

Public Works (1899) Department.

Equak

G.O., No. 1579

DATED 6 January 1898

10/1/98

[Despatch Abstract.]

*Machinery Estimate of Rs. 5,200 for
special - required for the Shakti to be Anicut
South Arcot Division Sanctioned.*

100/5

22/6.1.98

Estimate of Rs. 5,200 for special. — required for the Shatiatope anicut, South Arcot division, sanctioned.

No. 15 I., 6TH JANUARY 1898.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers:—

From Colonel C. C. RAWSON, R.E., Superintending Engineer, V Circle, to the Chief Engineer for Irrigation, dated Chepāk, 8th December 1897, No. 433 E.I.

I have the honour to forward, herewith, an estimate for a machinery consisting of 10 H.P. engine, 10" pump and steam mortar (or surki mill) for the Shatiatope anicut, which I request may be sanctioned.
The engine and pump belong to the Periyār stock and are in the Public Works workshops. The surki mill is similar to two which were obtained from Messrs. Burn & Co., Calcutta, for the Lower Anicut work and which have worked exceedingly well. The mill is made in India.

No. 298 I.

Note by the Chief Engineer for Irrigation.

The accompanying estimate for Rs. 5,200 submitted by the Superintending Engineer, V Circle, is for machinery required for carrying out the improvements to the Shatiatope anicut, which were sanctioned in G.O., No. 983 I., dated 5th November 1897. The estimate may be sanctioned.

17th December 1897.

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

ORDER—No. 15 I., dated 6th January 1898.
The following estimate is sanctioned:—

Irrigation.
43. Minor Works and Navigation.
Minor Works for which Capital and Revenue Accounts are kept.
Shatiatope Anicut System.
Open Capital Account.
3. Tools and Plant.
2. Plant and Machinery.
Special Machinery required for the Shatiatope Anicut, South Arcot Division.

Estimate	RS.
...	...
...	...
...	...
...	...
...	5,200

2. This sanction is registered as No. 146 I. of 1897-98, and will expire on the 31st March 1898.

(True Extract.)

Under Secretary to Government,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, V Circle, with one enclosure.
" Examiner, Public Works Accounts.

Ed. T. K. Narayana Aiyangar.

Public Works (1898) Department.

CURRENT No. 92

Order

From The Chief Eng for Irr

No. 298 I

Dated 17-12-97

Received 5.1.98

Enclosures 2

Spare copies

SUBJECT.

Shatiatope Anicut. Estimate
of Rs 5200 for machinery
required for carrying out
improvements to the - Note
recommending for sanction the

PROCEEDINGS OF THE
Statestake Circuit - Estimate of
Rs 520 for machinery required for
carrying out the works to the

Under date the

Read the following

From the Superg. Engineer, Fifth Circle, (142 No 433-2) dated 8.12.87
 Vaccination
 Account
 Note by the Chief Engineer for Surg.

The accompanying estimate for Rs. 5,200. submitted by the Superintending Engineer, Fifth Circle is for machinery required carrying out the improvements to ~~for the Shariatpore Ancient, the im-~~
~~provements of which were sanctioned~~
~~in G.O. No. 983. I dated 5th~~
November 1897, ~~and~~ ^{The estimate} may be sanctioned.

15 July 1968

Order thereon

The following estimate is prepared -

ed :-
 Irrigation.
 #3, Minor Works + Irrigation.
 Minor Works for which Capital and
 Revenue Accounts are kept.
 Shakti Ane Ancient System.
 Open Capital Account.

3 Folds

he said he would

MS 10-129

Issue

W.H

3-197

31/12/97

Ref. in Acc
30/12/97

3, Tools and plant.
2, Plant and Machinery.
Special machinery required for
the Shalatope Ancient, South
West division.

Estimate. Rs 5,200.

A. 47
22.12.97

2. This sanction is registered
as No. 1463 of 1897-98 & will
expire on the 31st March 98.

13/12
17.

W.H.
17.12.97

7.2.98

To The Chief Engineer for Irry.
- Supers. Engineer, Fifth Circle with 1 encl.
- Examiner, P.W. Accounts.

9.11.1897

Public Works (1897) Department.

CURRENT No. 62.5.2

Order

From The Supy Engineer
5 Encl.
433
No. 343 62.

Dated 8th December 1897.

Received 10 — 50 —

Enclosures /

Spare copies

SUBJECT.

Shalatope Ancient

Forwarding an Estimate
for Machinery consisting
of 10 Horse Power Engine
10" pump & Steam Motor
(or Surti Mill) for the
& requests that it may
be sanctioned

10/12/97

10/12/97

10/12/97

No

ETTY

V CIRCLE, MADRAS,

No. 433 *EW*

From

Colonel L. B. Rawson Rb
SUPERINTENDING ENGINEER,
V CIRCLE,

To

THE Chief Engineer
for Irrigation

SIR,

Enclosures.

Abstract-Est.

SIR,

I have the honour to forward herewith an estimate for a machinery consisting of 10 H.P. Engine, 10" pump and steam mortar (or Surki mill) for the Shatiatope anicut which I request may be sanctioned.

The engine and pump belong to the Periyar Stock and are in the Public Works Workshops, the Surki mill is similar to two which were obtained from Messrs Burn and Co. Calcutta for the Lower Ancient work and which have worked exceedingly well. The mill is made in India.

I have the honour to be
your most obed^t servant.

C. Lamm
 8/12/97
 Subtq: 8

coll 22

Suptg. Engineer 5th Grade

64-81292
600-31-3-97.

CHIEF ENGINEER
FOR IRRIGATION.
10 DEC. 1897
No. 622a

CHIEF ENGINEER
FOR IRRIGATION.
6-DEC. 1897
No. 616-J

IRRIGATION.
ACCOUNT.

Government {1897} of Madras.
PUBLIC WORKS

Recd.

Regd.

} 1897.

Enclosures

Spare copies

G.O., No. 983 I., 5th November 1897.

NOVEMBER.

Shatiatope Anicut

Estimate of Rs. 64,000 for improving the —, in South Arcot division, sanctioned.

No. 983 I., 5TH NOVEMBER 1897.

From A. H. GARRETT, Esq., Executive Engineer, South Arcot division, to the Superintending Engineer, V Circle, dated 18th September 1897, No. 665 S.E.

With reference to your No. 363 S.A., dated 8th September 1897, I have the honour to return the estimate for Shatiatope anicut, revised in accordance with the Chief Engineer's instructions.

2. In my report accompanying the estimate first submitted, I pointed out that the exact nature of the foundations was not known, and I think it very likely that in some places we shall find no block wall at all. It is, at any rate, quite certain that a revised estimate for the work will have to be submitted.

3. Taking up the existing stone floor gives us a lot of extra work, and it was on this account I did not allow for it. As it is, we have an enormous amount of work to get through in one season.

4. A proper specification cannot be made as we don't know till we have examined the foundation what work has to be done. I will, however, draw up the best specification I can, but think it advisable not to delay the estimate till this is ready.

5. I have given out on contract for the supply of 7 lakhs of bricks and 100,000 cubic feet of brick jelly, and have called for tenders for the well curbs.

6. I shall take care that all necessary arrangements are made to commence work in January.

No. 274 E.I.

Submitted to the Chief Engineer for Irrigation, with reference to his memo. Enclosures 7.

- 1 Tracing plan.
- 1 Report.
- 1 Data.
- 1 Detailed estimate.
- 1 Abstract estimate.
- 1 Complete specification.
- 1 Contract agreement.

No. 60 S.A., dated 4th September 1897.
The estimate has been revised in accordance with his instructions and is resubmitted for sanction.

The contract agreement for supply of 7 lakhs of bricks and 100,000 cubic feet of brick jelly is enclosed for information and return.

A complete specification is enclosed.

2nd October 1897.

(Signed) C. C. RAWSON, Col., R.E.,
Superintending Engineer, V Circle.

No. 226 I.

NOTE BY THE CHIEF ENGINEER FOR IRRIGATION.
Improvement of Shatiatope Anicut.

The Shatiatope anicut system is for its size the most remunerative of the works carried out by the British Government. The returns of the last three years are shown in the following table:—

Years.	Cultivation, 1st and 2nd crops.	Net revenue.	Capital.	Percentage net revenue on capital.
1894-95	ACS.	RS.	RS.	
1895-96	82,126	87,716	1,36,047	64.67
1896-97	82,987	88,193	1,37,579	64.10
	83,196	84,423	1,38,769	60.44

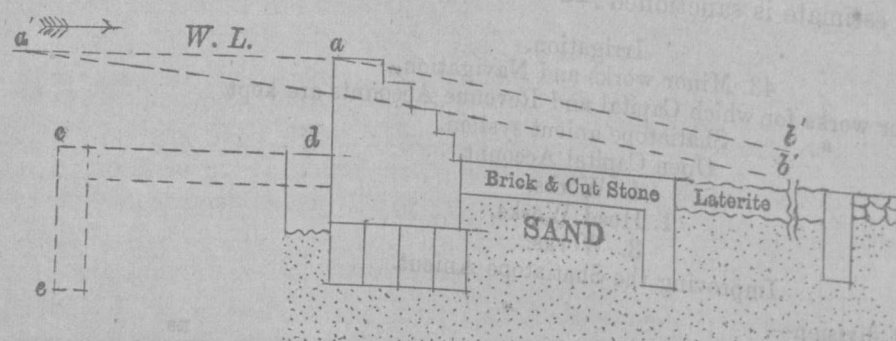
2. To make clear the reason of the present proposals for the improvement of the anicut, its history must be briefly referred to. The anicut was sanctioned in 1842, and built in 1847-48. Its length between abutments is 675 feet; the bridge over it consisted originally of 19 arches of 31 feet span (except the scouring sluice spans which are a little smaller), carrying a roadway 24 feet wide over parapets. The sixth span from each end contains a set of three scouring sluices. According to the description given in the "professional papers of the Royal Engineers" the body wall was designed with a good front batter and vertical drop of 9 feet in rear on to a dressed stone apron 16 feet wide beyond which there was to be a loose block apron. The section given in "Foord's notes," which must have been published after the work was built, shows the stone apron 25 feet wide, the top width of body 4 feet and the base 11 feet. The foundations of the body wall are shown as 5 feet of solid work on wells 4½ feet deep retaining wall foundations of the same depth and an apron 3 feet thick. It has, however, been recently reported that the apron is actually only 2 feet.

3. The foundations were designed after the model of the Coleroon anicuts, it being assumed that the material of the river bed and the general conditions of the site were as favourable as in the case of those anicuts. This was altogether a mistake, as the velocity and depth of the Vellar at Shatiatope are one and-a-half times as great as those of the Cauvery at the Upper anicut, while at the lower anicut the bridge is on the upper side of the anicut and the bridge flooring forms a front apron to the anicut and prevents scour. The river also approaches the Shatiatope anicut obliquely and tends to scour holes in front of the work. It was also a mistake to provide only 25 feet of solid apron for an anicut 9 feet high with a flood depth of 10 feet on crest and an afflux of 4 or 5 feet. The anicut appears to have been completed to the section given in "Foord's notes," and at some subsequent time of which there is no record, the body wall was removed and built on a somewhat broader base with a vertical face and steps 4 wide and 2½ feet high in rear. At the same time probably a solid flooring 6 feet wide was put in, at level 9 feet below crest, in front of the anicut. The depth and nature of foundation of this apron are not known, but it is presumed to extend at least as deep as the anicut foundation. It is only subsequent to 1869 that there is any regular record of work on the anicut. In that year the second apron was of rough laterite in mortar and beyond it there was an apron of loose stone. The floods of 1869 tore up the intermediate apron in many places and carried away most of the outer apron, and an estimate was sanctioned for repairs and for rebuilding the third apron in concrete and supporting its outer edge by a shallow retaining wall. In 1871, a large hole was scoured out of the front apron; in 1872, the second and third rear aprons were again greatly damaged; in 1877, more damage was sustained by the aprons, and in fact from 1870 to 1880, they were almost constantly being repaired or strengthened, the total expenditure incurred being about Rs. 43,000. In 1880, the Chief Engineer for Irrigation found the work in an unsafe state, and ordered the preparation of an estimate for a retaining wall 94½ feet from the anicut and for filling between it and the existing masonry apron with laterite in mortar on concrete. The estimate, amounting to Rs. 51,350, was sanctioned in G.O., No. 755 I., dated 23rd November 1880, and appears to have been fully carried out between 1881 and 1883. On the 7th May 1885, the Executive Engineer (Mr. Larminie) reported the existence of a dangerous leak right under the anicut, and on the 21st May he reported that, during a sudden flood in the river, the 15th to 18th spans of the bridge had fallen and the anicut under them had sunk and was in ruins. The estimate of Rs. 23,300 sanctioned in G.O., No. 198 I., dated 25th February 1886, provided for rebuilding the breached portion of the work and putting in a curtain wall in front of it on wells sunk 15 feet below the river bed, but when the Chief Engineer inspected the work in 1888, he found that a leak had appeared under the new work in much the same position as that which caused the destruction of the old. This was attributed to part of the new work having unavoidably been built on debris, but operations undertaken with a view to stop the leak though not quite successful were believed to have rendered it harmless. It was decided for greater security to carry the roadway over the 15th to 18th spans on girders instead of arches and to cut back the face of the bridge 8 feet in order to reduce the afflux.

4. Since then, the anicut has not given much trouble until lately when not only have some leaks been observed which pass a large volume of water, but a great many smaller leaks in various places.

The leakage varies a good deal from time to time and attempts have been made to stop it where it seemed most dangerous, but without much effect. The plan, dated 30th July 1897, shows the position of leaks at that time and the places where it is charged by some of the leaks at the time of the undersigned's inspection indicated that the leakage was not mere filtration which could do no harm as long as the velocity of the issuing water was too low to move material from under the masonry. It rather indicated that in places channels had been formed under the work and that, unless the passage of water through these can be stopped, the anicut must be destroyed in a short time. Whether the remedy will not come too late next year cannot be said with confidence.

5. As the estimate is only approximate and may have to be largely departed from when the river bed is laid bare and its material ascertained, it will be as well to state, for the guidance of the officers who have to carry out the work, the principles on which the proposals embodied in the estimate are based so that if facts do not quite correspond with the assumed data, there may be no difficulty in knowing what modifications should be made. The marginal sketch roughly represents the form of the anicut. If the material under the work is sand, and water passes through it only by filtration the ordinates of the dotted inclined line *a.b.*, represent the upward pressures, and so long as these are so low where water issues from under the work that the velocity due to them is insufficient to move any material no harm can result. Subject to this limit and to the necessity of making the aprons for a sufficient distance from the work capable of resisting the scour during floods, it is a mistake to extend the solid aprons very far and further seal up the water by retaining walls as this raises the line of pressures, and unless the apron is heavily and strongly built it is liable to blow up. This is actually what has to some extent occurred at the Shatiatope anicut. Most of the small leaks are due not to scour from above but to pressure from below. The pressure may be reduced by putting in a front apron as only lengthen the course which the water must take, but also prevent undermining of the flooring and the formation of "channels." The rear apron need then be only made strong and solid enough to bear the impact of the water and the eddying and scouring action in floods which, in the case under consideration, probably does not extend to above 50 feet to 60 feet from the anicut. The leaks in the rear part of the apron near the retaining wall will not in the least matter, in fact they will be safety valves. The case is more difficult and uncertain in dealing with the parts of the anicut under which "channels" have formed. The foundations of the front curtain wall must be sunk well below the depth of possible scour and at the same time below whatever mud or debris there may be, and the stuff between the curtain wall and the anicut taken out, unless it happens to be good clean sand, to as great a depth as can be done without risk of undermining the old work. This excavation as also the excavation elsewhere will be filled with pure clean sand, than which there is nothing more satisfactory to build on, as long as it can be kept in place. It is insoluble and



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incompressible and if the flooring be well bedded on it, channels are most unlikely to form. The filling must be prevented passing through the space between the wells by sheet piling on the inner side.

The first apron in rear is reported to be only 2 feet thick which is not enough. Leaks have shown themselves and must be completely stopped. It is proposed to remove the stone covering, repair any parts of the work below, which may be found defective, raise the apron with concrete and relay the stone flooring on this.

Such are the principal features of the work in contemplation. The front curtain wall is shown at a good distance from the anicut in order to get clear of any stone or debris there may be, and also to avoid undermining existing work. The extra width of flooring due to this is not a heavy item. If it is found that the wall can be put in safely and conveniently nearer the anicut, this may be done. The second apron will be repaired and any bad parts rebuilt as found necessary on examination. The estimate is recommended for very early sanction. Orders for the preparation of materials have been given in anticipation.

CHEPAUK,
22nd October 1897.

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

ORDER—No. 983 I., dated 5th November 1897.

The following estimate is sanctioned:—

Irrigation.
43. Minor works and Navigation.
Minor works for which Capital and Revenue Accounts are kept.
Shatiatope anicut system.
Open Capital Account.
I. Works.
1. Head Works.
3. Works.
Improving the Shatiatope Anicut.

South Arcot division—

	Rs.
I. Works	52,000
II. Establishment	11,960
III. Tools and plant	40
Total	64,000

2. This sanction is registered as No. 111 I. of 1897-98, and will expire on the 31st March 1899.

(True Extract.)

(Signed) W. HUGHES,
Joint Secy. to Government,
Irrigation Branch.

To the Chief Engineer for Irrigation.
" Superintending Engineer, V Circle, with nine enclosures.
" Examiner, Public Works Accounts.

Exd. Shaik Karim.