M.R.O. 1—20,002—12-8-05.

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MADRAS RECORD OFFICE

GOVERNMENT OF MADRAS

Revenue DEPARTMENT

G.O. No. 2214 Press.
B.P. No. Mis.

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M.R.O. 1—20,002—12-3-65.

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MADRAS RECORD OFFICE

GOVERNMENT OF MADRAS

Revenue DEPARTMENT

G.O. No. 2214 Press.
B.P. No. Mis.

Dated 31-10-1875 196 .

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Proceedings of the Madras Government, Public Works Department,
1st October 1875.

Read the following papers:—

No. 7. From T. MOSS, Esq., Controller of Public Works Accounts, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Madras, 19th December 1874, No. 8,342.

I HAVE the honor to request that you will be good enough to hold over action on my letter No. 7,941, of the 5th instant, regarding the Striviguntum Anicut Project, until receipt of a further report from this office. Owing to the manner in which the accounts were kept, the charges in connection with the project appeared as part of the charges of a range in which other works were in progress, and therefore the conclusion of this office, that as, unlike the Madras Water Works, the Striviguntum Project was not treated as a separate Public Works charge, it could not be regarded as having a special or exclusive establishment attached to it. But from a letter* received from the District Engineer of Tinnevelly, I find that this view was not a correct one, and that there was for some years a special establishment employed on the project. I shall therefore have the matter carefully looked into, and will in due course submit a statement of the charges for establishment, and tools and plant, fairly debitable to the project.

* No. 94 of the 15th December 1874.

No. 7-A. From J. W. RUNDALL, Esq., District Engineer, Tinnevelly, to Major J. O. HASTED, R.E., Officiating Chief Engineer for Irrigation, dated Palamcottah, 19th April 1875, No. 17.

WITH reference to G. Os., Nos. 3,231 and 3,443-A, of the 16th November and 7th December 1874, respectively, I have the honor to submit a revised estimate for the Streeviguntum Anicut Project amounting to Rupees 10,00,000 exclusive of charges on account of Engineering Establishment.

1 Revised General Abstract Estimate.
1 Abstract of the revised estimates.
1 Statement showing the sums expended on upkeep of tanks, &c.
1 Statement showing the amount of water available for supplying channels.

2. In this sum are included the extra payments to Ragavachary as well as the excess on various items which the adjustment of Ragavachary's accounts as sanctioned in the last-named Government Order has entailed.

3. At this late period, when almost every item of the project has been completed with the exception of the revetment to the northern tanks, it would be useless to forward detailed estimates. I will, however, notice and explain, as far as I can, the causes of excess or saving in cost of the various works comprising the project.

4. As the Deputy Secretary to the Government of India in paragraph 5 of his letter printed with G. O., No. 3,231, of the 16th November 1874, says, it was not found possible to compare the present estimate with the original one in detail, I will note the charges introduced in each item of the original estimate.

5. *Anicut.*

	Rs.
Original estimate	1,59,500
Estimate of 1873-74	1,75,540
Present estimate	1,99,800

The original estimate allowed for the construction of the anicut on wells; but as it was found that nearly all across the river there was a bed of compact blue clay, the wells were abandoned, only about twenty wells being sunk in the centre of the river. This was the principal alteration. Well rings had been prepared for the whole number of wells required and had to be paid for. The excavation and baling were both heavier in getting in the foundations solid.

The original estimate allowed for all the works being constructed in ordinary mortar, hydraulic mortar made with sooji ee was used in the foundations and lower portions of the work. This added 4 annas 8 to the cost of all the brickwork built with sooji ee cement.

Grooves, flooring in front and rear of under sluices, and an additional 3 yards of stone to the rear apron were subsequently added. These last two additions were sanctioned in G. O., No. 1,831, dated 24th June 1870.

As regards rate it was early found that the excavation could not be executed at the original rate of Rupees 12, and after the supply of stone from the old fort at Palamcottah was exhausted it could not be done under Rupees 21. As, however, the bulk of the work was executed at Rupees 18, the average rate works out to Rupees 18¼, which includes the cost of Portland cement for pointing now debited to this item so previously charged to the general "sundries" of the estimate.

The increase in the rate of brickwork is due to the Contractor having been promised Rs. 0-0-6 per cubic yard in addition to the original full rate of the estimate. This and the use of hydraulic cement have caused an increase of the rate for brickwork from Rs. 7 to Rupees 8-0-6 per cubic yard.

The increase in the cost of the anicut above the sum originally estimated is thus explained for, partly by additional earth and stone excavation as above,

6. *South Head Sluice.*

	Rs.
Original estimate	11,750
Estimate of 1873-74	12,850
Present estimate	13,106

The excess on this item is due to the cost of fixing the sluices with shutters perfect with grey pointing instead of sun-dried as originally provided.

7. *South Main Scale Channel.*

	Rs.
Original estimate	63,250
Estimate of 1873-74	60,050
Present estimate	60,100

The saving of the present estimate as compared with the original estimate is due to very much less labour having been required in forming the channel than was anticipated, the soil being much softer than was expected, whilst the saving as compared with the estimate of 1873-74 is due to the latter having been prepared to cover the cost of certain works which were really required, but which were not provided for in the original estimate.

The cause of excess in the present estimate as compared with that of 1873-74 is due to extra payments to Contractor Rajagopalachary.

8. *Sivan Tattapilly Bridge.*

	Rs.
Original estimate	15,000
Estimate of 1873-74	15,000
Present estimate	9,200

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Work necessary and added subsequently at special request of the villagers and Revenue Officers.

9. *Kulasegarapatam Road Bridge.*

	Rs.
Original estimate	3,404
Estimate of 1873-74	3,055
Present estimate	2,180

The cause of excess above the original estimate is due to the roadway having been increased from 6 feet to 15 feet, which is partly counterbalanced by a saving in foundations.

The cause of excess in present estimate above that for 1873-74 is due to extra payment to Contractor Rajagopalachary.

10. *Two Syphon Sluices.*

	Rs.
Original estimate	2,920
Estimate of 1873-74	1,830
Present estimate	2,240

The cause of saving on the original estimate is due to only one instead of two syphon sluices having been constructed, but this was partly counterbalanced by increased cost in baling, and by an increase in size of vent.

The cause of excess in present estimate above that for 1873-74 is due to an extra payment to the Contractor for baling for the sluice constructed.

11. *Trenkore Bridge.*

	Rs.
Original estimate	6,500
Estimate of 1873-74	6,042
Present estimate	6,380

There is no difference between the work as carried out and as originally estimated for either in quantities or rates.

The cause of excess in present estimate is due to the extra sum allowed to Contractor for excavating foundations.

12. *Kalingalan Head Sluice.*

	Rs.
Original estimate	3,500
Estimate of 1873-74	3,115
Present estimate	3,140

Work carried out substantially the same as originally estimated for. Excess in present estimate is due to an extra payment to Contractor for shutters, &c.

13. *Aalur Branch Channel Head Sluice.*

	Rs.
Original estimate	1,440
Estimate of 1873-74	1,440
Present estimate	1,946

Excess due principally to provision of screw shutters instead of wooden as originally estimated for.

14. *Autur Channel.*

	RS.
Original estimate	17,880
Estimate of 1873-74	16,870
Present estimate	17,075

The original line of the channel was altered, and a considerable saving would have been effected had not the flood of November 1869 so seriously damaged the channel then nearly completed as to bring up the cost of the channel, even without masonry works, nearly to the amount of the original estimate.

15. *A Syphon Sluice under Autur Channel.*

	RS.
Original estimate	6,320
Present estimate	...

Work not executed. The anicut intercepted the supply to the old Tentraperi channel, the water of which this syphon was intended to pass on. The land irrigated by this old channel is now cultivated by the Kadamba tank supplied by south main channel. In the Chief Engineer's note, dated 18th September 1868, the advisability of closing the Tentraperi head sluice and channel was noted.

16. *Trichendur Road Tunnel.*

	RS.
Original estimate	880
Estimate of 1873-74	1,140
Present estimate	1,140

The cause of increase here is due to the fact that sufficient waterway was not originally allowed, and the bridge was built with two vents 4 feet × 6 feet instead of with two vents 3 feet × 4 feet.

17. *Terai Road Tunnel.*

	RS.
Original estimate	880
Estimate of 1873-74	1,140
Present estimate	1,140

Alterations the same as in the case of the Trichendur road bridge.

18. *Aqueduct across old Autur Channel.*

	RS.
Original estimate	3,400
Estimate of 1873-74	3,690
Present estimate	3,690

Excess in this case is due to trifling alterations in carrying out the work.

19. *Rough Stone pitching.*

	RS.
Original estimate	...
Estimate of 1873-74	1,210
Present estimate	1,210

The new channel above and below the aqueduct is laid out on an ogee curve of small radius; it was therefore necessary to pitch the new channel banks both above and below the aqueduct.

20. *Two Drops in Autur Channel.*

	RS.
Original estimate	...
Estimate of 1873-74	2,025
Present estimate	1,650

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These drops are necessitated by the water level of the Sathukuvoithan tank having been made 3¼ feet lower than originally estimated and by the fall in the latter part of the channel having been reduced.

The saving in present on estimate of 1873-74 is due to the use of rough stone in mortar for brick.

21. *Raising the bund of the Sathukuvoithan Tank.*

	RS.
Original estimate	3,820
Present estimate	...

It was thought unadvisable to raise this tank, as the extra capacity to be obtained was not commensurate with the cost.

22. *Calingulah in Sathukuvoithan Tank.*

	RS.
Original estimate	520
Estimate of 1873-74	1,559
Present estimate	1,585

The increase in cost above original estimate is due to the calingulah having been considerably lengthened and having extra vents provided.

23. *A Head Sluice for the Channel round Kadamba Tank.*

	RS.
Original estimate	2,280
Present estimate	...

A channel from west end of Kadamba Tank to Ammenpuram.

Original estimate	74,500
Present estimate	...

Aqueduct for Tenkawai Surplus.

Original estimate	10,126
Present estimate	...

These three works are superseded by the Puttur channel and head sluice. It having been found impracticable to carry a channel through the sandy soil above the Kadamba tank, it was determined to pass on the supply for the lower tanks through the Kadamba. This arrangement is discussed in paragraph 18 of the Chief Engineer's inspection notes of November 1869, printed in G. O., of the 18th January 1870, No. 108, and the estimates for carrying out the alterations were sanctioned in G. O., No. 861, dated 28th March 1870.

The alteration has effected a saving of Rupees 70,000 nearly, and by enabling the large Kadamba tank to be used to a great extent as a reservoir for the lower tanks has effected a great improvement in the project.

24. *Head Sluice to Puttur Channel.*

	RS.
Original estimate	...
Estimate of 1873-74	3,790
Present estimate	4,155

The cause of the increase of the present above the former estimate is due partly to increased cost of brickwork and partly to extra cost in fitting the screw shutters.

25. *Parsur Channel.*

	Rs.
Original estimate	...
Estimate of 1873-74	...
Present estimate	7,277
	7,830

Extra cost above previous estimate is due partly to extra payment to Contractor Kaguvellury (vide letter No. 8 on his claims) and partly to a little extra work having been done.

26. *Bridge at Parsur.*

	Rs.
Original estimate	...
Estimate of 1873-74	3,260
Present estimate	3,398

The extra cost of this work is due to increased cost of brickwork.

27. *Dam in Parsur Channel.*

	Rs.
Original estimate	...
Estimate of 1873-74	510
Present estimate	510

This work was necessary to preserve the surface fall in the channel; there has been a slight saving in carrying out the work.

28. *Syphon Sluice under Parsur Channel.*

	Rs.
Original estimate	...
Estimate of 1873-74	904
Present estimate	920

This work was necessary to pass the drainage from transport under the channel; there has been a slight saving in carrying out the work.

29. *Irrigation on Calingulah.*

	Rs.
Original estimate	2,750
Estimate of 1873-74	937
Present estimate	1,116

As the foundations of this work had been built, it was decided to make the Kanam and Anniyapuram sluice one unit, and this conversion of this calingulah was effected.

The excess of present above former estimate is due to an extra sum having been paid to Contractor Kaguvellury.

30. *Improving Anniyapuram and Kanam Tanks.*

	Rs.
Original estimate	...
Estimate of 1873-74	660
Present estimate	825

There has been a slight excess in carrying out the work, which was necessary to admit of the tank holding an increased volume of water.

31. *Kanam Calingulah.*

	Rs.
Original estimate	...
Estimate of 1873-74	2,750
Present estimate	3,152
	3,930

The calingulah was built with crest on a higher level than was originally proposed, and was raised on its being decided to abandon the construction of the Anniyapuram calingulah; hence excess above original estimate. The cost of work above estimate of 1873-74 is due to extra cost of brickwork.

32. *Kanam Channel.*

	Rs.
Original estimate	36,100
Estimate of 1873-74	35,450
Present estimate	35,200

The levels of the channel were somewhat altered during execution, the off-take being on a higher level and the channel afterwards dropped.

The slight saving on estimate of 1873-74 is on cost of making up banks.

33. *Pulipat Syphon Sluice.*

	Rs.
Original estimate	...
Estimate of 1873-74	746
Present estimate	715

This work was necessary to pass drainage under the channel; there has been a small saving on estimate of 1873-74 in carrying out the work.

34. *Kanam Drop.*

	Rs.
Original estimate	...
Estimate of 1873-74	1,950
Present estimate	1,870

There has been a small saving in carrying out the work.

35. *Tatchur Channel and Tank—Head Sluice and Drop.*

	Rs.
Original estimate	830
Estimate of 1873-74	906
Present estimate	940

The work was altered from a calingulah to a regular sluice of two vents and the wings made a reasonable length.

The increase above estimate of 1873-74 is due to extra cost of brickwork.

36. *Tatchur Channel.*

	Rs.
Original estimate	1,600
Estimate of 1873-74	2,560
Present estimate	2,560

The excess of cost is due to the fact of rock having been met with in excavating this channel.

37. *Drop in Tatchur Channel.*

	Rs.
Original estimate	...
Estimate of 1873-74	555
Present estimate	655

This was necessary to regulate the channel which had a heavy fall into the tank.

38. *Pulicat Tank.*

	Rs.
Original estimate	5,040
Estimate of 1873-74	2,500
Present estimate	2,500

A considerable portion of the area originally included in this tank was left to be cultivated by the Kaum tank; the Tuttaken sink head was made lower than originally estimated for.

39. *Cuttingalai to Tuttaken Tank.*

	Rs.
Original estimate	780
Estimate of 1873-74	930
Present estimate	930

The estimate was lengthened, in my opinion, very unnecessarily.

40. *Annapar Tank.*

	Rs.
Original estimate	5,000
Estimate of 1873-74	6,003
Present estimate	6,003

Excess is due to the level of the tank having been raised 1 foot above that allowed in the sanctioned estimate.

41. *Kongur Channel.*

	Rs.
Original estimate	820
Estimate of 1873-74	1,846
Present estimate	1,846

The cut-gullah was lengthened, in my opinion, very unnecessarily.

42. *Ellapunaicken Tank.*

	Rs.
Original estimate	5,000
Estimate of 1873-74	8,411
Present estimate	8,411

The excess over original estimate is due to the tank bund having been made 1 foot higher than first estimated for.

43. *Ellapunaicken to Vellangudi.*

	Rs.
Original estimate	780
Estimate of 1873-74	1,743
Present estimate	1,743

The original cross-section was altered by the cutting also being lengthened.

44. *Tidal Sluice and Tank to Annapar Channel.*

	Rs.
Original estimate	500
Present estimate	500

Annapar Channel.

	Rs.
Original estimate	5,000
Present estimate	5,000

These works (sluice and channel) were abandoned by Mr. Bourne, the works were small and were intended to enable fishermen and small craft to navigate conveniently.

45. *North Channel and Branches, North Head Sluice.*

	Rs.
Original estimate	12,520
Estimate of 1873-74	19,416
Present estimate	19,985

The alteration of this sluice from four to six vents was sanctioned in G. O., No. 613, of 23rd February 1874. This revision provided only for the sluice being worked with needles, as in the original estimate. The plan was further revised by providing shutters with screw gearing. This accounts for the excess of estimate of 1873-74 above original estimate. The excess in present estimate is due to extra payment to Rugavachary for firewood, also to an increased cost of fitting the shutters, altering the grooves, &c.

46. *North Channel.*

	Rs.
Original estimate	1,07,140
Estimate of 1873-74	98,451
Present estimate	98,735

The saving on original estimate is due to the quantity of earthwork being over-estimated. There was a mistake in the original sections, which was found out and corrected during execution of the work. The saving on this account was more than sufficient to cover the cost of widening the channel bed from 30 feet to 36 feet from 7 miles to the Paykalam, 30 feet only having been provided in the original estimate.

The difference between the present estimate and that of 1873-74 is due to an extra payment to Contractor Ragavachary.

47. *A dam across stream below Head Sluice.*

	Rs.
Original estimate	630
Estimate of 1873-74	871
Present estimate	920

The increase of cost is due to an alteration in design and the provision of bottas wings. The excess above 1873-74 estimate is due to increased cost of brickwork.

48. *Tidals.*

	Rs.
Original estimate	...
Estimate of 1873-74	1,140
Present estimate	1,049

Two more streams enter the north channel within the first 2,000 yards for which no inlets were provided in the original estimate, but the construction of which was necessary.

49. *Kottapalayam Head Sluice.*

	Rs.
Original estimate	1,440
Estimate of 1873-74	3,171
Present estimate	2,173

The increase of cost is due, first, to the work having been damaged by floods and a portion having to be rebuilt, and also to the provision of screw gearing for working the shutters.

50. *Dam in North Channel below Kaelpadagay Head Sluice.*

	Rs.
Original estimate	...
Estimate of 1874-74	240
Present estimate	240

This is required when the water is low to give a supply to the Kaelpadagay channel which has a prior right to water.

51. *Bairavanagadam Bridge.*

	Rs.
Original estimate	3,400
Estimate of 1870-74	4,357
Present estimate	4,310

The bridge allowed in the original estimate was to replace a stone platform bridge 3 miles from the head across the old Kaelpadagay channel, and was estimated with a roadway of 9 feet. The bridge was built about 52 miles down the channel with a roadway of 15 feet; hence the increase over original estimate. The excess of present over estimate for 1873-74 is due to increased cost of brickwork.

52. *Bridge at Mangalacherri.*

	Rs.
Original estimate	3,260
Estimate of 1873-74	4,945
Present estimate	4,970

The excess on this work is due, first, to an alteration in raising the abutments from 3 feet to 5 feet, and secondly to the arch, which was on the centres at the time of the flood of November 1869, having been destroyed and having to be rebuilt. The excess of present over estimate of 1873-74 is due to increased cost of brickwork.

53. *Kaelpadagay Sluice.*

	Rs.
Original estimate	1,440
Estimate of 1870-74	1,560
Present estimate	1,570

The entire cost of this work is due to provision of screw shutters to replace the wooden ones originally provided.

54. *Retaining Wall at Pattukottai.*

	Rs.
Original estimate	...
Estimate of 1873-74	3,500
Present estimate	3,500

This work was executed and the circumstances are fully explained in paragraph 20 of my No. 144, dated 16th December 1873 printed with G. O. No. 1,498, of the 8th June 1874.

55. *Sluices across Canal.*

	Rs.
Original estimate	4,150
Estimate of 1873-74	5,840
Present estimate	6,700

The excess is entirely to a considerable enlargement of the work, the lower floor being laid much more level than originally estimated for.

The excess of present estimate over that for 1873-74 is due to increased cost of brickwork, also to an extra provided to protect the lower floor being laid.

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56. *Outfall Channel from Siphon Sluice.*

	Rs.
Original estimate	...
Estimate of 1873-74	3,800
Present estimate	3,800

The necessity for this work omitted in the original estimate is fully explained in paragraph 37 of my No. 143 of 13th December 1873, printed with G. O., No. 1,498, of the 8th June 1874.

57.

	Rs.
Original estimate	19,060
Estimate of 1873-74	12,022
Present estimate	11,760

These three works were lumped together in the original estimate, the ultimate cost of each is shown in the margin. The saving is due to the stone pitching to the channel bank (called a causeway) having been estimated for twice over in the original estimate, also to kunkur having been met with in the foundations for both bridges.

Cost.	
4,760	*Bridge and Culvert at Veral.*
3,700	*Causeway at Veral.*
3,300	*Bridge at Sivathanda.*
11,760	

58. *Double dam.*

	Rs.
Original estimate	5,850
Estimate of 1873-74	7,260
Present estimate	7,020

The original plan was modified by raising the dam and adopting a better style of wing walls.

59. *Bridle for Pattukottai Road.*

	Rs.
Original estimate	3,200
Estimate of 1873-74	3,503
Present estimate	5,115

Excess over original estimate due to raising of abutments from 3 feet to 5 feet counterbalanced by some saving due to kunkur being met with at a less depth than 6 feet.

60. *Raising Bank of Paptukota Tank.*

	Rs.
Original estimate	8,000
Present estimate	...

This bank was raised by Revenue authorities after sanction of the original estimate, and though it has subsequently been damaged in some places it will cost only a few hundred rupees to repair it instead of the sum allowed, which was omitted in the subsequent revisions of the estimate.

61. *Culvert for Playhouse.*

	Rs.
Original estimate	2,790
Present estimate	...

The Parkstain and the west of the series, Maruthoor tank, being on the same level are virtually one, and no culvert between them is necessary for purposes of regulation, its cost was therefore omitted on the revision of the estimates.

62. *Raising the land of the Mayadhany Tank.*

	Rs.
Original estimate	...
Estimate of 1873-74	478
Present estimate	402

This tank the next to the Pothukulum required improvements not provided in the original estimate. The excess in present above previous estimate is due to an extra payment to Contractor Ragavachary.

63. *Calingapuk for Mayadhany Tank.*

	Rs.
Original estimate	2,790
Estimate of 1873-74	3,855
Present estimate	2,095

There was a saving in the foundations owing to the work being founded on ...

64. *Pothukulum Tank.*

	Rs.
Original estimate	9,500
Estimate of 1873-74	11,008
Present estimate	12,050

The main cause of the increase is due to the general level of the tank and tank bunds having been raised. The increase over estimate of 1873-74 is due to an extra payment to Contractor Ragavachary.

65. *Pothukulum Calingapuk.*

	Rs.
Original estimate	2,790
Estimate of 1873-74	6,994
Present estimate	6,959

The original design was modified to suit the site adopted. A greater height of bund was allowed for in the present design on calculation the original estimate being thus rendered necessary. The excess of the present over estimate for 1873-74 is due to ... and correction case of brickwork.

66. *Escape Revetment.*

	Rs.
Original estimate	12,800
Estimate of 1873-74	11,920
Present estimate	...

The necessity for this work is explained in paragraph 11 of my letter, No. 24, of 20th January 1875, and the work is approved in paragraph 9 of your note printed ... (Irrigation) No. 1 1875, of 8th June 1875.

The difference between present and last for 1873-74 is due to the whole ... the several tanks revetments having been incorrectly divided between the ... which was Tenkasi tanks in your office.

67. *Raising the bund of Chengarayan Anicut or Karumpalliam Tank.*

	Rs.
Original estimate	11,270
Estimate of 1873-74	35,041
Present estimate	34,100

This tank as well as the Pothukulum was raised in level. The capacity of the tank as originally designed was much too small, and the raising was essential to the proper supply of the lands under the northern tanks. The excess in present over estimate of 1873-74 was due to an extra payment to Contractor Ragavachary.

68. *Escape weir for Karumpalliam Tank.*

	Rs.
Original estimate	2,790
Present estimate	...

The Upar Odei dam acts as the escape for the Karumpalliam tank and the separate provision of an escape was unnecessary.

69. *Escape weir at Upar Odei Dam.*

	Rs.
Original estimate	38,640
Estimate of 1873-74	39,100
Present estimate	39,310

The excess above original estimate is due to the work having been raised 1½ feet, also to an increase in the rate for cut stone, both of which are partly counterbalanced by the saving effected by substituting rough stone in mortar for brickwork in the body.

70. *Revetment to Karumpalliam Tank.*

	Rs.
Original estimate	70,000
Estimate of 1873-74	70,389
Present estimate	...

The explanation given for Pothukulum revetment applies to this tank.

71. *Upar Odei Embankment.*

	Rs.
Original estimate	41,060
Estimate of 1873-74	30,800
Present estimate	27,900

The saving on the original estimate is due, partly to a shorter line for the embankment having been chosen, and partly to a saving in the rates. The increase in present estimate over that for 1873-74 is due to provision being made for ramps on the road from Tuticorin to Puleyakoil.

72. *Excavating Channel to Tuticorin.*

	Rs.
Original estimate	21,250
Estimate of 1873-74	12,117
Present estimate	11,112

The saving on this channel is due to its having been carried out at rates considerably below those of the estimate. The line was altered by carrying the channel to the north of Tuticorin instead of the south, in order more thoroughly to intercept the drainage. By adopting this line to the north the channel ran across the cotton road for which a bridge (the latter item) had to be provided.

73. *Bridge over Odei Head.*

	Rs.
Original estimate	...
Estimate of 1873-74	3,500
Present estimate	3,500

The excess over the last is explained above.

74. *Tiled mail shades.*

	Rs.
Original estimate	7,000
Estimate of 1873-74	18,000
Present estimate	18,000

The provision on this item is for a more suitable design having been adopted for all the more important shades than that originally entered for. Thirty-four shades have been fitted with screw shutters.

75. *Pulicat Channel.*

	Rs.
Original estimate	10,000
Estimate of 1873-74	20,000
Present estimate	20,000

It was ascertained at an early date that the provision under this head in the original estimate was quite inadequate. As the original intention was to throw the expenses of excavating town ditches upon the rates, and as, owing to the Municipality's irregular, the project was not carried out, an application for further funds was made to the Chief Engineer, Colonel Anderson, who added Rupees 10,000 to this estimate. It has been found necessary to enlarge and heavy drainage channels in many cases with drops. The greater portion of the excavation is soft white sand, but the supply channel to Pulicat will cross one three feet thick Kurungalli bed, which must necessarily be much more costly, and for which Rupees 8,000 in the present estimate.

76. *Conservancy of Municipal Bungalow.*

	Rs.
Original estimate	3,370
Estimate of 1873-74	3,808
Present estimate	3,808

Rupees 438 are required for the repair of the compound wall which was constructed though not originally estimated for.

77. *Lunatic's Shed.*

	Rs.
Original estimate	2,000
Estimate of 1873-74	4,850
Present estimate	4,850

A three-roomed bungalow for the Overseer having been built

78. *Petta Bungalows.*

	Rs.
Original estimate	12,000
Estimate of 1873-74	12,000
Present estimate	12,000

Rupees 500 are required in the estimate for the compound wall prepared by Captain [illegible] Engineer, and approved by Colonel Anderson, then Chief Engineer, in his No. [illegible] dated the 30th September 1868. Rupees 1,000 are required for the construction of the house surgeon's quarters, and Rupees 500 for the erection of a [illegible] as per estimate prepared by Captain [illegible] and approved by Colonel Anderson in his [illegible] dated the 30th September 1868.

79. *Compensation for land.*

	Rs.
Original estimate	9,000
Estimate of 1873-74	40,000
Present estimate	37,000

The provision in the original estimate for this item was quite inadequate. As I cannot explain how the original figure was arrived at, I cannot point out the cause of excess. Nearly all the land has been paid for, and as it does not appear likely that the whole Rupees 40,000 will be required, I therefore now enter a smaller sum.

80. *Capitalized assessment on lands.*

	Rs.
Original estimate	[illegible]
Estimate of 1873-74	20,000
Present estimate	18,500

This item was added by you to the estimates, *vide* paragraph 5 of your note printed in G. O., No. 1,498, *of* 8th *June* 1874. As, however, the compensation to be paid for land will not, it now appears, amount to more than Rupees 37,000, the capitalized assessment has been correspondingly reduced.

81. *Sundries.*

	Rs.
Original estimate	40,608
Estimate of 1873-74	39,777
Present estimate	27,027

The expenditure on this item has now been reduced by debiting to their proper heads several charges which should really be included in the cost of individual works. Such, for instance, as the cost of wells in the animal foundations, also the cost of well frames, roads but not used, previously referred to. The expenditure above shown now includes—1st, the cost of repairs to works which in progress, not separately charged to sanctioned estimates under Agricultural Repairs; 2nd, cost of tools; 3rd, repairs to bungalows; 4th, provision of office sheds, store sheds, &c.; 5th, office contingencies, official postage, &c.

82. *Damage by flood.*

	Rs.
Original estimate	[illegible]
Estimate of 1873-74	5,000
Present estimate	5,000

This is a payment to the Contractor for materials damaged in the flood of November 1869, and was sanctioned in G. O., No. 1,424, of the 8th June 1870. The sum of Rupees 31,074 mentioned in paragraph 4 of the same order has, in the estimate now submitted, been distributed among the individual works to which it appertains, and appears, therefore, in the total cost of such work.

I have now, I think, explained the alterations, both as regards construction and cost of each item made from time to time during the execution of the work, and I trust I have been able to make my explanations sufficiently clear.

I have alluded in several places to increased cost of brickwork. This is due to the fact that when the brick manufacture accounts were finally closed, it was found that the cost of bricks had amounted to Rupees 2-6-0 per cubic yard, instead of Rs. 2. This gives a rate of Rupees 2-13-0 per 1,000.

Taking all the work done departmentally, the average cost of brickwork in common mortar is as nearly as possible Rupees 5 per cubic yard, which was the original rate allowed.

83. *Direct Establishment Charges.*

I have since the receipt of G. O. No. 3,231, of the 16th November, been in communication with the Controller as to the amount to be debited to the project, and have ascertained that, including the cost of establishment for getting out the estimates and plans in 1867-68, the cost of separate establishments amounted, up to 30th November 1872, to Rupees 74,6[illegible]. As, however, the Controller in a letter, dated 2nd instant, informs me that the [illegible] which is to form a debit to the project is still under discussion, I have not added this [illegible] to the general estimate, but must request you to be good enough to [illegible] sum may be finally determined to be the correct debit.

As regards the subsequent ratable charge, which the Controller informs me is to be calculated at 25 per cent. of the expenditure, I have the honor to remark that deducting from the total of the present estimate, Rupees 10,00,000, the expenditure up to 30th November 1872, *viz.*, Rupees 7,61,001, the balance would be Rupees 2,28,999, and the debit at 25 per cent. on this sum would amount to Rupees 57,245.

I think, however, it would only be fair to include under expenditure, up to 30th November 1872, the whole of work done by Contractor Ragavachary, whose accounts were not settled till last official year. Should you agree to this, the work executed to 30th November 1872 would stand at Rupees 7,94,976, and the sum on which establishment charges are to be ratably calculated would be Rupees 2,05,024, and the amount Rupees 51,246.

84. *Interest Statements.*

The interest charges which are likewise to be added should, I presume, be calculated by the Controller. On the 23rd November 1874, I asked this officer to make out the statements, but as they have not been received by me, I shall feel obliged by your having the amounts added in your office.

85. *Revenue Statements.*

The revenue returns called for are, I am informed by the present Acting Collector, still under preparation, and, as I shall not see them before leaving the district on furlough, I am unable to offer any remarks upon them.

I have prepared and forward herewith a statement showing the sum spent on repairing the channels and tanks now merged in the Streevigundam Irrigation system.

The amount shown will of course form a deduction from the revenue derived in each year.

86. *Water-supply.*

I have, however, still to report on the water-supply, regarding which further information is asked for in paragraph 4 of the letter from the Government of India.

In my previous report of January and December 1873, I have stated that the supposition that the minimum supply of water would never be less than 108 cubic feet per second was found incorrect, and that in September 1873 we had found the minimum 16 cubic feet per second. We have now had another year's experience, and in 1874 the minimum in September was 16 cubic feet per second. For sixteen days in that month the water was less than 75 cubic feet per second.

As we have had regular registers kept for two years, I forward a calculation showing the amount of water available for supply under the existing conditions of the anicut and sluices. Similar statements were called for in paragraph 3 of your memorandum, No. 188, of the 25th March 1873. I was not then able to give you the information you required, but the river and channel discharges have now been worked out by Mr. Hughes and myself from the registers kept at Streevigundam since June 1873.

I should premise by stating that I regard the calculations only as fair approximations, and not as absolutely accurate. It is evident from many considerations that we do not know the correct coefficients for the sluices, but I hope these will be ascertained by direct experiment as soon as possible after the channels have been opened in June.

Roughly averaging the two years the monthly supply is as shown below :—

	Cubic yards.
June	88,000,000
July	76,000,000
August	35,000,000
September	14,000,000
October	34,000,000
November	65,000,000
December	64,500,000
January	20,000,000
February	16,000,000
March	13,000,000

April and May are omitted, for, as a rule, the channels would be closed and no cultivation in progress.

The south-west monsoon of 1873 was unusually abundant, the volume reaching Streevigundam in June, July, and August 1873, being in round numbers 250 millions against 148½ millions in the same period in 1874. On the other hand the north-east monsoon of 1873-74 was an almost entire failure, and the average is brought up only by a single fresh lasting four days at the end of February 1874. In 1874-75 the north-east monsoon was most capricious, there being violent floods in November with a very scanty supply during January and February. 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 Arumugamungalam tanks in September and March.

This is in some measure due to the ryots not cultivating early enough. Last year the Arumugamungalam 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.

In your calculations regarding the expenditure of water (paragraph 7 of your note, dated 25th April 1874) you have allowed only 2 cubic yards per hour per acre. I am, however, convinced that for the kar crop the expenditure is much in excess of that. The sandy nature of greater part of the land and the salty nature of other tracts have not been taken into account, and it must be remembered that the kar cultivation will not, as a rule, be helped out by rain. Judging from what I have seen of the way the ryots cultivate, it would seem to be fair for the kar crop to consider the tanks full at the

and of July, and then adding the supply in August and September, calculate the acreage cultivable with an expenditure of 60 cubic yards per day for sixty days.

The total tank capacity, as previously reported, was 28 million cubic yards on the north and 27·6 on the south side. New tanks have recently been made from special funds which would raise the tank capacity on the south side to 30 millions; hence the total tank capacity = 58 millions.

For the kar crop therefore—

Tanks full 31st July	58	Million cubic yards.
Receipts in August and September	49	"
	107	"
Deduct quantity remaining in larger tanks (probable) not for irrigation	17	"
	90	"

which at 3,500 cubic yards per acre would suffice for only 25,000 acres, and to ensure this the cultivation must be commenced in June.

For the peshcush, considering that the crop will be helped out by the rainfall, 2 yards (to which no ryot may be reduced, though I think that even here 2½ per acre were would be better.

Supposing therefore for the peshcush that the tanks were full at the end of December, and adding the average supply up to the 15th March, the result is as follows—

Tanks full 31st December	58	Millions
Receipts in January and February to 15th March	49·8	"
	107·8	"
Deduct remaining not for irrigation	14·9	"
	93	"

$\frac{93,000,000}{4,000}$ = 23,250. The supply would therefore suffice, in round numbers, for 24,000 acres.

I have assumed as such that a certain amount of water remains in the tanks, pass this point, because the tanks being of various relative capacities the whole volume of water cannot be said to be available for all the cultivation at once.

There would also be the Kadamba which could not be used for the Korkei.

In paragraph 2 of your No. 128 (9th March 1875) you state it will not do to [illegible] supply is such uncertain two years running the latter [illegible] [illegible] No results would be of any [illegible] to Government [illegible] Korkei tanks as the same reasons which [illegible] all those [illegible] which the hill crop.

It is necessary to drainage two rainfall records of any three years in the Arumpavur [illegible] [illegible] the Kadamba, of the south and [illegible] these [illegible] [illegible] Chrompet and 30·5 in August and September [illegible] 0·08 and 1·85 respectively in the average of ten years. Both of these small quantities would reach

the Korumpallum tank. In January and February again the average of ten years is 1·69 and 0·54 inches, respectively, and water would only reach the Korumpallum tank when this fall occurred in single showers.

The foregoing calculation presents therefore, in my opinion, the most favorable aspect possible of the area likely to be irrigated.

I still think that it will eventually be found necessary to raise the anicut to ensure the fullest possible utilization of the flood water: every cubic yard wasted in January or February when freshes usually occur should, if possible, be passed into the channels.

It will be seen that further experience has led me to believe that it is not likely the acreage originally calculated on will be cultivated. Feeling also that no cultivation independent of tanks is likely to succeed, I have, when accompanying the late Collector Mr. Puckle over the ground for settlement purposes, deprecated any ground being classed as wet which was not commanded by a tank.

87. *Additions to be made to estimates in Chief Engineer's Office.*—I regret that I am not able to submit all the papers complete to you, but as neither the interest statement nor the revenue statement has been received by me, you will I trust excuse my troubling you to compile in your office the further information needed. I hope, however, that, as regards the details of the works themselves and the available water-supply, this letter and its accompaniments will afford you all requisite information.

88. *Ryots' Contributions.*—Out of the sum contributed by the ryots Rupees 38,845-8-0, Rupees 22,853 have been spent on the river bund, and Rupees 11,062 on the bridge piers, leaving a balance of Rupees 2,930-8-0, which I would propose should be spent on the work required to raise the river embankments.

N.B.—A general abstract in accordance with the instructions contained in the last clause of paragraph 20 of your note, No. 222-A, printed with G. O., No. 1,498, of the 8th June 1874, has been prepared and forms an accompaniment to this letter.

TINNEVELLY DISTRICT.

Comparative Abstract of Estimate for Sivaverumalum Anicut Project.

Estimate of 1873-74 sanctioned in G. O., No. 1,498, of the 8th June 1874.

		Estimate, 1873-74.			Estimate, 1874-75.			Total.	Grand Total.	
		Quantity.	Amount.		Quantity.	Amount.				
			Rs.	A. P.		Rs.	A. P.	Rs.	Rs.	
Anicut.										
Rubble-in-chunam	C. yds.	14,216½	79,077	14 3	14,250	91,252	8 0			The increase in brickwork is due to the Contractor having been allowed brickwood in addition to the original ..... of estimate.
Cut stone	...	1,963½	33,543	0 0	1,871½	34,895	5 0			At Rupees 18½. The rate has been increased to cover cost of Portland cement pointing.
Rough stone-in-chunam	...	705½	2,330	15 6	705½	2,330	15 6			The quantity has been increased as stone was thrown in front of anicut after flood of 1869 and hitherto improperly charged to groynes.
Do. boulder	...	8,982½	20,703	3 9	9,532½	22,208	3 9			
Jamelo wood	C. feet	120	332	8 0	120	332	8 0			Quantity and rate have both been increased.
Cut-stone coping	...	214½	371	13 0	243	729	0 0			
Iron bars	lbs.	10,166½	847	3 4	3,625	785	1 0			Quantity reduced to correspond with work.
Earth	C. yds.	19,525	1,910	10 0	25,402	3,208	11 10			Extra quantity allowed to Contractor Ragavachary as explained in Note No. 3 on Contractor's claims.
Sand	...	51,971	3,782	4 2	57,782	3,750	0 6			Do. do. do.
Old masonry	C. yds.	1,104	552	0 0	1,104	552	7 10			
Baling	...	...	13,683	9 2	...	13,683	9 2			
Temporary dams	...	...	6,000	0 0	...	6,000	0 0			
Wells and well rings	...	...	...		...	7,328	6 6			The expenditure on this head has hitherto appeared in "General Sundries," but as it is properly debitable to the anicut, it is now transferred.
Sundries	...	...	7,835	12 10	...	8,337	2 9			
			1,71,000	0 0		1,95,500	0 0			
Rough stone	...		3,000	0 0	...	3,000	0 0			
Groynes	...		1,540	0 0	...	1,300	0 6			
			1,75,540	0 0	...	1,99,800	0 0	1,98,800	1,99,800	
South Channel and Branches.										
South head sluice	...	...	11,799	0 0	...	12,300	0 0			The increase here is due to the extra cost of fitting screw shutters above Lieutenant Shepherd's original estimate. The piers and platform had to be raised with cut stone 9½' which was not allowed for.
Screw gearing for do.	...	...	753	0 0	...	800	0 0	13,100		
South main channel	...	...	63,976	0 0	...	67,000	0 0			Excess on this channel is due to extra payment to Contractor Ragavachary getting extra quantities for earthwork and to extra work having been done in raising banks at lower end of channel.
Stone-pitching do.	...	...	1,100	0 0	...	1,100	0 0	68,100		
Alwar Tinnevelly bridge	...	...	3,200	0 0	...	3,200	0 0			Excess due to extra payment to Contractor Ragavachary.
Kulasegarapatnam road bridge	...	...	4,083	0 0	...	4,180	0 0			Do. do. do.
Tycalow syphon sluice	...	...	1,850	0 0	...	2,240	0 0			Excess due to payment to Contractor Ragavachary—*vide* Note No. 12 on Contractor's claims.
Do. bridge	...	...	6,042	0 0	...	6,280	0 0			Do. do., Note No. 13.
Kalemba head sluice	...	...	3,115	0 0	...	3,140	0 0	19,040		
Autur Branch Channel.										
Autur head sluice	...	...	1,696	0 0	...	1,696	0 0			
Screw gearing	...	...	250	0 0	...	250	0 0			
Autur channel	...	...	16,670	0 0	...	17,075	0 0			Excess due to extra payment to Ragavachary for earthwork—see Note No. 6, on Contractor's claims.
Tachendore road (upper)	...	...	1,140	0 0	...	1,140	0 0			
Do. (lower)	...	...	1,140	0 0	...	1,140	0 0			
Weir	...	...	3,690	0 0	...	3,690	0 0			
Aqueduct	...	...	1,210	0 0	...	1,200	0 0			
Rough stone-pitching	...	...	1,084	0 0	...	720	0 0			Sum spent entered. Saving due to substitution of stone for brick.
Drop in Autur channel (1st)	...	...								

Comparative Abstract of Estimates for Strengthening Anicut Project, &c.—(Continued.)

	Estimate 1874-75.			Revised Estimate 1874-75.			Total.	Grand Total.	
	Quantity.	Amount.		Quantity.	Amount.				
		Rs. A. P.			Rs. A. P.		Rs.	Rs.	
Anicut Branch Channel— (Concluded.)									
Drop in Anicut channel (end)	...	940 0 0		...	940 0 0				
Salinkuvithan calingulah	...	1,559 0 0		...	1,585 0 0				
							29,436		
Puntur Channel and Ammeiyarum Tanks.									
Head sluice	...	3,679 0 0		...	3,365 0 0				Excess due to extra cost of brickwork.
Screw gearing for do.	...	720 0 0		...	790 0 0				Do. do. of fixing shutters and freight.
Puntur channel &c.	...	7,217 0 0		...	7,830 0 0				Excess due partly to extra payments to Ragavachary, Note No. 6, and partly to extra earthwork.
Bridge over do.	...	8,260 0 0		...	8,395 0 0				Excess due to extra cost of earthwork.
Dam in do.	...	510 0 0		...	510 0 0				Slight saving.
Syphon sluices	...	961 0 0		...	920 0 0				Do.
							16,810		
Ammeiyarum calingulah	...	937 0 0		...	1,115 0 0				Excess due to extra payment to Ragavachary—see Note No. 15 on Contractor's claims.
									Slight saving.
Improving Ammeiyarum and Kanum tanks.	...	860 0 0		...	825 0 0		1,940		
Kanum Channel and Lower Tanks.									
Kanum calingulah	...	3,163 0 0		...	3,325 0 0				Excess due to extra cost of brickwork.
Do. channel	...	35,450 0 0		...	35,200 0 0				Saving on earthwork which also covers extra payment to Contractor on this channel.
									Slight saving in rates.
Palaput syphon sluice	...	746 5 0		...	715 0 0				Do. do.
Kanum drop	...	3,360 0 0		...	1,270 0 0				
							40,510		
Tulukan Channel and Tank.									
Head sluice and drop	...	903 0 0		...	940 0 0				Excess due to extra cost of brickwork.
Channel	...	2,560 0 0		...	2,560 0 0				
Tulukan drop	...	555 0 0		...	555 0 0				
Do. tank	...	2,590 0 0		...	2,590 0 0				
Do. calingulah	...	920 0 0		...	920 0 0				
							7,565		
Avudyar tank	...	6,903 0 0		...	6,903 0 0				
Do. calingulah	...	1,846 0 0		...	1,846 0 0				
							8,749		
Elangonikkan tank	...	8,411 0 0		...	8,411 0 0				
Do. calingulah	...	1,745 0 0		...	1,745 0 0				
							10,156		
								2,15,406	
Total of south side ...	...	...		...	...		...		
North Channel and Tanks.									
North head sluice	...	17,630 0 0		...	18,200 0 0				Extra cost due to payment for firewood to Contractor Ragavachary.
Screw gearing	...	1,455 0 0		...	1,785 0 0				Excess due to error in original estimate, angle irons having been omitted, &c., to cost of enlarging grooves.
							19,985		
North channel	...	95,737 0 0		...	96,075 0 0				Excess chiefly due to extra payment to Ragavachary—see Note No. 16 on Contractor's claims.
Do. arching	...	2,660 0 0		...	2,660 0 0				
							98,735		
Dam	...	871 0 0		...	920 0 0				Excess due to extra cost of brickwork.
Inlets	...	1,440 0 0		...	1,440 0 0				
							2,360		
Kelipudagei head sluice ...	...	1,921 0 0		...	1,921 0 0				
Screw gearing to do. ...	...	250 0 0		...	250 0 0				
Dam in north channel below do. ...	...	240 0 0		...	240 0 0				
							2,411		
Rivermungalum bridge	...	4,257 0 0		...	4,310 0 0				Do. do. do.
Mungalamedu do.	...	4,945 0 0		...	4,970 0 0				Do. do. do.
Kedgar head sluice	...	1,200 0 0		...	1,220 0 0				Do. do. do.
Screw gearing for do. ...	...	250 0 0		...	250 0 0				
Parungalum surplus bank, road ...	...	3,909 0 0		...	3,502 0 0				

Comparative Statement of Estimates for Correspondence Annual Project.—(Concluded.)

Remarks, 1874-75.		Estimate, 1875-76.				Grand Total.	
Quantity.	Amount.	Quantity.		Amount.			
	Rs. a. p.			Rs. a. p.	Rs.	Rs.	
North Channel and Branches.							
—(Concluded.)							
Land under tunnel	5,812 0 0	...		5,700 0 0			Excess due to extra sum allowed to Contractor for baling and sundries.
Do. outfall channel	3,360 0 0	...		3,360 0 0			
Do. bridge and culverts ...	4,692 0 0	...		4,760 0 0			Excess due to extra cost of brickwork.
Causeway	3,780 0 0	...		3,780 0 0			Slight saving.
Sluiftumdu bridge	3,360 0 0	...		3,360 0 0			Do. in culverts.
Doulas dam	7,160 0 0	...		7,020 0 0			Do. in approaches and centering.
Palayatangal road bridge ...	3,584 0 0	...		3,416 0 0			
					50,942		
Maruthoney tank	178 0 0	...		423 0 0			Excess due to extra sum allowed to Ragavachary—see Note No. 17 on Contractor's claims.
					3,167		
Do. calingulab	2,885 0 0	...		2,695 0 0			Saving.
Pottakullam tank	11,995 0 0	...		12,850 0 0			Excess due to extra payment to Ragavachary—see Note No. 15 on Contractor's claims.
							Excess due to extra rate for brickwork.
Do. calingulab	5,934 0 0	...		6,035 0 0			Work in progress. Estimate amount was previously incorrect.
Do. revetment	12,800 0 0	...		11,920 0 0			
					30,905		
Chintaneswary Nalken or Kanamapallum tank	33,041 0 0	...		34,190 0 0			Excess due to extra sum allowed to Ragavachary—see Note No. 19 on Contractor's claims.
Escape weir on Upper Odei dam.	39,100 0 0	...		39,310 0 0			Amount for buttresses added—see Chief Engineer's Memorandum, No. 117, dated 27th January 1875.
Revetment	70,000 0 0	...		70,380 0 0			Excess equals reduction on Pottakulam, the total amount having been incorrectly divided before.
					144,380		
Upper Odei embankment	26,850 0 0	...		27,200 0 0			Excess due to cost of ramps on local roads.
					27,200		
Tuticorin channel	14,112 0 0	...		14,112 0 0			
Bridge over cotton road	2,500 0 0	...		2,500 0 0			
					16,612		
Total north side	...	...		...	...	3,94,920	
Distribution sluices	18,600 0 0	...		18,600 0 0			Amount increased for reasons explained in report.
Do. channels	29,000 0 0	...		33,000 0 0			
					51,600		
Pullingody bungalow	3,888 0 0	...		3,888 0 0			
Temporary sheds	4,859 0 0	...		4,859 0 0			
					8,747		
Ferry Establishment	42,000 0 0	...		42,000 0 0			
					42,000		
Land compensation	40,000 0 0	...		37,000 0 0			It seems likely as only the branch channels remain to be paid for, that only the reduced amount will be required.
Capitalized assessment on land taken up.	20,000 0 0	...		18,500 0 0			
					55,500		
Sundries	39,777 0 0	...		27,027 0 0			Reduced owing to transfer of certain charges for Portland cement wells, &c., to the anicut.
					27,027		
Damage to materials	5,000 0 0	...		5,000 0 0		5,000	
Total of general	...	...		...	...	1,89,874	
Grand Total	9,81,330 0 0	...		...	...	10,00,000	

(Signed) J. W. RUNDALL,
District Engineer, Tinnevelly.

PALAMCOTTAH,
19th April 1875.

Abstract of the Revised Estimates for the Sivaramgudum Anicut Project, &c.—(Continued.)

Description.	Amount.	Total.	Grand Total.	
	Rs.	Rs.	Rs.	
Tahsken Channel and Tank.—(Concluded.)				
Avudyar tank	6,303			
Do. calingulah	1,846			
		8,749		
Ellapanaiken tank	8,411			
Do. calingulah	1,745			
		10,156		
Grand Total, South Channel ...	...	...	2,15,400	Total of south side.
North Channel and Branches.				
North head sluice	18,200			
Screw gearing	1,785			
		19,985		
North channel	96,075			
Stone-pitching	2,660			
		98,735		
Dam	930			
Inlets	1,440			
		2,360		
Keelpudugai head sluice	1,921			
Screw gearing	250			
Dam in new channel below do.	240			
		2,411		
Sivaramangalam bridge	4,310			
Mungalacurchy do.	4,970			
Korkai head sluice	1,320			
Screw gearing do.	200			
Perungalum surplus embankment ...	3,500			
Venal under tunnel	6,700			
Outfall channel	3,300			
Venal bridge and calingulah	4,760			
Causeway	3,700			
Sirutheundee bridge	3,300			
Double dam	7,020			
Palayakayal road bridge	7,810			
		50,040		
Muruthony tank	402			
Do. calingulah	2,685			
		3,087		
Pottakulam tank	13,060			
Calingulah	6,050			
Revetment	11,200			
		30,305		
Chinnasawmy Naiken or Korumpullum tank	34,190			
Escape weir or Upaur Odei dam	38,810			
Revetment	70,930			
		1,14,380		
Upaur Odei embankment	27,300			
Tuticorin channel	14,113			
Bridge over do. on cotton road	2,500			
		16,612	8,44,020	Total of south side
Distribution sluices	18,600			
Do. channels	33,000			
		51,600		
Pathagooday bungalow	4,889			
Temporary sheds	4,808			
		9,717		
Sundries		27,027		

Abstract of the Revised Estimates for the Sivaramgudum Anicut Project, as submitted with letter from District Engineer, Tanjore, No. 17, 19th April 1875.

Description.	Amount.	Total.	Grand Total.	
	Rs.	Rs.	Rs.	
Anicut	1,87,500			
Rough stone	3,000			
Guaging	1,500			
		...	1,92,000	Total of Anicut.
South Channel and Branches.				
South head sluice	12,500			
Screw gearing do.	600			
Total of head sluice ...	...	13,100	...	
South main channel	67,660			
Stone-pitching do.	1,100			
		68,100	...	
Bridge over Tuticorin branch	3,000			
Kilanangaimoodoo road bridge	1,180			
Tuticorin regulator sluice	3,340			
Tuticorin bridge	3,250			
Kattumbahu head sluice	2,140			
		13,010	...	
Tuticorin Branch Channel.				
Avoor head sluice	1,006			
Screw gearing	250			
Avoor channel	17,075			
Kilanangaimoodoo road bridge	1,140			
		1,140		
Venal do.	3,000			
Kalingulah	3,250			
Kilanangaimoodoo channel	720			
Do.	240			
Kalingulah	1,586			
		20,436	...	
Tuticorin Channel and Arumpannei Tank.				
Head sluice	2,305			
Screw gearing	790			
Channel	7,810			
Bridge	4,302			
Escape	510			
Dam in channel	620			
Sluice doors		16,810	...	
Arumpannei calingulah	1,115			
Arumpannei Arumpannai and Kanam tanks	825			
		1,940	...	
Kanam Channel and Lower Tanks.				
Kanam calingulah	3,325			
Do. channel	35,400			
Escape weir	715			
Do. dam	1,270			
		40,810	...	
Kanam Channel and Tank.				
Head sluice and drip	340			
Channel	2,550			
Culvert	550			
Dam	3,500			
Pottakulam tank	920			
Do. calingulah		7,860	...	

Abstract of the Revised Estimates for the Sreevaigoondum Anicut Project, &c.—(Concluded.)

Description.	Amount.	Total.	Grand Total.	
	Rs.	Rs.	Rs.	
Petty Establishment	42,000	42,000	...	
Land compensation	37,000			
Capitalized assessment on land taken up ...	18,500	55,500		
Damage to watercourse	...	5,000	...	
			1,89,874	Total of General.
Grand Total ...	...	...	10,00,000	

General Abstract.

Anicut	1,00,800
South side	2,13,406
North side	5,94,820
General	1,89,874
Total ...	10,00,000

Examined,
19th April 1875.

(Signed) J. W. RUNDALL,
District Engineer, Tanjore.

Statement showing the Sums expended on account of Tanks and Channels now merged in the Sreevaigoondum Anicut Scheme.

Official year.	North Side.	South Side.	Common to both North and South Sides.	Total.	Remarks.
	Rs.	Rs.	Rs.	Rs.	
1857-58	440	1,007	...	1,447	
1858-59	920	3,360	...	4,280	
1859-60	1,043	1,091	...	2,135	
1860-61	1,017	1,015	...	2,032	
1861-62	585	1,067	...	1,652	
1862-63	3,450	2,164	...	5,614	
1863-64	930	750	...	1,680	
1864-65	2,000	2,349	...	4,349	
1865-66	6,030	2,293	...	8,323	
1866-67	3,142	1,911	...	5,104	
1867-68	1,081	513	...	1,594	
1868-69	811	1,473	...	2,284	
1869-70	3,371	1,770	...	5,141	
1870-71	13,884	10,124	...	24,008	
1871-72	980	4,098	...	5,078	
1872-73	1,893	1,013	...	2,906	
1873-74	5,237	4,805	...	10,042	
1874-75	2,964	1,977	1,116	6,057	
1874-75	12,850	16,537	1,104	30,491	

Examined,
19th April 1875.

(Signed) J. W. RUNDALL,
District Engineer, Tanjore.

Proceedings of the Madras Government, Public Works Department,
1st October 1875.

Statement showing the Amount of Water available for supplying Channels at Sreevaigoondum Anicut deduced from Registers of the Anicut and Sluices for each year.

Month and Date.	Hours.	Supply per Hour.	Total Supply.	Total Supply per Month.
1873-74.		c. yds.	c. yds.	c. yds.
21st June	24	153,600	77,414,400	
9th do.	24	81,482	17,600,112	
				95,014,512
19th July	24	153,600	70,041,600	
12th do.	24	115,000	33,120,000	
				103,161,600
6th August	24	153,600	22,118,400	
25th do.	24	50,046	30,027,600	
				52,146,000
30th September	24	26,682	19,211,040	19,211,040
2nd October	24	153,600	7,372,800	
29th do.	24	33,500	23,316,000	
				30,688,800
3rd November	24	200,000	14,400,000	
6th do.	24	153,600	22,118,400	
21st do.	24	68,250	34,398,000	
				70,916,400
3rd December	24	153,600	11,059,200	
28th do.	24	52,414	35,222,208	
				46,281,408
31st January	24	14,900	11,085,600	11,085,600
1st February	24	200,000	4,800,000	
3rd do.	24	153,600	11,059,200	
24th do.	24	14,726	3,482,176	
				24,341,376
31st March	24	20,850	15,512,400	15,512,400
		Total ...	...	468,366,136
1874-75.				
4th June	24	200,000	10,200,000	
8th do.	24	153,600	29,491,200	
28th do.	24	73,586	31,932,352	
				80,623,552
7th July	24	153,600	25,804,800	
24th do.	24	40,000	23,040,000	
				48,844,800
31st August	24	23,570	10,024,080	10,024,080
30th September	24	13,208	9,509,760	9,509,760
4th October	24	153,600	14,745,600	
27th do.	24	34,563	22,396,824	
				37,142,424
5th November	24	200,000	24,000,000	
1st do.	24	153,600	8,686,400	
24th do.	24	42,007	30,474,432	
				63,160,832
3rd December	24	200,000	14,400,000	
14th do.	24	153,600	51,609,600	
15th do.	24	49,415	16,602,240	
				82,611,840

Statement showing the Amount of Water available for supplying Channels at Srivaigoondum Anicut deduced from Registers of the Anicut and Sluices for each year.—(Concluded.)

Month and Date.	Hours.	Supply per Hour.	Total Supply.	Total Supply per Month.
		c. yds.	c. yds.	c. yds.
1874-75.—(*Concluded.*)				
2nd January	24	153,600	7,372,800	
29th ,, ...	24	81,574	21,975,504	29,348,304
28th February	24	12,618	8,479,296	8,479,296
31st March	24	13,531	10,067,064	10,067,064
Total			...	283,713,152

(Signed) J. W. RUNDALL,
District Engineer, Tinnevelly.

Collectorate,
16th April 1876.

No. 71. From Captain L. COSWAY-COUDON, R.E., Controller of Public Works Accounts, to Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, dated Fort St. George, 21st August 1875, No. 11 I.

With reference to your letter of the 15th July 1875, No. 760, and to C. O. of 15th November 1874, No. 3,231, I have the honor to forward a statement showing approximately the direct and some of the indirect charges which, in the light of present information, seem fairly debitable to Srivaigoontum Anicut system from the commencement of the work to the close of the year 1875-76.

2. The sums entered under composition for land, works, and tools and plant represent expenditure incurred entirely on account of the anicut system.

3. Under establishment, the actual cost of the special establishment employed, together with a charge of 5 per cent. of the outlay on works, had been entered for the period during which the works constituted a separate charge; for the remaining period the charges for establishment have been taken at 25 per cent.

4. The Collector of Tinnevelly has not yet furnished the information required to enable this office to capitalize the statement of land revenue; and in the absence of information regarding the date from which the works are to be considered to have come into operation, this office cannot calculate the interest charges.

5. To prevent misunderstandings, I may as well point out that the figures given in the statement now forwarded are to be regarded as simply an indication of alterations which are likely to be made in the Capital Account of the Srivaigoontum Anicut system when that Capital Account is in its turn systematically taken in hand; that the present total charges on account of establishment must in particular be regarded as liable to further revision when Government have determined the principle on which such charges are to be apportioned; and that in the regular monthly accounts of Capital outlay on Irrigation Works no alteration will for the present be made.

Establishment.	Special Establishment.	Tools and Plant.	Total.	Capitalization of Assessment.	Total to end of the year	Interest at 4½ per cent.	Grand Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Establishment of Engineers.	4,985	4,000	8,985				
Proposed Establishment for Execution and Accounts.	18,015	5,000	23,015				
Total ...	23,000	9,000	32,000				
Establishment of Engineers.	4,985	100	5,085				
Proposed Establishment for Execution and Accounts.	10,362	...	10,362				
Total ...	15,347	100	15,447				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	9,015	...	9,015				
Total ...	14,001	...	14,001				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	18,583	...	18,583				
Total ...	23,568	...	23,568				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	11,517	...	11,517				
Total ...	16,502	...	16,502				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	7,920	...	7,920				
Total ...	12,905	...	12,905				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	54,823	...	54,823				
Total ...	59,808	...	59,808				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	54,823	...	54,823				
Total ...	59,808	...	59,808				
Establishment of Engineers.	4,985	...	4,985				
Proposed Establishment for Execution and Accounts.	54,823	...	54,823				
Total ...	59,808	...	59,808				

(Signed) J. MILLS,
for Controller of Public Works Accounts.

No. 72. From Captain L. COSWAY-COUDON, R.E., Controller of Public Works Accounts, to Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, dated Fort St. George, 21st August 1875, No. 12 I.

With reference to your letter of the 15th July 1875, No. 760, and to C. O. of 15th November 1874, No. 3,231, I have the honor to forward a statement showing approximately the direct and some of the indirect charges which, in the light of present information, seem fairly debitable to Srivaigoontum Anicut system from the commencement of the work to the close of the year 1875-76.

2. The sums entered under composition for land, works, and tools and plant represent expenditure incurred entirely on account of the anicut system.

3. Under establishment, the actual cost of the special establishment employed, together with a charge of 5 per cent. of the outlay on works, had been entered for the period during which the works constituted a separate charge; for the remaining period the charges for establishment have been taken at 25 per cent.

4. The Collector of Tinnevelly has not yet furnished the information required to enable this office to capitalize the statement of land revenue; and in the absence of information regarding the date from which the works are to be considered to have come into operation, this office cannot calculate the interest charges.

5. To prevent misunderstandings, I may as well point out that the figures given in the statement now forwarded are to be regarded as simply an indication of alterations which are likely to be made in the Capital Account of the Srivaigoontum Anicut system when that Capital Account is in its turn systematically taken in hand; that the present total charges on account of establishment must in particular be regarded as liable to further revision when Government have determined the principle on which such charges are to be apportioned; and that in the regular monthly accounts of Capital outlay on Irrigation Works no alteration will for the present be made.

No. 1,084.

No. 8. *Note by the Chief Engineer for Irrigation.*

In G. O. of the 16th November 1874, No. 3,231, instructions were issued for the collection of certain information required by the Government of India in connection with the Sirivigrantum Anicut Project. The information is on some points not yet complete, but Government may desire to have laid before them that which has been obtained.

2. The information asked for referred to the following subjects:—

1*st*.—The cost of the works including establishments and other charges.

2*nd*.—The causes of excess over original estimate.

3*rd*.—The net income to be obtained from the outlay.

4*th*.—Water-supply.

3. On the first point the District Engineer has reported so far as direct charges are concerned, and his letter of the 19th April last contains also explanations of all causes of excess on works. It will be observed that the amounts of the items in nearly every case differ more or less from those of the estimate reviewed in June 1874. In most cases the differences are small, but in the following, in which they are considerable, special notice is necessary:—

	Rs.
Anicut	Increase Rs. 24,360
Works, south side	Increase 6,197
" north side	Increase 6,493
Sundries	Decrease 12,750
Land compensation	Decrease 3,000
Channel (Government)	Decrease 1,500
Special establishment—Engineering up to 1872	Decrease 50,150
	35,040 78,400
	43,360

The explanation given in paragraph 5 of the District Engineer's letter above noticed does not account for this difference, except that the cost of Portland Cement has been transferred from sundries to this work. The adjustment of the contractors' claims (Proceedings, Madras Government, 7th December 1874, Note, paragraphs 6 and 20) accounts for—

	Rs.
On the anicut	2,694
On the canal principally for the mound	6,848
" walls and well-rings before improperly debited to sundries ...	7,823
Total ...	17,365

and the rest is made up of increases on many items, some of which at any rate ought to have been included in the estimate of 1873-74, as the expenditure has not been incurred since, *e.g.*, rough stone boulders, Rupees 1,500.

4. The total of the estimate of 1874-75, as submitted by the District Engineer, is Rupees 10,00,000, whereas that transmitted to the Government of India was Rupees 10,49,630. It has taken some trouble to investigate the differences, but the following is a summary:—

	Increase. Rs.	Decrease. Rs.
Anicut	24,360	
Works, south side	6,197	
" north side	6,493	
Sundries		12,750
Land compensation		3,000
Channel (Government)		1,500
Special establishment—Engineering up to 1872		50,150
	35,040	78,400
		43,360

The difference of Rupees 20 is hardly worth tracing, as it is due to some clerical error in calculation.

Why the District Engineer left out the special engineering establishment is not clear, but at any rate the amount must be restored to its place, and the estimate of 1874-75 then becomes Rupees 10,59,150—

	Rs.
This sum includes part of the establishment charges, *viz.*, special ...	59,150
" petty ...	42,000
Total ...	1,01,150

Letter No. 11 I.

	Rs.	Rs.
and to enable use to be made of the information furnished by the Controller, the above must be deducted, leaving for works ...		9,58,050
Add Controller's statement of establishment up to 1874-75		1,48,109
Tools and Plant		6,105
The above establishment is for an expenditure of Rupees 8,54,508 and Rupees 1,03,492 remained to be expended, on which the establishment charge at 26 per cent. will be		26,873
Total ...		11,38,087

The Controller states that his figures must be taken as an approximation, and he has not calculated the interest charges in the absence of information regarding the date from which the works are to be considered to have come into operation.

This date is somewhat difficult to settle, as the south channel was turned to account at a very early date, and one part after another has been subsequently utilized as soon as it was ready. If a date must be fixed arbitrarily, probably the beginning of 1872-73, or Fusly 1282, would be reasonable, but on this point the opinions of the Collector and District Engineer may, with advantage, be obtained.

5. The only Revenue information at present available is contained in the Proceedings, Madras Government, as per margin. It is there shown that the recent settlement, made in special connection with Revenue Dept., No. 1,085, 19th July 1875.
Public Works Dept., No. 70, 10th August 1875.

the effect of this project, gives as the actual results an increase of revenue of Rupees 45,784; that probably had the project not been carried out, there would have been a reduction of assessment of Rupees 20,000, the lands being overassessed at the old rates considering the character of the former water-supply, and that ultimately a further increase of Rupees 49,495 may be anticipated as population increases and irrigation is extended. The above refers to only the south side of the river, the settlement of the north side not having as yet been completed. The irrigation on the south and north sides of the river respectively is expected to be 13,500 and 20,000 acres, and the cost of the south side works may approximately be assumed to be as follows, exclusive of interest:—

	Rs.	Rs.
South channel and subsidiary works, rule abstract estimate		2,15,400
¼, or, say, four-tenths of the following:—		
Anicut	1,09,800	
General charges, some of which have to be divided between	1,89,874	
Special establishment	59,150	
Tools and Plant	6,105	
Further establishment charges (there is no information as to the outlay yet to be incurred on the two sides of the river, but it is believed that most will be on north side)	26,873	
	3,90,802	1,02,320
		4,07,440

Supposing interest, &c., to raise the cost to five lakhs of Rupees for this portion of the system, the results would be—

On the actual settlement of Rs. 45,784	9·2	per cent.
Do. do. with 20,000 added	13·2	"
On possible future increase of revenue, Rs. 45,784 + 49,495	19·0	"
On the above with Rs. 20,000 added	23·0	"

these would be the gross returns.

The District Engineer has furnished a statement showing the maintenance charges for a series of years from 1867-68. If 1872-73 be taken as the first year of the anicut system, then for fifteen years before the average outlay was Rupees 5,325, and for the three years after Rupees 15,530, or, say, 10,000 Rupees have to be deducted from the increase of revenue, and for the south side the deduction would be Rs. 4,000.

It appears to be quite impracticable at present to forecast accurately the results of the outlay on this system of irrigation, but on the whole the prospect of a fair return is encouraging.

6. Lastly, with respect to water-supply. In paragraph 7 of the Note on the revised estimates printed in Proceedings Madras Government, dated 8th June 1874, No. 1,498, were given calculations of the quantity of water

Vide Statement.	required, ...	cubic yards	297·48 millions
	and quantity probably available,	"	311·43 "
while the District Engineer reports that in 1873-74 there were		"	468·36 "
and in 1874-75, ...		"	383·71 "

OOTACAMUND, (Signed) JOHN MULLINS, Lieut.-Colonel, R.E.,
20th September 1875. *Chief Engineer for Irrigation.*

No. 9. ORDER THEREON, 1st October 1875, No. 2,831.

IRRIGATION, No. 1.
Account.

THE information contained in the foregoing papers, though not quite complete either as regards the probable cost of the Strivigantum Anicut Project or the returns to be obtained from the irrigation under it, will nevertheless afford the Government of India a fairly clear view of its circumstances. As soon as the revenue information for the lands under the north channel may be available a further report will be made to the Government of India, and in the meantime the annual statements of area irrigated and revenue, in the form prescribed for all important irrigation works, should be completed as soon as possible.

2. The interest charges being, in the Controller states, dependent upon the date from which the anicut works are to be considered to have come into operation, the District Engineer will, in communication with the Collector, and in connection with the remarks in the Note of the Chief Engineer for Irrigation, report from the beginning of what year this date should be fixed.

3. The differences between the estimate of 1873-74 and that of 1874-75, so far as they were caused by the settlement made with the late Contractor, may be admitted to be reasonable, and it is presumed that many others were first brought to light during

the detailed examination of the accounts made [illegible] investigating the Contractor's claims. Undoubtedly the accounts were kept in a man[illegible]y far from satisfactory, but notice of t[illegible] regularities has already been taken in [illegible]ng orders on the late Contractor's clai[illegible]

Proceedings of the Madras Government, No. 3,443-A., dated 7th December 1874.

4. Ordered that the following letter be s[illegible]—

(Here enter No. 2,832, dated [illegible] October 1875.)

(True Ex[illegible]

Major-General, R.E.,
Secretary to Government.

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

Exd. S. T. Austin.
Spare Copies [illegible]

C.T. 1873 No. 249
C.T. 1879
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PUBLIC WORKS.

THE ASSISTANT ENGINEER,
TENTERFIELD.

Sir,

I have the honor to be,

Your obedient servant,

[illegible]

Assistant Engineer.

[illegible]

[illegible]

[illegible]