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# MADRAS RECORD OFFICE.

## Government of Madras.

*Public Works* DEPARTMENT.

|                      |               |
|----------------------|---------------|
| G.O. No. <u>2462</u> | Press<br>Mis. |
| <u>563-564</u>       |               |
| Dated <u>24-8</u>    | <u>1865.</u>  |

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,  
24th August 1865.*

No. 563. Read the following letter from L. BOWRING, Esq., Commissioner of Mysore, to the Secretary to Government of Fort Saint George, Public Works Department, dated 9th August 1865, No. 1,798-14 :—

SIR,

At the request of the Chief Engineer in Mysore forwards in original a fourth Memorandum, dated 4th August 1865, on the failure of the lower Coleroon anicut in Tanjore, for submission to His Excellency the Governor in Council.

*Fourth Memorandum on the failure of the lower Coleroon anicut in Tanjore.*

1. Although I am still ignorant of any orders that may have been passed by the Madras Government on the recent breach for the fourth time of the Lower Coleroon Anicut, I have, since writing my last Memorandum, become aware of certain views held by those authorities, materially affecting the question of the origin of the late serious disasters, from which on professional grounds I feel myself compelled to dissent.

2. In paragraph 3 of the Orders of Government of the 6th June 1865, No. 1,544, are the following expressions of opinion:—“ Captain Oakes shows by two Sections of the river above the Anicut, and by a sketch in the margin of his report how, by the accumulation of sand above the line of the dam, the river bed has been raised till it has even assumed a reverse slope. If this rise were uniform across the entire channel of the river near the Anicut, the effect would not be injurious, but as it has occurred only partially, and formed heavy sand banks which obstruct the flow of the stream towards one portion of the dam, and set it with augmented velocity on the other, they are most objectionable and dangerous”

3. Referring to my first Memorandum dated 17th January 1865, it will be found stated (paragraph 22):—“ It is easy to see that under such conditions, (viz., the formation of accumulations of sand) the river cannot be discharged uniformly over the dam, but must be divided into currents impinging with accelerated force at uncertain parts.” It is therefore evident that the Government have arrived at the same opinion with myself as to one very material source of danger, if not the actual cause of destruction, although during the six months that have elapsed since my first paper was laid before them, they have not thought it necessary to notice my views, except for correction of an opinion in which it is now proved, was quite right.

4. But a more important point is the authoritative statement that the uniform rise of the bed of a river above a dam would not be injurious to its stability, which seems to me opposed to experience in such rivers as the Cauvery and Coleroon, where no natural bed of rock exists to receive the over-fall.

5. When a dam is first built, the current above it is not affected until it reaches the obstruction, where the velocity is checked, and which it then surmounts by a sudden rise and fall, striking the bed below at a distance proportioned to the slope of the bed, and height of dam, but as the upper bed is gradually filled up with sand, the over-fall becomes smoother, and the distance of its point of impact greater (see Diagram) until it reaches beyond the artificial bed or apron prepared to receive it, and acting on the sand, soon produces deep holes, which eventually undermine and destroy the apron and body of the dam, and that this has been the process by which the existing evils at the Coleroon Anicut have been occasioned, there can be no doubt, in addition to those caused by oblique action and lateral currents.

6. In his remarks on the Upper Coleroon Anicut, the late Colonel Baird Smith appeared to under-value the effects of the enlarged under-sluiques, because he “ found (in January 1853) the bed of the river above the dam on the same general level as the crown of the work and merely channels of about the same width as the sluices cut through the sand opposite to each set.” But as I have before observed the state of the flooded river cannot be altogether judged of when the bed is dry, for the sluices being opened only during the freshes cause powerful currents to set towards them; bringing down the sand in suspension, but when the sluices are closed the sand is deposited

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24th August 1865.*

filling up the channels, and taking a pretty uniform level. Had Colonel Smith seen the state of the Coleroon ten years sooner, he would have observed the bed for some distance above the Anicuts raised higher than the crown, by deposits of sand since swept away by the action of the sluices, the utility of which he fully recognizes in the following words:—"Although however the primary object of their construction has not been attained, their influence in combination with other works "to be referred to presently in maintaining an uniform distribution of the deposits and in "preventing the formation of sand banks in front of the dam, has doubtless been of important "service."

7. I may therefore fairly appeal to the High Authority, just quoted, in support of my plan of distributing the enlarged sluices uniformly along the dam, and I firmly believe that with due attention to their working, combined with such operations in the river bed when dry, as would tend to remove casual obstructions, and preserve the direct flow of the current, these outlets will prove adequate to their purpose, and as large as would be conveniently manageable, as well as safe with regard to their action on the down-stream bed.

8. Since the foregoing observations were written, I have had an opportunity of reading Captain Oakes's Reports of the 23rd June and 12th July 1865, with the orders of Government thereon, and I notice the remarks on the difference between the aprons and bed of the river in the north and south branches of the anicut, but I believe that some misconception exists on this point from inattention to the great changes that have taken place at the anicut during the last seven or eight years, for both branches were originally constructed alike with a single apron, over about 12 feet of which another course of cut stone was afterwards laid to receive the overfall.

9. The effect of the raised apron however was found to be an extension of the overfall to the rough stone packing beyond, and it was removed from the work in the south branch and the apron re-laid on one level, which at that time was certainly not above the down-stream bed; but it is quite intelligible that the increased action of the last few years and especially since the breach of 1862, has had the effect of deepening the bed, and leaving the apron above it, and I must here repeat that both aprons were protected by rough stone till 1857.

10. With regard to the actual circumstances of the recent breach, it seems the European Officer and Subordinate observed that the current at first set towards the north, or new section, over which it flowed before overtopping the rest of the dam, a fact which though contradicted by others, seems to me perfectly in accordance with the state of the river as shown by Captain Oakes's sections, as the deep channel there shown must fill at once, and the sand banks to the south being higher than the dam, would necessarily intercept the stream on that side.

11. The sections show a bed of 10' 9" below the crown or about three feet below the base of the dam on the north, and "a high ridge" of sand above the level of the crown on the south, and under such conditions, the torrent, bursting from the temporary embankment 700 yards higher up the river, must have set violently in an oblique direction on the very foundations of the newly built work, which "rolled over en masse when two feet of water was flowing over it" a body which could not possibly have disturbed a solid mass of masonry, eight feet thick, however new, had it not been undermined; and whatever may be the appearances now, I have no doubt whatever that such will prove to be the fact.

12. In fact it is only necessary to refer to Captain Oakes's own suggestions for closing the north section of the anicut by a masonry wall, and to the notice of it in the order of Government No. 1,901, dated 7th July 1865, paragraph 4, to show that the belief in the mere overturn of the body of the dam, leaving the foundations uninjured, is not seriously entertained. Had the current acted from above, the destruction of the work must have been gradual, not sudden and early in the freshes as was actually the case.

13. It is a subject for most serious consideration that these successive disasters are producing changes in the river Coleroon which must inevitably enhance the difficulty of restoring the anicut, and I consider it now quite impossible for any dam, of whatever section it may be, to stand on the site of the runned work, unless the current can be previously turned from that direction.

BANGALORE.  
4th August 1865.

(Signed) E. LAWFORD, Colonel, R. E.,  
Chief Engineer of Mysore.

*Proceedings of the Madras Government, Public Works Department,  
24th August 1865.*

No. 564.

ORDER THEREON, 24th August 1865, No. 2,462.

CIVIL WORKS, No. 78.

Communicated to the Superintending Engineer of the 6th Division, for consideration when preparing his further reports on the Lower Coleroon Anicut

and in the measures to be adopted for its restoration.

(True Extract.)

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

To the Superintending Engineer of the 6th Division.

and as large as would be conveniently manageable, as well as safe with regard to their action on the down stream bed.

8. Since the foregoing observations were written, I have had an opportunity of reading Captain Oakes's Reports of the 23<sup>rd</sup> June and 12<sup>th</sup> July 1885 with the orders of Government thereon, and I notice the remarks on the difference between the apron and bed of the river in the north and South Branches of the Aricut, but I believe that some misconception exists on this point from inattention to the great changes that have taken place at the Aricut during the last seven or eight years; for both branches were originally constructed alike with a single apron, over about 12 feet of which another course of cut stone was afterwards laid to receive the overfall.

9. The effect of the raised apron however, was found to be an extension of the overfall to the rough stone packing beyond, and it was removed from the work in the South branch and the apron relaid on one level, which at that time was certainly not above the down stream bed; but it is quite intelligible that the increased action of the last few years and especially since the breach of 1862, has had the effect of deepening the bed, and leaving

the apron above it, and I must here repeat that both aprons were protected by rough stone till 1857.

10. With regard to the actual circumstances of the recent breach, it seems the European Officer and Subordinate observed that the current at first set towards the North, or new section, over which it flows before overtopping the rest of the Dam, a fact which though contradicted by others, seems to me perfectly in accordance with the state of the river as shown by Captain Oakes's sections, as the deep channel there shown must fill at once, and the sandbanks to the South being higher than the Dam, would necessarily intercept the stream on that side.

11. The sections show a bed of 10' 9" below the crown or about 3 feet below the base of the Dam on the North, and "a high ridge" of sand above the level of the crown on the South, and under such conditions, the torrent, bursting from the temporary embankment 700 yards higher up the river, must have set violently in an oblique direction on the very foundations of the newly built work, which "rolled over en masse when 2 feet of water was flowing over it" a body which could not possibly have disturbed a solid mass of masonry, 8 feet thick, however new,

now, had it not been undermined; and whatever may be the appearances now, I have no doubt whatever that such will prove to be the fact.

12. In fact it is only necessary to refer to Captain Oakes's own suggestions for closing the North section of the Aricut by a masonry wall, and to the notice of it in the order of Government 181905, dated 7 July 1863, Para 4, to show that the belief in the mere overturn of the body of the Dam, leaving the foundations uninjured, is not seriously entertained. Had this current acted from above, the destruction of the work must have been gradual, not sudden and early in the flushes as was actually the case.

13. It is a subject for most serious consideration that these successive disasters are producing changes in the River Channel which must inevitably enhance the difficulty of restoring the Aricut, and I consider it now quite impossible for any Dam, of whatever section it may be, to stand on the side of the present work, unless the current can be previously turned from that direction.

Bangalore 2  
4<sup>th</sup> August 1865

Lawford St. M.  
Chief Engineer of Mysore

1865

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1865-2462-245 August 1865

Public Works Department  
9

No. 2462.

Proceedings of the Madras Government  
Under date the 24<sup>th</sup> August 1865  
Read the following

From the Commissioner of Mysore.

At the request of the  
Chief Eng<sup>r</sup> in Mysore forwards  
in Original & four the Memo:  
- random of 4<sup>th</sup> August/65 on  
the failure of the Lower Co.  
- Coloon Amicut in Tanjore  
for submission to His Ex.  
- cellency the Governor in Council.

14 E. 279 Aug 1865 No. 1798  
14.

Communicated to  
the Superintending Engineer  
of the G. S., for consi-  
- deration when preparing  
his further reports on  
the Lower Coleroon Amicut  
and the measures to be  
adopted for its restoration

To the Super Engineer of the  
G. S. Works (Plow) to be returned/✓  
Sept. 25<sup>th</sup> August

24-9-31 III

To / 1865 Depa to  
P. No. of Gout for Augt

N. 2462

P. No. of the Alsat.

D / 24<sup>th</sup> August 1865

Original letter and one half of its  
inclosure lost in the Press —

ROC 15115/6

Communicating to the Super-  
intending Engineer of the 6<sup>th</sup> Div.  
letter from the Commissioner of  
Mysore forwarding the Chief Eng<sup>r</sup>  
Fourth Memo. on the failure of  
the Lower Coleroon Aqueduct in  
Mysore.

N. 563. 564