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# MADRAS RECORD OFFICE.

**Government of Madras.**

*Public Works* **DEPARTMENT.**

|               |                 |
|---------------|-----------------|
| G.O. No. 3486 | Press           |
| 108-109       | <del>Mis.</del> |
| Dated 7-12-   | 1864.           |

Not to be folded or roughly handled

*23-10-42*

17

*Proceedings of the Madras Government, Public Works Department,  
7th December 1864.*

No. 108. Read the following letter from Captain J. BEAN, R. E., Officiating Superintending Engineer, 6th Division, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Tanjore, 7th November 1864, No. 1,905:—

SIR,

1. I have the honor to report further on the state of the lower Coleroon anicut, and to state what steps I consider should be taken to counteract the effects of the breach, which has lately occurred in the body of the work, on the further stability of the anicut, and to secure the southern branch of the anicut from further disasters, in pursuance of Government Order No. 2,992, dated 18th October 1864.

Enclosure 1.

2. And, in the first place, I would remark, as regards the closing of the present breach, that I did not intend, when I proposed to throw in blocks of stone, to attempt to stop leakage through the work by this means. My object was to deposit stone on the line of the advanced apron, and clear altogether of the body of the work and its lines of front and rear retaining wall wells, so that sand might have accumulated, the bed of the river been raised, and some hindrance given to the flow of the large body of water through the breach which was being drawn off from cultivation and endangering the exposed ends of the anicut. This stone, if displaced, would have been carried by the force of the current still more clear of the work, and it would have formed a good foundation for a new apron, but I cannot deny that much care would have been required to lay it down, and the work should have been proceeded with simultaneously at all points, to avoid a deep scour.

3. As circumstances have turned out, however, it has been found impossible and undesirable to attempt this work, because immediately after my inspection of the anicut, towards the end of September, the river rose in both branches, and the monsoon rains, augmenting the floods, have raised the surface level of water to the top of the anicuts, and, until November, have entirely prevented any endeavours being made to close the breach. With the limited resources available, there being no quarries of granite or laterite in the neighbourhood, and the stone procurable being of small size, it would have been impracticable to carry out the work, and by the middle of December, if we have a favorable season, we may hope to turn off the water by embankments in the bed of the river above the breach. I have not heard of any further damage to the work which will add to the expense of re-construction, the exposed ends of the shattered masonry have been disturbed, but not the standing portion itself, and these would, in any case, have had to be removed.

4. As regards the measures proposed to strengthen the anicut, and more especially with reference to paragraph 2 of the above Order, Letter No. 1,374, dated 14th December 1863, Colonel Foord on his inspection in December last, did bring to notice the necessity for front lines of wells, being under the impression that

No. 2,133, dated 15th March 1864.  
G. O. No. 1,030, dated 12th April 1864.

none existed, and I have also noticed in my report the probable defective state of the foundations from leakage. Having joined the Division in January last, I was not prepared to recommend Government to incur a large additional outlay on protective works without having very good cause for doing so, founded on past experience, but the experience since gained in the present year has led me still more to believe that leakage does take place generally to a considerable extent, and that precautionary measures towards the counteraction of disturbances in the bed of the river should be adopted.

5. It is worthy of notice that the accidents which have lately occurred to this anicut have taken place when the river was nearly on a level with the top of the anicut. At such times there are seven and a half feet in depth of water in front of the work, and none in the rear. The section of the anicut consists of wells six feet in depth, with solid brick and chunam work four feet in depth above them for the foundations, with a body wall above seven and a half feet high. I believe that the pressure forcing its way below the solid foundation causes leakage through the

wells and disturbs the front aprons. It is true that the floorings of the arches between the piers, which were constructed when the bridge was built, and which are one and a half feet thick of brick in chunam, must offer some counteracting effect to such pressure, but I believe not sufficiently great to remedy the evils I complain of. Again, the front retaining walls on the line of the cutwaters of the piers, though said to be sunk on wells ten feet below the bed on the same level as the body of the work, may possibly prevent any leakage, but here, also, I am not at all sure that the effects complained of do not occur, and that the sand is not disturbed in the neighbourhood of this retaining wall. A lateral scour along the face of the work was supposed to have occurred

\* G. O. Nos. 479 and 1,080, dated 24th February 1863, and 12th April 1864.

from the draught through the sluices, but the results of the Government Order,\* directing the closing of the sluices, and the remedial

works which I propose, and will refer to presently, will, I believe, effectually remove such a scour. When the river rises above the anicut there is a considerable depth of water on the lower apron, and the pressure is more equalized, as well as an additional weight added to the apron to counteract such pressure. It is well known that leaks occur in the upper Coleroon anicuts, and are traced to such causes as I have described. There have been six within the last few years, and there is one now in the apron near the body of the work, adjoining one of the sluices, which we shall close up as effectually as possible immediately the state of the river permits.

6. To remedy these defects therefore, and to remove them, as far as possible, I would propose to adopt the following work which is shewn in the enclosed sections of the anicut. We cannot well interfere with the present section of the anicut, but to prevent leakage as much as possible, I would add two layers of granite stone in hydraulic chunam to the flooring of the arches between the piers in front of the anicut, to its full breadth, which would make the thickness two and a half feet in place of one and a half feet, and I would add an apron on the upper side of the bridge six yards wide and two and a half feet thick, faced with granite stone imbedded in concrete, and resting, on its outer edge, on a row of wells, sunk nine and a half feet below the bed, or seven feet below the apron. In the body of the work, I would endeavour to lay the wells to a greater depth, and sink them twelve feet in place of ten feet, as in the present anicut, the solid work would thus be six feet in thickness above the wells. Cut-stone work, properly dressed and fitted, would be extremely expensive, so I have allowed for rubble or rough stone masonry in chunam, but I would observe that, as the stone is procured from old native buildings, the quality of this masonry will not be greatly inferior to the former work. Laterite also has to be brought from great distances and is very expensive, otherwise I would recommend it to be laid in large blocks, in lieu of brick in chunam, which costs one-third its price, to form the lower layers of the apron. Such granite stone work, as above, costing 13 Rupees per cubic yard, the outlay on these additions and improvements will not cost less than 33,000 Rupees, which, added to the cost of restoring the old work, will not make the estimate much less than 60,000 Rupees.

7. I consider that if rough stone were packed on the present rear apron, the addition would also add to the stability of the work, and it is only a question of expense whether this improvement should not be effected at a cost of Rupees 30,000.

8. If Government approve of the above measures, I will prepare the estimates and plans, and I beg immediate authority to collect material to the extent of 20,000 Rupees, that no time may be lost. I do not consider with the short working season available in Tanjore, and the constant liability of freshes in the Coleroon river, that the whole work can be undertaken in one year, but I would construct the aprons, body of anicut, and piers, in one season, leaving the arches and superstructure to be completed in the second year.

9. I regret that Sub-Engineer Bateman's health has been failing him of late, and that he has constantly been compelled to seek medical advice. He is now at Tranquebar under treatment by the Zillah Surgeon, and should he continue unfitted for active work, I must beg that a thoroughly competent and active Officer be sent to take his Range. Indeed, the anicut work is of such importance and requires such close attention, that I consider it should become an independent charge, at an early a date as possible.

No. 109.

ORDER THEREON, 7th December 1864, No. 3,486.

1. In this letter the Superintending Engineer of the 6th Division replies to that part of the Order of Government, No. 2,992 of the 18th October 1864, which called upon him to report the manner in which he proposed to throw stone into the breach in the southern branch of the lower Coleroon Anicut, so that it should not interfere hereafter with the getting in of foundations to a proper depth, and cause a tendency to increased leakage under the work, and how, while guarding against this source of weakness, he intended to complete the re-construction of the anicut and bridge.

2. Captain Bean explains the mode in which he intended to throw in the rough stone, so that it would not interfere with the subsequent sinking of the necessary deep foundations, but he admits that much precaution would have been required in laying the stone down, and states that it has become no longer desirable to make the attempt, as the river has risen, and with the only material that is available, the breach could not be closed in the way he suggested before the middle of December, when he anticipates there will be no difficulty in damming off the water.

3. The Superintending Engineer states that on each of the occasions of the anicut giving way, it yielded when the water stood against it nearly up to its crest, and if this be the case, and if no overfall had previously scooped out the sand to any considerable depth from the rear of the lower apron, it is clear that the work has been each time destroyed by the leakage removing the sand from around the foundations, and allowing the upward pressure of the water standing in front of the anicut to act on the lower side of the thin rear apron and, blowing it up, to form a breach.

4. The addition of an apron faced with a deep retaining wall in front of the anicut, and the strengthening of the apron behind the work, as proposed by Captain Bean, appear to be measures well adapted to check leakage and generally to strengthen the work, but steps must be at the same time taken to regulate the discharge down each arm of the river with reference to the length of the two sections of the dam, and to prevent all irregularity of overfall on either branch of the work.

5. The Government approve of Captain Bean's suggestion to restore the body of the anicut and to build up the piers of the bridge this year, leaving the arches and superstructure to be completed hereafter. The Superintending Engineer will expedite the submission of the plans and estimates referred to in paragraph 8 of his letter.

6. No allotment of specific funds can at present be made, as all available savings have been appropriated, but application has again been made to the Government of India for an assignment for the work, and in consideration of its importance as well as of the danger of a great loss of revenue if it be not immediately restored, the Government resolve to direct the Superintending Engineer to proceed with it at once with the general funds at his disposal, which will be supplemented hereafter by the grant applied for, or by a transfer of savings accruing in other Districts.

(True Extract)

(Signed) CHARLES A. ORR, Colonel, R. E.,  
Secretary to Government.

To the Superintending Engineer, 6th Division.

„ Controller of Public Works Accounts.

„ Accountant General.

Exd. S. T. Augustin.

N<sup>o</sup> 1400-

Supt: Engrs Office 6<sup>th</sup> Div<sup>n</sup>  
5<sup>th</sup>

2<sup>d</sup>

Tanjore 7<sup>th</sup> November 1864

From,

Captain J. Bean R.E.

Offs: Supt: Engineer 6<sup>th</sup> Div<sup>n</sup>

To,

Colonel C. A. Dyer R.E.

Secretary to Government

P. W. D.

Enclosure 1.

Sir,

I have the honor to report further on the state of the Lower Coleroon, Anicut, and to state what steps, I consider, should be taken to counteract the effects of the breach, which has lately occurred in the body of the work, on the further stability of the Anicut, and to secure the Southern branch of the Anicut from further disasters, in pursuance of Government Order N<sup>o</sup> 2992 dated 18<sup>th</sup> October 1864.

2 And, in the first place, I would remark, as regards the closing of the present breach, that I did not intend, when I proposed to throw in blocks

of

of stone, to attempt to stop leakage through the work by this means. My object was to deposit stone on the line of the advanced apron and clear altogether of the body of the work and its lines of front and rear retaining wall walls, so that sand might have accumulated, the bed of the river been raised, and some hindrance given to the flow of the large body of water through the breach which was being drawn off from cultivation and endangering the exposed ends of the anicut. This stone, if displaced, would have been carried by the force of the current still more clear of the work, and it would have formed a good foundation for a new apron, but I cannot deny that much care would have been required to lay it down, and the work should have been proceeded with simultaneously at all points, to avoid a deep scour.

As circumstances have turned out, however, it has been found impossible

28  
impossible and undesirable to attempt this work, because immediately after my inspection of the anicut, towards the end of September, the river rose in both branches, and the Monsoon rains, augmenting the floods, have raised the surface level of water to the top of the anicuts, and, until November, have entirely prevented any endeavours being made to close the breach. With the limited resources available, there being no quarries of granite or laterite in the neighbourhood and the stone procurable being of small size, it would have been impracticable to carry out the work, and by the middle of December, if we have a favorable season, we may hope to turn off the water by embankments in the bed of the River above the breach. I have not heard of any further damage to the work which will add to the expense of reconstruction, the exposed ends of the shattered masonry have been disturbed, but not the standing portion.

portion itself, and these would, in any case, have had to be removed.

4 As regards the measures proposed to strengthen the Anicut, and more especially with reference to para 2 of the above Order, Colonel Ford on his inspection in December last did bring to notice the necessity for front lines of walls, being under the impression that none existed, and I have also noticed in my report the probable defective state of the foundations from leakage. Having joined the Division in January last, I was not prepared to recommend Government to incur a large additional outlay on protective works without having very good cause for doing so founded on past experience, but the experience since gained in the present year has led me still more to believe that leakage does take place generally to a considerable extent, and that precautionary measures towards the counteraction of disturbances in the bed of the River should be adopted.

It

Letter No. 1374  
dated 14<sup>th</sup>  
December 1863

No. 2133  
dated 15<sup>th</sup> March  
1864  
G. O. No. 1030  
dated 12<sup>th</sup>  
April 1864

5 It is worthy of notice that the accidents which have lately occurred to this anicut have taken place when the river was nearly on a level with the top of the anicut. At such times there are  $7\frac{1}{2}$  feet in depth of water in front of the work, and none in the rear. The section of the anicut consists of walls 6 feet in depth with solid brick and chunam work 4 feet in depth above them for the foundations, with a body wall above  $7\frac{1}{2}$  feet high. I believe that the pressure forcing its way below the solid foundation causes leakage through the walls and disturbs the front aprons. It is true that the floorings of the arches between the Piers, which were constructed when the Bridge was built and which are  $1\frac{1}{2}$  feet thick of brick in Chunam, must offer some counteracting effect to such pressure, but I believe not sufficiently great to remedy the evils I complain of. Again the front retaining walls on the line of the cutwaters of the Piers, though said to be sunk on walls 10 feet below the bed on the same level as the body

of the work, may possibly prevent any leakage, but here, also, I am not at all sure that the effects complained of do not occur, and that the sand is not disturbed in the neighbourhood of this retaining wall. A lateral scour along the face of the work was supposed to have occurred from the draught through the sluices, but the results of the Government Order directing the closing of the sluices, and the remedial works which I propose, and will refer to presently, will I believe effectually remove such a scour. When the river rises above the Anicut there is a considerable depth of water on the lower Apron, and the pressure is more equalized, as well as an additional weight added to the Apron to counteract such pressure. It is well known that leaks occur in the Upper Coleroon Anicuts, and are traced to such causes as I have described. There have been six within the last few years, and there is one now in the apron near the body of the work adjoining one of the sluices, which we shall close up

9. Oct<sup>r</sup> 479 and  
1030 dated  
24<sup>th</sup> February 1863  
and 12<sup>th</sup> April  
1864

as effectually as possible immediately the state of the river permits.  
To remedy these defects therefore, and to remove them, as far as possible, I would propose to dopt the following work which is shown in the enclosed sections of the Anicut. We cannot well interfere with the present section of the Anicut, but to prevent leakage as much as possible, I would add 2 layers of granite stone in hydraulic Chumam to the flooring of the arches between the Piers in front of the Anicut, to its full breadth, which would make the thickness  $2\frac{1}{2}$  feet in place of  $1\frac{1}{2}$  feet, and I would add an Apron on the upper side of the Bridge 6 yards wide and  $2\frac{1}{2}$  feet thick, forced with granite stone imbedded in concrete, and resting, on its outer edge, on a row of wells, sunk  $9\frac{1}{2}$  feet below the bed, or 7 feet below the apron. In the body of the work, I would endeavour to lay the wells to a greater depth, and sink them 12 feet in place of 10 feet as in the present Anicut, the solid work would thus be 6 feet in thickness

above

above the walls. Cut stone work properly dressed and fitted would be extremely expensive, so I have allowed for rubble or rough stone masonry in Chunanam, but I would observe that, as the stone is procured from old Native Buildings, the quality of this masonry will not be greatly inferior to the former work. Laterite, also, has to be brought from great distances and is very expensive, otherwise I would recommend it to be laid in large blocks, in lieu of brick in Chunanam which costs one third its price, to form the lower layers of the apron. Such granite stone work, as above, costing 13 Rupees per Cubic yard, the outlay on these additions and improvements will not cost less than 33,000 Rupees, which, added to the cost of restoring the old work, will not make the Estimate much less than 60,000 Rupees.

7 I consider that if rough stone were packed on the present rear Apron the addition would also add to the stability of the work, and it is only a question of expense whether  
this

this improvement should not be effected at a cost of Rupees 30,000.

8 If Government approve of the above measures I will prepare the Estimates and Plans, and I beg immediate authority to collect material to the extent of 20,000 Rs, that no time may be lost. I do not consider with the short working season available in Tanjore and the constant liability of freshes in the Coleroon River, that the whole work can be undertaken in one year, but I would construct the Aprons, body of Ancient, and Piers, in one season, leaving the Arches and superstructure to be completed in the second year.

9 I regret that Sub Engineer Bateman's health has been failing him of late, and that he has constantly been compelled to seek medical advice. He is now at Tranquebar under treatment by the Zillah Surgeon, and should he continue unfitted for active work, I must beg that a thoroughly competent and active officer be sent to take his range. Indeed, the ancient work is of such importance and requires such close

attention

attention, that I consider it should  
become an independent charge, at  
an early a date as possible.

I have the honor to be  
Sir,  
Your most obedient servt

W. H. Mear  
Capt. R. E.  
Off: Supt: Engineer 6<sup>th</sup> Div.

Circulated for the  
orders of Government  
W. H. Mear  
Secretary & Capt.

12<sup>th</sup> July / 63. N. 429-430  
23<sup>rd</sup> Dec / 63. 565-62-  
12<sup>th</sup> Oct / 64. 282-283  
18<sup>th</sup> Oct / 64. 311-312

977 1864, D. M.  
Pro: of 10<sup>th</sup> Dec  
From 11<sup>th</sup> 4871  
The Supt: Engineer  
15<sup>th</sup> 6<sup>th</sup> Div.

To The Secretary to Govt  
P. W. D.

Adm. should have  
expected some action  
upon the same in the  
11<sup>th</sup>

Dated 7<sup>th</sup> Novem 1864  
Recd 10<sup>th</sup>

N. 1905  
423486-7<sup>th</sup> Dec 1864  
Encls: 12  
Plan given to Govt  
1-2/65  
Reporting further on the  
state of the Lower Coleroon  
ancient and stating what  
steps he considers should  
be taken to counteract the  
effects of the breach lately  
occurred in the body of the work  
as also to secure the Southern  
Branch of the ancient from  
further disasters

N. 108.

c. 17<sup>th</sup> Nov 1864 P. 22nd

31  
No. 3486. P.W. Depd.

Proceedings of the Madras Government  
Under date the 7<sup>th</sup> ~~December~~ 1864

Read the following letter

From  
The Supg Engrs 6<sup>th</sup> Div.

Reporting further  
on the state of the Lower  
Coleroon Anicut, and stating  
what steps he considers should  
be taken to counteract the  
effects of the breaches lately  
occurred in the body of the  
work as also to secure the  
Southern Branch of the Ani-  
cut from further disasters.

(Here enter 7<sup>th</sup> Nov/64 No. 1905)

In this letter the  
Superintending Engineer  
of the 6<sup>th</sup> Division replies  
to that part of the Order  
of Government No. 2992  
of the 18<sup>th</sup> October 1864  
which

which called upon him to report the manner in which he proposed to throw stone into the breach in the Southern branch of the Lower Colorado Aqueduct so that it should not interfere hereafter with the getting in of foundations to a proper depth and cause a tendency to increased leakage under the work, and how, while guarding against this source of weakness, he intended to complete the reconstruction of the Aqueduct and Bridge.

2nd. Captain Deane explains the mode in which he intended to throw in the rough stone

So

194  
so that it would not interfere with the subsequent sinking of the necessary deep foundations, but he admits that much precaution would have been required in laying the stone down, and states that it has become no longer desirable to make the attempt, as the River has risen and, with the only material that is available, the breach could not be closed in the way he suggested before the middle of December, when he anticipates there will be no difficulty in damming off the water.

The

3 The Superintending Engineer states that on each of the occasions of the Anicut giving way it yielded when the water stood against it nearly up to its crest, and if this be the case, and if no overfall had previously scooped out the sand to any considerable depth from the rear of the lower apron, it is clear that the work has been each time destroyed by the leakage removing the sand from around the foundations and allowing the upward pressure of the water standing in front of the Anicut to

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to act on the lower side of the thin rear apron and, blowing it up, to form a breach.

It The addition of an apron faced with a deep retaining wall in front of the Anicut and the strengthening of the apron behind the work, as proposed by Captain Deane, appear to be measures well adapted to check leakage and generally to strengthen the work, but steps must be at the same time taken to regulate the discharge down each arm

and of the River with reference to the length of the two sections of the dam, and to prevent all irregularity of overflow on either branch of the work.

5 The Government approve of Captain Bean's suggestion to restore the body of the Ancub and to build up the piers of the Bridge this year, leaving the arches & superstructure to be completed hereafter. The Superintending Engineer will expedite the submission of the Plans and estimates referred to in Para 8 of his letter.

6 No allotment of specific

23A  
specific funds can at present be made, as all available savings have been appropriated, but application has again been made to the Government of India for an assignment for the work, and in consideration of its importance as well as of the danger of a great loss of revenue if it be not ~~immediately~~ restored, the Government resolve to direct the Superintending Engineer to proceed with it at once with the general funds at his disposal, which will be supplemented hereafter by the grant applied for, or by a transfer of savings accruing in other districts.

To The Supg Engr 6 Dec 87  
Cm. of Mr Secy  
Acty Genl.

23  
Dec 8<sup>th</sup> December 1887

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Pro: of Gov: for Dep

No 3486.

Pro: of the All Gov:  
of 7<sup>th</sup> Dec: 1864

Dep: 1864  
1864

Letter from the  
Sup: Eng: 1864  
reporting on the state  
of the Lower Coleroun  
Ancient, and the steps  
to be taken Counte.  
rect the effects of the  
breach therein. With  
orders thereon.

No 108. 109