

# Revenue (1897) Department.

MISCELLANEOUS SERIES.

G.O., No. 724

DATED 8<sup>th</sup> Feb. 1897

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[Despatch Abstract.]

*Coming to the Board of Rev. Progs. P. W. Depar<sup>th</sup>, orders approving the lowering of the crest of the Godavari be stopped and that estimates for the improvement of the upper ancient and Grand ancient, Canvey Delta system, be submitted.*

# BACK PAPERS.

| G.O. | No. | Department. | Date. | G.O. | No. | Department. | Date. |
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*Revenue Department*  
IRRIGATION.

Government (1897) of Madras.  
PUBLIC WORKS.

*Current No 1088.*



Recd. 4<sup>th</sup> Feb.

Enclosures.

Regd. 5<sup>th</sup> "

1897.

Spare copies 20.

G.O., No. 75 I., 20th January 1897.

1897.

*G.O. No. 724 of 8<sup>th</sup> Feb.*

JANUARY.

*Approved by the Secy  
after*

*1897.*

*16 to the order of the Secy (LR)  
Sec. 8-10-27*

*List  
RS*

The Kistna and the Godavari Anicuts

Orders approving the lowering of the crest of the Kistna anicut by 2 feet, directing that the raising of the crest of the Godavari anicut be stopped and that estimates for the improvement of the Upper anicut and Grand anicut, Cauvery delta system, be submitted.

*From 25/1  
5/2/97*

## GOVERNMENT OF MADRAS.

## PUBLIC WORKS DEPARTMENT.

## Irrigation.

READ—the following paper :—

No. 4 I.

*Note by the Chief Engineer for Irrigation.*

The accompanying notes of a recent inspection of the head works of the Gódvári and Kistna deltas made in company with the Inspector-General of Irrigation and the Superintending Engineers are submitted to Government.

2. The Inspector-General has given me permission to say that he fully approves of the proposals made to lower the crest of the Kistna anicut and fit both anicuts with falling shutters.

3. The Kurnool-Cuddapah canal was inspected from Nandyal to Cuddapah, and all matters of importance in connection with it brought to notice by the Superintending Engineer. As these will be referred to in Mr. Higham's report, I have kept no notes.

4. The Cauvery Upper anicut and the regulators and Grand anicut were also inspected and the proposed improvements discussed. Lieutenant-Colonel Smart's designs for shutters in the Grand anicut were shown to Mr. Higham and approved by him. The estimate will shortly be submitted to Government.

5. Plans of the Upper anicut improvements were drawn out by Lieutenant-Colonel Smart after the inspection and details settled before Mr. Higham left Madras.

CHEPÁK,  
6th January 1897.

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

## ENCLOSURE.

*Inspection Notes of Chief Engineer for Irrigation.*

*Kistna head works.*—These works were inspected first with the Superintending and Executive Engineers on the 26th and 27th November and in the following week with the Inspector-General of Irrigation also and the important questions connected with them discussed.

2. *Anicut.*—In 1891, an estimate of Rs. 13,200 was sanctioned for raising the crest of the anicut one foot,\* fixing iron posts and providing plank shutters 2 feet high. The result of this work was not considered satisfactory much water being lost by leakage and difficulty experienced in putting in and removing the shutters, and in 1894 it was resolved to remove the shutter posts and raise the body wall of the anicut 2 feet. An estimate of Rs. 7,500 was sanctioned for this in G.O., No. 330 I., dated 11th April 1894, and the work carried out, but it soon became evident that a mistake had been made in not strengthening the apron. In design, material and workmanship the anicut is adapted for water running down a long slope and is not capable of resisting the severe action of falling water and resulting eddies. In the first season after the raising, the anicut narrowly escaped breaching, a hole 13 feet deep having formed alongside the body wall. The

\* See Irrigation Chief Engineer's Inspection notes printed with G.O., No. 193 I., dated 24th March 1890 and G.O., No. 15 I., dated 6th January 1891.

weak parts of the apron were relaid or strengthened, but the Superintending Engineer has recognized that this was not enough and has had built as a sample and experiment a short length of concrete apron sloping down from the raised crest to the first retaining wall, a width of about 21 feet, and part of the second apron grouted. From the extent to which the concrete has been scoured during the past season, I should say that such an apron would require very frequent repairs. This may be avoided by using gneiss for the surface work. Estimates for different classes of work, ranging from Rs. 46,000 to Rs. 1,02,000, have been prepared. These include an allowance for grouting the second apron, but I should not be surprised if grouting were found insufficient and the second apron had eventually to be built in mortar. It is difficult in a case of this kind to say where expenditure will stop. No doubt the other disadvantages of raising the crest have been considered, but I do not think they can have been allowed sufficient weight. There is first the raising of the flood level, by something between a half and three-quarters of a foot. This may not seem much, but it doubles the previous afflux and is quite enough, combined with the alteration in form of the anicut, to greatly increase the action of the water on and below the anicut. To this, in my opinion, was chiefly due the violent disturbance during the August flood referred to in the Superintending Engineer's reports. The second objection to raising the anicut is the effect on the river bed. The river bed above every anicut tends to a certain level below the anicut crest, determined by the fall of the river, quality and quantity of sand and silt carried, overfall at the anicut and other circumstances. It cannot be estimated with accuracy what the rise of bed would be in this case: probably it would be over 2 feet and this would greatly aggravate the silting at the heads of the canals which has been for years a sore trouble. The chart of this year will soon be completed and a comparison of it with the charts of previous years may afford much useful information.

The conclusion come to is that it was unwise to raise the anicut above the level fixed in 1891, and that it should be lowered to that level before next freshes and self acting falling shutters fitted as soon as possible. The work done in 1891 is chiefly concrete and should be replaced by a crest better adapted for falling shutters. Mr. Walch in the inspection notes above referred to states that he does not consider falling shutters suitable, but those on the Grand anicut in Tanjore have been found to answer very well, and the Inspector-General says that there is scarcely any leakage at certain works in Northern India where similar shutters are used. The plans of the shutters on the Grand anicut and those on the Sone weir will be compared and the more suitable adopted with such modifications as may be necessary. The apron near the body wall has been damaged by this year's floods. If the anicut is to be lowered, only ordinary repairs will be required. The second apron is partly grouted and the rest is to be done this year. The reconstruction of part of the revetment in rear of the anicut at the left flank is nearly completed and the remainder is being grouted.

3. *Eastern head sluice.*—A very neat parapet has been built from the anicut over the head sluice to the upper gates of the lock. The head sluice is said to be in good order, but is not to be relied on to withstand a very heavy flood unless the pressure can be adequately reduced. The Superintending Engineer proposes to effect this by a regulator capable of holding up 15 feet of water between it and the head sluice. The regulator would have to be of 3-40 feet spans. If fitted with shutters of Lieutenant-Colonel Smart's design it would cost probably  $\frac{3}{4}$  lakh. I am not altogether satisfied with the proposal, as nothing can compensate for the absence of a head sluice capable of standing any possible pressure from the river side with just enough water in the canal to permit of navigation. It is frequently desirable to reduce the intake when the water is very silty and especially so in heavy floods. A regulator would enable this to be done, but assuming the intake one fourth of what it was on the 6th August, the head sluice would be liable to not less strain than on that occasion when the vents were opened 4 feet: thus reducing the pressure in front to 180 tons less than it would have been with one foot of vents open. This was about the amount of relief afforded by raising the water in rear from ordinary full supply level to 13 feet. The area of vents open is therefore a factor not to be neglected in calculations. Before making designs for a regulator, the Superintending Engineer should calculate the strains in the head sluice assuming depths front and rear 27 and 15 feet above floor and the sluice

raised and strengthened as far as practicable. The work should be closely inspected during the closure in order to see whether it has sustained any damage and whether it can be trusted to stand a maximum flood. If there is cause to doubt its security it will have to be considered whether a new head sluice cannot be built. Unfortunately there is no good site for one.

4. *Eastern Delta Main Canal.*—The canal is so much silted owing to the floods of August that crates of stone had to be put on the anicut crest in order to get enough water for irrigation. This is of course quite exceptional, but every year there is some deposit of silt and it is becoming difficult to find places to put the spoil when the canal is cleared. Stone is being collected for extending the pitching in the first mile where the slopes are eroded. This will be a great improvement.

5. *Locks.*—The conversion of the lock into a double one must be considered in connection with the proposals for a regulator or new head sluice.

6. *Western delta head sluice.*—The old sluice has been leaky and unsafe for a long time past. A plan and estimate for a new sluice about 200 feet below the old one in the line of the canal was approved in G.O., No. 112 I., dated 3rd February 1896, but formal sanction and appropriation of funds deferred pending the reply of the Government of India to an application for a large increase in the lump sum grant for unforeseen works. The application was refused, but the work being urgent had meantime been put in hand and is now not far from completion. Except that the rear wings are much too short, the sluice is an excellent work both in design and workmanship. It is built of gneiss from Sattanapalli, which is a very much harder and more durable stone than the Bezwada sandstone and better suited for so important a work. The estimate has been revised and will shortly be submitted, when necessary steps will be taken to get it sanctioned. The revetment walls of the chamber between the old and new sluices are only 10 feet high and heavily loaded. During the floods 14 feet of water had to be admitted in order to save the old sluice and this, with the commotion in the chamber, was too much for the wall on the right, most of which has been thrust forward and broken up. These walls are to be replaced by new ones and the chamber floored. A neat parapet similar to that on the Bezwada side is being built in the head sluice and is nearly completed. The revetments on the river side were damaged during the floods and are being grouted.

7. *Railway bridge.*—The bridge, of 12-300 feet spans, is built half a mile below the anicut with its left abutment a quarter of a mile inside the old river margin and connected with the anicut by a bund faced with stone. The Superintending Engineer considers that this diversion of the natural current of the river is dangerous to the head works and advocates the extension of the bridge by three spans, but it seems to me that the raising of the anicut was probably the predominant cause of the dangerous action of the water described in the reports on the floods of August last and the effect of the bridge can be known only after the anicut is lowered. The Inspector-General intends to report on the subject.

8. *Goddavari head works.*—There is too much water going over the anicut to admit of close inspection, but as far as can be seen the work is in fair order for this time of year. There have been important changes in the shoals above the anicut during the last two years, but none is likely to give trouble except the growth of the foreshore from Dowlaishweram hill to the Eastern delta head sluice. Only a few years ago there was deep water all along the margin in this place, while now the shoal threatens to approach so near to the lock and head sluice that dredging may be required. Except close to the anicut nothing can be done to stop the accretion which is due to changes two or three miles up. The level sections which accompany the annual charts give an erroneous idea of the state of the river, as they are taken near the anicut where the water is generally deep owing to scour caused by cross currents. The section 300 feet above the anicut shows an average depth of 8 to 10 feet, but actually we found it not easy and had to take a circuitous route to get to the heads of the Central and Western deltas in a steamer drawing little over 3 feet. The approaches to the three canals would apparently be greatly improved if the scouring sluices in the anicut could be made more use of. The present rule is to open the sluices only, when the depth on the anicut reaches 3 to 4 feet and they are therefore kept

closed all the time they would act with the greatest efficiency. The rules are said to have been made by Mr. Walch, but the reasons for them are not fully known, though possibly they may be traced in the records. Presumably one reason for not opening the sluices is the difficulty which it would cause in carrying on the navigation. It is thought that this would at least be freed from danger if a strong grille were made in front of the sluices or at the heads of the channels leading to them. The effect on the aprons has also to be considered. The Superintending Engineer should make a thorough enquiry into the origin and working of the rules and report fully on them.

All the masonry works at the heads of the canals are in good order, except the Bobberlanka (Central delta) lock, the rear returns of which have parted from the sidewalls. This is believed to be in some way due to the returns and retaining wall being founded on wells, while the remainder of the work is on solid foundations. The piling, &c., ordered by the Superintending Engineer will probably prevent the mischief going further. When it is found that settlement has ceased, the cracks can be filled.

There are huge mounds near the heads of the canals of material taken from the beds. Silting cannot altogether be prevented, but would probably be reduced if the approach channels can be scoured by the use of the sand sluices to such a section that when the sluices are closed towards the end of the season the velocity of approach to the head sluices will be insufficient to carry sand from the river, but anything tending to raise the level of the river bed would quite defeat any attempt to improve the present state of things and make it worse than it is.

9. This leads to the question — the most important one at present in connection with the anicut — whether the work of raising it 2 feet approved in G.O., No. 917 I., dated 2nd November 1895, should be gone on with. Fortunately some discussion arose as to the width of the wall to be built on the crest and the materials to be used, and this has so delayed the work that only a little at the right end of the Dowlaishweram branch has been built as a sample. The question has been fully considered and discussed with the Inspector-General of Irrigation, who entirely approves of the raising being stopped and falling shutters substituted. It is believed that with well-designed and fitted shutters there will not be any very large leakage. At present there are iron grooved posts in which planks are fitted to raise the water 2 feet above crest. This is a very troublesome method as the planks have to be taken to their place in the anicut by boat and it makes great waste unavoidable as the planks cannot be put in until it is certain that the freshes are over. Another thing which was overlooked when the estimate for raising the anicut was submitted is that the long stone groynes by which the approaches to the sluices are regulated would have to be raised by the same amount. This is merely a matter of expense, while the raising of the river bed would be an irremediable evil. The Superintending Engineer will prepare an estimate for falling shutters. It is not anticipated that there will be no trouble in working these, but it will be reduced to a minimum if the under sluices are opened while the shutters are being raised on the subsidence of freshes. The required height of the shutters should be ascertained by the Superintending Engineer, and they should be regulated to fall with about 1 foot going over them. By making the tie bars adjustable at different levels, the shutters can be made to fall at different stages of a fresh, and it is possible that in this way the direction of currents can be, to some slight extent, influenced.

CHEPÁK,  
6th January 1897.

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

ORDER—No. 75 I., dated 20th January 1897.

The proposals of the Chief Engineer for Irrigation to lower the crest of the Kistna anicut 2 feet is approved. An estimate for falling shutters should be submitted.

2. The raising of the crest of the Gólavari anicut should be stopped and an estimate for shutters submitted.

3. The Chief Engineer for Irrigation will submit estimates for the improvement of the Upper anicut and Grand anicut, Cauvery delta system, with as little delay as practicable.

(True Extract.)

*J. Hulme*

Under Secretary to Government,  
Irrigation Branch.

To the Superintending Engineer, I Circle.

- II "
- " Chief Engineer for Irrigation.
  - " Consulting Engineer for Railways.
  - " Superintending Engineer, V Circle.
  - " Superintending Engineer on Special Duty,  
Cauvery Completion Estimates, Tanjore.
  - " Examiner, Public Works Accounts.
  - " Revenue Department.

Exd. Shaik Karim.

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