M.R.O. 1—77,005—8-6-37.

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MADRAS RECORD OFFICE.

Government of Madras.

Public works. **DEPARTMENT.**

G.O. No. 3140. Press / Mis.

327-229.

Dated 13-12- 1911.

Not to be folded or roughly handled

Read the following letters:—

No. 227. From the Acting Superintending Engineer, 5th Division, to the Secretary to Government, Public Works Department, dated Cuddalore, 16th November 1871, No. 181.

It is with great regret that I write to inform you of the total destruction, on the night of the 7th instant, of the new bridge across the Vellaur at Mutlur.

2. What I now communicate is taken from a demi-official letter from Mr. R. E. Norfor, who superintended the construction of the bridge, and who is, as you may imagine, deeply distressed by this most unexpected calamity; further particulars I will report when I have myself visited the locality, which I purpose doing in company with Mr. Norfor; at present the river is impassable for boats, the road leading to the bridge from the north is breached, rendering access from that side impracticable, and we are in the midst of a monsoon the like of which has not been known for twenty years, and of the abatement of which there seems no speedy prospect.

3. The particulars I have to communicate are briefly as follow:—On the night of the 6th a violent hurricane set in, and the river came down in very heavy flood (12 feet above the flooring of the bridge), to this—itself no ordinary trial to a bridge lately completed (the last arch was turned in September last)—was added the violence of the waves raised by the furious wind which beat against the down-stream side of the bridge, the whole forming as severe a trial as could well be brought to bear on a work.

4. The sea is said to have been raised several feet, and to have washed over the bridge. The second arch from the south bank appears to have first given way, the rest following one after the other.

5. It would perhaps be premature to here enter on the cause of failure; but this I may say that I feel convinced it is not due to either bad material, bad workmanship, or want of careful and experienced supervision. I myself examined, so far as I could examine, the bridge on 23th August, immediately after I joined the district, and I then thought, and still think, I had never seen a better piece of work, materials and workmanship being alike excellent; such was also the opinion of the late Colonel Boileau. A good Overseer had special charge of the construction, and the work was very frequently visited by Mr. Norfor, who commenced and completed it.

6. The destruction of this bridge, situated as it is on a most important line of communication, interrupted by a river so formidable as the Vellaur, cannot but be regarded as a serious disaster; but in these days of failures through the use of bad material, or the want or laxity of supervision, I trust it will be some little consolation to the Government to be assured that here these causes of failure are entirely wanting, and that all was done that could be done to bring this work to a successful issue, and to make it a credit to the department.

7. My opinion is that a masonry bridge in such a locality is a mistake, and that there should be an iron girder bridge on screw pile piers, or something similar thereto.

8. I will conclude by mentioning that I have just heard the water rose on the occasion alluded to 13 *feet* over the Vellaur Anicut at Shatiatope, and that, but for the breaching of embankments above, the bridge over that anicut would also have gone.

No. 228. From the same Officer, dated Cuddalore, 20th November 1871, No. 185.

In continuation of my letter No. 181, of 16th instant, I have the honour to forward a copy of Mr. R. E. Norfor's official report of the destruction of the Vellaur bridge.

1 copy of Report.

2. From this it will be seen that the flood rose, according to Mr. Norfor's calculation, to a height of 17 to 18 feet, and according to the Maistry in charge of the bridge to 19½ feet.

Whichever of these calculations is correct, it seems beyond doubt that the flood is 2 feet higher than any previously registered.

3. I have heard reports that some of the arches were blocked up by trees brought down by the floods, and, if so, some or other of the piers must have been exposed to violent shocks from trees dashed against them; these are dangers to which a masonry bridge is particularly liable, and which it is impossible to guard against; moreover, the smaller the space of the arches, and hence the greater the number of piers, the greater the danger, and thus only confirms me in my opinion that in such a site a masonry bridge is totally inapplicable.

4. It will be quite impracticable to make any examination of foundations before the month of January, and even then the only use of an examination will be to satisfy oneself as to how far such a flood acted on the foundations of known depth; if these are found not to have suffered, it will be an additional proof of the goodness of the work, but nothing more.

From R. E. NORFOR, Esq., Executive Engineer, No. 1 Range, South Arcot, to the Superintending Engineer, 5th Division, dated Camp at Punrooty, 15th November 1871, No. 737.

You will doubtless ere this have received my demi-official letter of the 10th instant, reporting to you the unforeseen and lamentable destruction of the bridge across the river Vellaur at Mutlur. I intended to defer reporting the matter in official form in the hopes that I should have had an opportunity of examining the work so as to ascertain, if possible, cause of the accident; but as the river still continues to be in flood such an examination it is impossible to make at present.

1 Letter of Mr. Theodore.
1 Do. of Valoomyloo Moodeliar.

2. I received intimation of the destruction of the bridge on the evening of the 9th, I proceeded to Mutlur at once, and with great difficulty (owing to flooded state of the country and breaches across the road) reached the river on the morning of the 10th; there was nothing to see but the abutments on either bank, the river was running at a depth of 13 feet over the flooring of the bridge at the time, and the ruins were submerged.

3. From inquiries instituted I have been able to obtain the following information. On the night of the 6th instant this district was visited with a very severe hurricane (some call it a cyclone) accompanied with heavy rain; this continued till the noon of the 7th, the depth of water over the flooring of the bridge during the continuance of the storm is said to have been 12 feet,

and the river at the time, from the violence of the wind, had a regular sea on; the traffic over the bridge was stopped by the Maistry; in fact there were no carts, he says, owing to the state of the weather and the condition of the roads on either side; the river continued to rise steadily from morning of 7th, flooded the work-sheds, store-sheds, etc., on both banks immediately above the bridge, and rose up to the step of the bridge bungalow on the south bank. I calculate there must have been from 17 to 18 feet of water over the flooring of the bridge (although the Overseer gives it 19½ feet) when the accident occurred, which took place on the night of the 7th, or rather about 2 A.M. on the morning of the 8th. The second arch from the south abutment was first heard to fall with a crash, and all the others followed in succession at short intervals, and in the course of an hour they had all fallen in.

4. The arch that first gave away was the last but one uncentred on the 21st August (the last arch of all was uncentred on the 25th August), and it was not till two months and 10 days afterwards (on the 1st November) that I allowed carts to pass over the bridge, the traffic at this season of the year being very light owing to the almost impassable condition of the coast road between Cuddalore and Tranquebar.

5. I was at the bridge on the 27th, 28th, and 31st of October and 1st November, and on these two occasions I *thoroughly* examined the whole work, and the absence of any flood at the time enabled me to do so most effectually. I was perfectly satisfied that its condition was faultless.

6. It is my firm belief that this unfortunate accident would not have occurred if the bridge had had a chance of tiding over its first season with only ordinary floods. I have already reported to you numbers of such floods, 10 and 12 feet deep, passed under the bridge during September and October without causing the *slightest* damage of any sort; but the extraordinary flood which came down on this occasion has no precedent; the accompanying copy of a letter, from the Vellaur Anicut Overseer to the Talook Overseer, shows that notwithstanding the anicut shutters and surplus sluice being opened and the Trunk Road being breached, thus relieving the anicut of an immense volume of water, the depth of water running over its crest was 13½ feet, 11½ to 12 being the highest known without breaches in the Trunk Road forming the approach to the bridge over the anicut. This anicut is situated, as you know, from 10 to 12 miles above the Mutlur bridge, and it is possible that the suddenness with which the river came down, rising 13½ feet in the course of eight hours between 9 A.M and 5 P.M. on the 7th, caused the arch to give way under the vibration on the piers, and the work was doubtless too new and unseasoned to stand the shock of such a flood. As I have said I have not yet been able to examine the work, but I feel sure of the excellent quality of the work done that I am sanguine there is no defect in construction.

7. It is a matter to be regretted that one or two abutment piers were not provided in this work, as there would then have been a chance of some of the arches being saved; but piers 13½ feet high and 6 feet in thickness, with a lateral pressure of a 45 feet arch, cannot be expected to stand in such a situation with the strong current there was at the time.

8. The interest I have always felt in this work makes me feel acutely the sad accident it is my faithful duty now to report upon. I have always endeavoured, during its construction, to give as much of my attention to it as I possibly could, though I must admit that I was not satisfied with the arrangement of the supervising staff, often finding it necessary for days together to entrust the work to a temporary Maistry on 20 Rupees a month. I myself had, in addition to the ordinary duties of the 4th Range, which are as you may know very heavy, the Mahmatoor, Katoomyloor, and Pelanderia Anicuts, to see to. I had also for the greater part of the time two ranges in my charge, and, for about three months, the charge of the Superintending Engineer's Office in addition to all this. I had no extra Overseer allowed me for this or any other work, though the bridge was a very difficult work to do, owing to its situation; the consequence was, as I have said, the Talook Overseer had other work to do as well as this bridge, which took him away for a week or ten days at a time, and it often happened that the Maistry was left alone; for all this I have every reason to believe that all did their work conscientiously and fearfully, and I do *not* think that any bad work has been done when my back was turned. Colonel Roberts inspected the bridge while it was in progress, and has reported the excellence of the quality of the work; the late Colonel Boileau more

than once inspected the work while in progress, and each time very carefully examined it; he was present at the uncentring of one or two of the arches, and, I believe, he too has reported very favourably on the quality of the work; and, if I am not mistaken, I think you yourself saw the bridge before the railway was put on and while the arches were exposed.

9. The arches were perfect in symmetry; when uncentred the average sinking at the crown was 4 inches, *i. e.*, from 3 to 5 inches; the greater number sunk only 3½ inches, and no signs of the *smallest appearance of a crack in any one of these*; in fact, I did not anticipate such success in the construction of the arches with the working staff at my disposal.

10. I will report further after the freshes have subsided sufficiently to allow of the work being examined properly, and will be glad if you can be present also at that time.

No. 229. ORDER THEREON, 13th December 1871, No. 3,140.

CIVIL WORKS, No. 15.

THE Government have received with great regret the above reports of the total destruction of the bridge over the Vellaur in South Arcot, the main body of which had only just been completed. It is observed that in the papers which are before the Government there is nothing to show what was the immediate cause of the failure of the structure, and it is only even inferentially to be gathered that the whole of the piers have fallen, while it is entirely a matter of doubt whether they were overthrown by the thrust of the arches, and, if so, at what height, or whether their foundations were undermined. The Government consider it is necessary in the public interests that there should be a searching inquiry into the circumstances attending the failure of this bridge, and will appoint a special Committee to conduct it. The Superintending Engineer will immediately report about what time the water may be expected to have subsided sufficiently to a limit of a thorough examination being made of the foundations of the structure, and whether any special appliances, such as pumps, will be necessary, and he will communicate any further information which may have reached him in regard to the fall of the first arch.

2. All necessary particulars relating to the site should be communicated to the General Superintendent of the Public Works Workshops to enable him to prepare drawings and an estimate for an iron girder bridge on screw piles in place of the masonry one, or on masonry piers raised on the old foundations if the latter are considered to be available.

(True Extract.)

(Signed) J. CARPENDALE, Colonel, R.E.,
Secretary to Government.

To the Superintending Engineer, 5th Division.
" General Superintendent of Public Works Stores and Workshops.

Exd. S. T. Augustin.

No 737.

From

R. C. Norfor Esqre
Executive Engineer, 1st Range
South Arcot.

To

Captain James Vertue R.E.,
Superintending Engineer, 5th Division

Camp Vinnoly, 15th November 18[illegible]

(5)

Sir,

Enclosures 2
1 Letter from
Mr. Theadore
Dt. of Valavanoor
Dated

You will doubtless ere this have received my Demi Official letter of the 10th Instant reporting to you the unforeseen and lamentable destruction of the Bridge across the River Vellaur at Koattoor. I intended to defer reporting the matter in Official form in the hopes that I should have had an opportunity of examining the work so as to ascertain, if possible, cause of the accident, but as the River still continues to be in flood such an examination it is impossible to make at present.

2. I received intimation of the destruction of the Bridge on the evening of the 9th. I proceeded to Koattoor at once, and with great difficulty (owing to flooded state of the country and breaches

across

across the Road) reached the River on the morning of the 10th, there was nothing to see but the abutments on either bank, the river was running at a depth of 13 feet over the flooring of the Bridge at the time and the ruins were submerged.

3- From enquiries instituted I have been able to obtain the following information; on the night of the 6th Instant, this District was visited with a very severe Hurricane (some call it a Cyclone) accompanied with heavy rain, this continued till the noon of the 7th, the depth of water over the flooring of the Bridge during the continuance of the Storm is said to have been 12 feet; and the River at the time from the violence of the wind had a regular sea on - the traffic over the Bridge was stopped by the Mistry, in fact, there were no carts, he says, owing to the State of the weather, and the condition of the roads on either side. the River continued to rise steadily from morning of 7th flooded the work Sheds, Store Sheds, &c, on both banks immediately above the Bridge, and rose up to the Step of the Bridge Bungalow on the South bank. I calculate there must have been from 17 to 18 feet of water over the flooring of the Bridge (although the Overseer gives it 19½ feet) when the accident occurred - which took place on the night of the 7th or rather about 2 A.M. on the morning of the 8th. The second arch from the South abutment was first heard to fall with a crash, and all the others followed in succession at short intervals, and in the course of an hour they had all fallen in.

4. The arch that first gave away was the last but one uncentred, on the 21st Aug.t (the last arch of all was uncentred on the 25th August), and it was not till two months

And

and 10 days afterwards (on the 1st of November) that I allowed carts to pass over the Bridge; the traffic at this season of the year being very light owing to the almost impassable condition of the coast road between Cuddalore and Tranquebar.

5. I was at the Bridge on the 27th, 28th and 31st of October and 1st of November, and on these two occasions I thoroughly examined the whole work, and the absence of any flood at the time enabled me to do so most effectually; I was perfectly satisfied that its condition was faultless.

6. It is my firm belief that this unfortunate Accident would not have occurred, if the Bridge had had a chance of telling over its first season with only ordinary floods. I have already reported to You, number of such floods (and 12 feet deep) passed under the Bridge during September and October without causing the slightest damage of any

any sort; but the extraordinary flood which came down on this occasion has no precedent. The accompanying copy of a letter from the Vellaur Anicut Overseer to the Taloor Overseer shows that notwithstanding the Anicut Shutters and Surplus Sluice being opened and the Trunk Road being breached, thus relieving the Anicut of an immense volume of water, the depth of water running over its crest was 13½ feet 11½ to 12' being the highest known without breaches in the Trunk Road forming the approach to the Bridge over the Anicut. This Anicut is situated, as You know, from 10 to 12 Miles above the Bridge, and it is impossible that the suddenness with which the River came down rising 13½ feet in the course of 8 hours between 9 A.M. and 5 P.M. on the 7th caused the Arch to give way under the vibration on the Piers. And the work was doubtless, too, new and unseasoned, to stand

the

the shock of such a flood as I have said I have not yet been able to examine the work, but I feel sure of the excellent quality of the work done and that I am sanguine there is no defect in construction.

7. It is a matter to be regretted that one or two abutments Piers were not provided in this work, as there would then have been a chance of some of the Arches being saved, but Pier 13½ feet high and 6 feet in thickness, with a lateral pressure of a 45 feet Arch cannot be expected to stand in such a situation with the strong current there was at the time.

8. The interest I have always felt in this work makes me feel ~~unworthy~~ acutely the sad accident it is my faithful duty now to report upon. I have always endeavoured during its construction to give as much of my attention to it as possibly could, though I must admit that I was not satisfied with the

the arrangement of the supervising staff, often finding it necessary for days together to entrust the work to a temporary Mistry on 20 Rupees a Month. I myself had, in addition to the ordinary duties of the 4th Range which are as you may know very heavy, the Kuh. . nator, Katoomylore, and Pelandorai Anicuts, to see to, I had also for the greater part of the time 2 Ranges in my charge, and for a about 3 Months, the charge of the Superintending Engineer's Office in addition to all this. I had no extra Overseer allowed me for this or any other work, though the Bridge was a very difficult work to do owing to its situation. the consequence was, as I have said, the Talook Overseer had other work to do as well as this Bridge which took him away for a week or 10 days at a time, and it often happened that the Mistry was left alone. for all this I have every reason to believe that all did their work conscientiously and fearfully, and I do not think that any bad work has been done

done when my back was turned. Colonel Roberts inspected the Bridge while it was in progress and has reported the excellence of the quality of the work. the late Colonel Boileau more than once inspected the work while in progress, and each time very carefully examined it, he was present at the uncentring of one or two of the arches, and I believe he too has reported very favorably on the quality of the work, and if I am not mistaken, I think you yourself saw the Bridge before the roadway was put on and while the arches were exposed.

9. The arches were perfect in Symmetry. when uncentred the average sinking at the crown was 4 inches viz. from 3 to 5 inches the greater number sunk only 3½ inches and no signs of the smallest appearance of a crack in any one of them, in fact, I did not anticipate such success in the construction of the arches with the working staff at my disposal.

10. I will report further after the freshes have subsided sufficiently to allow of the work being examined properly, and will be glad if you can be present also at that time.

I have &c
(Sigd) R. C. Nasfor
Executive Engineer

James Bertell Captain R.E.
Ag. Supg. Engr. 5th Div.

No 185. Superintg: Engineers Office, 5th Division,
Cuddalore 20th November 1871.

From,

The Offg: Superintending Engineer,
5th Division.

Closure Copy of report.

To,

The Secretary to Government,
Public Works Department.

Sir,

In continuation of my letter No 181 of 16th instant, I have the honor to forward a copy of Mr R. G. Norfor's official Report of the destruction of the Vellaur Bridge.—

2. From this it will be seen that the flood rose—according to Mr. Norfor's calculation to a height of 17-18 feet, and according to the Ministry in charge of the Bridge to 19½ feet.—

Whichever of these calculations is correct, it seems beyond doubt that the flood is 2 feet higher than any previously registered.

3. I have heard reports that some of the Arches were blocked up by trees brought down by the floods, and, if so,

Enclosure to my letter No: 185 of 20th November 1871 from the Offg: Supt: Engr: 5th Div: to the Secretary to Government P.W.D.

P. W. S. 5571/71.

Received 22nd Nov. 1871.

some or other of the Piers must have
been exposed to violent shocks from Ices
dashed against them; these are dangers
to which a masonry bridge is particularly
liable, and which it is impossible to
guard against; moreover, the smaller
the space of the Arches, and hence the
greater the number of Piers, the greater
the danger, and thus only confirms
me in my opinion that in such a site
a masonry Bridge is totally inapplicable.

4. It will be quite impracticable to make
any examination of Foundations before
the month of January, and even then
the only use of an Examination will be
to satisfy oneself as to how far such a
flood acted on the Foundations of small
depth; if these are found not to have
suffered, it will be an additional proof
of the goodness of the work, but nothing more.

I have the honor to be
Sir,
Your most obedient Servant.

James Vetch Captain R.E.
Offg. Superintg. Engineer, 5th Div.

Public Works Department

Letter from the Superintending Engineer of the 5th Div
dated 20th Nov. 1871 No. 183.

I think he should have an indemnification and would delete from those of Kamra Kyle & Ederie & absent & Cmr

Noted for the information of Government in continuation of the Superintending Engineers previous letter

There is nothing yet to show that caused the fall of the bridge

Nov/71

for Secy to Govt

Public Works 1871 Department
Genl Offr Jan Dec
No. 5 to 8 71
From
The Offg Superintg Engr
5th Div
To
The Secy to Govt
Pub Dept
Dated 20th November 1871
Rec'd 28th do
No. 185.
Forwarding copy of his official report of the C.E. Bridge Opening
Mr C.E. Bridge Engineer, of the destruction of the Bridge across the Villaur at Bullur
in South Arcot
No 3140 - 13 Dec 71

No 228
Eg. Dec 71 R. 12.
to 25 do 71 R. 28

Letter from the Asst Superintending Engineer
St Denison dated 16th November 1871.

order dated 9th inst
that estimate be amended
prepared for the construction
of an under bridge
of the width of
Carriageway
with the information of Go.
vernment.

Nov. 21st

A Letter
must a note stating that
work should be
executed for

A.

1.0.!

P W Dept.

(23)

No 3140.

Proceedings of the Madras Government
under date the 13 December 1871
Received the following
from the Secy to Govt Pubs Dept No 1813 dated 16 November 1871
From the Secy to Govt Pubs Dept No 2211 dated 25 November 1871
—do— —do— —do— —do—

The Government
have received with great
regret the above report of
the total destruction of
the bridge over the Vellaur
in South Arcot. The
main body of which had
only just been completed.
It is observed that in
the papers which are
before the Government

there is nothing to shew what was the immediate cause of the failure of the structure, and it is only even inferentially to be gathered that the whole of the piers have fallen while it is entirely by a mere train of doubt whether they were overthrown by the thrust of the Arches and if so at what height or whether their foundations were undermined. The Government consider it is necessary in the Public interests that there should be a searching enquiry into the circumstances attending

(25) 11

attending the failure of this bridge and will appoint a Special Committee to conduct it The Superintending Engineer will immediately report about what time the water may be expected to have subsided sufficiently to admit of a thorough examination being made of the foundations of the structure, and whether any special appliances such as Pumps will be necessary, and he will communicate any further information which may

may have reached him
in regard to the fall
of the first Arch.

All necessary
particulars relating to
the site should be com-
-municated to the General
Supt of the Public Works
Workshops to enable him
to prepare Drawings and
an estimate for an iron
Girder bridge on screw
piles in place of the
masonry one or masonry piers raised on the
old foundations of the
latter are considered
unavailable.

[illegible]

11

To The S Engr 5th Cir
Genl Supt of Pub Wks

Cy Secy P.W. 125

M.S. desp to ... 13.12.71
... 21.12.71

Nos. 227 & 229

Gold of 1871. Widows.

PUBLIC WORKS.

to The Superintending Engr.
of Circles

Nos. 227 & 229

Widows, Pensions,
Entitlement of. Papers
orders & letters from the
Collector, Dist. & Superin-
tending Engr. Circles
Office relating to Widows
Pensions.