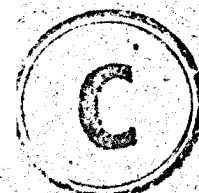


REPRINT OF OLD RECORDS ABOUT THE
CONSTRUCTION OF THE SRIVAIKUNTAM
CANAL ACROSS THE TAMERARANI
RIVER TINNEVELLY DISTRICT

1920



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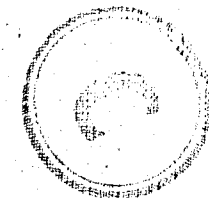
REPRINT OF OLD RECORDS

ABOUT THE

CONSTRUCTION OF THE SRIVAİKUNTAM ANICUT
ACROSS THE TAMBRAPARNI RIVER,
TINNEVELLY DISTRICT



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PREFACE.

Before the Srivaikuntam anicut was constructed, the last anicut over the Tambraparni river was the Marudur anicut which is nine miles further up and twenty-seven miles from the sea. During the monsoons, a large quantity of water overflowed the Marudur anicut and was entirely lost to the district.

Between Srivaikuntam and the sea, for a distance of twenty miles, there were crops on the ground till the end of April which were reaped only in May, though they were harvested in February higher up the stream. The tanks from which these lands were irrigated received their supply from the overflow of other tanks supplied from the Marudur anicut and many good freshes came and went without the lower tanks receiving any supply.

The cultivating season far down the river was three months later than it need be and the remissions granted for the failure of crops below the proposed Srivaikuntam anicut during the ten years preceding 1867, when the anicut was reported for construction, amounted to upwards of a lakh of rupees.

2. The people were therefore so impressed with the advantage of this work that they subscribed and paid into the treasury Rs. 20,000 as a donation. The channels pass through a series of villages where cheap labour was available.

The lands which were poorly irrigated from the surplus of the Marudur anicut were sure to get an abundant supply in the event of the scheme being executed, and a large tract of country was also likely to be benefited by direct irrigation. These circumstances led to the construction of the Srivaikuntam anicut.

7th April 1919.

A. R. COX,
 Collector.

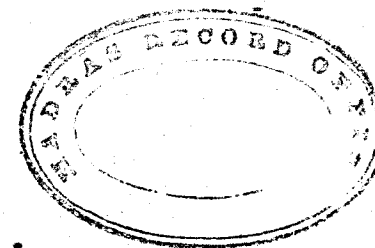


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SELECTIONS FROM THE RECORDS RELATING TO THE
CONSTRUCTION OF THE SRIVAİKUNTAM ANICUT.

Letter—from C. J. BRAD, Esq., Collector of Tinnevely.
To—the Civil Engineer, 8th Division.
Dated—Tinnevely, the 18th October 1855.
No.—1107.

In returning with my countersignature the estimate of Rs. 3,84,172-5-0 for constructing an anicut across the Tambraparni river at Srivaikuntam with channels, to Tuticorin on the north, and Tiruchendur and Kulasekarapatnam on the south, as also branch channels for the supply of Korkay and other tanks in the Panchamahall taluk, received with your letter of 15th June last, I have the honour to forward a statement showing the probable return to Government from the above outlay and containing the other information required by you in paragraph 7 of your letter under reply and another statement drawn out as requested by you in the long form showing the present and expected increase in cultivation and revenue from the several works mentioned by you.

The Zamindar of Maniyachi whose tanks will also be benefited by the channel to Tuticorin has been required to state whether he is willing to pay for the water which his lands will receive additionally, but no reply has yet been received; when received it will be forwarded to you.

Letter—from J. SILVER, Esq., Collector of Tinnevely.
To—the Civil Engineer, 8th Division.
Dated—Tinnevely, the 27th November 1855.
No.—1245.

With reference to the concluding paragraph of my predecessor's letter to the address of the late Civil Engineer, dated 18th ultimo, I have the honour to inform you that the Zamindar of Maniyachi whose tanks will also be benefited by the construction of the proposed anicut across the river Tambraparni at Srivaikuntam with channels to Tuticorin on the north and Kulasekarapatnam on the south, has signified his consent to pay a sum of Rs. 500 for the water which his lands will receive additionally.

(A true extract).

Deputy Chief Engineer.

Extract from the proceedings of the Chief Engineer in the Department of Public Works No. 3537, dated 13th December 1855.

Read—the following paper:—

Letter—from the Capt. W. H. HORSLEY, Civil Engineer, 8th Division.
To—Col. C. E. FABEE, Chief Engineer, Public Works Department, Fort St. George.
Dated—Madras, the 7th December 1855.
No.—1856.

With reference to the twelfth paragraph of my letter to your address under date 22nd October 1855, transmitting an estimate of Rs. 3,85,000 for constructing an anicut across the Tambraparni river at Srivaikuntam, in the district of Tinnevely, I have the honor to transmit herewith copy of a letter No. 1245, dated 27th November 1855, from the acting Collector of that district to the acting Civil Engineer, 8th Division, received this morning from Lieut. Roberts.

2. It is not stated whether the Rs. 500 which the Maniyachi Zamindar consents to pay for the water which his lands will receive by means of the above work is to be an annual payment, or simply a contribution towards the expense of the work itself, but I need scarcely point out, that as an annual payment it is altogether disproportionate to the advantage likely to accrue to him from the supply of water which will be thrown into his tanks, etc., by means of the proposed channel to Tuticorin, to say nothing of the new land likely to be brought under wet cultivation; the extent of which I have roughly estimated at 1,000 seed Kottas, while as a contribution towards the expense of the work, it is hardly worth speaking of.

Resolved that copy of the foregoing letter be communicated to the Collector of Tinnevely with a request that he will be good enough to state whether the contribution proposed by the Maniyachi Zamindar for the water which his lands will receive by means of the proposed channel from the Tambraparni river to Tuticorin is intended by him to be annual or as a proportionate payment to the work in question.

2. The exact amount of benefit to be derived by the zamindar should also be stated.

Letter—from the Collector of Tinnevely.
To—the Chief Engineer, Public Works Department.
Dated—the 8th February 1856.

With reference to extract from your Proceedings under date the 13th December last, and its enclosure, I have the honour to inform you that the sum of Rs. 500 therein alluded to, which the Zamindar of Maniyachi promised to pay, was not intended to be an annual payment, but simply a contribution towards the expense of the work. Subsequent to the receipt of the extract under reply the zamindar having been particularly informed of the advantages he would likely derive by the construction of the anicut and the channel to Tuticorin, and the small amount he offered to contribute to the work, he has now expressed his willingness to pay Rs. 700, in addition to his former offer or both together Rs. 1,200. This sum he offers to pay in five instalments while the work is progressing within his limits. He states that he is unable to give more or any amount in the shape of an annual payment.

The amount of benefit to be derived by the zamindar is as estimated by the Taluk authorities the conversion to nunjah of about 470 cottahs of dry land, which are now stated to be on a high level and consequently require some outlay to make them irrigable.

The zamindar states that only 200 cottahs of land could be converted into nunja and that it will cost him about four or five thousand rupees.

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Superintending Engineer, 8th Division, Madras.
Dated—Tinnevely, the 3rd August 1866.
No.—147.

Ten years ago Capt. Horsley prepared an estimate for an anicut across the Tambraparni at Srivaikuntam which was not only to fill certain tanks now almost beyond reach of river irrigation but was to furnish supply of water to Tuticorin. Various officers have inspected the site and reported pro or con. Colonel Moberly was the last and he was of opinion that the same results as far as irrigation is concerned might be obtained by raising the Marudur anicut higher up the stream, but still nothing has come of the project—the present opportunity is most favourable for reviving the subject of extending irrigation in this district—provisions are at famine prices—the tanks that are to be affected by the anicut have entirely failed this year. Labour is just now plentiful and the people are in need of employment and thousands of cubic yards of stone now available at Palamcottah will be disposed of in the course of time. I shall be happy to accompany you whenever you have leisure to visit this spot.

Letter—from Capt. H. L. PRENDERGAST, R.E., Officiating Superintending Engineer, 8th Division.
To—the Collector of Tinnevely.
Dated—Kodaikanal, the 11th August 1866.
No.—654.

In reply to your letter No. 147 of 3rd August 1866, I have the honour to inform you that nothing is being done in the matter of building the anicut at Srivaikuntam, or raising the Murdur anicut because there is no officer available for examining the merits of the two projects.

The last order of Government on the subject is dated the 18th January 1866, No. 210, and it has been intended that Capt. Payne should report on the comparative expense and advantage of each project: that officer however is at present employed in investigating a scheme of great importance, as to the practicability of diverting the waters of the Perryaur, a river that runs westward through Travancore into the Madura district, by the Cumbum valley. This duty will probably occupy his time until next January, so that his services cannot be available for several months to proceed to Tinnevely.

I shall be happy to meet you at the Murdur anicut next month, but there can be no practical result from a mere inspection of the spot, that is, with a view to putting work in hand, and I am acquainted with the features of the anicut and main channels, as I inspected them in last March.

Before any work can be undertaken the Government will require to have a definite design laid before them showing the expense of the projected works and the probable increase of annual revenue consequent thereon. And until a thorough survey of the country has been made on the scheme of raising the Murdur anicut, of course, no idea can be formed of the prospective financial advantages. The Srivaikuntum anicut project appears to have occupied the attention of Colonel Horsley for some years, and it was actually sanctioned by Government several years ago, a grant of money being made, to commence the work: but (I think on account of the mutiny and subsequent difficulties) the work was countermanded, and funds have never again been sanctioned.

Within the last three years Lieut.-Col. Moberly started the suggestion that it would be preferable to raise the Murdur anicut and enlarge its channels: but no investigation has been made to ascertain whether this project should supersede the original one. I hope to hear from England before long, from Colonel Horsley, who was for some 14 years in the Tinnevely district, his opinion on the new scheme, for it is possible that he may have taken it into consideration before maturing his project for the Srivaikuntum anicut and channels and if it should turn out, that he found valid objections to the extension of the Murdur project: we would thereby be saved much time and labour that the survey operations will involve.

Under these circumstances, I do not see that anything can be done at present, towards extending the irrigation eastwards, although the advantages are so great, and the employment of labor would be of great benefit to the people. With regard to the Fort stone at Palamcottah, I was given to understand, that a quantity of cut stone was set apart by Mr. Wedderburn, in case of its being required for the Murdur anicut. Should this work be carried out, the stone would prove of great service.

Mr. Wedderburn mentions in his letter No. 238 of 4th October 1865, that the Srivaikuntam irrigation project was estimated at Rs. 2,85,000: but prices have risen so much in the last dozen years, that this estimate would probably now be as high as five lakhs.

Letter—from Capt. H. L. PRENDERGAST, R.E., Officiating Superintending Engineer, 8th Division.
To—the Collector of Tinnevely.
Dated—Periyakulam, the 16th April 1867.
No.—113

I believe you have been looking into the revenue returns likely to be obtained from the project for the Srivaikuntam anicut and channels and as Capt. Payne is now revising the estimate, and I hope to be able shortly to submit it to Government. I shall feel obliged by your letting me know what increase of revenue may be at present set against the estimate of expenditure. Colonel Horsley in furnishing his original report in 1855, quotes a statement of Mr. Silver's of a grand annual return of Rs. 46,346-4-4, on an expenditure of Rs. 2,35,000, or 16½ per cent, but as the estimate will probably be doubled, the percentage of return (as originally calculated) will be reduced by one half.

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Officiating Superintending Engineer, 8th Division, Madura.
Dated—Tinnevely, the 24th April 1867.
No.—95.

In reply to your letter No. 113, dated 16th instant, I have the honour to inform you that I have been over most of the villages likely to be affected by the Srivaikuntam anicut, and have seen the enormous benefits likely to be conferred by the work between Srivaikuntam and the sea, a distance of 20 miles. The crops are now on the ground (at the end of April) and are not reaped till May instead of in February as is the case higher up the stream. The tanks from which these lands are irrigated receive their supply from the overflow of other tanks supplied from the Marudur anicut some 10 miles above Srivaikuntam and many good freshes come and go before the lower tanks receive a drop of water, in fact the cultivating season far down the river is three months later than it need be, and the remissions made for failure of crops below the proposed anicut during the last ten years amount to upwards of a lakh of rupees. The proposed anicut will bring under cultivation 1,500 acres of nanjai waste, assessed at Rs. 7,500 will convert 3,000 acres of single crop land into double crop, which at Rs. 2½ an acre represents Rs. 7,500 and will irrigate 3,000 acres of dry land which at Rs. 5 an acre represents Rs. 15,000 total Rs. 30,000.

2. There is moreover a tract of marsh extending from Kulasekarapatnam to Vaippar almost entirely uncultivated but capable of growing rice crops if supplied with fresh water to wash out the salt.

3. I have lately ridden over the whole length of this with the Inspector-General of Police and we both agreed that this barren tract some 40 miles in length by an average of one in breadth, might be irrigated apparently with the greatest ease; the level is low, almost the sea level, and if the flood water that collects there during the monsoon had but an exit through the sand hills, this alone would wash out the salt an exit is easily provided and here are 25,000 acres that the people would readily take up at Rs. 3 an acre lying waste from want of the water that fills the river day after day and week after week during several months of the year.

4. I calculate that the increase of revenue to be derived from an anicut at Srivaikuntam would be at least a lakh of rupees per annum, and the people are so impressed with the advantages of the scheme that they are now subscribing and within a few days more will pay into the treasury a very considerable sum as a donation towards the work and as an earnest of their anxiety that the Government should commence it at once. On receipt of this sum I will address the Board and by that the present favorable opportunity may be taken advantage of and that the money paid by the ryots may be spent at once in carting to the works the enormous mass of stones that now encumbers the Fort at Palamcottah. These stones as you are doubtless aware are excellently well erected for building being many of them dressed on one side at least and most of them averaging 4 feet in length. If the people subscribe as they probably will from Rs. 30,000 to Rs. 40,000 I can move some 8,000 cubic yards of this stone down to the work spot at once free of all charge to Government and thus considerably diminish the cost of the work. Excellent bricks for wells, etc., are procurable on either side of the river and firewood for brick and chunam burning can be got in any quantity close by.

5. The first proposals for this anicut went in nearly ten years ago and though circumstances have rendered a restriction of outlay necessary ever since the estimate was framed, I trust, that it may now be possible to commence a work that will add so greatly to the prosperity of this district.

Letter—from Capt. H. L. PRENDERGAST, R.E., Officiating Superintending Engineer, 8th Division.
To—the Collector of Tinnevely.
Dated—Kodaikānal, the 9th May 1867.
No.—282.

With reference to the first paragraph of your letter No. 95 of the 24th ultimo, I shall feel obliged by your informing me of your opinion as to the permanency of the assessment of land at Rs. 5 per acre. I have noticed in the newspaper

that the Secretary of State has written to the Government of India regarding the levying of a rate for the water supplied by irrigation works, independent of the rate settled for the land.

The financial prospects of the Srivaikuntam anicut project might be materially altered if the Government rule that there should be a separate water-rate. You have set down 4,500 acres of nanjai waste and dry lands, at Rs. 5 or Rs. 22,500, and Rs. 7,500 at Rs. 2½ per acre for a second crop on 3,000 acres total Rs. 30,000 return. This gives only 3¼ per cent remuneration on an outlay of 8 lakhs, or taking into consideration the average remissions at Rs. 10,000 per annum (upwards of a lakh of rupees during the last ten years): the return Rs. 40,000 becomes exactly 5 per cent.

Supposing however a water-rate of Rs. 4 to be levied on 4,500 acres brought under cultivation as two crop land Rs. 18,000 and Rs. 2 on 3,000 acres for the second crop Rs. 6,000 there would then be Rs. 24,000 to be added to the land assessment of Rs. 40,000 (including gain from abolition of remissions) or a return of Rs. 64,000 of 8 per cent on the capital.

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Superintending Engineer, 8th Division, Madura.
Dated—Tinnevely, the 18th May 1867.
No.—119.

The assessment of Rs. 5 an acre alluded to in your letter No. 282, dated 9th instant, is about the average I propose for wet lands in the settlement—our settlement in the Southern India must be permanent as it is practically impossible to revise the rental of millions on tenants every few years, and the fluctuating charge of the ooloongoo system has only lately been abolished. In your calculation of your revenue to be derived from the anicut you omit the future assessment of the enormous tract of waste land along the west from Kulasekarapatnam to Tuticorin which may be brought under cultivation. You mention 8 lakhs as the probable cost of the work but the expense of a bridge over the anicut would be repaid by tolls, and I conclude the idea of a navigable canal has been abandoned. A water cess was declared inapplicable to Trichinopoly a district similarly situated to this, and the water cess scheme has hitherto been confined to the Kistna and Gōdāvari anicuts. The ryots have paid Rs. 6,000 towards the expenses of the work and much more will be collected shortly.

Proceedings of the Board of Revenue, No. 5610, dated 29th August 1867.

Read—the following paper:—

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—the 24th June 1867.
No.—334.

Upwards of ten years ago Colonel Horsley proposed an anicut at Srivaikuntam on the Tambaraparai, and the project was pronounced well devised and feasible; the mutiny unfortunately stopped the work, and the Government have since remitted upwards of a lakh of rupees for withered crops on the very area that would have been so fertile and flourishing had the anicut been built. The revenue lost to Government, and the profits foregone by the ryots of the villages that would have been irrigated, may, at a very low computation, be estimated at upwards of 11 lakhs of rupees; while the want of grain during the recent scarcity was more severely felt in this neighbourhood and along the seaboard to the south than anywhere else in the district.

Extract from Minutes of Consultation, No. 116, dated 25th January 1856, Public Works Department.

Calculating that 4,500 acres of irrigable waste and dry land might have been converted into single crop, that 3,000 acres of single crop might have been converted into double crop, and that each acre might have produced 20 kalamas of grain, this gives 15 lakhs of kalamas as the gross produce. 15 lakhs of kalamas at 12 annas a kalam (or one anna a measure for cleaned rice) are worth 11½ lakhs of rupees. Taking one-third as the Government share of the produce, the Government share lost 3½ lakhs, and the ryots 7½ lakhs by the non-execution of this work ten years ago.

2. There is no anicut lower than Marudur, nine miles above Srivaikuntam, and 27 miles from the sea, and during both the south-west and north-east monsoons, an enormous body of water flows over the Marudur anicut, and is entirely lost to the district.

3. Comparatively speaking the Tambraparni is a better river than the Cauvery; the freshes are far more frequent, but instead of being utilized to the last drop, as is the case in the Cauvery, there is no anicut in the Tambraparni for the last 27 miles of its course, and millions of cubic yards of water are allowed to flow out to the sea. The people are so impressed with the advantage of the work proposed, and are so anxious that it should be sanctioned before the revision of assessment, and the registry of lands at the settlement, that they have subscribed and paid into the treasury Rs. 20,000 as a donation towards the work, and as an inducement to Government to accord their sanction at once.

4. We are just now peculiarly well situated for commencing a work of this sort. The fort at Palamcottah has been recently dismantled, and allowing a large margin for works in the neighbourhood, there are 25,000 cut stones that I should be only too glad to see moved. The money subscribed is sufficient to cart these to Srivaikuntam, and if the Government will advance a like sum now, and accord a general sanction for the work when it has been properly budgetted for, I might at once collect supplies and assist the Engineer greatly in getting the channels laid out. These channels will pass through a series of villages where the Pallars, a low class of labourers, enjoy "Pallar maniyam" for the performance of mara-mat work; and if the channels are dug, as they must be at the dry season when the Pallars have nothing to do, each village will gladly contribute 200 or 300 men to work at much lower rates than those paid for labour during the cultivating season.

5. Cheap labour, the free gift of stone and the free cartage of stone to the work, will save the Government at least half a lakh of rupees.

6. The Superintending Engineer is now revising the original estimate to suit the altered prices of to-day, and I am not aware of the aggregate cost proposed; but whatever the cost may be, the return will amount to about a lakh of rupees per annum, as explained in the following extract from my letter to the Engineer:—

24th April 1867, No. 95.

"I have been over most of the villages likely to be affected by the Srivaikuntam anicut, and have seen the enormous benefits likely to be conferred by the work; between Srivaikuntam and the sea, a distance of twenty miles, the crops are now on the ground (at the end of April), and are not reaped till May, instead of in February, as is the case higher up the stream. The tanks from which these lands are irrigated receive their supply from the overflow of other tanks supplied from the Marudur anicut, some ten miles above Srivaikuntam, and many good freshes come and go before the lower tanks receive a drop of water; in fact, the cultivating season far down the river is three months later than it need be, and the remissions made for failure of crops below the proposed anicut during the last ten years amount to upwards of a lakh of rupees. The proposed anicut will bring under cultivation 1,500 acres of nanjai waste, assessed at Rs. 7,500 will convert 3,000 acres of single crop land into double crop, which at Rs. $2\frac{1}{2}$ an acre represents Rs. 7,500 and will irrigate 3,000 acres of dry land, which at Rs. 5 an acre, represents Rs. 15,000, total Rs. 30,000.

These are the rates that would probably be imposed at the settlement; the existing rates are very much higher.

"There is moreover a tract of marsh extending from Kulasekarapatnam to Vypar almost entirely uncultivated, but capable of growing rice crops if supplied with fresh water to wash out the salt.

"I have lately ridden over the whole length of this with the Inspector-General of Police, and we both agreed that this barren tract, some forty miles in length, by an average of one in breadth, might be irrigated apparently with the greatest ease. The level is low, almost the sea level, and if the flood water that collects there during the monsoon had but an exit through the sand hills, this alone would wash out the salt. An exit is easily provided, and here are 25,000 acres that the people would readily take up at Rs. 3 an acre, lying waste from want of the water that fills the river day after day and week after week during the several months of the year."

7. It is not by irrigating fresh land only that the Government and the ryots will profit; the lands now poorly irrigated from the surplus of the Marudur anicut will receive an abundant supply direct; the harvest will be some months earlier, and the annual settlement may be early in proportion; the kists will be paid with greater promptitude, and should the irrigation extend as far as proposed and bring fresh water to Tuticorin, the aspect of the country will be changed, and the condition of the people in our most important seaport town will be very greatly improved.

Fresh water is now sold in Tuticorin at 4 pias per chatty full.

8. The enclosed plan exhibits the general direction of the channels, and the area proposed to be irrigated; but I think this area may be greatly extended, particularly if the channel from the Marudur anicut on the northern bank of the river after having passed through the Srivaikuntam and Perur tanks is relieved from supplying the Sevali, Perungulam, Arumugamangalam, Iruvapapuram and Korkei tanks as it does at present, and is taken away from Perur on a high level to irrigate the whole of the sandy waste that stretches for miles round Tuticorin. The feasibility of this can, however, only be determined by levelling, and I would suggest that an officer be at once deputed to take the requisite levels.

ENCLOSURE No. 1.—SKETCH.

Resolution—No. 5610, dated 29th August 1867.

The Board are much obliged to Mr. Puckle for bringing forward the very important work to which he refers in the foregoing letter, and they resolve to submit the matter to Government, with their recommendation that, if possible, a grant of funds for the early prosecution of the work be sanctioned, or that, at any rate, authority be given for the expenditure of the sum subscribed by the ryots likely to benefit by the project.

2. It is quite evident that the anicut with its subsidiary channels will be a remunerative work, but the Board request Mr. Puckle to forward a rough estimate of the probable cost as soon as possible, with a statement giving the area of the dry and wet land likely to be affected by the work.

3. The liberality of the ryots in raising so large a subscription for the prosecution of the work merits the commendation of Government, and evinces their confidence in the project.

(A true copy and extract)

R. A. DALYELL,
Secretary.

To the Secretary to Government, Revenue Department, with sketch.
Copy to the Collector of Tinnevely.

Proceedings of the Board of Revenue, No. 6259, dated 1st October 1867.

Read—the following paper:—

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—Tenkasi, the 11th September 1867.
No.—499.

In reply to the Board's Proceedings No. 5610, dated 29th August 1867, I have the honour to inform you that the Superintending Engineer has just submitted to the Central office detailed plans and estimates for the proposed Srivaikuntam Anicut; the estimate amounts to nearly seven lakhs of rupees.

2. I have given the approximate area likely to be affected in paragraph 6 of my letter of 24th June; these figures were taken from the karnams accounts, and are probably far below the mark, as the karnams calculate on the present water level in their villages, while the Srivaikuntam anicut will head up water thirty-one feet above the sea level at Tuticorin.

3. The amount subscribed by the ryots now amounts to Rs. 24,374-7-5.

Resolution—No. 6259, dated the 1st October 1867.

The foregoing letter will be submitted for the information of Government, in continuation of the Board's Proceedings under date 29th August 1867, No. 5610.

(True extract)

R. A. DALYELL,
Secretary.

To the Secretary to Government, Revenue Department.
Copy to the Collector of Tinnevely.

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—Attur, the 18th January 1868.
No.—2.

When I reported the flood in the Tambraparni river on the 31st of October last there was every indication of a bountiful monsoon. Since then however we have had but little rain and the river has been extraordinarily low for the season, the consequence is that the more distant tanks that should have been fed from the river have as yet had no water supply and the crops under many of the rain fed tanks are likely to prove a failure. I have called on Division Officers and Tahsildars for detailed information and will shortly submit an estimate of the remissions that will have to be made this year. In the meantime however I beg to submit a scheme for alleviating any possible distress in a very large tract of country by the execution of a work of great permanent good without any cost to Government.

2. The area to be irrigated from the Srivaikuntam anicut is as poor as any in the district: under many of the tanks there is no cultivation at all this year, and under others the cultivation is just now commencing at the time when the crop should be harvested.

3. The anicut when built will give these tanks a proper supply but there is no necessity to wait for the anicut which may not be completed for years as there is always a head of water in the river and an ordinary river channel without any anicut at all would give a large supply; the ryots are anxiously waiting for permission to draw off water at once and propose building a head sluice and digging a channel three miles in length entirely at their own expense.

4. The interest of the people in the anicut scheme was evinced by their paying down Rs. 32,450 as a subscription towards the work. The Government sanctioned the expenditure of this sum in the collection of materials, and I have accordingly carted 20,370 cut stones from the Old Fort at Palamcottah and have laid them down on the site of the work at a cost of Rs. 14,000.* These stones average 3 feet in length by one foot in breadth and thickness and are sufficient for the facing in front and rear, for the top of the anicut and for an apron, 8 yards in width; if quarried and carted to the work these stones would have cost Rs. 50,000 but they have cost the Government nothing, and there is still Rs. 18,450 of the money subscribed in hand.

5. If the Government accede to the following proposal and permit me to lay out the balance in hand on a channel instead of on the further collection of materials a revenue of Rs. 67,616 will be secured in a very adverse season and if the ryots get a car crop in June they will profit by that alone to the extent of a lakh of rupees. I beg however respectfully to remind the Board that every day is precious and that if sanction be not accorded at once it will be of no use this season.

6. The people of the villages to be benefited are all unanimous in feeling. There are no conflicting interests. The work is so highly popular that all available labour will be given at almost nominal rates and material of all kinds will be provided without the slightest difficulty.

7. I have spent the last month in a minute inspection of the villages east of the proposed anicut and south of the river and have visited them all in company

with Lieutenant Shepherd, R.E., an officer specially deputed for the work with the aid of maps and land registers and from information gained from the ryots I have been able to prepare an accurate estimate of the area capable of irrigation from the anicut and have marked it off with yellow dots in the accompanying map. The area coloured yellow throughout* has been levelled and is that proposed to be irrigated by Colonel Horsley many years ago. Levels have not yet been taken for the dotted area† but it is sufficient at present to know that this area is but little above the sea, while the Kadamba tank a few miles distant is estimated by Colonel Horsley to receive water enough for 20,000 acres at a level of 31 feet above the sea.

8. The yellow dotted area as well as that coloured entirely yellow forms part of the general anicut scheme and will not be much‡ affected by the present proposal which is merely to bring water in due season to existing tanks and so secure a revenue on 6,217 acres of nanjai now very uncertainly irrigated. This nanjai is marked with lines in the map and is mostly in the villages of Tentiruperi, Ammanpuram, Kanam, Nallur, Arumuganeri and Attur; its assessment is Rs. 67,616.

9. I propose crossing the river next week and preparing statistics regarding the capability of irrigation on the north and I had intended to have submitted but one report on the subject but the necessity of this particular case is so urgent as there are but three months before us for building a head sluice cutting a channel and strengthening several tank banks and the ryots are so anxious to take instant advantage of the working season already begun that I lose no time in bringing forward a scheme which though complete in itself is but a fragment of the irrigation system comprized in the anicut scheme.

10. Colonel Horsley proposed two main channels one on either side of the river. The northern villages have their channel now though not of the full width it will be and the southern villages had a channel once but it has long ago silted up; the heads of the two channels are opposite each other just above the proposed site of the anicut.

11. The southern channel fed the Kadamba tank and a long chain of minor works extending down to the sea; since the channel choked up the Kadamba tank and its tributaries have received merely surplus water from the Tenkarai tank and the Kadamba tank comprising a waterspread of three square miles instead of being the first on its own channel is now the 8th on the Marudoor channel and gets not a drop of water until the seven tanks above it are filled. These seven tanks take three months to fill and the crop may be sown and reaped under some of the upper tanks before the ground can be ploughed at the lower end of the chain. Of course the crop is precarious in a cultivating season extending from December to May instead of from October to February and on the average Rs. 6,000 have been remitted annually for failure of crop in these villages. All this will be changed by the execution of the work now proposed, which is virtually the restoration of the old channel from Srivaikuntam to the Kadamba tank, though somewhat altered in line§ by Colonel Horsley's plan.

12. Colonel Horsley proposed a head sluice (an essential for any large river channel|| with or without an anicut) and a cutting estimated to cost Rs. 15,000 a mile till it fell into the broad part of the Kuruvoykal, a surplus channel leading into the Kadamba tank. This cutting will be four yards in depth by twelve yards in width at bottom for a distance of nearly three miles and the estimate allows two annas a cubic yard for earthwork. For present purposes ¶ of the estimated width¶ at bottom would be sufficient and a temporary head sluice might be built to be replaced by a permanent sluice when the anicut

* 5,800 acres.

† 10,182 acres.

‡ Of course there will be some extension of cultivation but that will be considered in the general anicut scheme. The great object is to give an early and certain supply to the same area irrigated of late and uncertainly. The revenue of this area for ten years would alone pay the cost of the anicut.

§ Following Colonel Horsley's line now will be so much excavation gained and will save Government some Rs. 30,000 but should it be thought irregular to commence any part of the anicut work in anticipation of the sanction of the Supreme Government I need not break ground on the line at all but by taking off the Head Sluice a little higher up the river will nearly restore an old channel which will do good service till such time as the anicut is built.

|| 84 feet wide at top; 23 feet wide at bottom.

¶ 60 feet wide at top; 12 feet wide at bottom.

is built and the channel is dug out completely hereafter. This would greatly reduce the cost as the ryots agree to excavate it at half the estimated cost or at one anna a yard. Cutting three miles will cost Rs. 15,540, add for the head sluice Rs. 500 and for two syphon sluices in the line Rs. 700, total Rs. 17,040 leaving Rs. 1,410 for sundries.

13. Independently of the present advantage of this work there is the prospective advantage of its helping to drain the river while the anicut is in course of construction and of its being a kind of trial line to show how far the Kadamba tank and its tributaries will be benefited by the anicut scheme. I trust that the Board will not see any objection to the present proposal, as, should the anicut never be built, the channel will be quite as useful as the channel on the opposite bank now is; and as long as there is water in the river there will always be water flowing through the proposed channel into the Kadamba tank. There is no engineering difficulty and there are ample funds in hand. Lieutenant Shepherd who is now on the spot is available for the supervision of the work, and I will render all aid in my power and try and get the work finished by June. The levels and channel are now with Lieutenant Shepherd who shares my opinion as to the advantages to be derived from the work. Lieutenant Shepherd has reported on the subject to the Superintending Engineer now at Madura and to avoid delay I have forwarded a copy of this letter to the Superintending Engineer requesting him to be good enough to communicate at once with the Board should he generally approve of the scheme.

Proceedings of the Board of Revenue, No. 809, dated 1st February 1868.

Read—the following paper:—

Letter—from Capt. H. L. PRENDERGAST, R.E., Officiating Superintending Engineer, 8th Division.
To—the Secretary to the Board of Revenue.
Dated—Madura, the 23rd January 1868.
No.—2103.

With reference to letter No. 28 of the 18th instant, from the Collector of Tinnevely to your address, I have the honour to make the following remarks:—Mr. Puckle proposes to open out a channel with a head sluice on the right bank of the Tambrapoorney river opposite Srivaikuntam, which being excavated for about 3 miles, will throw water into the present channel leading into the Kadamba tank, and irrigate the lands below the Kadamba tank, and the other tanks dependent on it, from the commencement of the cultivating season: whereas, at present these lands receive an uncertain supply from the Murdoor anicut, by a channel which has to fill several tanks on its course before the water reaches the Kadamba tank. The object is to secure a revenue on 6,217 acres, in the group of villages, the nanjai assessment of which is Rs. 67,616, and in which the average annual remission for failure of crop has been Rs. 6,000. The work now proposed is a part of the Srivaikuntam anicut project, according to which a main channel of thirty-six feet bottom width is to be taken off the right bank of the river, to supply the Kadamba tank and others beyond; while the Collector would have the channel excavated at first to a width of twelve feet only; the work then being carried out, at the reduced rate of one anna per cubic yard, as agreed to, by the ryots, might be completed by the time, the first freshes of the south-west monsoon come down the river, for the amount of subscriptions that the Collector has in hand, viz., Rs. 18,450. This work would thus cost nothing to the Government, but, on the contrary, from the offer of the people interested to carry it out at a low rate of payment, there would be a saving to Government, on the estimated cost, of upwards of Rs. 30,000.

2. So far the scheme is perfectly practicable, the same channel, only with a greater sectional area, having been sanctioned by Government, on Colonel Horsley's estimate, many years ago. There is the contingent advantage to the Government, in the prospect of there being no remissions, and great benefit to the people of the villages concerned.

3. The main objection to the proposal is, that the work is a part of the anicut project, which the Government will not allow to be put in hand before formal sanction is accorded. The Collector meets this objection by suggesting a temporary head sluice in the river bank a short distance above the site where the larger permanent head sluice would be built, so that there would hereafter be no need of disturbing the temporary head to admit of the permanent works being put in hand.

Again, the Collector's proposal, if treated as distinct from the general anicut scheme, amounts to a new irrigation project, expected to cost about Rs. 18,000. Such projects are, in the usual course, entrusted to the Public Works Department, and in the ordinary routine, contribution funds would be placed to the credit of the Public Works Department for the execution of the works. Now the Collector is particularly anxious that this course should not be followed, at least I presume so from his letter of the 13th November 1867, but that he should lay out the funds under his own management (paragraph 5 of letter) with Lieutenant Shepherd for the supervision of the work (paragraph 13 of letter). This officer, however, has much to do in working up the general project; he could spare time only for a casual visit, but could not devote himself to a regular superintendence of the work.

4. Hence it is my opinion that, assuming the undoubted benefit to be derived from the works proposed by the Collector, the excavation of the channel should be considered as a separate work in itself, being in fact the restoration of the old native channel, and that application should be made to Government for its being sanctioned in an exceptional manner, the management being in the hands of the Collector, while an Overseer would be required to superintend the details of execution of the work.

Resolution No. 809, dated 1st February 1868.

Submitted to Government in continuation of the Board's Proceedings, dated 24th January 1868, No. 614.

2. The Board concur in the Superintending Engineer's proposals as expressed in the concluding paragraph of his letter. The very exceptional circumstance that the ryots will themselves bear the expense of this work, though the State will also profit largely by it, is quite sufficient ground for exceptional treatment.

(A true copy and extract)

R. A. DALYELL,
Secretary.

To the Secretary to Government, Revenue Department.
Copy to the Collector of Tinnevely.
" Superintending Engineer, 8th Division.

Memorandum on the Tambraparni river and the irrigation works connected with it.

The Tambraparni river rises in the Western Ghats, and has a drainage area at the first anicut, which is at the foot of the hills, of about 200 square miles, though it cannot be asserted with any accuracy, as the greater portion is impenetrable jungle, and unsurveyed.

2. We, however, do know that there is a constant supply of water—more than sufficient for the seven anicuts across the river, and four supply channels, leaving a large surplus flowing into the sea even at the hottest season of the year.

3. It is to utilize this surplus that it is now proposed to build the Srivaikuntam anicut and its subsidiary works.

4. This river is the only river south of Madras, except the Cauvery, that rises in the Western Ghats that gets any benefit, beyond an occasional fresh from the south-west monsoon. The rainfall at Uthemallay, where the principal feeder rises, is about 300 inches yearly, while the fall at Palamcottah only averages 22½ inches. From Uthemallay, for about eleven miles, the river flows with a rapid current, till it precipitates itself over a ledge of rock about 100 feet in height, and thence, by a succession of minor falls, amounting in the aggregate to 200 feet in

four and a half miles, it comes to Vanatheertum fall, about 150 feet in height, at the foot of which it is joined by the Pombaur, which rises to the south of Mount Augustier, where there is also a fall of 300 inches of rain. Between Mount Augustier and this junction is the very fine cataract called the Pombaur falls. From the junction to Soorimooten Covil, a distance of about three and three-quarters miles, the fall of the river is about twenty feet a mile, but the slope varies, and near the Covil it is like a rapid. From this it traverses a table land for about five miles, receiving a large tributary on its right bank, where it reaches the Papanasam barrier of rocks, and falls into a basin at a depth of about 250 feet. About one and a half miles below is the first rough anicut on the river.

5. The several rivers in Madura and north Tinnevely, whose sources are in the Western Ghats, are not affected by the south-west monsoon, but only get freshes in north-east monsoon, and for the greatest portion of the year they are merely a waste of sand, like the Palar, while the Tambraparni, even in the driest months, is (nineteen miles from the sea) a running river with high banks.

6. It may be here noticed that the mouth of the river is never closed, and while I am now writing this at Srivaikuntam, in the end of April, there is a stream of 100 feet broad and half a yard deep with an average fall of three feet per mile, or sufficient for 26,544 acres; so that unless the south-west monsoon fails, there is a perfect certainty of there being quite sufficient water for the Srivaikuntam project.

7. Colonel Horsley, in his report on the Srivaikuntam project, shows the capabilities of the river to be very great, for an ordinary high fresh was ascertained to discharge 47,520 cubic feet a second at Palamcottah, and including the water brought down by the Chittaur, there would at the same time be 56,970 cubic feet a second immediately above the Murdoor anicut. I have carefully gone down the river from Papanasam to the mouth, and consider that he rather understates the quantity.

8. Any further additions that would be made to the present works would only be in order to collect the flood-water, and would have nothing to do with present surplus usual stream, which will all be kept for the Srivaikuntam project.

9. None of the feeders of the Tambraparni are completely under the influence of the south-west monsoon. The Mannemootocaur, however, which falls into the river just above the Cannadien anicut, has a hill drainage area of about fifty square miles, but is only partially under the influence of the south-west monsoon. But still it is a stream that is never dry, and has two large anicuts on it, which are of the same date, I should think, as Cannadien, the upper one made by nature of a bridge of rocks, the gaps in which are closed with rough stones yearly.

10. The other large feeder is the river Chittaur, which falls into the Tambraparni, ten miles below Palamcottah, and two above the Murdoor anicut. The drainage area is about 1,000 square miles, and although it rises in the Western Ghats, it is only in a small degree affected by the south-west monsoon. The principal stream falls into the low country, at the well known falls of Courtallum.

11. There are four anicuts on the Chittaur but, except the Marantha, are not of much importance. It is, however, proposed to repair an old ruined anicut, and thus fill a very large reservoir near the town of Sivilaperi. This is now under consideration, and will be reported on directly an officer can be spared to investigate it.

12. The Government are aware that there has been a project for making a large reservoir in the hills above the Paupanassum falls, but I do not see that it is required unless all the channels in the district be made for navigation, an expense not likely to be made with doubtful results, and without the problem being solved of the possibility in India at a moderate expense of making reservoirs that shall keep up the supply of water in rivers.

13. The following are the names of the anicuts and channels on the Tambraparni. They are old works, built before the British were in possession of the country, and I have entirely failed in getting information as by whom they were founded, though each one has its tradition.

- (1) Codymalaligien anicut and channels (2).
- (2) Nethyooney anicut and channel, north side.
- (3) Cannadien do. do. south do.
- (4) Kodagun do. do. north do.
- (5) Pallyoor do. do. south do.
- (6) Sutamullay do. do. north do.
- (7) Murdoor anicut with channel, on both sides of the river.

There are also four channels without anicuts for supplying tanks in high freshes, all below Murdoor—

- | | |
|---------------------|------------------|
| Keelpadagay channel | } on north side. |
| Coorkay do. | |
| Tendripairy do. | } on south do. |
| Authoor do. | |

14. CODYMALALIGIEN OR THALAY ANICUT.—This anicut, situated close to Paupanassum, can hardly take the name of more than a 'Vaganai,' as it is re-built every year with strong jungle-wood stakes and brush-wood fixed in large holes cut for the purpose in the rock. It has, however, two good channels, one on the north ten miles long, and the other to the south, six miles, ending in tanks. As a great deal of the land under them is Inam, I have not obtained the necessary information as to amount of cultivation or revenue under them.

15. NETHYOONEY ANICUT.—This anicut, about six miles below the Paupanassum falls, is constructed across the stream at a very oblique angle, as most ancient works of the kind are, and has only one channel. The anicut consists of a row of large blocks of stone, many of them ten feet by four feet by three feet, and is evidently a very old work. It puts me much in mind of the several anicuts built, chiefly by Deewan Purneah, in the Mysore country, across the Hennavutty, Luchmatert, and Lockanny, all branch rivers to the Cauvery. The length of the anicut proper is 468 feet, though it is difficult to distinguish where the anicut ends.

The channel is about twelve miles long, and revenue derived from it about Rs. 12,968 from 1,119 acres of land.

16. CANNADIEN ANICUT.—A mile and a half below comes the Cannadien anicut, a carefully built cut-stone work nine feet high with a top width of six feet, and with a large rough stone apron which varies in width from thirty-five feet to 160 feet. A small portion has a cut-stone curved section, as if repaired at a breach, but I can find no record of the same. It is divided into two portions by a rocky island, and just above the anicut the Mannemootocaur falls into the river. The channel is a noble stream, and can, I hope, be still improved. Its length is twenty-two miles, and the land so good under it that at Shermadavi, the residence of the Sub-Collector, the land sells at Rs. 2,500 to Rs. 3,000 an acre.

✓ Revenue on 9,574 acres is Rs. 1,79,812, or Rs. 18½ per acre.

17. KODAGUN ANICUT.—Six miles below is Kodagun anicut, and is of cut-stone, but very roughly put together. It is oblique to the river, and has one channel on the north bank. Length of anicut 2,289 feet. The channel is about ten miles long, and the revenue is, on 1,131 acres, Rs. 18,043, or Rs. 16 (nearly) per acre, in the Sub-Collectorate, and 4,302 acres under the Collector, of which I have not the assessment, but say Rs. 10 per acre, which would be Rs. 43,020, or a total of Rs. 61,063.

18. PALLYOOR ANICUT.—Seven miles below. This anicut is formed with several different sections of cut-stone, the original section having a perpendicular drop on the apron. I found an inscription cut on a stone, showing that very extensive repairs had been carried out by a collector named Hudleston in the year 1829. The length of the anicut is 2,532 feet. It has a very fine large channel twenty-six miles long, and supplies water to fifty-four tanks, terminating below Palamcottah. The cultivation consists of 2,865 acres, Revenue Rs. 54,688.

19. SUTAMULLAY ANICUT.—One and a half miles. This anicut is in two portions divided by a rock, and has one channel on the northern side. I am rather inclined to think that, at first, the northern portion from the rock was the original anicut, and that in some high flood the water made its way to the south of the rock. The southern portion, as may be seen from the plan, has quite a different section from the northern, which is more of the native form, with upright stones like a

calingulah. A very large breach was repaired in 1855, at a cost of Rs. 2,527 in the southern portion. The channel is fourteen miles long, it then branches into two, one flowing for two miles further, the other supplying several tanks. This channel runs into the town of Tinnevely.

The acreage under the channels is about 1,806 acres, with a revenue of Rs. 32,995.

20. MURDOOR ANICUT.—Eighteen miles below and twenty-seven from the sea, the last and much the largest anicut on the river. It is of a curious horse-shoe shape, with curve up the river, and is of several quite different sections, I suppose, owing to repairs being made at different times. There is an east as well as a west channel, and the former one has a head-sluiice to it. At the head of the south channel is a very large calingulah of beautifully cut-stone work. The whole length of the anicut is 4,028 feet. There are nine sand sluices on the body of the work. The channels can hardly be counted by length, as they run in and out of several of the largest tanks in the Collectorate, both on the north and south side. The last tank on the south side being the Katumba, and on the north the Peruncollum. The total number of acres under cultivation on both sides is 14,400, giving a Revenue Rs. 1,77,000.

The four channels below Murdoor anicut.

21. KEELPADAGAY CHANNEL on the north side has a head-sluiice in position where the head sluice of the Srivaikuntam north channel will be, and the new channel follows the same course for about two and a half miles. It supplies the large tank of Aroomoogamangalum, and has a cultivation of about 1,347 acres, and a revenue of Rs. 16,611.

22. COOROOKAY CHANNEL.—The head-sluiice of this channel is nearly opposite to Yeral. The channel supplies the tank at Coorookay. Revenue about Rs. 10,856, acres 1,064.

23. TENDRIPARI CHANNEL.—Rs. 1,860, acres 115.

24. AUTHOOR CHANNEL.—Head-sluiice six miles below Srivaikuntam on the southern bank, and the channel supplies the Authoor tank. Revenue Rs. 20,429, acres 1,854. When the Srivaikuntam project is carried out, these channels will all be supplied from the anicut.

25. The revenue under the anicuts and channels is as follows, amounting in a total to Rs. 5,68,282. These amounts have been taken chiefly from records in my office, and only show the revenue for one year, but I am inclined to think that seven lacs is nearer the average yearly revenue, at least that is the amount Colonel Horsely calculated it at, and in the last revenue report on the district, I see that the number of acres under the Tambraparni river works were in Fusly 1274, 24,962 in the Sub-Collectorate, and 93,426, or a total of 1,18,388 acres, the assessment of which at Rs. 10 an acre is nearly double what I have put it at. The revenue returns of each work are now under preparation in Tinnevely, and will be shortly printed.

				Revenue. Rs.
1. Codymalalaigien anicut and channels	...	...	...	No record.
2. Nethyooney do.	do.	...	...	12,968
3. Cannadien do.	do.	...	...	1,79,812
4. Kodagun do.	do.	...	...	61,063
5. Pallyoor do.	do.	...	...	54,688
6. Sutamullay do.	do.	...	...	32,995
7. Murdoor do.	do.	...	...	1,77,000
Total	...	...	...	5,18,526

Channels.

	Revenue. Rs.
Keelpadagay	16,611
Coorookay	10,856
Tendripari	1,860
Authoor	20,429
Total ..	49,756
Grand total ...	5,68,282

The average repairs for five years of the six anicuts and channels amount to only Rs. 7,264, while the revenue for one year is Rs. 5,18,526, or the repairs have only cost 1.4 per cent on the revenue.

MADURA,
1st August 1868.

C. V. WILKIESON, Lieut.-Col., R.E.,
Superintending Engineer, 8th Division.

Proceedings of the Board of Revenue, No. 7087, dated 6th October 1868.

Read—the following paper :—

Proceedings—of the Government, Revenue Department.

No.—2528.

Dated—1st October 1868.

ABSTRACT.—Views of the Board of Revenue with reference to the imposition of a water cess on lands irrigated by the Srivaikuntam Anicut in Tinnevely district approved.

Resolution—No. 7087, dated the 6th October 1868.

Communicated to the Collector of Tinnevely, who will take steps for introducing a consolidated nunjah assessment as the works or portions of them are completed.

(A true extract)

To the Collector of Tinnevely.

A. MACGRUGOR,
Acting Secretary.

Proceedings of the Madras Government, Public Works Department, No. 3365, dated 26th October 1868.

Letter—from the Superintending Engineer, 8th Division.

To—the Chief Engineer for Irrigation.

Dated—Madura, the 10th August 1868.

No.—1172.

I have the honour to forward, for submission to Government, the plans and estimates (as per margin) for the project of constructing, at a cost of Rs. 8,32,000, an anicut at Srivaikuntam over the Tambraparni river in the Tinnevely Collectorate, with two channels, head sluices, and other subsidiary works on the north (left) and south (right) banks of river for the irrigation of about 33,000 acres of land, which will yield an increased revenue of Rs. 1,52,885 per annum.

2. It will be in the recollection of Government that the original project was prepared by Colonel (then Captain) Horsley in the year 1855, and was sanctioned by Government some years afterwards, but cancelled; no funds being available. This very promising scheme was again brought forward by Captain Prondergast while Acting Superintending Engineer of the Division in 1866-67,

who forwarded it to Government in much the same state as sent up by Colonel Horsley, except with regard to the rates, which have of course increased much since that date.

3. Government in G.O. No. 2987, 25th September 1867, called for an amended project for the anicut, etc., and in G.O. No. 563 of the 19th February 1868, on my taking charge of the division, Captain Prendergast was placed in charge of the investigation of the Srivaikuntam anicut project.

4. The amended scheme now forwarded consists of an anicut 1,380 feet long, to be built across the Tambraparni at Srivaikuntam on wells, the bed being of sand, and consists of a wall 6 feet high, $7\frac{1}{2}$ feet broad, incased in cut-stone with a cut-stone apron 24 feet in width, with rough stone below it. Full description of the anicut and its subsidiary works are entered into in Captain Prendergast's report,* so I will not say more here than that on the south side the channels

* Paragraph 7.

after supplying the large Cadamba tank, runs through several large tanks, and finishes at Trichendur, a town on the coast, to which place twice a year large number of pilgrims resort, and at present there is only one well of fresh water for the supply, on those occasions, of water for several thousand pilgrims.

5. On the north (left) side the channel takes its course of 21 miles through several large tanks, until it comes down to the port of Tuticorin, where fresh water is very much wanted, and it may perhaps be worth the consideration of Government if a tax should not be levied on the town for the water it will receive.

6. I have been frequently over the whole ground that is to be irrigated, once in company with Government Chief Engineer for Irrigation, and am in a position to say that I quite agree with the whole system now proposed by Captain Prendergast and to the conclusions he has arrived at.

7. I would remark, however, that the assessment proposed by the Collector appears to be very low, whether you take it with reference to that paid for the portions now under wet cultivation, or with reference to the actual value of the land, which close to Srivaikuntam is valued at Rs. 2,000 an acre, while higher up the river it frequently reaches as high a price as Rs. 3,000. The present average assessment of wet crops is about Rs. 18 an acre, while the Collector proposes Rs. 4 for a single crop, or Rs. 6 when two crops are grown, and these are rates at which the profits have been calculated by Captain Prendergast. I forward a copy of the Collector's letter on the subject of the return expected, in which he still calculates the assessment on all the lands (old and new) that come under the influence of the anicut at the proposed reduced rate, Rs. 4 and Rs. 2, and deducts from it the present high rate on lands now under wet cultivation—evidently not a fair way of arriving at the profits to accrue from a new work. There is also a certain amount of acreage on the south side omitted. These will account for the difference of profit in the two statements of the Collector and Captain Prendergast.

8. In the present project I have recommended that the bridge over the anicut should be cut out of the estimate, as it is hardly fair to make an irrigation project pay for a bridge, but the foundations to the piers are included, so that at any future date one can be built. The channels have not been made for navigation, as it is considered it would add greatly to the cost, and eventually a line of rail will run almost parallel.

9. There is an item in the Budget of Rs. 58,100 for this project, and if Government considers it a sufficiently promising scheme, might I ask that the sum should at once be sanctioned for the preparation of materials in anticipation of orders of the Supreme Government.

10. In conclusion, I would beg to bring to notice of Government the very efficient way in which Captain Prendergast has got up this project. He was most ably assisted by Lieutenant Shepherd, who has gone to the extra labour of making a contour map over the whole country where the channels are to run and the land to be irrigated.

Letter—from Capt. H. L. PRENDERGAST, R.E., Executive Engineer on Special duty.

To—the Superintending Engineer, 8th Division.

Dated—Madura, the 8th August 1868.

I have the honour to submit plans and estimate of Rs. 8,32,000 for constructing an anicut across the Tambraparni at Srivaikuntam, and channels for irrigation, led off both banks, each extending to a distance of about 21 miles.

60 estimates contained in 40 abstracts.
1 specification.
1 descriptive abstract estimate.
1 classified abstract in two parts.
13 plans.
1 memorandum.

The original plans and survey of Colonel Horsley have been revised, and levels have been taken all over the extent of land that it is proposed to bring newly under wet cultivation. Many years have elapsed since the sections were first taken and not one bench mark was to be found, or any of the Surveyors' Field books: the only fixed points to which reference could be made were the floors of the head sluices of village channels in the river bank, and by comparing the differences of level, which were found to be perfectly accurate, the datum line from which Colonel Horsley's sections were plotted was ascertained.

2. The sketch plan of the country to the east of Srivaikuntam shows the direction of the channels, and the land to be irrigated by them. The site of the anicut has been determined with reference to the existing system of irrigation on the north bank, which is also found to be the most suitable point for extending the irrigation on the south bank. The anicut is to be built immediately below the present temporary dam, which supplies the Keelpadagay channel on the left bank of the river; the course of this channel is followed for about $2\frac{1}{2}$ miles, and a new channel is then traced to the south of the present cultivation, so as to avoid interfering with existing rights, past the village of Mungalacurchi, to join the Armugamungalum supply channel, where the surplus channel of the Perungoolum tank falls in. From this point there is at present a branch channel for the supply of the Coorkay tank, as also another old channel to Armugamungalum tank; and the main channel being carried northwards, above the Armugamungalum tank to maintain the head of water, passes through the Payecolum tank, and following the line of bund of several small ruined tanks, terminates at the Korumpullum tank. The surplus of this tank will be conveyed to Tuticorin, and a sluice is provided to furnish a constant supply of water for the benefit of that town. It had been expected that irrigation might have been carried for some miles further to the north; but levels having been taken as far as 4 miles to the north of Tuticorin, it is found that beyond Korumpullum the land is altogether too high to admit of its being brought under the influence of an anicut at Streeviguntam.

On the right bank of the river a new opening is made for the main channel, which at 300 yards distance meets and absorbs the Keelavycal, a channel that carries off the drainage from the cultivation under the large Tenkarai tank, and flows into the Cadamba tank at $5\frac{1}{2}$ miles distance from the anicut head sluice. At the western extremity of the Cadamba tank, the main channel throws off a branch to the north, for the supply of the Ahtoor tank, as compensation for the loss of water in the Ahtoor river channel that will be caused by the anicut arresting the greater part of the river supply in the dry season: the Cadamba tank will receive its share of water at once from a sluice in the main channel, which turns to the south from the same point, and passes round the spread of the Cadamba tank, instead of flowing through it. By this arrangement the Government will retain the entire command of the water supplied by the anicut, to be apportioned both to the Cadamba tank and to the lands irrigated independently further on; the existing rights of the villages of Tenterapery, etc., will thus be maintained, while there will be no cause for the exhibition of that jealousy which the ryots are disposed to feel when their tanks are made to serve the purpose of benefiting their neighbours as well as themselves. At the southern extremity of the Cadamba tank bund there is a small channel which carries off water from a high level to the Ammenpura tank, 3 miles below; this channel is to be enlarged, and the anicut water on leaving the Cadamba tank will pass down the enlarged

channel to the Ammenpura tank and the contiguous Kanum tank; from the southern end of the latter, a new channel has to be excavated for a length of 5 miles, to the Ellapanaiken tank, throwing off a branch eastwards for the supply of the Tritchendoor tank, and another small branch to Shonancatvele tank.

3. The Tambraparni differs materially from the Pennair and Palar rivers, which are swollen by short and uncertain freshes; for while floods of magnitude occur usually several times in the year, there is a constant moderate stream which, even so low down as Srivaikuntam, never fails. The principal source of the Tambraparni is from the extensive valley above Papanasam, and this being within the influence of the south-west monsoon, a flood comes down as an ordinary occurrence in the early part of June. In the present season the river rose in the first week of June, and on the 7th there was a depth of 10 feet at Srivaikuntam. For the next six months, or till the close of the north-east monsoon, the river is subject to floods of frequent recurrence: while the natural drainage from the hills keeps up a hot weather stream, that was calculated by experiment, opposite Srivaikuntam in the present year, at 12 cubic yards per second; while also from the record of five years, it is found that during the month of March the discharge of the river is never less than $7\frac{1}{2}$ cubic yards per second. But for six months of the year the volume of water in the river is not less than 79,200 cubic yards per hour, which, with the sectional area allowed, gives a discharge on each channel of 11 cubic yards a second, for a depth of 3 feet, or sufficient water for the irrigation of 39,600 acres of land at 2 cubic yards per acre per hour. The total quantity of water available for irrigation is thus arrived at:—

For six months, or for the full period of 125 days for raising the first crop, the discharge of the river at 22 cubic yards a second is 237,600,000 cubic yards and allowing 48 cubic yards a day for each acre, or 6,000 yards for 125 days, there is water sufficient for 39,600 acres.

Next, considering fifty-seven days to elapse before the full quantity of water is needed for the second crop, the river discharges 15 cubic yards per second for a period of forty-five days, or a total of 58,320,000; and 1,350 cubic yards being required per day, at 30 cubic yards per acre per day for the second crop, 43,200 acres might be irrigated in this period. Again, for another term of forty-five days, taking the minimum river discharge at $7\frac{1}{2}$ cubic yards per second, there is a total volume of 28,332,400 cubic yards, which would irrigate 21,024 acres at the same rate of 1,350 cubic yards per acre.

Now, the land to be brought newly under cultivation from the anicut is 21,254 acres, 15,000 acres being on the north side and 6,254 acres on the south side of the river. Add 4,091 acres of land at present cultivated on the north bank and 7,322 acres on the south bank, and there is a total of 32,667 acres, of which 19,091 acres are on the north and 13,576 on the south bank.

	CUBIC YARDS.
For the first crop the volume of water available is	237,600,000
and the water required for 32,667 acres is	196,002,000
Excess	41,598,000
For the first period of forty-five days for the second crop—	
The water available is	58,320,000
The water required is	44,100,450
Excess	14,219,550
For the second period of forty-five days for the second crop—	
The water available is	28,320,000
The water required is	44,100,450
Deficiency	15,718,050

Or throughout the dry season of the year the quantity of water wanting is only 1,498,500 cubic yards. For the first crop there is an excess of water to the extent of $41\frac{1}{2}$ million cubic yards over the volume required for watering 32,667 acres, viz., 196 millions, or an excess of about 20 per cent; but in this calculation no account is taken of the floods by which an immense body of water is poured into the sea. The observation of an ordinary high fresh passing Palamcottah to a depth of 12

feet in the north-east monsoon gave the discharge past Srivaikuntam (allowance being made for further drainage, and the Murdoor anicut intervening) at upwards of 2,000 cubic yards per second. The storage capacity of the tanks on the line of channel on the north bank is 15 million cubic yards, and on the southern line 20 million cubic yards of water; hence 35 million cubic yards may be held in reserve in case of a failure of the ordinary river supply, which at a safe computation gives about one-fifth more water than is required.

During the first-half of the period in which the second crop is growing, there is an excess of water of nearly $14\frac{1}{2}$ million cubic yards, and in the latter half of the growing season there is a deficiency of nearly $15\frac{1}{2}$ millions. But before the second crop requires water, the freshes of the north-east monsoon will have come down, and the tanks will be filled, so that there is a store of 35 million cubic yards available, in addition to the gradually accumulating excess of $14\frac{1}{2}$ millions, to make good the want of $15\frac{1}{2}$ millions towards the close of the season.

To illustrate the capacity of the channels in carrying off the water in freshes: if we suppose only a depth of $4\frac{1}{2}$ feet of water in each main channel which will be given by a very moderate flood, the discharge down each channel is 21 cubic yards per second; or the supply obtained by both channels together is upwards of $3\frac{1}{2}$ million cubic yards in a day. Again, at the time of cutting the first crop, when no water is required to be admitted to the fields, and with only a slight use in the river for nine days, sufficient water will be poured into the tanks to provide for the deficiency of $15\frac{1}{2}$ million cubic yards for the second crop.

4. The Tambraparni being a perennial stream, and the discharge of water varying very much according to the time of year, as regulated by the West Coast monsoon, no provision is attempted for storing the flood waters, as the existing tanks will hold a moderate reserve, sufficient to provide against the very probable event of a failure of the ordinary flow after the north-east monsoon has ceased. While then every high fresh sends a large body of water to waste into the sea, it is altogether beyond the present scheme to utilize this excess of water. In the flat sandy plains near the coast there are no natural facilities for storing a large body of water, and in fact there is no inducement to consider such a proposition, for there is but a limited area of land between the existing cultivation and the seashore. If the floodwaters of the river are ever to be turned to useful account, it must be in their being stored up in reservoirs before the river leaves the hills, or in moderate-sized tanks higher up, at any rate, than Srivaikuntam. What the present project aims at is to secure the cultivation of the tract of land that has hitherto been the last to receive water, by admitting the first freshes at the beginning of the cultivating season, to draw off the fields all the water (i.e., taken at a minimum) that has hitherto run to waste during the dry season, thus ensuring the growth of a second crop on land that has had but a precarious supply for one crop, and to bring the remaining cultivable land that is suitably situated under irrigation from the river.

5. In the calculations of water-supply the unfailing stream of water from the hills is depended on for the cultivable area. For as much as forty-five days of the cultivating season the average daily supply is taken at the minimum, and after March, or in the most dry time of year, hardly any water at all is required for the fields; but there is also a stand-by in the event of a season of extraordinary drought, in the water drawn off the river on both banks, from the Murdoor anicut, 12 miles above Srivaikuntam. On the north bank the Peerungoolam tank, which is the last of the chain of tanks fed by the Murdoor channel, is so well supplied that it is never empty, and after a succession of floods the surplus water passes down to the Arumugamungalam tank. This extra supply will now be caught by the new channel, and be available for distribution independent of the water in the river at Striveiguntam, while it may further provide a store against the diminution of water that commences in January, inasmuch as the floods of greatest magnitude come down during the north-east monsoon, which terminates in the month of December. The Paycolum tank, next beyond the Arumugamungalam, may also obtain a large supply; this tank has hitherto been very badly off for water, and there has been very little cultivation from it; it will, however, be increased as

to capacity, by the strengthening of the bund, and, in fact, become a considerable reservoir. On the south bank there is a similar additional supply of water. The Tenkarai tank is filled by the channel from the Murdoor anicut, on the right bank, and the waste water from its calingula passes down to the Cadamba tank, so as to be in future a supplemental supply for filling directly the Cadamba tank and also for the benefit of the lands further on.

From the Collector's statement of land that can be brought under cultivation, and the additional revenue to be thereby raised, the following details are obtained:—

On the north bank.			
2,709 acres now one crop land for second crop at Rs. 2	...	Rs.	RS.
10,000 acres, dry cultivation at Rs. 7 for two crops	...	5,418	
Deduct present assessment	Rs. 4,000		
Increase	...	66,000	
5,000 acres waste at Rs. 7 for two crops	...	35,000	
			1,06,418
On the south bank.			
1,036 acres, now one crop land for two crops at Rs. 2	...	2,072	
1,631 acres, dry cultivation at Rs. 6 for two crops, there being 1 rupee already paid as dry assessment	...	9,786	
3,587 acres principally waste, at Rs. 7 for two crops	...	Rs. 25,109	
But deducting for present assessment	...	Rs. 1,003	
		24,109	
			35,967
		Total...	1,42,385
Add the gain from the abolition of ordinary remissions, averaging	...		10,000
		Grand total	1,52,385

Allowing 10 per cent of the gross profits for repair and management, or Rs. 15,235, there remains a net profit of Rs. 1,37,150 per annum, or 16.48 per cent on the capital to be expended in carrying out the works.

6. The Collector in his statement of expected profits sets down the assessment at his proposed reduced rate of Rs. 7 per acre for a double crop; but he deducts the present revenue of 4,091 acres on the north, Rs. 37,491, from the aggregate future revenue of the total acreage to show the net gain. Now, it is manifestly unfair to deduct the present average rate* per acre, of Rs. 9, from the total revenue, the greater part of which is obtained from the lower rate. To institute a proper comparison, either the future assessment of the 4,091 acres should be deducted at the 7 rupees rate, or the whole assessment should be reckoned on the higher rate. Hence the actual profits are shown above on the

* Note.—This rate is the average of Rs. 37,491 for 4,091 acres, but does not at all represent the real rate paid for a double crop, for there are 2,709 acres for which the rate for—

1 crop is paid	Rs.
and 1,352 acres for which the rate for—	
2 crops is paid	
hence a rate of 1 rupee for dry land will give	4,091
Do. 7 rupees for first crop	28,637
Do. 3½ " for second crop	4,857
Total 11½	37,585

Thus the average rate of assessment is about Rs. 11½, without making any allowance for remissions, which are for this land, usual and not exceptional.

Collector's low assessment, without regard to the higher rate already paid for a small portion of the land. Again, if a moderate water-rate of Rs. 4 per acre were to be levied, as distinct from the ordinary wet assessment, the additional return on 23,963 acres would be Rs. 95,852, and the gross profits 28 per cent.

7. The anicut is to be 1,380 feet in length between the wing-walls, to be raised 6 feet above the average level of the deep bed of river, and the width at the crown to be 7½ feet; there is a front slope of ½ to 1, and in rear a perpendicular fall on to a cut-stone apron 24 feet wide and 4½ feet in depth; beyond, there is a rough-stone apron of the same depth and 36 feet in width, protected by a retaining wall. The foundations of the body of the work and of the cut-stone apron in rear are to be of brick in chunam, laid on wells sunk 10½ feet in the sand, and raised 4½ feet above the wells, including the cut-stone covering; the retaining wall to be built of stone in chunam will also rest on a line of wells, to be sunk to the same depth, 10½ feet. The body of the anicut is to be of brick in chunam, faced throughout with cut-stone, and furnished with a set of under-slucies at each extremity of the work to let off sand and surplus water. Each set of sluices is to consist of nine vents of 4 feet width each, lined with cut-stone, it was originally intended to have three more similar sets of sluices at equal distances throughout the length of the work, but with the example of the Kistna anicut it is now considered preferable to dispense with the intermediate sets of sluices.

The original estimate also provided for a bridge of thirty-three arches of 36 feet span, and 9 feet rise, with piers 15 feet in height above the apron, to carry a roadway 15 feet in width between the parapets; but as the anicut is not situated on any line of road, it is now felt that the expensive construction of a bridge is not a legitimate charge to a work of irrigation, but should be carried out hereafter, under the head of "Communications." Still with a view to economy and a saving of time in future, it is proposed to build the foundations of the thirty-two piers, each 6 feet thick, to the same depth as those of the body of the anicut, supported by wells, as also the foundations of the wing-walls, in order that the superstructure of a bridge as described above may at any time be built.

It is found by calculations that a height of 6 feet for the anicut allows of a convenient slope of 1½ feet per mile down each of the main channels for the first few miles, the floor of the head sluice being 6 feet below the crown of the anicut. Owing to the loose sandy nature of the soil, in many places sand, the main channels must have side slopes of 2 to 1: the channels are not designed to carry off water rapidly, as in arresting freshes of sudden rise and brief duration, but width is required to enable the requisite body of water to pass down with moderate velocity.

The top of the wing-walls of the anicut are brought to a height of 3 feet above the level of a maximum rise of the river, the afflux caused by the anicut during a flood of magnitude is hardly appreciable (being calculated at less than 3 inches) from the increased velocity, and no precautionary measures are required to prevent the river topping its banks, as there is an artificial bund along each bank, for some miles, both above and below the site of the anicut.

8. The northern channel for the first 7 miles, and the southern for 5½ miles, have both a fall of 1½ feet per mile, with a bottom breadth of 36 feet; the sectional area of each will be 6½ square yards, and the hydraulic mean depth about 16 inches when there is a depth of water of 18 inches in the channel. Hence by Neville's Hydraulic rules, the velocity is about 20 inches per second; and the discharge becomes 3½ cubic yards per second, as the minimum supply of water in the channel during the cultivating season. With 3 feet of water in a channel, the discharge will be 11 cubic yards a second, as the normal state of the channel for at least six months; and when 4½ feet depth of water is admitted, at the time of freshes, the delivery of the channel will be about 21 cubic yards per second. On these data the supply of water at different seasons, and the area of land thereby irrigable, have been calculated.

In reckoning on the supply of water derivable from the river, the additional supply by the rainfall has been neglected, for the rainfall is but insignificant; the average rainfall in a succession of years being 21.06 inches, and that in a very

bad season only 11.68 inches; a constant stream of water is also depended on for the cultivation, not storage in tanks to be maintained by the drainage of the country, in the short season of the rains.

But to provide for the disposal of the natural drainage, and also of the surplus water passing from the cultivation above the lines of new channel, a further valid reason exists for these channels having a considerable capacity in width, and for their sectional area being greater than would be necessary only for the passage of water actually requisite for irrigation. In addition to other escapes for stormwater, there is on the northern line a dam 200 yards in length, with under-sluiques, across the Oopaur Oday, or jungle stream; and on the south side there is an extensive calingulah in the Cadamba tank bund, measuring 330 yards in length.

9. The wing-walls of the anicut are carried round by a curve to join the lower wing-wall of the head-sluique on each bank; on the right bank the head-sluique contains three vents of 4 feet, on the left bank the head-sluique has four similar vents, inasmuch as the area of land to be irrigated on the north bank is greater than that on the south.

On the north bank, at a distance of $2\frac{1}{2}$ miles from the head-sluique, there is to be a division sluice for the irrigation of the Keelpadagay lands, where the new channel leaves the old one at D on the sketch plan. This sluice consists of two vents of 2 feet width by 4 feet, and is capable of discharging 24.6 cubic feet per second, with a depth of 18 inches of water in the channel.

Five miles on, a head-sluique is provided for the present branch channel to the Coorkay tank; the sluice has two vents of 2 feet width each and 4 feet height; hence it is calculated to discharge 14,514 cubic yards an hour, for storage in the tank, when the channel is running 4 feet deep. Close beyond the above there is a division sluice, serving also as a surplus calingulah for the supply of the Armugamungalam tank. The sluice contains three vents of 4 feet width each and 6 feet height, which will discharge 28,281 cubic yards per hour, with the ordinary flow of 3 feet in the main channel, and in flood times will send down 79,993 cubic yards per hour for storage in the tank. The waterway of the calingulah is 10 yards in length, and supposing the water to pass over 2 feet deep when the Perungcolum surplus channel is running, the discharge over the calingulah will be 38,486 cubic yards per hour. Over this calingulah there is a bridge of 30 feet span, and a causeway leads to another bridge of the same dimensions over the main channel; this arrangement being necessary to maintain communication along the road from Yeral through Siruthundoo to other villages to the north.

Following the main channel, at a distance of about $2\frac{1}{2}$ miles, a jungle stream falls into the Armugamungalam tank; and to allow this to discharge into the tank, when in flood, there is a calingulah of 150 feet in length and 4 feet high. In the body of the calingulah there are ten vents, each of 4 feet; and if the stream is in flood, a depth of 2 feet over the calingulah will carry off 192,434 cubic yards per hour, which is ample provision for the drainage of the lands above. After another half a mile, in consequence of the rapid rise of the ground to the west, the main channel falls into the Paycolum tank, the bund of which is to be strengthened and slightly raised where necessary.

From the floor of the calingulah of this tank there is a fall of 1 foot per mile along the line of bund of several small ruined tanks to the Korumpullam tank; these bunds will be strengthened to a proper section, and calingulahs are provided with sluice vents to pass on the ordinary flow from the main channels, which will also be closed in order to obtain storage and pass the surplus water on over the crown.

Within a mile from the Korumpullam tank to the south, the Oopaur jungle stream crosses the line of water-supply; this stream runs in several widely diverging channels, and, when swollen by heavy rain, spreads over a broad strip of land; for the disposal of floods a long dam or calingulah, 600 feet between wing-walls, is provided, and the banks on either side are further protected by a revetment wall for a length of 225 feet, to be built on deep foundations. In the body of the work, which is 4 feet high, there are twenty vents of 4 feet each; in a heavy burst of monsoon, supposing the water from the stream to rise 3 feet above the crown

the discharge per hour will be 1,414,099 cubic yards. To compare this with the volume of water liable to be brought down, a maximum fall of rain is taken at 8 inches in the twenty-four hours. Along the coast of Southern India the rain cloud is known to take its course along a narrow belt of country, and in the north-east monsoon its direction is not far different from that of the coast line; hence its path intersects, nearly at right angles, the general course of the rivers which run down from the west. In the case of the Oopaur, it is assumed, that there may be a fall of 8 inches over about one-fourth of the drainage area, or 80 miles 4 inches over another fourth or 80 " and 2 inches over the remainder... .. 182 "

Total ... 342 square miles,

and allowing one-fourth of the rainfall to run off, there is a discharge of 1,186,546 cubic yards an hour. Thus the dimensions of the dam are sufficient to carry off the drainage from an excessive fall of rain.

Beyond the Korumpullam tank the channel is carried on through four vents of 4 feet width, with a fall of 1 foot a mile, to Tuticorin; while in the monsoon the surplus water brought into the tank by drainage will pass over the crown of the calingulah. The channel will cut off the drainage of the ground on the north, and prevent the accumulation of water in the low land to the south, which is thus reclaimed for irrigation. While then the duty to be ordinarily performed by this channel is merely that of supplying fresh water to Tuticorin, the channel is liable, at certain times, to have a considerable accession of flood-water, and the fall given, viz., 1 foot in a mile, is the greatest possible, as it terminates at the high tide level: hence on calculating the amount of drainage that the channel receives and intercepts, a bottom width of 24 feet must be allowed.

The present principal outlet for the discharge of waste water along the course of the main channel to the south of the Oopaur river is the calingulah of the Armugamungalam tank, the capacity of this calingulah exceeds that of the two new calingulahs provided in the channel bank, and the work, therefore, does not require alteration.

The Oopaur stream, however, must not be left in its natural condition, for the several channels in which it is divided meet again in two lines of drainage, or rather these two lines indicate the general direction to the sea, for the water spreads promiscuously over the country and lodges in extensive swamps. To remedy this the drainage to the north will be cut off, and the whole of it will be kept within bounds, to follow the line to the south and enter the sea at the natural outlet, near the main mouth of the river. The fall of the ground lies in this direction, as seen by the contour plan, and from the wing-walls of the dam across the Oopaur a bank will be thrown up on each side of the drainage channel to a height of $6\frac{1}{2}$ feet. The deep bed of the channel is about 4 feet in depth and 300 feet wide, a berm of 100-foot width is given on each side, and by the dimensions thus fixed (the excavation for the bunds being all taken from the inside) the channel will carry off a volume of 1,294,705 cubic yards of water per hour. Thus the channel will dispose of the flood-waters passed on from the dam, calculated above at 1,186,556 cubic yards per hour.

The minor works, on the north side of the river, besides those specified above, are—

A dam across a sandy stream falling into the main channel, within 300 yards from the head sluice;

A bridge of 36 feet span for communication with the villages north of the channel;

A syphon sluice to carry off the drainage from the fields of Perungcolum under the main channel;

A small supply sluice near Mungalacurchee near E on the plan;

A bridge of 30 feet span on the road between Mungalacurchee and Perungcolum; a similar bridge on the Palyacoi salt road marked H; and

Four calingulahs, each of 24 yards length, and furnished with four vents of four feet width at the extremities of the Paycolum, the Pottacolum, the Olunasawmy Naick, and the Korumpullum tanks.

The estimated cost of the channels and subsidiary works on the north-side is Rs. 2,97,940.

10. On the south bank, at a distance of $5\frac{1}{2}$ miles from the head sluice, the main channel arrives at the Cadamba tank. At the entrance to the Cadamba tank, where there is at present a dam that retains the water in the tank and prevents it flowing up the Keelavycal channel, dividing works are proposed for three-fold purpose, viz., for supplying direct the Cadamba tank; for a channel on the left bank to the Ahtoor tank; and for carrying on the main channel on the right bank, round the Cadamba tank.

For the Ahtoor channel there is provided a head sluice of two vents, each 2 feet wide by 4 feet. For the Cadamba tank the head sluice consists of four vents, each 4 feet wide by 6 feet high, over which there is a platform bridge to give communication along the left bank of the channel; close to this there is another head sluice of three vents, each 4 feet wide and 6 feet high, for the channel round the Cadamba tank.

The Ahtoor branch channel has a bottom width of 12 feet, side slopes two to one, and a fall of 1 foot in a mile; with this section the discharge at a depth of 3 feet is $3\frac{3}{4}$ cubic yards a second (or double the volume needed for the 3,000 acres dependent on the channel supply), at a distance of about half a mile the branch channel crosses the Tentorapery river channel, the latter being carried under by an inverted syphon; then passing under the Tritchendoor road, at about $1\frac{1}{2}$ miles further on, it crosses by an aqueduct the old Ahtoor river channel, and falls into the Shedavycal tank. The tract of land between the old Ahtoor channel and the river will thus be brought under cultivation as far as Shedavycal, and the old tank being strengthened, the stream of water will be passed on by a calingulah, of 30 feet length for the supply of the Ahtoor tank. In addition to the aqueduct and syphon sluice, there is provided a platform bridge of two vents of 4 feet each, on the Tritchendoor road; another similar bridge on the road leading to Yeral across the river, and an ordinary sluice of irrigation in the Shedavycal tank bund.

The main channel on leaving the dividing works has a bottom width of 24 feet side slopes of two to one, and a fall of 1 foot per mile, for a length of 8 miles, at the end of which the channel falls into the Ammenpuram tank. When running 4 feet deep this channel will convey 12 cubic yards per second for the supply of the Ammenpuram tank; at a distance of nearly 2 miles from the head sluice the channel is taken under the surplus stream from the Tenkarai tank by an arched tunnel of four vents, each 4 feet wide and 5 feet high, with a water way of 90 feet length, and, at the southern extremity of the Cadamba tank bund, joins in with the present high level channel leading down to the Ammenpuram tank. The section of this latter channel is increased both by deepening and widening, width being for these 3 miles especially requisite, as the channel skirts the edge of the hills of red sand which are loose, and much affected by the strong westerly winds.

The Ammenpuram tank is separated from the Kanum tank by a calingulah, to be built 24 yards long and 5 feet high, and with four vents 4 feet wide; a similar calingulah is provided at the southern extremity of the Kanum tank, to admit of the constant stream flowing through the tanks to the channel beyond. On leaving the Kanum calingulah, the channel is continued with the same section as before, along the slope of the land that falls rapidly from the Red Hills, for a distance of 5 miles, to the Ellappanaiken old tank, which is its termination. This latter section of the channel is of greater width than would be necessary merely to convey the water for irrigation: but the channel cuts off the drainage of the land above entirely, the soil is sandy, and a greater fall than that allowed is not attainable; hence in providing for a maximum fall of rain, it is not safe to reduce the channel section. A branch channel is thrown off at $1\frac{1}{2}$ miles above

the Ellappanaiken tank, with a bottom width of 12 feet, and of the same capacity as the Ahtoor channel. This branch channel will supply the town of Tritchendoor with fresh water in filling the old tank which is to be restored, for the irrigation also of the land below it. A regulating dam of 15 feet length and $4\frac{1}{2}$ height is provided where the branch channel leaves the main channel: one sluice vent of 3 feet width will pass on the supply of water for irrigation, and flood-water will flow over the dam.

Another similar regulating dam is provided a short distance below the Kanum calingulah for the branch channel, of about a mile to the Shonancat-vele or Thulakencolum old tank. The bund of this tank is to be restored, two irrigating sluices are also provided, and a surplus calingulah of 30 feet length.

The other works estimated for consist in the restoration of the old Ellappanaiken tank, with a surplus calingulah of 30 feet length, for the discharge of the monsoon drainage into the swamp a mile below, which has its exit into the sea, some miles on, near Colasegarapatam. A surplus calingulah is also to be provided for the Tritchendoor tank, and an irrigating sluice.

The other minor works are ten irrigating sluices along the channel between the Kanum and Ellappanaiken tanks, and six irrigating sluices in the Ahtoor branch channel.

The cost of the channels and subsidiary works on the south side is Rs. 3,02,682.

Within the high belt of land along the seashore, between the salt pans and Tritchendoor, there are lowlying swamps, marked on the sketch map: and levels have been taken over these parts to ascertain if it is possible to drain them off. They are found, however, to be so very low that such a measure is not practicable, and the idea of bringing them under cultivation has consequently been abandoned.

11. A small tiled bungalow is provided for in the estimate, consisting of two rooms, for the occupation of the resident Executive Officer, and for the safe keeping of the Office records, instruments, etc., during the progress of the works. This will be built as near as convenient to the site of the anicut, there being at present no building at all in the vicinity. Provision is further made for erecting temporary sheds, at distances of ten miles apart, for the general accommodation of the Engineering staff, Contractors, and other persons connected with the works.

Under Superintendence no entry is made in the estimate for the salary of the Executive staff, as the general establishment will furnish the Officers and Overseers; but due provision is made for the Subordinates of lower grade that come under the head of Petty Establishment, and also for the Office establishment, which is set down on the scale of a first class Range Office.

The rates are taken in general as those prevailing in the Tenkarai taluk; for some of the masonry works a higher rate must be allowed than for the head works, as both bricks and stone, as well as chunam, must be conveyed several miles. No increase in prices has been made in anticipation of Railway operations being commenced from Tuticorin, but the sooner the anicut works are put in hand, the less will the Government suffer in consequence of the demand for labor on the railway, and the rise of prices that must then inevitably take place.

Memorandum.

The dimensions of the head sluices have been determined with relation to the height of the anicut. When the river water stands on a level with the crown of the anicut, the head sluice on the north bank will discharge about 21 cubic yards per second, or double the volume required for irrigating the land, viz., 19,091 acres, the flow of water in the river being constant, and there being partial storage, it is held that twice the actual quantity to be used will be sufficient, evaporation and other losses inclusive. If the crown of the anicut had been 1 foot lower, the head sluice must have been enlarged to allow of the same discharge of water; but from the tendency of a river to silt up above an anicut, necessitating an increased height being given to the work after a few years, it appears advisable to place the crown of the anicut on that level, which will allow a sluice of moderate dimensions to discharge the required quantity of water.

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Memorandum.

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The width of the body of the anicut, at top $7\frac{1}{2}$ feet, is somewhat great, but in the event of the work being raised in course of time, it will be an advantage having a good top width upon which to build.

The discharge of the river has been taken from the record of the average of five years, which gives 22 cubic yards a second for six months, and never less than $7\frac{1}{2}$ cubic yards up to the end of the cultivating season. Now, considering that only the minimum discharge is reckoned on for as much as forty-five days, it is taken as a fair average calculation that, for the other forty-five days, the discharge is 15 cubic yards a second.

If, however, only the minimum discharge were assumed as available for the whole ninety days of the second crop—

	CUBIC YARDS.
There would be water available	56,764,800
Do. required	88,200,900

Deficit ... 31,436,100

and to meet this extreme case there is storage capacity to the extent of 35 million cubic yards, to be obtained by all the floods of the north-east monsoon.

The land commanded by the channels is limited on the north side of the river by the sand hills to the west of the line of channel, as far as the Oopaur stream, beyond which on the north the ground is all several feet above the channel level, and no extension of the channel can be made.

On the south bank the channel likewise is taken round the edge of the hills of sand, and the cultivation is limited by the backwater running up from the sea. The minimum supply of water from the river not being quite enough for the irritable area, recourse is had to storage for that deficiency of water by making use of the existing tanks. More water is available for several months, but is not wanted, more land might be irrigated, but is not available. It does not appear likely at present that the channels will ever be required for navigation, and therefore there have been alterations made in the course of the channels, from those originally proposed, when it was considered that the East Coast Canal might be extended to the south of the Peninsula: the development of the railway system in the last few years having altogether changed the prospects that were entertained formerly of improved means of communication. On the north bank the channel might have been taken along the upper spread of the Paycolum tank, but the expense of 4 miles of excavation is saved by letting the channel into the tank; again, the channel might be continued above the tanks beyond the Paycolum, but the bunds of these tanks, which have fallen into disuse from want of water, provide a line of embankment that only needs restoration.

On the south bank the channel might have been kept up at the edge of the Ammenpuram and Kanum tanks, but the cost of two miles of channel is avoided by making use of these tanks.

The channel leading into Tuticorin must carry off the drainage from the north, and its section is determined from the drainage area in a heavy burst of monsoon; the channel also cannot pass the drainage across by escapes through the land to be brought under cultivation, without embankments along the course the water would have to take, and thus further intercepting the field channels from the Korumpallum sluices.

Likewise, on the south, the channel from Kanum tank must conduct the drainage by the Ellappanaicken tank, to the natural outlet into the sea further south.

MADURA,
8th August 1868.

H. L. PRENDERGAST, Capt., R.E.,
Executive Engineer.

Specification to accompany the Estimate for the Srivaikuntam Anicut Project.

Estimate of Rs. 8,32,000 for constructing an anicut across the Tambrapoorney river at Streovaiguntam, in the Tenkarai taluk, of the Tinnevely district,

with channels for irrigation to Korumpallum on the north and Trichendoor in the south, as also branch channels for the supply of Ahtoor and other tanks, comprising the following items:—

	Rs.
Anicut	1,48,500
Northern channel	1,28,370
Subsidiary works of northern channel	1,69,570
Southern channel	1,93,850
Subsidiary works of southern channel	1,08,832
Cost of land, superintendence, plant, etc.	82,878
Total	8,32,000

1. The Anicut is to be 1,380 feet in length between the wing-walls, the foundations both of the body of the work and of the piers of the bridge to be of brick-in-chunam, laid on 924 wells, each well to be 4 feet inside diameter and 6 feet deep, the thickness of the brick-work of the wells to be 10 inches, making a total or outer diameter of 5 feet 8 inches. The wells are to be sunk $10\frac{1}{2}$ feet in the sand, and the foundations to be raised $4\frac{1}{2}$ feet above the wells, including the cut-stone covering. The height of the Anicut is to be 6 feet above the average level of the deep bed of the river, the width at the crown is to be $7\frac{1}{2}$ feet and with a batter in front of 3 feet, the bottom thickness is $10\frac{1}{2}$ feet. The body of the anicut is to be faced throughout with cut-stone 9 inches thick, and to be furnished with two sets of under-sluices, to let off sand and surplus water, each set to contain nine vents of 4 feet width. The breadth of the cut-stone apron in rear is to be 24 feet, the stone-work being 9 inches thick above the brick foundation of 3 feet 9 inches, which makes a total depth of $4\frac{1}{2}$ feet; beyond this, there is to be a rough stone apron 36 feet in breadth and $4\frac{1}{2}$ feet in depth, including the retaining wall 3 feet broad and $4\frac{1}{2}$ feet deep, built on a row of wells of the same dimensions as those of the body. Each of the wing-walls is to be 151 feet in length, including a curve of 47 feet length, which connects the anicut wing-wall with the wing-wall of the head-sluice. The foundations to the wing-walls to be built of brick-in-chunam, $8\frac{1}{2}$ feet in breadth and $7\frac{1}{2}$ feet deep; the wings above will be 20 feet high, the breadth at bottom 7 feet, and at top 3 feet, including a cut-stone facing 9 inches thick throughout. Two sets of cross-stones are provided for each vent for working the wooden shutters; the stones to be $5\frac{1}{2}$ feet long, having 9 inches let into the masonry on each side. The shutters are to be of teak wood, 3 inches thick and $7\frac{1}{2}$ feet long, the grooves for the shutters being of cut-stone.

Northern Channel.

The Northern Channel has a bottom breadth of 36 feet, with side slopes of 2 to 1, and a fall of $10\frac{1}{2}$ feet in the first 7 miles, or $1\frac{1}{2}$ feet per mile; during the next 11 miles, or as far as the Korampullam tank, the average fall is 1 foot per mile. Beyond the Korumpullam tank, the channel to Tuticorin has a bottom width of 24 feet, and fall of 1 foot per mile to the level of high water in the sea.

Head-sluice for the Northern Channel. Estimate Rs. 12,520. No. 1.

The abutments and piers are to be built on a foundation $29\frac{1}{2}$ feet in length, $26\frac{1}{2}$ feet in breadth, and 7 feet deep (inclusive of the 9 inches cut-stone covering). The sluice is to contain four vents, each 4 feet in width. The thickness of the abutments above to be 4 feet at top, and 5 feet at bottom, with steps of 2 feet 8 inches each, and offsets of 6 inches each. The piers will be 3 feet thick, and raised to a height of 8 feet.

The front and rear aprons, which are 3 feet thick, are protected by retaining walls 3 feet broad and 7 feet deep.

The foundations of the wing-walls, both in front and rear of the sluice, are to be $8\frac{1}{2}$ feet in breadth and 7 feet deep. The front wing-walls to be raised above to a height of 20 feet the top thickness of 3 feet to be carried down uniformly for the first 4 feet; and with steps of 2 feet, and offsets of 6 inches, the thickness at bottom is 7 feet. The rear wing-wall is 20 feet high for a length of

12 feet, and from thence for a length of 18 feet it slopes down to a height of 10 feet, the front face of these wing-walls on the river side will be faced with cut-stone 9-inches thick. The head sluice will be connected with the anicut by a curve of 30 feet radius for a length of 47 feet. A flight of twelve steps is made in the wing-wall, each step 1 foot in breadth and 3 feet in length. A stone platform is laid in front, above the piers, 4 feet in breadth and 2 feet thick; for working the shutters of the sluice twelve cross stones are provided for the three vents, 9 inches square and $5\frac{1}{2}$ feet in length. The shutters are each 4 feet in breadth, 3 inches thick, and 11 feet 6 inches in length. The wing-walls of the roadway will be built on a foundation 5 feet in breadth and 7 feet deep. The height of walls above is 6 feet, and the average breadth 3 feet.

The versed sine of the arches over the vents will be 2 feet, giving a total height of 10 feet to the soffits.

The face-walls above the arches are to be 6 feet broad at bottom, and $2\frac{1}{2}$ feet broad at top, with offsets of 6 inches, to a total height of $14\frac{1}{4}$ feet.

The blocking course is to be 1 foot 9 inches thick and $1\frac{1}{2}$ feet deep, over which the parapet walls are $1\frac{1}{2}$ feet in thickness and 3 feet in height, with pedestals $2\frac{1}{2}$ feet square at each end, and protected by ten guard stones, each 9 inches square.

The thickness of the arch will be $1\frac{1}{2}$ feet, and the breadth 18 feet. The roadway will have a clear width of 15 feet between parapets, and 24 feet between the wing-walls. With the exception of the cut-stone casing and apron the work is to be constructed of brick-in-chunam.

A dam across a sandy stream falling into the channel, 270 yards below the Keelpadagay head-sluice. Estimate Rs. 620. No. 2.

The body is to be 30 feet in length, 3 feet broad, and $7\frac{1}{2}$ feet high, raised on a foundation 4 feet broad, and $4\frac{1}{2}$ feet deep; with wing-walls 36 feet long, $2\frac{1}{2}$ feet thick, and $10\frac{1}{2}$ feet high, built on foundations similar to those of the body. The whole to be built of brick-in-chunam, except the rough-stone apron in rear, which is $31\frac{1}{4}$ feet average length, $5\frac{1}{2}$ feet broad, and $2\frac{1}{2}$ feet deep.

A bridge of one elliptical arch 36 feet span across the channel, in lieu of the present imperfect stone platform bridge, to keep open the communication between the villages to the north of the channel and the river. Estimate Rs. 3,400. No. 3.

The foundations of the abutments are to be 6 feet deep, 9 feet broad at top, and 12 at bottom, resting on clay; with an inverted flooring under the arch 6 feet in breadth, and $1\frac{1}{2}$ feet thick, protected by front and rear retaining walls $1\frac{1}{2}$ feet thick and $5\frac{1}{2}$ feet in depth. The abutments above will be 9 feet thick, raised to a height of 5 feet; the versed sine of the arch to be 9 feet, giving a total height of 14 feet to the soffit. The foundations of the wing-walls are to be 15 feet in length, with a breadth at top of $6\frac{1}{2}$ feet, and at bottom $8\frac{1}{2}$ feet, and sunk to a depth of 6 feet; the wing-walls above will be $15\frac{3}{4}$ feet high, and 4 feet average thickness. The face walls are to be 2 feet thick, and the blocking course $1\frac{3}{4}$ feet. The thickness of the arch will be $1\frac{3}{4}$ feet at the crown and $4\frac{1}{2}$ feet at the haunches. The roadway will have a clear width of 6 feet between parapets (which are to be $1\frac{1}{2}$ feet thick and 3 feet high), and 12 feet between the wing-walls. The bridge is to be constructed of brick-in-chunam throughout.

A division sluice with two vents 2 feet $\times$ 4 feet each, for supplying the Keelpadagay lands at the point where the new channel leaves the old one, at D in the sketch map. Estimate Rs. 1,440. No. 4.

The sluice consists of two vents, each 2×4 . The abutments and pier will be 16 feet in length including the cut-water, 3 feet broad including a cut-stone facing of 9 inches thickness, and $5\frac{1}{2}$ feet high, built on foundations 6 feet in depth and 4 feet broad. The wing-walls are to be 22 feet in length each, of 2 feet mean thickness, and 10 feet high, resting on a foundation $3\frac{1}{2}$ feet in breadth, and 6 feet in depth. The flooring to the vents will be 12 feet in length, 4

feet broad, and $1\frac{1}{4}$ thick, with a cut-stone lining above of 9 inches thickness the flooring is supported by a front and rear retaining wall $1\frac{1}{2}$ feet thick and $5\frac{1}{4}$ feet deep. In rear, there is a rough stone apron of 13 feet mean length, $7\frac{1}{2}$ feet breadth, and 3 feet depth; protected also by a retaining wall 18 feet in length, $1\frac{1}{2}$ feet breadth, and $4\frac{1}{2}$ feet in depth. The covering stone platform will be 14 feet in length, 7 feet broad, and 9 inches thick; four cross stones are provided, 9 inches thick, for the wooden shutters, which will be 4 feet $\times$ 7, and consist of 3 inches teak planking. The whole of the work is of brick-in-chunam, with the exception of the apron of rough stone.

A small supplying sluice at the head of the branch channel to the Keelpadagay lands. Estimate Rs. 470. No. 5.

The sluice is to have a vent $1\frac{1}{2}$ feet square, the body being 30 feet long, 6 feet broad, and 6 feet deep; the wing-walls in front and rear being 18 feet in length, $13\frac{1}{2}$ feet high, and $2\frac{1}{4}$ feet thick. The sluice will be built of brick-in-chunam, excepting the cut-stone lining of the vent.

A bridge of one elliptical arch, 30 feet span, on the cross road leading from Parrongolum to Mungala-curichy. Estimate Rs. 3,260. No. 6.

The foundations of the abutments are to be 6 feet deep, $7\frac{1}{2}$ feet thick at top, and $10\frac{1}{2}$ feet at bottom, resting on clay. The abutments above will be $7\frac{1}{2}$ feet broad, and 3 feet high; the wing-walls are to be 12 feet high, and of 3 feet mean thickness, resting on foundations 6 feet deep, and $4\frac{1}{2}$ feet broad, with a length of 20 feet each. The versed sine of the arch is to be $7\frac{1}{4}$ feet, giving a total height of $10\frac{1}{2}$ feet to the soffit. The face walls are to be 2 feet thick, and the blocking course $1\frac{1}{2}$ feet, over which the parapet is $1\frac{1}{2}$ feet thick, and 3 feet high. The thickness of the arch at the crown will be $1\frac{1}{2}$ feet, and at the haunches 4 feet. The roadway will have a clear width of 15 feet between the parapets, and 21 feet between the wing-walls. The flooring is to be an invert 30 feet in length, 15 feet wide, and $1\frac{1}{2}$ feet thick, protected by retaining walls $1\frac{1}{2}$ feet-thick, and to a mean depth of $5\frac{1}{4}$ feet. The bridge is to be built of brick-in-chunam throughout.

Ten irrigating sluices for new land to be brought under cultivation, between the extremity of the Payacolum tank and the north end of the Korumpullum tank. Each to be similar to that for the Keelpadagay lands, No. 5, but with a length 60 feet. Estimate Rs. 2,670. No. 15.

Two bridges, each of one elliptical arch, 30 feet span, with a causeway 471 feet in length, and a calingulah with sluice vents across the Armugamangalam channel at Yeral. Estimate Rs. 19,060. No. 9.

The foundations of the abutments are to be 6 feet deep, $7\frac{1}{2}$ feet thick at top, and $10\frac{1}{2}$ at bottom, resting on clay; the abutment walls above are to be $7\frac{1}{2}$ feet thick raised to a height of $6\frac{3}{4}$ feet; the versed sine of the arch to be $7\frac{1}{2}$ feet, giving a total height of $14\frac{1}{4}$ feet to the soffit. The abutments are strengthened by buttresses 3 feet thick, raised to the full height. The wing-walls are curved, $15\frac{3}{4}$ feet high, $1\frac{1}{4}$ feet thick at top, and $6\frac{1}{2}$ feet thick at bottom, resting on foundations of 6 feet depth and 8 feet in thickness. The face walls will be 2 feet thick, and the blocking course $1\frac{3}{4}$ feet; over this the parapet is $1\frac{1}{2}$ feet thick and 3 feet high. The thickness of the arch at the crown will be $1\frac{1}{2}$ feet, and at the haunches $3\frac{1}{2}$ feet. The flooring under the arch is to be 30 feet long, $16\frac{1}{2}$ feet broad, and $1\frac{1}{2}$ feet thick, with a retaining wall $1\frac{1}{2}$ feet thick and $5\frac{1}{4}$ feet deep. The body of the calingulah has a length of 30 feet, breadth 4 feet, and height 6 feet, which includes stone lining 9 inches thick. There are three vents each 4 feet $\times$ 6 feet and nine cross stones for the shutters, which are 4 feet $\times$ 6 and 3 inches thick. The roadway over the bridge and the approaches are horizontal, the clear width between parapets being $16\frac{1}{2}$ feet. The work is to be built of brick-in-chunam.

Constructing a double dam across a jungle stream falling into Armugamangalam tank. Estimate Rs. 5,850. No. 10.

The body of the dam on the right bank is 150 feet long, $3\frac{1}{2}$ feet thick, and $4\frac{1}{2}$ feet high; these dimensions including a cut-stone facing of 9 inches, the

foundations are $4\frac{1}{2}$ feet thick, and $4\frac{1}{2}$ feet deep. Ten sluice vents are provided, each 4 feet wide and $4\frac{1}{2}$ feet high, lined with cut-stone. The wing-walls are curved 24 feet long, their mean thickness being $2\frac{1}{2}$ feet and height 9 feet; the foundations being 4 feet thick and $4\frac{1}{2}$ feet deep. Below the dam there is an apron 6 feet wide and $2\frac{1}{2}$ feet thick, with a rear retaining wall 159 feet long, 2 feet thick, and $4\frac{1}{2}$ feet deep.

The body of the dam on the left bank is 150 feet long, 3 feet thick, and $2\frac{1}{2}$ feet high, the foundations being $3\frac{3}{4}$ feet thick, and $4\frac{1}{2}$ feet deep: there is one inlet vent of $1\frac{1}{2}$ feet width. The wing-walls are similar to those of the dam described above. The flooring between the two dams is $44\frac{1}{2}$ feet wide and $2\frac{1}{2}$ feet thick, supported by side-retaining walls, each 30 feet long, and of the same section as the wing-walls. The whole work to be of brick-in-chunam, except the flooring, and apron of rough stone-in-chunam, and the lining of the vents in cut-stone.

A bridge of one elliptical arch, 30 feet span, for the Pullayacoil salt pan road. Estimate Rs. 3,260. No. 11.

Similar to that on the Mungalacurehy road, No. 6.

A dam across the Oopoday, a large jungle stream which crosses the line at I in the sketch map. Estimate Rs. 36,640. No. 12.

The dam is to be 600 feet in length, $4\frac{1}{2}$ feet thick, and $4\frac{1}{2}$ feet high, including the cut-stone facing 9 inches thick; the foundations will be 9 feet deep and 6 feet thick. The wing-walls will be $97\frac{1}{2}$ feet in length each, $2\frac{1}{2}$ feet thick, and rising in height from 6 to $10\frac{1}{2}$ feet; the body is to have twenty discharge vents, each 4 feet wide and $4\frac{1}{2}$ feet high. The apron is 16 feet wide, and consists of rough stone-in-chunam $2\frac{1}{2}$ feet thick, covered with cut-stone, 9 inches in thickness with a fall in rear of 3 feet; a second apron extends to a width of 12 feet, being 3 feet thick, in rough stone, each apron has a retaining wall 9 feet deep and 2 feet thick. The vents have the usual arrangement of cross stones and shutters 3 inches thick. The walls and foundations are to be of brick-in-chunam. Stream wings are also to be built, each 225 feet in length, 3 feet thick, and 9 feet high, built on foundations 4 feet thick and 9 feet deep.

Constructing a head sluice, 350 yards below the proposed bridge calingulah at Yeral for the supply of Coorkay tank. Estimate Rs. 1,440. No. 7.

The particulars are the same as those explained for the sluice provided for the Keelpadagay lands (No. 4.).

A syphon sluice of one vent near Yeral. Estimate Rs. 3,150. No. 8.

The body of the sluice is to be 114 feet in length, $11\frac{1}{2}$ feet in breadth, and 3 feet deep; the side walls of the vent are to be 3 feet thick, including the cut-stone facing 9 inches thick, and 4 feet deep; the versed sine of the segmental arch will be 1 foot, making a total height of 5 feet to the soffit. The thickness of the arch is to be 2 feet, with backing 3 feet deep. The retaining walls are to be 10 feet long, 3 feet thick, and 3 feet deep, the top being on a level with the side walls of the cisterns. The front and rear cisterns are to be 6 feet square each, the body of the cistern and the side walls will be $2\frac{1}{2}$ feet thick. The side walls of the cistern are to be 10 feet high; the thickness at bottom being 3 feet and at top 2 feet, inclusive of the cut-stone casing.

The sides and bottom of the vent and of the cisterns are to be lined with cut-stone 9 inches thick.

The sluice is to be constructed otherwise of brick-in-chunam.

A calingulah at the northern extremity of the Payacolum tank in lieu of the present calingulah. Estimate Rs. 2,790. No. 13.

The body is to be 72 feet in length and 4 feet thick, the foundations to be $5\frac{1}{2}$ feet thick and 6 feet deep, the height of the body for a length of 31 feet in the centre will be 8 feet, and the remaining portion at the sides (41 feet in length)

will be 5 feet high. The wing-walls are to be $10\frac{1}{2}$ feet high and 34 feet in length each, with breadth at bottom $3\frac{1}{4}$ feet and at top $1\frac{1}{4}$, with three offsets, each 6 inches wide in rear, the front face being vertical. The foundations of the wing-walls will be 6 feet deep and 5 feet in breadth.

Four sluice vents are provided, each 4×8 , and 7 feet apart from centre to centre, having shutters 3 inches thick, supported by sixteen cross stones; twelve upright stones of 6 feet length are sunk 3 feet into the lower part of the body, so that the top of the upright stones is on a level with the crown of the higher part of the calingulah.

The rough stone apron in rear is $74\frac{1}{2}$ feet average length, $8\frac{3}{4}$ feet in width, and 3 feet deep; supported by a retaining wall $78\frac{1}{2}$ feet in length, $2\frac{1}{2}$ feet thick, and 6 feet deep.

The body wall will be faced all round with cut-stone 9 inches thick, as also the sides and bottom of vents. The rest of the work is to be constructed of the brick-in-chunam.

Three other calingulahs, similar to the above, for the Pottacolum, Chinnasamy Naick, and Korumpullum tanks Estimate Rs. 8,370. No. 14.

Southern Channel.

The southern channel will have the same sectional area as the northern, and the same slope for the first $5\frac{3}{4}$ miles as far as the Cadamba tank. For the remaining 14 miles the bottom width is 24 feet, and the fall 1 foot a mile.

The branch to Ahtoor, 6 miles long, has a bottom width of 12 feet, and fall of 1 foot a mile for the first 2 miles, then a fall of 2 feet a mile for the remaining 3 miles.

The branch channel to Tritchendoor has a bottom width of 12 feet, and fall of 1 foot a mile throughout its length of $1\frac{1}{2}$ miles.

The subsidiary works required for this channel are as follows:—

Head Sluice at the head of the Southern channel Estimate Rs. 11,750. No. 1.

The sluice is in all respects similar to that at the head of the channel on the north bank, except that there are three vents instead of four.

Two syphon sluices, one above and another below the small bridge to the west of Tricaloor, in lieu of the present aqueduct. Estimate Rupees 1,460 each. No. 2.

The body of the sluice is to be 84 feet in length, 6 feet broad, and 6 feet deep. The vent to be 2 feet broad and $1\frac{1}{2}$ high, the wing-walls in front and rear to be 36 feet long, $3\frac{1}{4}$ feet average thickness, and $11\frac{1}{4}$ feet height above the vent. The cisterns in front and rear will be each $4\frac{1}{2}$ feet square, the side walls being $1\frac{1}{2}$ feet thick and 11 feet high. The sluices will be built throughout of brick-in-chunam.

A bridge of one elliptical arch, 36 feet span, on the west of Tricaloor in lieu of the present stone platform bridge. Estimate Rs. 3,400. No. 3.

The abutments are to be 30 feet in length, 9 feet thick, and 5 feet high, resting on foundations 6 feet deep, 9 feet broad at top, and 12 feet broad, at bottom, resting on clay. The wings are to be 15 feet in length, 4 feet mean thickness, and $15\frac{3}{4}$ feet height, built on foundations $7\frac{1}{2}$ feet thick and 6 feet deep. The versed sine of the arch is to be 9 feet, giving a total height of 14 feet to the soffit. The face walls are to be 2 feet thick and the blocking course $1\frac{3}{4}$ feet, over which the parapet walls are $1\frac{1}{2}$ feet thick, and 3 feet high. The thickness of the arch at the crown will be 1 foot 9 inches, and at the haunches $4\frac{1}{2}$ feet. The roadway will have a clear width between parapets of 6 feet, and between wing-walls of 13 feet. The floor is an invert $35\frac{1}{2}$ feet in length, 6 feet broad, and $1\frac{1}{2}$ feet thick. The retaining wall in front and rear is $1\frac{1}{2}$ feet thick, and $5\frac{1}{2}$ feet average depth. The bridge is to be built of brick-in-chunam, and plastered.

A bridge of three arches at Tricaloor. Estimate Rs. 6,156. No. 4.

The foundations of the abutments and piers are to be 6 feet deep, the average thickness of the former to be 6 feet, and of the latter $7\frac{1}{2}$ feet, resting on clay. The piers are to be 6 feet thick, and the abutments $4\frac{1}{2}$ feet, raised to a uniform height of 5 feet; the versed sine of the centre arch to be 9 feet, and that of the side arches $7\frac{1}{2}$ feet, giving a total height to soffit of 14 feet for the centre arch and $12\frac{1}{2}$ feet for the side arches. The wing walls are to be 25 feet in length, 13 feet average height, 2 feet thick at top, and 5 feet at base: the foundations to be 6 feet mean thickness and 6 feet deep. The face walls are to be 2 feet thick, and the blocking course $1\frac{3}{4}$ feet. The parapet walls are $1\frac{1}{2}$ feet thick and 5 feet high. The centre arch is to be elliptical, the thickness at the crown being $1\frac{3}{4}$ feet, and at the haunches 4 feet; side arches are segmental, thickness at crown being 1 foot 6 inches. The invert under the arches is 15 feet broad, and $1\frac{1}{2}$ feet deep, with the support of a retaining wall $1\frac{1}{2}$ feet thick and $5\frac{1}{4}$ feet deep. Over the arches the clear width of roadway between parapets will be 15 feet, and between wing-walls 24 feet. The bridge is to be built of brick-in-chunam, and plastered.

Ten small sluices for irrigation in the portion of channel between Kanum and Ellapanaiken tank. Estimate Rs. 140 each. No. 18.

Each to be similar to the ten irrigating sluices on the northern channel No. 15 but 30 feet only in length.

Two irrigation sluices in Ellapanaiken colum. Estimate Rs. 650. No. 25.

Each similar to that in Shadavycal tank No. 11.

The body of the sluice is to be 72 feet in length, $3\frac{3}{4}$ feet in breadth, and $3\frac{3}{4}$ feet deep, with a water-way of $\frac{3}{4}$ foot square, the thickness of the outer wall is to be $1\frac{1}{2}$ feet, with front and rear retaining walls 12 feet in length each, $1\frac{1}{2}$ feet broad and $7\frac{1}{2}$ feet deep, provided also with a basin $4\frac{1}{2}$ feet square and $5\frac{1}{4}$ feet high and floored 9 inches thick; the sluice is to be constructed with brick-in-chunam.

A surplus Calingulah for Ellapanaiken colum. Estimate Rs. 670. No. 26.

The body is to be 30 feet long, $3\frac{3}{4}$ feet broad, and 3 feet 9 inches height, raised on a foundation $4\frac{1}{2}$ feet thick and 6 feet deep. There are three vents, each 3 feet wide and $3\frac{3}{4}$ feet high, lined with cut-stone. The wing-walls are to be 24 feet in length, $1\frac{1}{2}$ feet thick, and 6 feet high, on a foundation 6 feet deep and $2\frac{1}{4}$ feet thick. The rear apron will be $7\frac{1}{2}$ feet wide, and 3 feet thick, with a retaining wall 6 feet deep and 1 foot 6 inches thick. The calingulah is to be built of brick-in-chunam, with the exception of the apron of rough stone-in-chunam.

A regulating dam for the branch channel to Auvadayar ruined tank. Estimate Rs. 530. No. 22.

The body of the dam is to be 15 feet in length, 3 feet 9 inches thick, and $4\frac{1}{2}$ feet high, on a foundation $4\frac{1}{2}$ feet broad and 6 feet deep. There is one vent 3 feet wide and $4\frac{1}{2}$ feet high, with cross-stones and teak shutters of 3 inches thickness. The foundations of the wing-walls are to be 24 feet long, 2 feet 3 inches thick, and 6 feet deep, the wing-walls above to be 6 feet high and $1\frac{1}{2}$ feet thick. The apron is $7\frac{1}{2}$ feet wide and 3 feet thick, with a retaining wall $1\frac{1}{2}$ feet thick and 6 feet deep. The vent is to be faced with cut-stone 9 inches thick. The walls and foundations are to be of brick, and the apron of rough stone-in-chunam.

Do. dam for Shonancatvele channel, Rs. 530. Estimate No. 19.

An irrigating sluice in Auvadayar colum tank. Estimate Rs. 325. No. 24.

The dimensions of the sluice to be the same as those given for the Shedavycal tank (No. 11.)

A calingulah of discharge in Auvadayar colum tank. Estimate Rs. 20. No. 24.

The body will be 18 feet in length, $3\frac{3}{4}$ feet thick, and 3 feet 9 inches high,

on a foundation $4\frac{1}{2}$ feet broad and 6 feet deep. There is one vent 3 feet wide and $3\frac{3}{4}$ feet high, with three cross-stones and shutters as usual. The foundations of the wings are to be $21\frac{1}{4}$ feet long, 6 feet deep, and $2\frac{1}{4}$ feet broad; the wing-walls above to be 6 feet high and $1\frac{1}{2}$ feet thick. The rear apron is 6 feet wide and 3 feet thick, with a retaining wall $1\frac{1}{2}$ feet thick, and 6 feet deep. The vent will be faced with cut-stone 9 inches thick. The walls and foundations to be built of brick-in-chunam, and the apron of rough stone-in-chunam.

Two irrigating sluices in Shonancatvele tank. Estimate Rs. 325 each. No. 20.
And one for Auvadayar Colum tank. Estimate Rs. 325. No. 23.

The dimensions to be the same as those given for the sluice in Shedavycal tank (No. 11).

A calingulah of discharge in Shonancatvele tank. Estimate Rs. 670. No. 21.

The calingulah is to be similar to that provided for the Ellapanaiken tank (No. 26.)

A head-sluice for the Ahtoor branch channel, similar to that for the Keelpadagay lands on the north side, No. 4, Rs. 1,440. Estimate No. 6.

Aqueduct across the old Ahtoor channel. Estimate Rs. 3,400. No. 8.

The abutments and piers are to be built on a foundation $26\frac{1}{2}$ feet in length, $18\frac{1}{2}$ feet in breadth, and 6 feet deep. The aqueduct consists of three arched vents, each 4 feet in width. The thickness of the abutments to be 4 feet, and that of the piers $2\frac{1}{2}$ feet, inclusive of the cut-stone facing 9 inches thick. The height of piers and abutments to be 6 feet. The versed sine of the arches will be 1 foot, making a total height of 7 feet to the soffits; the thickness of the arch being 2 feet. The foundations of the wing-walls are to be 6 feet thick and 6 feet deep, the wing-walls above to be 21 feet long, 3 feet thick at top, and $4\frac{1}{2}$ feet at bottom; their height being 15 feet. The parapet walls of the water-way will be 6 feet high, 3 feet thick at top, and $4\frac{1}{2}$ feet at bottom. The breadth of the water-way between parapets will be 8 feet. A rough stone revetment is provided at the end of the front wing-walls, $7\frac{1}{2}$ feet in length, 2 feet thick, and 7 feet deep. The sides and flooring of the vents are to be lined with cut-stone. The aqueduct is to be otherwise constructed of brick-in-chunam.

Six small irrigating sluices in the Ahtoor branch channel, the dimensions as giving in Estimate No. 18, each Rs. 140. Estimate No. 13.

A tunnel across the Ahtoor channel on the road to Trichendoor, two vents, Rs. 880. Estimate No. 9.

The foundations of the abutments and piers are to be $4\frac{1}{2}$ feet deep, the thickness of the former to be $4\frac{1}{2}$ feet, and that of the latter $3\frac{1}{4}$ feet, the abutments are to be 3 feet, and the pier $2\frac{1}{2}$ feet thick, raised to a height of 4 feet. The wing-walls are to be 13 feet in length, $4\frac{3}{4}$ feet high, 1 foot and 9 inches thick at top, and 2 feet at base; built on a foundation $3\frac{1}{4}$ feet thick and $4\frac{1}{2}$ feet deep. The blocking course will be $1\frac{1}{4}$ feet deep, and the parapets $1\frac{1}{2}$ feet thick, and 3 feet high. The flooring to be $1\frac{1}{2}$ feet thick, supported by a retaining wall in front $1\frac{1}{2}$ feet thick, and 4 feet deep. The vents will be covered with cut-stone 9 inches thick. Over the vents the clear width of road-way between parapets will be 15 feet, and between wing-walls 24 feet. The tunnel is to be built of brick-in-chunam.

A similar tunnel on the Yeral road. Estimate Rs. 880. No. 10.

A syphon sluice under the Ahtoor channel, where it crosses the Tenterapery channel, three vents, Rs. 6,320. Estimate No. 7.

The body of the sluice is to be 70 feet in length, $26\frac{1}{2}$ feet in breadth, and $4\frac{1}{2}$ feet deep. The foundations of the cisterns in front and rear to be $27\frac{1}{2}$ feet average

length, $11\frac{1}{4}$ feet in breadth, and $4\frac{1}{2}$ feet deep. The wing-walls are to be 6 feet in length, $2\frac{1}{2}$ feet average thickness, and $7\frac{1}{2}$ feet deep; built on a foundation 5 feet in breadth, and $4\frac{1}{2}$ feet deep. The abutments are to be 4 feet thick, and the piers $2\frac{1}{2}$ feet, inclusive of the cut-stone casing, 9 inches thick; and to be raised to a height of 4 feet, the versed sine of the arches will be 1 foot, making a total height of 5 feet to the soffit. The sluice is to consist of three vents, 4 feet in width, the arch-work being 2 feet thick. The side walls of the cisterns are to be $2\frac{3}{8}$ feet average breadth, their mean height being $7\frac{1}{2}$ feet, and the end walls are to be $1\frac{1}{4}$ feet mean thickness, and 4 feet deep. The face walls above the arches are to be 25 feet in length, $1\frac{1}{2}$ feet thick at top, and 2 feet in bottom, and 4 feet deep. The sides and flooring of the vents and cisterns are to be lined with cut-stone 9 inches thick.

The sluice is to be otherwise constructed of brick-in-chunam.

A calingulah at the southern extremity of the Ammenpura tank, and another at the southern extremity of the Kanum tank, each similar to that for the Payacolum tank on the north side, each Rs. 2,790. Estimates Nos. 16 and 17.

Head Sluice at the west end of Cadamba tank. Rs. 3,390. Estimate No. 5.

The abutments and piers are to be built 6 feet high, on a foundation 33 feet in length, $24\frac{1}{4}$ feet in breadth, and 6 feet deep. The sluice is to contain four vents each 4 feet in width, the thickness of the abutments is to be 4 feet, and that of the piers $2\frac{1}{2}$ feet, inclusive of the cut-stone casing 9 inches thick. The vents will be covered with cut-stone 9 inches thick. The wing-walls are to be 19 feet in length, $1\frac{1}{2}$ feet thick at top, and 3 feet at bottom, the height being 9 feet. The foundations of wing-walls will be $4\frac{1}{2}$ feet thick and 6 feet deep. The length of the cut-waters is to be $1\frac{1}{4}$ feet, and the caps to be 9 inches high.

The front face walls, including the platform for working the shutters, will be $31\frac{1}{2}$ feet in length, $5\frac{1}{2}$ feet thick, and $2\frac{1}{2}$ feet high, the rear wall being 2 feet thick. The parapet walls of the same length to be $1\frac{1}{2}$ feet thick and 3 feet high.

The rear apron, which is 31 feet average length, $15\frac{1}{4}$ feet wide, and 3 feet thick, is supported by a retaining wall 36 feet in length, $2\frac{1}{2}$ feet thick, and 6 feet deep; sixteen cross stones are provided for the four vents to hold the shutters. The sides and flooring of the vents are to be faced with cut-stone 9 inches thick. The road-way over the sluice will be 15 feet in width, between parapets. A rough stone revetment is to be built 15 feet in length, 3 feet thick, and $4\frac{1}{2}$ feet average height, at each end of the wing-walls.

With the exception of the apron and the revetment, the sluice is to be constructed of brick-in-chunam.

A similar head sluice for the channel round the Cadamba tank, but with three vents and the road-way 6 feet wide. Estimate Rs. 2,280. No. 14.

Aqueduct for passing Tenkarrai surplus channel over the new channel round the Cadamba tank, Rs. 10,126. Estimate No. 15.

The abutments and piers are to be built on a foundation $100\frac{1}{2}$ feet in length, 33 feet in breadth, and 6 feet deep. The aqueduct is carried over four arched vents, each 4 feet in width. The thickness of the abutments to be 4 feet, and that of the piers $2\frac{1}{2}$ feet, inclusive of the cut-stone casing 9 inches thick, and the height of piers and abutments to be 4 feet; the versed sine of the arches will be 1 foot, making a total height of 5 feet to the soffits, and the thickness will be 2 feet. The foundations of the wing-walls are to be 6 feet thick and 6 feet deep, the wing-walls above to be 25 feet long, 3 feet thick at top, and $4\frac{1}{2}$ feet at bottom, their height being 13 feet. The parapet walls of the waterway will be 6 feet high, 3 feet thick at top, and $4\frac{1}{2}$ feet at bottom. The breadth of the water-way between parapets will be 90 feet.

A rough-stone revetment is provided at each end of the wing-walls, 6 feet in length, 3 feet thick, and 7 feet deep. The aqueduct is to be constructed otherwise of brick-in-chunam.

An embankment will be raised for a length of 100 yards along each bank of the surplus channel, with a top thickness of 6 feet, to prevent the water spreading on either side.

A calingulah and regulating dam in the Shedavycal tank bund, similar to that provided for the Avudayar Colum tank, No. 12, Rs. 520.

An irrigating Sluice in the bund of the Shedavycal tank, 72 feet in length, on the usual sluice plan. Rs. 325. Estimate No. 11.

Bungalow, Rs. 3,370.

The building is to be $63\frac{1}{2}$ feet in length and 38 feet in breadth, comprising one room 24 feet long and 18 feet broad, one room 18 feet square.

Two verandah rooms, each 12 feet in length and 7 feet in breadth, and a verandah all round 7 feet in breadth, supported by 16 pillars. The basement of the walls and pillars is to be 2 feet thick and 2 feet deep, raised on a foundation $2\frac{1}{2}$ feet thick and 3 feet deep. The basement or retaining walls between pillars is to be $1\frac{1}{2}$ feet thick and $3\frac{1}{2}$ feet deep, including the foundation.

The principal walls will be $1\frac{1}{2}$ feet thick and 12 feet in height, and the verandah pillars and walls are to be 7 feet high and $1\frac{1}{2}$ feet thick. Seven doors are provided, each 4×7 for the main building, and six windows, each $3\frac{1}{2} \times 5$; the verandah rooms are to have two doors each, 3×6 and $2\frac{1}{2} \times 5$, and one window $2\frac{1}{2} \times 3\frac{1}{2}$ in the rear walls. The hip roof consist of couples, with two collar pieces, jack and hip rafters, reepers, pantiles, etc. The building is to be floored with square bricks. The foundations, basement, pillars, retaining walls, as well as the jambs and soffits of doors, and jambs and cills of windows, are to be of brick-in-chunam: the walls being of brick-in-clay and plastered with chunam. The whole roof is to be made of palmyrah wood, except the bressummers and wall plates, which will be of Vengay wood.

Out-houses.

The out-houses consist of two rooms, each 12 feet long and 8 feet broad, with open godown in rear.

The outer walls, of brick-in-clay and $1\frac{1}{4}$ feet thick, have a foundation 2 feet thick and 2 feet deep. The pillars are $1\frac{1}{4}$ feet square and 8 feet in height, each room will have a door 3×6 , and a window 2×2 . The rear godown is to be floored with gravel.

MADURA,
8th August 1868.

H. L. PRENDERGAST, Capt., R.E.,
Executive Engineer.

Memorandum by the Chief Engineer for Irrigation.

(Here enter 28th September 1868.)

Order—No. 3365, 26th October 1868.

IRRIGATION No. 25.

With his Memorandum above recorded the Chief Engineer for Irrigation submits a project estimated to cost Rs. 8,31,600 for extending irrigation from the Tambraparni river in the Tinnevely district by the construction of an anicut across that river at Srivai kuntam, and of channels to be taken off from either flank for the better supply of several tanks, and for the irrigation directly from those channels of a considerable tract of land on either side of the river.

2. As the project appears to have been carefully designed and matured, and promises not only to be remunerative, but, in other respects very beneficial, and Excellency the Governor in Council will have much pleasure in submitting it for the sanction of the Government of India. Meanwhile, considering the importance of the undertaking, and the interest with which the cultivating classes are stated to look forward to its early execution, the Government resolve, in anticipation of the sanction of the Right Honourable the Governor-General in Council, and in accordance with the recommendation of the Superintending Engineer, to authorize the collection of materials to be proceeded with, and the construction of the work

to be put in hand with the assignment of Rs. 58,100 which has been made for it in the budget of the current official year.

(Here enter No. 3366, dated 26th October 1868.)

(True extract)

S. ORR, Col. R. E.,
Secretary to Government.

To the Chief Engineer for Irrigation.
" Superintending Engineer, 8th Division.
" Controller of Public Works Accounts.
" Accountant-General.
" Revenue Department, with Note by the Honourable A. J. Arbuthnot.
" Collector of Tinnevely.

Proceedings of the Board of Revenue, No. 2190, dated 2nd April 1869.

Proceedings of the Board of Revenue, No. 4469, dated 21st June 1869.

READ—the following paper:—

Proceedings of the Madras Government, Revenue Department, No. 1722, dated 17th June 1869.

ABSTRACT.—Proceedings of Government, Public Works Department, communicating to the Officer concerned Proceedings of the Government of India, forwarding a copy of a Despatch from the Home Government regarding irrigation works on the Tambraparni river in the Tinnevely district, communicated to the Board of Revenue.

Resolution—No. 4469, dated 21st June 1869.

Communicated to the Acting Collector of Tinnevely.

(A true extract)

A. MACGREGOR,
Acting Secretary.

To the Acting Collector of Tinnevely.

READ—the following paper:—

Proceedings of the Madras Government, Public Works Department, No. 836, dated 24th March 1869.

ABSTRACT.—Communicating Proceedings, Public Works Department, passing orders on the letter from the Government of India, sanctioning, with remarks, the estimates amounting to Rs. 8,31,600, for extending irrigation from the Tambraparni river in the Tinnevely district.

Resolution—No. 2190, dated 2nd April 1869.

Communicated to the Collector of Tinnevely.

(A true extract)

A. MACGREGOR,
Acting Secretary.

To the Collector of Tinnevely.

Letter—from Lieut. F. S. SHEPHERD, R.E., Assistant Engineer, Officer in charge of Srivaikuntam Ancient Project.

To—the Superintending Engineer, Padugudi, the 8th Division.

Dated—6th April 1870.

No.—4.

I have the honour to report that the sum of Rs. 3,17,847 have been expended on the Srivaikuntam ancient project during the last official year. The details of expenditure under each head are shown in the account appended and the following are the particulars of progress under the chief heads of the estimate:—

Anicuts	67 completed.
Head sluice	39 "
Channel on south side	80 "
Tanks on south side	81 "
Masonry works, south side	69 "
Channels, north side	33 "
Masonry works, north side	20 "
Tanks, north side	12 "

The whole of the foundations of the anicuts and southern wing wall and about half of that northern wing wall are completed with exception of foundation to retaining wall of rough stone apron. 1,000 feet of the anicut is completed up to level of top of cutstone apron. 195 feet of the foundation of body and cut stone apron is built up to within an average of 1½ feet of the top of cut stone.

apron. 500 feet of the body of the anicut is completed to an average height of 5 feet and 400 feet to an average of 2½ feet.

Plenty of labour was available during the first seven months of the year and the works were pushed on vigorously during that period. In the month of November disastrous floods occurred which did considerable damage to the works. The monsoon in December and January was also unusually heavy and retarded the work. A large amount of emergent repairs have been executed in the taluk at higher rates than allowed for the project. Much of the labour which would otherwise have been employed on the project has been thus diverted. The river has been unusually high for the season of the year and prevented rapid progress, especially as most of the remaining work on the anicut lies in the deep bed of the river. Cholera has also broken out at Srivaikuntam, Yeral and Poreur. It has on this account been found impossible to avoid a balance of about Rs. 56,000 at the close of the last year.

ENCLOSURE.

Expenditure on new works during the year 1869-70.

District and range.	Military.	Civil buildings.	Agricultural.	Communications.	Miscellaneous public improvement.	Total.	Remark.
Tinnevely, kuntam project.	...	...	Rs. 3,17,847	...	..	..	...

Letter—from Lieut. F. S. SHEPHERD, R.E., Assistant Engineer in charge of Srivaikuntam Ancient Project.
To—the Collector of Tinnevely.
Dated—Padugudi, the 7th April 1870.
No.—7.

With reference to petition No. 309 (herewith returned) I have the honour to inform you that to avoid disputes with the cultivators under the Cadamba tank it would be better to supply the lands in question from a sluice in the Poreur channel.

Letter—from H. B. GRIGG, Esq., Acting Head Assistant Collector.
To—the Collector of Tinnevely.
Dated—5th May 1870.
No.—185.

I have the honour to inform you that a portion of the land under the Chetticolam tank in Tenkarai taluk is required to be taken up for the northern channel of the Srivaikuntam anicut. Mr. Shepherd has forwarded to me a plan of the locality with the remark that as the owner of the land is indisposed to give it up, it will probably be necessary to enforce the cession by resort to Act VI of 1857.

The village of Setticolam belongs to the Pagoda of Nellaiyappar at Tinnevely, the Tahsildar, to whom I referred Mr. Shepherd's letter, reports that the dharmakarta or trustee of the pagoda was written to on the subject and absolutely refuses to give up the land.

As the dharmakarta will not come to terms, there seems no other course open but to fall back on this Act, I therefore beg you will submit the matter to Government with a view to obtaining their sanction under section 2 of the Act.

I beg to forward the entire records connected with the subject for your disposal, drawing your special attention to Mr. Shepherd's statement that the work is stopped pending the settlement.

Letter—from H. B. GRIGG, Esq., Acting Head Assistant Collector.
To—the Collector of Tinnevely.
Dated—Camp, Alwar Tinnevely, the 19th July 1870.
No.—299.

I beg to inform you that on receipt of your Docket * No. 1076, dated 14th instant, I addressed Mr. Shepherd and asked him if the line in which the Northern Channel should run could be altered to meet the wishes of the Pagoda Committee, and I enclose copy of his letter received in reply.

As Mr. Shepherd asserts that the request of the committee cannot be complied with, I request that application be at once made to Government in view to the provisions of Act X of 1870 being put in force.

The records connected with this case, I forwarded to you with my letter No. 185, dated 5th May last.

Letter—from H. B. GRIGG, Esq., Acting Head Assistant Collector.
To—the Collector of Tinnevely.
Dated—Camp, Alwar Tinnevely, 22nd July 1870.
No.—308.

Referring to the enclosed original letter † received by me from Lieut. F. S. Shepherd together with its enclosure I have the honour to request you will be pleased to favour me with your opinion on the following point.

2. The land alluded to in the letter under reference is punjah consisting of 23 decimals with 20 palmyras.

3. This land has already been marked out and included in the southern channel within the limits of kanum village near Ammanpuram.

4. No assessment was hitherto charged the Mission for the land as pattah was only granted for the palmyras and teerwah charged only for the trees.

5. Other lands of the same description and garden lands have been taken both for the southern and northern channel but no compensation paid for such, as according to the custom of this district the land is still presumed by a fiction to belong to Government. The ryots have only been permitted to take for their own use all the trees cut down without paying any melwaram or Government share to the Cirkar.

6. But some of them still complain that they have good claim for compensation although they held no pattah for the land on the ground that if the trees were damaged or blown down by wind, etc., they would cultivate the land and pay assessment, if not, they say where would be the use of planting trees on their lands in future.

7. It seems to me that their claim is a just one. To give them merely the trees and to remit the Government demand is but partial compensation. I have, however, declined to give compensation as such was not done heretofore and I did not wish to agitate the question. However as the claim has been made we must meet it. I, therefore, beg that you will instruct me as to what course I should follow either as heretofore simply to give the trees and remit the teerwah or to pay a fair compensation for the loss of the tree or what commends itself to my mind as the simplest course, viz., to give the trees and remit the teerwah and pay the lowest rate given for Punjah land taken, viz., about Rs. 35 per acre.

Letter—from J. A. DAVIES, Esq., Assistant Collector in charge, Head Assistant Collector's office, Tinnevely.
To—the Collector of Tinnevely.
Dated—Tinnevely, 18th November 1870.
No.—497.

I have the honour to forward for disposal urzi, § dated 14th instant, received from the Tahsildar of Tenkairai on the subject of compensation claimed by the Trustee of Nallaiyappar Pagoda at Tinnevely for the lands required for the northern channel of the Srivaikuntam anicut.

§ With enclosures to be returned.

Although the rate demanded by the Pagoda is much higher than that hitherto paid for lands of similar description in other villages yet considering the emergency of the occasion and the reluctance of the Trustee to give up the land, I am of opinion that it may be best to grant the higher rate proposed by the Tahsildar and settle the matter at once.

Memorandum No. 1654 dated 30th November 1870, to the Acting Head Assistant Collector with reference to his letter No. 497 of 19th November 1870.

The compensation claimed by the trustees of the Nallaiyappar Pagoda for lands taken up for the Srivaikuntam anicut may be adjusted as under.

5 cottahs and 8 mercals of irrigated land single crop at Rs. 577½ per cottah, the dry at the rate of Rs. 27½ per mercial. The Collector proposed 25 and the trustees Rs. 30 per mercial, the difference was eventually halved. The dry lands consist of 4 chaims and 11/16 assessed with the palmyras at Rs. 3 per annum. The palmyras were cut down and taken away by the trustees but throwing them in we may value the land at 20 years purchase of the assessment, viz. Rs. 60.

The terms have been agreed to by the trustees for Rs.

Letter—from Lieut.-Col. R. A. ROBERTS, R.E., Acting Superintending Engineer, 8th Division.
To—the Collector of Tinnevely.
Dated—Palamcottah, 9th May 1871.
No.—388.

I have the honor to forward herewith a plan with estimate and specification of a Bridge of 33 feet arches of 36 feet span each proposed to be built over the Srivaikuntam anicut.

2. You will observe that on the drawing the sections are coloured to distinguish the work which has been carried out from Imperial funds, and that being performed in anticipation of the Government's sanctioning the work.

3. Thus, all the foundations, which have been carried out from Imperial funds, (being sanctioned originally as part of the anicut) are coloured red, while the part coloured blue shows the work which is being constructed in anticipation of sanction, and consists of the piers which are being constructed for a height of 6 feet, the abutments of 17 feet and the wing walls of 20 feet, above the level of the flooring of the anicut.

4. The estimate amounts to Rs. 76,850, from which if we deduct Rs. 38,840 subscribed by the ryots, which sum as I understand is deposited in the Huzur Treasury and is available for the work, a balance of Rs. 38,010 will remain to be provided.

5. The questions regarding which I now desire to obtain information are two, viz.—

1st. Is the sum of Rs. 38,840 available for immediate use? that is, can the construction of the Bridge proceed, as it is most desirable it should do, simultaneously with that of the completion of the anicut, supposing of course that the Government approve of the plan now submitted?

2nd. From what funds do you consider it will be possible to provide the Rs. 38,000 required, as above stated, to complete the bridge?

6. As regards the plan itself. I cannot but think it is an error to construct a bridge of so great a length nearly 1,400 feet, with a roadway of only 15 feet! In my opinion the roadway should have a minimum width of 18 feet. There is no constructive difficulty in so carrying out the bridge as to admit of this width being given it, but the additional cost thus entailed would probably amount to Rs. 15,000, or say Rs. 91,000 for the whole structure.

7. You are aware of the very great importance that the bridge would be not only for the topical traffic, but for the very considerable traffic between this place and Tuticorin, during these months when the Tambrapoorney is in flood, and when its unbridged passage offers so serious an obstruction to the traffic on the direct Tuticorin Road. Coming round by this bridge would add only 7 or 8 miles to the length of road, while it would enable the river to be crossed without the slightest discomfort.

8. I shall be much obliged therefore by your kindly favoring me with your opinion on these points, before the plan and estimate are submitted in proper course to Government for sanction.

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Superintending Engineer, 8th Division.
Dated—Tuticorin, the 18th May 1871.
No.—78.

I have the honor to return herewith the three enclosures of your letter No. 388, dated 9th instant, a bridge across the Tambraparni at Srivaikuntam would no doubt be very useful there being no bridge available for traffic over that river at all at present and the lowest bridge now in ruins but under repair 35 miles from the mouth of the river. When in Madras some two years ago I was asked how the money subscribed by the ryots towards the anicut could best be laid out and I replied on a bridge over the work—the sum of Rs. 38,840 has since been lying idle in the treasury and is available for outlay at once. It is easy to make up the difference of Rs. 38,000 for a 15 feet bridge or Rs. 51,000 for an 18 feet bridge as all roads bridges, etc., will be local fund works in future and our road cess is to be raised to 9 pice in the rupee of assessment. There will therefore be no difficulty in allotting the sum required in 1871-72 and 1872-73.

I agree with you in thinking it a great pity to build so long a bridge with only a 15-foot roadway and have seen the disadvantage of this limited width in the case of the Ambasamudram bridge—it would, I think, be well worthwhile to lay out the additional sum you name in securing an 18-foot roadway. As so much money has been subscribed by the ryots, I am averse to putting a toll on this bridge or on any bridge over the Tambraparni; all having been built at private cost.

Letter—from Lieut.-Col. R. A. ROBERTS, R.E., Acting Superintending Engineer, 8th Division.
To—the Collector of Tinnevely.
Dated—Madura, the 15th June 1871.
No.—836.

I have the honor to state that the expenditure on the Srivaikuntam anicut project during last year is Rs. 98,310-0-1 and not Rs. 94,313-5-7 as mentioned in my letter No. 549, dated 25th ultimo.

2. The excess of Rs. 3,996-10-6 in the total now named is due to the amount for compensation for land having been reported to this office, in the first instance, as Rs. 22,170-13-2, instead of Rs. 26,167-8-0 the amount actually paid.

Proceedings of the Madras Government, Revenue Department, No. 83, dated 15th December 1871.

Read—the following paper:—

Proceedings of the Board of Revenue, No. 4932, dated 5th December 1871.

Read—the following paper:—

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—the 1st September 1871.
No.—380.

In reply to Board's Official memo No. 1121, dated 24th August 1871, I have the honour to inform you that one (1) the figures 4-6-10 were obtained on the calculation of half the present assessment of the area made over in lieu of the inam land taken for the channels from the Srivaikuntam anicut which was chargeable with a quit-rent of half assessment.

2. There was no special sanction for the compensation for 2.75 acres. This area was included with all others taken up for the channels and was paid for at one and the same time from the anicut funds.

3. The payment of money compensation instead of land was a mistake. It has, however, been done some time ago and as the recipient is a pauper, I doubt the possibility of getting it back now. It was difficult to distinguish between the inam lands belonging to Pudugudi Kasthuriengappa Nayakan individually and those he held in trust for a pagoda—he was paid from the anicut funds.

Resolution No. 4932, dated 5th December 1871.

Submitted for the sanction of Government.

2. In lieu of 0.63 acre assessed at Rs. 8-13-6 subject to a quit-rent of Rs. 4-6-9, Religious and Charitable Service Inam, in Sriparankusanallur of the Tenkarai taluk, taken up for public purposes, it is proposed to grant a fresh assignment of 0.65 acre, bearing an equal amount of assessment and subject to half quit-rent.

3. It appears that the endowment of the Pudukudi Chuttram and Pagoda consisted of 13.7 acres assessed at Rs. 167 subject to a quit-rent of half that amount, and that 3.38 acres were taken up for an irrigation channel. For 2.75 acres assessed at Rs. 31-9-2 subject to a quit-rent of Rs. 15-10-7 money compensation once for all amounting to Rs. 1,427-8-0 was paid to the Trustee from the Srivaikuntam anicut funds. It is proposed to grant a fresh assignment of land for the remainder as stated in paragraph 2.

4. In reply to an Official Memorandum requesting the Collector to quote the order sanctioning payment of the money compensation and to explain the circumstances under which money compensation instead of a fresh grant of land was proposed in lieu of land forming the endowment of a Religious and Charitable institution the Collector states that the payment of money compensation was a mistake made some time ago and that the recipient being a pauper, he doubts the possibility of getting it back now. He also observes that it was difficult to distinguish between the lands belonging to Kasturi Rangappa Naikan individually and those held by him as Trustee.

5. The Board observe that had previous sanction for the compensation been solicited according to the Board's Standing Orders the mistake would not have occurred, but under the circumstances mentioned by the Collector they do not see how it can now be rectified.

6. They do not understand how there could be any difficulty in distinguishing between Personal and Service Inams as the Inam Registers show the nature of the grants.

(True extract)

J. B. PENNINGTON,
Sub-Secretary.

To the Secretary to Government, Revenue Department,
with an original letter and statement.
Copy to the Collector of Tinnevely.

Order—No. 83, dated the 15th December 1871.

The compensation is sanctioned.

(True extract)

W. HUDLESTON,
Secretary to Government.

To the Board of Revenue with two enclosures.

Mis. No. 4764.

Communicated to the Collector of Tinnevely.
(By Order).

Revenue Board office, Madras,
20th December 1871.

J. GROSE,
Secretary.

Letter—from H. W. RUNDALL, Esq., Executive Engineer, Southern Range.
To—the Collector of Tinnevely.
Dated—Palamcottah, the 23rd December 1871.
No.—410.

I have the honour to forward herewith a statement prepared by Lieut. Shepherd, R.E. Executive Engineer, showing the points where he proposes to build sluices in the anicut channels and the approximate area for the irrigation of which each sluice would be adopted.

2. I shall feel obliged if you will inform me whether in your opinion the proposed location of the sluice is the most advantageous which can be adopted, and also whether the area assigned to each sluice approximately correct.

3. It may be desirable to alter slightly the position of some of the sluices with reference to the boundaries of villages, and any remarks from you on these points will receive attention.

4. It is desirable now that no time be lost in fixing the sites of those sluices already sanctioned. It can hardly be supposed that these 38 sluices will be all that are required, but properly placed, they are quite enough to start with.

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.

To—the Executive Engineer, Southern Range.

Dated—Tinnevely, the 26th December 1871.

No.—337.

In reply to your letter No. 410, dated 23rd instant, I have the honour to inform you that the otak war measurements showing the position of sluices on the channels under the Srivaikuntam anicut are hardly sufficient for my purpose. To enable the executive authorities and the villagers to satisfy themselves as to the whereabouts and sufficiency of the proposed sluices it will be necessary to mark them out on the ground, and for this purpose it would be well to drive in a stake with a placard attached on the site of each sluice.

If you will then furnish me with a list showing the villages that each sluice will supply I will direct the Tahsildar to go over the ground with the villagers and report if anything further seems needed.

The water spread of the tanks under the northern channel in the limits of the Karaikurichi mittah might be defined at once.

Proceedings of the Board of Revenue, No. 74, dated 10th January 1872.

Read—the following paper:—

Letter—from R. K. PUCKLE, Esq., I.C.S., Collector of Tinnevely.

To—the Secretary to the Board of Revenue.

Dated—the 9th December 1871.

No.—518.

The amount subscribed by the ryots of the Tenkarai taluk for the head sluice and channel the construction of which immediately preceded that of the Srivaikuntam anicut was Rs. 40,000. In Proceedings of Government No. 1843, dated 29th June 1869, this amount was ordered to be paid out as the ryots' subscription to a bridge over the anicut—the piers of this bridge are completed in part up to the level of the crown of the anicut and have so far cost Rs. 8,000, their completion to the same level throughout will cost Rs. 2,000 more, total Rs. 10,000.

It now appears that the Engineers are rather afraid of constructing a bridge over the work on account of the increased scour that a diminished water-way will give rise to and it is certain, as far as through traffic is concerned, that a bridge is not needed at all. It will moreover be very costly and the Government will probably have to meet a charge equivalent to the amount already subscribed. I was camped by the side of the work a few days ago when the river came down in freshes and rose at the rate of a foot per hour to within three feet of the crest of the cart tracks and foot ways that pierce the river bank. Two years ago the river rose still higher and immense damage was done by the breaching of the crazy embankment that is intended to keep the river within bounds. The people are very anxious to have these embankments secured throughout the whole length of the taluk and an estimate has been prepared for this purpose but there are no Imperial funds available to carry it out.

As no work that could be undertaken would confer anything like the same benefit on the taluk generally and the estimate is within the amount of the unspent balance of the ryots' subscriptions I propose that this balance be withdrawn from the bridge project which may well stand over for future consideration and that it be devoted to the thorough embanking of the river from the Srivaikuntam anicut down to the sea. The Executive Engineer in charge of the irrigation range and

the Executive Engineer in charge of the Srivaikuntam anicut project agree in thinking with me that the embankment is more important than the bridge. I have not consulted the Superintending Engineer as he is away from the district and the project if approved by the Board will naturally be referred for his opinion.

Resolution No. 74, dated 10th January 1872.

Submitted for the orders of Government

2. The Board approve the transfer of the balance from the proposed bridge to the embankment, as it appears to be suggested in consonance with the opinion of the subscribing ryots.

(True extract)

J. B. PENNINGTON,
Sub-Secretary.

To the Secretary to Government, Revenue Department,
with original letter to be returned.
Copy to the Collector of Tinnevely.

Letter—from Lieut. F. S. SHEPHERD, R.E., Executive Engineer in charge of Srivaikuntam Anicut Project.

To—the Collector of Tinnevely.

Dated—Pudugudi, the 22nd April 1872.

No.—52.

As requested in your letter No. 128 of the 16th instant I have the honour to forward herewith a list showing the amount expended by this department on the Srivaikuntam anicut project during the year 1871-72.

ENCLOSURE.

List showing the amount expended by the Department of Public Works on the Srivaikuntam Anicut Project in 1871-72.

Expenditure in 1871-72.		Expenditure in 1871-72.	
Rs.	A. P.	Rs.	A. P.
Anicut at Srivaikuntam	501 6 10	Two Dams in Channel	
Groynes		Kipadagai Head sluice	233 3 3
South Head sluice	304 0 0	Sivaramangalam Bridge	73 15 7
South Channel		Mangalacuruchy Bridge	915 11 4
Kulasekarapatnam Road Bridge	1 12 6	Korkai Head sluice	595 13 0
Syphon sluices at Tricalur	50 4 4	Syphon sluices at TATER	332 1 11
Tricalur Bridge	107 15 2	Bridge and Calingula at Yarel	1,323 14 9
Gadamba Head sluice	122 12 7	Causeway	623 5 2
Athur Head sluice	111 7 7	Siruthonda Bridge	234 12 2
Athur Channel	6,538 13 6	Double Dam	1,692 0 8
Tiruchendur Road Tunnel	1 1 2	Palayakayal Road Bridge	75 5 11
Yarel do. do.	1 1 3	Marathony Tank	116 6 4
Athur aqueduct	82 9 3	Do. Calingula	493 0 11
Two drops in Athur Channel		Padu and Pottackulam Tank	5,200 12 3
Saithuvoycal Calingula	647 3 7	Do. Calingula	1,689 10 11
Rough stone pitching	171 0 8	Chinnaswamy Naiken Tank	26,149 9 3
Poraiyar Head sluice	337 6 11	Oopar Odai Dam	8,171 9 0
Do. Channel	7,026 9 11	Do. Embankment	162 12 5
Do. Bridge		Tuticurin Channel	14,015 0 7
Annenpuram Calingula		Small sluices	
Canam Calingula	787 7 7	Office Bungalow	
Tulaken Head sluice and drop	77 13 4	Temporary sheds	
Do. Channel	2 4 6	Compensation	748 7 0
Do. Drop	554 8 7	Damage to materials	
Do. Tank		Tools and sundries	
Do. Calingula	175 0 11	Rough stones	
Canam Channel	2,643 0 11	Small Channels	
Do. Drop		Materials and manufacturing Bricks	517 4 7
Ellapansaioken Tank	1,792 7 0	Superintendence	7,123 11 2
Do. Calingula		Bridge	7,861 11 4
Avudayar Head sluice			5,533 3 0
Do. Channel			
Do. Tank	141 13 10		
Do. Calingula	0 15 0		
North Head sluice	5,831 8 0		
Do. Channel	49,223 0 5		
		Deduct Recoveries	1,61,241 15 2
			61,654 10 7
			99,587 4 7

*Proceedings of the Government of Madras, Revenue Department,
No. 25, dated 5th August 1872.*

Read—the following paper :—

*Proceedings of the Government of Madras, Public Works Department,
No. 1777, dated 26th July 1872.*

Read—the following paper :—

Letter—from the Superintending Engineer, 8th Division.

To—the Chief Engineer for Irrigation and Joint Secretary to Government,
Public Works Department.

Dated—Madras, the 1st July 1872.
No.—1469.

In reference to the enclosed letter* No. 139, dated 23rd April 1872, and its accompaniment, received from the Collector of Tinnevely, regarding funds for the Tambraparani river bunds in the Tenkarai Taluq of the Tinnevely District, I have the honour to state that the ryots' contributions to the Srivaikuntam Anicut Project were expended on the south channel and south head sluice previous to the sanction of the estimate for the same; the amount of this expenditure, namely, Rs. 38,840, was by the Controller of Public Works Accounts charged against the anicut estimate in the accounts for April 1870 by adding the above sum to the expenditure up to 31st

March 1869-70. This course was no doubt correct inasmuch as the money was expended on items included in the estimate, but it follows that out of the total expenditure shown on the project the sum of Rs. 38,840 has not been provided by Government, and the Government, I think, need reminding that this sum still remains to be repaid by them, otherwise they will allot only the balance which the accounts show to be available.

2. I may mention that as the Collector now proposes to spend a sum of Rs. 19,060 towards restoring the river embankments out of the said sum of Rs. 38,840, and as he is very anxious that the repairs should be completed before October next, I request that you will be so good as to obtain the early sanction of Government for an allotment of Rs. 20,000, as suggested by the Collector in his letter above quoted.

3. I think it as well to call your attention in this connexion to G.O. in the Revenue Department, dated 14th March 1872, No. 449, received with order thereon, dated 22nd March 1872, No. 205.

Order—No. 1777, dated 26th July 1872.

Irrigation No. 22.

In their Order No. 2987, dated 25th September 1867, the Government authorized the appropriation of certain funds, contributed by the villagers for the Srivaikuntam Anicut Project, for the collection of materials for that work; in No. 1417, dated 30th April 1869, it was ruled that the contributions of the villagers should be brought into the accounts of the Public Works Department; in No. 1926 of 14th June 1869, it was resolved that the contributions of the villagers should not be accepted in aid of the project works, but that they should be appropriated for the construction of a bridge over the anicut; and in G.O. No. 449 of 14th March 1872, Revenue Department, it was determined that the construction of the bridge should be postponed, the foundations of the piers up to the level of the crest of the anicut only being laid at an estimated cost of Rs. 10,000, and that the balance of the contribution, namely, Rs. 30,000, should be expended in repairing the river embankment from the anicut to the sea.

2. With the letter recorded at the head of these Proceedings the Superintending Engineer forwards a correspondence between the Collector and the Treasury Deputy Collector, from which it would appear that the amount expended upon the anicut works from the contributions by the villagers, namely, Rs. 38,840, has not been recovered from the sanctioned estimate as directed in G.O. No. 1926,

dated 14th June 1869, and the Superintending Engineer requests that an allotment of Rs. 20,000 may be made to admit of the repair of the river embankment being undertaken at once.

3. The Government resolve to sanction an appropriation of Rs. 20,000, from the allotment of Rs. 90,000 for the Srivaikuntam Anicut Project in the Budget of 1872-73, towards the repair of the river embankment in part re-payment of the contribution by the villagers, and should the Superintending Engineer require a further allotment for the anicut works during 1872-73 he will submit a supplemental estimate of his probable requirements, including in it the balance of Rs. 18,840 still due on account of contributions by the villagers, when the Government of India will be requested to make a further allotment for the work.

4. The Controller will issue instructions relative to the manner in which the recoveries now to be made should be adjusted in the accounts.

(True extract)

R. F. OAKES, Capt., R.E.,
Acting Joint Secretary to Government.

To the Superintending Engineer, 8th Division,
" Controller of Public Works Accounts,
" Acting Chief Engineer for Irrigation,
" Revenue Department.

Order—No. 25, Revenue, dated 5th August 1872.
Communicated to the Board of Revenue.

(True extract)

C. A. GALTON,
Acting Under Secretary to Government.

To the Board of Revenue.

Mis. No. 5604.
Communicated to the Collector of Tinnevely.
(By order)

REVENUE BOARD OFFICE,
MADRAS,
4th August 1872.

To the Collector of Tinnevely.

J. GROSE,
Secretary.

Memorandum by the Chief Engineer for Irrigation.

The project now submitted by the Superintending Engineer, 8th Division, is substantially the same, as regards alignment of channels and the tract of country to be commanded by them, as the one which was drawn up in 1855 by Colonel Horsley then District Engineer of Tinnevely. It differs from the latter, however, in other respects. Colonel Horsley proposed to adapt his main channels for navigation with the object of connecting them with the Coast Canal. In the present design irrigation only has been provided for. The surveys and levels have been carried out afresh with much care and minuteness, and with the aid of the additional information which has been thus obtained, combined with a careful inquiry into the circumstances of the country, it has been ascertained that a considerably larger area of land can be brought under irrigation than was contemplated by Colonel Horsley. In justice to that Officer, it should however be mentioned that the new levels which have been carried out by Captain Prendergast and Lieutenant Shepherd have served to confirm the accuracy of the original measurements; that the site he selected for the construction of an anicut across the Tambraparani has been retained; and that his various designs of masonry works, and for the general arrangement of the channels have formed the basis of the designs now submitted.

2. The project has been drawn up under the direction of the Superintending Engineer, 8th Division, Colonel Wilkieson. Lieutenant Shepherd was employed for three months in drawing up the preliminary surveys, and afterwards continued to work under Captain Prendergast. The result of their operations is, I consider, very creditable to both Officers, and particularly to Lieutenant Shepherd, whose

intelligence and indefatigable industry have placed him on the footing, so far as the value of his services to Government is concerned, of Officers of much longer standing in the department.

3. The Government are aware that Colonel Horsley's project, though pronounced well devised and feasible and actually sanctioned by them, was not carried out in consequence of the mutiny. It does not appear to have again attracted much notice until the present Collector of Tinnevely, Mr. Puckle, reported to the Board of Revenue that there had been remissions of revenue aggregating upwards of a lakh of rupees on the very land which would have been watered by the proposed channels, and that the people were so impressed with the advantage to be gained from an improved supply of water that they had subscribed and deposited in the Treasury upwards of 20,000 rupees as their contribution to the work; and the Government, being satisfied that the scheme would prove highly beneficial, authorized the appropriation of the amount subscribed towards carting a large quantity of fine stone which was available from the dismantled fort of Palamcottah to the site of the proposed anicut. A further sum having been contributed by the cultivators, a head sluice at the south bank of the proposed anicut, and a cutting from it to the Cadamba tank were commenced under the superintendence of Lieutenant Shepherd in April, and were completed or sufficiently far advanced, to allow of the freshes of the south-west monsoon being utilized, for the cultivation of the harvest season.

4. A memorandum recently submitted by the Superintending Engineer contains a description of the Tambraparni river generally, of the anicuts already in

Copy attached.

operation, the channels leading from them, and the extent and value of the cultivation. It may, therefore, suffice here to mention that the Tambraparni, though an insignificant river as regards its length, or the area of its catchment basin, is, for its size, by far the most valuable river in the Presidency. It is one of the four which alone derive a supply from the south-west monsoon, which as the Government are aware, compared with the supply from the north-east monsoon, constitutes all the difference between a certain and a precarious cultivation. The other three rivers, are the Godavery, the Kistna, and the Cauvery. The two former, with their branches, drain the eastern slopes of the ghats for a distance of 550 miles, and as far south as the Kudray Mukh (horse's head), a hill 5,000 to 6,000 feet high, and about forty miles east of Mangalore. The Cauvery drains a strip of country extending from thence to the Pulney Hills, and including the Neilgherries; and the only other rivers besides the Tambraparni which have their sources in the Western Ghats, viz., the Vigar and Vypar—the one in Madura and the other in Tinnevely—do not get a supply from the south-west monsoon, in consequence of their sources reaching only to the eastern edge of the ghats where the rain-fall is scanty. It is to turn the supply of the Perryaur from its natural course to the West Coast, across the water-shed which divides it from the plains of Madura, and thus to obtain for that district the inestimable benefit of an abundant supply from the south-west monsoon, that is the object of a scheme which has been brought forward by Captain Ryves and which is now under investigation.

5. I have mentioned these points, because the importance of making the most of all the available supply from the south-west monsoon cannot in this Presidency be over-rated. It is the only supply which has never been known to fail, and consequently the only real security against famines. Much has been said of late years of the necessity of maintaining, improving, and extending the means of irrigation in this country, and if a famine occurs immediate attention is drawn either to the inefficiency of the existing works, or to the want of new ones. But it is not always considered, that famines most generally occur—so far at least as this Presidency is concerned—in districts where not only tanks are dried up, but where the rivers which traverse them are dry also. There was a scarcity in the North Arcot and Madras districts only a few months ago, and though there has since then been a considerable fall of rain, which has had the most beneficial influence, the Palar river, the largest if not the most important source of supply in the two districts, and the one which would naturally be looked to as the best subject for

an artificial improvement on the supply derived from local rains, has been dry from February 1867 to the beginning of the present month, or for a period of nineteen months.

6. All the other rivers in the Presidency, with the exception of the four above mentioned, and to a certain extent the Pennair which has a very large catchment basin (20,000 square miles), and which even in the worst seasons brings down a considerable volume of water to Nellore, are in the same category as the Palar. They are most useful adjuncts in average seasons, when tanks may not derive an adequate supply from the fall of rain within the limits of the area drained by them but in famine years they are absolutely powerless.

7. The superabundant supply of the rivers which are fed by the south-west monsoon, if it could only be distributed over the Presidency would probably make up for the deficiency from other sources, but as this cannot be accomplished it is very desirable that every thing should be done which can be done to utilize that supply to the utmost in the localities immediately within the influence of these rivers.

8. The rate of assessment for lands under irrigation is, moreover, a very fair indication of the value of the water-supply. Along all the old native channels which derived a certain supply from the south-west monsoon, it was formerly, if it is not now, largely in excess of the average assessment of the irrigated lands throughout the Presidency. Thus, on the Calingaroyen and other channels from the Cauvery, and on the Toongahoodra channels in Bellary, the assessment of wet land was Rs. 12 and upwards. The improvement and extension of the irrigation channels in the Godavery and Kistna are of recent date, and the assessment is comparatively low, but on the old established irrigation system under the Tambraparni, it reaches the very high rate of Rs. 18 or Rs. 19 per acre. And the selling price of the land is also very high—1,500, 2,000, or even more per acre; whereas in Nellore, as I was lately informed, Rs. 40 per acre might be considered a fair rate of compensation for lands taken up for Government works. The above may probably be what may be called a fancy price for land, which people who have acquired wealth are ready to give, to be land-owners in a favoured spot, even if the outlay does not prove remunerative to them; but at all events it shows the singular value which the natives set upon such land, or rather upon the land combined with an abundant and never failing supply of water, for we do not hear of such prices being paid for land in other parts of the district.

9. The existing channels from the Tambraparni water a strip of alluvial land along its banks of from two to four miles in width. This land has been formed by the river, and is extremely fertile. It is moreover tilled and manured with an unusual amount of care, and the crops yielded by it are abundant, amounting, I was informed, in some cases to 130 bushels of paddy per acre in one year. The country rises rapidly out of the valley of the river, and the soil becomes gravelly and stony. If any improvement is capable of being effected along the upper section of the river, it would be in the form of channels starting from a high level and worked up along the slope of the country bordering the valley of the river, so as to admit of the surplus flood-water being carried into tanks which are now dependent for their supply on the local rains. But this operation would of course be more expensive in the first instance, and less remunerative in the second, than the conveyance of the river water to alluvial lands which are naturally within command of it. Hence, whatever ulterior improvements may be devised in connection with the Tambraparni the completion of the system of irrigation within the limits of the valley of the river should engage attention first of all. This is the scope of the present project.

10. There would be no object in building a dam higher up than the proposed site at Srivaikuntam, for at that site it will give the means of supplying all the land, that could be irrigated from any higher attainable level. The limits of the small delta at the mouth of the Tambraparni are, in fact, clearly defined by a range of sand-hills of considerable height. The channels could not be carried inland of them, and if carried to the seaward side they must be at such a distance as will render them secure from being filled up by the drifted sand. Captain Prendergast has, in my opinion, carried the lines of

NOTE.—Of a reddish singe which gives them a resemblance to heaps of powdered laterite.

channels quite as near the sand-hills as is consistent with safety, and if this be the case, he has aligned them to command the greatest area possible of land.

11. On both the north and south sides of the river the channels after being carried in a direction nearly parallel to that of the river, and skirting as closely as possible the cultivated lands under a series of tanks which draw a supply from the higher or Maradoor Anicut, are led to two important tanks of that series which now receive but an imperfect supply. It would, of course, have been possible to have so improved the channels from the Maradoor Anicut as to enable them to irrigate the whole of the land which it is proposed to include in the new project; but such a scheme would amount to an entire remodelling of them, and would certainly be more costly than the proposed works in consequence of rock prevailing in the cuttings, while it would deprive the lands of the benefits which the latter will procure for them, by intercepting the leakage and waste from the Maradoor Anicut.

12. It will be observed that Captain Prendergast has carried his main channels round, and not through, the two principal tanks they have to supply. Although I fear this arrangement will expose the channels to some extent to invasion by the drift-sand, it gives a power of distribution which would be wanting if the tanks in question had to be filled before the other tanks lower down got any water. This advantage is not continued to all the tanks in the series, because it would add very greatly to the expense of the project, particularly on the north bank. But it will be observed that the escapes to these tanks are adapted with sluices on a low level (five feet below full tank), and as their capacity up to that level is very considerable there will be no delay worth mentioning in passing on the water to the last of the chain.

13. With regard to the supply of water available for the new works, Captain Prendergast, in paragraph 3 of his report, explains that the discharge in March during the last five years has not fallen below 194 cubic feet per second, and that during the last hot weather (May) it was 324 cubic feet per second, also that for six months in the year (15th June—15th November) it is not less than 594 cubic feet per second.

14. The latter quantity, or 79,200 cubic yards per hour, he considers competent to irrigate 39,600 acres, allowing two cubic yards per hour per acre; which, if the experience gained in the Northern Deltas is to be trusted, is a sufficiently liberal allowance.

15. This has been taken as the standard or normal supply on which the capacity of the channels was to be based. The bottom width of each main channel has been fixed at thirty-six feet, and, with a depth of three feet they will each discharge a moiety of the above quantity with a velocity of about two and a half feet a second. At times during high freshes when a larger volume might be required, a depth of four and a half feet, and a velocity of about three feet per second, would give nearly double the normal discharge. I need not follow Captain Prendergast in his calculation of the mode by which he proposes to use the storing powers of the tanks, which are to be fed by his channels, to make good the deficiency in the river for a second crop. It may be sufficient for me to say that he has carefully considered the subject, and that his calculations are as close an approach to accuracy as the nature of the case admits of. It would have been more satisfactory if a register of the rise and fall of the river for five years had been furnished: but from what I heard when in Tinne-

* Colonel Wilkieson in May last made arrangements for keeping correct registers in future at several points.

vely I conclude that a complete record has not been kept up. If however, Captain Prendergast's account of the minimum monsoon discharge of the river at Srivaikuntam is correct, it serves to show how completely the Marudur anicut fails to intercept the supply that reaches it, for nearly every tank comprised in the present project is connected with the channels leading from that anicut, and might be supplied from it. In fact, the Marudur anicut does intercept the monsoon supply in a great measure, but a large proportion of it must find its way back to the river; and, apart from any wastage which may be due to the imperfections of the channels, the cultivators of the upper portion of the channel, after satisfying their own wants, will turn off as much water as possible in this way rather than let it reach the tanks at the lower part of the channel. This is the usual practice that

prevails in the old native systems of irrigation, and it is one which it is impossible to subvert unless Government take active measures in support of their own rights in the matter. When the new channels from Srivaikuntam come into operation, the officers in charge cannot be too careful to introduce a proper system of distribution from the first, and above all never to allow a cultivator to touch a sluice in the main or branch channels.

16. The following is a summary of the information furnished by the Collector regarding the extent of land to be irrigated by the new channels.
North bank—Total area under command of channel 39,023 acres.

	ACS.		ACS.
Present wet cultivation	4,091		4,091
Area under dry irrigation	18,535	deduct 8,585 leaving to be irrigated	10,000
Cultivable waste	8,329	"	3,329
Uncultivable waste	8,018	"	8,801
	39,023		19,932
			19,091

17. Of the first item 4,091 acres, 2,709 acres are single, and 1,382 double crop, so that there will be 15,000 acres dry and waste converted into wet (two crops), and 2,709 acres yielding a second crop.

18. On the south bank the total area under command of the channels is not given, but it does not differ greatly from that on the north.

19. The area to be irrigated is the following:—

	ACS.	
Wet cultivation	8,358	of which 1,036 acres yield one crop only.
Dry do.	1,631	
Waste do.	3,587	
	13,576	

So that, if the whole area be taken at 80,000 acres, the proportion irrigated will be about two-fifths.

20. The assessment is calculated at the rate of 4 rupees for the first crop, 2 rupees for the second, in addition to 1 rupee at which the land would be assessed for dry cultivation. Deducting present revenue, the gain would thus be found to amount to 1,42,385 rupees per annum, exclusive of the average loss to Government of 10,000 rupees for remissions in past years.

21. The Collector has not described in the letter accompanying the reports on the project, the principles on which the rate of assessment is based, nor is it my province to enter into the question; but, since Captain Prendergast, in paragraph 6 of his report, states that the Collector sets down the assessment at a proposed reduced rate of 7 rupees for a double crop, but deducts the present revenue on 4,091 acres, rupees 37,491, or at the average rate of 9 rupees per acre, to show the net gain, I must remark that, if it is intended to lower the assessment on the 4,091 acres in question to a rate of 7 rupees, that rate should, of course, be also taken as the basis of the calculation of gain to Government from the opening of the new works, since without those works the assessment would remain at that figure.

22. The proposed rate of assessment is much lower than that prevailing on the land watered by the Tambraparni channels generally. As I have already observed it is not in my province to enter into the question of revenue assessment, but it may not be foreign to the line of my duties to point out, that, as the new works will be carried out from the "Loan" grant, the Government of India are likely to demand that any additional water which is led by means of expenditure from that source, to extend the irrigation in any district, is paid for at the full value current in the locality. So that the question is not purely a land revenue one. The Government of India may set any price they please on the water thus provided, while the cultivators would equally have the liberty of using it or not, as they pleased. All I would venture to urge is the importance of not giving the water at too low a rate. The project now submitted is a very promising one, perhaps

the most promising that will come before Government from any part of the Presidency. A number of other projects are under preparation; which if carried out would doubtless improve the condition of the country, but there has been a great reduction of the revenue assessment in some districts, while the prices of labour and materials have much advanced; and I fear it will be the exception, rather than the rule, for the projects now under consideration to promise a certain return of five per cent on the outlay. Consequently, it may be anticipated that many of them will be returned as failing to come up to the standard required by the Government of India to entitle them to a grant from the "Loan" Fund. It is easily seen that if the rate of assessment is reduced by one-half, while prices of labour and materials are doubled, a return of twenty per cent is at once cut down to five per cent and this is hardly an exaggeration of the changes which have occurred within the last ten or fifteen years in various parts of the Presidency. Hence, it becomes a matter of vital importance for Government to secure the highest possible return, consistent with justice to the people, from lands irrigated under favourable conditions, since it is only by setting the net returns in excess of five per cent from such lands against the deficiency below that standard obtained from lands less favourably situated, that the aggregate returns from new irrigation works will reach the same standard, after deducting all charges of whatever kind.

23. The present project offers a very good example of the change that has occurred in the prices of labour and materials since Colonel Horsley's time, 1c55. Captain Prendergast in August 1867 sent in a comparative statement showing what the works would cost, by merely altering the rates allowed by Colonel Horsley, and the estimate by the latter officer was thus raised from Rs. 3,28,954 to Rs. 7,00,000 or more than double. The following are the former and present rates of some of the most important articles:—

	1855.			1867.		
	RS.	A.	P.	RS.	A.	P.
Brick-work per cubic yard ...	2	0	0	5	0	0
Cut-stone ...	7	0	0	12	0	0
Wells...	2	4	0	5	8	0
Jungle-wood, per foot ...	1	4	0	3	8	0
Earth-work ...	0	0	8	0	2	0
Kunker ...	0	12	0	1	8	0

24. The expected returns, according to the statement obtained from the Collector, amount to Rs. 1,52,385, or deducting ten per cent for repair and management, to Rs. 1,37,150 per annum, and the estimates to Rs. 8,31,600, that is 16.48 per cent. But some additional works will be required, and an extra establishment of probably not less than ten per cent on the estimates will have to be included in the outlay, which in all will then probably amount to about 9,47,696 rupees. The returns would then be 14½ per cent. And this would only be the eventual return: for some years it would be less.

25. As regards the designs for the works, I am of opinion that they have been prepared with much care and judgment. In the case of the anicut only has it appeared necessary for me to make any additions or alterations worthy of notice. I append a memorandum descriptive of these and other purely technical details.

26. It will be observed that no provision is made in the estimates either for distribution or drainage channels, but as regards the former, the tanks along the lines of new channel are already furnished with means of distributing the water to the fields, and in any case it is the invariable custom in this Presidency for the cultivators to form the small village channels for leading the water from tanks. The Superintending Engineer has allowed for irrigation sluices along such portions of the new channels as are unconnected with tanks, and he apparently assumes that the village channels from them also will be carried out by the cultivators according to the custom prevailing in Tinnevely; and as the distances to which the water has to be led to the fields is inconsiderable, it may not be unreasonable to throw this operation upon them. Still as a channel may be required to irrigate the lands of two or three villages, the arrangement for leading the water to them cannot be left entirely in the hands of the people; I have therefore added 10,000 rupees to the estimates to allow of the Executive Officer carrying out the distribution channels, up to the point where separate channels for different interests may be required.

27. Some provision for drainage channels would seem also to be requisite. The amount of drainage which will cross the new channels is not very large, if we except that due to one large nullah on the northern side, and for that embankments are allowed for leading off the drainage water after it crosses the channel to a tidal creek near the mouth of the river. The new channels are, for the greater part of their course, marked by the line of sand-hills previously described, and any drainage water that leaves them must come in the form of infiltration. Various masonry works are allowed both for crossing the natural drainage and the surplus from the tanks above the new works, and they appear to be ample for that purpose. Moreover, the southern channel from the Maradur Anicut has an open head, and when this defect is remedied, as I hope will be the case before long, the surplus of the tanks in question will be reduced, in times of extraordinary flood, to the local drainage only. But still any water which would cross the new channels (excepting what is passed off by the embanked channel above-mentioned), must find its way into the low strip of ground which extends along the landward side of the sandy ridge bordering the coast, and as it would appear that this low ground is already in part swamp, it cannot be expected to improve when the surplus water from the fields under the new channels, which will be all extra to the present supply, shall be thrown upon it. The natural flow of the water to the tidal outfalls will therefore, I contemplate, have to be improved. A channel thirty feet wide, and averaging three feet deep, would cost Rs. 2,640 per mile, and I would propose to allow for ten miles of channel of that capacity. This, with smaller channels, would add Rs. 30,000 to the estimate.

28. It is not necessary that this amount should be sanctioned until detailed estimates are submitted; but it should be kept in view, when the total probable cost of the project is under the consideration of Government.

29. An allowance in the estimate of rupees 5,400 and rupees 21,058 for office and petty establishment for three years has been struck out; a special establishment, both executive and office, will however be required when the works are authorized for execution.

30. The estimates as revised by these, and several other alterations amount to Rs. 8,31,600 (not including probable cost of additional drainage channels, Rs. 30,000), which I beg to recommend for early sanction.

31. The Order of Government No. 2680, dated 21st August, directing the adoption of certain scales in the preparation of all maps and plans, was not received in time to be acted on for the project now under consideration; but the plans now submitted will be recopied if required, on their being returned by the Government of India.

32. In closing this report, I would beg to state that the Officers employed in investigating the project have received the most cordial assistance from the Collector Mr. Puckle, who not only went over the whole of the ground in their company to point out to them the tract which they might count on bringing under irrigation with an improved supply of water, but also induced the cultivators to take so great an interest in the work, as to contribute both funds and labour, for carting material, building a head sluice, and opening out a channel sufficient to provide a supply for the wants of the current season.

ENCLOSURE.

Memorandum on Estimates.

Anicut.—A row of wells has been added at the rear of the floor to secure it against risk of subsidence. The flanks in rear have been altered from straight lines to curves, as the violent eddy from the former would produce an erosive action on the bank of the river down stream. Additional rough stone 123 × 24 × 3 has been allowed for an extension of the apron in rear of each set of under-sluices, and rough stone has also been added as a protection to the base of front curved wing-wall, against a set of the river. Seven counterforts have been added to the wing-walls and returns at each flank of the anicut. The mean thickness of walls should not be much under one-third height. The batter should also rather be to the outside than inside. These additions will raise the estimate from Rs. 1,48,500 to Rs. 1,59,500.

The arrangement of under-sluiques is, in my opinion, judicious. The object of under-sluiques is not to prevent a general silting up of the bed of the river above the anicut, but to keep channels clear in front of the head-sluiques. So long as this object is accomplished, I do not see that any practical injury can result from the silting of the bed in the rest of the river channel, and I consider the practice in the South of India of allowing a series of small rents, which in the larger anicuts at the Godavari and Kistna are arched over, preferable to large openings, because the resistance offered by the intervening piers prevents an undue acceleration of velocity when the river rises several feet above the anicut.

It will be observed that the retaining and wing-walls are not to be built on wells, but Col. Wilkieson reports that the same soil for foundations will be encountered as was met in the foundation at the south head-sluique (built during past dry season) that is compact clay.

A section of the river is given on rather a small scale in the longitudinal section of the southern channel. The height of an ordinary fresh above the average deep bed of the river, or the proposed level of sluiques, may be taken at ten feet.

	Sq. ft.
Total Sectional area above level of sluiques 1,400	10 x 14,000
Sectional area from same level to level of bed...	4,679
Present waterway	9,321
Obstruction by anicut—area of section	7,848
Proposed waterway 14,000—7,848	6,152

or with a ten feet fresh one-third the waterway will be obstructed, or the velocity will be increased in the proportion of three to two. Average depth of water in natural condition of river is seven feet, velocity 5 to 5.6 feet per second, according as the fall is taken at two-and-a-half or three feet a mile, within which limits the actual fall of surface is likely to be, the distance to mouth of river being sixteen miles, and the total fall forty feet. The velocity of the water passing over the dam, supposing the surface to remain the same as before would, therefore, be only 8.4 to 7.5 feet per second, and the afflux corresponding to the natural mean velocity of 5.6 feet would be slightly under two feet. This is moderate. On the Kistna Anicut, which is reckoned at twenty feet above the ordinary river-bed, when the river in its natural state is four feet above the crown, the afflux is from three-and-three-fourths to four feet, and the velocity twelve feet per second, and on the Godavari anicut with a like depth on the crown the afflux is nearly three feet.

Head sluiques.—The south sluique, as before observed, was built by Lieut. Shepherd in order to secure a supply to the Cadamba tank during the present season. It has three vents of four feet. When the water in the channel has a depth of three feet velocity is two-and-a-half feet per second, and the discharge, in round numbers, 300 cubic feet per second. This passed through a sluique twelve feet by three waterway, gives a velocity of 8.33 feet per second, and to generate such a velocity, the head must be such that $v=5\sqrt{h}$; hence $h=2.77$ feet. The required supply would therefore be delivered before the water rose to the crest of the anicut. It is desirable that the waterway of the sluiques should be kept within moderate limits to reduce the risk of accidents in sudden floods, still the northern head sluique, which moreover has to supply a larger area than the south, has been judiciously allowed an increased waterway of four vents, or sixteen feet in all. This will reduce the velocity and afflux corresponding to a discharge of 300 cubic feet per second to six-and-a-quarter feet per second and 1.56 feet respectively.

Channels.—Several small inlets should have been provided for receiving surplus water from paddy fields for the first three miles from head-sluique southern channel. These works may be carried out from the allowance for contingencies.

On the northern channel, all surplus will find its way to the Arumugamangalam tank. The regulating sluique, shown in the first sheet of sections for the southern channel, is an old work, and will be rendered useless by the new channel. The Coloor calingulah will also be removed. Bridge near Alwar Tinnevely, is to

be removed. Several new bridges are allowed a roadway only six feet wide; on these provision for cart traffic is not required.

Two syphon sluiques.—In reply to a remark from me that the levels would appear to be suitable for aqueducts instead of syphons, the Superintending Engineer explains that, with the former, there would be no means of passage for canoes, etc., when the channel is full. This point should, however, be reconsidered before the works are built.

Bridge of three arches at Tricaloor.—The channel at the spot where this work must be built is both wide and deep.

Ahtoor Branch channel.—Two masonry works are provided for carrying the new channel across the old Ahtoor channel and the Tenteraperri channel. Col. Wilkieson reports that the latter cannot be closed, and that the other had better be left as it is. I do not think it necessary to detain the estimates for a further explanation, but it appears to me very desirable that these old channels should be closed, seeing that the new works will be competent to irrigate the land under them.

The dimensions of the calingulahs provided for various tanks have been considered with reference to the volume of surplus water.

Northern channel.—Dam across sandy stream, 270 yards below head sluique. This dam is on the left bank of channel. No vents are required. The drainage will pass on to the river as at present.

Syphon sluique near Yeral.—This work is for carrying the surplus water from fields above across the new channel.

Double dam across stream falling into Arumugamangalam tank.—The higher dam with vents is on the lower or right bank for the supply of the tank.

Double embankment for drainage along the Oopaur stream.—The levels are not given in detail, but can be ascertained approximately from contoured plan.

The flooring of the calingulahs or escapes to various tanks is to be of rough stone in lime. The rough stone obtainable is of a very superior quality, and as there will be either water in the lower channel, or only a small discharge into it, this may be considered sufficient provision in the way of strength, still it is desirable that there should be some further protection to the retaining wall of floor in rear, and I therefore have thought it expedient to add 5,000 rupees to the estimates to provide for work of the kind.

Proceedings of the Government of Madras, Revenue Department, No. 1153, dated 2nd August 1872.

Read—the following paper:—

Proceedings of the Board of Revenue, No. 1352, dated 18th July 1872.

Read—the following paper:—

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.

To—the Secretary to the Board of Revenue.

Dated—the 31st May 1872.

No.—224.

As required in the Board's Proceedings No. 644, dated 23rd April 1872, I have the honour to forward herewith an outline scheme for the settlement of the lands under the Srivaikuntam anicut.

2. I submit this merely to show the approximate returns from the work as, should I leave the district, it may be difficult to show them hereafter. There will be without doubt a return of at least sixteen per cent on an expenditure of 10 lakhs of rupees. It must be understood, however,

This allows a wide margin for extra expenditure; the cost of the work hitherto being well within the estimate, which is Rs. 8,31,600 exclusive of establishment.

that the rates indicated below are not absolutely those that may be imposed at the settlement, for the settlement rates have not yet been determined by Government, but they are those that the land

will bear and are sufficiently near such as I would impose as to render it certain that the additional revenue will be at least Rs. 1,60,000.

3. I have recently been over every village under the anicut in company with Lieutenant Shepherd, the Executive Engineer in charge of the work, and have arranged with him for the distribution of water from every sluique and channel;

30,000 acres, of which 21,000 acres are now held on potta, are commanded by the work according to the Karnam's accounts, and this area is indicated by the green colouring in the accompanying maps; besides these 30,000 acres there are large tracts of country excluded by the Karnams as too high or too low though really commanded as well as the rest, and these will no doubt be cultivated when water is available. Lieutenant Shepherd is confident that the minimum area that he can supply with water for two crops is 40,000 acres, so my calculation of area is one-fourth less than his, and that the missing one-fourth can be found is manifest from the fact that, though every acre between the anicut and the sea is commanded, my calculations provide for only 300 acres in each square mile being irrigated. I have, however, adopted the

Northern Channel 45 square miles.	
Southern Channel 55 Do.	100

Karnam's figures as showing the area that the people are prepared to take water for now, and that which they consider to be culturable without a doubt.

4. The irrigated lands in this tract of 100 square miles are now assessed at eighty-one different rates, varying from Rs. 9-15-3 to Rs. 2-4-5 per acre. I propose merging these eighty-one rates in three rates of assessment, viz., Rs. 10½, Rs. 9 and Rs. 6 per acre, and charging the second crop with two-thirds of the single crop assessment in the two first rates, and with half the single crop assessment in the third rate; this will give the following consolidated rates for two crops Rs. 17½, Rs. 15 and Rs. 9 per acre.

5. The incidence of this assessment will be Rs. 17½ on 2,000 acres coloured dark green, Rs. 15 on 12,000 acres coloured light green, and Rs. 9 on 13,000 acres coloured dotted green in the maps. The Rs. 9 rate is the equivalent of a double crop water-rate of Rs. 4 for each crop on a dry land assessment of Re. 1 per acre; there are besides 3,000 acres of zamindari and inam land to be charged with a water-rate of Rs. 4 an acre for each crop.

6. The following shows the manner in which the lands have been laid out for assessment:—

(1) *Southern channel.*—The first tract to be now newly irrigated is a block of 30 acres of dry land between the channel and the Trichendur road in the limits of Vellur and Adinadapuram. This area will be supplied by two aqueducts carrying the surplus water of the Vellur cultivation across the channel.

(2) The aggregate assessment of this tract was Rs. 34 last year, but when irrigated the acreage charge should be Rs. 6 (the lowest Peshanam average in that locality) for a single crop and a half rate, or Rs. 3, for a second crop; there will thus be a net increase of revenue of Rs. 230.

(3) The second tract comprises 2,162 acres of irrigated land in the villages of Alagia-Manavalapuram, Ullur-Sanpattu, Parkulam, Tirukalur, and Tentiruperi, and extends from the immediate vicinity of Alwartirinagari to the surplus of the Kadamba tank; this tract is already fairly irrigated by the Kulavaikal, now used as the southern channel, from the anicut and by the Kadamba tank through which this channel passes. Every acre of this tract will in future be irrigated for at least nine months in the year and it is without doubt the most favoured spot under the southern channel. The soil is a good sandy loam similarly circumstanced throughout, though at present assessed at seven different rates for Peshanam; the highest of these is Rs. 9-15-0 per acre, a fair approximation to which is Rs. 10½

which I have adopted as the acreage charge for a single crop, while in consideration of the certainty of the water-supply I have charged the second crop a two-thirds rate, or Rs. 7 an acre.

(4) The aggregate assessment of the irrigated land in this tract was Rs. 31,075 last year; in future it will be charged Rs. 22,701 for a single crop and Rs. 15,134 for a second crop. The net increase of revenue from irrigated land will thus be Rs. 6,760.

(5) There are, moreover, in this tract 130 acres of dry land, at present assessed at Rs. 134. This area is commanded by the channel and tank, and is capable of being thoroughly irrigated; if charged as above for two crops it will bring in a net increase of revenue of Rs. 2,141.

(6) The third tract comprises 128 acres of irrigated land on the other side of the channel in the bed of the Kadamba tank, in the limits of Tirukalur and Kadayanodei. This area, at present assessed at four different rates for Peshanam, is supplied from the Kulavaikal, and is partly classed as double

crop; it will, however, be submerged for eight or nine months in the year when the tank has its full supply, and should be assessed as single crop only at a lower acreage charge than No. 2, or say at Rs. 9 per acre.

(7) The aggregate assessment of this tract was Rs. 1,080 last year; in future it will be assessed at Rs. 1,152; there will thus be a net increase of revenue of Rs. 72.

(8) There are no dry lands in this tract.

(9) The fourth tract comprises 2,646 acres of irrigated land in the limits of Tentiruperi, Angamangalum, Kurumbur, Nalumavadi, Viramanikum, Pudukudi, Ammanpuram, Mutakarei, Mulapuli, Kanam, Manakadi, Pallipat, Kayampuli, Mela Trichendur, and Attur. These form a continuous belt from the Kadamba surplus to within two miles of the sea, and will all be under the first class irrigation. The soil is but little inferior to that of No. 2, but it has not the advantage of being already highly cultivated or commanded by the first tank on the line; it is at present assessed at fifteen different rates for

Peshanam, and rejecting one which is peculiar to a single village. I have adopted Rs. 9 as the acreage charge for a single crop, and a two-thirds rate, or Rs. 6 for a second crop.

(10) The aggregate assessment of the irrigated land in this tract was Rs. 25,789 last year. It should, in future, be charged Rs. 23,814 for a single crop and Rs. 15,876 for a second crop; the net increase of revenue from irrigated land will thus be Rs. 13,901.

(11) There are, moreover, in this tract 2,646 acres of dry land, at present assessed at Rs. 1,078, commanded by the channel and capable of being thoroughly irrigated. This area, if charged as above for two crops, will bring in a net increase of revenue of Rs. 38,612.

(12) The fifth tract comprises 1,251 acres of irrigated land under second class irrigation on the skirts of No. 4, in the limits of Nalumavadi, Nallur, Varan-divayal, Sukandalei, Vellakovil, Attur, Kayalpatnam, Arumuganeri, Vadamalei-samudram, Manakad, and Kila Trichendur. This will be mostly supplied by the Nallur Tannipandal, Arumuganeri, Nattakulam, Tulukkankulam, Avudayakulam and Ellapa Nayakan tanks, as well as by the surplus drainage of No. 4; the soil of this tract is far inferior to that of No. 4, being mostly stiff clay mixed with soda, and the situation is more remote. It is at present assessed at eleven different rates for Peshanam, and as it would be manifestly unfair to assess this tract at the same rate as No. 4, I have adopted Rs. 6 as the acreage charge

for a single crop, and a half rate, or Rs. 3, for a second crop.

(13) The aggregate assessment of the irrigated land in this tract was Rs. 9,386 last year. It should, in future, be charged Rs. 7,511 for a single crop and Rs. 3,755 for a second crop. The net increase of revenue from irrigated land will thus be Rs. 2,648.

(14) There are, moreover, in the tract 1,360 acres of dry land, at present assessed at Rs. 1,265. This area, if charged as above for two crops, will bring in a net increase of revenue of Rs. 37,982.

(15) The sixth tract comprises 137 acres of irrigated land at the foot of the Teri under a high level channel from the Kadamba tank in the limits of Panikanadan Kudiyrupu and Nalumavadi. This tract is exceptionally circum-

RS.	A.	P.
9	14	4
9	2	11

RS.	A.	P.
7	3	2
6	0	0

RS.	A.	P.
9	15	3
7	6	0
7	0	7
6	11	3
6	9	6

RS.	A.	P.
8	0	9
5	15	3
5	15	1
5	6	5
5	6	1

RS.	A.	P.
4	6	6
4	2	11
3	12	2
3	2	0
2	7	9

RS.	A.	P.
7	4	11
7	6	0
7	5	7
7	0	8
6	9	6

RS.	A.	P.
6	4	2
5	15	3
5	8	4
4	2	11
3	12	2

RS.	A.	P.
3	9	0
3	0	3
2	7	11
2	4	5

stanced as the channel is frequently choked with the drifting sand of the Teri, and the situation is somewhat remote; the soil, however, is good and is now assessed at two different rates for peshanam, the higher of which is Rs. 6-4-2 per acre. Here, as in No. 5, I have adopted Rs. 6 as the acreage charge for a single crop, and a half rate, or Rs. 3, for a second crop.

(16) The aggregate assessment of the irrigated land in this tract was Rs. 1,165 last year. In future it should be Rs. 820 for a single crop and Rs. 411 for a second crop. The net increase of revenue from irrigated land will thus be Rs. 66.

(17) There are, moreover, in this tract 20 acres of dry land, at present assessed at Rs. 10 commanded by the channel. This area, if charged as above for two crops, will bring in a net increase of revenue of Rs. 167.

(18) *Northern channel.*—The retention of the present temporary head sluice on the northern side of the river, and the improvement of a partly existing channel, will carry the river water direct to 678 acres in Tirupuliengudi and Parakravadi, and so secure a second crop on lands now imperfectly irrigated by the Srivaikuntam tank. The soil is good, but the water-supply has hitherto been very uncertain. Even when fully irrigated hereafter this tract cannot be classed with the best under the southern channel. I have, therefore, assessed it

at the medium rate of Rs. 9 an acre for one crop, and at a two-thirds rate, or Rs. 6, an acre, for a second crop.

(19) The aggregate assessment of this tract was Rs. 7,984 last year; in future it will be charged Rs. 6,102 for a single crop, and Rs. 4,068 for a second crop; thus giving a net increase of revenue of Rs. 2,186. There are no dry lands in this tract.

(20) The second tract comprises 3,045 acres of irrigated land in the villages of Kilpidagei, Mangalakurichi, Yeral, Sirutandanallur, Valavallan, Arumugamangalam, and Korangani under the main channel from the anicut and two tanks supplied by that channel; these will be well irrigated, but still not so well as the best on the southern side. I have, therefore, assessed these also at the medium rate of Rs. 9 an acre for a single crop and at a two-thirds rate, or Rs. 6 an acre, for a second crop.

(21) The aggregate assessment of this tract was Rs. 38,857 last year; in future it will be charged Rs. 27,405 for a single crop and Rs. 18,270 for a second crop; thus yielding a net increase of revenue of Rs. 6,788.

(22) There are, moreover, in this tract 872 acres of dry land, at present assessed at Rs. 793. This area is commanded by the channel, and is capable of being thoroughly irrigated. If charged as above for two crops it will bring in a net increase of revenue of Rs. 12,287.

(23) The third tract comprises the entire remaining area up to Tuticorin in the villages of Korkei, Arumugamangalam, Iruvapapuram, Palayakail, Manjanirkail, Mullikadu and Milavittan, altogether 1,828 acres of irrigated and 4,993 acres of dry land. The soil is very similar to that on the outskirts of the irrigation on the south side, and though further north under the new chain of tanks the irrigation will be very good; the situation is so remote, and the population at present so scanty, that these lands cannot be assessed higher than at Rs. 6 for a single crop and a half rate, or Rs. 3 for a second crop.

(24) The aggregate assessment of this tract was Rs. 14,113 last year; it will now be charged Rs. 40,926 for a single crop and Rs. 20,463 for a second crop; thus giving a net increase of revenue of Rs. 47,276.

(25) Besides the above there are 3,000 acres of dry land in zamin and inam villages, which, if charged a water-rate of Rs. 4 for each crop, will yield a net increase of revenue of Rs. 24,000.

RS.	A.	P.
6	4	2
5	8	4

RS.	A.	P.
8	14	10
11	8	0

RS.	A.	P.
9	11	11
8	8	4

RS.	A.	P.
7	0	3
5	7	2

RS.	A.	P.
5	10	3
3	7	0

RS.	A.	P.
3	3	0
3	0	3

(26) These lands were all once classified and Settlement data has been recorded for them, but I cannot work out a scheme for their re-assessment on settlement principles until I know the figure that the Government mean to adopt as a commutation rate for the district.

My calculations, however, which are based on karnams' areas,* and the circumstances of the several tracts, are sufficiently low to enable me to feel confident that the new assessment when imposed will yield the full amount I have indicated.

ENCLOSURES NOS. 1 AND 2.—MAPS.

Resolution—No. 1352, dated 18th July 1872.

Mr. Puckle submits a scheme under which the lands commanded by the anicut (as now enlarged and improved) are shown in the relative positions which they will probably occupy when a formal classification has been made, the assessment proper to each tract or block of land according to established principle is also given, and the financial result of applying such rates is calculated in each case.

2. The aggregate shows a large addition to existing revenue.

3. In the face of the dilemma, created by the imminent and unavoidable issue of a supply of water through the new channels to lands which have not been classified and assessed so as to meet their altered circumstances, the Board recommended to Government the imposition of a uniform water-rate of Rs. 4 an acre on all land irrigated for the first time by the new channels. This course was approved by Government, and it appeared to be the only one possible though open to grave objection because it introduces a separate water-rate in an extensive system of irrigation under which land-tax and water-rate are consolidated.

4. But the scheme now drawn up by Mr. Puckle exhibits blocks or tracts of land of varying size, including in some cases the area of many villages and in others limited to a few acres, and these lands are dealt with confidently and decidedly by Mr. Puckle as belonging in the main to such and such classes and liable to the assessments assigned to them, so that if the descriptions given by Mr. Puckle can be thoroughly relied upon as representing truly, though roughly, the character of each block his scheme places the Board in possession of the data essential for the imposition on these lands of the appropriate rates (on the scale sanctioned by Government for the rest of the river valley) subject to the modifications which future formal classification may require.

5. It becomes a question then whether the Board should accept Mr. Puckle's scheme and advise the Government to act upon it with confidence, as affording a solution of the difficulty preferable to that already chosen, or whether no change is to be made. The decision turns entirely on the degree of confidence to which Mr. Puckle's estimates are entitled, and the Board are disposed to repose very great confidence in their general correctness and to recommend Government to accept them. Mr. Puckle has classified the rest of the river valley, he knows by long experience how the upper strata of soil dispose themselves in this valley, and is intimately acquainted with their relative value; the lands of which his present letter treats have been traversed and examined by him in person, and he is in a position to estimate the relative value, extent, and other conditions of the blocks which make up the entire tract in a manner which would be quite impossible to an officer not similarly prepared for the task. The acceptance of his scheme will place the newly watered lands very nearly if not quite in the position they must hereafter hold, it will at once enhance the revenue and realize the results of the outlay, lastly it is in harmony with the form of assessment obtaining throughout the valley.

Order thereon—No. 1153, Revenue, dated 2nd August 1872.

Irrigation No. 1.

Communicated to the Public Works Department (with copy of Revenue Proceedings No. 747, dated 10th May

1872), as furnishing an approximate estimate of the probable returns from the Srivaikuntam Anicut Project.

2. Mr. Puckle's revised proposals for the settlement of the Government demand on the "River Valley" have just been received, and will be speedily

disposed of: meanwhile, should necessity previously arise for the immediate assessment of lands newly irrigated, the principle of Mr. Puckle's sketch-scheme is approved.

(True extract)

W. HUDLESTON,
Secretary to Government.

Letter—from H. W. RENDALL, District Engineer, Tinnevely.
To—the Collector of Tinnevely.
Dated—Palamcottah, the 20th January 1874.
No.—802.

With reference to our discussion yesterday at Tirukalur with regard to the turns to be fixed for the irrigation of the Tirukalur lands by the south main channel from the Srivaikuntam anicut, I have the honour to state that as then arranged, I will direct the following rules to be adopted for the distribution of water under this canal.

2. The ryots and others concerned should be informed that these turns are experimental, and while fixed specially with a view to do justice to all, are subject to revision if in practice not found to secure an equitable distribution.

I. When the water on the rear floor of the Srivaikuntam south sluice, stands at or below 3 feet, the Kadamba and Attur head sluices will be closed for three days in each week, and water allowed to flow to Tirukalur through the sluices already existing and to Tentiruperi through the new sluice about to be built in the south channel for the better irrigation of high lands at the west end of the Kadamba tank.

II. When the water is above 3 feet on the south head sluice floor, the Attur sluice to be kept open, the water reaching the Kadamba tank over the Kadyan Odai calingulah. Whenever there is a considerable fresh in the river and water is required beyond the Kadamba tank, the Kadamba head sluice may, at the discretion of the Range or Subdivision Officer in charge of the canal, be opened to pass water on as rapidly as possible.

3. I shall be glad to receive for record in my office your written concurrence to these experimental rules.

ENCLOSURE.

The following rules for distribution of water from the south main channel of the Srivaikuntam anicut project sanctioned by Government in their order No. 990-I., dated 5th December 1878, are published for general information.

2. The south main channel will be closed on the 1st April in each year.

3. The distribution of water from the sluices rests with the Public Works Department as before.

Rules.

I. With one foot or less water on the rear floor of the head sluice the Attur and Kadamba tank head sluices must not be opened.

II. With more than one foot and less than three feet of water on the rear floor of the head sluice the Attur and Kadamba tank head sluices to be opened four days a week. For the remaining three days both should be closed, and the whole supply distributed to the Tirukalur and Kadaiyan Odai lands.

III. With more than three feet of water on the rear floor of the head sluice both the Attur and Kadamba head sluices to be opened and water to be distributed at the same time to the channel fed lands of Tirukalur and Kadaiyan Odai.

IV. When Kadamba tank fills up to or above the level of Puraiur head sluice floor, water to be passed down the Puraiur channel.

V. After the 1st September and 15th February of each year the Puraiur head sluice must be closed when the Kadamba tank water level sinks to $1\frac{1}{2}$ feet on the Puraiur head sluice floor. But one shutter should be raised $1\frac{1}{2}$ inches or so to keep up a small supply to the direct irrigation (see also Rule No. VII.)

VI. As soon as the Puraiur head sluice is opened, Ammanpuram, Kanam, and Nallur Melakulam tanks to be supplied equally if water is sufficient, otherwise in the order given.

VII. After the 1st September and 15th February of each year, when the level of Kadamba tank is below $1\frac{1}{2}$ feet on Puraiur head sluice, a turf bank 1 foot high to be made over the crest of the Puraiur drop.

VIII. When Ammanpuram, Kanam and Nallur Melakulam are filled, if the Puraiur channel supply of water continues, the following tanks are to be filled in the order named:—

- | | | |
|--------------------------|-----|--|
| 1. Sinimavadi | ... | } (The tanks bracketed together to be filled simultaneously as far as possible.) |
| 2. Nallur Kilakulam | ... | |
| 3. Natlaikulam | ... | |
| 4. Tulukankulam | ... | |
| 5. Arumuganeri | ... | |
| 6. Nalayiramudayarkulam. | ... | |
| 7. Anudayarkulam | ... | |
| 8. Ellapanaikenkulam | ... | |

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—the District Engineer.
Dated—Tinnevely, the 4th February 1874.
No.—82.

In reply to your letter No. 802, dated 20th ultimo, I have the honour to inform you that I approve of the experimental rules therein proposed for the better regulation of the water flow in times of scarcity to Tirukalur, Attur and Tentiruperi in the Tenkarai taluk. A takid on the subject has been sent to the Tenkarai Tahsildar.

Proceedings of the Government of Madras, Revenue Department, No. 302,
dated 25th February 1875.

Read—the following paper:—

Proceedings of the Board of Revenue, No. 4, dated 4th January 1875.

Read—the following paper:—

Letter—from R. K. PUCKLE, Esq., Collector of Tinnevely.
To—Secretary to the Board of Revenue.
Dated—the 21st November 1874.
No.—623.

With reference to Government Proceedings No. 106, dated 23rd January 1874, I have the honour to report on the work performed from Special Funds in the villages under the Srivaikuntam anicut on the south bank of the river.

2. These villages are twenty-seven in number, and works have been executed from Special Funds in twelve of these. The works executed consist of five tanks calculated to hold an aggregate of 12,000,000 cubic yards of water, fifty-two masonry works, sluices and calingulahs, sixteen miles of roadway, sixteen miles of drainage channel, and forty miles of delivery and branch channel; the last mentioned, however, are but a fraction of what are required; but my approaching departure from the district necessitates winding up the accounts and prevents my commencing the numerous works required on the north bank of the river.

3. The revision of assessment has been carried on in the Tenkarai taluk throughout the current year, and an opportunity has thus been afforded of studying the requirements of these twenty-seven villages over and over again. It was from the first apparent that but little reliance could be placed on direct irrigation from the channels—the head sluice for the main channel is small, the great Kadamba tank has to be filled up on the occurrence of every fresh before water can pass further eastward, the soil traversed by the channels is sandy, and the evaporation during the high winds of the south-west monsoon is excessive. Attention was therefore directed to increasing the storage of water in the area about to be irrigated, and several old tanks were restored; but as irrigation without drainage is useless, steps were taken to get rid of the accumulation of water in the low lands towards the coast, and to provide a free passage for the surplus of the Kadamba tank which used formerly to find its way over the fields. At the same time, the bank of the Kadamba tank and that of the main channel leading to it were cleared of obstructions and opened out wide enough to carry a roadway for a great part of their length, and earthwork was thrown up for another road through much of the waste land to be irrigated. Finally, small sluices were built in the distribution channels and a large number of minor branch channels were cut from these sluices to carry

water to the fields. The estimated cost of these works was Rs. 61,391, and the sale of the right of occupancy of 2,007 acres has realized Rs. 55,575; there still remains as much more waste land to be parted with, but the best has of course been selected and further purchasers hold back until they see the water flow to the fields. All the works commenced have been completed with the exception of the roads, two drainage channels, and some ten branch channels which will be completed by the end of the year.

4. The estimates were prepared by the Subdivision Officers, Department of Public Works, and countersigned by the District Engineer and Collector, and completion certificates have been granted by the Subdivision Officer for the greater part of the works. The execution of 2,356 cubic yards of masonry and 564,200 cubic yards of earthwork was carried out under the immediate supervision of Venkata Achariyar, Special Assistant for Settlement, and Krishnaswami Ayyangar, Head Classifier in the Settlement Department, and these officers have worked day and night and have spared no labour or trouble to get the works finished this year.

5. Besides the lands parted with to purchasers of occupancy, 114 acres were given in exchange for patta lands taken up for tank beds, channels, etc., and the Government have thus been saved compensation to the extent of some Rs. 5,000.

6. Priority of purchase of the right of occupancy was in all cases conceded to the villagers at the upset price fixed, which was usually Rs. 30 an acre, if the villagers did not care to purchase, the lands were laid out in blocks of one acre each, and sold by auction, the average price realized was Rs. 28 an acre. The assessment of the area taken is Rs. 8,778, or an average of Rs. 4-6-0 an acre. All, however, will not be irrigated this year—high levels have to be cut down and hollows filled in; the thorn jungles approaching maturity must be left till fit to cut; branch channels have in many cases yet to be brought to the fields; and agricultural labourers must be induced to settle in a country now thinly inhabited. I have, therefore, thought it better to register as irrigated only such fields as may be irrigated this year, and to enter the rest as dry till such time as they are actually irrigated. The provisions of the settlement allow of such transfer being easily made, as in every case the technical class and sort shown in the register is the class and sort which should stand when the land is brought under irrigation.

7. The accompanying map shows these Special Fund works. The irrigation works in this map are coloured blue, and the roadways red.

8. I also enclose a memorandum with rough sketches of the principal works performed.

9. Of the total expenditure, Rs. 4,000 were spent on supervision and petty establishments, Rs. 1,431 on contingencies and sundries, and Rs. 50,144 on masonry and earthwork. The masonry averaged Rs. 3-10-1, and the earthwork Re. 0-1-2 per cubic yard.

10. The District Engineer accompanied me over the works on various occasions and approved of what was done. The Chief Engineer for Irrigation has also recently inspected the works. The Subdivision Officer, Department of Public Works, Mr. Falvey, gave a great deal of his time to these works, and the Revenue Officers employed are much indebted to him for his advice and assistance.

ENCLOSURE No. 1.—Statement showing progress of work from Special Funds.

ENCLOSURE No. 2.—Map.

ENCLOSURE No. 3.—Memorandum with rough sketches of principal works performed.

Resolution—No. 4, dated 4th January 1875.

Submitted for the information of Government with reference to G.O. No. 106, dated 23rd January 1874.

2. The work which has been done under the permission accorded to require premia to be paid before giving waste land under the Srivaikuntam anicut to applicants, and to expend the money in distribution works, etc., surpasses even the expectations of the Board, which, knowing as they did the antecedents of Mr. Puckle, were very sanguine. There are few officers in the Presidency who

could have shown such results in so short a time and at so small a cost, and they reflect the highest credit both on Mr. Puckle and on Venkata Achariyar, the Special Assistant for Settlement, and Krishnaswami Ayyangar, Head Classifier, who Mr. Puckle says, have worked day and night and spared no labour or trouble. It must not be forgotten, also, that the District Engineer, Mr. Randall, and other officers of the Department of Public Works in the district, prepared the estimates, measured the work performed, and assisted in all with hearty good-will. A large tract of country has been permanently enriched and made eminently productive, and Government, who under ordinary circumstances would have had to expend fifty or sixty thousand rupees, have had to pay nothing.

3. The report refers only to the twelve out of the twenty-seven villages on the south bank of the river in which distribution works, etc., had to be constructed. The other 15 the Board believe, consisted for the most part of wet land even before the anicut was constructed. In these twelve villages, there were some 4,000 acres of irrigable waste, but about 2,000 of them were better situated than the rest and the Collector had to look to them for the required funds. As is clearly explained by Mr. Puckle, tanks were wanted to store water in different parts of the tract as well as sluices and calingulabs and channels for supply and drainage, and roads were required to connect points, the communication between which had been severed by the new irrigation. The cost of the works was estimated at Rupees 61,391, and Mr. Puckle imposed an upset price of Rs. 30 an acre, and offered the unoccupied land at this rate to the resident villagers. When the resident villagers did not come forward for any of the land, it was sold by auction, and altogether Rs. 55,575 were realized from 2,007 acres, which, when irrigated as some are now, and all will be in a year or two, will yield an assessment of Rs. 8,778.

4. The summary of work done given in paragraph 2 speaks for itself. It was not till the end of January that permission to commence it was given and most is finished now, and all will be finished by the end of the calendar year. The memoranda map and sketches submitted with the report make it very clear and add considerably to its value.

5. The tract on the north bank of the river, which is still untouched must of course be dealt with in the same manner, or there will be great discontent; but now that Mr. Puckle has been called away from the district for which he has done so much, more will have to be left to the Department of Public Works, and the Board do not doubt that it will be in good hands.

Order—No. 302, Revenue, dated 25th February 1875.

Land Revenue No. 12.

With their Proceedings above recorded, the Board submit the report of Mr. Puckle, Collector of Tinnevely, on the results of the sale of waste lands under the Srivaikuntam anicut, and the employment of the proceeds thereof on the construction of useful Public Works for the successful cultivation of those lands, agreeably to the sanction given in the Proceedings of Government, dated 23rd January 1874, No. 106.

2. The extent of land sold in twelve villages was 2,007 acres and the proceeds thereof amounted to Rs. 55,575. The whole of this sum was spent in constructing five tanks calculated to hold an aggregate of 12,000,000 cubic yards of water, in building fifty-two masonry works, sluices and calingulabs, in making sixteen miles of roadway, and in excavating sixteen miles of drainage channel and forty miles of delivery and branch channels. The lands which have been taken up at the sales will yield to Government in a year or two an annual assessment of Rs. 8,778.

3. The successful manner in which the sales have been conducted and the amount of work done within a comparatively short time are highly satisfactory, and the thanks of Government are due to Mr. Puckle and his Assistant Venkata

ENCLOSURE.

Name of the canal and village under, etc.	Point on which information is now requested.
Kilpedagai channel in Siruthondanallur ... Palayacoyal channel in Siruthondanallur ...	Is this land not irrigated from Perungulam tank or its surplus. The only Palayacoyal channel known is in Palayacoyal village far from Siruthondanallur. Is this another channel. Do.
Periyakulam tank in Arumugamangalam under the above channel. Kilpedagai channel in Valavallan village ...	By our arrangement of channels, etc. Kilpedagai channel cultivation extends only as far as Yeral, where Korkai channel branches. Is this land under what is now known as Korkai channel or tank, or how much under each. Do.
Do. in Korkai village ...	Do.
Kilpedagai channel in Melathenthiruperi village.	Is this land not under Korkai channel. Are the lands in Manjanirkoyal, which are now cultivated from the old Palayacoyal supply channel included under the cultivation of Arumugamangalam and if so how much, as in future they will be supplied from Peicolam tank. SOUTH SIDE.
Kadamba tank in Tirukalur (Sini Iyen pulli).	Are not all Tirukalur lands under Sreevaikuntam Anicut project supplied direct from south main channel?
Kadamba tank in Angamangalam village ...	How much of this land is now supplied from Puraiyur channel?
Nedungarai channel in Kurumbur village ...	Is this channel a branch of Peraiyur channel or if not how is it supplied?
Ammanapuram Periyakulam and Sini-mavadi tank in Pudugudsthanpathu village.	Is this all tank cultivation or partly irrigated by Angamangalam field channel from Puraiyur channel?
Kadamba tank in Nalumavadi village ...	A new sluice has lately been built in Puraiyur channel from which possibly some of this may be supplied, if so, how much is supplied by it and how much from other sources?
Kadamba tank in Pankianadan kudiyruppu village.	Is this supplied directly from the tank or how?
Ammanapuram Periyakulam tank in Viramanikkam village.	Is none of this land supplied from the Angamangalam field branch of Puraiyur channel?
Sugundalai tank, Sugundalai village ...	Is none of this land supplied from Sedukuvaitan?
Kadamba surplus, Varandivel-shanpathu village.	How much is supplied from Kadamba tank or Nanjah surplus and how much, if any, from Attur channel or tank, or Nallur tank?
Kadamba surplus in Perumpattu village ...	Do.
Kadamba surplus in Marudupanai village (irrigated by baling).	From what source is this supplied? the village is so scattered, that its identification from the map is impossible?
Kadamba tank, Kachanavelai village (irrigated by baling).	Do.
Purapattam tank, Kadayanodai village ...	How is this tank supplied?
Pottakuttam in Sedukuvaitan village ...	Is this the cultivation under the Sedukuvaitan tank?

Letter—From the Collector of Tinnevely.

To—the District Engineer, Tinnevely.

Dated—the 21st November 1875.

No.—225.

In reply to your letter No. 420, dated 19th October last, I have the honour to send herewith copy of a memorandum prepared by the Tahsildar giving information on the several points noted down in the tabular form which accompanied your letter under reply.

ENCLOSURE.

Name of the canal and village under, etc.

Point replied to the information requested.

1. Kilpidagai channel in Sirutandanallur.

Q. Is this tank not irrigated from Perungulam tank or its surplus?

No. These are the lands that are cultivated on both sides of the main channel, i.e., to the south of the main channel near Eral, and also to the north of the main channel within the round bund in front of the syphon sluice. The latter lands are irrigated from the Man-galakurichi channel which itself is a part of the main channel. The main channel itself is generally known as Kilpidagai channel. Of course, these lands receive the drainage water of Perungulam lands as well as the surplus. For the sake of convenience, all the lands in this Sirutandanallur village is taken to the irrigation register under Kilpidagai channel all along for the last 20 years in the accounts.

2. Palaikoyal channel in Sirutandanallur.

Q. The only Palaikoyal channel known is in Palaikoyal village far from Sirutandanallur. Is this another channel?

No. These lands are irrigated from the very Palaikoyal channel, i.e., Man-janirkoyal lands which being hitherto a hamlet of Sirutandanallur, they have been entered in that village. But now in the settlement, Manjanirkoyal has been made as a separate village.

3. Periyakulam tank in Arumugamangalam under the above channel.

Q. Do. i.e., The only Palaikoyal channel known is in Palaikoyal village far from Sirutandanallur. Is this another channel?

No. Arumugamangalam tank under the Palaikoyal channel.

I cannot understand the question. This is meant the Arumugamangalam tank itself which is fed by the north main channel. There were two tanks some 50 years ago when this was called as "Periyakulam" which name is still retained.

4. Kilpidagai channel in Valavallam village.

Q. By our arrangements of channels, etc., Kilpidagai channel cultivation extends only as far as Eral where Korkai channel branches. Is this land under what is known as Korkai channel or tank, or how much under each?

The name Kilpidagai channel is generally given to the north main channel itself. The land in question is under what is known as Korkai channel which branches off at Eral.

5. Do. in Korkai.

Q. Do.

These lands are under Korkai tank only.

6. Kilpidagai channel in Mela Ten-tiruperi Village.

Q. Is this land not under Korkai channel?

Yes. They are under Korkai channel and now in the settlement is added with Valavallan village.

Are the lands in the Manjanirkoyal which are now cultivated from the old Palaikoyal supply channel included under the cultivation of Arumugamangalam and if so, how much as, in future, they will be supplied from Periyakulam tank?

Vide answer to question No.2. These lands are included under Palaikoyal channel and excluded under the cultivation of Arumugamangalam tank that although a portion of the lands helped by the Arumugamangalam surplus.

South side.

7. Kadamba tank in Tirukalur Sini Iyenpalli.

Q. Are not all Tirukalur lands under Srivaikuntam anicut project supplied direct from south main channel?

Yes. With the exception of a very small extent which is in the midst of Tentiruperi lands irrigated direct from Kadamba tank which is now in the settlement added with Tentiruperi village. All other lands are irrigated direct from the south main channel and also by the high level sluice recently built above the Kadayano-dai calingulah to the west of the tope.

8. Kadamba tank in Angamangalam village.

Q. How much of the land is now supplied from Puraiyur channel?

All the lands are hitherto irrigated from Kadamba tank and from the surplus channel. A portion is now supplied by the high level sluice from Puraiyur channel, but this register contains the extent and assessments irrigated under different source since faslis 1274 to 1282 or 1864-65 to 1872-73. The sluices and other works having been made only in the last year, we cannot make or divide separately in those years. Moreover this register is prepared following the old rate retaining the old names of irrigation. In fact, there will be a thorough change in the register that will have to be prepared for fasli 1284 (1874-75) in extent, assessment and names of sources according to settlement villages.

9. Nedungarai channel in Kurumbur village.

Q. Is this channel a branch of Puraiyur channel or if not, how it is supplied?

This is not supplied by a branch of Puraiyur channel. It is supplied by an aqueduct across the old Attur channel from Sedukavaitan to Nedunkarai. This Sedukavaitan tank itself was supplied direct from the river by a head sluice formerly; but now it is supplied by the new Attur channel. The lands in question are now amalgamated with Sugundalai village in the settlements.

None of the lands are irrigated by Angamangalam field channel. All are irrigated from the tank.

10. Ammanpuram Periyakulam and Sinimavadi tank in Pudugudi shampathu village.

Q. Is this all tank cultivation or partly irrigated by Angamangalam field channel from Puraiyur channel?

The register in question is prepared as stated in the answer to question No. 8 for faslis 1274 to 1282, and the sluice has been very recently built. We cannot distinguish for those years.

11. Kadamba tank in Nalunavadi village.

Q. A new sluice has lately been built in Puraiyur channel from which possibly some of this may be supplied, if so, how much is supplied by it and how much from other sources?

This is supplied from the Kadamba tank by the old Ammanpuram channel, i.e., near the sand-hill about half a mile distant south from Puraiyur head sluice.

12. Do. Pankianadan kudiyruppu. Q. Is this supplied from the tank or how?

No. All is supplied from the tank.

13. Ammanpuram Periyakulam tank in Viramanikkam village.

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Q. Is none of this land supplied from the Angamangalam field branch of Puraiyur channel?

14. Sugundalai tank in Sugundalai village.

Q. Is none of the lands supplied from Sedukuvaitan?

15. Kadamba surplus, Varandivelshampathu village.

Q. How much is supplied from Kadamba tank or nunjah surplus, and how much, if any, from Attur channel or tank or Nallur tank?

16. Do. in Perumpattu village.

Q. Do.

No. There is a small tank which is continually filled by the drainage water of Tentiruperi lands. Of course, at times a few of the lands under this tank may be helped from Sedukuvaitan aqueduct.

These four villages, Sugundalai, Marandalai, Varandivelshampattu and Varandivelperumpattu are irrigated in the following manner as hitherto:

Sugundalai from Sugundalai small tank as stated in answer to question No. 14;

Marandalai from Attur old channel; Varandivelshampattu and Varandivelperumpattu from the drainage and surplus water of Kadamba tank and nunjah surplus, also from Sedukuvaitan nunjah surplus and from Marandalai nunjah surplus which is supplied from Attur old channel. In fact, no means for proper supply. The people are continually howling for a source as they have been ill-supplied. There is very recently a sluice opened in the Nallur tank for which delivery channels have not been dug out. In all the four sides round this village unless they steal water or fight all round, they have no means of getting a fair supply. Unfortunately, their prayers were not attended yet for want of funds in the special works and the difficulty of arranging the people to acquire lands for any channel that can be dug. These four villages have been clubbed now in the settlement as one village retaining the name of Sugundalai alone.

The lands of this and Kachanavilai village are in the bed of the Kadamba tank along the higher level to the other side of the waterspread and is covered with Kadamba water for some days and then cultivated by baling gradually on the water going down.

17. Do. in Marudupannai village (irrigated by baling).

Q. From what source is this supplied, the village is so scattered that its identification from the map is impossible?

18. Kadamba tank, Kachanavilai village (irrigated by baling).

Q. Do.

19. Purapattamkulam in Kadayano-dai village.

Q. How is this tank supplied?

This is a very small tank lying at about less than a quarter mile distant to the south of Kadayano-dai calingulah and is supplied from above at the dam southward by a small channel from the main channel. In fact, it is irrigated from the south main channel directly. But this register contains the old name as it has been prepared in conformity to the old registers in order to correspond.

20. Pottalkuttam in Sedukuvaitan village. No. This is a small tank by the old name in Manakadu village supplied by the surplus of Tulukankulam. The taluk copy of the register does not show that it is in Sedukuvaitan.

General Explanation.

The taluk officials are instructed to prepare the above registers for faslis 1274 to 1282 assigning the same numbers to each source of irrigation as published in the District Gazette supplement, dated 2nd March 1872, and so, it has been prepared.

Letter—from J. D. GRANT, Esq., Officiating District Engineer, Tinnevely.
To—the Collector of Tinnevely.
Dated—Palamcottah, the 18th November 1875.
No.—490.

By G.O. No. 2831 of 1st October 1875 I am directed in communication with you, to report the date on which the Srivaikuntam anicut works may be considered to have come into operation, and I have the honour to request that you will favour me with your opinion on the subject.

2. In G.O. No. 115 of 17th January 1874, fasli 1280 is taken as the first year in which the anicut project was in operation, but the Chief Engineer for Irrigation in his note printed with G.O. No. 2831 of 1st ultimo gives it as his opinion that fasli 1282 would seem to be the more suitable date. It is impossible to determine accurately the year from which the anicut project began to take effect, but I am inclined to think that fasli 1279 approximates more closely to accuracy than fasli 1282.

Letter—from A. J. STUART, Esq., Collector of Tinnevely.
To—the District Engineer, Tinnevely.
Dated—Tinnevely, the 14th December 1875.
No.—271.

In reply to your letter No. 490, dated 18th ultimo, I have the honour to state that I think the Srivaikuntam anicut works should be considered to have come into operation from the year in which the crest of the rising work was first above the level of the river bed by 1 foot or more and so turned water in low freshes into the channels.

2. Your office records will give you the season in which this was the case and I request you will be so good as to let me know what it is. Should you disagree it will be best in my opinion to note the date of a personal interview.

Letter—from J. D. GRANT, Esq., Officiating District Engineer, Tinnevely.
To—the Collector of Tinnevely.
Dated—Palamcottah, the 6th January 1876.
No.—555.

In reply to your letter No. 271 of 14th ultimo, I have the honour to state that I think your proposal to consider the Srivaikuntam anicut project as beginning to act when the anicut reached a height of 1 foot above river bed is the best that can be made.

In May 1870 the height of the anicut was as follows: for 500 feet of length it was 5½ feet high, for 500 feet of length it was 4 feet high, for 380 feet of length it was 1 foot high, and the works may therefore be considered to have come into operation in the succeeding fasli, viz., 1281.

In anticipation of your concurrence in this settlement of the point, I will proceed with the classification of the revenue.

Letter—from A. J. STUART, Esq., Collector of Tinnevely.
To—the District Engineer, Tinnevely.
Dated—the 12th January 1876.
No.—9.

With reference to your letter No. 555, dated 6th instant, I have the honour to state that I concur with you in thinking that the Srivaikuntam anicut works may be considered to have come into operation in fasli 1281.

List of wet areas at the time of ayacut in all the villages on both sides of the river before the Srivaikuntam anicut was thought of, Tenkarai taluk, Tinnevely district.

Whether the north or south channel.	Number and name of village.	Ayacut.		Ryots' holdings in fasli 1280, viz., before the anicut was built.		Remarks.
		Extent.	Assessment.	Extent.	Assessment.	
			RS.		RS.	
South side.	1 Tirukalur Vadamalpulli	110	1,421	75	894	There are several changes in the wet ayacut since the anicut was built.
	2 Tirukalur Senaiyanpulli	238	2,248	200	1,844	
	3 Tirukalur Sickilarpulli	162	2,135	64	769	
	4 Kela Tendriparai	2,593	31,225	1,459	18,625	
	5 Mela Tendriparai			1,155	14,616	
	6 Angamangalam	179	1,467	178	1,374	
	7 Nallur	344	1,986	443	2,392	
	8 Kurumbur	227	722	219	639	
	9 Podukudishanpattu	223	1,455	223	1,455	
	10 Nalunavadi	101	645	195	1,042	
	11 Panikenadaukudiyeruppu	80	610	120	752	
	12 Kanam	122	710	122	659	
	13 Mulappuli	119	774	119	711	
	14 Veramanikam	82	296	82	257	
	15 Mulakkurai	150	810	206	1,105	
	16 Sugandalai	193	1,921	281	2,469	
	17 Marandalai	29	342	29	330	
	18 Varandivalshampattu	244	1,743	279	2,153	
	19 Varandival Perumpattu	78	541	79	585	
	20 Ammanapuram	469	5,050	466	5,202	
	21 Manakadu	77	208	82	204	
	22 Authur	2,022	21,158	2,062	20,002	
	23 Kaluvannallur	125	1,207	123	1,085	
	24 Kunnarapannai	77	1,030	78	1,030	
	25 Maradipannai	320	2,361	372	6,058	
	26 Koranganai	11	98	11	96	
	27 Kachanavilai	283	495	283	495	
	28 Puravur	62	112	62	112	
	29 Kadayanodai	98	1,112	193	1,551	
	30 Kayalpattanam Tulukarpulli	36	156	51	155	
	31 Kayalpattanam Silparaipulli	49	330	41	207	
	32 Rajapathi	2	15	2	15	
	Total	8,905	87,381	9,854	89,066	
North side.	1 Kelpadagai	1,498	15,563	1,487	18,010	
	2 Sriparankusanallur	74	600	32	140	
	3 Mangalakerihi	328	3,625	418	4,703	
	4 Sirutondenallur	340	2,549	337	2,384	
	5 Valavallan	163	1,437	165	594	
	6 Arumegamangalam	1,636	21,318	1,550	15,400	
	7 Korkai	813	7,184	840	6,466	
	8 Ernavappapuram	824	5,247	847	3,889	
	9 Kunnarapuram	1	11	1	11	
	10 Palayakayal	269	812	193	533	
	11 Kudungani attached to Perungulam	96	964	96	964	
	12 Valavallano attached to Mela Tendriparai	87	495	87	495	
	Total	6,129	59,865	6,053	53,359	
	Grand Total	15,034	147,246	15,907	1,42,655	

25th December 1875.

C. ANANTANARAYYA,
Tahsildar.

Proceedings of the Government of Madras, Public Works Department,
No. 270, dated 29th January 1876.

Read—the following paper:—

Letter—from Col. C. H. DICKENS, R.A., Secretary to the Government of India,
 Public Works Department (Civil Works—Irrigation).
To—the Secretary to the Government of Madras, Public Works Department.
Dated—Fort William, the 27th December 1875.
No. 451. I.

I am directed to acknowledge the receipt of your letter No. 2832, dated the 1st October 1875, furnishing a part of the information called for by the Government of India in connection with the Srivaikuntam Anicut Project in the Tinnevely district, and in reply to say that the information given so far as it goes is satisfactory.

2. I am accordingly to convey the provisional sanction of the Government of

	RS.
Works	9,02,500
Land compensation	37,000
Capitalization of land-revenue	18,500
Tools and plant	8,105
Establishment	1,73,982
Total	11,38,087

India to the amount of the revised estimate as now submitted, viz., Rs. 11,38,087 * ; but I am to observe that the Government of India must express dissatisfaction at the delay which has occurred in supplying the more complete information called for in Public Works Department, No. 517

I., of the 19th August 1874. I am now to state that it is hoped this information will be received at an early date.

3. In submitting this information it should be stated whether, as directed in Public Works Department letter above quoted, provision has been made in the revised estimate for "repairs during construction," as it is not clear that this has been done. The calculation of net revenue as directed in the same letter should also be made. It is presumed that this was not submitted with the present letter, owing to the absence of the calculation for interest charges. But there is not sufficient reason for omitting these. They are necessarily based on estimate, and it should be easier to estimate the date of opening of a work nearly finished than in the case of one of which the estimate is submitted before it is begun.

4. I am to forward copy of a despatch from the Secretary of State, No. 57, dated the 16th September 1875, and to add that, until the information called for in this and previous communications has been received, the revised estimate for the Srivaikuntam Anicut Project cannot be reviewed so completely as is desirable.

5. The sanction accorded in paragraph 2 of this letter has been registered as No. 65-I of 1875-76, and supersedes that registered as No. 17-I of 1868-69.

ENCLOSURE.

Despatch—from the Right Hon'ble the Secretary of State for India.

To—His Excellency the Right Hon'ble the Governor-General of India in Council.

Dated—India Office, London, 16th September 1875.

No.—57, Public Works.

I have received your Excellency's letter, No. 73, of the 2nd July last, forwarding copies of the Progress and Administration Report of Public Works in the Madras Presidency for the year 1873-74.

2. From this report it appears that the scheme for irrigation from the Tambraparny river in Tinnevely is now nearly complete. No proper estimate for this work has, however, yet been submitted for the sanction of Her Majesty's Government.

3. With your letter, No. 122, of the 19th August 1874, copy of a correspondence was forwarded with the Madras Government relative to this project, from which it appeared that it was then expected to cost Rs. 10,40,480. This estimate, however, was incomplete, and further information was called for by your Government, on receipt of which another communication on the subject was promised.

4. No subsequent letter relative to this project has since been received, and I have now only to desire that a complete estimate of the cost and probable returns of the work may be sent home with as little further delay as possible.

Order—No. 270, dated 29th January 1876.

Communicated to the department and officers concerned. It will be ascer-

Irrigation No. 39.

tained in the Revenue Department when definite information, regarding the irrigation on the north or left bank of the Tambraparny under the

Srivaikuntam anicut, will probably be available.

2. The attention of the District Engineer, Tinnevely, will be called to paragraph 2 of the Order of the 1st October 1875, No. 2831, and he will, in making the report therein called for, explain why a delay of some months has taken place, when apparently a few days should have sufficed for the determination of the date from which the anicut works are to be considered to have come into operation. The District Engineer will also report whether charges for repairs during construction have been included in the revised estimate for the Srivaikuntam anicut, that estimate being for the most part a statement of actual cost of works. If such charges for the time that they were chargeable to capital have been omitted,

their amount for (1) the anicut, (2) the south channel and its subsidiary works, and (3) the north channel and its subsidiary works respectively, should be stated.

3. It is observed that the reason why net income was not formally calculated in the papers printed in Proceedings, Madras Government, No. 2831, of the 1st October 1875, was that the amount of ultimate gross income, as regards the south channel irrigation, was shown to be uncertain, and to range possibly between 9 and 23 per cent according to the way in which the revenue due to the works was calculated, and to the extent to which irrigation was assumed to extend. The information available, however, was made use of, and it was indicated that the net income was already something more than 8 per cent on the capital outlay exclusive of interest charges, while ultimately it might approximate to 20 per cent. For the north channel, on the other hand, there were at the time no reliable data, and it appeared to be undesirable to put forward calculations which might mislead, and which could serve no useful purpose. When the revenue information, dependent upon the revision of the settlement of the lands under the north channel, becomes available, it may be practicable to afford a fairly accurate estimate of the gross and net returns from the entire project.

4. Ordered that a copy of these Proceedings be transmitted for the information of the Government of India.

(True extract)

G. W. WALKER, Major-Genl., R.E.,
Secretary to Government.

To the Revenue Department
" District Engineer, Tinnevely.
" Controller of Public Works Accounts.
" Chief Engineer for Irrigation.

Proceedings of the Board of Revenue, No. 733, dated 14th March 1876.

Read—the following papers :—

Letter—from A. J. STUART, Esq., Acting Collector of Tinnevely.

To—the Secretary to the Board of Revenue.

Dated—the 13th January 1876.

No.—18.

I have the honour to submit the statements called for in G.O. No. 149, dated 23rd November 1874, showing—

(1) The gross and net revenue for a series of years prior to the commencement of the Srivaikuntam anicut.

(2) The area of irrigation and the revenue of each year subsequent.

(3) An estimate of the ultimate area and revenue.

2. As regards the two first, the only point of importance is the date at which the anicut should be considered to have begun to take effect. It was built by degrees, and portions of it rose above the river-bed at different times; but, in communication with the District Engineer, this date has been fixed as commencing with fasli 1281 when the anicut was—for 500 feet of its length $5\frac{1}{4}$ feet high, for 500 feet of its length 4 feet high, for 380 feet of its length 1 foot high.

As regards the third point, I beg to submit an account showing the wet holdings, the cultivation distinguishing first and second crop, and the revenue of the lands affected by the Srivaikuntam anicut for the past four faslis, upon which and upon observations made during a tour over that part of the district and after consulting the Tahsildar, I have formed the following opinion as to the ultimate area which will be watered from that work.

3. I think that the limit of the water-supply in the river for ear or second crop has already been reached, and that it is improbable that there will be any considerable extension of second crop cultivation. It will be observed that the second crop cultivation of fasli 1284 is still 1,000 acres behind the first crop cultivation of fasli 1281, and that there are 2,600 acres of first crop land now cultivated in excess of the area of second crop land; much of this land is undoubtedly capable of second crop cultivation, and would be cultivated if there were sufficient water as

there is in the first crop season. I had complaints made to me on several occasions to the effect that the irrigation in the second or car crop was already extended so far that the yield over the whole area was much diminished. Of course, this would be the result of too great a rush made on all sides upon a limited supply of car water; the excessive extension of cultivation would result in a deficient supply of water throughout and a decrease in the yield of all lands.

4. I am not satisfied that this complaint is established, but I think it is not improbably true at least in some measure, and that the further extension of car cultivation should be prevented except in special cases until further experience shows whether the original area of second crop cultivation is not being injured by the extension of second crop beyond the capability of the river to supply properly. The Tahsildar, on the other hand, thinks that the second crop cultivation can and will be extended to the extent of 2,500 acres more than at present without fear of injury, and the opinion of the Engineer in charge coincides with that of the Tahsildar. I beg to quote an extract from paragraph 86 of Mr. Rundall's (late District Engineer) report to be found in Proceedings of the Madras Government, Public Works Department, 1st October 1875, No. 2,831 in which he gives the result of his experience and observation:—

"Experience has shown us that even the present cultivation (and there has not as yet been much extension) is always in difficulties except under the Kadamba and Arumugamangalam tanks in September and March. This is in some measure due to the ryots not cultivating early enough. Last year the Arumugamangalam and Paykulam tanks were full at the end of June, but the ryots neglected to commence cultivation till the end of July and beginning of August. It is inexplicable, but such was the fact."

The Assistant Engineer in charge at present thinks that the ryots will gradually learn to cultivate earlier in the season, and by so doing, be able to extend the car cultivation. I think this is possible, but not to be depended upon.

5. As regards the first or peshanam crop, it will be seen that the ryots, eager to compete one with another for every chance of water, are already holding as wet nearly 4,000 acres more than they could cultivate in the last season, and I think that, adding perhaps 1,000 acres to this, will give the safest figure at which to put the ultimate area of first crop cultivation under the anicut, supposing that no new works are undertaken, but that considerable sums are expended annually as minor new works and for the repair, restoration, and improvement of existing tanks and channels. The Tahsildar thinks about 5,500 acres will be added to the cultivation for peshanam.

6. There can be no doubt that the area which can be supplied by direct channel irrigation, whether for first or second crop, has been long ago reached and that the only way in which cultivation can now be extended further is by the enlargement and improvement of the channel-supplied tanks, and possibly the construction of new ones.

7. It appears to me possible that with a large additional outlay in widening the main channels and in constructing new tanks as well as in drainage works in the neighbourhood of Trichendur and Tuticorin, a further area of perhaps 4,000 or 5,000 acres might eventually be brought under cultivation, but I do not think the returns would pay the interest of the works which would be required. This land could only be supplied for one crop, peshanam, and the rate of assessment would have to be low, as most of the land is swampy and inferior in quality, as well as situated in a thinly populated neighbourhood. The Tenkarai Tahsildar estimates this figure at 3,650, but speaks of the Tenkarai Taluk alone; I allow also for about 2,000 acres near Tuticorin in the Ottapidaram Taluk.

8. On the whole, I think it would be rash to calculate upon a larger ultimate area under the present condition of supply than 5,000 acres more than the figures for 1284, and that for one crop cultivation only. This will certainly not be reached without a liberal expenditure in repairs, improvement, and enlargement of existing tanks and minor channels, and even with this, I should be sorry to express myself as by any means confident of the result. I think that 3,000 acres for one crop may be considered a safe figure, and 2,000 more may be considered probable for first crop and 2,500 possible for second crop.

The repairs, enlargements, and improvements required to secure this will not require an addition to the original estimate, but may, I think, be provided by a liberal allotment for agricultural repairs and minor new works.

A heavy addition to the original estimate would probably in time, but not at first, produce a further addition of 3,000 to 4,000 acres for one crop.

9. I would take the average assessment of one crop land at Rs. 5 per acre and the average of second crop charge at Rs. 5, as the single-crop land is mostly poor and far away from the source of supply, while the second crop cultivation would be on land already in cultivation for first crop.

On this assumption we should have safe ultimate figure—

	ACS.	RS.
For first crop cultivation	3,000	15,000
Probable, first crop	5,000	25,000
Possible, second crop	2,500	12,500
And with a heavy addition to the original estimates—		
Probable figure, first crop cultivation	5,000	25,000

10. The totals for last year were—

First crop	13,678	} assessed at 1,49,930
Second crop	10,728	
Do. waste charged	263	1,660
Dry converted into wet	144	643
Inam and Zamindari lands	1,442	2,398
Total	26,255	1,54,631
A safe estimate of the ultimate area will add		
first crop	3,000	15,000
	29,255	1,69,631
A probable farther addition will give first crop	2,000	10,000
	31,255	1,79,631
And a possible second crop increase of	2,500	12,500
	33,755	1,92,131
With heavy addition to the estimate, the figures		
would in all probability rise in time to	5,000	25,000
Total	38,755	2,17,631

11. As regards the time within which the above result may be expected, I think that five years is a safe and reasonable figure for all the increase to be got by improvement, enlargement, and extension of existing works without additions to the original estimate, and five years from the completion of the new works for the increase which may be obtained by a large addition to the original estimates.

12. I beg to recommend that discretion be allowed to the Collector in dealing with all lands newly brought into cultivation to levy one-fourth assessment the first year, half the second, and so on; much of the land requires a considerable outlay in levelling and manuring before it can produce the crop which it will afterwards carry without extraordinary labour; and, as the assessment is calculated upon what the land is likely to produce when properly brought into cultivation, this arrangement appears fair. It will certainly encourage enterprise.

ENCLOSURE No. 1.

Statement showing the irrigated area and revenue under, the Srivastakundam anicut in the Tinnevely district for 15 years previous to the construction of the work.

[illegible]

ENCLOSURE No. 2.

Statement showing the irrigated area and revenue under Srivaikuntam anicut for the four years subsequent to the construction of the work.

Faalia.	Government land charged as irrigated.						Inam lands charged as irrigated.			Zamindari lands charged as irrigated.		Total.				Deduct amount of outlay on repairs of tanks and channels now merged in the Srivaukuntam ancient scheme.	Net revenue.	
	Dry.			Wet.			Extent.	Old jodi and quit-rent payable to Govern-ment.	Charge for water, etc.	Extent.	Charge for water, etc.	Assessment exclusive of remission.	Charge for water, etc.	Total as- essment for or gross revenue.				
	Extent.	Assessment exclusive of remission.	Charge for water, etc.	Extent.	Assessment exclusive of remission.	Charge for water, etc.												
															ACS.			RS.
1281	...	61.	29	290	19,947	1,23,660	7,178	1,214	2,062	113	...	...	21,222	1,25,751	7,592	1,33,323	2,896	1,30,437
1282	...	100	68	462	15,655	93,728	5,274	1,128	2,092	130	...	...	17,183	95,858	5,866	1,01,724	10,040	91,684
1283	...	181	...	614	21,240	1,37,114	...	1,277	2,084	331	...	...	22,648	1,39,221	945	1,40,166	6,057	1,34,109
1284	...	144	144	490	24,669	1,51,590	...	1,442	1,811	587	...	...	26,255	1,53,545	1,086	1,54,631	30,491	1,24,140

ENCLOSURE No. 3.

Statement showing the ryots' holding and cultivation in the villages under Srivraikentam anicut.

Ryots' holdings, wet.		Actual cultivation.				Waste charged.				Total of columns 8 and 4.				Dry converted into wet.		Inam lands charged as irrigated.		Zamindari lands charged as irrigated.		Total.	
Faslia.		Extent.		Extent.		Extent.		Extent.		Extent.		Extent.		Assessment and charge for water.		Quit-rent and charge for water.		Charge for water.		Assessment and charge for water.	
		Extent.	Assessment.	1st. crop Pesha-nam.	2nd. crop Car.	Total.	Assessment.	1st. crop Pesha-nam.	2nd. crop Car.	Total.	Assessment.	1st. crop Pesha-nam.	2nd. crop Car.	Total.	Assessment and charge for water.	Quit-rent and charge for water.	Charge for water.	Assessment and charge for water.			
1261	13,338	Rs. 1,35,638	ACS. 11,916	ACS. 6,852	ACS. 18,748	RS. 1,20,957	ACS. 874	ACS. 325	ACS. 1,199	RS. 9,882	ACS. 12,780	ACS. 7,157	ACS. 19,947	RS. 1,30,839	ACS. 61	ACS. 319	ACS. 1,214	RS. 2,175	ACS. 21,222	ACS. 1,33,338	
1282	13,349	Rs. 1,36,525	ACS. 11,967	ACS. 8,379	ACS. 15,346	RS. 97,748	ACS. 546	ACS. 63	ACS. 609	RS. 1,251	ACS. 12,513	ACS. 3,442	ACS. 15,955	RS. 99,002	ACS. 100	ACS. 550	ACS. 1,128	RS. 2,192	ACS. 17,183	ACS. 1,01,724	
1283	13,877	Rs. 14,891	ACS. 11,977	ACS. 9,008	ACS. 20,983	RS. 1,34,716	ACS. 228	ACS. 29	ACS. 257	RS. 2,398	ACS. 12,205	ACS. 9,035	ACS. 21,240	RS. 1,37,114	ACS. 131	ACS. 657	ACS. 1,277	RS. 2,395	ACS. 22,648	ACS. 1,40,166	
1284	17,338	Rs. 1,82,025	ACS. 13,678	ACS. 10,728	ACS. 24,406	RS. 1,49,930	ACS. 255	ACS. 8	ACS. 263	RS. 1,680	ACS. 31,938	ACS. 10,786	ACS. 24,669	RS. 1,51,590	ACS. 144	ACS. 843	ACS. 1,442	RS. 2,898	ACS. 26,255	ACS. 1,54,631	

*Proceedings of the Government of Madras, Revenue Department, No. 408,
dated 14th February 1876.*

ABSTRACT.—Communicating G.O. No. 270, Public Works Department, dated 29th January 1879, and calling for report on paragraph 1 thereof requesting to ascertain when definite information regarding the irrigation on the north or left bank of the Tambrapoorney under the Srivaikuntam anicut will probably be available.

Resolution—No. 733, dated 14th March 1876.

In the foregoing letter the Collector submits the information called for by Government in their Orders Nos. 149, dated 23rd November 1874, and 408, dated 14th February 1876, regarding the Srivaikuntam anicut.

2. The revenue realized from irrigated lands in the tract affected by the anicut prior and subsequent to fasli 1281, when it is considered to have begun to take effect, was as shown below :—

	North side.	South side.	Total gross revenue.
Average of fifteen years prior to fasli 1281	RS.	RS.	RS.
Do. of seven " " to " "	...	...	1,16,983
Revenue of " " to " 1281	49,104	69,749	1,18,853
Do. of " " to " 1282	58,283	75,070	1,33,353
Do. of " " to " 1283	42,126	59,598	1,01,724
Do. of " " to " 1284	63,929	91,802	1,54,631

3. It is not stated how much of the area irrigated from fasli 1281 to fasli 1284 was formerly under occupation as dry and what revenue was derived therefrom. The Board, however, presume that most of the lands newly brought under irrigation were formerly waste, and even if they had been under occupation as dry, the revenue they yielded must have been trifling. Assuming, therefore, that the entire difference between the average revenue prior to fasli 1281 and the revenue of subsequent years may fairly be credited to the project, the Board observe that in fasli 1284 there was an increase of Rs. 21,853 on the southern side and Rs. 13,925 on the northern side of the anicut over the average of seven years prior to fasli 1281.

4. This compared with the estimated expenditure gives the following results :—

	Estimated expenditure.	Increase of gross revenue.	Percentage of increase on the expenditure.
North side	RS. 7,30,361	RS. 13,925	1.9 per cent.
South "	4,07,726	21,853	5.3 do.
Total	11,38,087	35,778	3.14 do.

5. It must be here remarked that in calculating the increase of revenue, allowance has not been made for the annual repairs for the upkeep of the works. If the net revenue for fasli 1284 (i.e., after deducting outlay on repairs), viz., Rs. 1,24,140, is compared with the average net revenue for the seven years previous to the construction of the anicut, viz., Rs. 1,10,528, the increase is reduced to Rs. 13,612 only, or 1.2 per cent on the estimated expenditure. The Board observe, however, that four years is too short a series on which to base a calculation of the average outlay that will be required, and that in two out of the four years included in the series, the outlay appears to be abnormally high. Information is probably available in the Public Works Department which will enable an estimate to be framed of the amount which may be fairly debited on this account. As the Board have no materials for arriving at a decision on the point, they have based their conclusions on the gross revenue, leaving the determination of the deduction to be made for upkeep for consideration in the Department of Public Works.

6. In paragraph 5 of their Proceedings, dated 10th May 1875, No. 1217, G.O. No. 1085, dated 19th July 1875, the Board observed that the revenue of fasli 1284 from river-irrigated lands on the southern side of the anicut exhibited an increase of Rs. 45,515, or 9 per cent on the expenditure taken at Rs. 5 lakhs, whereas according to the figures given in the last paragraph, the increase is only Rs. 21,853, or 4.37 per cent on the assumed expenditure (Rs. 5 lakhs). This difference has arisen from two causes, firstly, from the present revenue being now compared with the average revenue* of seven years previous to fasli 1281, while in the Proceedings above referred to, it was compared with the revenue of fasli 1279;† and, secondly, from the revenue‡ of fasli 1284 being now taken *exclusive* of remissions, while on the previous occasion the demand§ was taken *inclusive* of remissions. The latter course was adopted on the supposition that with improved anicut irrigation, no remissions would be necessary. Mr. Stuart does not explain why large remissions, such as those granted in fasli 1284, were called for, but they appear to have been granted chiefly on lands left waste for want of early rains. The total assessment of the holdings on both sides of the river in fasli 1284 was Rs. 1,85,666,|| while the assessment of the extent cultivated and waste charged was only Rs. 1,54,631, the difference¶ having been remitted. The Board presume that such large remissions will not ordinarily be necessary in future, and so the present actual revenue on both sides of the anicut may be taken at Rs. 1,80,000 in round numbers, as shown below :—

Deduct average remissions	RS. 71,291	7,236
Remainder	64,055	
† Rs. 91,602.		
‡ Rs. 1,09,570		
§ Rs. 1,81,625		
Government. (Wet ... 1,81,625		
Inam, etc. { Dry into wet ... 643		
	2,398	
Total	1,85,666	

¶ Rs. 31,035.

necessary in future, and so the present actual revenue on both sides of the anicut may be taken at Rs. 1,80,000 in round numbers, as shown below :—

Assessment of wet land under occupation	RS. 1,82,625
Dry converted into wet	643
Quit-rent and water-rate on inam and zamindari lands	2,398
Deduct probable annual remissions (the average remissions prior to fasli 1284 were only Rs. 7,236)	1,85,666
Remainder	5,666
	1,80,000

Deducting from the above, the average revenue** of seven years prior to fasli 1281, the remainder amounts to Rs. 61,147 which is 5.3 per cent on the estimated expenditure.†† If to this be added Rs. 20,000, the estimated saving in reduction in the assessment on the southern side likely to be effected by the anicut, the percentage of profit amounts to 7.1.

** Rs. 1,18,853.
†† Rs. 11,38,087.
Paragraph 3, Board's Proceedings, No. 1,217, dated 10th May 1875.

7. It must be observed, however, that in the above calculations the Board have taken into account only the revenue derived from river irrigated lands. Mr. Puckle, in calculating the increase‡‡ (Rs. 45,784) on the southern side of the anicut, took into account the increase obtained on all classes of land, *dry* and *wet*, brought under settlement in the villages under the influence of the anicut, as the increase is stated to have resulted solely from the anicut, though it is not explained how this was the case, and the Board are not satisfied that the assumption is altogether justified. The revenue so included amounts to Rs. 6,610. The Board think that the indirect advantages may be left out of account.

‡‡ Revenue from river-irrigated lands	RS. 71,291	1,09,570
Other lands, wet	9,467	6,967
Do. dry	5,788	14,898
Deduct fixed remissions (356) and other items not known (539)	895	
Difference	45,784	

8. As for the future increase, Mr. Stuart's estimate differs widely from that formed by Mr. Puckle as shown below:—

	Total Area likely to be irrigated.		Increase over the actuals of fasli 1284.	
	First crop.	Second crop.	Revenue.	Revenue.
Mr. Stuart's safe estimate	ACS. 17,922	ACS. 11,333	Rs. 1,69,631	Rs. 15,000
Do. "possible estimate"	19,922	13,833	1,92,131	37,500
Mr. Puckle's estimate—vide his letter recorded in G.O., dated 2nd August 1872	27,928	27,798	2,92,793	1,38,182

9. Mr. Stuart's estimate appears to be too low. His safe estimate (Rupees 1,69,631) is less than the assessment of the lands now under occupation, which amounts to Rs. 1,85,666. This can hardly be correct. His possible estimate is

Assessment of holding	Rs. 1,82,625
Quit-rent on inam, etc.	3,041
Total	1,85,666

also too low, it being only Rs. 6,465 over the revenue of the present holdings.

10. According to the District Engineer's reports there were in 1873-74 and 1874-75, 468 and 383 millions of cubic yards of water available for supply which

* Vide paragraph 7 of the Chief Engineer's Memorandum recorded in G.O., dated 8th June 1874, Department of Public Works, No. 1498.

are sufficient to irrigate two crops on more than 33,500 acres, the area originally* estimated, the actual extent now

under occupation for irrigation being only 18,924 acres.

11. It is thus clear that there is water enough to irrigate a much larger area than that estimated by Mr. Puckle, and there is also a considerable area of available waste for extension of cultivation; the great difficulty is to compute the period within which it will be brought under the plough, and the information furnished by Mr. Stuart is not sufficient to enable the Board to form an opinion on this point. They have little doubt, however, that Mr. Puckle's estimate carefully framed as it was and based on an intimate acquaintance with the locality will be realized in course of time; the question within what time the full return may be looked for must be matter for conjecture. Mr. Puckle himself stated in regard to the south-ern channel that "the area now held on patta is as much as the people can manage with the present scanty labour-supply; but, as population increases, the entire area commanded will be irrigated." It appears that in fasli 1284 the ryots held nearly 4,000 acres of nanjai more than they cultivated. Under these circumstances, the Board are not sanguine of any considerable immediate increase over the present revenue (Rs. 1,80,000); but, as it is, the results are satisfactory. They show a return according to the Board's calculations of 7 per cent on the expenditure—vide paragraph 6 supra. Mr. Stuart, however, has omitted to furnish any particulars regarding the population of each village under the influence of the anicut on each side, the area available for irrigation, the extent of the present holdings and general condition of the ryots, without which information it is impossible for the Board to judge of the correctness of his estimate, nor does he explain how far the revision of assessment on the northern side of the river is likely to enhance the revenue. He will now be requested to go thoroughly into the whole matter without delay and supply the omissions above noted. He should explain the necessity for the large remissions granted in fasli 1284 on lands under the work and state how far they will recur in future.

12. Meanwhile these Proceedings will be submitted for the information of Government with reference to the orders quoted in the first paragraph, and a copy furnished to the Chief Engineer for Irrigation.

(True copies and extract.)

C. A. GALTON,
Acting Secretary.

To the Secretary to Government, Revenue Department.
" Collector of Tinnevely, with copy of G.O. No. 270, Public Works Department, dated 29th January 1876.
Copy to the Chief Engineer for Irrigation.

Letter—from J. D. GRANT, Esq., Officiating District Engineer, Tinnevely.
To—the Collector of Tinnevely.
Dated—Palamcottah, the 18th March 1876.
No.—710.

As I mentioned to you personally, the Chief Engineer for Irrigation has called on me to draw up a set of rules for the distribution of water from the Sri-vaikuntam Anicut channels, etc., I have the honour to enclose a letter from the Tinnevely Range Officer making some remarks on the subject.

As I understood from you that you were collecting information as to the former customs, in the distribution of water, I have done nothing further in the matter till I hear from you, and I should feel obliged by your letting me know your views on the subject as soon as you can, so that if possible some arrangements may be decided on before next crop.

Letter—from A. J. STUART, Esq., Collector of Tinnevely.
To—the District Engineer, Tinnevely.
Dated—the 22nd March 1876.
No.—64.

In reply to your letter No. 710, dated 18th instant, I have the honour to inform you that I propose taking up the subject during the jamabandi of Tenkarai taluk which will begin after the Easter holidays. I will write to you as soon as possible after the completion of the jamabandi probably about the end of next month.

2. I may observe that Mr. Hughes' inspection notes do not in general seem to give any greater consideration to old cultivation than to new, if it be possible, I think this is what ought to be done, and the more so as this is the last anicut on the river and liable in scanty seasons to an insufficient supply. The first step will be a record of the irrigation in proportion to the length of time it has existed, this I shall endeavour to get and without attending to fine distinction, it may, I hope, be possible to arrange so as to give the bulk of the lands water in the order of their claims to it.

3. As regards the late period of sowing I will make special inquiries this jamabandi and try to ascertain whether custom cannot be changed.

Letter—from A. J. STUART, Esq., Collector of Tinnevely.
To—the District Engineer, Tinnevely.
Dated—Tinnevely, the 23rd May 1876.
No.—131.

I have during the jamabandi of the Tenkarai taluk received several complaints about the arrangements connected with the distribution of water from the Srivaikuntam anicut chiefly from the villages of (1) Tirukalur, (2) Attur, (3) Tentiriperi, (4) Mangalakurichi and I beg to propose the following alterations and improvements:—

(1) Either a new head sluice near Alwartirunagiri for the Attur village or the widening of the channel leading from the present head sluice so that it may carry more water and so fill the Attur tank which is so small that it only holds 15 days water more rapidly and more often. The improvement of the tank is, I understand, in hand.

(2) Wooden removeable shutters, 9 inches or a foot high, on the crest of the calingula above Kadamba tank to raise the water let into the high level sluices in Tentiruperi and Tirukalur raising an embankment along the south-west bank of the main channel from the said calingula for some distance up the channel to prevent the water spreading over the tail lands of Velur tank and thereby taking a longer time to rise to the level of the Tirukalur high level sluices.

(3) If possible to take the level of the old calingula now in ruins to the south of the bungalow at Puraiyur in the Kadamba tank as the full tank level, and to fix some definite date towards the end of the season after which no water shall pass down the Puraiyur channel until after the tank is full up this level. I would suggest the first of December as a suitable date.

(4) To carry a channel across from Perunkulam tank to supplement the supply to Mangalakurichi.

I have only to add that these villages being the oldest cultivation are clearly entitled to their supply first and to a full supply, and that only after they are and ought to be satisfied, should further use be made of the water.

*Proceedings of the Government of Madras, Public Works
Department, No. 1923, dated 28th July 1876.*

Read—the following paper :—

No. 492—Read again Proceedings of the Government of Madras,
No. 1268, dated 20th May 1876.

No. 493—Order thereon, No. 1923, dated 20th July 1876.

Ordered that these financial abstracts be forwarded to the Government of India with reference to Colonel Dickens' letter No. 48 A.I. of the 25th January last together with a copy of the Proceedings, of Madras Government, 1268, dated 20th May 1876.

2. Ordered also that these papers be communicated to the departments and officers concerned.

(True extract)

G. W. WALKER, Major-Genl., R.E.,
Secretary to Government.

Irrigation No. 53-A.
Account.

APPENDIX I.
Approximate general abstract of financial results of Srinivakuntam aicut system.

Year.	Capital outlay.			Revenue.			Working expenses.			Net revenue.		
	During year.		To end of year.	During year.		To end of year.	During year.		To end of year.	During year.		To end of year.
	Ordinary.	Extraordinary.		Direct income by water rate and miscellaneous receipts.	Increased land revenue due to irrigation works.		Direct income by water rate and miscellaneous receipts.	Increased land revenue due to irrigation works.		Direct income.	Increased land revenue.	
1874-75	Rs. 65,708	Rs. 10,60,597	Rs. 11,26,305	Rs. 62,928	Rs. 24,149	Rs. 87,077	Rs. 38,779	Rs. 24,149	Rs. 62,928	Rs. 24,149	Rs. 87,077	Rs. 11,26,305
1875-76	Rs. 75,226	Rs. 9,94,889	Rs. 10,70,115	Rs. 23,148	Rs. 15,320	Rs. 38,468	Rs. 23,148	Rs. 15,320	Rs. 38,468	Rs. 23,148	Rs. 15,320	Rs. 38,468
1876-77	Rs. 1,85,480	Rs. 9,19,663	Rs. 11,05,143	Rs. 16,321	Rs. 7,34,203	Rs. 7,50,524	Rs. 16,321	Rs. 7,34,203	Rs. 7,50,524	Rs. 16,321	Rs. 7,34,203	Rs. 7,50,524
1877-78	Rs. 1,27,201	Rs. 6,07,002	Rs. 7,34,203	Rs. 16,321	Rs. 6,07,002	Rs. 6,23,323	Rs. 16,321	Rs. 6,07,002	Rs. 6,23,323	Rs. 16,321	Rs. 6,07,002	Rs. 6,23,323
1878-79	Rs. 1,19,789	Rs. 4,87,213	Rs. 6,07,002	Rs. 16,321	Rs. 4,87,213	Rs. 5,03,534	Rs. 16,321	Rs. 4,87,213	Rs. 5,03,534	Rs. 16,321	Rs. 4,87,213	Rs. 5,03,534
1879-80	Rs. 8,57,578	Rs. 1,29,635	Rs. 9,87,213	Rs. 16,321	Rs. 1,29,635	Rs. 10,16,538	Rs. 16,321	Rs. 1,29,635	Rs. 10,16,538	Rs. 16,321	Rs. 1,29,635	Rs. 10,16,538
1880-81	Rs. 1,29,635	Rs. 1,29,635	Rs. 2,59,270	Rs. 16,321	Rs. 1,29,635	Rs. 1,45,956	Rs. 16,321	Rs. 1,29,635	Rs. 1,45,956	Rs. 16,321	Rs. 1,29,635	Rs. 1,45,956

* There is no information regarding working expenses and the remainder of the statement has been calculated as if the working expenses were nil.

APPENDIX II.
Approximate general abstract of financial results of Srivaikuntam anicut system.

Year.	Charge for interest.				Difference between net revenue and charge for interest.				Percentage of net revenue on capital outlay.		Area of land irrigated during year.			Irrigation capacity of canal at end of each year.		Cost of working expenses per acre of land irrigated.		Length of canal opened at end of each year.		Length of canal in progress at end of each year.		Length of distributary channels opened at end of each year.		Length of distributary channels in progress at end of each year.																		
	During year.		To end of year.		Excluding land revenue.		Including land revenue.		land	land	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																	
	Ordinary.	Extraordinary.	Total.	Rs.	Rs.	Rs.	Rs.	Rs.																		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1874-75	47,727	47,727	47,727	1,94,286	1,94,286	8,948	1,31,308	3.65	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1875-76	44,770	44,770	44,770	1,46,509	1,46,509	21,622	1,22,860	2.32	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1876-77	41,335	41,335	41,335	1,01,739	1,01,739	56,705	1,00,788	1.66	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1877-78	33,039	33,039	33,039	60,354	60,354	16,718	44,083	2.22	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1878-79	27,315	27,315	27,315	27,315	27,315	27,315	27,315	2.22	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1879-80	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1880-81	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1881-82	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1882-83	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1883-84	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1884-85	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1885-86	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1886-87	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1887-88	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1888-89	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1889-90	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1890-91	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1891-92	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1892-93	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1893-94	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1894-95	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1895-96	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1896-97	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1897-98	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1898-99	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1899-00	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1900-01	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1901-02	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1902-03	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1903-04	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1904-05	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1905-06	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1906-07	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1907-08	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1908-09	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1909-10	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1910-11	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1911-12	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1912-13	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1913-14	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1914-15	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1915-16	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1916-17	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1917-18	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1918-19	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1919-20	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1920-21	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1921-22	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1922-23	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1923-24	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1924-25	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1925-26	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1926-27	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1927-28	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1928-29	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1929-30	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1930-31	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1931-32	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1932-33	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1933-34	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April to November.	Sown from December to March.	Total.	end of each year.	per	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.	Main canal.	Branch canal.																
1934-35	...	...	...	...	...	...	...	...	No credit is allowed on account of increased land revenue.	Sown from April																																

Proceedings of the Government of Madras, Revenue Department, No. 3135, dated 21st December 1876.

Read—the following paper :—

Proceedings of the Madras Government in the Public Works Department, No. 3287, dated 5th December 1876.

Read—the following paper :—

Proceedings of the Madras Government in the Revenue Department, dated 17th November 1876, No. 1710.

ABSTRACT.—Communicating to the Public Works Department Proceedings, Board of Revenue, stating that fifteen years may be taken as the period for ascertaining standard revenue under Srivaikuntam anicut in Tinnevely district.

Order—No. 3287, dated 5th December 1876.

Irrigation No. 14.

Recorded.

2. The following is a list of the sub-sections of irrigation under the Srivaikuntam anicut :—

North Side.

1. Main channel (direct irrigation).
2. Korkai channel (do.).
3. Korkai tank.
4. Arumungamungalum tank.
5. Paycolum and Marathoni tanks.
6. Palayacoyel tank.
7. Pottakulam tank.
8. Korumpollum tank.

South Side.

1. Main channel to Kadamba tank (direct irrigation).
2. Authoor channel (do.).
3. Sethukavoithan tank.
4. Authur tank (Periakulam and Koluvaanallur).
5. Kadamba tank.
6. Puriyur channel (direct irrigation).
7. Nallur tanks (Melakulam and Kilakulam).
8. Ammenpuram group of tanks including Ammenpuram, Kanum, Sinimayadi, Arumuganeri, Natakulam and Nalayiramudyar tanks.
9. Kanum channel (direct irrigation).
10. Tulukan channel and tank.
11. Avudiyar channel and tank.
12. Ellapanaiken tank.

(True extract)

G. W. WALKER, Major-Gen., R.E.,
Secretary to Government.

Order thereon—No. 3135, Revenue, dated 21st December 1876.

Communicated to the Board of Revenue.

(True extract)

H. B. GRIGG,
Acting Under Secretary to Government.

To the Board of Revenue.

Mis. No. 11475.

Communicated to the Collector of Tinnevely.

REVENUE BOARD OFFICE, MADRAS,
28th December 1876.

To the Collector of Tinnevely.

H. G. STOKES,
Acting Secretary.

Proceedings of the Board of Revenue, No. 389, dated 1st February 1877.

Read—the following paper:—

*Letter—from A. J. STUART, Esq., Acting Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—the 3rd November 1876.
No.—651.*

In reply to Board's Proceedings No. 733, dated 14th March 1876, I have the honor to submit comparative statements for the north and south Srivaikuntam channels, showing the areas likely to be irrigated as estimated by Mr. Puckle in 1872, and those now thought probable by the Tahsildar, a very competent officer and thoroughly acquainted with his taluk. The Board will find the population of each village in the first column, and the condition of the ryots as well as explanations of variations in estimate in the last column.

2. The revision of assessment on the north side has resulted in an increase of revenue of Rs. 7,743, but this is included in the figures already given by me for fasli 1284.

3. The remissions for fasli 1284, amounting to Rs. 31,035, were in part the result of a deficient supply of water in the kar season, and also to a large extent were caused by the ryots having taken into holding more land than there was any prospect of cultivating for kar for a long time to come if ever. This remission to a great extent disappears in the current fasli, owing to the rule that no remission is to be granted on lands compounded for two crops when only one crop fails, the result being that the large extent of 7,246 acres assessed at Rs. 23,015, waste and withered in kar, has been paid for by the ryots.

4. I am of opinion that this state of things is likely to be permanent, and ought to be met by granting option to the ryots of having their lands reclassified as single crop with a charge of half or two-thirds single-crop assessment on a second crop if cultivated successfully. The opportunity would not be taken advantage of except when there is no probability of a second crop being permanent, and then, I think, it is only just to allow the opportunity. The ryots, there can be no doubt, had exaggerated ideas of the quantity and certainly of the supply for kar, and ought to be allowed the opportunity for at least five years to come of retracting their consent to the compounded charge.

5. I beg to enclose also a Statement No. 4, in the form of No. 3 of my letter contained in Board's Proceedings under reply, giving the information already tabulated for a number of years for the past Fasli 1285 also. It will be seen by comparison of the figures of 1285 with those of 1284, that the area of holdings on patta at wet rates has remained nearly the same, that the area cultivated for Peshanam has increased by nearly 1,000 acres, while that cultivated for kar has diminished by more than 3,000 acres. The kar season was unusually unfavourable, but still I cannot but regard this as confirming my low estimate of the increase to be expected in the kar season. It shows how near the ultimate limit we have come when a difference in season will reduce the area cultivated in kar, already 7,000 acres less than that held and paid for, by as much as 3,000 acres more.

6. As regards the statement now submitted, I beg to state that it expresses the views of the Tahsildar who is certainly very well qualified to form an opinion both by thorough knowledge of the taluk acquired in four years' residence there, and by the fact that he is himself a very intelligent officer. According to his estimate, 1,000 acres under the south channel and 463 acres under the north channel, total 1,463 acres, may be expected to come into cultivation eventually besides the area now held on patta, and he expects the whole of this will be cultivated for both crops. This is for the Tenkarai taluk only. The total would thus be 18,801 acres assessed at Rs. 1,97,986 for both crops together.

To this must be added for Ottapidaram taluk 241 acres of first crop and 24 acres of second crop cultivated this year, and about 2,000 acres more for first crop, which in course of time will probably come into cultivation at the end of the north channel, and perhaps 200 for second crop:

or 2,241 acres first crop assessed at ...	Rs. 11,205
224 „ second crop assessed at ...	1,120
Total ...	12,325

The grand total would thus give—

21,042 acres for peshanam first crop ...	} assessed at 2,10,311
19,025 „ for kar second crop ...	

7. I regret that I cannot agree with the Tahsildar in the estimate of the areas likely to be ultimately irrigated, as I think the figures already given by me are much more probable. The Board have taken my safe estimate for the comparisons and observations made by them. If my probable estimates were taken they would have a fair idea of what I think may be expected; the safe estimate is what I am sure of, the other what I believe will most probably result. This will give 31,255 acres assessed at Rs. 1,79,631 as my estimate of what is probable, against 40,067 acres assessed at Rs. 2,10,311 as the Tahsildar's estimate, and 55,724 acres assessed at Rs. 2,92,793 as Mr. Puckle's estimate of 1872. I consider it most probable that some of the land now in holding on the south side will go out of wet holding for want of water-supply, and that on the north side besides present holdings, there will eventually be about 2,000 acres of land cultivated near Tuticorin for one crop only. This will probably be a good many years in coming to pass, as that part of the country is thinly populated and a good deal must be done in the way of draining and improving the lands to be cultivated.

The widest difference between my estimate and the Tahsildar's is in the extent likely to be cultivated in kar: I do not think this will rise beyond 10,000 acres; he thinks 18,800 will eventually be successfully sown. The remaining difference is in Peshanam, where I think present holdings will not be fully reached on the south side and he thinks that 1,400 acres more than this will come into cultivation.

8. I think, as regards the Tenkarai taluk, that the ryots have from the first taken too sanguine a view of the possible irrigation. As remarked in my previous letter, any extension can only be by means of tanks already existing, and which cannot be very greatly enlarged without encroaching on the lands taken up for cultivation. Moreover, though the supply in the river is abundant, I doubt the carrying power of the main canals under present conditions to supply a larger area than that estimated. For the villages at the end of the south main channel, I can say certainly that it is nothing but the absence of a sufficient water-supply which has prevented their working up to the area held by them or near it, and I do not see, under existing conditions of channels and tanks, that this state of things can be very materially improved.

9. The reasons why there is so great a difference between my estimate and the Tahsildar's or Mr. Puckle's probably is that Mr. Puckle estimated in 1872, and took into account nearly all the land which was then reported to be within command of the channels: while subsequent experience of four years shows that only such area as can be commanded by tanks can be expected to come into cultivation: credit was given to the channels for being able to carry all the water that was wanted, and it was thought that the only difficulty was to find land lying low enough for command. Experience shows that the channels fed by freshes of varying amount are not in their present state capable of carrying more water than suffices for a limited area, far below, in my opinion, the total of what the level of the channel commands.

ENCLOSURES Nos. 1 to 3.—Statements.

Resolution—No. 389, dated the 1st February 1877.

In 1872, Mr. Puckle estimated the total area likely to be brought under

* G.O. No. 1153, dated 2nd August 1872.			
	1st crop.	2nd crop.	Total.
	ACS.	ACS.	ACS.
South canal	13,510	13,382	26,892
North canal	14,416	14,416	28,832
	<u>27,926</u>	<u>27,798</u>	<u>55,724</u>

						Rs.
† South canal	...	...	...	...	...	1,72,829
North canal	...	...	...	...	...	1,54,294
						3,27,123

G.O. No. 1085, dated 19th July 1875.

							Rs.
†	North channel	...	...	...	...	...	1,54,294
	South channel, fasli 1284	...	...	...	...	...	91,602
	Increase under south channel	...	...	...	...	...	49,495
							2,95,391
							ACS.
\$	1st crop	...	...	...	...	...	17,922
	2nd crop	...	...	...	...	...	11,333
							29,255

was called upon to report more fully on the subject, and the letter above recorded is the reply.

2. Mr. Stuart still adheres to his former opinion, and states that while he is sure that 29,255 acres will be brought under irrigation, it is probable that under first and second crops 31,255 acres assessed at Rs. 1,79,631 may be irrigated, but not more. He states that this large difference between his estimate and that of Mr. Puckle's is due to Mr. Puckle having taken into account nearly all the land which was then reported to be within the command of the channels, but that subsequent experience of four years has shown that channels are not capable of supplying as much water as is required for so large an extent. The Tahsildar of the Tenkarai taluk, in which the lands are mostly situated, estimates the probable area to be irrigated at 37,602 acres, assessed at Rs. 1,97,986, and adding to this the area likely to be irrigated in the Ottappidaram taluk, the total area estimated by the

						ACS.
First crop ...	...	...	...	...	...	21,042
Second crop	...	...	...	...	...	19,025
				Total	...	40,067

occupied on the south side will not be cultivated as wet for want of water-supply.

3. The extent now actually irrigated or charged as irrigated under the first and second crops is 30,025¹/₂ acres assessed at Rs. 1,58,657, according to the channel register.

likely to be brought under irrigation hereafter.

					ACS.	
first crop	...	...	...	...	27,826	
second crop	...	...	...	...	27,798	
				Total	<u>55,724</u>	

						ACS.
** First crop	...	...	...	...	...	27,926
Second crop	...	...	...	...	...	27,798
Total	...					55,724

however, that the seasons have been very adverse, and the work has had no chance of showing its full capabilities. There is ample land which could be irrigated if water is available, and the whole question of the probable revenue therefore depends entirely upon the capacity of the channels to supply water, which can only be determined by Public Works Department. The Board therefore suggest that the Chief Engineer for Irrigation be requested to estimate the

quantity of water available for each village commanded by the channel for first and second crop. When this is done, a better estimate of the probable return can be made.

5. The extent irrigated and the actual revenue realized ever since the completion of the anicut are shown below in comparison with the figures previous to that period :—

	Area charged as irrigated.			Revenue.
	1st crop.	2nd crop.	Total.	
Average of 7 years previous to fasli 1281	13,083	6,554	19,537	1,18,853
Fasli 1281	13,607	7,615	21,222	1,33,333
" 1282	13,497	3,686	17,183	1,01,724
" 1283	13,064	9,584	22,648	1,40,166
" 1284	14,922	11,333	26,255	1,54,631
" 1285	15,948	14,071	30,019	1,58,657

6. In reporting that the cause of large remissions in fasli 1284 on the lands under the anicut was a deficient supply of water, Mr. Stuart again raises the question of the propriety of refusing remissions on lands compounded for two crops when only one crop fails, and observes that in fasli 1285, 7,246 acres of land which were either waste or in which crops withered were charged under the rules with an assessment of Rs. 23,015. He is of opinion that riots should be

Board's Proceedings No. 662, 9th March 1876.

"	"	768, 17th	"	"
"	"	2812, 13th	Nov.	"

The question has, however, been fully considered and disposed of in Board's Proceedings noted in the margin.

(A true copy and extract)

H. E. STOKES,
Acting Secretary.

To the Secretary to Government, Revenue Department, with three original statements to be returned and copies of Board's Proceedings No. 662, dated 9th March 1876, No. 768, dated 17th March 1876, and No. 2812, dated 18th November 1876.

Copy to the Collector of Tinnevely.
 " " Chief Engineer for Irrigation.
 " " Director of Revenue Settlement.

Proceedings of the Madras Government, Revenue Department, No. 754, dated 21st February 1877.

Read—the following paper:—

Proceedings of the Board of Revenue, No. 389, dated 1st February 1877.

Read—the following paper:—

Letter—from A. J. STUART, Esq., Acting Collector of Tinnevely.

To—the Secretary to the Board of Revenue.

Dated—the 3rd November 1876,
No.—651.

[Printed on pages 84 to 87.]

Order—No. 754, Revenue, dated 21st February 1877.

Irrigation No. 6.

Communicated to the Public Works Department in continuation of G.O. No. 646, dated 19th May 1876, and

with especial reference to paragraph 4 of the Revenue Board's Proceedings above recorded.

(True extract)

D. F. CARMICHAEL,
Secretary to Government.

To the Public Works Department.
,, Board of Revenue.

ENCLOSURE.

List of distributing works required in connexion with the Srivaikuntam anicut works.

Name of work.	Approximate estimate.	Remarks.
SOUTH SECTION.		
<i>Attur tank.</i>		
1 Extending Sendamangalam channel	200	For irrigation of Government land (Attur village).
<i>Kadamba tank.</i>		
2 Extending and improving Suganthalai channel ...	2,000	Do.
<i>Nalayiramudaiyar tank.</i>		
3 Aqueduct over Tharuvai drainage channel ...	656	Do.
4 Tharuvai drainage channel, deepening $\frac{1}{2}$ yard ...	1,200	
NORTH SECTION.		
<i>Korkai channel and tank.</i>		
5 New masonry sluices to replace palmyra sluices in channel 5 at Rs. 250.	1,250	For irrigation of Government land.
<i>Paykolam.</i>		
6 South field channel, 5 small sluices at Rs. 40 ...	200	Do.
7 North field channel, 3 small sluices at Rs. 40 ...	120	Do.
8 Culvert to carry drainage under S.F. channel ...	700	
<i>Palayakayal tank.</i>		
9 Three new sluices in tank at Rs. 200	600	For irrigation of Government land.
<i>Marathoni tank.</i>		
10 Lowering sluices	400	Karakurchi mitta land.
11 Six small sluices in field channel at Rs. 30 ...	180	Do.
<i>Pottakolam.</i>		
12 Twelve small sluices in field channel at Rs. 30 ...	360	Do.
<i>Korampallam tank.</i>		
13 New sluices	600	Do.
14 Twelve sluices in field channel at Rs. 40	480	Karakurchi mitta land and for Government land.
15 Field channels	* 4,855	Do.
	5,935	
	9,745	
Grand Total	13,745	

* Of which Rs. 3,768 already allotted from sale-proceeds on waste lands.

The Head Assistant will be requested to report if the works proposed provide sufficiently for the wants of the villagers.

J. B. PENNINGTON,
Collector

Proceedings of the Board of Revenue, No. 1059, dated 16th April 1878.

READ—the following Proceedings of the Madras Government, dated 13th March 1878 No. 204-I I, Public Works Department:—

ABSTRACT.—Desires the Board of Revenue to instruct the Collector in concert with District Engineer the to consider the rules for the distribution of water provided by the Srivaikuntam anicut channels, Tinnevely district.

Order No. 204 I, dated 13th March 1878.

The note by the Chief Engineer for Irrigation places the matter in quite a new light. The Collector merely stated that the District Engineer was anxious to lay

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down a few rules for the guidance of officials in the distribution of water for irrigation and asked for an expression of the Board's opinion on one point only, viz., "whether lands near the head of the channel should be first supplied before water is passed on to those lower down." Copies of the correspondence with the District Engineer were not forwarded, and no mention was made of the existence of ground for complaint under the existing practice. The Board asked for a copy of the rules and were informed in reply that no rules had been drawn up, and that an expression of the Board's views on the point referred was asked for as a preliminary to framing rules. As there was nothing in the papers before the Board to show that the existing practice had failed to meet requirements and many points of difficulty were likely to arise in the settlement of detailed instructions of general application, the Board passed the Proceedings quoted in paragraph 7 of Colonel Mullins' note.

2. It now appears that there is urgent necessity for regulation in the matter, and the Collector will, as directed, take the subject into consideration in communication with the District Engineer without delay and submit a draft code of rules applying for instructions on any doubtful points of importance which may arise in the discussion of the subject.

(A true extract)

C. A. GALTON,
Acting Secretary.

To the Collector of Tinnevely, with copy of Government Order
Copy to the Joint Secretary to Government, Public Works Department,
Irrigation Branch.

the Secretary to Government, Revenue Department.

*Proceedings of the Government of Madras, Revenue Department,
No. 1206, dated 15th May 1878.*

Read—the following paper:—

*Proceedings of the Government of Madras, Public Works Department,
No. 358-I., dated 1st May 1878.*

(i)

Read—the following papers:—

Endorsement of the Chief Engineer for Irrigation No. 110 I.,
dated Ootacamund, 29th April 1878.

(ii)

Letter—from J. D. GRANT, Esq., Officiating District Engineer, Tinnevely.
To—the Chief Engineer for Irrigation.
Dated—Palamcottah, the 5th January 1878.
No.—166.

I have the honour to forward for your sanction a revised estimate, Rs. 1,318, for constructing a bund to protect nanja to the south of the south main channel, Srivaikuntam anicut project near Alwar Tinnevely, and conveying a drainage

One original estimate.
" revised do.
" comparative statement.

channel now entering the south main channel.

2. The original estimate of Rs. 420 for the same purpose was sanctioned in May 1874 and charged to Repairs, Srivaikuntam anicut project, but it was considered at that time that no compensation would be claimed for the land taken up for the purpose.

3. It subsequently turned out that the landholders brought forward their claim through the Collector for compensation, and the Collector has accordingly sent in a bill for Rs. 897-8-0, hence the necessity for a revised estimate.

4. As according to the recent classification there is no sub-head, B Land, under Maintenance and Repairs to which this work was originally charged, I beg your permission to charge the whole amount to the same head.

(iii)

No. 18 T.N.

Irrigation Memorandum.

In reply to the letter, No. 166 of the 5th January last, from the District Engineer, Tinnevely, the undersigned has the honour to say that before the orders of Government on the papers therewith transmitted can be taken it will be necessary to explain—

1st.—The nature and object of the works, the necessity for undertaking them, and the cause of that necessity.

2nd.—Why the improvement, for such it seems to be, has been charged to Repairs. The drainage channel would appear from the heading of the estimate to be a necessary adjunct of the syphon sluice.

2. It must be understood that no work involving the acquisition of ground is to be carried out until a proper estimate, countersigned by the Collector, of the compensation payable has been obtained. If it be understood that the owners will give up the land without payment, the transaction must nevertheless pass through the Collector and proper land-plans and registers must be recorded, and until the Collector has certified that no compensation is payable or required, it must not be assumed that nothing will have to be paid.

3. Only for emergent work is any departure from the rules allowable, and then only when the interests involved manifestly justify the setting aside of the rule.

J. MULLINS, Lieut.-Col., R.E.,
Chief Engineer for Irrigation.

1st April 1878.

(iv)

Letter—from J. D. GRANT, Esq., Officiating District Engineer, Tinnevely.

To—the Chief Engineer for Irrigation.

Dated—Palamkottah, the 13th April 1878.

No.—10.

In reference to your No. 18 T.N. of 1st instant, I have the honour to offer the following explanation:—

- (1) The syphon sluice to which the drainage channel in question leads is one built from the Srivaikuntam anicut project estimate to pass one of the distributaries of Tenkarai tank across the south main channel, and was not originally intended for drainage also.
- (2) The channel in question is but a continuation, as far as the syphon sluice, of one of the field channels of Tenkarai tank, which previously discharged into the south main channel.
- (3) The necessity of the work was owing to the water of the south main channel, when channel ran full or nearly so, backing up this field channel, and also spreading over a considerable extent of nanja.
- (4) It was considered that the inconvenience would be easily remedied by carrying on the channel to the syphon sluice and making a bund between the new cut and the south main channel.
- (5) An estimate for the work, amounting to Rs. 420, was locally sanctioned in 1874 and the work carried out. This estimate provided nothing for compensation, and it was understood that no claim would be made.
- (6) No claim was made for compensation until a couple of years after the work was done. The sum for which sanction is now requested is merely the amount of compensation as fixed by the Revenue authorities.
- (7) At this distance of time I am unable to state why the work done in 1874 was charged to "Repairs" instead of to "New Works," but finding it so charged the estimate now sent for sanction was charged to the same head.

Submitted to Government for consideration.

The sanction asked for has been rendered necessary by the omission to acquire regularly the land required for an extension of an irrigation channel to a syphon sluice, and it may be noticed that, apart from the rules, the occupation of land, which has been valued by the Revenue Officers at upwards of Rs. 420 an acre, without proper authority and before compensation had been settled or was regularly determined to be unnecessary, was very improper.

2. It appears that a field channel discharged into the Srivaikuntam anicut south main channel and the water from the latter was found to back up the field channel and to cause injury to the adjacent lands. What appeared to be the easiest remedy, viz., continuing the channel to the syphon sluice, was estimated to cost Rs. 420, and a repair estimate of this amount was approved by the Collector in May 1874 and carried out. The claim for compensation amounts to Rs. 898. Had

the circumstances been fully ascertained at the time no doubt some other remedy would have been found, and as the water in the south main channel is never at a high level for more than a day or two and seldom for more than a few hours, the old outfall of the field channel might probably have been retained, and the main channel water excluded there from by means of a small sluice with a self-acting shutter. The unfortunate results now brought to notice are in a great measure due to neglect of instructions. Circular No. 57, dated November 1873, or six months before the first estimate was sanctioned, enjoins the use of revenue survey maps, and especially of the large scale village maps, for exhibiting proposed arrangements, and Circular No. 56 of the same date prescribes the preparation of land-plans for all land required for irrigation works whether sanctioned locally or not.

3. It is recommended that the Examiner, Public Works Accounts, be authorized to pass the compensation bill, and that the whole* expenditure be charged to Revenue Extensions and Improvements to which it properly appertains. The classification will be—Srivaikuntam anicut system, south main channel. Sub-head—F, Other Cross-drainage Works.

*About Rs. 1,318.

J. MULLINS, Lieut.-Col., R.E.,
Chief Engineer for Irrigation.

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

Order—No. 358 I., dated 1st May 1878.

The Examiner of Public Works Accounts is authorized to pass the bills† for land compensation in connexion with the extension of a field channel to the syphon sluice under the Srivaikuntam anicut, south main Channel, near Alwar Tirunagari.

† Rs. 898.

2. It is observed that the Chief Engineer for Irrigation has already furnished the District Engineer with instructions which will prevent a recurrence of such claims for land compensation. The circumstances indicate great want of care primarily on the part of the Range Officer, also the acceptance of the estimate of Rs. 420 by the District Engineer on insufficient information and without regard to the instructions conveyed in Circulars Nos. 56 and 57 of the Irrigation Department.

3. These Proceedings will be communicated to all District Engineers in order that it may be clearly understood that land for irrigation works must be acquired in the manner prescribed, and that any future case of this kind will be severely dealt with.

(True extract)

J. MULLINS, Lieut.-Col., R.E.,
Joint Secretary, to Govt., P.W.D., Irrigation Branch.

To District Engineers.
To the Chief Engineer for Irrigation.
" Examiner of Public Works Accounts.
" Revenue Department.

Order—thereon No. 1206, Revenue, dated 15th May 1878.

Communicated to the Board of Revenue.

(True extract)

L. A. CAMPBELL,
Under Secretary to Government.

To the Board of Revenue.

Mis. No. 5285.

Communicated to the Collector of Tinnevely.

(By order)

C. A. GALTON,
Acting Secretary.

MADRAS REVENUE BOARD OFFICE,

23rd May 1878.

To the Collector of Tinnevely.

*Proceedings of the Government of Madras, Revenue Department, No. 2474,
dated 12th October 1878.*

Read—the following paper:—

*Proceedings of the Government of Madras, Public Works Department, No. 756 I.,
dated 1st October 1878.*

Read—the following papers:—

(i)
Endorsement of the Acting Chief Secretary to Government in the
Revenue Department, dated Ootacamund, 2nd September 1878.

(ii)
Proceedings of the Board of Revenue, No. 2283, dated 15th August 1878.

(iii)
Board's Proceedings Nos. 1059, 1150 and 1510, dated 16th April, 1st
May, and 6th June 1878, respectively.

(iv)
Letter—from J. B. PENINGTON, Esq., Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—Courtallam, the 29th July 1878.
No.—557.

With reference to Board's Proceedings No. 1059, dated 16th April 1878, and
G.O. No. 804, dated 28th May 1878, I have now the honour to submit the draft
rules (with plan) prepared by the District Engineer for regulating the distribution
of water under the *South Main Channel* of the Srivaikuntam anicut.

2. As pointed out in my letter No. 358, dated 13th May 1878 (paragraph 3),
no special difficulty has been experienced elsewhere, and the District Engineer
has therefore postponed the compilation of rules for the north main channel
pending orders on those now submitted.

3. I have carefully discussed the proposed rules with Mr. Grant; and consider
that they are as likely to give general satisfaction as any rules on such a subject
can ever be, but they are of course (as explained by Mr. Grant) to be construed
liberally, and much is always to be left to the discretion of the responsible officer
of Government on the spot. They are in fact rather guides to indicate the general
policy to be pursued in the distribution of water than binding rules; but still they
will no doubt be extremely useful and a step in the right direction.

4. The difficulty that was anticipated as to the claims of old over new cultiva-
tion is not so prominent as was expected when I wrote my letter No. 705, dated
8th October 1877; and it is impossible to dispose of it otherwise in the present case
than by giving the new lands at the head of the channel equal advantages with the
old cultivation. Fortunately in this particular case there is no great area newly
irrigated.

5. As pointed out in the memorandum that accompanies the rules (paragraph
10 *et seq.*) the claims of the Kadambar ryots form the great difficulty in the distri-
bution of water from this channel. It is even open to question if their position
has been much improved (as yet) by the anicut, and they are therefore entitled to
the greatest consideration; but I think they have no right to complain of the
arrangements made.

ENCLOSURE No. 1.—Draft Rules.

ENCLOSURE No. 2.—Map.

The draft rules will be submitted to Government with reference to G.O. No.
204 I, dated 13th March 1878; they appear to have been very carefully drawn up,
and both Collector and District Engineer are in accord as to their meeting as far
as possible all requirements. The Collector has not however complied with the
direction in paragraph 2, Board's Proceedings, dated 1st May, to embody in the
rules the arrangements decided on for the control of the sluices and distribution of
the water by main and minor channels; as this is an important feature in the
system, and it is desirable that there should be no uncertainty on the point, the
Collector will submit the necessary additional rules. With reference to the
concluding paragraphs of the District Engineer's memorandum the distribution
from the small sluices of each tank and channel should be left to the villagers.

(A true copy and extract)

C. A. GALTON,
Acting Secretary.

Transferred to the Public Works Department with reference to the Order in
that Department, No. 204 I., dated 13th March 1878.

C. G. MASTER,
Acting Chief Secretary.

Note by the Chief Engineer for Irrigation, No. 252 I., dated 17th September 1878.

The rules ordered in G.O. No. 204 I. of the 13th March 1878 to be drawn up
for the more systematic distribution of the water-supply of the Srivaikuntam
anicut channels have been prepared by the District Engineer in consultation with
the Collector, and the circumstances have been explained in the District Engineer's
notes on the rules.

2. The undersigned thinks that the District Engineer has taken a less favourable
view of the circumstances of the Kadam-
bur tank and of the irrigation under it

than is quite correct. Its old sources of supply have not been interfered with by
its connexion, through the south main channel, with the Srivaikuntam anicut,
and it is believed that more water has not been drawn off on the east side of the
tank by the Puriyur channel than has been received from the main channel on the
west. The seasons have been so adverse for several years that probably had both
these channels been non-existent, as great or even greater difficulty might have
been experienced in supplying the irrigation under this very important tank.

3. A perusal of the notes will show that detailed local knowledge is requisite
to a proper understanding of the requirements of the water distribution, and that

the proposals have been based on such
knowledge. The only modification of
the rules which is thought desirable is
the entry in rule IV of the periods *
during which water may be passed into

the Puriyur channel, and in rule V of the dates † ending the two periods named.
It is better that each rule should be complete and quite clear.

4. It will be seen that it is considered not to be necessary at present to draw
up rules for the irrigation under the North Main Channel, but the data for such
rules should be collected as they will certainly be required as irrigation extends.

J. MULLINS, Lieut.-Col., R.E.,
Chief Engineer for Irrigation.

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

Order—No. 756 I., dated 1st October 1878.

The rules agreed upon by the Collector and District Engineer, Tinnevely, and
submitted by the Board of Revenue for the distribution of water from the south
main channel of the Srivaikuntam anicut will be adopted for the management of
the water-supply.

2. It is noticed that the Board of Revenue have in their Proceedings No. 2283
of 15th August 1878 called upon the Collector to submit additional rules embodying
the arrangements decided on for the control of the sluices and distribution of water
by main and minor channels and these will be awaited. It should be shown exactly
what part of the regulation will be in charge of the Public Works Officers, and
the rest will, it is presumed, be left to the villagers under the general control of
the Revenue Officers. Apparently as regards the former no change of the system
hitherto in force is contemplated.

(True extract)

J. MULLINS, Lieut.-Col., R.E.,
Joint Secretary to Government, P.W.D.,
Irrigation Branch.

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

Order—No. 2474, Revenue, 12th October 1878.
Communicated to the Board of Revenue.

(True extract)

L. A. CAMPBELL,
Under Secretary to Government.

To the Board of Revenue.

Mis. No. 19767.

Recorded.

2. The additional rules which should show clearly the extent to which the officers of the Revenue and Public Works Department are respectively responsible for the regulation of the supply from the south main channel are awaited.

(By order)

REVENUE BOARD OFFICE, MADRAS,
21st October 1878.

To the Collector of Tinnevely.

C. A. GALTON,
Acting Secretary.

Proceedings of the Board of Revenue No. 2888, dated 28th October 1878.

Read—the following paper:—

Letter—from J. B. PENNINGTON, Esq., Collector of Tinnevely.
To—the Secretary to the Board of Revenue.
Dated—Courtallam, 20th September 1878.
No.—694.

In reply to the Board's Proceedings No. 2283, dated 15th August, I have the honour to enclose copy of letter from the District Engineer, from which it will be seen that we are not quite agreed as to the meaning of the previous order referred to (paragraph 2 of Board's Proceedings, dated 1st May 1878).

2. As already explained in my letter, dated 13th May 1878 (Board's Proceedings No. 1510, dated 6th June 1878) (which, however, was unfortunately not worded with sufficient clearness), the original orders of Government on the subject* had reference solely to the south main channel of the Srivaikuntam anicut, as it was only under that channel that the urgent necessity for precise regulation had arisen.

3. If, however, the Board are of opinion that rules for the distribution of water to and from all the main and minor channels in the district should be laid down in the same detail this can of course be done, though I doubt if the advantages to be expected will be at all commensurate with the labour that is involved in the preparation of such intricate regulations, and I am even inclined to agree with Mr. Grant in thinking that it is better not to attempt such minute precision in these matters: to say nothing of the fact noticed by him that, except in the case of the Srivaikuntam anicut, water is generally abundant so that no rules are required.

4. If indeed the old distributing sluices, which, as Mr. Grant observes, are "impossible to regulate with any degree of nicety," could first be put in order and provided with plank shutters and padlocks I should be inclined to attempt a more economical distribution of water through them so as to avoid the considerable waste by evaporation that must occur under the present rather extravagant system: but even then I should deprecate the introduction of any hard-and-fast rules for distribution unless the channel establishment were materially strengthened and put in charge of an officer who could be relied on to carry them out with absolute fairness. The establishments now at my disposal for the distribution of water to the villages could not be trusted to do anything of the kind. It would be necessary to introduce the system in force in the North West Province and have a responsible officer of the Public Works Department in charge constantly patrolling the banks at, I need hardly add, a very considerable increase of expenditure.

5. Whether the waste of water involved by the present system is sufficient to justify such a considerable increase of expenditure is a very difficult question which will, be doubt, be fully considered by the Irrigation Committee now sitting.

ENCLOSURE.

Letter—from J. D. GRANT, Esq., Officiating District Engineer, Tinnevely.
To—the Collector of Tinnevely.
Dated—Palamcottah, the 12th September 1878.
No.—387.

Referring to your letter No. 242 of 5th instant, requesting my opinion on the instructions of the Board of Revenue to embody in the rules for the south main channel, Srivaikuntam Anicut Project, the arrangements decided on for the control of the sluices, and distribution of the water by main and minor channels, I have the honour to state that I do not understand what is required.

2. Had the Board's Proceedings been worded as quoted by you in your letter under reply, "by other main and minor channels," I should have understood the other river channels of the district to be referred to, but if I correctly understand the Board's Proceedings as printed the "Main" and "Minor" channels of the south main channel, Srivaikuntam Anicut Project, are referred to, in which case I beg to state that the rules were intended to be complete.

3. In case, however, your interpretation be correct and the other river channels referred to my opinion is that no rules can be framed.

4. Except the Tinnevely channel none of the river channels have any minor channels except to their tanks, and the plan hitherto in force cannot, I think, be improved on.

5. The channels are now kept as full as possible by the Public Works Department and water is distributed by Revenue officials according to the condition of the crops, and I can suggest no better arrangement or code of rules, nor are any rules, in my opinion, necessary because water is abundant.

6. In the case of the Tinnevely channel the rule now adopted, experimentally I believe, is to fill the end tanks first, and till it is found how this answers after the channel is repaired nothing need be attempted.

7. Looked at from a distance this may seem a very haphazard system, but as it has worked satisfactorily for so many years it would, I think, be well to leave it, especially as the sluices which are in use on the channels are old and impossible to regulate with any degree of nicety.

8. If water is scarce towards the end of channel the ryots interested send up their kavalgars and see that no waste is going on, and if water is not scarce any excess water discharged through the sluices simply drops into the river and is picked up by the next anicut.

9. On the Srivaikuntam Anicut Project Channels, the case is otherwise, any water wasted is absolutely lost, as it falls into the sea.

Resolution—No. 2883, dated 28th October 1878.

The Board did not intend that rules should be drawn up for any works other than the south main channel of the Srivaikuntam anicut, but that the arrangements made as regards control of the sluices and responsibility for distribution with reference to the question discussed in Board's Proceedings No. 1150, dated 1st May 1878, should be embodied in the regulations for the south main channel; at present the rules merely define when the sluices are to be opened and for what period the supply to each tank is to continue, and are silent as to the authority vested with the regulation of the supply.

(True extract)

C. A. GALTON,
Acting Secretary.

To the Collector of Tinnevely.

Copy to the Secretary to Government, Revenue Department,
with draft rules in No. 6516 of 1878.

Letter—from J. W. RUNDALL, Esq., Acting Superintending Engineer, V Circle.
To—the Collector of Tinnevely.
Dated—Trichinopoly, the 6th January 1879.
No.—1007.

I forward herewith a copy of G.O. No. 990 I. of the 5th December, regarding rules for the regulation of the water-supply of the south main channel, Srivaikuntam.

2. As to the additions suggested by the Board of Revenue to be made to the rules, I would remark that the Board of Revenue have not, in their proceedings quoted, suggested any additions.

3. They state that they intended rules to be drawn up for the south channel only, and they ask for instructions as to the authority vested with the

regulation. On this point the Government order says nothing. The regulation will, I conclude, continue as at present to be vested in the Public Works Officer at Puthugudi.

4. I would suggest that the rules as drawn up by Mr. Grant be published in the District Gazette with an intimation that the south main channel will be closed on the 1st April in each year.

5. I would suggest, however, that every endeavour be made to open the channel again on the 1st June; so that advantage may be taken of early freshes, should they occur.

6. Our opening of the channel at an early date must depend very much on the ryots furnishing us with labour for the requisite clearances.

Statement showing the amount of estimate and outlay to end of March 1879 on each of the works included in the Srirakuntam anicut system.

Item number.	Name of work.	Amount of estimate.	Outlay to end of March 1879.	Remarks.
(1) HEAD WORKS.		RS.	RS. A. P.	
1	B. Compensation for land ...	37,000	37,832 4 6	Completed.
2	C. Anicut ...	1,89,800	1,98,439 2 7	
3	K. Puthuk di bungalow ...	3,888	3,888 0 0	
4	Temporary sheds ...	4,853	4,854 0 0	
5	O. Sandries ...	27,027	26,222 14 11	
6	Damage to materials ...	5,000	5,000 0 0	
Total, (1) Head Works ...		22,77,574	2,78,216 6 0	
(2) MAIN CANALS AND BRANCHES.				
North Main Channel.				
7	Damage to Head-sluice ...	18,200	18,435 15 5	Completed. Excess in "coping" omitted by oversight in the revised estimate.
8	Screw gearing ...	1,785	1,782 13 2	Completed.
9	E. Dam in channel ...	920	920 5 3	Do.
10	Do. do. ...	240	219 8 6	Do.
11	F. (1) Yeral under-tunnel ...	9,700	9,698 9 2	Do.
12	Perangulum surplus embankment ...	3,500	3,402 3 5	Do.
13	F. (1) Outfall channel ...	3,800	3,518 12 2	Do.
14	Seven inlets at different miles ...	720	521 0 0	Do.
15	G. Sivaramangalam bridge ...	4,310	4,303 3 5	Do.
16	Munglacurchi do. ...	4,270	4,269 2 4	Do.
17	Siruthunda do. ...	3,800	3,291 12 9	Do.
18	Palayakayal road do. ...	3,415	3,415 5 3	Do.
19	H. Double dam ...	7,020	6,938 2 7	Do.
20	Yeral bridge and calingulah ...	4,760	4,757 15 2	Do.
21	L. North main channel ...	96,075	96,076 9 11	Do.
22	Stone pitching ...	2,660	2,732 10 4	Do. Excess expenditure sanctioned in G.O. No. 254 I., dated 1st September 1877
23	Causeway ...	3,700	3,651 0 9	Completed.
24	N. Maruthoray tank ...	492	492 8 3	Do.
25	Do. calingulah ...	2,695	2,695 0 11	Do.
26	Pottakolam tank ...	12,050	12,052 3 7	Do.
27	Do. calingulah ...	6,035	6,038 5 2	Do.
28	Revetment to do. ...	11,920	6,222 7 8	In progress.
29	Chinnaswami Naiken or Korampalli tank ...	34,190	24,182 7 7	Completed.
30	Escape weir or upper odai dam ...	39,310	34,760 11 3	In progress.
31	Revetment ...	70,580	76,130 13 11	In progress, and the excess was reported to Government in the Statement of Objectionable Items for December 1878—Vide G.O. No. 223 I., dated 6th April 1879.
South Main Channel.				
32	D. Head-sluice ...	12,300	12,549 13 10	Completed. Excess chiefly in "coping" which was omitted from the revised estimate.

STATEMENT showing the amount of estimate and outlay, etc.—cont.

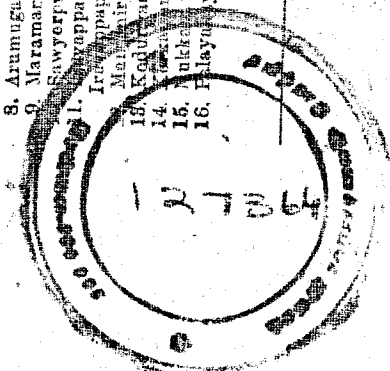
Item number.	Name of work.	Amount of estimate.	Outlay to end of March 1879.	Remarks.
(2) MAIN CANALS AND BRANCHES—cont.		RS.	RS. A. P.	
South Main Channel—cont.				
33	Screw gearing ...	800	800 0 0	Completed.
34	F. (1) Trikalore syphon sluice ...	2,240	2,238 14 6	Do.
35	Two inlets ...	430	464 0 0	Do.
36	G. Alwar Tinnevely bridge ...	3,200	2,755 12 9	Do.
37	Kulasckharapatam road bridge ...	4,180	4,181 0 7	Do.
38	Trikalore bridge ...	6,280	6,279 10 1	Do.
39	L. Excavating south main channel ...	67,000	67,919 15 3	Completed. The work was erroneously believed to be complete when the last estimate was made. The work represented by the excess over estimate was subsequently found necessary.
39a	Stone pitching ...	1,100	695 3 6	Completed.
Total, (2) Main Canal and Branches ...		4,44,227	4,33,101 5 5	
(3) DISTRIBUTARIES.				
North Main Channel.				
40	Kilpadugai channel—			
41	C. Kilpadugai head-sluice ...	1,921	1,920 12 4	Completed.
	Screw gearing ...	250	...	No expenditure incurred up to date.
42	Korkai channel—			
43	C. Korkai head-sluice ...	1,330	1,318 13 10	Completed.
	Screw gearing ...	250	...	No expenditure incurred up to date.
44	Tuticoria town-supply channel—			
45	C. Bridge on cotton road ...	2,500	2,500 15 11	Completed.
	L. Tuticoria channel ...	14,112	14,111 9 7	Do.
46	Minor distributaries—			
47	C. Small sluice ...	*9,000	...	
	L. Small channels ...	*25,600	...	
South Main Channel.				
48	Kodamba branch channel—			
	C. Kodamba head-sluice ...	3,140	3,141 7 5	Completed.
49	Atur branch channel—			
50	C. Atur head-sluice ...	1,695	1,695 0 0	Completed.
	Screw gearing ...	250	350 0 11	Completed. Excess in cost of shutters which were made larger than originally designed.
51	Drop ...	720	717 15 5	Completed.
52	Drop ...	940	...	No expenditure incurred up to date.
53	Aqueduct ...	3,596	5,690 0 0	Completed.
54	Trichendore road tunnel ...	1,140	1,140 0 0	Do.
55	Yeral road tunnel ...	1,140	1,140 0 0	Do.
56	Sutturvoiyal calingulah ...	1,593	1,593 11 7	Do.
57	Inlet ...	240	200 4 2	Do.
58	L. Atur branch channel ...	17,075	17,072 13 7	Do.
59	Rough stone pitching ...	1,200	1,191 9 0	Do.
Puriar channel—				
60	C. Head-sluice ...	3,365	3,368 10 11	Completed.
61	Screw gearing ...	790	789 14 0	Do.
62	Dam ...	510	510 0 0	Do.
63	Syphon sluice ...	920	921 0 3	Do.
64	Bridge ...	3,395	3,393 2 6	Do.
65	L. Channel ...	7,330	7,324 13 0	Do.
66	N. Ammenpuram calingulah ...	1,115	1,113 7 1	Do.
67	Improving Ammenpuram and Kanam tanks, ...	826	847 2 11	Do.
Kanam channel—				
68	C. Drop ...	1,270	1,269 9 5	Completed.
69	Palapet syphon sluice ...	715	714 10 8	Do.
70	L. Channel ...	35,200	35,193 13 5	Do.
71	N. Kanam tank and calingulah ...	4,325	3,325 7 0	Do.
Tuluken channel—				
72	C. Head-sluice and drop ...	940	938 6 10	Completed.
73	Drop ...	555	554 8 7	Do.
74	L. Channel ...	2,500	2,500 0 0	Do.
75	N. Tuluken tank ...	2,500	2,500 0 0	Do.
76	Tuluken calingulah ...	920	920 0 0	Do.

Statement showing the extent and assessment of lands under the irrigation of north and south of Srivastanantam aint for fasli 1288—cont.

Area of Government land charged for as irrigated under the amount.																				
Charged as cultivated with wet crops.																				
Dry crop charged as irrigated.																				
Total.																				

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Statement showing the extent and assessment of lands under the irrigation of North and South of Srivaikuntam anicut for fash 1288--cent.

[illegible]

Statement showing the extent and assessment of lands under the irrigation of North and South of Srivaikuntam aicut for fasli 1288—cont.

Zamindari and inam lands as irrigated.																Grand total.		
Name of the channel and village under which the land is irrigated.	Charged as cultivated with wet crops.						Dry crop charged as irrigated.									Zamindari and inam lands as irrigated with water tax and fire of quit-rent both dry and wet crops.	Total revenue.	
	First crop.			Second crop.			First crop.			Second crop.			Total.					
	Extent.	Quit-rent and jodi on inams payable to Government.	Water tax exclusive of remissions.	Extent.	Quit-rent and jodi on inams payable to Government.	Water tax exclusive of remissions.	Extent.	Quit-rent and jodi on inams payable to Government.	Water tax exclusive of remissions.	Extent.	Quit-rent and jodi on inams payable to Government.	Water tax exclusive of remissions.	Rent.	Quit-rent and jodi on inams payable to Government.	Water tax exclusive of remissions.			
(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)
	ACS.	RS.	RS.	ACS.	RS.	RS.	ACS.	RS.	ACS.	RS.	RS.	ACS.	RS.	RS.	RS.	RS.	ACS.	RS.
TENKARAI TALUK—cont.																		
Southern channel—cont.																		
14. Attur Kasba under Periyakulam tank	22	13	...	5	...	...	...	...	...	...	...	...	27	13	...	...	2,005	13,559
Do. under Kinnakulam tank	11	6	...	1	...	...	...	...	...	...	...	...	12	6	...	...	462	1,835
Do. irrigated by Attur channel	4	37	...	...	...	...	...	...	...	...	...	...	8	37	...	...	12	55
15. Serdamankulam under Attur Periyakulam tank	20	15	...	20	...	...	...	...	...	...	...	...	40	15	...	...	1,682	8,167
Do. under Nallur melakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	142	...
Do. under Nallur melakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	26	...
Do. under Nallur melakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	39	57
17. Nallur under Sinimavedikulam tank	...	18	...	2	...	11	...	...	...	...	...	...	2	18	...	...	182	126
Do. under Melakulam tank	6	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	181	841
Do. under Kinnakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	480	513
Do. under Arumucanikulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	384	124
18. Kanom under Sinimavedikulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	214	...
Do. under Kanom Periyakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	62	305
Do. under Kanom Periyakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	839	4,225
19. Ammanapuram under Periyakulam tank	7	11	...	7	...	46	...	...	...	...	...	...	1	11	...	...	380	1,082
Do. under Sinimavedikulam Periyakulam tank	4	12	...	4	...	24	...	...	...	...	...	...	4	12	...	...	183	992
20. Melakulam under Sinimavedikulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,172	5,072
Do. under Nathakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	758	3,668
Do. under Kanom Periyakulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	357	1,177
21. Manbadu under Tufukankulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	326	551
Do. under Tufukankulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	204	691
22. Manbadu under Tufukankulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	592	949

Statement showing the extent and assessment of lands under the irrigation of north and south of Srivaikuntam aicut for fasli 1288—cont.

Area of Government land charged for as irrigated under the aicut.																				
Name of the channel and village under which the land is irrigated.	Charged as cultivated with wet crops.					Dry crop charged as irrigated.										Total.				
	First crop.			Second crop.		First crop.			Second crop.											
	Extent.	Assessment exclu- sive of remissions.	Water-tax exclu- sive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water-tax exclu- sive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water-tax exclu- sive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water-tax exclu- sive of remissions.		Total.			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)
	ACS.	RS.	RS.	RS.	ACS.	RS.	RS.	RS.	ACS.	RS.	RS.	RS.	ACS.	RS.	RS.	RS.	ACS.	RS.	RS.	RS.
TENKARAI TALUK—cont.																				
<i>Southern range—cont.</i>																				
Manakadu under Nalavayamdiyakulam tank	...	...	...	332	161	95	...	95	7	4	28	32	5	...	...	...	334	491	50	531
Do. under Nathakulam tank	...	...	...	12	29	3	...	3	2	1	4	5	...	...	...	...	6	10	4	30
23. Kilavilchender under Avudaiyarkulam tank	...	...	...	41	...	...	...	...	...	...	...	...	...	...	...	...	189	91	...	41
Do. under Elappanankulam tank	...	...	...	169	...	...	...	...	...	...	...	...	...	...	...	...	347	150	...	180
24. Pallipattu under Kanankulam tank	...	...	...	53	8	13	...	13	4	3	9	12	...	...	...	...	20	68	9	78
25. Kayamo' under Pottekulam tank	...	...	...	220	40	58	...	58	...	...	...	...	...	...	...	...	80	278	...	278
26. Nazareth irrigated by balog from Kadamba tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
27. Inam Setakuvolan	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
28. Inam Tirpanisettikulam tank	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total of Southern channel	10,318	65,609	...	65,609	9,473	22,209	...	22,209	345	288	829	1,217	128	...	583	583	20,164	93,193	1,512	94,778
Total of Northern and Southern channel	16,365	111,470	...	111,470	15,440	46,821	...	46,821	593	593	2,002	2,595	251	...	1,066	1,066	32,704	158,994	3,058	162,042
OTTAPIDAKAM TALUK.																				
<i>Northern channel.</i>																				
1. Mullaikadu	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2. Milavilan	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3. Krikurichi Mittakulayankarikal	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4. Tamikamindan	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
5. Korampallam Entire Inam village	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total	662	1,136	...	1,136	...	...	...	...	...	...	...	...	...	...	...	...	780	1,136	474	1,610

J. PENNINGTON,
Collector.

Area of Government land charged for as irrigated under the anicut.

Name of the channel and village under which the land is irrigated.	Charged as cultivated with wet crops.										Dry crop charged as irrigated.										Total.
	First crop.					Second crop.					First crop.					second crop.					
	Extent.	Assessment exclusive of remissions.	Water tax exclusive of remissions.	Total.	Rate.	Extent.	Assessment exclusive of remissions.	Water tax exclusive of remissions.	Total.	Rate.	Extent.	Assessment exclusive of remissions.	Water tax exclusive of remissions.	Total.	Rate.	Extent.	Assessment exclusive of remissions.	Water tax exclusive of remissions.	Total.	Rate.	
TENKARAI TALUK.																					
Northern channel.																					
1. Kilpadagai Varadarajapuram irrigated by northern channel.	299	2,408	...	2,408	...	299	1,057	...	1,057	...	3	3	6	9	...	601	3,408	...	3,408	...	
2. Kilpadagai Appankovil irrigated by northern channel	326	3,081	...	3,081	...	326	1,439	...	1,439	...	4	5	8	13	...	657	4,525	...	4,525	...	
3. Kilpadagai Appankovil Kasba irrigated by northern channel.	625	5,732	...	5,732	...	625	2,753	...	2,753	...	6	...	13	13	...	1,257	8,485	...	8,485	...	
4. Mangalakurichi village irrigated by northern channel	415	3,615	...	3,615	...	407	1,668	...	1,668	...	38	38	63	101	...	861	5,321	...	5,321	...	
5. Struthondanallur village irrigated by northern channel	72	589	...	589	...	72	288	...	288	...	6	6	12	18	...	150	843	...	843	...	
6. Valavallan village irrigated by northern channel	109	503	...	503	...	109	171	...	171	...	31	29	55	84	...	249	703	...	703	...	
Do. under Korkai channel	69	315	...	315	...	69	107	...	107	...	10	10	32	42	...	136	422	...	422	...	
7. Kottarakurichi village under Arumugamangalam tank	530	4,313	...	4,313	...	558	1,871	...	1,871	...	10	10	32	42	...	1,097	6,191	...	6,191	...	
8. Arumugamangalam under Arumugamangalam tank	502	5,222	...	5,222	...	501	2,610	...	2,610	...	13	13	19	32	...	1,003	7,832	...	7,832	...	
9. Maranangalam under Arumugamangalam tank	489	4,338	...	4,338	...	489	2,032	...	2,032	...	14	13	19	32	...	896	6,433	...	6,433	...	
10. Sawyerpuram village irrigated by Pektulam tank...	53	140	...	140	...	17	38	...	38	...	21	33	33	33	...	103	211	...	211	...	
11. Iruvapuran Kunnurpuram village under Pektulam tank.	77	577	...	577	...	77	256	...	256	...	184	125	717	842	...	2,263	7,957	...	7,957	...	
Do. under Arumugamangalam tank.	178	232	...	232	...	173	58	...	58	...	2	...	2	2	...	348	290	...	290	...	
12. Manjankkayal village under outlet of Arumugamangalam tank.	103	879	...	879	...	103	432	...	432	...	1	2	4	6	...	208	1,315	...	1,315	...	
13. Kodangani village under Korkai tank	479	3,864	...	3,864	...	450	1,420	...	1,420	...	45	64	77	141	...	973	4,848	...	4,848	...	
14. Korkai village under Korkai tank	411	2,870	...	2,870	...	411	1,362	...	1,362	...	2	2	11	11	...	824	4,154	...	4,154	...	
15. Mukkan village under Korkai tank	206	217	...	217	...	206	55	...	55	...	11	4	18	22	...	421	276	...	276	...	
16. Palayakkayal village under Palayakkayal tank	5,638	44,650	...	44,650	...	5,690	19,214	...	19,214	...	378	394	1,035	1,369	...	12,808	64,128	...	64,128	...	
Total of northern channel	5,638	44,650	...	44,650	...	5,690	19,214	...	19,214	...	378	394	1,035	1,369	...	12,808	64,128	...	64,128	...	
Total.	5,638	44,650	...	44,650	...	5,690	19,214	...	19,214	...	378	394	1,035	1,369	...	12,808	64,128	...	64,128	...	

Statement showing the extent and assessment of lands under the irrigation of north and south of Srivaikuntam aintant for fasli 1938---cont.

[illegible]

Statement showing the extent and assessment of lands under the irrigation of North and South of Srivilliputhur for faali 1938-~~1939~~.

Area of Government land charged for as irrigated under the amount.																							
Charged as cultivated with wet crops.										Dry crop charged as irrigated.										Total.			
First crop.					Second crop.					First crop.					Second crop.					Total.			
Extent.	Assessment exclu- sive of remissions.	Water tax exclusive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water tax exclusive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water tax exclusive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water tax exclusive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water tax exclusive of remissions.	Total.	Extent.	Assessment exclu- sive of remissions.	Water tax exclusive of remissions.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
OTTAPIDARAM TALUK.																							
Northern channel.																							
1 Mollakadu	118	740	...	740	78	354	...	854	58	26	330	357	...	...	...	250	1,121	330	1,451	...	...	...	1,451
2 Karikuriichi Mittakulayankarai	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
3 Tambikaimindan	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
4 Koraupallam entire inam village	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Total...	118	740	...	740	75	354	...	354	58	26	330	857	...	...	...	250	1,121	330	1,451	...	...	...	1,451

Name of the channel and village under which the
-land is irrigated.

J. PENINGTON,
Collector.

1. Description of the river Tāmbraparni.
2. Old irrigation on the Tāmbraparni.
3. Scope of the Srīvaikuntam anicut project.

4. First estimate for the project.
5. Delay in prosecution of work.
6. Ideas entertained of the project.
7. Revised estimates for the project.
8. Construction of southern head-sludge.
9. First revised estimate.
10. Brief description of works projected.
11. First revised estimate sanctioned.
12. Northern head-sludge ordered to be enlarged.
13. Second revised estimate.
14. Supplemental estimates found necessary.
15. Third revised estimate.
16. Alterations in design to supplement defective water-supply.
17. Further revised estimate called for.
18. Fourth revised estimate.
19. Provisional sanction of revised estimate.
20. Enlargement of southern head-sludge and main channel determined on.
21. Effect of enlargement of southern head-sludge and main channel.
22. Fifth and final revised estimate.
23. Subscriptions by ryots towards the project.
24. Progress of the works.
25. Accidents to the works.

26. Calculations forwarded with first revised estimate of 1868.
27. Water-supply found in 1874 to be less than was formerly supposed.
28. Result of further observations.
29. Regulation of the whole water-supply of the Tambraparni proposed, but subsequently abandoned.
30. Causes of original incorrect opinions regarding water-supply.

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BRIEF NARRATIVE OF THE SRĪVAIKUNTAM ANICUT SYSTEM.

Description of the river Tāmbraparni.—The river Tāmbraparni rises in the Western Ghats bordering Travancore and the Tinnevely district, and, flowing east-ward, falls into the sea a few miles south of Tuticorin, the principal seaport of the Tinnevely district. Its source is in latitude $8^{\circ} 36' 30''$, longitude $77^{\circ} 20' 0''$, in a high conical peak known from fabulous times as the "Agustiar Malai." The total length of the Tāmbraparni proper is 60 miles, and, during its course, it receives numerous affluents which all take their rise in the mountain chain of the Western Ghats. Its principal affluent is the Chittār river, which joins the Tāmbraparni a few miles north-east of the town of Tinnevely, after a course of 45 miles in length. The Tāmbraparni, although an insignificant river as regards its length and drainage area—which, at the site of the Srīvaikuntam anicut, is 1,739 square miles, of which 1,389 are in the plains of the Tinnevely district, and 350 in the Western Ghats bordering the Travancore frontier—drains a tract of hilly and wooded country completely under the influence of both the north-east and south-west monsoons, and, derives its importance solely from the fact that it is one of the four rivers of the Madras Presidency, which alone obtain a supply from the south-west monsoon. The three other rivers alluded to are the Gōdāvari, Kistna and Cauvery, on which are the most important irrigation works of the Presidency.

2. *Old irrigation on the Tāmbraparni.*—Dating from the 15th century, there has been extensive irrigation on the Tāmbraparni and its affluents. The Chittār river is crossed by fifteen old anicuts, and on the Tāmbraparni itself there were seven anicuts constructed prior to the occupation of the country by the British. In 1868, when the scheme for building the Srīvaikuntam or eighth anicut on the Tāmbraparni river was taken up, the total area of irrigation under the seven upper anicuts was acres 83,462, and the assessment Rs. 6,50,935.

3. *Scope of the Srīvaikuntam anicut project.*—Previous to the construction of the Srīvaikuntam anicut, some 12,800 acres of the land intended to be commanded by it were irrigated partly from the surplus water from the Marudur anicut, the seventh or last anicut on the Tāmbraparni river, and partly by two main channels taken off, one on either bank of the river, at Srīvaikuntam, 9 miles below the Marudur anicut. About 6 miles below Srīvaikuntam, channels cut direct from the river supplied the Korkai tank on the north bank, and the Atur tank on the south bank. The main channels, besides supplying direct irrigation to the lands under them, formerly supplied a chain of tanks extending from Srīvaikuntam to near Tuticorin on the north, and to Tiruchendūr on the south; but, for some years prior to 1868 the supply had been found defective, particularly to the lands on the south bank, where, owing to the destruction of the head-sluice from the river by floods, river-channel had gradually silted up, and the lands had become solely dependent for their supply on the surplus water from the Marudur anicut. To remedy this state of things, and to extend irrigation to lands which the Marudur anicut was incapable of supplying, the Srīvaikuntam anicut was projected. The site selected for the anicut, was at Srīvaikuntam, 16 miles from the sea, 9 miles below the Marudur anicut, and immediately below the two main river-channels abovementioned, the head of the delta being very clearly defined by a range of sand hills of considerable height.

HISTORY OF THE WORKS.

4. *First estimate for the project.*—The project was first brought forward in 1855 by Captain W.H. Horsley, Madras Engineers, who prepared the first estimate. Briefly, the scheme provided for building an anicut over the Tāmbraparni river at Srīvaikuntam, with main channels designed both for irrigation and navigation to Tuticorin on the north and Tiruchendūr and Kulasekarapatnam on the south, and with branch channels for the supply of numerous existing tanks. The

estimate amounted to Rs. 3,85,000, and included a bridge over the anicut, as well as the provision of a supply of fresh drinking water to the town of Tuticorin. The return on this expenditure was calculated at Rs. 40,000. If provision for navigation was omitted, the amount of the estimate was reduced to Rs. 2,85,000. The complete estimate of Rs. 3,85,000 was passed for entry in the budget of 1856-57, and was finally sanctioned in Despatch No. 8, dated 17th April 1857, from the Honorable the Court of Directors to the Government of India, printed with Proceedings of Madras Government, No. 1625, dated 24th September 1857.

5. *Delay in prosecution of work.*—The mutiny interfered with the execution of the project, and no further action was taken with regard to commencing work until May 1862, when the District Engineer, Tinnevely, reported that the original estimate of Rs. 3,85,000 was totally inadequate, owing to the great rise in building rates since the year (1855) in which the estimate was framed. A revised estimate was accordingly called for, and the work was ordered to be proceeded with, but was subsequently postponed until the revised estimate had been prepared and sanctioned. The inadequate staff of the Department prevented any progress being made in the preparation of the estimate, and it was not until 1866, when the Government of India intimated their intention of carrying out large works of irrigation by means of Loan Funds, that the project was again revived, and an officer was deputed to investigate it, and prepare the revised estimate excluding all provision for making the main channels navigable.

6. *Ideas entertained of the project.*—At this time the most sanguine ideas of the ultimate success of the project were entertained. Mr. Puckle, the Collector of the Tinnevely district, urged very strongly in 1867 the immediate execution of the work, and reported that the people were so anxious for the work to be commenced that they had subscribed and paid into the treasury Rs. 20,000 as a donation towards the project. No doubt was at this time expressed, nor until some years afterwards, that the supply of water available for the irrigation of the lands under the anicut was not of the most ample description, and, in point of fact, the capabilities of the river Tāmbraparni were considered well nigh inexhaustible, and any deficiency of water was the last thing anticipated.

7. *Revised estimate for the project.*—In September 1867 a revised estimate for the project, amounting to Rs. 7,50,000, was prepared by Capt. H. L. Prendergast, R.E., and was forwarded for the sanction of Government. The revenue was estimated at Rs. 40,000, giving a total return on $7\frac{1}{2}$ lakhs of $5\frac{1}{2}$ per cent, not deducting anything for maintenance or repairs. This estimate was returned by Government for further revision, as it was incomplete in some particulars, but a commencement of the work was sanctioned by the appropriation of the sum of Rs. 20,000, subscribed by the ryots, towards carting the cut-stone available from the ruins of the dismantled fort at Palamcottah to the site of the proposed anicut.

8. *Construction of southern head-sluice.*—In January 1868, in consequence of the partial failure of the monsoon, and the inadequate supply received by the Kadamba tank and the other tanks on the south side of the river supplied from the surplus of the Marudur anicut, the Collector urged the immediate cutting of a channel from the south flank of the proposed anicut to the Kadamba tank, from the unexpended balance of the ryots' subscriptions. These subscriptions then amounted to Rs. 32,450, of which amount Rs. 14,000 had been expended in the carriage of stone to the anicut site. It was represented that the utilization of the balance of Rs. 18,450 in digging the channel would save a revenue on acres 6,217, whose assessment was Rs. 67,616. The proposal was approved, and a head-sluice at the south flank of the proposed anicut and a cutting of 12 feet bottom width to the Kadamba tank were put in hand, and were completed before the south-west monsoon set in. This work was, in reality, a part of the Srīvaikuntam anicut project, according to which the ultimate dimensions of the main channel feeding the Kadamba tank would be 36 feet bottom width.

9. *First revised estimate.*—In August 1868 a revised estimate, which may be called the first revised estimate, amounting to Rs. 8,32,000, was submitted. The estimate, as drawn up, revised the rates, but otherwise was substantially the same as that prepared by Captain Horsley in 1855, except that no provision was

made for navigation, or for a bridge over the anicut. The foundations of the piers of the proposed bridge, were, however, included in the estimate, so that, at any future date, the bridge could be constructed if found to be necessary. From the new levels taken, it was found that the area of irrigation that could be brought under the anicut was considerably more than had formerly been thought to be practicable. The following is an abstract of this estimate:—

	RS.		RS.
Anicut	1,48,500	South channel	1,93,850
North channel	1,28,370	Subsidiary works of south channel	1,08,832
Subsidiary works of north channel	1,69,570	Cost of land, plant, etc.	82,878
		Total	8,32,000

Alterations made in the anicut design by the Chief Engineer for Irrigation, together with some minor alterations, reduced the amount of the estimate to Rs. 8,31,600. The estimate was then submitted for the sanction of the Government of India; the collection of materials was ordered to be proceeded with, and an assignment of Rs. 58,100 was made in the budget of 1868-69. It was calculated that the total irrigated area under the anicut would eventually be acres 33,000, yielding an increased revenue of Rs. 1,52,385, or deducting 10 per cent for "Repairs and Management," Rs. 1,37,150 per annum, which would give a return of 16.48 per cent.

In recommending the project for the sanction of Government, the Chief Engineer for Irrigation remarked that "it would have been more satisfactory if a register of the rise and fall of the river for five years had been furnished." No complete record had, however, been kept up; but, from the data furnished by the officers engaged in the investigation of the project, there was every reason to suppose that there would be an abundant supply of water; and, in forwarding the estimate for the sanction of the Government of India, the Madras Government remarked that they "were satisfied there need be no fear of any deficiency of water." For further information regarding the data deduced to show that the water supply was ample—*vide* paragraph 26.

10. *Brief description of Works projected.*—The works projected consisted of an anicut with main channels, 21 miles each in length, taken off from either flank, for the better supply of several existing tanks previously very inadequately supplied from the Marudur Anicut, and for the irrigation directly of a large tract of country on either side of the river.

Anicut.—The anicut was to be 1,380 feet in length between the wing walls, to be raised 6 feet above the average level of the deep bed of the river, and to have a breadth, at the crown, of $7\frac{1}{2}$ feet. It was to have a batter in front and a perpendicular fall in rear to a cut-stone apron 24 feet in width and $4\frac{1}{2}$ feet in depth, beyond which a rough stone apron of the same depth and 36 feet in width, was to be laid between retaining walls. The body of the anicut was to be built of brick in chunam, faced with cut stone throughout, and furnished at each end with a set of under-slucies of 9 vents of 4 feet width, and with head sluices for the main channels. As it was then thought that the bed of the river was sandy throughout, the foundations of the anicut were designed to rest on wells. In case a bridge over the anicut might ultimately be required, the foundations of 32 piers, 6 feet in thickness, were to be founded on wells to the same depth as those of the body of the anicut, and were to be brought up to the level of the anicut crest.

North Main Channel and Head-Sluice.—The head-sluice was to have 4 vents of 4 feet width. The main channel was to have a bottom breadth of 36 feet, with side slopes of 2 to 1, and a fall of $1\frac{1}{2}$ feet per mile for the first 7 miles, for the next 11 miles, or as far as the Korampollam tank, the fall to be 1 foot per mile. From the Korampollam tank, the channel, 4 miles in length, for the supply of drinking water to the town of Tuticorin, was to have a bottom width of 24 feet and a fall of 1 foot per mile to high tide level in the sea.

South Main Channel and Head-Sluice.—The southern head sluice, with 3 vents of 4 feet each, had already been constructed, as noticed in paragraph 8. The

main channel, which had already been excavated as far as the Kadamba tank to a bottom width of 12 feet (paragraph 8) was ultimately to have a bottom width of 36 feet, side slopes 2 to 1, and a fall of $1\frac{1}{2}$ feet per mile, for the first 6 miles, or as far as the Kadamba tank. For the remaining 14 miles, the bottom width was to be 24 feet, and the fall 1 foot per mile.

11. *First revised estimate sanctioned.*—The Government of India, in their letter No. 53 I., dated 11th February 1860, printed with Proceedings of Madras Government, No. 844, dated 16th March 1869, sanctioned the revised estimate of Rs. 8,31,600 from the extraordinary grant for agricultural works, and remarked that no provision had been made for the cost of establishment during construction, and that an addition of 15 per cent on the estimate should be allowed for this purpose, which would bring the total of the estimate up to Rs. 9,56,000. In Despatch No. 38 of 15th April 1869, from the Secretary of State to the Government of India, printed with Proceedings of Madras Government, No. 1891, dated 10th June 1869, the execution of the project from loan funds was approved.

12. *Northern head sluice ordered to be enlarged.*—Some correspondence took place between the Governments of India and Madras regarding the height of the anicut and the waterway to be given to the head sluices. Finally, it was decided in January 1870, to increase the number of vents of the northern head sluice from 4 to 6, and a revised estimate for the project, showing all the modifications and alterations of the works found necessary up to date, was called for.

13. *Second revised estimate.*—In June 1872 the second revised estimate was submitted, and was sanctioned by the Government of Madras. Its amount was Rs. 8,31,600, or the same as that of the first revised estimate sanctioned by the Government of India in 1869. As much of the work was already finished, the estimate was mainly one for work already laid out and executed. A sum of Rs. 36,974 was included in this estimate to provide for damages to the works caused by heavy floods in the river in November and December 1869, and Rs. 31,000 was added for land compensation in excess of the Rs. 9,000 allowed for this item in the first revised estimate. The principal saving effected was owing to the length of the channel for the supply of the Ammapuram tank being reduced from 8 miles to $2\frac{1}{2}$, by its being taken off the Kadamba tank instead of being carried round the tank by a contour. In this estimate, as in the first revised estimate, no provision was made for establishment.

14. *Supplemental estimates found necessary.*—In August 1872 the Superintending Engineer forwarded supplemental estimates for works amounting to Rs. 74,070, and reported that a sum of Rs. 43,700 would be required for extra establishments, whereupon Government called for a full revised estimate for the project, and directed that no work included in the supplemental estimates should be undertaken until the complete revised estimate was sanctioned.

15. *Third revised estimate.*—In June 1874 the revised estimate was submitted. It amounted to Rs. 10,40,480, of which Rs. 9,19,330 was for works, and was forwarded for the sanction of the Government of India in place of the original estimate of Rs. 8,31,600 (for works) formerly sanctioned. The following is an abstract of this estimate.—

	RS.		RS.
(1) Head works	2,29,064	(4) Drainage and protective works	32,830
(2) Main canals and branches—		Compensation for land	40,000
North main channel	3,41,064	Total for works	9,19,330
South main channel	93,243	Establishment	1,01,150
	4,34,307		
(3) Distributaries—		Capitalized abatement of land revenue	10,20,480
Northern section	48,923	Grand total of direct and indirect charges	20,000
Southern section	1,34,206		
	1,83,127		

The area of irrigation was 33,500 acres or nearly the same as that of the first revised estimate (paragraph 9). The proportions of the old irrigated area

prior to the anicut, and of the new irrigated area to be brought in by the anicut, were as shown in the following table:—

	Existing.	Extension.	Total.
North side	ACS. 5,650	ACS. 14,350	ACS. 20,000
South side	7,150	6,350	13,500
Total ..	12,800	20,700	33,500

The returns were calculated at Rs. 1,60,000, or 15 per cent on the total estimate. The increase in this estimate was chiefly due to the fact that some provision had been made for establishment, and that the storage capacity of the tanks on either side of the river had been largely increased, owing to the discovery that the minimum discharge of the river at Srivaikuntam was now found to be very much less than was supposed when the project was first investigated in 1868. For further information on this subject—vide paragraph 27.

16. *Alterations in design to supplement defective water-supply.*—So considerable was the diminution in the water-supply available, that it was now abundantly clear that something must be done, by a revision and alteration of the designs of the project, to endeavour to provide for the effectual irrigation of the large area for which the available water-supply was now clearly deficient. Two remedies were suggested. The first was to raise the height of the anicut from 6 feet to 7½ feet, but this proposal was subsequently negatived, and accordingly no provision was made for it in the revised estimate. The second remedy was to increase the storage capacity of the tanks on both sides of the river to the utmost, so that full advantage might be taken of all freshes by running into tanks the full supply of the channels. This proposal was approved, and provision was made in the revised estimate, by raising the bunds of the tanks and building revetments, to increase the storage capacity of the tanks on the north side from 15 millions of cubic yards (which was the amount of storage capacity originally allowed) to 28 million cubic yards, and on the south side from 20 millions of cubic yards to 25½ million cubic yards. By this means the total storage capacity was raised from 35 million cubic yards to 53½ million cubic yards.

17. *Further revised Estimate called for.*—In August 1874 the Government of India, in acknowledging the receipt of the revised estimate for Rs. 10,40,480, remarked that provision for establishment had only been made up to the 30th November 1872, and that therefore the estimate would be exceeded. They therefore called for a further revised estimate, in which should be included the establishment charges for the whole period of construction, and in which provision should also be made for repairs during construction, and accumulation of interest during the same period. Additional information was also asked for regarding (1) the causes of excess over the original estimate, (2) net income to be obtained from the outlay, and (3) available water-supply.

18. *Fourth revised Estimate.*—In October 1875 the revised estimate, amounting to Rs. 11,38,087, was forwarded for the sanction of the Government of India. The following is an abstract of this estimate:—

	Rs.
Head works	277,574
South main channel	2,32,626
North main channel	4,28,300
Total for works	9,39,500
Establishment	1,74,982
Tools and plant	6,105
Total, direct charges	11,19,587
Capitalization of land revenue	18,500
Gand total of direct and indirect charges	11,38,087

Of the sum of Rs. 9,39,500 for works, Rs. 37,000 was on account of land compensation. No interest charges were included in this estimate, as the date on which the works were considered to come into operation had not then been fixed. The causes of excess over the original estimate, were due (1) to additions in the anicut design, and partly to an increase in rates for work which raised the total cost of the anicut from Rs. 1,48,500 (paragraph 9) to Rs. 1,99,800; (2) to its being found that a large additional amount would have to be paid to the Contractor formerly employed to execute the works, in consequence of the issue of erroneous measurements by the officer in charge of the works in the final settlement of the Contractor's claims. With regard to the water-supply, it was stated that further observations of the river had shown that the reduced minimum discharge reported to the Government of India in forwarding the third revised estimate (paragraph 15), was found by the result of another year's observation (1874) to be again reduced by nearly 50 per cent, and that even the present cultivation of 26,884 acres (for both crops) was always in difficulties in the months of March and September. With regard to the returns to be expected, no complete forecast was given, as the revenue information dependent on the revision of the settlement of the lands under the north main channel was not, at that time, available. In August 1875 a new settlement had been made of the lands on the south side of the anicut, with the result that there was an increase of revenue of Rs. 45,784 on this side. In forwarding the estimate for the sanction of the Government of India, the probable returns from the south side were set down at Rs. 1,15,279, and it was remarked that the probable returns from the north side could not be estimated until the settlement, then in progress, of the lands under the north main channel, had been completed.

19. *Fourth revised estimate provisionally sanctioned.*—The Government of India, in their letter No. 451 I. of 17th December 1875, printed with Proceedings of Madras Government, No. 270, dated 29th January 1876, accorded provisional sanction to the estimate of Rs. 11,38,087, and called for further information and a calculation of net revenue.

20. *Enlargement of southern head-sluice and main channel determined on.*—In March 1877, owing to the frequent complaints of the cultivators under the south main channel regarding the insufficiency of the water-supply, Government called for regular estimates, for submission to the Government of India, for enlarging the southern head-sluice and widening the south main channel. These estimates were accordingly prepared, and, in October 1878, were forwarded for the sanction of the Government of India. They amounted to Rs. 24,770, exclusive of establishment, and tools and plant charges, and provided for adding 2 vents (6' x 6') to the south head-sluice, for widening the south main channel from 36' to 45' bottom width, and for improving the supply to certain tanks on the south side. The Government of India, in according provisional sanction to this estimate in April 1879, again called for further information and a calculation of net revenue. By this additional sanction of Rs. 24,770 for works, the total provisional sanction for works up to April 1879, was increased from Rs. 9,39,500 (paragraphs 18 and 19) to Rs. 9,64,270.

21. *Effect of enlargement of southern head-sluice and main channel.*—In February 1880 it was reported that the enlargement of the south head-sluice and main channel had given satisfactory results, and that, owing to the slow extension of cultivation on the north main channel, no pinch for water had yet been felt on that side. The maximum discharges into the main channels were at this time (1880)—

	CUB. FT. PER SEC.	CUB. FT. PER SEC.
North channel	673	
South channel with head-sluice and channel enlarged	770	
		South channel before enlargement. 499

while the areas of cultivation on the north and south side were—

First or S.W. Monsoon Crop.		Second or N.E. Monsoon Crop.	
	ACS.		ACS.
North channel	7,936	North channel	6,555
South do.	10,893	South do.	9,834
	18,829		16,409
		Grand total, acres	35,238

22. *Fifth and final revised estimate.*—With Proceedings, Madras Government, No. 380 I., dated 8th May 1882, a final revised estimate, amounting to Rs. 14,96,809, was submitted for the sanction of the Government of India. The following is an abstract of this estimate:—

RS.		RS.	
Works	10,59,051	Capitalized abatement of land	
Unforeseen expenses	25,000	revenue	54,913
Establishment	2,92,536	Leave and pension allowances	62,164
Tools and plant	12,550	Interest during construction	15,595
Total, direct charges	13,64,137	Total, in direct charges	1,32,972
		Grand total, direct and indirect charges	14,96,809

The delay in the submission of this revised estimate, which had been called for in letter No. 451 of 27th December 1875, from the Government of India (paragraph 19), was owing to the fact that the revenue information dependent on the revision of the settlement of the lands under the north main channel (paragraph 18), did not become available until the end of the year 1881. Comparing this estimate with the original estimate of Rs. 8,31,600 (which was for works only) sanctioned in 1869 (paragraph 11), the difference between them for works is Rs. 2,27,451. The increase was due to (1) alterations and additions in design, (2) increase in rates, (3) extra works not included in the original estimate, and (4) damages by floods. The net direct earnings on completion of the works, in 1886-87, were estimated at Rs. 67,465, or 4.5 per cent on the total estimate, and when credit had been given to the work on account of enhanced land revenue (the amount of which had not at that time been determined), it was anticipated that the direct earnings would be largely increased. Finally, in April 1883, the credit to be given on account of enhanced land revenue was determined, and, with Proceedings of Madras Government, No. 334 I. of 19th April 1883, a complete forecast was forwarded to the Government of India, which estimated the return on the total expenditure of Rs. 14,96,809, at Rs. 1,07,344, excluding indirect receipts, and at Rs. 1,09,402, including indirect receipts; or 7.51 per cent on the total charges. The ultimate area of irrigation to be reached during 1886-87, was estimated at 25,500 acres, all of which would be double cropped. The extent of new irrigation in the northern and southern sections respectively, is shown in the following table:—

Section.	Irrigation prior to anicut.	Extension.	Total.
	ACS.	ACS.	ACS.
North	5,650	5,495	11,145
South	7,150	7,205	14,355
Total	12,800	12,700	25,500

23. *Subscriptions by ryots towards the project.*—Allusion has been made in paragraph 8 to the amount of Rs. 32,450, subscribed by the villagers towards the project, and expended in 1868 in constructing the south head-sluice and excavating a channel to the Kadamba tank. Subsequently the total amount of subscriptions reached the sum of Rs. 38,556, and Government having decided that the contributions of the ryots should not be accepted towards the project, in order that the subscribers might have no ground on which to base a claim to be exempted from a charge for

water, the expenditure of Rs. 38,556 was charged to the estimate for the project. The whole amount thus made available was then devoted towards the construction of a bridge over the anicut, as a separate work unconnected with the anicut system, and it was decided that any further amount required to complete the bridge should be provided from Local Funds. By January 1872 the piers of the bridge had been completed to the level of the anicut crest, at a cost of Rs. 13,162, and, as it was then reported that the diminished waterway, and consequent increased velocity that would be caused by the construction of the arches, would endanger the safety of the anicut, and that, as far as through traffic was concerned, a bridge was not needed at all, the work was stopped, and the balance of the ryots' subscriptions, viz., Rs. 25,394, was diverted to the bankment of the river from Srivaikuntam to the sea—a work which was at that time urgently required—subject to repayment from the Imperial Grant when funds became available. The necessary refund of Rs. 25,394, from Imperial to Local Funds has lately been made, and it having also been recently decided that a bridge will not endanger the anicut, the matter is now in the hands of the Local Fund Board of the Tinnevely district, who contemplate the early construction of the bridge.

24. *Progress of the works.*—The history of the successive estimates for the project having been recorded, it will now be convenient to trace briefly the general progress of the works, from their commencement in 1868 to the present time. The budget allotment of Rs. 58,100 made in August 1868 (paragraph 9) was subsequently increased by Rs. 50,000 making the total assignment for the year 1868-69, Rs. 1,08,100. The budget grant for 1869-70 was Rs. 1,40,000, but was subsequently increased by successive allotments to Rs. 3,73,475. The anicut was practically finished during 1870-71, from which year irrigation under it dates, and the works on the south side were, at this time, in an advanced stage of progress.

The next incident in the history of the progress of the works was of a most unfortunate description, and delayed work for nearly one year. It was due to the failure of the Contractor, to whom the entire execution of the Srivaikuntam Anicut Works was given when work was first started in 1868, to carry out the terms of his original agreement. Under the terms of the contract the works were to be finished by the 1st April 1871 under certain penalties, and further penalties were imposed in the event of the works not being completed by 1st April 1872. From December 1868 to October 1869 work proceeded satisfactorily. In November 1869 the rate of progress fell off; in May 1870, in consequence of the Contractor's repeated attempts to introduce bad and inferior work, much of his work was rejected; and in August 1870 a climax was reached by a wholesale rejection of his work and materials. In January 1871 the Contractor was arrested on a criminal charge connected with the execution of other Public Works in the Tinnevely district, and was convicted and sentenced to two years' imprisonment in the following April. From January 1871 to September of the same year, work was entirely stopped. During this time various efforts were made to carry out the work by departmental agency, but were subsequently abandoned owing to the Contractor's threat of bringing a civil suit against Government, unless his claims were fully settled prior to the work being taken out of his hands. It was not until September 1871 that a full and final settlement of the Contractor's claims were made, and all obstacles to the prosecution of the work by departmental agency were removed. From that date, the original contract for the execution of the works was cancelled, and until the completion of the project all work was carried out under the direct management of the Public Works Officers.

On 31st March 1872 the expenditure on the works amounted to Rs. 6,58,48. In January 1873 the works were already in use, and were approaching completion; and a conservancy establishment, at a cost of Rs. 1,905 per annum, was sanctioned by the Government of India from 1st April 1874. In June of that year, the town of Tuticorin was supplied with drinking water by the channel from the Korampollam tank, and a charge of Re. 1 was fixed for each 1,000 cubic yards discharged into the town channel at the Korampollam tank sluice. In March 1875 a sum of Rs. 55,575 was realized by the sale of waste lands under

the Srivaikuntam Anicut, and this amount was laid out in the construction of the main distributary works necessary to conduct the water to the fields, and in constructing some small tanks on the southern side of the river, by which the total storage capacity of the tanks in the southern section was increased from 25½ million cubic yards (paragraph 16) to 30 millions of cubic yards. The following statement shows the amount of outlay on works against sanctioned estimates up to the 31st March 1879 :—

Name of work.	Amount of sanctioned estimate.	Outlay.
	Rs.	Rs.
(1) Head works	2,77,574	2,76,216
(2) Main canals and branches.	4,41,227	4,39,101
(3) Distributaries	1,96,499	1,83,968
(4) Drainage and protective works.	26,200	26,913
Total	9,39,500	9,26,198

25. *Accidents to the works.*—The various accidents to the works have next to be mentioned, and it may be as well to premise that, from the very commencement of the work, repeated damages were occasioned owing to heavy river and upland floods, and that on nearly every occasion of high floods in the Tambraparni, accidents occurred. For the seven years preceding 1881-82, the cost of maintenance and repairs to the works of the system averaged Rs. 24,634 per annum, and it was not until 1883, when the Tambraparni River embankments above the Srivaikuntam Anicut had been completed, the north bank below the anicut had been thrown back so as to allow the river a sufficient channel for flood water, and the cross drainage from the tanks above those of the Srivaikuntam Anicut system had been provided for, that it was considered that the works were safe from damages, and that in future none but ordinary repairs would be required. The following is a brief detailed account of the principal accidents to the works.

In November and December 1869, much damage was caused to the works by heavy floods in the Tambraparni River. The river embankments breached, and the towns of Srivaikuntam, on the left bank, and Alwar Tinnevely, and Attur on the right bank, were flooded. In the northern main channel, the banks were breached, and the newly made excavation was much silted up. The south main channel was also breached, and the Ahtur branch channel was much injured by the river bursting through. A repair estimate, amounting to Rs. 31,974, and a sum of Rs. 5,000 as compensation to the contractor for loss of materials, were sanctioned by Government (paragraph 13), and orders were issued regarding the improvement of the river embankments both above and below Srivaikuntam. In November 1874 heavy damages were again occasioned to the works by floods in the Tambraparni river. The river embankments were breached; the Ahtur branch channel was also breached in several places; breaches occurred in the Korkai and Korampollam tanks; and the Yeral under-tunnel, passing the drainage of a large area of country under the north main channel, was carried away. In December 1877, extensive damage was again caused by floods in the river. The Kadamba tank, the principal reservoir of the southern section of the Srivaikuntam Anicut System, was breached, and much damage was done to the country traversed by the surplus water. In November 1880, further damages to the works occurred; and, finally, in November 1881, the Korampollam Tank and several tanks in the upper part of the catchment basin breached.

With regard to the damages caused by the repeated breaching of the river embankments, it may be noticed that, in January 1880, the Chief Engineer for Irrigation, after personal inspection, observed that the breaches in the north bank of the river, and the damage to the works under the north main channel, were "due in great part to the contracted waterway of the river, and to the flood banks being much too close together." It was consequently determined to abandon the existing flood bank on the north side for the first 7½ miles below the Srivaikuntam

Anicut, and to strengthen the bank of the north main channel, and make it the river flood embankment. An estimate of Rs. 39,175 was accordingly sanctioned for this purpose in May 1882, and a complete estimate for the left flood bank below the anicut was called for. By April 1883 the north flood bank for 7½ miles, and the south flood bank for 5 miles, below the anicut, were completed, and, in future, it is improbable that any further serious breaches will occur in the river embankments.

WATER-SUPPLY.

26. The various calculations and information regarding the water-supply, forwarded with the several estimates for the works, will now be noticed.

Calculations forwarded with First Revised Estimate of 1868.—In paragraph 9, allusion has been made to the favourable character of the water-supply in forwarding the first revised estimate of 1868 for the sanction of the Government of India. The following were the data brought forward to show that the water-supply was ample. From observation of the river at Srivaikuntam for an average of 5 years, it was stated that, as "calculated by experiment," the minimum discharge during March, the driest month of the year, was never under 198 cubic feet per second, which, as early as June, increased to upwards of 300 cubic feet per second, and for 6 months in the year (from 15th June to 15th November) was never less than 600 cubic feet per second. This latter quantity, at 2 cubic yards per acre per hour (the ordinary allowance in the Gōdāvari and Kistna Deltas) was sufficient for the irrigation of 39,000 acres. The full area to be irrigated from the anicut was acres 33,000, and it was calculated that the aggregate discharge above-mentioned would give a total supply of 324,240,000 cubic yards, which would be within 1½ million cubic yards of the full estimated requirements for both first and second crops on the area to be irrigated, not taking into account the large quantity of water stored in the tanks during freshes. As the storage capacity of the tanks amounted to 35 millions of cubic yards (paragraph 16), the water-supply available appeared to be ample.

27. *Water supply found in 1874 to be less than was formerly supposed.*—In paragraph 15, it was noticed that, when submitting the third revised estimate of 1874 to the Government of India, the minimum discharge of the river was found to be much less than was formerly supposed. By the observations taken between the years 1868 and 1874, it was found that the minimum discharge of the river at Srivaikuntam, which had been calculated by experiment in 1868 as 198 cubic feet per second, was only 90 cubic feet per second. It was stated at the time (1874) that the large increase of irrigation under the upper anicuts on the river above Srivaikuntam had seriously diminished the water-supply formerly calculated as available at the Srivaikuntam anicut, and was sufficient to account for the difference in the figures showing the minimum discharge. How far this was the case will be noticed further on (paragraph 30).

28. *Result of further observations.*—In paragraph 18, it was observed that, in forwarding the fourth revised estimate of 1875 to the Government of India, it was found that the minimum discharge was, from the result of another year's experience (1874), still further reduced. The observations referred to showed that the minimum discharge of 90 cubic feet per second was now ascertained to be as low as 46 cubic feet per second. Again, in February 1880, the Superintending Engineer forwarded statements giving an analysis of the water-supply at the Srivaikuntam anicut from 1873 to 1879. These statements showed that a very marked feature of the Tambraparni river was the exceedingly varying character of the water-supply, and that whereas in the year 1876 water topped the Srivaikuntam anicut only for 16 days, in the following year water passed over the anicut for 89 days.

29. *Regulation of the whole water-supply proposed but subsequently abandoned.*—In May 1882, when the final revised estimate was submitted to the Government of India, it was clear that the project would not be so successful as was formerly anticipated, and that the main cause of the disappointment was that the water-supply of the River Tambraparni at Srivaikuntam was now clearly demonstrated to be very much less than was formerly supposed. It was therefore

decided to deal with the regulation of the distribution of the water-supply of the River Tambraparni as a whole, and to provide that whenever water could be spared during low freshes it should be allowed to pass on to Srivaikuntam, instead of being unnecessarily stored in the tanks connected with the upper anicuts.

Owing however, to the insuperable difficulties connected with the regulation of the distribution of water as thus proposed, it has now been decided not to attempt to deal with the subject in this manner, as, owing to the cultivators under the upper anicuts having established, from immemorial custom, a right to use as much water as they pleased, it was considered that it was impossible to curtail their supply, as in case of a subsequent failure, or scarcity, of water in the river, the ryots owning the lands under the upper anicut would probably sue Government for having deprived them of their full early supply. It has therefore been recently determined that all that could be done was to supply the channels leading from the upper anicuts with head-sluiques, and to economise, as much as possible the water-supply available at the Srivaikuntam anicut. In G.O. No. 334 I., dated 14th April 1883, forwarding the revised forecast statement to the Government of India, the Chief Engineer for Irrigation remarked, "to some extent the regulation of the water at the upper anicut has been effected, as head-sluiques have been built to all channels taking off the Tambraparni except those under a small anicut near the hills, but it is to be noticed that the cultivators under these upper anicuts have the prior right to the river water and that for many years they have been accustomed to fill their tanks as often as there was water available, thereby establishing a claim which it would be extremely difficult to dispute. The water thus diverted from the river is not wasted, as all surplus from the tanks and fields comes back into the river, and the river valley is narrow, and rather than attempt to interfere with what, by use, has become a right, it will be advisable to base the estimate of the water-supply on the measurement of the water that has reached Srivaikuntam since the anicut was built." And added that, from a consideration of the discharges of the two main channels from the Srivaikuntam anicut for the past nine years, "the conclusion arrived at is, that with economy in the distribution of water, which has hitherto not received sufficient attention, there is

* 25,500 acres—vide paragraph 22.

a reasonable prospect of the area shown in the forecast statement * being irrigated."

30. *Causes of original incorrect opinions regarding water-supply*—It has already been stated that the minimum discharge of the river, which had been originally calculated in 1868 as 198 cubic feet per second, was subsequently, by the result of further observations, reduced to 90 cubic feet per second in 1874, and, finally, to 46 cubic feet per second in 1875; and in paragraph 27 it was observed that the large increase of irrigation under the seven upper anicuts on the River Tambraparni was reported in 1874, to be sufficient to account for the diminished water-supply. The following are the figures of the irrigated area and revenue under the seven anicuts above Srivaikuntam for ten years before and after the Srivaikuntam anicut was built, which will be of interest as showing the increase in the Tambraparni irrigation generally, independent of the question whether such increase diminished the water-supply formerly calculated on:—

Year.	Area.	Revenue.	Year.	Area.	Revenue.
1860-61	ACS.	Rs.	1871-72	ACS.	Rs.
1861-62	76,204	4,96,918	1872-73	82,283	6,56,263
1862-63	80,706	6,40,997	1873-74	83,596	6,69,209
1863-64	81,435	6,50,148	1874-75	91,193	6,81,491
1864-65	81,130	6,48,874	1875-76	97,976	6,21,559
1865-66	82,873	6,48,695	1876-77	101,277	6,23,290
1866-67	83,330	6,60,010	1877-78	101,623	6,25,445
1867-68	83,230	6,60,815	1878-79	102,055	6,25,454
1868-69	85,185	6,61,778	1879-80	102,231	6,27,909
1869-70	83,462	6,50,935	1880-81	102,925	6,37,418
1870-71	84,418	6,62,299	1881-82	102,820	6,35,160
	83,797	6,51,750		102,731	6,34,602

From this statement it will be observed that, while the total average area of irrigation under the seven upper anicuts above the Srivaikuntam anicut, for the eight years preceding the year 1868-69 was only 81,755 acres, the average irrigated area for the seven years following, or up to the year 1874-75, was 86,818 acres, or the average increase was about 5,050 acres. To some extent, therefore, it may be assumed that the reduced figures of the minimum river discharge, as shown by the observations of 1874, were due to the increase of irrigation higher up the river. Continuing the examination of the statement, it will be seen that in 1874-75 the irrigated area suddenly rose to 97,976 acres, and in the following year to 101,277 acres, since which date it has steadily remained above this figure. Taking the average area of irrigation for the eight years succeeding 1874-75, we find that it is 101,705 acres, or an increase of 19,950 acres, above the average area of cultivation for the eight years preceding 1868-69.

On the whole, it may be considered that—

(1) the great value and success of the irrigation under the seven anicuts above Srivaikuntam originally led to an over-sanguine estimate of the capabilities of the Tambraparni, and to

(2) the cardinal error of supposing that observations of the river for so short a time prior to 1868 were sufficient to determine the discharge of the "hot weather stream," or minimum supply, in a river so uncertain as the Tambraparni; but that

(3) the increase of irrigation above the Srivaikuntam, between the years 1868 and 1875, undoubtedly vitiated to some extent the original observations of 1868, and that

(4) since 1875, the increase of irrigation has been so great as to render the original observations of 1868 entirely nugatory.

31. *Description of works as existing*.—The works of the Srivaikuntam anicut system are of so simple a character that any detailed description is unnecessary. The accompanying map, on a scale of two miles to the inch, shows the main channels leading from the anicut, and supplying the distributaries and tanks of the system. A description of the works, as originally designed, has been given in paragraph 10, and the additions and alterations to the northern head sluice (paragraph 12) and to the southern head sluice and channel (paragraph 20) has already been mentioned. The anicut, with some minor additions, was built as originally designed (paragraph 10), with the important exception that, as stiff blue clay was found during the construction of the work at a depth of 5 to 6 feet below the river bed, the foundation was built with brick masonry throughout to a depth of 7½ feet. The height of the anicut crest above mean sea-level at Tuticorin is +37.40 feet, while the level of the sill of the head sluices is +31.40.

32. *Extension of irrigation*.—The following statement gives the irrigated area, etc., for a series of years before the construction of the anicut after its construction and after the introduction of the new settlement of 1874-75 (paragraph 18):—

Statement showing the irrigated area under the Srivaikuntam anicut.

Year.	First crop.			Second crop.		
	Area.	Assess-ment.	Rate per acre.	Area.	Assess-ment.	Rate per acre.
<i>Before construction of the anicut.</i>						
	ACS.	RS.	RS. A. P.	ACS.	RS.	RS. A. P.
Fasli 1275 (1865-66) ...	14,431	94,905	6 9 3	7,814	43,370	5 9 6
" 1276 (1866-67) ...	14,315	94,102	6 9 2	6,563	40,777	5 15 5
" 1277 (1867-68) ...	13,869	89,441	6 8 9	7,108	43,031	6 0 11
" 1278 (1868-69) ...	13,403	89,025	6 10 4	6,900	42,433	6 1 5
" 1279 (1869-70) ...	13,409	88,932	6 10 2	6,938	42,701	6 1 9
Average ...	13,846	91,305	6 9 6	7,151	42,580	5 15 2
<i>After construction of the anicut.</i>						
Fasli 1280 (1870-71) ...	13,161	89,403	6 12 8	7,121	43,333	6 1 4
" 1281 (1871-72) ...	13,397	91,502	6 13 3	7,490	43,836	5 14 3
" 1282 (1872-73) ...	13,519	89,384	6 9 10	7,091	44,385	6 4 2
" 1283 (1873-74) ...	13,660	92,912	6 12 10	6,772	41,597	5 7 2
Average ...	13,434	90,800	6 12 2	7,185	45,815	5 14 2
<i>After introduction of the new settlement.</i>						
Fasli 1284 (1874-75) ...	17,005	1,23,466	*7 4 9	16,128	51,017	3 2 7
" 1285 (1875-76) ...	18,021	1,30,528	7 3 11	16,188	50,874	3 2 3
" 1286 (1876-77) ...	18,155	1,30,635	7 3 2	16,380	51,296	3 2 1
" 1287 (1877-78) ...	19,132	1,33,292	7 1 8	16,739	53,272	3 2 11
" 1288 (1878-79) ...	19,375	1,37,603	7 1 7	16,780	53,491	3 3 0
" 1289 (1879-80) ...	20,014	1,40,861	7 0 7	17,108	54,812	3 3 0
" 1290 (1880-81) ...	20,492	1,43,588	7 0 1	17,253	54,197	3 2 3

* Of this amount, the average water-rate for Government lands may be taken at Rs. 4-8-0 per acre, and for zamindari and inam lands at Rs. 4 per acre, the remainder being the land assessment.

From this statement it will be seen that the irrigated area, which prior to the construction of the anicut had been slowly decreasing, began after its introduction as slowly to increase, until the introduction of the new settlement when a remarkable increase took place. For the five years prior to the construction of the anicut, the average area occupied for irrigation in the tract affected by it was 13,846 acres, the highest area being 14,431 acres in 1865-66. The area of double crop averaged 7,151 acres. The average occupation of the first four years of anicut irrigation was 14,434 acres, or 412 acres less than the average before the work, but the average of the double crop lands had risen to 7,786 acres. In 1874-75 was introduced a new settlement, and, from this date, the irrigated area, which, notwithstanding the construction of the anicut, had hitherto been almost stationary, rapidly increased. The single crop lands advanced from 13,660 acres in 1873-74 to 17,005 acres in 1874-75, and the double crop lands from 4,474 acres to 16,128 acres. Since then the extension of occupation has been continuous till in 1880-81, the area occupied for first crop was 20,492 acres, while the second crop area was 17,253 acres, the ultimate area to be reached in 1886-87 being 25,500 acres for both crops (paragraph 22). The principal change made under the new settlement was a decrease in the second crop assessment. Prior to the assessment, the charges for second crop were either the full first crop charge, or three-fourths of it; but, by the settlement, the normal charge for second crop was fixed at two-thirds of the charge for first crop, composition being allowed where there was any uncertainty as to the supply for a second crop. It may be noted that of the area shown under first crop in the foregoing statement, 12,800 acres were already occupied and irrigated prior to the anicut (paragraph 9), and that therefore in order to reach the estimated ultimate area of 5,500 acres, the anicut has to bring under first crop 12,700 acres. Up to date, however, the additional area effectually irrigated is only about 6,000 acres. The slow extension of irrigation under the anicut may be attributed not to deficient water-supply but to the numerous accidents which the works have received.

33. *Financial position of the work.*—The financial position of the work at the end of 1881-82 was as follows:—

Items.	Up to 1880-81.	During 1881-82.	Total.	Items.	Up to 1880-81.	During 1881-82.	Total.
<i>Capital Expenditure.</i>	Rs.	Rs.	Rs.	<i>Revenue Receipts.</i>	Rs.	Rs.	Rs.
Direct charges ...	12,23,392	1,058	12,24,450	Receipts in the Public Works Department.			
Indirect charges ...	73,700	2	73,702	Share of Land Revenue due to the work.	3,18,467	62,645	3,81,112
Interest on Direct Outlay while work was under construction.	15,595	...	15,595	Old maintenance charges saved to Government.	11,368	1,921	13,289
					77,979	7,093	85,063
Total ...	13,12,687	1,060	13,13,747	Total ...	4,15,892	72,661	4,88,553

Items.	Up to 1880-81.	During 1881-82.	Total.
<i>Revenue Charges.</i>	Rs.	Rs.	Rs.
Maintenance and Repairs. ...	2,95,189	21,941	3,17,130
Indirect charges ...	16,325	1,403	17,728
Share of collection charges in the Revenue Department at 7.2 per cent ...	23,748	4,649	28,397
Total ...	3,35,262	27,993	3,63,255
Balance of revenue ...	80,780	44,606	1,25,428
Interest charges ...	4,91,311	48,957	5,40,268
	—4,13,531	—4,259	—4,17,480

The total deficit on the work up to the end of 1881-82 is therefore Rs. 4,17,480.

GENERAL REMARKS.

34. *General character of water-supply of the Tāmbraparni.*—In paragraph 23, it was mentioned that "a very marked feature of the Tāmbraparni was the exceedingly varying character of the water-supply." With the exception of the freshes of the north-east monsoon, which are generally heavy and continuous from the middle of October till the beginning of January, the freshes in the Tāmbraparni are so uncertain, that the general state of the water-supply throughout the year can only be approximately predicted. The following may be taken as the ordinary state of the water-supply. With the cultivation of the first or Kar crop in the beginning of June, the first freshes commence and last throughout the month. The freshes of the south-west monsoon are uncertain, the heaviest floods often not occurring until about the beginning of August. The north-east monsoon is regular, and generally there are floods in the river from the middle of October till the middle of January. The river then gradually falls till the middle of April, when freshes frequently occur. From this date till the beginning of June, the river is generally at its lowest. Appended to this narrative is a diagram of the river Tāmbraparni for the five years 1877 to 1881.

Hydraulic particulars of river.—The maximum observed discharge of the Tāmbraparni at Srivaikuntam is 118,763 cubic feet per second, and occurred in the year 1877, when the freshes of the north-east monsoon were extraordinarily high and of long duration. On 7th December of that year, the highest recorded flood occurred, when 11 feet 9 inches depth of water passed over the Srivaikuntam anicut. The maximum recorded floods of each year since 1877 are as follows:—

1878 ...	2-00 feet above the anicut crest.	1880 ...	8-25 feet above the anicut crest.
1879 ...	3-00 feet above the anicut crest.	1881 ...	4-33 feet above the anicut crest.

The following statement shows the number of days in each year from 1873 to 1881 inclusive on which water topped the anicut:—

Year.	1873.	1874.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
Number of days	21	38	29	16	89	79	87	44	38

The average annual discharge of the river at Srivaikuntham, for the five years ending 1881, is 60,304 millions of cubic feet, equivalent to 14.92 inches of discharge from the whole catchment basin. In the year 1877, when, as already noticed in the preceding paragraph, the freshes of the north-east monsoon were extraordinarily high, the total annual discharge of the river was 121,295 millions of cubic feet, equivalent to 30 inches from the whole catchment basin, and if the results of this year are omitted, the average annual discharge for the four years ending 1881 is 45,056 millions of cubic feet, equivalent to 11.15 inches of discharge from the whole drainage area.

Particulars of cultivation under the northern and southern sections of the Srivaikuntam anicut.—The following are the recorded particulars of irrigation during the cultivating season of fasli 1290 (1880–81), which was a year of rainfall below the average, especially during the south-west monsoon.

PESHANAM CROP, OR NORTH-EAST MONSOON CROP, FROM 16TH OCTOBER 1880 TO 31st MARCH 1881.

Northern Section.

Ultimate area ...	11,145 acres.	Actual { Area ...	7,619 acres.
Theoretical supply required at two cubic yards per acre per hour ...	2,412 millions cubic feet.	{ Supply ...	2,639 millions cubic feet.
		Theoretical supply for actual area ...	1,649 millions cubic feet.

Southern Section.

Ultimate area ...	14,355 acres.
Theoretical supply ...	3,107 millions cubic feet.
Actual { Area ...	8,721 acres.
{ Supply ...	3,096 millions cubic feet.
Theoretical supply for actual area ...	1,887 "

Thus we see that the total actual supply received, viz., 5,735 millions cubic feet, was more than sufficient for the full ultimate area of irrigation for which only a total of 5,519 millions cubic feet is required.

KAR CROP, OR SOUTH-WEST MONSOON CROP, FROM 1st JUNE 1881 TO 15th OCTOBER 1881.

Northern Section.

Ultimate area ...	11,145 acres.
Theoretical supply ...	1,979 millions cubic feet.
Actual { Area ...	4,718 acres.
{ Supply ...	715 millions cubic feet.
Theoretical supply for actual area ...	838 "

Southern Section.

Ultimate area ...	14,355 acres.
Theoretical supply ...	2,549 millions cubic feet.
Actual { Area ...	2,575 acres.
{ Supply ...	743 millions cubic feet.
Theoretical supply for actual area ...	457 "

From the above, it will be seen that the supply received was more than sufficient for the area irrigated, the southern section receiving more, and the northern section less, than its proper supply.

During the whole of the cultivating season (first and second crop), for which the particulars have been given above, the freshes in the north-east monsoon, as is almost invariably the case in the Tāmraparni River, were heavy and continued while during the south-west monsoon the supply was exceedingly and unusually scanty. In fact, during the whole of the south-west monsoon of 1881, the water did not once top the Srivaikuntam Anicut, and, as far as the Tāmraparni is concerned, the south-west monsoon of 1881 may be considered a failure. For a river so uncertain as the Tāmraparni, it is difficult to generalize; but on the whole, it may safely be said that, during the north-east monsoon, there will be an ample supply of water, over and above, for the full ultimate area to be irrigated; while, during the south-west monsoon, it is anticipated that, with economy

in the distribution of water, the full ultimate area will, as a rule, be irrigated (paragraph 29). It will, however, be apparent, from the foregoing particulars, that the supply received during the south-west monsoon of 1881 would have proved insufficient for the full area, as no surplus passed to waste during the entire monsoon.

Appendices showing expenditure.—The following appendices, prepared by the Examiner of Public Works Accounts, show the expenditure up to the end of the financial year 1882–83 on the Srivaikuntam Anicut System in the forms adopted by the Government of India for other irrigation systems.

A. S. RUSSELL,
for Chief Engineer for Irrigation.

SRIVAIKUNTHAM ANICUT SYSTEM.

No. 1.—Statement of capital sanctioned and provided by Government to end of 1883-84.

Despatch of the Secretary of State conveying sanction.	No.	Date.	Particulars of sanction.	Estimated cost sanctioned.					Capital outlay provided, being outlay to end of 1882-83 plus grant for 1883-84.			Balance of sanctioned construction cost for which grants have not yet been authorized by the Government of India.		
				Construction Cost involving Actual and Direct Outlay.		Indirect or estimated items not involving actual and direct cash outlay.		Total.	Ordinary outlay.	Productive public works.	Total.	Ordinary outlay.	Productive public works.	Total.
				1	2	3	4	5	6	7	8	9	10	11
38		15th April 1889.	An Anicut across Tambraparni River and Subsidiary Channels in connection therewith for the irrigation of a portion of the District of Tinnevely. The area commanded by the work is 80,000 acres, of which the irrigable area is 32,000 acres. The ultimate annual net revenue has not been finally estimated for. The sanction of the Government of India (Public Works Department, No. 783, dated 23rd April 1879) for the improvement of the water supply of the southern section.	...	...	111,959	1,850	113,809	...	127,408	127,408	...	12,105	12,105
			Total ...	...	...	115,303	1,850	117,153	...	(c) 127,408	127,408	...	(b) 12,105	12,105

Notes.—(1) Columns 6 to 11 in this statement do not include "Indirect Charges not involving Cash Outlay." (2) See statement 6, column 2. (3) The revised estimate of £ 186,414 for the system submitted by Madras Government in G.O. No. 330 I., dated 8th May 1882, has not yet been sanctioned finally by the Government of India. (3) The minus entries in the statement indicate excess of outlay over sanctioned estimates.

D. C. GORDON,
Examiner, Public Works Accounts.

No. 2.—Statement of Ordinary capital provided and utilized.

Year.	Grant of the year.	Amount drawn in the year.	Amount remaining undrawn.	Remarks.
	1	2	3	
	£	£	£	
		Nil.		

No. 3.—Statement of capital for Productive Public Works provided and utilized.

Year.	Grant of the year.				Amount drawn in the year.	Amount remaining undrawn.	Remarks.
	RATE OF INTEREST.						
	4½ per cent.	4 per cent.	—	Total.			
	1	2	3	4	5	6	
Outlay constitutes grants.							
0-71	£ 60,700	£ ...	£ ...	£ 60,700	£ 60,700	£ ...	At present the unutilized portion of the annual grant lapses at the close of each year. The sums, therefore, that are entered as the grants for the several years are also the amounts drawn in those years.
1-72	12,720	...	...	12,720	12,720	...	
2-73	18,546	...	...	18,546	18,546	...	
3-74	7,460	...	...	7,460	7,460	...	
4-75	6,634	...	...	6,634	6,634	...	
5-76	4,711	...	...	4,711	4,711	...	
6-77	4,545	...	...	4,545	4,545	...	
7-78	1,291	...	...	1,291	1,291	...	
8-79	1,389	...	...	1,389	1,389	...	
9-80	3,311	...	...	3,311	3,311	...	
0-81	1,032	...	...	1,032	1,032	...	
1-82	...	106	...	106	106	...	
2-83	...	1,363	...	1,363	1,363	...	
Total ...	122,339	1,469	...	123,808	123,808	...	
amt for 1883-84...	...	3,600	...	3,600	...	3,600	
Total ...	122,339	5,069	...	127,408	(a) 123,808	3,600	

(a) See statement No. 4.

No. 4.—Receipts and Expenditure on Capital Account.

Cr.

	Amount expended to end of 1881-82.	Amount expended during the year 1882-83.	Total.
	1	2	3
Actual outlay—			
Old outlay	£.	£.	£.
Head works	23,902	...	23,902
Works on sections open for traffic and in course of construction	47,335	1,102	68,437
Establishment	27,074	245	27,319
Tools and plant	1,037	16	1,053
Suspense	...	...	...
Total outlay on construction	122,445	1,363	123,808
Add—Indirect Administrative Charges—			
Capitalization of abatement of Land Revenue	1,617	1	1,618
Loss by exchange	...	...	...
Leave and pension allowances	5,753	35	5,788
Total capital, excluding interest	129,815	1,399	131,214
Simple interest	54,327	4,925	59,252
Grand total	184,142	6,324	(a) 190,466
	4	5	6
By Receipts—			
Funds supplied by Government—			
For ordinary outlay	£.	£.	£.
Productive Public Works	122,469	1,363	123,832
Total	122,469	1,363	123,832
Less—Refunds to Government for Receipts on Capital Account—			
Ordinary	...	...	...
Productive Public Works	24	...	24
Total	24	...	24
Balance Net Receipts—			
Ordinary, as per statement No. 2	...	...	...
Productive Public Works, as per statement No. 3	122,445	1,363	123,808
Total	122,445	1,363	123,808
Indirect Administrative Charges...	7,370	36	7,406
Government of India for interest...	54,327	4,925	59,252
Grand total	184,142	6,324	(a) 190,466

(a) For details, see statement No. 5.

No. 5.—Details of capital expenditure for and to the end of the year 1882-83.

Particulars.	To end of previous year.			During the year 1882-83.			Total to end of year 1882-83.		
	Ordinary Outlay.	Productive Public Works.	Total.	Ordinary Outlay.	Productive Public Works.	Total.	Ordinary Outlay.	Productive Public Works.	Total.
I.—Works.									
(1) Head Works—									
Land	...	3,783	3,783	...	...	...	...	3,783	3,783
Works	...	19,844	19,844	...	...	...	...	19,844	19,844
Building	...	872	872	...	...	...	...	872	872
Miscellaneous	...	2,500	2,500	...	...	...	...	2,500	2,500
Total	...	26,999	26,999	...	...	...	...	26,999	26,999
(2) Works on sections open for traffic and under construction—									
Main Canals and Branches—									
Land	...	31	31	...	...	...	...	31	31
Regulators	...	4,170	4,170	...	...	...	...	4,170	4,170
Falls and Weir	...	114	114	...	...	...	...	114	114
Other Cross Drainage Works	...	1,985	1,985	...	520	520	...	2,505	2,505
Bridges	...	2,920	2,920	...	...	...	...	2,920	2,920
Escapes	...	1,170	1,170	...	...	...	...	1,170	1,170
Earthwork	...	17,993	17,993	...	...	...	...	17,993	17,993
Tanks and Reservoirs	...	17,266	17,266	...	262	262	...	17,528	(b) 17,528
Total	...	45,648	45,648	...	782	782	...	46,431	46,431
(3) Distributaries—									
Land	...	70	70	...	39	39	...	109	109
Works	...	5,348	5,348	...	172	172	...	5,520	5,520
Earthwork	...	10,807	10,807	...	...	...	...	10,807	10,807
Tanks and Reservoirs	...	2,770	2,770	...	109	109	...	2,879	2,879
Total	...	18,995	18,995	...	320	320	...	19,315	19,315
(4) Drainage and Protective Works—									
Earthwork	...	2,691	2,691	...	...	...	...	2,691	2,691
Total	...	2,691	2,691	...	...	...	...	2,691	2,691
Total of Works on Sections open for traffic and under construction.	...	67,335	67,335	...	1,102	1,102	...	68,437	68,437
Total Works	...	94,334	94,334	...	1,102	1,102	...	95,436	95,436
II.—Establishment	...	27,074	27,074	...	245	245	...	27,319	27,319
III.—Tools and plant	...	1,037	1,037	...	16	16	...	1,053	1,053
Total Direct Charges	...	122,445	122,445	...	1,363	1,363	...	123,808	123,808
Indirect Charges—									
Capitalization of abatement of Land Revenue	...	1,617	1,617	...	1	1	...	1,618	1,618
Leave and Pension Allowances	...	5,753	5,753	...	35	35	...	5,788	5,788
Total, Indirect Charges	...	7,370	7,370	...	36	36	...	7,406	7,406
Total, Direct and Indirect Charges...	...	129,815	129,815	...	1,399	1,399	...	131,214	131,214
Simple interest	...	54,327	54,327	...	4,925	4,925	...	59,252	59,252
Grand Total	...	184,142	184,142	...	6,324	6,324	...	190,466	(a) 190,466

(a) See Statement No. 4, columns 3 and 6.

(b) After deduction of £ 24 being receipts on capital account.

No. 6.—Estimate of further expenditure on capital account.

Particulars.	Future Expenditure.		
	During the year ending 31st March 1884.	In subsequent years.	Total.
	1	2	3
I.—Works—	£	£	£
(1) Head works ...	...	...	...
(2) Main canals and branches—	...	758	758
Other Cross Drainage Works ...	959	...	...
Total ...	959	—1,092	—133
(3) Distributaries—	...	...	...
Works ...	573	...	...
Earthwork ...	557	...	...
Tanks and reservoirs ...	808	...	...
Total ...	1,938	—1,596	337
(4) Drainage and protective works ...	...	29	29
II.—Establishment ...	2,892	—1,991	991
III.—Tools and Plant ...	695	—9,812	—9,117
...	43	—382	—339
Grand total ...	(b) 3,600	(a) —12,165	—8,565

(a) See Statement No. 1.

(b) The whole of this amount will be charged to productive public works, capital account. See statement No. 2.

Note.—The figures in large type in the statement indicate excesses over sanctioned estimates.

No. 7.—Revenue Account of the year ending 31st March 1883.

Dr.	To Expenditure.	£	Cr.	By Receipts.	£
Extensions and improvements (abstract A, statement No. 9) ...	146			Water supply of towns ...	89
Maintenance and repairs (abstract B, statement No. 9) ...	1,338			Rents of buildings ...	19
Charges for establishment (abstract C, statement No. 9) ...	917			Other canal produce ...	76
Share of charges for tools and plant ...	22			Miscellaneous ...	1
Indirect charges ...	139			Water-rates collected in the Civil Department ...	9,410
Total ...	2,562			Total, Direct Receipts ...	9,595
Deduct old maintenance charges saved to Government ...	738			Indirect—	
Net expenditure ...	1,825			Laid Revenue due to, or dependent on, the work ...	225
Balance of net earnings as per Statement No. 8 ...	7,301			Deduct share of collection charge ...	9,820
Total ...	9,126			Total ...	9,126

No. 8.—Net revenue for the year ending 31st March 1883.

Dr.	£	Cr.
To interest on capital outlay ...	59,252	
To surplus profit after paying off the accumulated interest ...	(a) ...	
Total ...	59,252	
		By net earnings to end of previous year ... 23,532
		By net earnings during the year, as per Statement No. 7 ... 7,301
		Balance of interest remaining unpaid as per column 10 of Appendix No. 6 ... 23,419
		Total ... 59,252

(a) For particulars, see column 10 of Appendix C.

No. 9.

Abstract A. Extensions and Improvements.	Abstract B. Maintenance and repairs.	Abstract C. Charges for establishment.
(2) Main canals and branches—	(1) Head works—	(1) General—
Earthwork ... 29	Works ... 8	Share of direction and execution at 23 per cent of outlay on works and repairs ... 334
(3) Distributaries—	Buildings ... 62	(2) Reserve—
Land ... 30	(2) Main canals and branches—	10 per cent on direct receipts ... 19
Works ... 42	Works ... 110	6 per cent on indirect receipts ... 564
(4) Drainage and protective works—	Earthwork ... 333	Total, Direct charges ... 917
Earthwork ... 45	Plantation ... 168	(3) Indirect charges ... 140
	Tanks and reservoirs ... 349	
	(3) Distributaries—	
	Works ... 24	
	Earthwork ... 115	
	Tanks and reservoirs ... 39	
	Miscellaneous ... 8	
	(4) Drainage and protective works—	
	Earthwork ... 71	
Total ... 140	Total ... 1,338	Total ... 1,057

Note.—The totals of these abstracts work up to the expenditure as shown in statement 7.

No. 10.—Capital Balance Sheet.

Dr.	£	Cr.	£
To Government for fund provided for construction of canal, viz.:			
For ordinary outlay ...			
For productive public works ... 123,808			
(a) 123,808		By capital outlay, as per statement No. 4 ...	123,808

(a) See Statement No. 4.

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No. 11.—Revenue Balance Sheet.

Dr.	£	Cr.	£
To net earnings, as per statement No. 8 ...	35,833	By Government for net earnings actually realized and brought to account ...	35,833
	35,833		35,833

Note.—These accounts close without any balance, the cash balance of the divisions concerned being dealt with as appertaining to Provincial, Buildings and Roads Branch.

APPENDIX A.

General comparative abstract of receipts from the work, year by year, from the commencement to end of 1882-83.

Year.	Unrealized assessment outstanding to end of previous year.	Direct revenue.														Indirect revenue.	Grand total, revenue.	Length of canal open.	Area of land irrigated.
		Assessments during year.																	
		Water-rates from irrigation.	Miscellaneous receipts by sale of water.	Water-supply of towns.	Receipts from plantations.	Receipts from other canal produce.	Water-power.	Navigation receipts.	Rent of buildings.	Fines.	Miscellaneous and other receipts.	Total.	Total assessments, together with the balance of previous year.	Deduct remissions or refunds not involving cash outlay.	Total net assessments.				
1870-71	...	£ 388	...	...	...	...	...	...	...	...	388	388	...	388	...	388	740	17,550	
1871-72	...	1,179	...	...	...	...	...	...	...	...	1,182	1,182	...	1,182	...	1,182	757	18,887	
1872-73	...	1,539	...	...	...	...	...	...	...	...	1,539	1,539	...	1,539	...	1,539	755	16,583	
1873-74	...	1,923	...	...	...	...	...	...	...	...	1,924	1,924	...	1,924	...	1,924	755	21,928	
1874-75	...	5,423	...	...	...	...	...	...	...	...	5,543	5,543	...	5,543	...	5,543	883	26,934	
1875-76	...	5,444	...	...	...	...	...	...	...	...	5,517	5,517	...	5,517	...	5,517	889	27,574	
1876-77	...	4,451	...	...	...	...	...	...	...	...	4,531	4,531	...	4,531	...	4,531	796	25,108	
1877-78	...	5,979	...	...	...	...	...	...	...	...	6,094	6,094	...	6,094	...	6,094	919	29,287	
1878-79	...	6,934	...	...	...	...	...	...	...	...	7,029	7,029	...	7,029	...	7,029	915	31,198	
1879-80	...	8,103	...	...	...	...	...	...	...	...	8,424	8,424	...	8,424	...	8,424	920	33,799	
1880-81	...	7,952	...	...	...	...	...	...	...	...	8,007	8,007	...	8,007	...	8,007	927	33,561	
1881-82	...	8,236	...	...	...	...	...	...	...	...	8,340	8,340	...	8,340	...	8,340	930	34,450	
1882-83	...	9,410	...	...	...	...	...	...	...	...	9,595	9,595	...	9,595	...	9,595	225	37,193	
Total to end of 1882-83.	(a)	63,157 (c)	...	552	231	86	...	...	126	...	112	64,204	64,204	(a)	64,204	63,370	63,370	73,384	

(a) There is no assessed revenue realized in the Madras Public Works Department; these columns have therefore been left blank.

(b) The figures to end of 1881-82 include old maintenance charges saved to Government, and from 1882-83 these are shown as deductions on expenditure side—vide Government of India, No. 68-A I., dated 17th May 1883.

(c) Realized in the Civil Department.

APPENDIX B.

General comparative abstract of working expenses, year by year, from the commencement to end of 1882-83.

Year.	Extensions and improvements.	Maintenance and repairs.	Plantations.	Establishment.					Tools and plant.	Deduct old maintenance charges (b).	Remissions or refunds involving cash outlay.	Grand total.
				General.	Collection of revenue.	Navigation.	Indirect charges.	Total.				
lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1870-71	...	548	...	146	-27	...	31	150	14	£	...	712
1871-72	...	292	...	76	119	...	23	218	7	...	...	517
1872-73	...	275	...	263	-77	...	63	249	25	...	...	1,265
1873-74	...	397	...	108	298	...	57	463	10	...	...	878
1874-75	...	2,913	...	513	446	...	212	1,471	77	...	...	4,610
1875-76	...	2,551	...	589	536	...	292	1,529	30	...	...	4,418
1876-77	...	1,172	...	1,778	379	...	123	880	27	...	...	2,992
1877-78	...	2,314	...	625	503	...	175	1,303	58	...	...	3,594
1878-79	...	432	...	1,339	581	...	329	1,303	123	...	...	7,248
1879-80	...	632	...	777	632	...	269	2,249	119	...	...	3,977
1880-81	...	1,858	...	684	655	...	180	1,648	...	...	...	3,216
1881-82	...	1,317	...	449	676	...	140	1,520	37	...	...	2,789
1882-83	...	1,338	...	917	...	...	140	1,057	22	...	...	1,835
Total to end of 1882-83	2844	21,410	...	7,335	(c) 4,764	...	(a) 1,913	14,012	611	738	12	36,151

(a) Leave and pension allowances only.

(b) This column is introduced in this statement from 1882-83—vide Government of India letter No. 68 I., dated 17th May 1883.

(c) From 1882-83 these charges are shown as deductions from revenue in Appendix A—vide Government of India letter No. 68-A I., dated 20th April 1883.

APPENDIX C.

Summary of capital and revenue accounts from the commencement to end of 1882-83.

Year.	Capital outlay exclusive of interest charges.		Revenue account.					Simple interest at 4½ per cent on capital, including interest while work was under construction.	Net profit after paying off interest charges.	
	During year.	To end of year.	Gross direct receipts.	Working expenses.	Net direct revenue.	Add indirect receipts (share of enhanced land revenue).	Total net revenue.		Exclusive of indirect revenue.	Inclusive of indirect revenue.
Estimate of capital and interest charges.	£	£	£	£	£	£	£	£	£	£
Estimate of annual revenue and working expenses.	...	...	...	...	...	...	...	...	...	...
1870-71	...	61,122	388	712	1,109	740	360	2,524	3,624	2,884
1871-72	13,887	76,006	1,182	517	665	757	1,423	2,912	2,247	1,450
1872-73	19,530	37,539	1,539	1,285	2,804	755	2,069	3,755	6,559	5,804
1873-74	7,709	106,218	1,924	878	1,046	758	1,804	4,274	3,223	2,470
1874-75	6,813	112,828	5,343	4,610	938	883	1,821	4,554	3,616	2,733
1875-76	4,984	137,189	5,317	4,418	1,099	890	1,988	4,908	3,809	2,830
1876-77	4,893	131,996	5,517	2,932	2,239	796	3,035	5,112	2,873	2,077
1877-78	4,566	143,421	4,531	2,694	2,239	893	3,319	5,232	2,832	1,913
1878-79	1,425	134,568	6,044	7,243	2,400	919	896	5,294	5,513	4,598
1879-80	2,075	138,654	7,029	8,977	219	915	5,367	5,384	1,391	17
1880-81	1,076	143,709	8,424	9,916	4,081	930	5,018	5,482	1,391	17
1881-82	1,766	151,214	8,907	2,790	5,611	930	6,471	4,896	1,675	464
1882-83	4,399	...	8,901	1,825	7,076	225	7,301	4,925	2,151	2,376
Liquidity of the system at end of 1882-83 for net loss and interest.	...	...	83,570	33,151	25,419	10,414	35,838	59,252	33,833	23,419

(a) See Statement No. 2

Liability of the system at end of 1882-83 for net loss and interest.

(a) See Statement No. 2. (b) See Statement No. 8. (c) See Statement No. 8. (d) See Statement No. 8.