

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	2016 A	Press
B.P. No.	211 A 211 B	Mis.
Dated	13. 8	1873

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
13th August 1873.*

No. 211A. 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, 6th August 1873, No. 412:—

ADVERTING to the Proceedings of Government noted in the margin, I have the honour to submit, for the consideration of His Excellency in Council, a letter* from the Agent of the Madras Railway Company, giving cover to a proposal from the Acting Chief Engineer to modify, in some particulars, the sanctioned designs for protective works to the bridges over the Palar, Poiney, and Goriattum rivers. The recommendations embodied in the modified proposals are as follow:—

28th June 1872, No. 1,568.
10th Sept. " " 2,148.
13th " " " 2,177.
31st Oct. " " 2,563.
7th Feb. 1873, " 410.
19th Mar. " " 860.

* No. 544, 29th July 1873.

1st.—That when the depth of sand exceeds 15 feet, the wells shall be 6 feet in external diameter, and 1½ bricks in thickness, set in chunam; and that, with a less depth of sand, the wells shall also be 6 feet in external diameter, and 1 brick only in thickness, set in chunam.

2nd.—That a somewhat different arrangement of the wells shall be adopted, which, while complying with the recommendations of the Bridge Committee, and providing a complete protection against scour, will be more economical than the arrangement shown in the sanctioned designs.

3rd.—That the limit of depth at which the curtain walls must be founded upon the hard substratum shall be fixed at 8 feet below the river bed, instead of 13 feet; and that wells shall be employed as a foundation for these walls when the depth of sand exceeds 8 feet.

4th.—That the distance between the outer edge of the foundations of the piers and the inner edge of the nearest row of wells shall be fixed at 8 feet, instead of 24 feet, as sanctioned in the case of the Palar bridge, and 18 feet in those of the Poiney and Goriattum bridges.

2. Mr. Going also recommends, in the case of each bridge, that the surface of the flooring shall be fixed at a depth of 2 feet below the river bed; and a reference to the revised plans, which accompany his letter, will show that the wells are designed to reach from the hard substratum to within 4 feet of the level of the flooring, thus fixing the height of the curtain walls at 4 feet.

3. Mr. Going shows that the estimated cost of the revised works, as compared with their sanctioned cost, gives a saving of Rupees 2,15,393, as follows:—

	Sanctioned Estimate.	Revised Estimate.	Saving.
Poiney Bridge...	RS. 3,11,832	RS. 1,85,931	RS. 1,25,901
Goriattum Bridge	1,39,922	80,449	59,473
Palar Bridge ...	80,757	50,738	30,019
Total saving	...	...	2,15,393

4. I have had an opportunity of discussing this question with the Acting Chief Engineer, and also of inspecting the experimental wells alluded to by Mr. Going, which have been sunk in the bed of the Cheyaur river. It is with great satisfaction that I am able to endorse all Mr. Going's proposed modifications in the cases of the Poiney and Goriattum rivers, and thus to recommend a saving of Rupees 1,85,374 upon the sums sanctioned for protecting these two bridges. I am of opinion that in the cases of these rivers the modified works proposed by Mr. Going will afford a complete protection against the destructive effects of scour.

5. In the case of the bridge over the Palar river the conditions are different; and, looking to the very insecure nature of the foundations, and to the generally critical position of the bridge, I am not able to recommend the great reduction in the width of stone flooring proposed by Mr. Going. The Bridge Committee recommended that the distance between the outer edge of the pier foundations and the inner edge of the nearest row of wells should be 24 feet, and Mr. Going proposes to reduce this to 8 feet. I am of opinion that, in the case of the Palar bridge, the width of stone flooring named by the Committee should be preserved; and also that the curtain walls should have a minimum height of 6 feet, as provided in the original design. In other respects I am of opinion that Mr. Going's revised proposals may be made applicable to this bridge.

6. If my recommendations should meet with the approval of Government, the saving effected upon the three bridges will probably exceed two lacs of Rupees, and it is with great satisfaction that I am able to recommend so large a reduction in the estimated outlay.

7. The progress of the works is at present in abeyance, pending the receipt of orders from Government; and, as it is of very great importance that no time should be lost in proceeding with them, I beg that the instructions of His Excellency in Council may be communicated to me by telegraph.

The original drawings, as well as the revised ones, are herewith forwarded for His Excellency's consideration.

From J. W. MELLIS, Esq., for the Acting Agent and Manager of the Madras Railway Company, to Lieutenant-Colonel J. H. M. SHAW-STEWART, R.E., Consulting Engineer for Railways, dated Madras, 29th July 1873, No. 544.

I HAVE the honour to forward herewith, for submission to Government, a copy of the Acting Chief Engineer's letter, No. 463, of the 18th instant, together with the modified plans and estimates therein referred to, relating to the protective works to the Palar, Poiney, and Goriattum Bridges.

2. I request that you will be so good as to communicate to me as early as possible the orders of Government upon the recommendations made by Mr. Going.

From T. H. GOING, Esq., Acting Chief Engineer, to W. B. WRIGHT, Esq., Acting Agent and Manager of the Madras Railway Company, dated Madras, 18th July 1873, No. 463.

In carrying out the sanctioned designs for protective works to the Palar, Poiney, and Goriattum Bridges, I find practical difficulties in the way which compel me to submit, for the approval of Government, modified plans and estimates for these works, which are accordingly herewith furnished.

2. The reasons which necessitate this course are as follow, viz. :—

1st.—In the sanctioned plans the wells for all depths are designed to be of the thickness of one brick; since these designs were forwarded, however, I have had an opportunity of proving by actual experiment that brick wells of this thickness cannot be sunk to a greater depth than 15 feet, beyond which the pressure becomes sufficient to crush them up, and this is the case whether the bricks be set with mortar or clay. A large proportion of the wells in these protective works will have to be sunk to depths varying from 15 to 34 feet below the river bed. I have, therefore, made experiments to ascertain what is the least thickness of a 6 feet well which will maintain its shape to these depths, and the result has been as follows, viz. :—Two wells were sunk, each of 6 feet external diameter and $1\frac{1}{2}$ brick thick; one, however, was set in mortar, and the other in mud.

The former was sunk at the rate of $4\frac{1}{2}$ rds lineal feet per day to a depth of 36 feet 6 inches, at a cost of Rupees 5-9-2 per lineal foot.

The latter was sunk at the rate of 1 foot 11 inches per day to a depth of 21 feet, at a cost of Rupees 5-8-9 per lineal foot.

The first few feet were sunk by divers and the remainder by Bull's dredger in each case. The chunam-built well retained its shape perfectly, and might probably have been sunk to a much greater depth.

The mud-built well retained its shape, but stuck at a depth of 21 feet; the friction caused by the envelope of straw rope (found necessary with this well) being so great that a super-imposed weight of 26,000 lbs. (52 rails) was unable to overcome it.

The experience thus gained has determined me in estimating for 6 feet wells of $1\frac{1}{2}$ brick thick, set in chunam, for all depths greater than 15 feet, and 6 feet wells of one brick thick, set in chunam, for depths of 15 feet and less. All the wells to be filled with hydraulic concrete.

2nd.—In the second place I propose a different arrangement of the wells which, complying with the recommendations of the Bridge Committee, and providing a complete protection against the destructive effects of scour, will be more economical than the arrangement shown on the sanctioned designs.

3rd.—In Government orders it is laid down that the curtain walls are to be founded on the hard substratum when found at a depth not exceeding 13 feet in the case of the Palar bridge, and 15 feet in that of the Poiney, Goriattum, and Naggery bridges. Practically, this order only affects the case of the Palar as, in that of the other bridges, there are no depths of sand less than 15 feet. But in the case of the Palar I would respectfully submit that it is impossible, with the appliances at my disposal, and not warranted by the circumstances, to lay the foundations of these wells at such a depth as 13 feet. I accordingly ask sanction to fix the limit of depth at which the curtain walls must be founded on the hard substratum at 8 feet below the river bed, and to employ wells as a foundation for these walls when the depth is greater than 8 feet.

4th.—My fourth reason for submitting revised plans arises from a desire to reduce the great width and consequent cost of flooring as provided for in the sanctioned plans. The distance of 24 feet in the case of the Palar and 18 feet in that of the other bridges, fixed by the Government Bridge Commission for the clearance of each curtain wall from the piers, was no doubt decided upon in consideration of the danger which might arise to the piers in excavating very deep foundations for the curtain walls. The result of subsequent borings has, however, shown that the depths of sand are such as will allow of the curtain walls being founded on wells throughout, except in a small portion of the Palar, and here I trust that my recommendation may be sanctioned for an 8 feet instead of a 13 feet limit to the depth of solid foundation. If so, the necessity will be removed, even in the case of the Palar, for placing the curtain walls at so great a distance from the piers, and I propose making this distance only 8 feet.

Proceedings of the Madras Government, Public Works Department,
13th August 1873.

3. It will be seen, on reference to the plans, that I have, in each case, designed the surface of flooring to be at a depth of 2 feet below the river bed, as I consider it a matter of great consequence that the sectional limits of floods should not be fixed too rigidly.

4. A comparison of the estimates already sanctioned with those now submitted gives the following results, viz. :-

	Sanctioned Estimate	Revised Estimate.	Saving effected.
	RS.	RS.	RS.
Poiney Bridge ..	3,11,832	1,85,931	1,25,901
Goriattum Bridge	1,39,922	80,449	59,473
Palar Bridge ...	80,757	50,738	30,019
Total ...			2,15,393

5. I trust the Consulting Engineer may recognise the expediency of advising the early sanction of these revised plans and estimates, as I shall in the meanwhile be unable to proceed with the protective works.

No. 211B.

ORDER THEREON, 13th August 1873, No. 2,016A.

RAILWAY, No. 29A.

His Excellency the Governor in Council assents to so much of the modifications of the sanctioned plans for protective works to the Railway bridges over the Poiney, Goriattum, and Palar Railway bridges, proposed by the Chief Engineer, as are concurred in by the Consulting Engineer, who was a member of the Committee that proposed the original designs.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

To the Consulting Engineer for Railways.

Exd. S. T. Austin.

Spare Copies.

18.

My dear Mr. Johnson
You are correct.
The six enclosures
are the six plans
we sent you. ^{Three}
original and three
revised. I just
got your note
yrs sincerely
W. A. D. S.

Railway Department.

CONSULTING ENGINEER'S OFFICE.

No. 412

From

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

Consulting Engineer for Railways,

To

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

Secretary to Government,

Public Works Department,

Fort Saint George.

SIR,

Adverting to the Pro-
ceedings of Government noted in the margin,
I have the honour to submit for the
consideration of His Excellency in Coun-
cil a letter from the Agent of the
Madras Railway Company, giving
cover to a proposal from the Acting
Chief Engineer to modify in some
particulars the sanctioned designs for
protective works to the bridges over

The

x 28th June 1872 N^o 1568
10th September 1872 N^o 2148
13th do 1872 N^o 2177
31st October 1872 N^o 2563
7th February 1873 N^o 4410
19th March 1873 N^o 860.

x N^o 544 - 29th
July 1873.

the Palar, Peiney, and Geriatum rivers. The recommendations embodied in the modified proposals are as follow:-

1st That, when the depth of sand exceeds 15 feet, the wells shall be 6 feet in external diameter, and 1½ bricks in thickness, set in chunam; and that, with a less depth of sand, the wells shall also be 6 feet in external diameter, and 1 brick only in thickness, set in chunam.

2nd That a somewhat different arrangement of the

wells

2
wells shall be adopted, which, while complying with the recommendations of the Bridge Committee, and providing a complete protection against scour, will be more economical than the arrangement shown in the sanctioned designs.

3rd That the limit of depth at which the curtain walls must be founded upon the hard substratum shall be fixed at 8 feet below the river bed, instead of 13 feet; and that wells shall be employed as a foundation for these walls when the

depth

depth of sand exceeds
8 feet.

4th. That the distance
between the outer edge
of the foundations of the
piers and the inner edge
of the nearest row of wells
shall be fixed at 8 feet,
instead of 24 feet as
sanctioned in the case of
the Palur bridge, and 18
feet in those of the Peiney
and Geriatum bridges.

2. Mr. Goings also recommends
in the case of each bridge, that the sur-
face of the flooring shall be fixed at
a depth of 2 feet below the river bed;

and

and a reference to the revised plans
which accompany his letter will show
that the wells are designed to reach
from the hard substratum to within 4
feet of the level of the flooring, thus
fixing the height of the curtain walls
at 4 feet.

3. Mr. Goings shows that
the estimated cost of the revised works,
as compared with their sanctioned cost,
gives a saving of Rs 2,15,393, as
follows:

	Sanctioned Estimate	Revised Estimate	Saving
Peiney bridge	3,11,832	1,85,931	1,25,901
Geriatum bridge	1,39,922	80,449	59,473
Palur bridge	80,757	50,738	30,019

Total Saving Rs 2,15,393.

4.

I have had an opportunity of discussing this question with the Acting Chief Engineer, and also of inspecting the experimental wells alluded to by Mr. Going, which have been sunk in the bed of the Chyaur river. It is with great satisfaction that I am able to endorse all Mr. Going's proposed modifications in the cases of the Poiney and Gariattem rivers, and thus to recommend a saving of Rs 185,374 upon the sums sanctioned for protecting these two bridges. I am of opinion that in the cases of these rivers the modified works proposed by Mr. Going will afford a complete protection against the destructive effects of scour.

5. In

4

5. In the case of the bridge over the Palar river. The conditions are different; and, looking to the very insecure nature of the foundations, and to the generally critical position of the bridge, I am not able to recommend the great reduction in the width of stone flooring proposed by Mr. Going. The Bridge Committee recommended that the distance between the outer edge of the pier foundations and the inner edge of the nearest row of wells should be 24 feet; and Mr. Going proposes to reduce this to 8 feet. I am of opinion that, in the case of the Palar bridge, the width of stone flooring named by the Committee should be preserved; and also that the curtain walls should

should have a minimum height of 6 feet, as provided in the original design. In other respects I am of opinion that Mr Goings' revised proposals may be made applicable to this bridge.

6. If my recommendations should meet with the approval of Government, the saving effected upon the three bridges will probably exceed two lacs of rupees, and it is with great satisfaction that I am able to recommend so large a reduction in the estimated outlay.

7. The progress of the works is at present in abeyance, pending the receipt of orders from Government;

ment, and, as it is of very great importance that no time should be lost in proceeding with them, I beg that the instructions of His Excellency in Council may be communicated to me by telegraph.

The original drawings, as well as the revised ones, are herewith forwarded for His Excellency's consideration.

I have the honour to be, Sir

Your most obedient servant.

Wm Stewart Esq.,
Cons. Engineer for Railways

Masdra
16th August 1873
Ed Beutt.

[Faint, illegible handwritten notes or signatures at the bottom of the page.]

MADRAS RAILWAY.

ENGINEERING DEPARTMENT.

Provision made in

Schedule B. Budget

Estimate.

Required for the Madras Railway in the

South West Line

This sanction will lapse at the end of the eighth quarter after the receipt of sanction in this office.

DESCRIPTION.	To be expended Departmentally.	To be drawn from Stores.	Total.
II Construction of Line 7 Brickwork and Masonry Protective Works required for the Palay Bridge as per annexed Estimate —	49,838 . .	900 . .	50,738 . .
TOTAL...			

Submitted for approval, and Sanction to the Government of

J. H. Mellis
Agent and Manager, Railway.

Chief Engineer, Railway.

Consulting Engineer to Government.

CHIEF ENGINEER'S OFFICE,

1873.

Secretary to Government.

RAILWAY DEPARTMENT.
From *Public Works 1873. No. 112*
The Consulting Engineer
for Railways,
To
The Secretary to Government,
P. W. Department,
Fort Saint George.

Dated *6th August* 1873.
Recd. *7th August*

No. 4112
No. 296 of 13th Aug 73.
Submitted

From the report of 2nd 13
Service crew to the Engineer
from the following days to
arriving in some position
the condition being for
the relative work to be large
over Palay, Pung and
Construction of new
of 1873

MADRAS RAILWAY.

South West Line.
Revised
 Estimate of the cost of *Protective works required for the*
Palas Bridge
 as per Plan No. 174.

DESCRIPTION.	Quantity.	Rate.	To be expended Departmentally.	To be drawn from Stores.	Total.
excavation for cuttings walls. Cyds. 4.154	7/8/-	2077			
— 10% — flooring — " —	7357	12/-	919		
asom. in cuttings walls. — " —	663	7 1/2/-	4941		
10% coarse in flooring — " —	2300	6 1/2/-	13800		
well sinking with brick ells 6 feet dia. well lining 12 brick thick —	Sft. 1794	12 1/2/-	20918	610	
well sinking with brick ells 6 feet dia. well lining 12 brick thick —	Sft. 316	10 1/2/-	2870	290	
contingencies —			4612		
			49838	900	50738

Rupces 49838 " " 900 " 50738 "
Rupces Fifty thousand, seven hundred and thirty eight

Chief Engineer's Office
 19 July 1873
 J. N. Seethis.
 Mr. A. R. S. S. S.

T. H. Goring
 Acting Chief Engineer.
[Signature]
[Signature]

P. O. 4372/73

DESCRIPTION.	Quantity.	Rate.	To be expended Departmentally.	To be drawn from Stores.	Total.
<i>Memorandum.</i> <i>Protective Works for Palay Bridge.</i> <i>Sanctioned 4th Novem. 1872.</i> <i>Revised Estimate</i>					80,757
					80,738
					30,019
<i>Chief Engineer's Office</i> <i>19th July 1873.</i> <i>J. H. Mellis.</i> <i>Agent and Manager, Railway.</i>					

MADRAS RAILWAY.

ENGINEERING DEPARTMENT.

Provision made in
Schedule B. Budget 1873-74.
Required for the Madras Railway in the *South West Line* Estimate.

This sanction will lapse at the end of the eighth year after the receipt of sanction in this effect.

DESCRIPTION.	To be expended Departmentally.	To be drawn from Stores.	Total.
Construction of Line Brickwork and Masonry.			
Protective Works required on the <i>Goddiam</i> Bridge as per annexed estimate	78,409	2,040	80,449
TOTAL...			

submitted for approval, and Sanction to the Government of

J. H. Mellis.
Agent and Manager, Railway.

CHIEF ENGINEER'S OFFICE,
19th July 1873.

A. Goring
Acty. Chief Engineer, Railway.

Consulting Engineer to Government.

Secretary to Government.

MADRAS RAILWAY.

Revised Estimate of the cost of *South West* Line.
Protective Works required for
the *Govindapuram Bridge* as per Plan No. 175.

DESCRIPTION.	Quantity.	Rate.	To be expended Departmentally.	To be drawn from Stores.	Total.
Excavation of curtain walls	647.524	7/8/-	3762		
20" Flooring	7520	7/2/-	940		
asonry in curtain walls	838	7 1/4/-	5866		
20" Coarse in flooring	3454	6/-	20724		
ell sinking with brick					
16 ft dia. well ring	11.1832	12 1/2/-	21309	675	
1/2 brick thick					
ell sinking with brick					
16 ft dia. well ring	11.1986	10 1/2/-	18495	1365	
2 brick thick					
contingencies			7313		
			78109	2040	80149

Ruppes

Ruppes Eighty thousand four hundred and
forty nine

Chief Engineer's Office
19 July 1873

J. N. Nellis.
Asst. Secy. Secy.

Atty. Chief Engineer.

Mem.

P. M. 1872/73.

DESCRIPTION.

Quantity.

Rate.

To be expended
Departmentally.

To be drawn
from Stores.

Total.

Memo

Protective Works for *Jeerathur*
Bridge. Sanctioned 19th March 1873
Revised Estimate

139.922
804.49

Saving effected. Rs. 59.473

Chief Engineer's Office
19th July 1873

J. N. Nellis
Acty. Chief Engineer

J. N. Nellis
M.A. Genl. Manager

cc/2/54-112

MADRAS RAILWAY.

ENGINEERING DEPARTMENT.

Provision made in
Schedule B. Budget.

Estimate.

Required for the Madras Railway in the *South West Line*

This sanction will lapse at the end of the eighth quarter after the receipt of sanction in this office.

DESCRIPTION.

To be expended
Departmentally.

To be drawn from
Stores.

Total.

Construction of Line
Brickwork and Masonry

Protective Works required
for the *Booney Bridge*
as per annexed Estimate

182.501 " " 3,430 " " 185.931 " "

TOTAL...

ed for approval, and Sanction to the Government of

J. N. Nellis
ent and Manager, Railway.

J. N. Nellis
Acty. Chief Engineer, Railway.

Consulting Engineer to Government.

ENGINEER'S OFFICE,
2nd July 1873.

Secretary to Government.

MADRAS RAILWAY.

Revised
 Estimate of the cost of *South West* Line.
 Protective Works, required for
 the Poiney Bridge.
 as per Plan No. 176.

DESCRIPTION.	Quantity.	Rate.	To be expended		To be drawn from Stores.	Total.
			Departmentally.			
Excavation for certain walls -	12360	1/2/-	6180	..		
10" - Flooring -	2300	1/2/-	1150	..		
Masonry in certain walls -	1360	7 1/4/-	9520	..		
10" - Course in flooring -	2506	6 1/4/-	15036	..		
Well sinking with brick walls 6 feet deep, well lining 1/2 brick thick	11490	12 1/4/-	134450	..	3430 ..	
Contingencies			169028	..		
			182501	..	3430 ..	185931 ..

Refused

Ruppes

Ruppes One lac, eighty five thousand, five hundred
 and thirty one.

Chief Engineer's Office
 19 July 1873

J. N. Selfie.
 Secy. Genl. Secy.

[Signature]
 Acting Engineer

Memo

P. N. 4372/73-

Consulting Engineer
who was a member
of the Committee that
proposed the original
designs.
LMW

To The Consulting Engineer
for Railways!
Mr. S. de la 13/7/73.
S.C. " 27/8/73

211A. 211B.

CP. 4372
Govt. of 1873 Madras.
PUBLIC WORKS.

To The Honorable Comr.
for Railways

Dated

Recd.

Encl. 5

Plans

G. O. 13 Aug 73. No. 2016

No. 211A & 211B

Madras Railway. Passing
orders on letter from
the Comr. Submitting
proposals to modify in
some particulars the
sanctioned designs for
protective works to
certain bridges on the
Madras Railway.