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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	267278 (Ry)	Press
B.P. No.		Mis.
Dated	17-9-	1875

Not to be folded or roughly handled

No. 386. Read the following letter from Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, to Major-General G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 20th August 1875, No. 461 :—

In the papers printed with the Proceedings of Government, under date the 21st May 1875, No. 1,408, it was reported that the progress of the protective works to the Poiney, Goriattum, and Naggery bridges, and to the Palar bridge on the downstream side, had been suspended, pending the receipt of Sir John Hawkshaw's report containing recommendations for certain modifications in those works. The report in question is printed with the Proceedings of Government, under date the 25th June 1875; and I have now the honor to lay

* No. 826, 4th August 1875.

before Government a letter* from the

Agent of the Madras Railway, forwarding for sanction revised plans and estimates for the protective works to the abovenamed bridges.

2. The Committee appointed by Government to examine the foundations of bridges on the Madras Railway, and consisting at the time of Mr. Andersen, Chief Engineer of the Madras Railway, Major Smith, R.E., and myself, recommended, in the case of the Palar bridge, "that two
Proceedings of Government, 28th June 1872, No. 1,503.

double lines of wells be sunk to the clay wherever the depth of sand exceeds 13 feet; curtain walls, resting on these wells and elsewhere on the clay, being constructed so as to extend across the river bed, and be connected with the abutments at either bank; the space between these wells being floored with stone in chunam, and the distance between the outer edge of the pier foundations and the inner edge of the nearest row of wells being at least 24 feet." With regard to the Goriattum, Poiney, and Naggery bridges, the Committee recommended similar protection, proposing "that the curtain walls be carried down to the clay where found at a depth not exceeding 15 feet, and that elsewhere they should rest on wells built and arranged as proposed for the Palar bridge, the distance between wells and pier being 18 feet."

3. These recommendations received the approval of Government, and plans and estimates for the proposed works at the Palar, Goriattum, and Poiney bridges were prepared and sanctioned. When submitting these plans, however, the Chief
Proceedings of Government, 7th February 1873, No. 410.

Engineer reported that, in the cases of the two last named bridges, "wells had been adopted throughout in order to avoid the expense and difficulty attending the sinking of solid foundations to so great a depth as 15 feet;" and a reference to the plans will show that the wells are designed to reach from the solid substratum to within 6 feet of the level of the flooring, a height of 6 feet being thus given to the curtain wall. In the design for the Palar bridge works, a similar height is given to the curtain wall, except in those places where the solid substratum was reached at a less depth than 13 feet, and where wells were altogether omitted.

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4. These plans and estimates were in due course sanctioned;* but shortly afterwards Mr. Going, who held the position of Chief Engineer in the years 1873-74 during Mr. Anderson's absence in England, reported that he found practical difficulties in the way of carrying out the sanctioned designs, which compelled him to submit modified plans and estimates. Mr. Going's modifications included—

- (1.) An increased thickness to the wells where the depth of sand exceeded 15 feet, it having been proved that a thickness of one brick was insufficient to sustain the pressure at that depth.
- (2.) A different arrangement of the wells, which, while preserving the double rows recommended by the Committee, provided for a greater distance between adjacent wells; the arrangement according to the original design having been proved to be unexpectedly expensive, as well as difficult and tedious in execution.
- (3.) A reduction of from 13 feet to 8 feet in the limit of depth below the river bed at which the curtain walls were to be founded; it having been found impossible, with the appliances at disposal, to lay the foundations of these walls at such a depth as 13 feet.
- (4.) A reduction to 8 feet in the distance between the cutwaters and the inner edge of the nearest row of wells; the greater distances recommended by the Committee being rendered unnecessary by the proposal to reduce the height of the curtain walls, and to found them everywhere upon wells.

5. In laying Mr. Going's proposals before Government, I recommended that the modifications suggested by him should be adopted at the Goriattum and Poiney bridges; but that, at the Palar bridge, the distance named by the Committee between the outer edge of the pier foundations and the inner edge of the nearest row of wells, 24 feet, should be preserved; also that the curtain walls should retain the height assigned to them in the original design. The modifications recommended for adoption were assented to by Government; and subsequently the Government of India expressed their satisfaction at the economy in cost which was expected to result from the modified designs.

Proceedings of Government, 25th November 1873, No. 2,844.

Proceedings of Government, 25th June 1875, No. 1,776.

6. Sir John Hawkshaw now recommends further modifications in the details of the last sanctioned designs. Those modifications are as follow:—

- (1.) That the wells should not be sunk nearer the bridge than 20 feet on the downstream side, and 15 feet on the upstream side.
- (2.) That on the downstream side the well work should be stronger than the sanctioned arrangement.
- (3.) That rubble stone, to a depth of about 5 feet, should be thrown in above and below the two lines of wells, for a distance of at least 60 feet on the downstream side, and 25 feet on the upstream side.

7. The revised plans and estimates now forwarded by the Agent have been framed as far as possible in accordance with Sir John Hawkshaw's recommendations.

The estimated cost of the proposals now brought forward, and of those which have already been laid before Government, compare as follows:—

Bridge.	Original Estimate for protective works.	Estimate as revised by Mr. Going.	Estimate as now revised by Mr. Anderson.
	RS.	RS.	RS.
Palar	80,757	61,461	1,50,386
Poiney	3,11,832	1,85,931	4,79,391
Goriattum	1,39,922	80,449	1,76,098
Total	5,32,511	3,27,841	8,05,875
Naggery	None.	44,438	1,11,146
Total	...	3,72,279	9,17,021

Mr. Anderson's revised estimates amount to Rupees 9,17,021; but he proposes to utilize the wells which have been already sunk to the value of Rupees 7,530, so that the sum for which he now asks sanction is Rupees 9,09,491.

8. In submitting his revised proposals, Mr. Going's object was to reduce the cost of the protective works to as low a figure as possible, consistent with securing sufficient protection for the bridges. In the newly revised proposals that object seems to have fallen out of consideration; and every precaution, likely to remove still further the risk of injury to the bridges, appears to have been suggested, without reference to cost. I am still of opinion that the works recommended in my letter No. 412, dated the 6th August 1873, will afford sufficient protection to the bridges; but so far as I know such works have nowhere been executed; and under those circumstances to maintain that precautions are superfluous which are considered necessary by an Engineer of Sir John Hawkshaw's position and experience is not an enviable task.

9. A new question is however necessarily raised by the enormous sum to which the new estimates amount. It seems probable that the bridges could be entirely rebuilt for a sum, possibly less, but certainly not much greater than what is now proposed to be spent in protecting the existing structures. The cost of works lately executed on the Madras Railway leads to the conclusion that rivers such as those now under discussion can be bridged, with thoroughly sound foundations, at a cost of less than Rupees 250 per lineal foot. The water-way allowed by the existing bridges is as follows:—

Palar Bridge	749 feet.
Poiney "	1,652 "
Goriattum* "	720 "
Naggery "	520 "

* Excluding the portion lately rebuilt, for which protective works have not been designed.

making a total water-way of 3,641 lineal feet. If this amount of water-way can be provided at a cost not in excess of that named above, it is clear that new and sound bridges can be built at an outlay nearly the same as that which it is now proposed to incur in protecting the existing unsound structures.

10. The nature of the foundations in the Palar, Poiney, and Goriattum bridges has been described by the Bridge Committee in their reports printed with the Proceedings of Government, under date the 28th August 1871, No. 2,197, and the 26th June 1872, No. 1,568. The Committee's report upon the Naggery bridge is printed with

*Proceedings of the Madras Government, Public Works Department,
17th September 1875.*

the Proceedings of Government, under date the 2nd April 1873, No. 1,021; but at that time they had not been able to examine any of the pier foundations. I have lately had an opportunity, in company with the Chief Engineer, of making a partial inspection of one of these foundations. The pier was not opened out to the bottom, so that the depth to which the foundation is carried cannot be stated; but the quality of the masonry which we were able to examine was worse than indifferent.

11. Taking into consideration the defective and unsound character of the foundations in these four bridges, and the enormous sum which it is now proposed to lay out in protecting them, I cannot avoid the conclusion that the proper course is to substitute bridges on thoroughly sound foundations for the existing structures. It is not impossible that some of the existing bridges could be made use of for ordinary road traffic.

Until the decision of Government upon this subject has been received, I have asked that the progress of the protective works on the upstream side of the Palar bridge may be suspended.

12. In addition to Mr. Anderson's revised plans* and estimates, the following drawings are also submitted herewith for the consideration of Government, with a request that they may be returned to this office.

* Nos. 201, 202, 203, 170.

Copy of Drawing No. 1, alluded to in Sir John Hawkshaw's report.

† Nos. 168, 169, 170.

Plans† of the original designs for protective works at Palar, Poiney, and Goriattum bridges.

‡ Nos. 174, 175, 176.

Plans‡ of Mr. Going's revised designs for protective works at Palar, Poiney, and Goriattum bridges.

§ No. 131.

Plan§ of Mr. Going's design of protective works at Naggery bridge.

From R. B. ELWIN, Esq., Agent and Manager of the Madras Railway Company, to Lieut.-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Madras, 4th August 1875, No. 826.

I HAVE the honor to forward you herewith plans* and estimates of the cost of the protective works required for the bridges over the Poiney, Goriattum, and Palar rivers, South-west Line, and for the bridge over the Naggery river, North-west Line, revised as far as possible in accordance with the recommendations contained in Sir John Hawkshaw's letter, dated the 20th April 1875, and I request that you will be so good as to communicate to me the sanction of Government for the required expenditure, viz. :—

* Nos. 201, 202, 203, and 170.

	RS.
Poiney Bridge	4,75,096
Goriattum Bridge	1,75,093
Palar Bridge	1,48,696
Naggery Bridge	1,10,606

2. In forwarding to me these plans and estimates the Chief Engineer observes as follows:—

"I regret to say I have been unable to adhere strictly to the design as shown in Sir John Hawkshaw's Drawing No. 1, but the modifications which I have been compelled to adopt are not of a serious character.

*Proceedings of the Madras Government, Public Works Department,
17th September 1875.*

"Before leaving for England on sick leave in April 1873, I obtained the sanction of Government for protective works at the Poiney, Goriattum, and Palar bridges. My design provided for curtain walls up and down stream, at a distance, in the case of the Poiney and Goriattum, of 22½ feet, and of the Palar bridge of 28½ feet, from the cutwaters, supported on double rows of wells, and with a flooring between the curtain walls. This design was considerably modified during my absence. Quite a different arrangement of wells was adopted, and the distance of the curtain walls from cutwaters was reduced to 11½ feet in the case of the Poiney and Goriattum, and to 27½ feet in the case of the Palar. At the Naggery bridge the design sanctioned in September 1873 provided for curtain walls up and down stream, at a distance of 11 feet 6 inches from cutwaters, the arrangement of wells being carried out as in the modified design of the other bridges.

"As considerable progress was made towards carrying out the works in accordance with the revised designs, I have been obliged, in order to utilize as much as possible what has already been done, to make the following changes upon Sir John Hawkshaw's proposal:—

"In the case of the Poiney bridge, the distance from curtain walls to cutwaters downstream has been made 26 feet 3¼ inches instead of 20 feet, to get clear of the wells already sunk, and upstream, 11 feet and 15½ feet, instead of 15 feet, to utilize a portion of the existing wells.

"In the Goriattum bridge, the distance in the case of the downstream curtain wall has been made 27 feet 3¼ inches, and of the upstream 13 feet 6 inches for similar reasons.

"In the Palar, the downstream curtain wall has been made 37 feet 9½ inches from cutwaters, to avoid existing wells, but the distance in the upstream 27 feet, remains unchanged.

"At the Naggery the distance downstream has been increased to 22 feet 9¼ inches, and upstream 15 feet for the reasons given in the case of the Poiney."

3. The usual information as to provision in the Budget, and the dates on which the sanctions will lapse, is given on the estimates in red ink.

No. 387. ORDER THEREON, 17th September 1875, No. 2,677.

RAILWAY, No. 36.

With this letter the Consulting Engineer submits revised estimates for protective works to the Palar, Poiney, Goriattum, and Naggery bridges on the Madras Railway, based on the remarks and suggestions of the Company's Consulting Engineer in England. The following abstract shows the amounts originally sanctioned for these works, the estimates as subsequently revised by Mr. Going, and the estimates as now revised by Mr. Anderson.

Bridge.						Original Estimate for protective works.	Estimate as revised by Mr. Going.	Estimate as now revised by Mr. Anderson.
						RS.	RS.	RS.
Palar	...	...	...	...	...	80,757	61,461	1,50,386
Poiney	...	...	...	...	...	3,11,832	1,85,931	4,79,391
Goriattum	...	...	...	...	...	1,39,922	80,449	1,76,098
Total						5,32,511	3,27,841	8,05,875
Naggery	...	...	...	...	...	None.	44,438	1,11,146
Total						...	3,72,279	9,17,021

2. The Consulting Engineer explains that Mr. Going's revised estimates were framed with the view of reducing the cost of the works to the lowest possible limit

*Proceedings of the Madras Government, Public Works Department,
17th September 1875.*

consistently with securing efficient protection for the bridges, but that in the newly revised proposals that object seems to have fallen out of consideration. The cost is in fact so great that it is calculated that entirely new bridges can be built for the sum that it is proposed to expend in protecting the existing structures. Under these circumstances, and looking to the fact that there is really no practical experience available as to the dimensions required to be given to protective works to render them absolutely secure, the Honorable the Governor in Council inclines to the opinion that it will be better to incur the expenditure required for the construction of new bridges.

3. It is observed that a sum of Rupees 95,668 has been already expended out of the total estimate of Rupees 3,72,279 as shown below :—

<i>Goriattum Bridge.</i>							
		RS.	A.	P.	RS.	A.	P.
Expended departmentally	...	21,944	13	9			
Drawn from Stores	...	929	3	0			
					22,874	0	9
<i>Poincy Bridge.</i>							
Expended departmentally	...	40,581	12	7			
Drawn from Stores	...	223	9	2			
					40,805	0	9
Naggery Bridge	...				8,406	0	7
Palar Bridge	...				23,582	0	2
					95,668	0	3

4. The question will, however, be remitted for the consideration of the Government of India.

(Here enter No. 2,678, dated 17th September 1875.)

(True Extract.)

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

Secretary to Government.

To the Consulting Engineer for Railways.
Examiner of Railway Accounts.

Exd. S. T. Austin.

Spare Copies

PUBLIC WORKS DEPARTMENT,
OOTACAMUND, 17th September 1875.

No. 388.

No. 2,678.

FROM

MAJOR-GENERAL 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. 37.

Government of India, No. 1,640 G. R., dated
14th October 1872.
Do. No. 375 G. R., dated 4th March 1873.
Do. No. 1,866, G. R., dated 1st Nov. "

SIR,—Adverting to the correspondence quoted in the margin, in which sanction was accorded to the estimates for protective works to the Palar, Poincy, Goriattum, and Naggery bridges on the Madras Railway, I am now directed to forward, for the

orders of the Government of India, plans with revised estimates which have been based on the suggestions of the Company's Consulting Engineer in England, whose report will be found printed with the Proceedings, No. 1,776, dated 25th June 1875, separately transmitted in compliance with your letter, No. 746 R., dated 18th March 1875.

2. It will be observed from the Proceedings of Government on the present proposals that the Honorable the Governor in Council is inclined, under the circumstances, to incur the expenditure required for the construction of entirely new bridges; but the question is one which can best be decided by the Government of India.

I have the honor to be,

Sir,

Your most obedient servant,

Major-General, R.E.,
Secretary to Government.

Exd. S. T. Austin.

Spare Copies

No. 826

MADRAS RAILWAY. 139

AGENT AND MANAGERS' OFFICE.

Madras, 4th August 1875.

From

R. B. Elwin Esq.

Agent and Manager. M. R. C.

To

Rt Hon J. H. Shaw Stewart, R.

Consulting Engineer for Railways.

Sir,

Nos 201, 202,
203 and 170.

I have the honour to forward you herewith Plans and Estimates of the cost of the protective works required for the Bridges over the Poincy, Gornattum and Palav rivers, South West Line, and for the Bridge over the Vaggeny river, North West Line, revised as far as possible in accordance with the recommendation contained in Sir John Hawkshaw's letter dated the 20th April 1875, and I request that you will be so good as to communicate the sanction of Government for the required expenditure, viz:

Poincy Bridge	Rs. 475.096
Gornattum Bridge	175.093
Palav Bridge	148.696
Vaggeny Bridge	110.606

In forwarding to these
Plans and Estimates, the Chief Engineer

909,49

observes as follows:

59

"I regret to say I have been unable to adhere strictly to the design as shown in Sir John Hawkshaw's drawing etc. but the modifications which I have been compelled to adopt are not of a serious character.

"Before leaving for England on sick leave in April 1873 I obtained the sanction of Government for protected works at the Poincy, Goriatum and Palar bridges - My design provided for curtain walls up, and down stream at a distance, in the case of the Poincy and Goriatum, of $22\frac{3}{4}$ feet, and of the Palar bridge, of $28\frac{3}{4}$ feet, from the cutwaters, supported on double rows of wells, and with a flooring between the curtain walls. This design was considerably modified during my absence. Quite a different arrangement of wells was adopted, and the distance of the curtain walls from cutwaters was reduced to $11\frac{1}{2}$ feet in the case of the Poincy and Goriatum, and to $27\frac{1}{2}$ feet in the case of the Palar. At the Taggeri bridge the design sanctioned in September 1873 provided for curtain walls up, and down stream, at a distance of 11 feet 6 inches from cutwaters - the arrange-

12
ment of wells being carried out as ¹⁷⁹ the
modified design of the other bridges.

As considerable progress was
made towards carrying out the work
in accordance with the revised designs,
I have been obliged in order to utilize as
much as possible what has already been
done, to make the following changes
upon Sir John Hawkshaw's proposal.

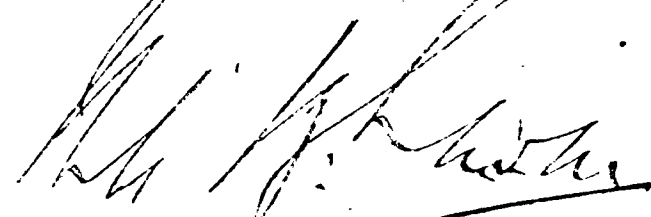
In the case of the Piney bridge,
the distance from curtain walls to
cutwaters down stream has been made
26 feet $3\frac{3}{4}$ inches instead of 20 feet, to get
clear of the walls already sunk, and
up stream, 11 feet and $15\frac{1}{2}$ feet, instead
of 15 feet, to utilize a portion of the
existing walls.

In the Gorintum bridge,
the distance in the case of the down
stream curtain wall has been made
27 feet $3\frac{3}{4}$ inches, and of the up stream
13 feet 6 inches for similar reasons.

In the Palas, the down stream
curtain wall has been made 37 feet
 $9\frac{3}{4}$ inches from cutwaters, to avoid
existing walls, but the distance in
the up stream, 27 feet, remains unchanged.

At the Baggy the distance
down stream has been increased to 22 feet.

9 3/4 inches, and up stream 15 feet for the reasons given in the case of the Prince.
 3. The usual information as to provision in the Budget, and the dates on which the sanctions will lapse, is given on the Estimates in red ink.

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

 Agent and Manager

213
Railway Department.

CONSULTING ENGINEER'S OFFICE.

No. 461 Madras 20th August 1875

From

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

Consulting Engineer for Railways,

To Major General

Colonel G. W. WALKER, R.E.,

Secretary to Government,

Public Works Department,

Fort Saint George.

SIR,

In the papers printed with the Proceedings of Government under date the 21st May 1875, No. 11408, it was reported that the progress of the protective works to the Peinny, Periatthum, and Naggery bridges, and to the Palau bridge on the down-stream side, had been suspended pending the receipt of Sir John Hawkshaw's report containing recommendations for certain modifications in those works. The report in question is printed.

with

MADRAS RAILWAY.

From

The Agent and Manager.

To

The Consulting Engineer

for Railways.

Dated 4th August 1875

1875

M. No. 826.

The undersigned in pursuance of the order of the Board of Directors, in protective works to be carried out at the Peinny, Periatthum, Naggery, and Palau bridges, and to the Palau bridge on the down-stream side.

M. 533 6/75.

20 17 September 1875

with the Proceedings of Government under date the 25th June 1875; and I have now the honour to lay before Government a letter from the Agent of the Madras Railway, forwarding for sanction revised plans and estimates for the protective works to the above named bridges.

2. The Committee appointed by Government to examine the foundations of bridges on the Madras Railway, and consisting at the time of Mr. Anderson, Chief Engineer of the Madras Railway, Major Smith, R.E., and myself, recommended, in the case of the Palay bridge, "that two double lines of wells be sunk to the clay whenever the depth of

N: 824-4th
August 1875

Proceedings of
Government
28th June 1875
N: 1568

"sand

258
"sand exceeds 13 feet; curtain walls resting on these wells and elsewhere "on the clay being constructed, so as to extend across the river bed, and be connected with the abutments at either bank; the space between these wells being floored with stone in chunam, and the distance between the outer edge of the pier foundations and the inner edge of the nearest row of wells being at least 24 feet. With regard to the Geriattum, Peiney, and Nuggery bridges, the Committee recommended similar protection, proposing that the curtain walls be carried down to the clay where found at a depth not exceeding 15 feet, and that elsewhere they

"they should rest on wells built
"and arranged as proposed for the
"Palau bridge, the distance between
"wells and pier being 18 feet."

3. These recommendations
received the approval of Govern-
-ment; and plans and estimates
for the proposed works at the
Palau, Geriattum, and Peirey
bridges, were prepared and sanc-
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to the plans will show that the

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Proceedings
of Government
7th February
1873 - N^o 410.

258
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6 feet of the level of the flooring,
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less depth than 13 feet, and
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estimates were in due course
sanctioned; but shortly after-
wards Mr. Goring, who held the
position of Chief Engineer in

Proceedings of
Government
31st October 1872,
N^o 2563.
and 19th March
1873 N^o 860.

the years 1873-74 during Mr.
Anderson's absence in England,
13th August 1873
N^o 2016 A.
reported

reported that he found practical difficulties in the way of carrying out the sanctioned designs, which compelled him to submit modified plans and estimates. Mr. Goings' modifications included:-

- (1) An increased thickness to the walls where the depth of sand exceeds 15 feet, it having been proved that a thickness of one brick was insufficient to sustain the pressure at that depth.
- (2) A different arrangement of the walls, which, while preserving the double rows recommended by the Committee, provided for a greater distance between adjacent wells; the arrangement according to the original

original design having been proved to be unexpectedly expensive, as well as difficult and tedious in execution.

- (3) A reduction of from 13 feet to 8 feet in the limit of depth below the river bed at which the curtain walls were to be founded; it having been found impracticable, with the appliances at disposal, to lay the foundations of these walls at such a depth as 13 feet.

- (4) A reduction to 8 feet in the distance between the cutwaters and the inner edge of the nearest row of wells; the greater distances recommended by the Committee being rendered unnecessary by the proposal to reduce

reduce the height of the curtain walls, and to found them everywhere upon wells.

5. In laying Mr. Gaingo's proposals before Government, I recommended that the modifications suggested by him should be adopted at the Geratam and Piner bridges; but that, at the Palan bridge, the distance named by the Committee between the outer edge of the pier foundations and the inner edge of the nearest row of wells, 24 feet, should be preserved; also that the curtain walls should retain the height assigned to them in the original design. The modifications recommended for adoption were assented to by

299
by Government; and subsequently the Government of India expressed their satisfaction at

Proceedings of the economy in cost which was Government expected to result from the modified designs.
25 November 1873 N^o 2844.

6. Sir John Hawkshaw recommended further modifications in the details of the last sanctioned design. These modifications are as follow:-

(1) That the wells should not be sunk nearer the bridge than 20 feet on the down-stream side, and 15 feet on the up-stream side:

(2) That on the down-stream side the well works should be stronger than the sanctioned arrangement:

(3) That rubble stone, to a depth of about 5 feet, should be thrown in above and below the two lines of walls, - for a distance of at least 60 feet on the down-stream side, and 25 feet on the up-stream side.

7. The revised plans and estimates now forwarded by the Agent have been prepared as far as possible in accordance with Sir John Hawkshaw's recommendations. The estimated cost of the proposals now brought forward, and of those which have already been laid before Government, compare as follows:-

Bridge.

Bridge	Original estimate for proposals made.	Estimate as revised by Mr. Gaine	Estimate as now revised by Mr. Anderson
Palan	80,757	61,461	1,50,386
Painy	3,11,832	1,85,931	4,79,391
Gariathum	1,39,922	80,449	1,76,098
Total	5,32,511	3,27,841	8,05,875
Vaggery	- none -	44,438	1,11,146
Total		3,72,279	9,17,021

Mr. Anderson's revised estimates amount to Rs. 9,17,021; but he proposes to utilize the walls which have been already sunk to the value of Rs. 7,530; so that the sum for which he now asks sanction is Rs. 9,09,491.

8. In submitting his revised proposals, Mr. Gaine's

object

object was to reduce the cost of the protective works to as low a figure as possible consistent with securing sufficient protection for the bridges. On the newly revised proposals that object seems to have fallen out of consideration; and every precaution, likely to remove still further the risk of injury to the bridges, appears to have been suggested, without reference to cost. I am still of opinion that the works recommended in my letter N^o 412 dated the 16th August 1873 will afford sufficient protection to the bridges; but so far as I knew such works have nowhere been executed; and under those circumstances to maintain that precautions

7339
precautions are superfluous which are considered necessary by an Engineer of Sir John Hawkshaw's position and experience, is not an enviable task.

9. A new question is however necessarily raised by the enormous sum to which the new estimates amount. It seems probable that the bridges could be entirely rebuilt for a sum, possibly less, but certainly not much greater than what is now proposed to be spent in protecting the existing structures. The cost of works lately executed on the Madras Railway leads to the conclusion that rivers such as those now under discussion can be bridged, with thoroughly sound foundations, at a cost of less than Rs. 250 per linear foot. The waterway

way allowed by the existing bridges
is as follows:-

Palau bridge. 711.9 feet

Poiney . 1652 .

Goriattum* 720 .

Naggery . 520 .

* Excluding the
portion lately re-
-built, for which
provision was not
designed).

making a total waterway of 3611 lineal

feet. If this amount of waterway

can be provided at a cost not in

excess of that named above, it is clear

that new and sound bridges can be

built at an outlay nearly the same

as that which it is now proposed

to incur in protecting the existing

unsound structures.

The nature of the foundations

in the Palau, Poiney, and Goriattum

bridges, has been described by the

Bridge Committee in their reports

printed with the Proceedings of

Government under date the 28th August

1871,

1871, N^o. 2197, and the 26th June 1872,
N^o. 1568. The Committee's report
upon the Naggery bridge is printed
with the Proceedings of Government
under date the 2nd April 1873, N^o. 1021;
but at that time they had not been
able to examine any of the pier founda-
-tions. I have lately had an
opportunity, in company with the
Chief Engineer, of making a partial
inspection of one of these foundations.
The pier was not opened out to the
bottom, so that the depth to which
the foundation is carried cannot be
stated; but the quality of the ma-
-sonry which we were able to examine
was worse than indifferent.

11. Taking into consideration the
defective and unsound character of
the foundations in these four
bridges, and the enormous sum
which

which it is now proposed to lay out
in protecting them, I cannot avoid
the conclusion that the proper
course is to substitute bridges on
thoroughly sound foundations for
the existing structures. It is not
impossible that some of the existing
bridges could be made use of for
ordinary road traffic.

Until the decision of
Government upon this subject has
been received, I have asked that
the progress of the protective works
on the up-stream side of the
Palar bridge may be suspended.

12. In addition to Mr. An-
dersen's revised plans and estimates, <sup>Nos 201, 202,
203, 170.</sup>
the following drawings are also sub-
mitted herewith for the considera-
tion of Government, with a re-
quest that they may be returned

to

313
to this Office.

Copy of drawing No. 1 alluded
to in Sir John Hawkshaw's report.

* Nos 168, 169, 170.

Plans of the original designs for
protective works at Palar, Peiney,
and Geriattum bridges.

* Nos 174, 175
176.

Plans of Mr. Goings' revised
designs for protective works at
Palar, Peiney, and Geriattum bridges.

Nos 131.

Plan of Mr. Goings' design of
protective works at Naggery bridge.

I have the honour to be
Sir

Your most obedient servant
Mantworth B. Esq., R.E.,
Consulting Engineer for G.O.

4386

Al A

No. 2677 Public Works Dept. 49

Proceedings of the Madras Government.
Under date the 17. Sept. 1875
Read the following

From
The Com. & Engrs for } (H.C. No. 101. 2/20th Augt/75)
Railways

With this letter
the Comd^g Engineer
submits revised estimates
for protective works
to the Palar, Poring,
Goriatum and Naggar
Bridges on the Madras
Railway, based on
the remarks and
suggestions

suggestions of the Com-
pany's Consulting Engineer
in England. The follow-
ing abstract shows the
amounts originally sanc-
tioned for these works,
the Estimates as subse-
quently revised by Mr.
Goins, and the Estimates
as now revised by Mr.
Anderson.

Bridge	Original Estimate for protective work	Estimate as revised by Mr. Young	Estimate as now revised by Mr. Anderson
Palar	80,757	61,467	150,386
Poing	3,11,832	1,85,931	47,9,391
Goriattum	1,39,922	80,449	176,098
Total	5,32,511	3,27,847	8,05,875
Naggers	none	44,438	1,11,146
Total		3,72,279	9,17,021

The Consulting Engineer explains that Mr. Goings revised Estimates were framed with the view of reducing the cost of the works to the lowest possible limit consistently with securing efficient protection for the bridges, but that in the newly revised proposals that object seems to have fallen out of consideration. The cost is in fact so great that it is calculated that entirely new bridges can be built for the

same

sum that it is proposed
to expend in pro-
tecting the existing
structures. Under
these circumstances,
and looking to the
fact that there is
really no practical
experience available
as to the dimensions
required to be given
to protective works to
render them absolutely
secure, the Honble the
Governor in Council
inclines to the opinion
that it will be better to incur the expenditure
in the present financial state of the Madras
Railway to run a very
indefinite

16-9
US-9
~~indefinite amount of~~
~~with and adhere to Mr.~~
~~Gowin's Estimate. Especially~~
It is observed
considering that a sum
of Rs 95,688 has been
already expended out
of the total Estimate of
Rs 3,72,279 as shown
below.

Gorattum bridge

Expended departmentally Rs 21,944-13-9
Drawn from Stores 929-3-0 22,874-0-9

Ponny bridge

Expended departmentally 40,581-12-7
Drawn from Stores 223-9-2 40,805-0-9

Naggery bridge 8,406-0-7
Palar bridge 23,582-9-2
95,688-11-3

The question will
however

however be remitted for
the consideration of the
Govt of India.

(H.E. No 2678 dt 17th Sep 75)

No 2678

To,
The Secy. to the Govt of India
Public Works Dept.

Sir,

Adverting to the
correspondence quoted
in the margin in which
sanction was accorded
to the Estimates for pro-
tective works to the Palar,
Poing, Goriattum and
Naggeny bridges on the
Madras Railway, I

am Comd. Engr. for Ry.

Comd. Engr. for Ry - 12
Engr. Ry Accts 7

Office 17
Govt of India 31

Govt of India No 1040 G.R. dt
14th Oct 1872
" " No 375 G.R. dt
4th March 1873
" " No 1888 G.R. dt
1st Nov 1873.

17
599
am now directed to
forward for the orders
of the Govt of India
plans with revised estimates
which have been based
on the suggestions of the
Company's Consulting
Engineer in England,
whose report will be
found printed with
the Proceedings No 476
dated 25th June 1875
separately transmitted
in compliance with
your letter No 746 R
dated 18th March 1875.

It will be observed
from the Proceedings of
Govt. on the present pro-
posals that the Honble
the

the Governor in Council
is inclined to adhere to

~~Mr. Goring's revised Estimate;~~
~~but the question is now which~~
~~can best be decided by~~
~~the Govt of India.~~

C.M.W.

under the circumstances
to incur the expenditure
required for the con-
struction of entirely new
bridges; but the question
is now which can best
be decided by the
Government of India.

ml
17/9

C.M.W.

Pl. 1 Estimate
deducted from
the original estimate
of 17/9/75

5 sc of Letter 4305c
of the order -

Dispd 5.10.75

N=386/8

1705396

of 1875
PUBLIC WORKS.

C. S. H. H. H.

Joseph H. H.

Edited

Revised

Printed

Printed

G. O. 1705396 No. 2677
2678

No. 386-387
388

Protective Works to the Polar
Mining Operations and Haggery
Bridges on the Maine Bay
Passing Orders on letters from
the Company submitting
various estimates for —