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MADRAS RECORD OFFICE

Government of Madras

Public works

DEPARTMENT

G.O. No.	1021	Press
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Not to be folded or roughly handled

No 72 Read the following letter from the Consulting Engineer for Railways, to the Secretary to Government, Public Works Department, dated Madras, 4th March 1873, No 136 —

In compliance with the instructions conveyed in the Order of Government, dated the 12th November 1870, No. 2,710, and in continuation of previous reports, I have the honour to submit a report upon the bridge over the Naggery river, drawn up by the Committee appointed to examine the foundations of the bridges on the Madras Railway.

2 In submitting this report, I have to observe that the duty for which the Committee was appointed has now been performed, inasmuch as the whole of the bridges which came within the scope of their investigations have now been examined and reported upon. The cause of the delay in the submission of this their final report is explained by the Committee

Report of the Committee appointed to inquire into the state of the Foundations of the Bridges on the Madras Railway

THE Committee have now the honour to submit the following report upon the bridge over the Naggery river, at 59 miles 68 chains on the North-West Line, which was inspected by them on the 7th and 8th February 1873

2 This bridge consists of thirteen 40 feet segmental arches. The piers and arches are built of stone, and it is believed that the foundations are of the same material. The sanctioned plan and estimates are herewith forwarded. It will be seen that the greatest depth below the river bed to which it was proposed to carry the foundations is 13 feet, and there is no reason to suppose that this depth was in any case exceeded. Two of the piers are known to have been founded upon wooden curbs or platforms, upon which the masonry was built. These two piers went down to a depth of 10 feet only, and they were then held to be beyond the reach of scour, although it is upon record that about 2 feet of sand intervened between the bottom of the curb and the hard substratum. With regard to the other piers, no accurate information is available, but the accompanying section,*

* No 330

showing the borings taken at the bridge, and giving a maximum depth of sand of 26½ feet, places it beyond doubt that the majority of the piers are far short of the hard substratum

3 The Committee regret that it has not been in their power to examine the pier foundations. In the month of May 1872 a coffer-dam was constructed alongside of one of the piers, and the sand was excavated to a depth of 9 feet, but when two powerful pumps were set to work to remove the water, the sand on the opposite side of the pier showed ominous symptoms of subsidence, and the attempt had to be abandoned. Although the foundations could not be examined, the Committee have no doubt as to their unsatisfactory nature. The necessity for abandoning the attempt to examine them was additional proof of this, if such were needed, and the Committee had sufficient proof, on the occasion of their visit, of the existence of a tendency to scour.

4. The fall of the river-bed, as shown in the accompanying section, exceeds 11 feet per mile. The proportion of water-way allowed by the bridge is liberal,

*Proceedings of the Madras Government, Public Works Department,
2nd April 1873.*

amounting to more than 28 square feet per mile of a catchment basin estimated, at 314 square miles. Looking, however, to the unsatisfactory nature of the foundations, and to the undoubted tendency to scour, the Committee do not hesitate to recommend that this bridge shall be protected in a manner similar to that which has been sanctioned in the cases of the Poiney and Goriattum bridges, as described in their report dated the 24th May 1872.

5. The peculiar circumstances of the country in the neighbourhood render it necessary, when dealing with the safety of the bridge, to take into consideration the state of the river bank above. At a point about three miles from the bridge, and about half a mile above the village of Sathravada, the north bank of the river is very low, and the levels marked on the accompanying survey* show

* No 234

that, in the event of the river bank being breached, a diversion of its waters from their present channel is by no means an improbable contingency, in which case the line of railway, to the north of the bridge, would inevitably be carried away. A reference to the papers printed with the Proceedings of Government

2nd April 1867, No 1,017
23rd July " " 2,209
22nd March 1869, " " 953
14th April " " 1,226
30th April " " 1,425

noted in the margin will show that the possibility of this has been foreseen, and that during the years 1866 and 1869, the part of the bank from which

danger was most apprehended was protected with a stone revetment. This revetment has been damaged to some extent by the heavy floods during the last four months.

6. As has been already stated, the Committee are of opinion that the waterway afforded by the bridge is ample, so long as the waters of the Naggery river are kept within its banks. With a view to secure the safety of the railway as far as possible, the Committee recommend the following measures —

(1) The thorough repair of the existing revetment along the river bank

(2) The construction of an embankment between the points marked A and B on the accompanying survey, in order to connect the river bank with a low range of hills lying to the north. Its length would be about half a mile, and its average height about 2 yards.

Three sluices would require to be built in it to accommodate irrigation channels.

(3) The construction of a groyne near the point marked C, as a further protective measure against the erosion to which the river bank is, from its outline at this point, peculiarly liable.

The Committee believe that the cost of these works will not be large, and they are of opinion that, taken in connection with the protective works to the bridge, recommended in paragraph 4 of this report, they will have the effect of placing the railway beyond all probability of being injured by the Naggery river.

7. The Committee think it right to allude to the fact that the works which they have recommended above the village of Sathravada will be within the estate

*Proceedings of the Madras Government, Public Works Department,
2nd April 1873*

of the Zemindar of Cavut Nuggur, whose property will be materially improved by their construction. They are not aware whether the Zemindar would be disposed to bear a share of the expense.

(Signed) J H M SHAW-STEWART, Lieut-Colonel, R E,
MADRAS,
4th March 1873.
Consulting Engineer for Railways.

(Signed) B ANDERSON,
Chief Engineer, Madras Railway

(Signed) C J SMITH, Captain, R E,
Offg Under Secretary to Government

No 73 ORDER THEREON, 2nd April 1873, No 1,021

RAILWAY, No 10

As, in the opinion of the Railway Bridge Committee, there are grounds for apprehending the undermining of the

existing bridge over the Naggery river owing to the unsatisfactory nature of its foundations and to the tendency to scour, His Excellency the Governor in Council approves of the recommendation that the same protective works shall be undertaken as for the Goriattum and Poiney Bridges, namely, the construction of curtain walls above and below and 18 feet clear of the piers, carried down to the rock or hard substratum, where found at a depth not exceeding 15 feet, and resting elsewhere on double lines of wells sunk down to the hard substratum, the spaces between the walls being floored with stone-in-chunam.

2. The Government also approve of the measures suggested in paragraph 6 of the report for retaining the waters of the Naggery river within its banks above bridge, and they grant authority for immediate effect being given to the recommendations of the Committee, the submission of the necessary estimates being meanwhile expedited.

3. The co-operation of the Cavut Nuggur Zemindar can hardly be reckoned on beyond his acquiescence in the measures proposed to be adopted, which should be ascertained.

(True Extract)

(Signed) G W. WALKER, Colonel, R E,
Secretary to Government.

To the Consulting Engineer for Railways
" Revenue Department

Exd. E C Shunker.

Report of the Committee appointed
to enquire into the state of the foundations of
the bridges on the Madras Railway.

The Committee have now
the honour to submit the following report
upon the bridge over the Naggeny river, at 69
miles 68 chains on the North-west line, which
was inspected by them on the 7th and 8th
February 1873.

This bridge consists of thirteen
40 feet segmental arches. The piers and
arches are built of stone, and it is believed
that the foundations are of the same material.

The

The sanctioned plan and estimates are
herewith forwarded. It will be seen that
the greatest depth below the river bed to
which it was proposed to carry the founda-
tions is 12 feet, and there is no reason to
suppose that this depth was in any case
exceeded. Two of the piers are known to
have been founded upon wooden curbs or
platforms, upon which the masonry was
built. These two piers went down to a
depth of 10 feet only, and they were there-
fore held to be beyond the reach of scour, although
it is upon record that about 2 feet of
sand intervened between the bottom of the
curb

* No 230.

curb and the hard substratum. With
regards to the other piers no accurate in-
formation is available; but the accompany-
ing section, showing the borings taken at
the bridge, and giving a maximum depth
of sand of $26\frac{1}{2}$ feet, places it beyond doubt
that the majority of the piers are far short
of the hard substratum. The Committee regret that
it has not been in their power to examine
the pier foundations. In the month of May
1872 a coffer-dam was constructed along-
side of one of the piers, and the sand was
excavated to a depth of 9 feet; but when
two powerful pumps were set to work to

remove the water, the sand on the opposite side of the pier showed ominous symptoms of subsidence, and the attempt had to be abandoned. Although the foundations could not be examined, the Committee have no doubt as to their unsatisfactory nature.

The necessity for abandoning the attempt to examine them was additional proof of this, if such were needed; and the Committee had sufficient proof, on the occasion of their visit, of the existence of a tendency to scour.

4. The fall of the river bed, as shown in the accompanying section, exceeds 14 feet per mile. The proportion of

51 5
of water way allowed by the bridge is liberal, amounting to more than 28 square feet per mile of a catchment basin estimated at 314 square miles. Looking however to the unsatisfactory nature of the foundations, and to the undoubted tendency to scour, the

Committee do not hesitate to recommend that this bridge shall be protected in a manner similar to that which has been sanctioned in the cases of the Poiry and Goriathum bridges, as described in their report dated the 24th May 1872.

5. The peculiar circumstances of the country in the neighbourhood render it necessary, when dealing with the

the safety of the bridge, to take into consideration the state of the river bank above.
At a point about three miles from the bridge, and about half a mile above the village of Lachnawada, the north bank of the river is very low; and the levels marked on the accompanying survey show that, in the event of the river bank being breached, a diversion of its waters from their present channel is by no means an improbable contingency; in which case the line of railway, to the north of the bridge, would inevitably be carried away. A reference to the papers printed with the Proceedings of

24th/67 No 1017 of Government noted in the margin will
23 July/67 No 2209
22nd/69 No 953 show that the possibility of this has been
14th/69 No 1226
30th/69 No 1425
foreseen; and that during the years 1866 and 1867 the part of the bank from which danger was most apprehended was protected with a stone revetment. This revetment has been damaged to some extent by the heavy floods during the last four months.
6. As has been already stated, the Committee are of opinion that the waterway afforded by the bridge is ample, so long as the waters of the Bagger river are kept within its banks. With a view to secure the safety of the railway, as far

far as possible, the Committee recommend the following measures:

1. The thorough repair of the existing revetment along the river bank.

2. The construction of an embankment between the points marked A and B on the accompanying survey, in order to connect the river bank with a low range of hills lying to the north. Its length would be about half a mile, and its average height about 2 yards.

Three sluices would require to be built

in it, to accommodate irrigation channels.

3. The construction of a groynes near the point marked C, as a further protective measure against the erosion to which the river bank is, from its outline at this point, peculiarly liable.

The Committee believe that the cost of these works will not be large; and they are of opinion that, taken in connection with the protective works to the bridge, recommended in paragraph 4 of this report, they will have the effect of placing the railway beyond all probability of being injured by the Naggen river.

The

The Committee think it
 right to allude to the fact that the works
 which they have recommended above the
 village of Sathravada will be within the
 estate of the Zemindar of Gandy Nigger,
 whose property will be materially improved
 by their construction. They are not aware
 whether the Zemindar would be disposed
 to bear a share of the expenses.

W. H. Stewart
 Lieut. Col. R.E.
 Consulting Engineer for Railways
 4 March 1873
 Chief Engineer
 Madras Railway
 C. Smith Capt R.E.
 Off. Secy to Genl. S.M.S.

Railway Department.

CONSULTING ENGINEER'S OFFICE,

No 136

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,

In compliance with the
 instructions conveyed in the order
 of Government dated the 12th
 November 1870, No 2710 and in
 continuation of previous reports,
 I have the honour to submit
 a report upon the bridge over
 the Saggery river, drawn up by
 the Committee appointed to
 examine

examine the foundations of the
bridges on the Madras Railway.

In submitting this
report, I have to observe that
the duty for which the Com-
mittee was appointed has now
been performed, inasmuch as
the whole of the bridges which
came within the scope of their
investigations have now been
examined and reported upon.
The cause of the delay in
the submission of this, their final
report, is explained by the Committee.

I have the honour to be,

Sir,
Your most Obedt Servant,

Madras
4th March
1873

W. M. M. M. M.
S. C. S. C. S. C.

Cons Eng for Railways

RAILWAY DEPARTMENT
Public Works 1872
From 1872
The Consulting Engineer
for Railways,

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

Dated 4th March 1872
Recd 6th March 1872

Enclosures 10
Sir C. C. C. C. C.
Consulcy 10

Submitting report
upon the bridges on the
Madras Railway drawn
up by the Committee
appointed to examine the
foundations of the bridges
on the M. R. G.
A. 1021-2 April 1873.

1872

1872, March 1873

e. 7. March 1873 - 1873

I think we are bound
 to adopt the recommendations
 of the Committee with respect
 to the ~~proposed~~ protective
 Middle, & let the other
 which they recommended
 be taken up at once
 to act on the Committee record their
 opinion that the same
 he can wait for the estimates
 when it is proposed to call
 for. I cannot pretend
 to pronounce an opinion on
 the question of how the bridge
 should be dealt with - but
 I hesitate to accept the
 responsibility of leaving
 the actual structure as it is -
 the foundations are declared
 to be unsatisfactory & there
 is a tendency to doubt.

The Railway Bridge
 is a very different
 structure from the
 others, viz. the con-
 struction of cast-iron
 walls above and below
 and 18 feet clear of the
 piers carried down to
 the rock or hard strata
 where found at

I think we are bound
 to adopt the recommendations
 of the Committee with respect
 to the ~~proposed~~ protective
 Middle, & let the other
 which they recommended
 be taken up at once
 to act on the Committee record their
 opinion that the same
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 when it is proposed to call
 for. I cannot pretend
 to pronounce an opinion on
 the question of how the bridge
 should be dealt with - but
 I hesitate to accept the
 responsibility of leaving
 the actual structure as it is -
 the foundations are declared
 to be unsatisfactory & there
 is a tendency to doubt.

Considers for success

a depth not exceeding
15 feet, and resting else-
where on double lines
of wells sunk down to
the hard stratum; the
spaces between the walls
being floored with stones
in channels.

A tabular view of the
waterway afforded by the
three bridges with reference
to the fall and catchment
basin of the rivers is
appended.

Name of Bridge	Fall of River in feet per mile	Area of Catchment Basin in Square Miles	Waterway of Bridge per Square mile of Basin
Piney	13.3	825.	25.5
Lariatum	15.	700.	10.8
Naggeny	14.	314.	28.

From this it would
certainly not appear that
the

the circumstances of the
three cases are such as to
justify their identical
treatment. And the
additional proposals of
the Committee taken into
consideration with pre-
vious correspondence on
the alleged insufficient
waterway on the left
bank of the Naggeny
river generally make
it evident that what
is more to be feared
than the undermining
of the existing bridge
is the breaching of the
left bank approached
by the River overflowing
its banks above.
Before therefore passing
final

final orders His Excellency
the Governor in Council
would desire to be sup-
plied with estimates of the
cost of the works now
recommended, and of
alternative works for car-
rying off such flood
as might be apprehended
to issue from neglect of
the River bank above
Chatrapady. It is evi-
dent that the protective
river works proposed
will not be paid for
by the Zemindar, even
if he consents to their
construction; and the
more that is done for him
the more will he neglect
the care of the river bank,

which now he must to
a certain extent attend
to, for security of the
Channels taken off from
it. Hence it may be
a cheaper policy in the
end to at once adopt
measures for facilita-
ting the passage of
flood waters across the
Railway approach on
the left bank of the
river. G.M.W.

J. W. Dyer

1021

Proceedings of the Madras Government

Under date 16th March 1873

Read the following

From the Cons^l Engineer
for Railways -

(Circular No 136 of 4 March 1873)

In the opinion of the

the Railway Bridge Committee

there are grounds for a

preliminary investigation

of the existing bridge over

the Taggeri River owing

to the unsatisfactory nature

of its foundations and the

inconvenience to the

locality of the

conduct of the

recommended that the

same be put in

11.6

h: 72-73.

e. 7. March 1873. R. 104

shall be undertaken
 as for the Gorakhpur &
 Poincy Bridges, viz. the
 construction of Curbani walls
 above & below, 18 feet
 clear of the Piers, carried
 down to the rock, on
 levelled substratum, where
 found at a depth not
 exceeding 15 feet, and
 resting elsewhere on
 double lines of wells sunk
 down to the hard soil
 showing the spaces between
 the walls being filled
 with stones in Chumam.

The Government is
 also approving of the measures
 suggested in Para 6 of

the Report for retaining
 the waters of the Nagpur
 River within its banks
 above Bridges, and they
 grant authority for im-
 mediate effect being given
 to the recommendations of
 the Committee, the submission
 of the necessary Estimates
 being meanwhile expedited.

The Cooperation
 of the Carut Nagpur
 Zemindar can hardly
 be reckoned on beyond his
 acquiescence in the measures
 proposed to be adopted,
 which should be ascertained

To the for Engineer
 Rungt & the C. C. =
 Rev. Secy. in Mr. Bayle's Memo.

Dec 22 5/4/73

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1880

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Vol. of 1873 Madras.
PUBLIC WORKS.

The Accounting Clerk
for Railways

Recd. East /
1021 April 20 1873

No. 1247
The Madras Railway
Accounting Clerk
in the
Department of the
Railways
Madras