BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

IRRIGATION.
ACCOUNT.

Government {1898} of Madras.
PUBLIC WORKS.

Recd. } 1898. *Enclosures*
Regd. } *Spare copies*

G.O., No. 516 I., 7th July 1898.

JULY.

Lower Coleroon Anicut

Estimate of Rs. 3,87,000 for improvements to the —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

Read—the following papers:—

From Colonel A. W. SMART, R.E., Superintending Engineer on Special Duty, Tanjore, to the Chief Engineer for Irrigation, dated 14th April 1898, No. 380.

With reference to your No. 43 T.J., dated 2nd April 1898, I have the honour to forward the plans and estimates for improvements to the Lower Coleroon anicut Rs. 3,21,800.

2. The estimate already sanctioned in G.O., No. 535 I., dated 25th June 1896, should be merged in the estimate now submitted. One lift shutter has been already put up and another is being made in the Public Works Workshops at Madras. It was found by experiment at the shop that the sliding down shutter formed of steel beams was not stiff enough; its manufacture has therefore been abandoned.

Enclosure.

Lower Coleroon anicut proposed alterations.

	RS.
Amount of estimate	3,14,100

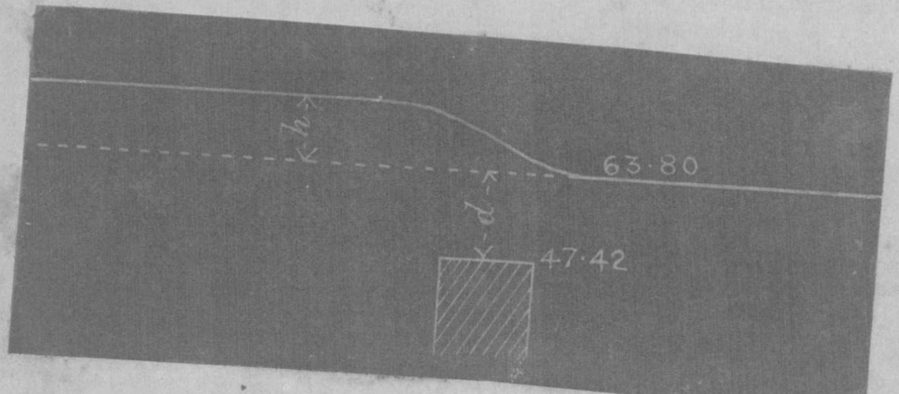
The estimate provides for re-building the Lower Coleroon anicut in the front of the bridge with a body wall 4 feet high and fitted with iron shutters 6 feet high of full width of bays of bridge.

It has been decided in Chief Engineer's No. V./111-S.A., dated 10th June 1896, that the anicut and bridge shall be made safe to carry a flood of 300,000 cubic feet per second; the discharge in the record flood of 1896 was about 250,000 cubic feet per second.

In G.O., No. 273 I., dated 21st March 1896, a protective front wall and apron was sanctioned. The work in the north branch has been completed and that in the south is in progress and should be completed by the end of the present working season. This together with the substitution of a solid wall in front 4 feet high and the removal of the anicuts in rear 8 and 7½ feet high will, it is believed, render the anicut absolutely safe against any flood it is likely to be exposed to.

The afflux in the 1896 flood which was very nearly of the same intensity as the record flood of 1858 was $\frac{\text{1·70 feet north branch.}}{\text{1·56 feet south branch.}}$

These measurements were made on the front gauges and rear gauges at apron level, but the real affluxes were, no doubt, greater as was found to be the case at the upper anicut by measurements made by levelling above and below. At the upper anicut, the afflux was measured to be 2·75; it was probably somewhat less than this at the lower anicut because of the less fall of river-bed, probably, however, not less than 2·25. With the new anicut the probable afflux may be thus calculated.



with crest level at 47·42 and tail water at 63·80.

$$D = \left[\tfrac{2}{3}\, c_1 \left\{ (h + h_a)^{\frac{3}{2}} - h_a^{\frac{3}{2}} \right\} + c_2\, d \sqrt{h + h_a}\right] \times \sqrt{2g}\ \angle$$

$$\text{with } c_1 = \cdot 66 = \tfrac{2}{3}$$

$$c_2 = \cdot 8 = \tfrac{4}{5}\ h = 1$$

$$\angle = 2{,}020$$

$$\frac{300{,}000}{2{,}020 \times 8} = \tfrac{4}{9}\left\{(h+1)^{\frac{3}{2}} - 1\right\} + \tfrac{4}{5} \times 16{\cdot}38 \sqrt{h+1}$$

$$19{\cdot}56 = \tfrac{4}{9}\, n^3 - 1 + 13{\cdot}104\, n \text{ when } n = \sqrt{h+1}$$

$$\text{by trial } n = 1{\cdot}4$$

$$\sqrt{h+1} = 1{\cdot}4$$

$$h = 1{\cdot}96 - 1 = \cdot 96 \text{ or very nearly 1 foot.}$$

The level of the tail water has been taken from Mr. Lobbs' levels and is a little over 3 feet above the level of the tail water of the flood of 1896, and as the discharge of this flood may be approximately taken at 250,000 cubic feet per second, an increase of 50,000 cubic feet per second will raise the flood level by something over 3 feet. According to Mr. Lobb the discharge of the flood of 1882 at lower anicut was 182,000, whereas Colonel Montgomerie gives the discharge at 212,000 cubic feet per second, by deduction, Mr. Lobb would have made the discharge of the 1896 flood about 212,000 cubic feet per second.

The 1896 flood was from 2 to 2½ feet above the 1882 flood at the lower anicut; the difference of level of the two floods at the Upper Cauvery dam was only ·8 feet.

2. The level of top of shutters is to be at 53·42 or 1½ feet above level of crest of north branch, and 2 feet above that of south branch. The higher level has been decided on in order to give a better supply to the Vadavar during small freshes.

3. A lump sum of Rs. 100 has been allowed for each set of under-sluices; it is proposed to raise the floors by 1 foot and to bring the level of top of shutters when down to 53·42 by attaching a plank to the top of each.

4. The work is to be carried out under the usual specifications of the department. It is proposed to use burnt stone on edge, pointed with cement for the new flooring close up to the anicut 8 feet wide for the overfall with an edging 3 feet wide at the outer margin with the intermediate space filled with cement concrete. The rate for the burnt stone work is Rs. 58 per 100 cubic feet, whereas rate for cement concrete is Rs. 48. If found advisable the whole floor might be made of cement concrete alone as the overfall is not very great. The cutstone of the old anicut and that lying about should be utilised to the fullest extent possible. This may be left to the Executive Engineer to look to when executing the work.

No. 190 I.

Note by the Chief Engineer for Irrigation.

In G.O., No. 150 I., dated 10th February 1896, general approval was accorded to Colonel Smart's proposals for improving the Lower Coleroon anicut and to render it safe with a flood of 300,000 cubic feet per second in the river.

2. The existing anicut is a bridged structure consisting of two branches, the north and the south. Each branch consists of 30 openings, each 33′-4″ wide and of 4 sets of under-sluices, each set having 2 vents of 6 feet wide. The body of the anicut

with removable shutt

itself is situated at the down stream side of the bridge. Colonel Smart's proposals were to cut down the solid body of the anicut by about half its existing height and to fit the lowered crest with removable shutters to be worked from the bridge. These, Colonel Smart proposed, should be made to slide down in front of the body wall as had been proposed by Colonel Drake-Brockman. It was also proposed that twelve of the arched openings should be fitted with Stoney's patent shutters to the full depth to floor level and also that the tops of the shutters throughout should be made one foot higher than the crest of the old work to enable an increased supply being sent down the Vadavar to supply the Veeranum tank.

Not available

3. A design of shutter for this anicut had been made by Mr. J. C. Larminie, Superintending Engineer, and an experimental shutter had been fitted. This design was found to have some defects and Colonel Smart in communication with the Superintendent of the Public Works Workshops, Mr. Moss, drew out two alternative designs, one for a shutter made to slide down in front of the anicut body and another to lift, and in G.O., No. 535 I., dated 25th June 1896, sanction was accorded to the construction of one shutter of each type. It was also decided at this time that instead of cutting down the existing anicut on the down stream side of the arches that it would be preferable to remove the old work altogether and construct a new dam of a height suited to the proposed shutters at the upstream edge of the arched openings. This was accordingly shown on the plans of these two types of shutter. On going into details and by experiment in the workshops, it was found that the sliding down shutter could not be made stiff enough and it was determined to adopt the other design for a lift shutter. One of these lift shutters has been made and fitted and another of the same pattern is being made in the workshops under the sanction conveyed in G.O., No. 535 I., dated 25th June 1896.

4. The estimate now submitted by Colonel Smart provides for fitting 6 feet lift shutters of this pattern to all the remaining 58 arched openings of the two branches of the anicut. It is now proposed to make the top of the shutters 1 foot higher than originally proposed, that is at level + 53·42, the crest of the new body being made at + 47·42. The height of the shutters will thus be 6 feet, the top being 1½ feet above the present level of the north branch and 2 feet above that of the south branch. As regards the under-sluices provision is made in the estimate for raising the floors by one foot and for adding to the height of the existing shutters to bring them up to the proposed level of + 53·42.

5. Colonel Smart submits calculations in support of his proposals; he calculates that with these shutters, the anicut should be able to pass a flood of 300,000 cubic feet per second with a difference of level above and below the work or afflux of about 1 foot. Colonel Smart provided in his estimate for the full number of 60 shutters intending the sanction of G.O., No. 535 I., dated 25th June 1896, for two shutters to be cancelled; it is thought better to keep the estimates distinct, so the provisions of this estimate have been reduced to 58 shutters. The amount of the estimate as corrected in this office is Rs. 3,87,000 and is recommended for sanction.

6. In G.O., No. 273 I., dated 21st March 1896, an estimate for protective work in front of the anicut, amounting to Rs. 1,25,000, was sanctioned. This work is expected to be completed at the end of the present working season. The total cost of the work required to be spent therefore on the Lower Coleroon anicut is Rs. 4,98,100 as shown in the margin. The amount is quite necessary to render the work safe. The total area irrigated under the Lower Coleroon anicut system during 1896–97 was 108,886 acres and the revenue derived therefrom Rs. 3,83,064. The actual return during the year was 33·79 per cent. on the capital outlay, the accumulated surplus revenue to the end of the year being Rs. 88,96,744.

	RS.
As sanctioned in G.O., No. 273 I., dated 21st March 1896 ...	1,01,400
As sanctioned in G.O., No. 535 I., dated 25th June 1896	9,700
As now proposed	3,87,000
Total ...	4,98,100

24th June 1898.

(Signed) W. HUGHES,
Chief Engineer for Irrigation.

Order—No. 516 I., dated 7th July 1898.

The following estimate is sanctioned :—

Irrigation.
43 Minor Works and Navigation.
Minor Works for which Capital and Revenue Accounts are kept.
Lower Coleroon Anicut System.
Capital Account.
1. Head Works.
3. Works.

Improvements to the anicut—

	RS.
I. Works	3,14,100
II. Establishment	72,243
III. Tools and plant	657
Total Estimate ...	3,87,000

2. This sanction is registered as No. 48 I. of 1898–99.

(True Extract.)

Under Secretary to Government,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, V Circle, with twelve enclosures.
„ „ „ on Special Duty, Tanjore.
„ Examiner, Public Works Accounts.

Exd. P. Seetharam,

removable she

A.

~~H.E. the Governor~~

~~The Hon'ble Sir H. Bliss, K.C.I.E.~~

~~Mr. Arundel, I.C.S.~~

PUBLIC WORKS

IRRIGATION

PROCEEDINGS OF THE MADRAS GOVERN

UNDER date the

Print with Expt

Estimates for improvements to the Lower Coleroon Anicut – Tanjore District –

READ

Flag. P.

Print

From the Supg. Engineer on Spl duty. Tanjore ——— } (Ht. No 380 d/ 14th Apr

Print

Note by the Chief Engineer for Irrigation ——— } (Ht. No 190 I d/ 2

No 516 I d/ 7.7.

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Issue

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provided in his estimate
for the full number of
60 shutters intending
the sanction of G.O. No 535. I
dated 25th June 1896 for

Flag G.

E. I. Form No. 1—500—14-5-95

two

Flag H.

as sanctioned in G.O. No 273. I. d/21. 3. 96	101,400
— do — G.O. No 535. I. dated 25. 6. 96	9,700
as now proposed	387,000
	4,98,100

two shutters to be cancelled – it is thought better to keep the estimates distinct, so the provisions of this estimate have been reduced to 58 shutters. The amount of the estimate as corrected in this office is 387,000 Rs and is recommended for sanction.

6. In G.O. No 273. I. dated 21st March 1896, an estimate for protective work in front of the anicut amounting to Rs 125,000 was sanctioned. This work is expected to be completed at the end of the present working season. The total cost of the work required to be spent then on the Lower Coleroon anicut is Rs 498,100 as shown in the margin. The amount is quite [illegible] to render the work [illegible]. The total area irri[illegible]ted under the Lower [illegible] anicut System during 1896–97 was [illegible]86 acres and the revenue derived therefrom Rs [illegible]064. The actual return during the year was 33.79 per cent on the Capital outlay, the accumulated surplus revenue to the end of the year being Rs 88,96,744

23/6/98

W.H.
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order

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E. I. Form No. 1—500—14-5-95

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as sanctioned in G.O. No 273.I. d/21.3.96	101,400
-do- G.O. No 535.I. dated 25.6.96	9700
as now proposed	387,000
	498,100

23/6/98.

W.H.
E.I.

order

Order thereon

The following Estimate is sanctioned:—

Irrigation

43. Minor works & Navigation

Minor Works for which ~~neither~~ Capital and Revenue accounts are kept.

Lower Coleroon Anicut System

Capital Account

1. Headworks.

3. Works.

Improvements to the anicut—

1. Works	Rs	3,14,100
II. Establishment	"	72,243
III. Tools & Plant		657
Total Estimate	Rs	3,87,000

2. This sanction is registered as No 48 I of 1898–99.

A.SH
24.6.98

27/6/98

28.6.98

28/6/98.

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WH

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To

The Chief Engr for Irrign
" Supg. Engr 5th Circle
in dup. with 12 Enclos
" Supg. Engr on Special duty. Tanjore
" Exr of P. W. Acct.

28/7/98

No 380

Office of Superintending Engineer
Cauvery completion Estimate
Tanjore Dated 14th April 1898.

From

Colonel. A. W. Smart R. E
Superintending Engineer
on Special duty, Tanjore.

To

The Chief Engineer
for Irrigation, Madras.

Sir,

Flag M. With reference to your No 43 T. I dated 2nd April 1898, I have the honour to forward the plans and estimates for improvements to the Lower Coleroon anicut Rs 3,21,800.

Flag G. 2. The estimate already Sanctioned in G. O. No 535. I dated 25 June 1896 Should be merged in the estimate now Submitted. One lift Shutter has been already put up and another is being made in the Public Works Work - Shops at Madras. It was found by experiment at the Shop that the Slidingdown Shutter formed

No. The large Sche may not be carried out for a long time formed of Steel beams was not Stiff enough; its manufacture has therefore been abandoned.

I have the honor to be,
Sir
your most obedient Servant

Col R E
Superintending Engineer
on Special duty

CHIEF ENGINEER FOR IRRIGATION.
18 APR. 1898
No. 473 J

Rev.r
5639/58

No 2

1

Lower Coleroon anicut proposed alterations

Amount of Estimate Rs. ~~3,21,800~~ 3,14,100.

The estimate provides for re-building the Lower Coleroon anicut in the front of the bridge with a body wall 4 ft high and fitted with iron Shutters 6 ft high of full width of bays of bridge.

+ sent to W with G. Is office Note No. 133 dt 15. 4. 98. ~~[illegible]~~ ~~[illegible]~~

[illegible] 19/4

It has been decided in Chief Engineer's No $\frac{V}{111\,S.A}$+ dated 10th June 1896 that the anicut and bridge Shall be made Safe to carry a flood of 300,000 cubic feet per Second, the discharge in the record flood of 1896 was about 250,000 cubic feet per Second.

Flag H.

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the Substitution of a Solid wall in front 4 ft high and the removal of the anicuts in rear 8 and 7½ ft high will, it is believed, render the anicut absolutely safe against any flood it is likely to be exposed to.

Old floor is +47.75' 4ft high wall makes crest +46.75 afflux

The afflux in the 1896 flood which was very nearly of the Same intensity as the record flood of 1858 was 1.70 ft North Branch

1.56 ft. South Branch.

These measurements were made on the front guages and rear guages at apron level, but the real affluxes were, no doubt, greater as was found to be the case at the Upper anicut by measurements made by levelling above and below. At the Upper anicut, the afflux was measured to be 2.75; it was probably somewhat less than this at the Lower anicut because of the less fall of river bed, probably, however, not

less

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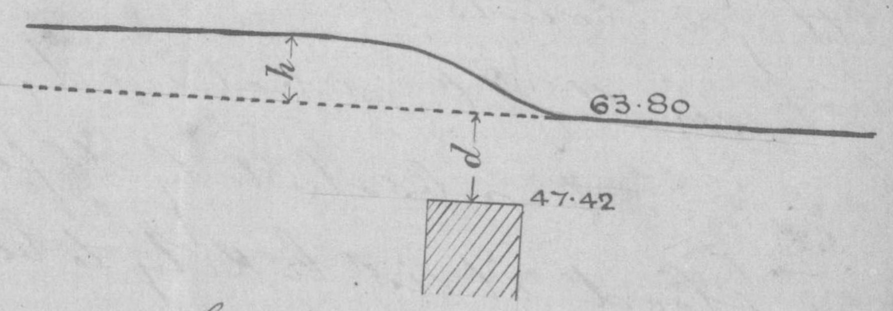
47.42 is new proposed fl



with crest level at 47.42 and tail water at 63.80.

$$D = \left[\frac{2}{3}c_1\left\{(h+h_a)^{\frac{3}{2}} - h_a^{\frac{3}{2}}\right\} + c_2 d\sqrt{h+h_a}\right] \times \sqrt{2g}L$$

with $c_1 = .66 = \frac{2}{3}$

$c_2 = .8 = \frac{4}{5} \;\|\; h_a = 1$

$L = 2020$

$$\frac{300,000}{2020 \times 8} = \frac{4}{9}\left\{(h+1)^{\frac{3}{2}} - 1\right\} + \frac{4}{5} \times 16.38\sqrt{h+1}$$

$19.56 = \frac{4}{9}n^3 \overset{-1}{\wedge} + 13.104n$ when $n = \sqrt{h+1}$

by trial $n = 1.4$

$\sqrt{h+1} = 1.4$

$h = 1.96 - 1 = .96$ or very nearly 1 ft.

The level of the tail water has been taken from Mr Lobbs' levels and is a little over 3 ft above the level of the tail water of the flood of 1896, and as the discharge of this flood may be approximately taken at 2,50,000 cubic feet per Second, an increase of 50,000 cubic feet per

Second

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The 1896 flood was from 2 to $2\frac{1}{2}$ ft above the 1882 flood, the difference of level of the two floods at the Lower anicut at the Upper Cauvery Dam was only .8 ft.

2. The level of top of Shutters is to be at 53.42, or $1\frac{1}{2}$ ft above level of crest of North Branch, and 2 ft above that of South Branch. The higher level has been decided on in order to give a better supply to the Vadavar during small freshes.

This is one foot higher than the shutters sanctd in G.O. No 535

3. A lump sum of Rs 100 has been allowed for each set of

104

of undersluices, it is proposed to raise the floors by 1 ft and to bring the level of top of Shutters when down to 53.42 by attaching a plank to the top of each.

4. The work is to be carried out under the usual Specifications of the Department. It is proposed to use burnt stone on edge, pointed with cement for the new flooring close up to the anicut 8 ft wide for the overfall with an edging 3 ft wide at the outer margin with the intermediate space filled with cement concrete. The rate for the burnt stone work is Rs 58 per 100 cubic feet whereas rate for cement concrete is Rs 48. If found advisable the whole floor might be made of cement concrete alone as the overfall is not very great. The cutstone of the old anicut and that lying about should be utilised to

to the fullest extent possible. This may be left to the Executive Engineer to look to when executing the work.

A. W. Smart Col R.E.
Superintending Engineer
on Special Duty
14.4.98.

CHIEF ENGINEER
FOR IRRIGATION.
18 APR. 1898
No. 479 J
5

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