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TAMIL NADU ARCHIVES
GOVERNMENT OF TAMIL NADU
Revenue DEPARTMENT

G.O. No.	2111	Press.
B.P. No.		Mis.
Dated	27.8.1878	197

Not to be folded or roughly handled

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

16th August 1878, No. 642 I.

Irrigation.
Account.

Read the following papers:—

No. 33. From F. B. PEMBERTON, Esq., C.E., Officiating District Engineer, South Arcot, to the Chief Engineer for Irrigation, dated Cuddalore, 5th June 1878, No. 110.

I HAVE the honor to submit, for the sanction of Government, an estimate of Rupees 30,300 for restoring the breached portion of the Pelendorai Anicut.

One plan (tracing).
" estimate (detailed).
" Form AA.
" " C.
" specification.

2. As has been already reported in this office letters, Nos. 161, of 27th October, and 183 of 17th November 1877, the

anicut was on the 25th October 1877 breached to a length of 195 feet. I understand that the anicut was inspected by you, in company with Major Mead, in the beginning of April last, and the requisite instructions were furnished by you to the latter on the spot regarding the work to be done. It does not, therefore, appear necessary for me to say anything here regarding the cause of the accident or the state of the anicut before the repairs were carried out, as the estimate now submitted has evidently been prepared in accordance with the instructions furnished by you.

3. The collection of materials for the closing of the breach and the formation of ring bund was commenced on emergency in January, and a sum of Rupees 5,000 was laid out thereon up to the end of March 1878. The progress of the work has not, however, been as satisfactory as it was anticipated owing to the frequent freshes in the river, each one causing a delay of several days. There was also another fresh on the 31st May; it rose $8\frac{1}{2}$ feet above the level of the sand sluice floor; on the 2nd instant it was $7\frac{1}{2}$, and it seems likely to continue for some time, as it is reported that it has been again raining in the river basin. Of course this will stop the work of the foundation for days; however at the next week I hope to be able to complete the concrete filling, and then there will be no further delay even if freshes do occur.

4. I inspected the anicut on the 30th May. I found that the work was progressing satisfactorily, the ring bund had been completed, and there was only a length of about 30 yards of excavation left to be filled up, which would have been completed almost by this time if unfortunately there had not been a fresh in the river the very day after I left. They have plenty of materials collected at site, therefore it will not take long to complete the foundation after the water has again subsided.

5. In the current year's budget there is a provision of Rupees 4,800 under Revenue, Maintenance and Repairs, for the Pelendorai Anicut System; of this a sum of Rupees 1,800 is required for completing the repairs to the main channel, leaving

Rupees 3,000 available for the anicut repair; the balance is Rupees 22,300 of the estimate, which will have now to be allotted.

No. 33-A. From the same Officer, dated Cuddalore, 27th June 1878, No. 139.

I HAVE the honor to bring to your notice that the Supervisor in charge of the Pelandorai Anicut work reports in a letter dated 11th June 1878 that at the west and east ends of the breach of the anicut and for sides of body at east end, for a length of about 70 feet, the use of concrete was not confined as per estimate; that the hollows in the floor were filled with concrete instead of sand, and at the sides of the body the depth of foundation was allowed from 9 to 12 feet down to hard soil instead of 7 feet; that the excess of concrete used in the above portions is 174 cubic yards, costing Rupees 550. This additional work is said to have been carried on with the approval of the Divisional Officer.

2. In a letter dated 13th May 1873, or in submitting the estimate for the anicut work, the Divisional Officer stated that the depth of foundation has been provided for in the estimate as ordered, but as work proceeded it would probably be found necessary to increase the depth considerably, as the subsoil appeared to be of an inferior nature; in fact, both he and the Supervisor suggested a solid foundation to a depth of 15 feet; but Major Mead, in his reply dated 17th May 1878, stated that on 1½ feet concrete, making a total depth of 9 feet; and he was moreover of opinion that this with the broad base and made with concrete of Soorkee mortar should prove ample. But the Supervisor states that the additional concrete work mentioned above was executed prior to the receipt of this order of Major Mead's.

3. I have therefore the honor to request that the estimate of Rupees 30,300 submitted with my letter, No. 110, of the 5th instant, may be increased to Rupees 30,850, raising the item of concrete by Rupees 550 and 174 cubic yards, or 4,698 cubic feet.

No. 33-B. From the same Officer, dated Tindivanam, 2nd July 1878, No. G-1.

WITH reference to your memoranda, Nos. 34 and 34-1 SA, dated 18th and 25th June 1878, I have the honor to inform you that the original plan of the Pelandorai Anicut, therein called for, was forwarded to you on the 1st instant from Cuddalore in a separate parcel.

2. The plan could not be sent up at once on receipt of your first memorandum, as it was not in this office, and as it was received from the Divisional Officer only on the 1st instant. There was, moreover, some delay in the receipt of your first call in consequence of my being on inspection tour in the district.

No. 33-C. Endorsement of the Officiating District Engineer, South Arcot, dated Oolundoorpett, 8th July 1878, No. 149.

From S. SUBROYA CHARIAR, Assistant Engineer, Virdachellam Division, to the District Engineer, South Arcot, dated Chepaukam, 28th June 1878, No. 155.

THE collection of the necessary quantity of rough stones as per estimate submitted is almost done for the Pelandorai Anicut, and as I understood from Major Mead, R.E., that we should also arrange for a stock of the said materials for use after floods, and as it is also desirable not to disperse the carts at present working with us, I beg to state that I am arranging for the collection of a thousand cubic yards more in anticipation of your sanction. If countermanded I would stop further progress on receipt of the orders.

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SUBMITTED to the Chief Engineer for Irrigation for early orders. The necessity for keeping up a stock of rough stone has been already noticed by the Chief Engineer in his endorsement printed in G.O., No. 599 I, of 13th December 1877.

(Signed) F. B. PEMBERTON, C.E.,
Officiating District Engineer.

FORM AA.

Work.—Abstract Estimate No. 1,

Main-head.—Head Works

Sub-head.—C. Works.

Pelandorai Anicut System.

Name of Work.—Restoring the breached portion of Pelandorai Anicut.

Descriptions of Work.	Quantities.	Units.	Rate.	Amount.	Remarks.
1	2	3	4	5	6
Concrete work ...	46,215	100 c. ft.	Rs. 11 11 6	5,415	4,698 cubic feet added as desired in District Engineer's No. 139 of the 27th June 1878.
Brick-in-chunam work ...	23,584	Do.	12 8 0	2,948	
Cut stone well dressed ...	8,005	Do.	56 12 4	4,545	
Do. partly do. ...	4,490	Do.	37 8 0	1,685	
Plastering two coats ...	3,150	100 sq. ft.	3 2 0	98	
Pointing ...	31,359	Do.	1 1 0	330	
Rough-stone work ...	67,449	100 c. ft.	6 15 1	4,683	
Earthwork for excavation ...	2,150	100 c. yds.	7 13 0	163	
Baling water of rough-stone work.	...	...	...	100	
Granite beams of 9 feet long ...	6	each	9 0 0	54	
Earthwork for ring bund ...	10,710	100 c. yds.	17 3 0	1,841	
Do. of puddle work for do.	1,182	Do.	31 4 0	369	
Brick-in-chunam work for temporary wall.	1,344	100 c. ft.	12 8 0	168	
Brick-in-clay work for do. ...	20,958	Do.	3 2 0	655	
Plastering two coats for do. ...	4,184	100 sq. ft.	3 2 0	131	
Baling water ...	...	...	...	2,000	
Clearing foundation and breaking old masonry.	...	...	...	1,800	
Scaffolding and planking ...	...	...	...	500	
Contingencies for floods, &c. ...	...	...	...	500	
Quarry road ...	...	...	...	800	
Superintendence ...	...	Per cent.	5 0 0	28,793	Additions made by Chief Engineer for Irrigation, vide Note.
Sundries ...	...	Do.	2 0 0	1,410	
Contingencies ...	...	Do.	3 0 0	842	
Total ...	...	...	...	31,609	
Deduct the value of 2,700 cubic feet of old cut stones to be realised from the work at 4½ Annas per cubic foot.	...	...	...	759	
Total Amount of Estimate ...	...	...	...	30,850	
Add for contingencies from floods.	...	...	...	4,500	
Reserve of rough stone ...	27,000	100 c. ft.	6 0 0	1,625	
Total ...	...	...	...	36,975	

Cuddalore,
5th June 1878.

(Signed) F. B. PEMBERTON, C.E.,
Officiating District Engineer.

Note by the Chief Engineer for Irrigation.
These papers refer to the estimate for closing the breach in the Pelandeni Anicut and for preventing future damage. Before reporting on the work in course of execution, it is necessary to refer to the cause of the accident.

2. The breaching of the anicut occurred on the 25th October 1877, the maximum height attained by the water having been 7 feet over the crest, the height of the latter above the apron being 9 feet. Apparently this depth represents the maximum discharge, as the anicut did not breach until after the water had fallen to 6 feet on the crest.

3. A further report as to the state of the weir before the freshes and as to the action of previous freshes is recorded in the Proceedings as per margin. Up to October 1877 the freshes since the construction of the anicut had been light and no disturbance indicating weakness had taken place. A moderate extent of protective work was found necessary by the District Engineer in 1876, and was carried out.

4. The further report called for as to the probable causes of the accident was long delayed, and the District Engineer's attention was called thereto in February last, it being of great importance that the modifications of section, which might be desirable, should be settled as soon as possible, and these could not be determined until the source of weakness in the work as originally built had been ascertained. On the 20th February the District Engineer replied that he was unable as yet to report on either the exact state of the anicut or on the probable causes of the accident, neither could he propose at that time any modifications of section. In December freshes in the river prevented a complete examination. Again on the 22nd January he was at the anicut, but a fresh had occurred on the 20th, and he was again unable to examine the work below the floor or apron level. It was, the undersigned considers, the duty of the District Engineer to arrange to see the anicut when the state of the river was such as to allow of a complete examination, and though no doubt there were many other calls on his time, the great importance of settling in what manner the restoration was to be effected, and of making all needful preparations, without delay, should have induced him to take care that he was at the anicut on the very first occasion that the river had fallen low enough to enable him to examine into the state of the work. Major Mead, however, stated his opinion to be that the breach was due to—

1. Weak section.
2. Insufficiency of rough-stone apron.
3. Probability that the concrete was not good, thereby practically reducing the depth of foundations to 6 feet (this is a mistake, for the foundations are shown in the original design as 9 feet in depth, of which $1\frac{1}{2}$ feet were concrete).
5. Further delay having occurred the undersigned went to the anicut on the 4th April, and from the examination then made came to the conclusion that the damage had commenced at the tail of the apron, and was primarily due to the small width, 6 feet, of the rough-stone apron, which having been washed away left the retaining wall of the masonry apron exposed to scour, and that being undermined and falling the breaching of the anicut would necessarily rapidly follow. To some extent also the high level of the aprons was a source of danger, and must have facilitated the destruction of the work.

The section of the anicut, with the exception of the rough-stone apron, was strong, and would have withstood, it is believed, a maximum flood without risk. A revised section was at once drawn up, and the principal modifications are—

- (1st) the placing of the outer 18 feet of the masonry apron at 2 feet below the level of the inner 25 feet of apron;
- (2nd) formation of the masonry aprons with 1 foot of stone on $2\frac{1}{2}$ feet of concrete instead of on $1\frac{1}{2}$ feet of brick-work, the concrete being deemed preferable as capable of being more rapidly executed, and as being better fitted to form the substructure for the dressed stone-work. It is also, even with the greater thickness, cheaper in the proportion of 5 to 6, and the strength with the additional thickness is much greater;
- (3rd) founding the retaining wall of the masonry apron at $19\frac{1}{2}$ feet below crest of anicut or $10\frac{1}{2}$ feet below surface of first apron, instead of at 9 feet below that level;
- (4th) placing the surface of the rough-stone apron at $1\frac{1}{2}$ feet below the top of the retaining wall or $3\frac{1}{2}$ feet below its original level, and making this apron 30 instead of 6 feet wide, and of 90 instead of 18 square feet in section; the depth of stone at the retaining wall to be 4 feet, and at the outer edge 2 feet.

No alteration in the section of the crest wall was considered necessary, and this being the case no change was advisable as the new wall has to be joined to the old wall still safe.

It was ascertained by the District Engineer, by cutting a pit down through a portion of the old foundations of the crest wall, that the concrete was fairly good. It was noticed when inspecting the work (then in progress) in March 1874 that fat lime had been used in the masonry, and that the mortar after a considerable time was still soft, but it was said that a mixture of clay and lime was used for the concrete in the foundations and had set well, and the recent examination confirms this statement.

It may be mentioned also that early in April demolition of the debris of the breached work had made but little progress and threatened to delay the commencement of reconstruction, and as some of this demolition appeared to be unnecessary, instructions were given to limit the removal of the blocks of debris on the line of the crest wall to 3 feet below first apron surface level, and to 2 feet below apron level elsewhere or between the crest and retaining walls. All spaces between the masses of old masonry on the line of the crest wall foundations were to be cleared out and filled in with carefully consolidated concrete, and generally there was to be a facing of new masonry on foundations of the full depth, on the upstream side of the blocks of old masonry, which had shifted more or less downstream from the line originally occupied.

The tracing dated 5th June 1878 shows the revised as well as the former section. The plan on which the anicut was originally built is dated 8th January 1869.

6. The estimate submitted by the District Engineer amounts to Rs. 30,300 and in his letter No. 139 he requested that to this may be added for extra concrete work 550

In the estimate Rupees 500 are allowed for contingencies for floods, &c., but there have been already many interruptions from freshes, and this provision will certainly prove altogether inadequate. The report made by the District Engineer's No. 140, 27th June 1878.

Engineer of the loss caused by the fresh of the 8th, 9th June, though the Supervisor's estimate includes materials which will in part be recovered, and temporary works washed away which are not to be replaced, indicates that the cost of the restoration will be considerably enhanced on account of freshes, and it

is thought that Rupees 5,000 should be provided, or an addition of Rs. 4,500

Making the total Rs. 35,350

The only work not properly debitable to Revenue, Maintenance and Repairs, is the additional width of rough-stone apron provided, and this may be taken to be of the value of Rupees 2,820.

The District Engineer further reports* that the stone required for this apron having been obtained, the collection of the reserve of rough stone pointed out in this office endorsement, No. 259 I, of the 30th November last, to be necessary,

* No. 149, 8th July.
Proceedings, Madras Government, No. 599 I,
13th December 1877.

has been commenced, and it is intended to provide 1,000 cubic yards for this purpose, this material not being obtainable except from the bed of the river. This also will require to be included in the estimate, and the rate for the apron being Rs. 1-14-0 a cubic yard, allowing 4 Annas for packing, the rate for the reserve will be Rs. 1-10-0 and the cost Rupees 1,625. The total requiring sanction will then be Rupees

36,975, of which Rupees 2,820 will be chargeable to Capital and the remainder† to Revenue.

7. The cost of the restoration if completed for the estimated amount will not it is considered be excessive. The rates of the original estimate of 1869 have been noted in pencil on the abstract of the present estimate; concrete is the only item which shows a considerable increase, and the rate, Rupees 6-4-0 per 100 cubic feet, allowed for this in 1869 was certainly much too low for hydraulic concrete.

8. The difficulty and additional cost due to the non-commencement of the work of restoration immediately after the close of the north-east monsoon are much to be regretted. Very little had been done and no constructive work had been begun up to the beginning of April, whereas by that time at least the foundations should have been completed. Several reports of interruption to the work and damage to the ring bunds, &c., have been received, and the works were in considerable danger on each occasion, while the fresh of 8th, 9th

District Engineer's No. 45, 26th April 1878.

" " " 86, 18th May "

" " " 121, 10th June "

" " " 140, 27th " "

June, which rose to 3½ feet over the crest of the weir, left little of the temporary protective works except the front or upstream ring bund standing. The Supervisor in charge states that out of sixty days only seventeen days could constructive work be carried on.

Letter No. 81, 11th June 1878.

No report of any later fresh has been received though no doubt many small freshes have occurred since the 9th June, but not of sufficient magnitude to occasion much inconvenience; and it is hoped therefore that better progress has been lately made. The Vellaur is liable to frequent freshes after the middle or end of April, and as this is another ancient, the Shatiatope, lower down for which there are records for many years, its circumstances were readily ascertainable and much greater energy arranging for pushing the work forward during the dry months should have been shown.

9. Instructions have been sent to the District Engineer regarding making provision for the supervision of the work, and also with a view to the adoption, necessary, of special arrangements for preventing the river above the ancient rising to a dangerous level.

OOTACAMUND,
16th July 1878.

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation

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P.S.—Since the above was written the report of a fresh on the 8th July has been received. The extent of damage sustained is valued at Rupees 530, but the interruption to the work is of far greater importance.

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

To the Joint Secretary to Government, Public Works Department, Irrigation Branch.

FORM C.

ABSTRACT BY SUB-HEADS, PELANDORAI ANICUT SYSTEM.

Service.—Irrigation.

Fund.—Revenue.

Class.—I.B., Maintenance and Repairs.

Main-head.—(1) Head Works.

Sub-heads.	Names of Works.	Amount of Estimates for individual works.	Totals of Sub-heads.	Total of Estimate.
1	2	3	4	5
	Anicut.	RS.	RS.	RS.
C. Works	Restoring the breached portion	34,155	34,155	34,155
	Total	...	...	34,155

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

FORM C.

ABSTRACT BY SUB-HEADS, PELANDORAI ANICUT SYSTEM.

Service.—Irrigation.

Fund.—Capital Ordinary.

Class.—I. Works.

Main-head.—(1) Head Works.

Sub-heads.	Names of Works.	Amount of Estimates for individual works.	Totals of Sub-heads.	Total of Estimate.
1	2	3	4	5
	Anicut.	RS.	RS.	RS.
C. Works	Rough-stone apron, extending	2,820	2,820	2,820
	Total	...	...	2,820

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

No. 34. ORDER THEREON, 16th August 1878, No. 642 I.

THE estimate for the repair of the damage sustained by the Pelandorai Anicut in October 1877 is sanctioned, as also the estimate for extending the rough-stone apron from 6 to 30 feet in width: the former amounting to Rupees 34,155 will be chargeable to Revenue, Maintenance and Repairs, and the latter Rupees 2,820 to Capital.

2. The want of energy shown in preparing for the restoration of the anicut has already been noticed in the Proceedings as No. 2,079 W, dated 8th May 1878. per margin, and the result of the season's work will be awaited before saying more on this subject. It is clear that the repairs are still so backward as to occasion much apprehension of further damage.

3. Major Mead having returned to the district from leave will inspect and report on the present state of the anicut without delay, and also on the efficiency of the arrangements which he may find existing or which he may provide for securing steady and adequate progress during the time still required to render the work safe.

4. The sanctions above given have been registered as Nos. 112 and 113 I of 1878-79.

5. Ordered that a copy of these Proceedings be forwarded for the information of the Government of India with reference to the sanction given under Capital.

(True Extract.)

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

(True Copy.)

John Mullins
Major, R.E.,
Under Secy. to Govt., P.W.D.,
Irrigation Branch.

To the District Engineer, South Arcot.
" Collector of South Arcot.
" Chief Engineer for Irrigation.
" Examiner of Public Works Accounts.
" Revenue Department.

Exd. A. F. Goodall.

14 Spare Copies

Revenue Department

No 3735

IRRIGATION.
ACCOUNT.

Govt. of (1878) Madras.

PUBLIC WORKS.

✓
To
THE DISTRICT ENGINEER,
SOUTH ARCOT,
&c. &c. &c.

Dated Aug. 1878.

Issued

Recd. *2/26*

Encl.

G. O., 16th August 1878, No. 612 L.

AUGUST.

Nos. 33-34.

Sh. 2/11

Communicated to the
Board of Revenue *W*

27 Aug 1878

Palanderai Anicut, South Arcot. — The esti-
mate, for the repair of the — and that for
the extension of the steep apron, sanctioned
with remarks.

with order

11 State Engineering Revenue and Public Works