Drummond's letter, it will be seen from the subjoined statement of weights that the girder spans weigh considerably in excess of what was estimated by Mr. Dibblee. The 100 feet and 120 feet spans were, I believe, calculated by him on the assumption that the load would be carried on the tops of the girders; whereas, in the girders now being manufactured in England, the load is suspended from the lower members, and this will to some extent account for the extra material required.

Mr. Fox of London, in remarking to me on this difference, states that he has designed the girders with as little material as is necessary to secure the requisite margin of safety.

In the following memorandum of weights, I have not confined myself to the spans to be used on the Cuddalore-Tanjore Extension, but give all available information with reference to the Northern Extension (Madras to Tanjore) :-

| Estimated by Mr. Dibblee. |     |     |            | As since designed in England. |
|---------------------------|-----|-----|------------|-------------------------------|
| 120 feet span             | ... | ... | Tons 30.61 | 47.00 Tons.                   |
| 100                       | ..  | ... | .. 23.90   | 34.00 ..                      |
| 70                        | ..  | ... | .. None.   | 20.00 ..                      |
| 66                        | ..  | ... | .. 9.71    | 12.00 ..                      |
| 40                        | ..  | ... | .. 7.2     | 7.00 ..                       |
| 30                        | ..  | ... | .. 4.43    | 5.00 ..                       |

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| Estimated by Mr. Dibblee. |     |           | As since designed<br>in England. |       |
|---------------------------|-----|-----------|----------------------------------|-------|
| 25 feet span              | ... | Tons 3.27 | 3.50                             | Tons. |
| 20                        | "   | " 2.41    | 2.50                             | "     |
| 10                        | "   | " 0.41    | 1.00                             | "     |
| 6                         | "   | " 0.18    | 0.24                             | "     |
| 4                         | "   | " 0.082   | 0.14                             | "     |

Regarding the rates referred to in paragraph 5 of Colonel Shaw-Stewart's letter, I consider that they will prove sufficient, viz., Rupees 350 for wrought and Rupees 225 for cast iron.

Paragraph 6 of Colonel Shaw-Stewart's letter. He is correct in understanding that the well foundations in large bridges will in all cases (except in the Velam river) be carried down to the hard, and the extra masonry provided in the estimates is intended to provide for floorings and protective works to all bridges where the foundations are not taken down to a substratum sufficiently hard to resist scour.

With reference to paragraph 8 of Colonel Drummond's letter (G. O., No. 1,876,) I trust that Government will accept my assurance that all proposals for waterways will be carefully reconsidered, not only when the working estimates are prepared, but at every opportunity of testing the sufficiency of our proposals. This is my invariable practice, and I take every means to impress upon my Assistants that such questions are always to be the subject of close study and revision as the works progress, so that lengthened experience of the various localities may enable us to confirm or modify our earlier provisions.

Paragraph 7 of Colonel Drummond's letter.—Revising the iron-work of Mr. Dibblee's estimate for the Coleroon bridge, in the light of the designs and weights for girders since received from England, I find that, approximately, nineteen 120 feet spans (= 2,280 lineal feet) would cost Rupees 5½ lakhs; while for the equivalent nearly of this waterway in 100 feet spans (i.e. twenty-three 100 feet spans = 2,300 lineal feet) the cost would be Rupees 5,17,000,\* being a difference of Rupees 8,000 only in favor of the shorter span.

\* See detailed Estimates herewith, marked A-1 and A-2, respectively.

As it is in the sinking of the well foundation for such bridges that much of the uncertain element in cost lies, owing to liability to obstructions in the underlying strata, to floods and other contingencies of a like nature, I recommend that the larger span be adhered to as involving a less degree of pecuniary risk in this respect.

While on this subject I would remark that, in consultation with Colonel Shaw-Stewart, after a re-inspection of the locality with him, I have come to the conclusion that eighteen 120 feet spans (instead of nineteen 120 feet spans) will be ample for the Coleroon crossing.

The existing road-bridge, close to the proposed railway crossing, consists of forty 50 feet brickwork arched spans. It is built on wells carried only 10 feet below the sandy level of the river. The openings are protected by floorings and an apron; but I think that a bridge over a river of this kind, resting on such shallow foundations, could scarcely have stood so long unless it possessed ample waterway, and I therefore feel quite convinced that with an addition of 120 lineal feet, and with foundations carried down to the hard, the railway bridge will have a very full margin of safety.

On the other hand, I ask permission to add an additional span of 100 feet to the river Guddelam, near Cuddalore, because during the heavy rains and consequent floods we have had at intervals, since the cyclone in May last, the advisability of this extra provision has forced itself upon me.

The bridge already sanctioned over the Guddelam is one of nine 100 feet spans, and the additional one proposed will make it ten 100 feet spans = 1,000 lineal feet.

I am having this span included in the revised estimates, now nearly ready, for the line between Madras and Cuddalore; meantime I would ask sanction to the change in order that an

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7th December 1874.*

indent may at once be sent home for the extra span. This subject does not perhaps strictly belong to the estimates under discussion, but I have included it in this communication in order to point out that, although an extra span of 100 feet is proposed at the Guddelam, a saving, more than equivalent to the cost of this, will be effected by leaving out one 120 feet span at the Coleroon.

In answer to the points remarked upon in Colonel Drummond's letter (paragraph 4) I have now given the designs and weights of the girders as they are being made in England; (paragraph 5) explained the course to be pursued with regard to the foundations of all bridges; (paragraph 7) considered the advisability of reducing the cost of the Coleroon bridge, by lessening the spans; and (paragraph 10) furnish herewith a survey which shows practically the exact location of the line.

At this season of the year, and with the means at my command, it will yet take some months to complete the staking out of the line and the working plans, and as until these operations are complete I cannot comply with the requisition for a revised estimate, I hope that Government will feel justified on the information now before them to sanction indents for the girders required in order to prevent delay hereafter.

I have done all I could to get extra hands to push the out-door work; but, with construction going on over 400 miles of line, I find that it is not possible to get reliable surveyors and out-door assistance for this kind of work in anything like the numbers requisite to ensure more rapid progress.

P.S.—Forwarded herewith

Four sets of iron girders, viz., Nos. 81 (1 set), 81a, 80 and 80a (1 set), 82 and 82a (1 set), and 79 and 79a (1 set).

Plan No. 120 showing location of line between Cuddalore and Tanjore (tracings in 3 pieces.)  
Two Estimates for Coleroon Bridge, viz., A1 and A2.

A1.

**SOUTH INDIAN RAILWAY NORTHERN EXTENSION.**

*Estimate for the Coleroon Bridge.*

| Quantities.    | Description of Work.                                | Rate.         |     |    | Amount. |          |    | Total. |          |    |    |
|----------------|-----------------------------------------------------|---------------|-----|----|---------|----------|----|--------|----------|----|----|
|                |                                                     | PER.          | RS. | A. | P.      | RS.      | A. | P.     | RS.      | A. | P. |
|                | 19 Spans 120 feet each.<br>Total length 2,468 feet. |               |     |    |         |          |    |        |          |    |    |
| 40             | Curbs, tie-rods, etc. ...                           | Each ...      | 568 | 0  | 0       | 22,720   | 0  | 0      |          |    |    |
| 286 lin. feet  | Well staking (12 feet diameter or depth 25 feet)... | Lin. feet.    | 8   | 0  | 0       | 2,288    | 0  | 0      |          |    |    |
| 1,876 "        | Well sinking (12 feet diameter or depth 59 feet) .. | "             | 11  | 0  | 0       | 20,636   | 0  | 0      |          |    |    |
| 9,599 C. yds.  | Brickwork ... ..                                    | C. yds.       | 10  | 0  | 0       | 95,990   | 0  | 0      |          |    |    |
| 2,026 "        | Concrete ... ..                                     | "             | 4   | 8  | 0       | 9,117    | 0  | 0      |          |    |    |
| 6,747 C. feet  | Ashlar ... ..                                       | C. feet.      | 2   | 0  | 0       | 13,494   | 0  | 0      |          |    |    |
| 893 tons       | Wrought iron ... ..                                 | Ton ...       | 350 | 0  | 0       | 3,12,550 | 0  | 0      |          |    |    |
| 893 "          | Carriage over 30 miles ...                          | Ton per mile. | 0   | 5  | 0       | 8,372    | 0  | 0      |          |    |    |
| 3,900 C. feet. | Teak timber ... ..                                  | C. feet.      | 4   | 0  | 0       | 15,600   | 0  | 0      |          |    |    |
|                | Contingencies, 5 per cent....                       | ...           |     |    |         | 25,038   | 5  | 7      |          |    |    |
|                |                                                     |               |     |    |         |          |    |        | 5,25,805 | 5  | 7  |

TRICHINOPOLY,  
30th October 1874.

3rd November 1874.

(Signed) D. LOGAN,  
Chief Engineer.  
( .. ) W. S. BETTS,  
Agent.

Proceedings of the Madras Government, Public Works Department,  
7th December 1874.

A2.

SOUTH INDIAN RAILWAY NORTHERN EXTENSION.

Estimate for the Coleroon Bridge.

| Quantities.    | Description of Work.                                 | Rate.         | Amount.   | Total.       |
|----------------|------------------------------------------------------|---------------|-----------|--------------|
| 48             | 23 Spans 100 feet each.<br>Total length 2,520 feet.  | PER.          | RS. A. P. | RS. A. P.    |
| 330 lin. ft.   | Curbs, tie-rods, etc. ...                            | Each.         | 508 0 0   | 27,261 0 0   |
| 2 252 ..       | Well sinking or depth 21 feet (12 feet diameter) ... | Lin ft.       | 8 0 0     | 2,640 0 0    |
| 11,375 C. yds. | Do. do 50 feet (12 feet diameter) ...                | Do.           | 11 0 0    | 24,772 0 0   |
| 2,378          | Brickwork ...                                        | C. yds.       | 10 0 0    | 1,13,750 0 0 |
| 8,083 C. ft.   | Concrete ...                                         | Do.           | 4 8 0     | 10,701 0 0   |
| 782 Tons.      | Wrought iron ...                                     | C. ft.        | 2 0 0     | 16,176 0 0   |
| 782 ..         | Cartage over 30 miles ...                            | Ton.          | 350 0 0   | 2,73,700 0 0 |
| 3,981 C. ft.   | Teak timber ...                                      | Ton per mile. | 0 5 0     | 7,331 4 0    |
|                | Contingencies, 5 per cent....                        | C. ft.        | 4 0 0     | 15,924 0 0   |
|                |                                                      | .....         | .....     | 24,612 12 0  |
|                |                                                      |               |           | 5,16,871 0 0 |

TRICHINOPOLY,  
30th October 1874.

3rd November 1874.

(Signed) D. LOGAN,  
Chief Engineer.  
( .. ) W. S. BETTS,  
Agent.

No. 125.

ORDER THEREON, 7th December 1874, No. 3,432.

RAILWAY, No. 20.

In their letter recorded with G. O., No. 1,876, dated 13th July 1874, the Government of India communicated their general approval of the extension from Cuddalore to Tanjore and of the proposed alignment of the railway, but withheld final sanction to the plans and estimates pending the exact location of the line and further information in respect to foundations, waterways, and the large bridges. Additional information was also called for in connection with certain other details of the project as well as a revised abstract estimate, accompanied by an index map showing the located line, and by drawings of the large bridges.

2. With this letter the Consulting Engineer submits a report from the Chief Engineer of the Company, in which the points noticed by the Government of India are dealt with. Drawings of the girders for the large bridges are also forwarded; and the Chief Engineer requests that, as the revised estimate required by the Government of India cannot be prepared until the entire line is staked and the working plans completed, which will occupy several months, sanction may be accorded to the original estimates, in order to admit of indents being sent home without delay.

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7th December 1874.

3. The Consulting Engineer recapitulates the several points of detail upon which information has been called for; and no further notice of the subjects adverted to in paragraphs 4 to 7 of the Government of India letter seems called for here, beyond observing that the recent disasters on the North-West Line of the Madras Railway give additional weight to the caution of the Government of India as to the necessity for careful reconsideration of the questions of waterway and foundation generally, with reference to which His Excellency in Council relies on the assurance of the Chief and Consulting Engineers that these important matters will be carefully attended to at every opportunity that presents itself.

4. The proposed arrangements in regard to engine stations between Madras and Tanjore will probably be found sufficient to meet the requirements of the case.

5. Under the explanation afforded as to the location of the line the tracing\* submitted may probably be accepted as the closest approximation at present practicable.

6. The papers will be forwarded to the Government of India, and sanction requested to the estimates already submitted. No time should however be lost in supplementing the Chief Engineer's report with the documents remaining to be supplied.

7. The sanction reported at the end of paragraph 5 of the Consulting Engineer's letter for additional girders for the Guddelam bridge on the section between Madras and Cuddalore is, under the circumstances, approved.

(Here enter No. 3,433, dated 7th December 1874.)

(True Extract.)

Colonel, R.E.,

Secretary to Government.

To the Consulting Engineer for Railways.

Exd S. T. Austin.

Spar

PUBLIC WORKS DEPARTMENT,  
FORT ST. GEORGE, 7th December 1874.

No. 126.

No. 3,433.

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. 21.

SIR,—With reference to your letter, No. 1,294 R., dated 12th June 1874, calling for further information on the subject of the proposed railway extension from Cuddalore to Tanjore, I am directed by His Excellency the Governor in Council to forward a copy of the accompanying Proceedings in which the several points adverted to are dealt with. His Excellency in Council trusts that with the information now afforded, and in consideration of the circumstances explained by the Chief Engineer of the Company as to the impracticability of at present preparing the revised estimate called for, the Government of India will no longer withhold their sanction to the original estimates, pending the approval of which the indents cannot be sent home for compliance.

2. The attention of the Railway authorities has been called to the necessity of submitting without delay the documents still due.

I have the honor to be,

Sir,

Your most obedient servant,

Colonel, R.E.,

*Secretary to Government.*

Exd. S. T. Austin

Spare Copies

South Indian Railway  
Northern Extension

Estimate for the Coleroon Bridge

| Quantity                                              | Description of work                                 | Rate          |       | Amount |       | Total |       |
|-------------------------------------------------------|-----------------------------------------------------|---------------|-------|--------|-------|-------|-------|
|                                                       |                                                     | Rs            | P a P | Rs     | P a P | Rs    | P a P |
| <u>19 spans 120 feet each. Total length 2,468 ft.</u> |                                                     |               |       |        |       |       |       |
| 110                                                   | Curbs to Roads &c                                   | Each          | 568   | 22     | 720   |       |       |
| 286                                                   | lin ft Well sinking (12 ft dia or dept 2 ft lin ft) |               | 8     | 2      | 288   |       |       |
| 1876                                                  | " " " " (12 ft dia or dept 2 ft lin ft)             |               | 11    | 20     | 646   |       |       |
| 9599                                                  | Brickwork                                           | Cy            | 10    | 95     | 990   |       |       |
| 2026                                                  | " Concrete                                          | "             | 4     | 8      | 9     | 117   |       |
| 6747                                                  | cft Ashlar                                          | cft           | 2     | 13     | 494   |       |       |
| 893                                                   | Tons Wrought Iron                                   | tons          | 350   | 2      | 12    | 500   |       |
| 893                                                   | Carriage over 30 Miles                              | tons per mile | 4     | 5      | 8     | 372   |       |
| 3900                                                  | cft Teak Timber                                     | cft           | 4     | 15     | 600   |       |       |
| Contingencies 5 per cent                              |                                                     |               |       | 25,038 |       | 5     | 7     |

Chief Engineer's Office

Tuchinopoly 30. Oct. 1874.

Wm. D. D. D.

Chief Engineer

William D. D.

21/10/74

South Indian Railway  
Northern Extension  
Estimate for the Cooleroon Bridge

| Quantities                                              | Description of work         | Rate        | Amount | Total       |
|---------------------------------------------------------|-----------------------------|-------------|--------|-------------|
|                                                         |                             | Per         | R a P  | R a P R a P |
| <u>23 spans. 100 feet each. Total length = 2300 ft.</u> |                             |             |        |             |
| 45                                                      | Curbs 12 feet high          | Each        | 565    | 27,250      |
| 2252                                                    | Well sinking or depth 20 ft | lin ft      | 8      | 2,604       |
| 2252                                                    | — — — — — 69                | lin ft      | 11     | 24,772      |
| 11,375 cy                                               | Brickwork                   | Cy          | 10     | 113,750     |
| 2,378                                                   | Concrete                    | "           | 4 8    | 10,701      |
| 8,088 cft                                               | Asphalt                     | Cft         | 2      | 16,176      |
| 782 ton                                                 | Wrought Iron                | ton         | 350    | 2,727       |
| 782                                                     | Cartage over 50 Miles       | ton per 100 | 5      | 7,321       |
| 3,981 cft                                               | Oak Timber                  | cft         | 11     | 15,921      |
|                                                         | Contingencies 5 per cent    |             |        | 24,612 32   |
|                                                         |                             |             |        | 5,16,971    |

Dec 17 1874  
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Chief Engineer's Office  
 Secunderpore 30 October 1874  
William Bell  
 Chief Engineer  
 Agent 3/11/74

No. 197

*South Indian*  
~~GREAT SOUTHERN OF INDIA~~ RAILWAY.

AGENT'S OFFICE,

NEGAPATAM, *3<sup>rd</sup> November 1884*

From

THE AGENT,

*South Indian*  
~~GREAT SOUTHERN OF INDIA~~ Railway,

To

The Consulting Engineer  
for Railways

SIR,

*Madras.*

I forward herewith copy of a report (No 4459) which I have this afternoon received from the Chief Engineer, in reply to your letter No 349 (altered to 59) of the 20<sup>th</sup> of July last; and regret that so much delay has occurred in supplying the information called for by the Government of India.

I consider that one locomotive changing station between Madras and Buckenopoly will be sufficient; should short local trains have to be run, small sheds may be required at Chengelpet, Pombacorum and Sangre - provision can be made in the estimates for these.

I have the honour to be  
Sir

Your most obedient servant  
*William B. B. B.*  
Agent

Railway Department.

CONSULTING ENGINEER'S OFFICE.

No. 692

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,

*Vide Proceedings  
Mo. G. 13<sup>th</sup> July  
1874. No. 1876.*

*No. 197-3<sup>rd</sup>  
November 1874.*

Adverting to the letter from the Government of India dated the 19<sup>th</sup> June 1874, No. 1294, P, I have the honor to submit for the consideration of Government a letter from the Agent of the South Indian Railway, giving cover to a report by the Chief Engineer, in which the several points noticed by the Government of India are dealt with.

2. Lt

*To the Agent  
of the Demerling Eng  
for Railways*

*Recd 21<sup>st</sup>  
Dec 6. 1874*

*Dec 197*

*The  
Chief Engineer  
in reply to your letter*

*No 59  
Dec 1974  
1874  
No. 151/74*

5. Mr. Logan mentions further, in connection with the Beleroon bridge, that, upon examining the locality a few months ago, we arrived at the conclusion that the proposed bridge might without risk be reduced in length, and that eighteen openings of 120 feet would provide amply for the waterway. He alludes, on the other hand, to the bridge over the Guddelum river, situated on the section between Madras and Guddalore, where the waterway originally proposed consisted of eight 100 feet openings. It was afterwards decided to add one opening; and the result of recent experience has shown that it will be advisable to have there ten 100 feet openings. In

the

Paragraph 8 of  
letter from G. of C.

Paragraph 9 of  
letter from G. of C.

the cases of these two bridges the waterway has formed the subject of close investigation, and I am satisfied as to the propriety of the revised proposals. In order to avoid delay, I have authorised the Agent to forward to his Board an indent for the additional girders required at the Guddelum bridge.

6. Mr. Logan tenders his assurance that all proposals for waterway will be carefully reconsidered, not only when the working estimates are prepared, but at every opportunity that offers for testing the sufficiency of these proposals. Upon this point the Government need have no apprehensions.

7. As will be seen from paragraph

paragraph 50 of the Memo which accompanied my letter of the 4<sup>th</sup> October 1872, No. 533, the question as to the number of engine stations necessary between Madras and Tanjore has not been lost sight of; and I am inclined to agree with the Agent that the proper course will be to have one principal changing station at Cuddalore, with smaller intermediate ones at Chingleput and Combaconum, to which places it is probable there will be considerable local traffic. If this is decided on, engine stables and turn-tables will of course be necessary there.

8. As regards the exact location of the line, Mr. Logan explains that, although the original

\* Vide Proceedings  
No. 4<sup>th</sup> Decem-  
ber 1872 No.  
2857.

No. 120

original survey was called a "trial" one, it was the result of careful examination of the country. The also explains the circumstances which have retarded the progress of the working survey and section, and forwards a tracing which shows what may be accepted as practically the exact location of the line. I have had opportunities of making careful examinations of the whole country to be traversed by the railway in company with both the late and the present Chief Engineers, and I am satisfied that, in carrying out the works, there will be little or no deviation from the revised line as marked on the tracing now forwarded. The general alignment has been already accepted by the Governments of Madras and India, and

9. Drawings of the gir-  
ders for the large bridges are  
also forwarded by the Chief  
Engineer, who explains that,  
until the entire line shall  
have been staked out and  
the working plans completed,  
he will not be able to sub-  
mit the revised estimate re-  
quested for by the Government  
of India. According to  
Mr. Logan's calculations,  
the completion of these opera-  
tions will yet occupy some  
months; and he expressed a  
hope

I have the honor to be  
Sir  
Your most obedient servant

Manufacturing Limited,  
Cons. Engineers for Railways

Machas  
 13<sup>th</sup> November  
 1874  
 Le Bourd.

South Indian Railway. Letter from the Chief Engineer, to the Agent, dated  
 Trichinopoly. 30<sup>th</sup> October 1874. N<sup>o</sup> 7759.  
 Madras C. O. 4786 of 13<sup>th</sup> July.

Yours N<sup>o</sup> 2186 of 23 July, with copy of Government Consulting  
 Engineer's letter N<sup>o</sup> 3249 of 20<sup>th</sup> July.

With reference to the exact location of the Line, I have done all in  
 my power with the force at my command to push this work. Partly  
 owing to the weather of this, and partly owing to the fact that nearly  
 all the land, not grown over with crops and villages, is covered  
 with water, being under wet cultivation, the progress of the working  
 Survey and Section has been slow. During the next month, I hope  
 to have an aggregate of about 60 miles pegged out; and, about  
 the end of the year, the centre line of the remainder similarly  
 completed.

I now forward a tracing N<sup>o</sup> 120 to show what is  
 practically the exact location of the line.

The red line represents that upon which the estimates  
 under referenced were framed.

The deviations adopted and to be adopted from this,  
 in locating the line, are shown in full and dotted black lines  
 respectively. Most of the deviations from the so-called trial  
 lines were discussed by me with Col. Shaw Stewart on the ground,  
 and I think he can bear me out in stating that the tracing  
 N<sup>o</sup> 120 represents practically the actual location of the line.

As explained in my N<sup>o</sup> 3253  
 2570 of 23 July last,  
 although the red line was designated a trial one, it is in  
 reality the result of a careful study of the country, and of  
 several trial lines, so that there has been little need or room  
 for alteration, except for instance, as at Theally in shifting  
 the line a few chains more to the East, to place the station  
 nearer to the town.

With reference to Girders, I forward herewith as  
 directed in para 10 of Col. Drummond's letter, the drawings  
 of Girders for the large Bridges. The piers of all the large bridges  
 (100 and 120 ft span) are each to be carried on 2 Wells, of 12 feet  
 external diameter, the piers themselves being of brickwork 8 ft thick.

Received by Government 11/11/74

24/11/74

Letter from the Engineer  
 of 20 July with enclosure  
 regarding the line  
 from Madras to  
 Bangalore.  
 No. 8432-9-12-74.

Serial No. 692

Dated 13<sup>th</sup> Nov 1874  
 Recd. 14<sup>th</sup>

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

From  
 The Consulting Engineer  
 for Railways,  
 No. 7151.

1874  
 11/11/74

With reference to para 4 of Col. Drummond's letter, it will be seen from the subjoined statement of weights that the girder spans weigh considerably in excess of what was estimated by Mr. Dibble. The 100 feet and 120 ft spans were, I believe, calculated by him on the assumption that the load would be carried on the tops of the girders; whereas, in the girders now being manufactured in England, the load is suspended from their lower flanges, and this will to some extent account for the extra material required.

Mr. Fox of London, on remarking to me on this difference, states that he has designed the girders with as little material as is necessary to secure the requisite margin of safety.

In the following Memo of weights, I have not confined myself to the spans to be used on the Cuddalore - Panjore Extension, but give all available information with reference to the Northern Extension (Madras to Panjore).

| Estimated by Mr. Dibble |            |  | As since designed in England |  |
|-------------------------|------------|--|------------------------------|--|
| Span                    | Wt in Tons |  | Wt in Tons                   |  |
| 120 ft                  | 30.61      |  | 147.00                       |  |
| 100 "                   | 23.90      |  | 34.00                        |  |
| 70 "                    | 9.71       |  | 20.00                        |  |
| 66 "                    | 9.71       |  | 12.00                        |  |
| 40 "                    | 7.2        |  | 7.00                         |  |
| 30 "                    | 4.43       |  | 5.00                         |  |
| 23 "                    | 3.27       |  | 3.50                         |  |
| 20 "                    | 2.41       |  | 2.50                         |  |
| 10 "                    | 0.41       |  | 1.00                         |  |
| 6 "                     | 0.18       |  | 0.24                         |  |
| 4 "                     | 0.082      |  | 0.14                         |  |

Regarding the rates referred to in para 5 of Col. Shaw Stewart's letter I consider that they will prove sufficient, viz Rs 350 for wrought and Rs 225 for cast iron.

Para 6 of Col. Shaw Stewart's letter. He is correct in understanding that the well foundations in large bridges will in all cases (except in the Velam river) be carried down to the hard, and the extra masonry provided in the Estimates is intended to provide for floorings and protective works, to all bridges where the foundations are not taken down to a substratum.

16  
sufficiently hard to resist scour.

With reference to para 8 of Col. Drummond's letter, (C. O. 1876) I trust that Government will accept my assurance that all proposals for waterways will be carefully reconsidered, not only when the working Estimates are prepared, but at every opportunity of testing the sufficiency of our proposals. This is my invariable practice, and I take every means to impress upon my Assistants that such questions are always to be the subject of close study and revision as the work progresses, so that lengthened experience of the various localities may enable us to confirm or modify our earlier provisions.

Para 7 of Col. Drummond's letter. Revising the estimate of Mr. Dobbles' estimate for the Coleroon Bridge, in the light of the designs and weights and for piers since received from England, I find that, approximately, nineteen 120 ft spans (= 2280 lin. ft) would cost Rs 5 1/4 lacs; while for the equivalent <sup>See</sup> <sup>of Dobbles' estimate</sup> <sup>of the waterway in 100 ft spans (i.e. 23, 100 ft spans = 2300 lin. ft)</sup> <sup>estimated here</sup> <sup>with marked the cost would be</sup> <sup>Rs 5.17.000, being a difference of</sup> <sup>Rs 8000 - only</sup> <sup>in favor of the shorter span.</sup> <sup>AL & A2 refer</sup> <sup>truly</sup>

As it is in the sinking of the well foundation for such bridges that much of the uncertain element in cost lies, owing to liability to obstructions in the underlying strata, to floods and other contingencies of a like nature, I recommend that the larger span be adhered to, as involving a less degree of pecuniary risk in this respect.

While on this subject, I would remark that in consultation with Col. Shaw Stewart, after a reinspection of the locality with him, I have come to the conclusion that 18-120 ft spans (instead of 19-120 ft) will be ample for the Coleroon crossing.

The existing road bridge, close to the proposed Railway crossing, consists of forty 50 ft. Brickwork arched spans - It is built on wells, carried only 10 ft. below the sandy level of the river. The openings are protected by floodings and an apron, but I think that a bridge over a river of this kind, resting on such shallow foundations, could scarcely have stood so long unless it possessed ample waterway, and

and I therefore feel quite convinced that, with an addition of 120 linear feet, and with foundations carried down to the hard, the Railway Bridge will have a very full margin of safety.

On the other hand, I ask permission to add an additional span of 100 ft to the river Cuddelam, near Cuddalor, because during the heavy rains and consequent floods we have had at intervals since the cyclone in May last, the advisability of this extra provision has forced itself upon me.

The Bridge already sanctioned over the Cuddelam is one of 9, 100 ft spans, and the additional one proposed will make it ten 100 ft spans = 1000 linear feet.

I am having this span included in the revised Estimates, now nearly ready for the Govt between Madras and Cuddalor, meantime I would ask sanction to the change in order that an Incident may at once be sent home for the Extra Span. This subject does not perhaps strictly belong to the Estimates under discussion, but I have included it in this communication in order to point out that although an extra span of 100 ft is proposed at the Cuddelam, a saving, more than equivalent to the cost of this, will be effected by leaving out one 120 feet span at the Coleroon.

In answer to the points remarked upon in Col. Drummonds' letter (para 4) I have now given the design and weights of the girders, as they are being made in England - (para 5) Explained the reasons to be pursued with regard to the foundations of all Bridges - (para 7) consistent the advisability of reducing the cost of the Coleroon bridge, by lessening its spans, and (para 10) furnish herewith a survey which shows practically the exact location of the Line.

At the season of the year, and with the means at my command, it will not take some months to complete the staking out of the line and the working plans, and as until these operations are completed, I cannot comply with the requisition for a revised Estimate. I hope that Government will feel justified on the information now before them to sanction Incidents for the Girders required in order to prevent

delay hereafter.

Have done all I could to get extra hands to push the outdoor work; but, with construction going on over 100 miles of line, I find that it is not possible to get reliable surveyors and out-door assistance for this kind of work in anything like the numbers requisite to ensure more rapid progress.

P.S. Forwarded herewith

14 sets of iron rods viz A<sup>o</sup> 81 (1 set) - 81a - 81b and 80a (1 set)  
82 and 82a (1 set) and 79 and 79a (1 set)

Plan A<sup>o</sup> 120 showing location of line between Cuddalore and Tanjore (tracings in 3 pieces)

2 Estimates for Coleroon Bridge viz A1 and A2.

(True Copy)

Wm Callaghan

Chief Clerk

Page 10

P.M.D.

19

14

Proceedings of the Madras Government  
Read the following

From the Com: Engineer } (H.E. no. 692d/13. Corr: 1/14)  
for Railways

3482

In their letter re-  
corded with G. O. no. 1876  
d/13: July 1874 the Govt.  
of India communicated  
their general approval  
of the extension from  
Luddalore to Tanjore  
and of the proposed  
alignment of the  
Railway, but withheld  
final sanction to the

20/7/13/74  
21/7/13/74  
22/7/13/74

M.D.  
26/11

plans and estimates  
pending the exact  
location of the line  
and further informa-  
tion in respect to  
foundations, water-  
ways, and the large  
bridges. Additional  
information was also  
called for in connection  
with certain other de-  
tails of the project  
as well as a revised  
abstract estimate, ac-  
companied by an in-  
dex

index map showing  
the located line and  
by drawings of the  
large bridges.

With this letter  
the Consulting Engineer  
submits a report from  
the Chief Engineer of  
the Company in which  
the points noticed by  
the Government of  
India are dealt with.  
Drawings of the girders  
for the large bridges  
are also forwarded; and  
the Chief Engineer requests

That, as the revised  
estimate required by  
the Government of  
India cannot be pre-  
pared until the en-  
tire line is settled and  
the working plans com-  
pleted which will  
occupy several months,  
sanction may be ac-  
corded to the original  
estimates in order to  
admit of tenders be-  
ing sent home with-  
out delay.

2  
The Consulting  
Engineer recapitulates  
the several points of  
detail upon which in-  
formation has been  
called for, and no fur-  
ther notice of the sub-  
jects adverted to in  
paras 4 to 7 of the Govt.  
of India letter seems  
called for here, ~~in re-~~  
~~spect to the question~~  
~~of waterway, however,~~  
~~generally~~  
~~the principle of the~~  
beyond observing  
~~in Council~~ that  
the recent disasters on the

~~para 7 of Govt. of India~~  
letter

North West Line of  
the Madras Railway  
give additional weight  
to the caution of the  
Government of India  
the necessity for  
as to ~~the~~ careful re-  
of the questions of  
waterway & foundation generally, with  
consideration ~~in~~ reference to which  
his  
excellency in Council  
relies on the assurance  
of the Chief and Con-  
sulting Engineers that  
these important matters  
will be carefully at-  
tended to at every op-  
portunity

Para 9 of Govt. of I. letter.

Para 10 — do —

1: 120.

opportunity that  
presents itself.

The proposed arrange-  
ments in regard to  
Engine Stations between  
Madras and Tanjore  
will probably be found  
sufficient to meet the  
requirements of the case.

Under the expla-  
nation afforded as to  
the location of the line  
the tracing submitted  
may probably be ac-  
cepted as the closest  
approximation at pre-  
sent

present practicable.

The papers will be forwarded to the Government of India and sanction requested to the estimates already submitted. No time should however be lost in supplementing the Chief Engineer's report with the documents pertaining to be supplied.

The sanction reported at the end of para 5 of the Consulting Engineer's letter for additional orders for the Guddalur Bridge on the section between Madras and Guddalur is, under

C.E. for Dept. ✓  
despt. 8/12/74

17  
The circumstances, approved.

3433

To The Secretary to the Govt. of India C.B.

Sir

With reference to your letter N. 1294 R d/ 12 June 1874 calling for further information on the subject of the proposed Railway Extension from Guddalur to Sanjor. I am directed by His Excellency the Governor

in Council to forward  
a copy of the accom-  
panying Proceedings  
in which the several  
points adverted to are  
dealt with. His Excellency  
in Council trusts that  
with the information  
now afforded, and in  
consideration of the cir-  
cumstances explained  
by the Chief Engineer  
of the Company as to  
the impracticability  
of at present preparing

the revised estimate  
called for, the Govt.  
of India will no longer  
withhold their sanction  
to the original estimates,  
pending the approval  
of which the indents  
cannot be sent home  
for compliance.

The attention of  
the Railway authorities  
has been called to the  
necessity of submitting  
without delay the docu-  
ments still due.

C. W. W.

no 464. Copies with 30. Copies  
of previous Proceedings with  
Plans despatched to Govt. of India.  
8/12/74.

7151

Genl. of 1874 Addres.

PUBLIC WORKS.

*Handwritten signatures and initials, including "J. P. H. D. D. D."*

Send

Recd.

Encl. 3

3432

o. c. J. Deer. No. 3433

Nos. 124-126.

Forwarding copy of Pro-  
ceedings ~~in which the~~  
passed on papers sub-  
mitted by the Com. & Co.  
for N.Y. & furnishing  
further information on  
the subject of the proposed  
Railway Extension from  
Cuddalore to Tanjore  
and requesting under the  
circumstances stated  
sanction to the original  
Estimates

Railway from Cuddalore to  
Tanjore

Passing orders on a  
letter from the Com. & Co.  
for N.Y. submitting papers  
from the Agent of the South  
India Ry. furnishing <sup>further</sup> in-  
formation on the subject  
of the proposed Railway  
Extension from Cuddalore to  
Tanjore —