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MADRAS RECORD OFFICE.

Government of Madras.

Public WORKS DEPARTMENT.

G.O. No.	1568	Press
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Dated	28-6-18	

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
28th June 1872.*

Read the following papers :—

No. 419. From the Consulting Engineer for Railways, Madras, to the Officiating Secretary to Government, Public Works Department, dated Madras, 24th May 1872, No. 255.

In continuation of the report published with the Order of Government dated the 28th August 1871, No. 2,197, I have the honour to submit a further report by the Committee appointed to examine the foundations of bridges on the Madras Railway.

2. The report now submitted deals with only two bridges, namely, that across the Goriattum river at 97 miles 40 chains and that across the Palar river at 106 miles 21 chains, both on the South-West Line. I regret that so much delay should have occurred in submitting this report; but the Committee found it necessary to make the condition of these two bridges the subject of very careful investigation and consideration before making a final recommendation with regard to the measures to be adopted for insuring their safety. In the event of the approval of Government being given to the measures which are now recommended, I beg that I may be favoured with instructions to authorize the immediate commencement of the protective works, at any rate, in the case of the bridge over the Palar river, the condition of which is at present undoubtedly not free from risk.

3. There still remain two bridges to be reported on; that over the Poiney river at 71 miles 25 chains of the South-West Line, and that over the Naggery river at 59 miles 68 chains of the North-West Line. The Committee have explained why these have not been included in their present report, and I trust that I shall soon be in a position to lay before Government a further report regarding their condition.

*Report of the Committee appointed to inquire into the State of the Foundations of the
Bridges on the Madras Railway.*

THE Government in their Order No. 2,197, dated 28th August 1871, desired that a more extended examination should be made of the foundations of the piers of the Palar bridge, and expressed an opinion that curtain-walls sunk to a depth of twenty-five feet would be a necessary precaution in the case of the Poiney and Goriattum bridges.

2. The Committee have now the honour to report that the west abutment pier of the Palar bridge was examined by Mr. Going, Major Prendergast, and Captain Smith on the 8th September 1871. It appeared to be founded on clay at a depth of 10' 2" below the ordinary summer-level of the river. The quality of the masonry, which consisted of large blocks of partly dressed stone laid in mortar, was considered very indifferent.

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3. The Committee having been given to understand that the adjoining pier had been built upon piles, it was determined to open out this one also; and it was accordingly inspected by Mr. B. Anderson, Lieutenant-Colonel Shaw-Stewart, and Captain Smith on 21st April 1872. This pier seemed to be founded at a depth of 9' 3" below summer-level, the quality of the masonry being, as in the case of the other pier, decidedly inferior.

This examination discovered no grounds for supposing that any piling was used in the founding of this pier, and the Committee are, therefore, constrained to believe that the foundations opened out and examined represent fairly the quality and depth of those of the remaining piers.

4. The Committee see no reason to apprehend danger to these foundations if the sand on which they rest be effectually secured against river-action; and, in the light of the borings taken in the river-bed to ascertain the depth of sand, they recommend that two double lines of wells be sunk down 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 walls 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.

The remedy proposed is a costly one; but, having regard to the fact that the fall of the river-bed has been found to exceed 12 feet per mile, while the proportion of water-way provided by the bridge, amounting to 5.4 square feet per square mile of a catchment-basin estimated at 1,750 square miles, is not excessive. The Committee are of opinion that with no less expenditure could the security of the bridge be placed beyond all reasonable doubt.

5. The Committee have further the honour to forward a list of the borings taken at the Goriattum bridge; and, while fully recognising the very different conditions attaching to it, rendering its position far less critical than that of the Palar bridge, they see no other course open to them than to recommend very similar protection.

They consider, however, that, looking to the more stable nature of the bed, the less depth of sand, and the probability of less water being met with, a somewhat less distance between the existing foundations and the wells may be permitted; and they propose 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. In this case the allowance of water-way afforded by the bridge amounts to 10.8 square feet per mile of a catchment-basin hardly exceeding 700 square miles in extent, and the fall of the river-bed in the neighbourhood of the bridge has been ascertained to be about 15 feet per mile.

6. The Committee beg to forward, with this report, the sanctioned designs and estimates for the two bridges under review. The Government will observe that these documents afford no grounds for believing that the use of clay instead

*Proceedings of the Madras Government, Public Works Department,
28th June 1872.*

of lime was ever intended, and the Committee can only conclude that the work in the Goriattum bridge was thus carried out without the cognizance of the supervising or controlling authorities.

7. In the report of the Committee upon the Goriattum bridge it was intimated that some experimental wells would be sunk in the bed of the river with a view to determine the depth at which a hard substratum would be met with below the sand. It has been found, however, that the same information could be more expeditiously obtained by means of screw-pile borings, and the well-sinking was, therefore, discontinued.

8. The Committee regret that they are unable to report finally upon the foundations of either the Nagari or Poiney bridges which yet remain to be examined; the preparations for the former were put a stop to by the late floods, and it may be some time before they can be resumed. Every exertion will, however, be used to effect the required examination before the ensuing rainy season. In the latter bridge the borings which extend to 35 feet in depth are not yet complete.

(Signed) C. J. SMITH, Captain, R.E.,
(") BERESFORD ANDERSON,
(") J. H. M. SHAW-STEWART, Lieut.-Colonel, R.E.

From the Resident Engineer, to the Chief Engineer, Madras Railway Company, dated Arcunum,
27th April 1872, No. 522.

I beg to send herewith a List of Borings taken at the Goriattum bridge.

Pier No.	Sand.	Clay.	Morumboo.	Total Depth.	Remarks.
		24	30' Arches.		
1	11 0	1 6		12 6	
3	11 0	1 2		12 2	
5	9 0	1 0		10 0	
7	14 0		1 3	15 3	
9	14 10		1 2	16 0	
11	13 6	1 8		15 2	
13	14 10		1 2	16 0	
15	16 3		1 2	17 5	
17	15 0		1 2	16 2	
19	15 9	1 0		16 9	
21	21 4		1 8	24 0	At 17½ feet met with 1 foot of stiff stratum of clay.
23	17 1		3 2	20 6	At 12 feet met with 3' 3" of stiff stratum of clay.
1	18 6		3 7	24 1	At 13 feet met with 2 feet of stiff stratum of clay.
3	18 6		2 0	22 6	At 13 feet do. do. do.

(Signed) W. F. POTTER,
Resident Engineer.

27th April 1872.

(True Copy.)

(Signed) B. ANDERSON,
Chief Engineer.

*Proceedings of the Madras Government, Public Works Department,
28th June 1872.*

Borings taken at the Palar Bridge.

Pier No.	Sand.	Clay.	Morumboo.	Total Depth of Boring.	Remarks.
1	6 8	1 6		8 2	
2	6 7		1 3	7 10	
3	5 9		2 6	8 3	
4	4 1		1 5	5 6	
5	6 6		0 10	7 4	
6	8 0		2 6	10 6	
7	12 6	0 8		13 2	Morumboo is mixed with clay.
8	10 0	0 10		10 10	Do. do.
9	23 4		0 8	24 0	
10	17 6	1 6		19 0	
11	23 0		1 6	24 6	
12	21 0	1 6		22 6	At 13' depth a thin stratum of hard clay was found.
13	22 0	2 6		24 6	
14	18 3	1 3		19 6	
15	7 9	0 9		8 6	
16	5 0	1 0		6 0	
17	5 3	0 9		6 0	
18	4 9	0 9		5 6	

The borings from the 1st to the 5th pier inclusive were taken with boring rods; the remainder with screw piles.

MADRAS,
28th February 1872.

(Signed) B. ANDERSON,
Chief Engineer.

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

No. 420.

ORDER THEREON, 28th June 1872, No. 1,568.

RAILWAY, No. 53.

Looking to the reported depths of foundations of the east and west abutment piers of the Palar bridge and of the pier adjoining the latter, the indifferent quality of the masonry, the depth of sand shown by the borings between the piers numbered from 7 to 14, the heavy fall of the river, and the moderate proportion of water-way provided in comparison to the catchment-basin, the Government conclude that they have no alternative but to adopt the costly expedient recommended by the Committee of curtain-walls resting on lines of wells where the depth of sand exceeds 13 feet and inclosing stone-in-chunam floors some 90 feet in width. They authorize the Consulting Engineer for Railways to take steps for commencing these protective works at once. He will submit in due course the estimates for carrying them out.

2. The Government regret to learn that clay instead of lime has been substituted in the foundations of the Goriattum bridge, but they observe at the same time that the bottom width of the foundations has been greatly increased (9 to 13). It is probable, therefore, that, though no record may exist, the changes were made with the cognizance of some controlling authority. And taking into consideration that there can be but little tendency to scour with the flood-line and proportion of

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28th June 1872.*

water way to catchment-basin recorded, they come to the conclusion that if the bridge has not hitherto shown signs of giving way (of which they have no information), it may be reckoned sufficiently safe for the future.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for Railways.

E d F. R. Bantleman

Report of the Committee
appointed to enquire into the state
of the foundations of the Bridges,
on the Meade's Railway.

The Government in their order
No 2197, dated 28th August 1871,
desired that a more extended ex-
amination should be made of the
foundations of the piers of the
Pilar Bridge, and expressed an
opinion that certain walls sunk
to a depth of 25 feet would be
a necessary precaution in the case
of the Prince and Consort Bridge.
The Committee have now
the honour to report that the
west abutment pier of the Pilar
Bridge was examined by Mr. Goering,
Major Prendergast, and Captain
Smith.

Smith, on the 8th September 1871.

It appeared to be founded on clay at a depth of 10' 2" below the ordinary summer level of the river. The quality of the masonry, which consisted of large blocks of partly dressed stone laid in mortar, was considered very indifferent.

3. The Committee having been given to understand that the adjoining pier had been built upon piles, it was determined to open out this one also; and it was accordingly inspected by Mr. B. Anderson, Lieut. Colonel Shaw Stewart, and Captain Smith, on 27th April 1872. The pier seemed to be founded at a depth of 9' 3" below summer level.

the quality of the masonry being as in the case of the other pier, decidedly inferior.

4. The examination discovered no grounds for supposing that any piling was used in the founding of this pier, and the Committee are therefore constrained to believe that the foundations opened out and examined represent fairly the quality and depth of those of the remaining piers.

5. The Committee see no reason to apprehend danger to these foundations of the sand on which they rest be effectually secured against river action; and, in the light of the borings taken in the river bed to ascertain the depth of sand,

they

they recommend that two double
lines of wells be sunk down
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 walls being
floored with stone in chunars; —
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.

The Kennedy proposed is
a costly one; but, having regard
to the fact that the fall of
the river bed has been found
to

to exceed 12 feet per mile; while
the proportion of waterway provided
by the bridge, amounting to 5.4
square feet per square mile of a
catchment-basin estimated at
17.50 square miles, is not excessive.
The Committee are of opinion that
with no less expenditure could
the security of the bridge be
placed beyond all reasonable
doubt.

5 The Committee have
further the honor to forward
a list of the borings taken at
the Coriattum Bridge; and,
while fully recognizing the
very different conditions attaching
to it, rendering its position
far less critical than that
of

of the Palai Bridge, they see
no other course open to them
than to recommend very similar
protection.

They consider however
that, looking to the more stable
nature of the bed, the less depth
of sand, and the probability
of deep water being met with
a somewhat less distance between
the existing foundations and
the wellways be permitted,
and they propose 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 Palai Bridge,
the

13
the distance between wells and
piers being 18 feet. In this
case the allowance of waterway
afforded by the bridge amounts
to 10.8 square feet per mile of a
catchment basin hardly exceeding
700 square miles in extent, and
the fall of the river-bed in
the neighbourhood of the bridge
has been ascertained to be about
15 feet per mile.

16 The Committee beg to
forward, with this report, the
sanctioned designs and estimates
for the two bridges under review.
The Government will observe that
these documents afford no ground
for believing that the use of clay
instead of lime was ever intended,
the Committee

Committee can only conclude that
the work in the Goreattum bridge
was thus carried out without
the cognizance of the supervising
or controlling authorities.

In the report of the
Committee upon the Goreattum
bridge, it was intimated, that
some experimental wells would
be sunk in the bed of the river
with a view to determine the
depth at which a hard substratum
would be met with below the
sand. It has been found,
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could be more expeditiously
obtained by means of screw-pile
borings and the well-sinking
was therefore discontinued.

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8 The Committee regret that
they are unable to report finally
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preparations for the former were
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effort will however be used to
effect the required examination
before the ensuing rainy season.
In the latter bridge the borings
which extend to 35 feet in
depth are not yet complete.

C. Smith, Capt. R.E.

Brigadier General.

Warranted J. W. R.

No 822

Madras Railway Company
Tst D^{ty} S. M. Line Engineer's Office
Arcorum 27 April 1872

My dear Sir,

I beg to send herewith a list of borings
taken at the Gooriatum Bridge.

Yours very truly
Sd/-, W. F. Potter
Resident Engineer

S,

The Chief Engineer

No	Bore	Depth		Remarks
		Sand	Clay	
		24' 30' arches		
1	11-0	1.6	12.6	
3	11-0	1.2	12.2	
5	9-0	1.0	10.0	
7	14-0	1.3	15.3	
9	14-10	1.2	16.0	
11	13.6	1.8	15.2	
13	14.10	1.2	16.0	
15	16.3	1.2	17.5	
17	15.0	1.2	16.2	
19	15.9	1.0	16.9	
21	21.4	1.8	24.0	at 17 1/2 ft met with 1 ft of stiff stratum of clay
23	17.1	3.2	23.6	at 12 ft met with 3' 3" of do
		5' 30' arches		
1	18.6	3.7	24.1	at 13 ft met with 2 ft of stiff stratum of clay
3	18.6	2.0	22.6	at 13 ft do do do

Engineer's Office
Division No 1, S. M. L.
27 April 1872

True copy
Sd/-, W. F. Potter
Chief Engineer

Sd/-, W. F. Potter
Resident Engineer

Borings taken at the Polar Bridge

Pier No	Land	Clay	Mosum ho	Total depth boring	Remarks
1	6-8	1-6	0-0	8-2	
2	6-7	0-0	1-3	7-10	
3	5-9	0-0	2-6	8-3	
4	4-1	0-0	1-5	5-6	
5	6-6	0-0	0-10	7-4	
6	8-0	0-0	2-6	10-6	
7	12-6	0-8	0-0	13-2	Mosumbo is mixed with clay
8	10-0	0-10	0-0	10-10	Do Do
9	23-4	0-0	0-8	24-0	
10	17-6	1-6	0-8	19-0	
11	23-0	0-0	1-6	24-6	
12	21-0	1-6	0-0	22-6	At 13' depth a thin stratum of hard clay was found.
13	22-0	2-6	0-0	24-6	
14	18-3	1-3	0-0	19-6	
15	7-9	0-9	0-0	8-6	
16	5-0	1-0	0-0	6-0	
17	5-3	0-9	0-0	6-0	
18	4-9	0-9	0-0	5-6	

The borings from the 1st to the 5th pier inclusive were taken with boring rods; the remainder with screw piles.

Madison 3
28 February 3
1892 3

Ligned Benesford Anderson
(True copy) Chief Engineer
Montgomery, Lewitt Coll. R.R.
Cons. Engineer for Railways

Railway Dept

Com: Engineer's Office

N. 255

From

Lieut Colonel J. M. Shaw Stewart M.C.
Com: Engineer for Railways
Madras.

To

Colonel L. W. Walker M.C.
Off: Secretary to Government
Public Works Dept
Fort Saint George.

Sir,

In continuation of the report published with the order of Government dated the 28th August 1871, N. 2197, I have the honour to submit a further report by the Committee appointed to examine the foundations of bridges on the Madras Railway.

2 The report now submitted deals with only two bridges, namely.

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and that across the Palar River
at 106 miles 21 chains, — both
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report; but the Committee
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measures which are now
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recommended, I beg that I may
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to authorize the immediate
commencement of the protective
works, at any rate in the
case of the bridge over the Palar
River, the condition of which
is at present undoubtedly not
free from risk.

3. There still remain
two bridges to be reported on,
that over the Poiney River at
71 miles 25 chains of the South-
West line, — and that over the
Tagger River at 59 miles 68
chains of the North-West line.
The Committee have explained
why these have not been
included

included in their present report,
and I trust that I shall soon
be in a position to lay before
Government a further report
regarding their condition.

Madras 26 May 1852
I have the honour to be
Dear Sir,
Yours Most Obedt Servt

Wm. D. O. S. I shall be
Cous. Secy for Railway

Wm. D. O. S. I shall be

Wm. D. O. S. I shall be

Wm 28 Aug 1852 No 361-565

Wm 1872 No 361-565

Wm 1872 No 361-565

Wm 1872 No 361-565

Wm 1872 No 361-565

Wm 1872 No 361-565

No 1568

Looking to the
reported depths of founda-
tions of the East and
West Abutment Piers
of the Palur Bridge -
and of the Pier adjoin-
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sonry the depths of sand
shown by the borings
between the piers num-
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heavy

W
A. D.
I. D.

of some controlling au-
 thority. And taking
 into consideration that
 there can be but little
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 the flood and
 proportion of waterway
 to Catchment Basin
 recorded they come to
 the conclusion that if
 the Bridge has not hitherto
 shown signs of
 giving way (of which
 they have no informa-
 tion) it may be re-
 stored sufficiently safe
 for the future.

G.M.W.

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Govt. of 1872 Madras.

PUBLIC WORKS.

The Engineering Works
for Railways

Dated

Encl. 3 ✓

Recd.

28 June 1868.

Nos. 4194/120

Order. Paper order
is being sent to the
submitting a further
report on the progress
of bridges in
the Madras - 1/2.