Public Works (1897) Department.

Brit Guiana

G.O., No. 299-302

Dated 22. March 1897

[Despatch Abstract.]

Upper Coleroon Anicut. Approving the estimate of Rs. 657,000 for the improvement of the Cauvery delta System and directing that the Govt of India be requested to sanction the estimate at an early date.

Upper Coleroon Anicut. Forwarding Pros: requesting sanction to an estimate of Rs. 6,57,000 for the improvement of the —, Cauvery delta System.

Indexed 22/3/97

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 {1897} of Madras.

PUBLIC WORKS.

Recd. } 1897. *Enclosures*

Regd. } *Spare copies*

G.O., Nos. 299, 300 I., 22nd March 1897.

MARCH.

Upper Coleroon Anicut

Forwarding Proceedings requesting sanction to an estimate of Rs. 6,57,000 for the improvement of the —, Cauvery Delta System.

that the work cannot be done for the rates allowed. The workshop charges for irrigation work are the bare cost of materials and labour. If the shutters were made elsewhere the cost would be at least Rs. 75,000 more than now estimated.

8. It is most desirable that the estimate should be sanctioned without delay, in order that arrangements may be made in good time for starting the work in December next.

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

3rd March 1897.

ORDER—No. 299 I., dated 22nd March 1897.

The estimate, amounting to Rs. 6,57,000,* for the improvement of the Upper Coleroon anicut, is approved.

	RS.
*Works	5,34,000
Establishment	1,22,820
Tools and Plant	180
Total ...	6,57,000

2. The Government considers that the work should be classed as remunerative under rule II (ii), paragraph 35, chapter V, Volume II, Public Works Department Code. The work could probably be completed in three years if adequate funds are assigned by the Government of India.

3. Ordered that a copy of these Proceedings, together with the plans and estimate for the proposed improvement, be forwarded to the Government of India with a request that sanction thereto may be communicated, at an early date, under "49. Capital Expenditure not charged to Revenue," Cauvery Delta System, Open Capital Account.

In anticipation of sanction, provision has been made for the work in the budget of 1897-98.

[Here enter No. 300 I., dated 22nd March 1897.]

(True Extract.)

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

To the Chief Engineer for Irrigation.
" Superintending Engineer on Special Duty, Cauvery Completion Estimates.
" Superintending Engineer, V Circle.
" Examiner, Public Works Accounts.

ENDORSEMENT—No. 300 I., dated 22nd March 1897.

Forwarded.

(By order.)

Joint Secy. to Government,
Irrigation Branch.

Exd. Narayana Aiyangar.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers :—

From Lieutenant-Colonel A. W. SMART, R.E., Superintending Engineer on Special Duty, to the Chief Engineer for Irrigation, dated Tanjore, 28th January 1897, No. 88.

I have the honour to submit plans and estimate (Rs. 5,34,000) for the proposed new work at the Upper Coleroon anicut as determined on in consultation with the Inspector-General of Irrigation and yourself. The masonry work estimate has come to less than I expected, but the iron gates more by Rs. 1,000 per gate.

ENCLOSURES.

REPORT to accompany estimate for remodelling Upper Coleroon anicut.

	RS.
Amount of estimate	5,34,000

The estimate provides for converting the present anicut or solid weir into an open regulator fitted with moveable gates.

The conversion is desirable on three accounts—

(1) To reduce the amount of sand now being forced down the Cauvery branch and to make the two rivers take a fairly equal share of the sand burden.

(2) To increase the flood discharge of the Coleroon and to decrease that of the Cauvery. At present in floods of over 11½ feet on the Cauvery dam gauge, there is very considerable spill into the Coleroon over banks and cultivated land, and much damage is caused thereby.

(3) To raise the crest level of the present weir by 2 feet to allow of an increase of supply in the Cauvery during low freshes.

2. In the flood of July-August 1896, the north gauge of the Cauvery dam on August 1st read 14 feet, which is the hitherto maximum and was slightly over the great flood of 1858.

By Major Montgomorie's calculation (*vide* G.O., No. 363 I., dated 9th June 1881) the discharge of such a flood is—

Cauvery	152,000 cubic feet per second
Coleroon	161,000 " "

Of the 152,000 cubic feet per second in the Cauvery, only 102,176 reached the Grand anicut—

Discharge over Grand anicut	62,226
Do. Cauvery	26,450
Do. Vennar	13,500
Total ...	102,176

This leaves 49,824 cubic feet per second spill into the Coleroon by breaches and over road between the two rivers. An approximate calculation made by measuring the lengths of breaches gave a discharge of 64,000 cubic feet per second. The afflux measured just after the flood at the south branch of the Upper Coleroon anicut was 2·47 feet. It is anticipated that with an open regulator the afflux in a similar flood would not be over one foot, in which case the discharges would be—

Cauvery	119,300 cubic feet per second.
Coleroon	193,700 " "

or the Cauvery will take 32,700 cubic feet less than it did on the 1st August. This would still leave a spill of (48,824 — 32,700) = 16,124 cubic feet per second to be passed into the Coleroon above the Grand anicut. As this spill is small compared to the spill in the great flood, the question of how the excess is to be provided for, whether by a road dam or otherwise, may be well left for future consideration, and after the effect of the new proposed regulator has been definitely ascertained.

3. It is also quite possible that at some future time, the local authorities will desire to bridge the Cauvery branch, when complete control will be obtained if the bridge is built as a regulator. The Cauvery below is in no danger with 11½ feet on the north gauge, as the surplus reaches the Grand anicut without spill, and the excess there is passed into the Coleroon over the anicut. The Coleroon takes all excess either by spill or at the Grand anicut or by breaches in the Cauvery below, so that the construction of the new regulator does not affect the question of the flood discharge of that river, which remains the same as before and which there is no means of mitigating, save by improvements in the river itself. This is a separate question which is being separately dealt with.

4. The top of the gates when down will be two feet higher than the crest level of the present anicut. At the present level the Cauvery supply is slightly over 6 feet, before the anicut begins to spill, and 6½ feet has been hitherto regarded as the full supply of the Cauvery, though it is often of great advantage to get more than this. As remarked by Major Montgomerie in paragraph 69 of his report, the land under the Cauvery is not really well supplied till the rivers are in good fresh. As the greater number of the minor channels are taken off the rivers direct without weirs, as they are considerably silted at their heads, and as much of the land is on a high level, a greater depth is required in the rivers than would otherwise be the case. The raising, therefore, of the supply level in small freshes, when there is water available (and the returns show a very large surplus not required lower down) is of great importance. With 8 feet on the Cauvery gauge, the discharge of the Cauvery will be 40,000 cubic feet per second.

Another advantage of increasing the supply will be that the under-sluices of the Grand anicut can be worked longer and oftener than is possible at present, and the Lower Coleroon system can also be supplied from here when required rather than from the upper anicut. It will also be possible by fitting gates to some of the bays of the 150 yards calingulah, 3 miles below the head, to make use of that work to discharge sand into the Coleroon during low freshes more effectively than is possible at present.

5. The new work designed is a regulator of 55 bays (45 south branch, 10 north branch) of 40 feet to be built close in front of the existing anicut. The gates, a single one for each span, are of the same pattern as those now being made for the Pelandorai anicut, fitted with rollers and disc roller bearings. The rollers are to be bushed with delta metal, and the pins and disc rollers are to be of that metal which is incorrosible. The gates are described in a separate report attached.

6. The rates allowed in the estimate for the masonry work are slightly in excess of the ordinary rates of the division and with good management, it is possible that there will be a saving on some of the items.

Specification.

It may be said, generally, that the work is to be carried out in accordance with the standard specifications of the department and only special points are here dealt with.

The first thing to be done, after the sand and stones in front have been removed, is to sink, in convenient sections, the front row of wells to the depth allowed as rapidly as possible in order to obviate all chance of sand being drawn from below the old work. If found necessary, the wells may be weighted with iron rails or otherwise. The wooden piles in front should, then, be driven to close the interpaces and the sand between wells should be scraped out to a depth of three feet and the interstices filled with cement concrete. A trial may be made to sink the wells by using the centrifugal pumps which will be required for the work. One pump may be used to pump out sand and water, whilst another pumps in water free from sand. A jet hose should be provided for the latter, so that the jets of water may be guided round the edges of the curb on the inside. The retaining wall should, then, be built. In this way, with the new work in front and the old work behind, a sort of coffer dam will be formed from which there should be no difficulty in pumping out the water, in order to allow of the foundations of piers and abutments being got in.

After the foundations of the piers, abutments and wings have reached the level of the foundation plates of the frame work carrying the roller path of shutters and uprights, the floor should be built and the sill beam fixed.

The last layer of floor of 6 inches cement concrete should be put down at the same time, as the last layer of the ordinary concrete below, so as to ensure perfect union.

There is no reason why work should not be commenced from each end of each branch of the new work at the same time, but each section should be fully completed before the next is begun. It would be advisable, if possible, however, to get the whole of the wells down in one season.

2. After the work has been completed to floor level and the upright framing of the shutters fixed (probably in the second year's work), the 40 feet spans between piers and abutments should be marked with absolute accuracy; otherwise the shutters may not be found to fit accurately afterwards. Great care must be observed in fixing and keeping the roller paths upright absolutely vertical.

3. The superstructure consists of ordinary platform bricks of full size with a facing of table-moulded bricks in surki mortar. The noses of the cutwaters are to be protected by a casing of cutstone.

4. The arches, 40 feet span, of five centres are to be built of table-moulded bricks in surki mortar on wooden centrings, supported on brick pillars with sand boxes between to allow of the lowering of centres after the completion of the arches. The centres should be lowered ¼ inch, just after the key stones have been fixed. The spandril spaces should then be filled in and the centres fully lowered, a week or ten days after completion.

5. The face walls and blocking course may then be built, leaving the parapets to be built after the monsoon following. A temporary bamboo railing may be put up, if required, to take the place of the parapets.

6. In the last year of work, when the superstructure has been completed and the gates have been fixed in position, the old bridge and anicut may be demolished in as large blocks as convenient, and the debris thrown in to widen the rear rough stone apron.

REPORT to accompany plan and estimate for lift shutters for Cauvery Upper anicut.

The Upper anicut will be fitted with 55 lift shutters, each 40 feet wide and 6 feet deep.

As will be seen from the drawings the construction and arrangement of these shutters is very similar to those now under construction for the Palandorai anicut, the only difference being that these are larger and heavier.

The shutters are constructed as shown of ⅜ inch plate backed by vertical channel irons which are supported by two bowstring girders.

These girders are so placed as to each receive an equal share of the pressure on the shutter.

Each end of each girder is carried by two cast-iron wheels 7 inches wide in a cast-iron carriage. This arrangement ensures each wheel always carrying its fair share of the pressure, notwithstanding any irregularities or small obstructions on the wheel path.

The wheels will be fitted with disc-roller bearings of delta metal No. 1. The resistance due to friction will be very slight and all trouble from rust will be avoided.

By the use of disc-roller bearings in the wheels and in the sprocket wheels of the gearing above the labour of working the shutters will be so far reduced that each shutter will be well within the power of one man to handle under any circumstances.

The wheels run on a planed cast-iron wheel path which rests on a foundation plate bedded in the concrete of the floor and which serves also as one of the supports of the platform above. A Z iron at each end of the shutter butts with a slight clearance (sufficient to allow of expansion and contraction) against the side of a vertical channel iron 12″ × 3¼″ × ½″ and prevents side play.

The planed cast-iron sill on which the shutter rests when down is also bolted at its ends to this vertical channel iron which also forms one of the guides of the counterweight.

Another channel iron spaced 3 feet from the abovementioned one forms the other guide for the counterweight and also another of the supports of the platform. The two rolled beams carrying the platform rest on top of this channel iron and on top of the wheel paths.

Both these channel irons rest on, and are attached to, the foundation plate carrying the wheel path.

The vertical channels and wheel path are all connected at intervals by a bracing of flat bars.

The counterweight is formed of 4-inch slabs of cast-iron. It is connected to the shutter by strong gear chains of steel, passing over sprocket wheels as shown. The upper of these sprocket wheels are connected by a 3½-inch steel shaft driven in the middle by a treble-geared crab on the platform.

The Z irons on the shutter face box in thin vertical plates which are sprung so as to fit tight against the vertical channels and stop all leakage.

No. 62 I.

Note by the Chief Engineer for Irrigation on the proposed improvement of the Upper (Coleroon) Anicut.

The Agunda Cauvery divides at the head of Seringham Island into the Cauvery and Coleroon across the latter of which the Upper anicut is built. The anicut is in two branches separated by an island 660 feet broad. The south branch has a length between abutments of 2,063½ feet and an effective length of sluices and dam of 1,736 feet. The north branch is 464 feet long with an effective length of 393½. The height of the south branch is about 6 feet and of the north branch 7 feet, but the crest level of the two is nearly the same, that of the north branch being slightly the higher. One of the first effects of the anicut was to scour the bed and banks of the Cauvery. To check this, the Cauvery dam was built in 1845. The centre part, 1,650 feet in length, is 6·0 feet below the average level of the south branch of the anicut and at either end there are steps 1 foot and 2 feet in height and 75 feet in length, making the total length 1,950 feet. There is unfortunately no section to show what the average level of the Cauvery bed was when the dam was built, but the presumption is that it is

slowly rising. The present level which varies somewhat from year to year is about 3 feet above the dam, while the Coleroon bed above the anicut is silted nearly to the level of the crest.

2. A depth of half a foot on the anicut gives a discharge more than sufficient for the lower Coleroon irrigation so that when there is over 6½ feet on the Cauvery dam gauge, water goes waste to the sea. This depth does not now give a sufficient supply to the Tanjore delta where the irrigation has greatly extended since the anicut was built. In the best of seasons the supply varies much in short periods and when the river is in fresh more than the average supply is required to make up for previous deficiency. There are besides some parts of the delta where the lands cannot be supplied unless there is a fair amount of water in the rivers.

3. The recent large increase in the assessment of the delta has given the ryots a claim to expect that there shall be no further delay in doing what is possible to improve the irrigation. The subject has been under consideration for long past, but was not thoroughly gone into until Lieut.-Colonel Smart was put on special duty for the purpose. It was obvious that the cheap expedient of raising the anicut would make matters worse than at present by increasing in height and volume the Cauvery floods, already so destructive and difficult to deal with, and in a short time would have the effect of raising the river beds until the supply in low freshes became no better than now. It remained to face the expenditure of substituting for the anicut a regulator which would not only enable a better supply to be forced into the Cauvery but also check the rise of its bed, while at the same time lowering the flood level.

4. Colonel Smart bases some of his calculations on Major Montgomerie's figures, but these were made on necessarily very imperfect data and the results can only be accepted as approximately correct. It is impossible to measure the discharge of such a river as the Cauvery in flood. What is especially to be noted is that in the flood of July 1896 the difference in level of the two rivers at half a mile below the anicut was about 2 feet. The effect of the proposed works will be to make the level in both nearly the same, the Cauvery being about a foot less and the Coleroon perhaps 8 inches higher than then. The effect of 1 foot reduction in the level of the Cauvery, that is from 14 to 13 feet on the gauge and 11 to 10 feet in average depth, would be to reduce the discharge about 15 per cent. We know the effect of a 13 feet flood as there have been several. It will do no harm down to some distance below Trichinopoly unless there is local drainage as well, and below Trichinopoly the only harm it will do if the banks are properly maintained, is that due to spill over the road on the left bank. The construction of the regulator at the Grand anicut, and closure of the upper part of the Vennár which used to take 22 per cent. of the flood water, has rather increased this spill, but it cannot be helped. The District Board cannot be allowed to raise the road, but the spill may be made comparatively harmless by the construction of a retaining wall with narrow apron where spill is likely to occur.

5. The design of the work except some details of little importance has been settled in consultation with the Inspector-General of Irrigation. The only novel part of the work is the shutters. A good pattern of lift shutter at moderate price has long been a desideratum and it is believed that Colonel Smart has solved the problem. Shutters of the same pattern are about to be fitted on other anicuts and it will be known before the Upper anicut work is put in hand whether they answer the expectations formed of them.

6. The estimate provides well foundations, but these will only be built when solid foundation cannot be got in without great expense. Provision is made for a bridge of 9½ feet roadway. It can be widened afterwards, if the district board should wish to do so, at little expense. It would probably be found impossible with arches so flat as those shown in the plans to remove the centerings very soon after completion, and as it would be too expensive to provide centerings for a very large number of arches, it will be better to build circular arches of 9 feet rise. The difference in cost being a mere trifle, the estimate has not been altered.

7. With reference to the rates allowed for the shutter work, it may be explained that the estimate has been carefully framed by the Superintendent of the Madras Workshops on the ascertained cost of similar shutters, and there is no reason to think

C.E.I.
9-3-97.

Public Works (1897) Department.

CURRENT No. ~~10. I.J.~~ 2932

2993/97

Order

From Lt. Col. A.W. Smart R.E.
Superintending Engineer
on spl. duty

No. 88

Dated 28th January 1897.
Received ~~30-1-97~~ 20-3-97
Enclosures ~~10~~ 14 (3) 12 Cards
Spare copies

SUBJECT.

Upper Coleroon anicut

Submits for sanction an estimate for Rs 534000, for remodelling the

D.E.I

30.1.97

BACK PAPERS.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

40	150 I	10	2	96	✓
40	480 W	1	3	95	✓
40	364 I	9	6	81	✓

Office of the Superintending Engineer
Cauvery Completion Estimates.
Tanjore dated 28th January 1897.
Despt. 29th.

No 88 18

From.

Lt. Col. A. W. Smart R.E.

Superintending Engineer on Spl duty

Tanjore.

To

The Chief Engineer
for Irrigation
Madras.

Sir,

Enclosures 10.

1. Tracing of North Branch.
2. Do. South Branch
3. Do of. Shutter plan.
4. Estt. report &c for Shutter in 6 sheets.
5. Do. for north branch in 4 sheets
6. Do. for South branch in 4 sheets
7. Combined abstract for both in one sheet.
8. one general report in 4 sheets.
9. one specification in 3 sheets
10. Data list in 3 sheets.

I have the honour to submit plans and estimate (Rs 5,34,000) for the proposed new work at the Upper Coleroon anicut as determined on in Consultation with the Inspector General of Irrigation and yourself. The Masonry work estimate has come to less than I expected, but the iron gates more by Rs 1000 per gate.

I have the honour to be,

Sir,

Your most obedient Servant

Lt Col RE
Superintending Engineer
on Special duty

CHIEF ENGINEER
FOR IRRIGATION
29 JAN 97
No. 10 J.

en 14
P-W 29 3/32 1897

J.S.P

Report to accompany estimate for remodelling Upper Coleroon anicut.

Amount of estimate Rs 5,34,000.

The estimate provides for convert-ing the present anicut or solid weir into an open regulator fitted with moveable gates.

The conversion is desirable on three accounts:—

1) To reduce the amount of sand now being forced down the Cauvery branch and to make the two rivers take a fairly equal share of the sand burden.

2) To increase the flood discharge of the Coleroon and to decrease that of the Cauvery. At present in floods of over 11½ feet on the Cauvery Dam gauge, there is very considerable spill into the Coleroon over banks and cultivated land, and much damage is caused thereby.

3) To raise the crest level of the

the present weir by 2 feet to allow of an increase of supply in the Cauvery during low freshes.

2. In the flood of July-August 1896, the North guage of the Cauvery Dam on August 1st read 14 feet which is the hitherto maximum and was slightly over the great flood of 1858.

By Major. Montgomories Cal-culation (vide G.O No 363 I dated 9th June 1881) the discharge of such a flood is—

Cauvery 152,000 cubic feet per second
Coleroon 161,000. Do

Of the 152,000 cubic feet per second in the Cauvery only 102,176 reached the Grand anicut.

Discharge over Grand anicut 62,226
Do Cauvery 26,450
Do Vennar 13,500
Total 102,176

This leaves 49,824 cubic feet per second Spill into the Coleroon by breaches and over road between the

29 S.B

the two rivers. An approximate calculation made by measuring the lengths of breaches gave a discharge of 64,000 cubic feet per second. The afflux measured just after the flood at the South branch of the Upper Coleroon anicut was 2.47 feet. It is anticipated that with an open regulator the afflux in a similar flood would not be over one foot, in which case the discharges would be:—

Cauvery 119,300 Cubic feet per second
Coleroon 193,700 do — do —

or the Cauvery will take 32,700 cubic feet less than it did on the 1st August. This would still leave a Spill of (48,824-32,700) 16,124 cubic feet per second to be passed into the Coleroon above the Grand Anicut. As this Spill is small Compared to the Spill in the great flood, the question of how the excess is to be provided for, whether by a road dam or otherwise, may be well left for future consideration, and after the effect of the new proposed regulator has been definitely

definitely ascertained.

3. It is also quite possible that at some future time, the Local authorities will desire to bridge the Cauvery branch, when complete control will be obtained if the bridge is built as a regulator. The Cauvery below is in no danger with 11½ feet on the North gnage, as the surplus reaches the Grand Anicut without spill, and the excess there is passed into the Coleroon over the anicut. The Coleroon takes all excess either by spill or at the Grand anicut or by breaches in the Cauvery below, so that the construction of the new regulator does not affect the question of the flood discharge of that river, which remains the same as before and which there is no means of mitigating, save by improvements in the river itself. This is a separate question which is being separately dealt with.

4. The top of the gates when down will be 2 feet higher than the crest level

V&S&

level of the present anicut. At the present level the Cauvery supply is slightly over 6 feet, before the anicut begins to spill, and 6½ feet has been hitherto regarded as the full supply of the Cauvery, though it is often of great advantage to get more than this. As remarked by Major Montgomerie in para 69 of his report, the land under the Cauvery is not really well supplied till the rivers are in good fresh. As the greater number of the minor channels are taken off the rivers direct without weirs, as they are considerably silted at their heads, and as much of the land is on a high level, a greater depth is required in the rivers than would otherwise be the case. The raising, therefore, of the supply level in small freshes, when there is water available (and the returns shew a very large surplus not required lower down), is of great importance. With 8 feet on the Cauvery gnage

gauge, the discharge of the Cauvery will be 40,000 cubic feet per second.

Another advantage of increasing the supply will be that the under Sluices of the Grand anicut can be worked longer and oftener than is possible at present, and the Lower Coleroon System can also be supplied from here when required, rather than from the Upper Anicut. It will also be possible by fitting gates to some of the bays of the 150 yards Calingulah, 3 miles below the head, to make use of that work to discharge sand into the Coleroon during low freshes more effectively than is possible at present.

5. The new work designed is a regulator of 55 bays (45 South Branch, 10 North Branch) of 40 feet to be built close in front of the existing anicut. The gates, a single one for each span are of the same pattern as those now being made for the Pelandorai anicut, fitted

fitted with rollers and disc roller bearings. The rollers are to be bushed with delta metal, and the pins and disc rollers are to be of that metal which is incorrosible. The gates are described in a separate report attached.

6. The rates allowed in the estimate for the masonry work are slightly in excess of the ordinary rates of the division and with good management, it is possible that there will be a saving on some of the items.

C. Lennard Lt Col R.E.
Superintending Engineer
28th January 1897 on Special duty.

CHIEF ENGINEER
FOR IRRIGATION.
29 JAN 97
No. 1.1.7

b S.P.

Specification

It may be said, generally, that the work is to be carried out in accordance with the Standard Specifications of the Department and only special points are here dealt with.

The first thing to be done is, after the Sand and Stones in front have been removed, to Sink, in convenient sections, the front row of wells to the depth allowed as rapidly as possible in order to obviate all chance of Sand being drawn from below the old work. If found necessary, the wells may be weighted with iron rails or otherwise. The wooden piles in front Should then be driven to close the interpaces and the Sand between wells Should be Scraped out to a depth of 3 feet and the interstices filled with Cement Concrete

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Sink the wells by using the centrifugal
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A jet-hose Should be provided for
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The last layer of floor of 6 inches
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There is no reason why work Should
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uprights absolutely vertical.

3. The superstructure consists of ordinary platform bricks of full size with a facing of table moulded bricks in Surki mortar. The noses of the cutwaters are to be protected by a casing of cutstone.

4. The arches 40 feet Span of five centres are to be built of table moulded bricks in Surki mortar on wooden centrings, supported on brick pillars with Sand boxes between to allow of the lowering of centres after the Completion of the arches. The centres should be lowered $\frac{1}{4}$ inch, just after the Keystones have been fixed. The Spandril Spaces should then be filled in and the centres fully lowered, a week or ten days after Completion.

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the parapets to be built after the monsoon following. A temporary bamboo railing may be put up, if required, to take the place of the parapets.

6. In the last year of work, when the Superstructure has been Completed and the gates have been fixed in position, the old bridge and anicut may be demolished, in as large blocks as convenient, and the debris thrown in to widen the rear rough Stone apron.

C. Smart
Lt. Col R.E.
Superintending Engineer
on special duty.
28.1.97

CHIEF ENGINEER
FOR IRRIGATION.
29 JAN 21.
No. 10 Jud

2

ex 1/
P.W 293 bdl

9.5.0

Report to accompany Plan and Estimate for Iron Shutters for Cauvery Upper Anicut

The Upper Anicut will be fitted with 55 Iron Shutters each 40 ft wide and 6 ft deep.

As will be seen from the drawings the Construction and arrangement of these shutters is very similar to those now under construction for the Palandoorai Anicut the only difference being that these are larger and heavier.

The Shutters are constructed as shown of 3/8" plate backed by vertical channel irons which are supported by two bow string girders.

These girders are so placed as to each receive an equal share of the pressure on the Shutter

Each end of each girder is carried by two Cast iron wheels 7" wide in a Cast iron Carriage. This arrangement ensures each wheel always carrying its fair share of the pressure notwithstanding any irregularities or small obstructions on the wheel path.

The wheels will be fitted with disc-roller bearings of delta metal No 1. The resistance due to friction will be very slight and all trouble from rust will be avoided.

By

The vertical channels and wheel path are all connected at intervals by a bracing of flat bars

The Counter weight is formed of 4" slabs of cast iron

It is connected to the shutter by strong gear chains of steel, passing over sprocket wheels as shown. The upper of these sprocket wheels are connected by a 3½" steel shaft driven in the middle by a treble geared crab on the platform

The Z irons on the shutter face box in thin vertical plates which are spring so as to fit tight against the vertical channels and stop all leakage.

28-1-97

Letter from the Superintending Engineer on Special duty No 88 of 28th January 1897

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Note by the Chief Engineer for Irrigation on the proposed improvement of the Upper (Coleroon) Anicut.

—"—

No. 62. I

—"—

The Agunda Canvery divides at the head of Seringham Island into the Canvery and Coleroon acroos the latter of which the Upper Anicut is built. The Anicut is in two branches separated by an Island 660 feet broad. The South branch has a length between abutments of 2063½ feet and an Effective length of sluices and dam of 1736 feet. The North branch is 464 feet long with an Effective length of 393½. The height of the South branch is about 6 feet and of the North Branch 7 feet but the Crest level of the two is nearly the same that of the North branch being slightly the higher. One of the first effects of the anicut was to scour the bed and banks of the Canvery. To check this, the Canvery dam was built in 1845. The centre part 1650 ft in length, is 6.0 feet below the average

level

level of the South branch of the Anicut and at either end there are steps 1 foot and 2 feet in height and 75 feet in length making the total length 1950 ft. There is unfortunately no section to show what the average level of the Cauvery bed was when the dam was built but the presumption is that it is slowly rising. The present level which varies somewhat from year to year is about 3 feet above the dam, while the Coleroon bed above the Anicut is silted nearly to the level of the crest

2. A depth of half a foot on the anicut gives a discharge more than sufficient for the Lower Coleroon irrigation so that when there is over 6½ ft on the Cauvery dam gauge, water goes waste to the sea. This depth does not now give a sufficient supply to the Tanjore Delta where the irrigation has greatly extended since the anicut was built. In the best of seasons the supply varies much in short periods and when the river is in fresh more than the average supply is required to make up for previous deficiency. There are besides some parts of the Delta where the lands cannot be supplied unless there is a fair amount of water in the rivers.

3. The recent large increase in the assessment of the Delta has given the ryots a claim to expect that there shall

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be no further delay in doing what is possible to improve the irrigation. The subject has been under consideration for long past but was not thoroughly gone into until Lt Col. Smart was put on special duty for the purpose. It was obvious that the cheap expedient of raising the Anicut would make matters worse than at present by increasing in height and Volume, the Cauvery floods, already so destructive and difficult to deal with, and in a short time would have the effect of raising the river beds until the supply in low freshes became no better than now. It remained to face the expenditure of substituting for the anicut a regulator which would not only enable a better supply to be forced into the Cauvery but also check the rise of its bed while at the same time lowering the flood level.

4. Colonel Smart bases some of his calculations on Major Montgomeries' figures but these were made on necessarily very imperfect data and the results can only be accepted as approximately correct. It is impossible to measure the discharge of such a river as the Cauvery in flood. What is especially to be noted is that in the flood of July 1896 the difference in level of the two rivers at half a mile below the anicut was about 2 feet. The effect of the proposed

works

works will be to make the level in both nearly the same, the Cauvery being about a foot less and the Coleroon perhaps 8 inches higher than them. The effect of 1 foot reduction in the level of the Cauvery, that is from 14 to 13 feet on the gauge and 11 to 10 ft in average depth would be to reduce the discharge about 15 per cent. We know the effect of a 13 ft flood as there have been several. It will do no harm down to some distance below Srichinopoly unless there is a local drainage as well, and below Srichinopoly the only harm it will do if the banks are properly maintained, is that due to spill over the road on the left bank. The Construction of the regulator at the Grand Anicut and closure of the upper part of the Vennar which used to take 22 per cent of the flood water, has rather increased this spill but it cannot be helped. The District Board cannot be allowed to raise the road but the spill may be made comparatively harmless by the construction of a retaining wall with narrow apron where spill is likely to occur.

5. The design of the work except some details of little importance has been settled in consultation with the Inspector General of Irrigation. The only novel part of the work is

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the shutters. A good pattern of lift shutter at moderate price has long been a desideratum and it is believed that Colonel Smart has solved the problem. Shutters of the same pattern are about to be fitted on other anicuts and it will be known before the Upper anicut work is put in hand whether they answer the expectations formed of them.

6. The estimate provides well foundations but these will only be built when solid foundation cannot be got in without great expense. Provision is made for a bridge of 9½ feet roadway. It can be widened afterwards, if the District Board should wish to do so, at little expense. It would probably be found impossible with arches so flat as those shown in the plans to remove the centering very soon after completion and as it would be too expensive to provide centering for a very large number of arches, it will be better to build Circular arches of 9 feet rise. The difference in cost being a mere trifle, the estimate has not been altered.

7. With reference to the rates allowed for the shutter work it may be explained that the estimate has been carefully framed by the Supt of the Madras workshops on the ascertained cost

of

of similar shutters and there is no reason to think that the work cannot be done for the rates allowed. The workshop charges for irrigation work are the bare cost of materials and labour. If the shutters were made elsewhere the cost would be at least Rs 75,000 more than now estimated.

8. It is most desirable that the estimate should be sanctioned without delay in order that arrangements may be made in good time for starting the work in December next.

Camp Lower Anicut
3 March 1897.

W. Hughes.
Chief Engineer for Irrigation

To

The Joint Secy to Govt.
P. W. D. S. A.

PUBLIC WORKS DEPARTMENT.

IRRIGATION BRANCH.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

UNDER date the

READ the following

From Supg Engr. on special duty, Cauvery Completion estimates, No. 88 dy 28. 1. 97.

Note by the Chief Engr for G. No. 62 dy 3. 3. 97

	Rs
†Works	534,000
Establishment	122,820
Tools & Plant	180
	657,000

The estimate, for Rs 6,57,000, for the improvement of the Upper Coleroon Anicut, is approved.

2. The Govt considers that the work should be classed as remunerative under rule II (ii), para 35, chapter V, Vol II, P.W. Code. The work could probably be completed in three years if adequate funds are assigned by the Govt of India.

3. Ordered that a copy of these Papers

together with the plans
estimate for the pro-
posed improvement,
be forwarded to the
Govt of India with a
request that sanction
thereto may be com-
municated, at an early
date, under "49.
Capital Expenditure not
charged to Revd"
Cauvery Delta System,
Open Capital Account.

A.H
13.3.97

Endorsement – In anticipation of Sanction
provision has been made for the work in the budget 1897-8
Forwarded. No 300 Dy 22.3.97

W.H
12/3

11/3
97

To The Chief Engr for I.
Supdg Engr, or Special Duty
C. C. Trichy.
Do V Circle.
Ex. Engr

E. I. Form No. 1—1,000—2-2-97.

17/3/97

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