M.R.O. 1—77,000—8-6-37.

(1) Number of pages 72.

(2) Date of repair 26-7-40.

(3) Initials of the Repairer

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

Irrigation Branch

G.O. No. 849-850 I Press Misc.

Dated 9th December 1881.

Not to be folded or roughly handled

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

9th December 1881 No. 849 I.

Irrigation.
Accounts.

Read the following papers:—

No. 16. No. 150[illegible].

Note by the Chief Engineer for Irrigation.

In the subjoined note is recorded the total expenditure on the Madras Water Supply and Irrigation Extension System to the end of 1880-81, and a comparison is drawn between the revised estimate and that sanctioned by the Government of India in their letter No. 695 I., dated 10th November 1871, the cause of excess on individual items or of additional expenditure being duly explained.

Statement of Total Outlay on the Madras Water Supply and Irrigation Extension Project to the end of 1880-81.

Particulars of Charges.	To end of 1874-75 as per G.O., No. 341, dated 8th Feb. 1876.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.	Total to end of 1880-81.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Works	11,73,436	6,119	(a)15,541	(a)2,530	(b)24,410	9,141	11,533	12,42,710
Establishment ..	1,83,977	1,676	3,885	633	6,102	2,285	2,295	2,00,853
Tools and Plant ..	4,779	62	389	63	610	229	229	6,361
Suspense	(c)	..	..	..	..	..	..	..
Total ..	13,62,192	7,857	19,815	3,226	31,122	11,655	14,057	14,49,924
Receipts on Capital Account	1,167	..	..	..	..	..	..	1,167
Net Total ..	13,61,025	7,857	19,815	3,226	31,122	11,655	14,057	14,48,757
Capitalization of abatement of Land Revenue.	1,95,647	(d)	(d)	(d)	(d)	(d)	(d)	1,95,647
Interest	71,904	..	..	..	..	..	..	71,904
Grand Total ..	16,28,576	7,857	19,815	3,226	31,122	11,655	14,057	(e) 17,16,308

(*a*) The charges up to 1875-76 stand debited to Capital, but from 1876-77 to Irrigation and Navigation Works for which Capital and Revenue Accounts are not kept. The Establishment and Tools and Plant charges were not calculated from 1876-77, no administrative accounts being kept up for this project. The amounts now shown are specially calculated for the purpose of this statement.

(*b*) Of this amount Rs. 23,214 are debited to Provincial grant and the remainder, Rs. 1,196, to Irrigation and Navigation Works for which Capital and Revenue Accounts are not kept.

(*c*) Suspense balances have been removed, *vide* Office Note dated 20th November 1879.

(*d*) The abatement of land revenue during these years is not known, and the charges for "Leave and Pension Allowances" have been omitted as they are not intended for work for which Capital and Revenue Accounts are not kept, *vide* G.O., No. 1,949, dated 2nd August 1876.

(*e*) Rs. 3,00,000 have been paid on account of this project from Provincial Funds to Loan Funds (Capital Productive Public Works).

2. The principal causes of excess expenditure on this project are as follow:—

1*st*.—The extension or modification of several of the component works.

2*nd*.—The omission of essential items from the former estimate.

3. Under the head of Direct Charges the excess under Works is shown to be Rs. 1,96,697. Of this amount the items not provided for in the estimate last sanctioned aggregate Rs. 188,158,* so that the actual increase on items previously sanctioned is Rs. 8,539.

* Exclusive of the erroneous Establishment debit of Rs. 24,866.

	RS.
On the other hand the decreases shown amount to Rs. 79,305, making the net excess on *works* to be ...	1,17,392
Add for Establishment	2,19,255
Add for Tools and Plant	8,201
	3,44,848
Deduct receipts on Capital Account	1,167
Total amount of Direct Charges requiring sanction ...	3,43,681
To which add total amount of Indirect Charges ...	2,85,224
Grand total of Direct and Indirect Charges requiring sanction in excess of the estimate sanctioned in letter No. 695 I., dated 10th November 1871	6,28,905

4. The total amount of the revised estimate including both charges is therefore Rs. 18,54,463,† of which the Provincial share, for the supply of the City of Madras, is Rs. 8,72,358, leaving a balance of Rs. 9,82,105, to be met from Imperial Funds.

† *Vide* Abstract B.

5. Under the head of Compensation on the land taken up for the project is 4,919·08 acres, valued at Rs. 1,87,349-3-6, and may be particularised as follows :—

Chingleput District.

		ACRES.	RS.	A.	P.
Collector's letter No. 2,399, dated 20th June 1881.	For all works other than the Delivery channel ...	4,762·10	1,45,079	4	8
	For the open Delivery channel	133·70	14,542	14	0
	Madras District.				
Collector's letter No. 893, dated 15th November 1879.	For the open Delivery channel	20·82	17,891	6	0
	For Municipal works below the end of the open Delivery channel	2·46	9,835	10	10
	Total Municipal ...	156·98	42,269	14	10
	Grand Total ...	4,919·08	1,87,349	3	6

6. The amount paid by Government for land taken up for Municipal purposes is as under :—

	ACRES.	RS.		
Chingleput District	125·36	12,438	13	8
Madras District	19·02	24,623	15	4
Total paid for	144·38	37,062	13	0
Do. not paid for	12·60	5,207	1	10
Total Municipal ...	156·98	42,269	14	10

7. The amount paid for land taken up for the project for other than Municipal purposes is as follows :—

	ACRES.	RS.	A.	P.
Land paid for	4,330·95	1,30,218	2	9
Do. not paid for	431·15	14,861	1	11
Total ...	4,762·10	1,45,079	4	8
Total land paid for in both cases ...	4,475·33	1,67,280	15	9*
Total land not paid for in both cases.	443·75	20,068	3	9
Grand Total ...	4,919·08	1,87,349	3	6

* Of this sum only Rs. 1,60,719 have been booked by the Examiner up to end of 1880-81.

8. It was anticipated many years ago that there would be a considerable increase in the estimated amount of land compensation, and in G.O., No. 2,783, dated 10th September 1867, it was stated that the compensation for land would amount to Rs. 2,06,000, which is a fair approximation to the actual demand.

9. The following statement shows the area irrigated and the revenue derived under the project both before and after the construction of the work. Correct figures are only available up to the end of 1879-80 (Fasli 1289).

Proceedings of the Board of Revenue, Mis. No. 11,856, dated 2nd December 1879.
Do. do. No. 3,606, dated 5th April 1881.

	Fasli.	Area Irrigated. First Crop.	Area Irrigated. Second Crop.	Revenue exclusive of Remissions. Land.	Revenue exclusive of Remissions. Water.	Revenue exclusive of Remissions. Total.	Remarks.
		ACS.	ACS.	RS.	RS.	RS.	
Years prior to the construction of the work.	1265 ...	2,283	Not known.	2,588	4,968	7,556	
	1266 ...	3,441		4,038	7,711	11,749	
	1267 ...	3,534		4,179	8,361	12,540	
	1268 ...	3,763		4,499	8,825	13,324	
	1269 ...	4,131		4,853	9,539	14,392	
	1270 ...	3,811		4,632	8,964	13,596	
	1271 ...	4,101		4,863	8,968	13,831	
	1272 ...	4,255		5,082	9,265	14,347	
	1273 ...	4,423		5,326	9,652	14,978	
	1274 ..	4,379		5,263	9,861	15,124	
	1275 ...	4,626		5,617	10,171	15,788	
	1276 ...	3,997		4,888	9,431	14,319	
	1277 ..	3,383		3,919	7,552	11,371	
	1278 ...	3,027		3,306	6,181	9,487	
	1279 ...	4,283		5,099	9,198	14,297	
	Total ...	57,437	...	68,052	1,28,647	1,96,699	
	Average ...	3,829	...	4,537	8,576	13,113	
Years subsequent to the construction of the work.	1280 ...	4,008	...	4,947	10,082	15,029	
	1281 ...	4,622	...	5,922	8,512	14,434	
	1282 ...	5,553	...	7,355	10,392	17,747	
	1283 ...	5,120	1,029	6,768	10,228	16,996	
	1284 ...	5,742	1403	7,279	12,161	19,440	
	1285 ...	5,747	1578	7,308	13,511	20,819	
	1286 ...	4,862	1004	6,011	1,391	7,402	Famine year.
	1287 ...	6,142	547	6,493	13,433	19,926	
	1288 ...	5,818	2214	6,249	18,909	25,158	
	1289 ...	6,477	2769	7,105	20,725	27,830	
	Total ...	54,091	10,044	65,437	1,19,344	1,84,781	
	Average ..	5,409	1,054	6,543	11,934	18,478	

10. The extended works may be considered to have come into operation in Fasli 1280 (1870-71), and the following table shows the increase of area and revenue for each year from that date inclusive—

Periods.	Area Irrigated.			Revenue exclusive of Remissions.			Difference.	
	First Crop.	Second Crop.	Total.	Land.	Water.	Total	Area.	Revenue.
Average for the fifteen years 1855-56 to 1869-70.	ACRES. 3,829	ACRES. ..	ACRES. 3,829	RS. 4,537	RS. 8,576	RS. 13,113	ACRES. ..	RS. ..
Fasli 1280 (1870-71) ..	4,008	..	4,008	4,947	10,082	15,029	179	1,916
,, 1281 (1871-72) ..	4,622	..	4,622	5,922	8,512	14,434	793	1,321
,, 1282 (1872-73) ..	5,553	..	5,553	7,355	10,392	17,747	1,724	4,634
,, 1283 (1873-74) ..	5,120	1,029	6,149	6,768	10,228	16,996	2,320	3,883
,, 1284 (1874-75) ..	5,742	1,403	7,145	7,279	12,161	19,440	3,316	6,327
,, 1285 (1875-76) ..	5,747	1,578	7,325	7,308	13,511	20,819	3,496	7,706
,, 1286 (1876-77) ..	4,862	1,004	5,866	6,011	1,391	7,402	2,037	— 5,711
,, 1287 (1877-78) ..	6,142	547	6,689	6,493	13,433	19,926	860	6,813
,, 1288 (1878-79) ..	5,318	2,214	7,532	6,249	18,909	25,158	4,203	12,045
,, 1289 (1879-80) ..	6,477	2,769	9,246	7,105	20,725	27,830	5,417	14,717
Total ..	..	..	64,635	..	..	1,84,781	24,345	53,651
Average ..	..	..	6,463	..	..	18,478	2,434	5,365

11. The cause of the great falling off in revenue in 1876-77 is owing to Government, in April 1876, having adopted measures in consequence of the continued drought to diminish the offtake. The Collector was directed to limit cultivation and to prevent further use of water for irrigation purposes.

G.O., Revenue Department, No. 841, dated 8th April 1876.

G.O., Public Works Department, No. 165, dated 25th April 1876.

In March 1877 Government directed the immediate closure of all the irrigation sluices.

G.O., Public Works Department, No. 703, dated 1st March 1877.

12. The possibility of restrictive orders of the above-mentioned nature having to be issued has necessarily exercised a prejudicial effect on the area irrigated and the revenue obtained.

13. The Comparative Statement, Appendix A, shows the difference between the last sanctioned estimate (recorded in Proceedings of Madras Government, No. 2,171, 23rd August 1871, and permission to carry out which was communicated with G.O., No. 65, dated 10th January 1872,) and the present revised estimate, the cause of excess being briefly explained in each case. An abstract of this statement is subjoined.

ABSTRACT A.

Particulars.	Amounts in the Estimate sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in Proceedings of Madras Government No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or Totals of Columns 3 and 4.	Increase.	Decrease.
1	2	3	4	5	6	9
IMPERIAL AND PROVINCIAL.						
I.—Anicut and Head Works ..	67,650	RS. 95,839	RS. ..	RS. 95,839	RS. 29,951	RS. 1,762
II.—Cholaveram Tank supply channel ..	2,4[illegible]692	2,08,710	36,960	2,45,670	39,830	34,852
III.—Cholaveram Tank	2,46,078	2,67,367	..	2,67,367	30,593	3,304
IV.—Red Hills Tank supply channel ..	1,3[illegible]389	1,32,882	..	1,32,882	493	..
V.—Red Hills Tank	2,6[illegible]254	2,82,865	15,744	2,98,609	41,904	8,549
VI.—Distribution, &c., below the two tanks	25,000	8,051	19,150	27,201	2,201	..
VII.—Land other than for Madras Municipality	* 1,75,017	1,30,218	14,861	1,45,079	..	30,838
VIII.—Miscellaneous	47,746	56,840	1,756	58,596	10,850	..
	11,[illegible]4,726	11,82,772	88,471	†12,71,243	1,55,822	79,305

* This was for all the land. † Includes Rs. 70,230 chargeable wholly to Imperial.—*Vide* paragraph 20.

ABSTRACT A—*cont.*

Particulars.	Amounts in the Estimate sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in Proceedings of Madras Government No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or Totals of Columns 3 and 4.	Increase.	Decrease.
1	2	3	4	5	6	7
PROVINCIAL.	RS.	RS.	RS.	RS.	RS.	RS.
IX.—Items chargeable to Provincial, on *Works*	30,832	84,804	11,769	96,573	65,741	..
	12,25,558	12,67,576	1,00,240	13,67,816	2,21,563	79,305
Deduct amount charged to Works, which properly belonged to Establishment	..	24,866	..	24,866	24,866	..
	12,25,558	12,42,710	1,00,240	13,42,950	1,96,697	79,305
Establishment	..	2,00,853	18,402	2,19,255	2,19,255	..
Tools and Plant	..	6,361	1,840	8,201	8,201	..
	12,25,558	14,49,924	1,20,482	15,70,406	4,24,153	79,305
Deduct Receipts on Capital Account.	..	1,167	..	1,167	1,167	..
Total, Direct Charges ..	12,25,558	14,48,757	1,20,482	15,69,239	4,22,986	..
Capitalization of abatment of Land Revenue	..	1,95,647	17,673	2,13,320	2,13,320	..
Interest	..	71,904	..	71,904	71,904	..
Total, Indirect Charges ..	..	2,67,551	17,673	2,85,224	2,85,224	..
Grand Total ..	12,25,558	17,16,308	1,38,155	18,54,463	7,08,210	79,305
Deduct amount of estimate sanctioned by the Government of India in letter No. 695 I., dated 10th November 1871, embodied in Proceedings of Madras Government, No. 65, dated 10th January 1872.	..	..	..	12,25,558	79,305	..
Net amount requiring sanction ..	..	..	..	6,28,905	6,28,905	..

ABSTRACT B.

Particulars.	Direct Charges.				Indirect Charges.			Grand Total.
	Works.	Establishment.	Tools and Plant.	Total.	Capitalized abatement of Land Revenue.	Interest.	Total.	
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
I.—Imperial	70,230	17,557	1,755	89,542	4,401	..	4,401	93,943
II.—Imperial and Provincial	11,74,960	1,95,830	5,860	3,76,670	1,96,171	71,904	2,68,075	16,44,745
III.—Provincial	96,573	5,868	586	1,03,027	12,748	..	12,748	1,15,775
	13,41,783	2,19,255	8,201	5,69,239	2,13,320	71,904	2,85,224	18,54,463
						Total, Revised Estimate ..		18,54,463

			Imperial.	Provincial.			
			RS.	RS.			RS.
I.—Items chargeable wholly to Imperial.	Direct charges ..		89,542	..	Amount chargeable to Provincial ..		8,72,358
	Indirect do. ..		4,401	..	Amount already met from do.—		
II.—Items chargeable to Imperial and Provincial by the shares 54 and 46 respectively.	Direct charges.	RS. 13,76,670	7,43,402	5,33,268	By transfer in 1876-77 ..	50,000	*
					Do. in 1878-79 ..	50,000	*
					Do. in 1879-80 ..	1,00,000	*
					Do. in 1880-81 ..	1,00,000	*
	Indirect do.	2,68,075	1,44,760	1,23,315	From the Reserve, G.O., No. 623 W., 1st March 1879	23,214	
III.—Items chargeable wholly to Provincial.	Direct charges ..		..	1,03,027			3,23,214
	Indirect do. ..		..	12,748	Balance due to Imperial		5,49,144
			9,82,105	8,72,358			
	Total Revised Estimate ..		18,54,463		* Refund to P. P. W.		

14. In paragraph 3 above it was shown that the revised estimate includes works not previously provided for, which are estimated to, or have cost Rs. 1,88,158.

The principal items are:—

		Rs.
(1).	Lengthening Thamarapak anicut	23,437
(2).	Cholaverm Tank channel. Increasing capacity of Kattankal surplus weir	19,000
	Do. Increasing capacity of Boosikal surplus weir	17,400
(3).	Reconstructing a portion of the bund of Cholaveram tank ...	29,832
(4).	Surplus sluices, Red Hills Tak	20,023
(5).	Drainage of rear part of bund &c., of do.	9,880

and the following remarks, in addition to the brief explanations given in the comparative statement, are submitted regarding these. All these items have been specially approved by Government.

15. ITEM 2 OF COMPARATIVE STATEMENT.—*Extension of the Thamarapak Anicut.*—The insufficient length, 474 feet, of the anicut as originally constructed was made evident by the fresh of November 1872 in the Kortalayár. The river having risen to 13 feet above the crest and to several feet above the level of the country on the north side, a large breach was made through the bank behind the north wing, though but little damage was sustained by the anicut. The work was inspected by the Inspector-General of Irrigation and he concurred in the necessity for lengthening the anicut by 150 feet, so as to carry it across the breach to the new line of the river bank. A still higher fresh occurred in 1874 and showed that the additional length of weir had not been provided without sufficient reason.

G.O., No. 2,132, dated 26th August 1873.

16. ITEMS 11 and 29 OF COMPARATIVE STATEMENT.—*Alteration of the Kattankal and Boosikal Surplus Weirs.*—The requirements for cross drainages were in the first instance very inadequately provided for. The areas of the drainage basins were not properly ascertained, while up to 1872 the maximum flood level in the Kortalayár was not even approximately known, the calculations made when the project was originally drawn up being very far from correct. The result has been that the Cholaveram Tank supply channel has suffered on several occasions very extensive damage. The circumstances unfortunately do not admit of completely satisfactory arrangements at a reasonable cost. Should the river be in extreme fresh when the local rainfall approaches a maximum, the discharge of the drainages will not be capable of being disposed of without exceeding the intended maximum water level in the channel, and on the rare occasions when these unfavorable circumstances may be expected to occur, the left bank of the channel will probably breach at places which will be left exceptionally low so as to fix the site of the breaches.

G.O., No. 2,785, dated 17th October 1876.

17. ITEM 39 OF COMPARATIVE STATEMENT.—*Reconstructing a portion of the bund of the Cholaveram Tank.*—The bund of this tank before its enlargement was a small one, and the new earthwork was placed partly inside and partly outside the old bund. This led to slips in the rear slope, and it was found necessary to secure stability by turning over the rear part near the south end and thus reforming the bank on the inside of the old bund. The bund has given no trouble since this was done. The length dealt with was 1,100 feet.

G.O., No. 271, dated 4th February 1874.

18. ITEM 47 OF COMPARATIVE STATEMENT.—*Surplus Sluices of ten vents. Red Hills Tank.*—These sluices which have been built in the southern part of the surplus weir of the tank were deemed necessary as a safeguard, owing to the unsatisfactory condition of the bund of this large reservoir. The surplus weir is of ample capacity to discharge all the water to be disposed of, but it does not come into action until the water rises above full tank level. On several occasions there have been extensive slips in the bund, which were occasioned by subsoil leakage, as also by water getting into the bund itself above ground level, and considerable anxiety was expressed lest the breaching of the tank should inundate Madras. It was considered therefore to be desirable to

G.O., No. 2,322, dated 11th August 1875.

provide means for rapidly lowering the water level should the bund be in danger of giving way, as also to allow of the discharge of surplus without necessitating the rise of the water level in the reservoir to as great a height above full tank level as would be necessary were all such surplus to be passed over the weir. Although Madras would not be inundated were the tank to breach, such an accident would be a very serious matter, whether the damage to property, the cost of repairs, or the loss of water, with the consequent cessation of irrigation and of the water-supply to the city, be considered. The construction of the sluices was therefore sanctioned by Government, but so far, owing to bad work, and badly set up gear for working the shutters, they have been of little use. The defects are being remedied.

The excess on the ring-bund in connection with these sluices is explained in the Comparative Statement Item No. 47.

19. ITEM 58 OF COMPARATIVE STATEMENT.—*Drainage of rear part of bund of the Red Hills Tank.*—The slips which have from time to time occurred, and the state of the bund at the slips, indicated that, unless the leakage which had caused these could be prevented from saturating the base of the rear part of the bund, and the leakage conveyed away, accidents would continue to occur. Borings which were made showed that much of the old bund, as well as of the additions made thereto, was formed of bad soil, and as the bund rests for a large part of its length on porous laterite there is not only leakage through the bund, but also through the subsoil to be provided against. After consideration, the conclusion was arrived at that a suitable puddle wall could not be inserted in the bund without lowering the water level in the tank to a greater extent, and keeping it down for a much longer period than could be allowed without great inconvenience to the City of Madras. As, in any case, drains would be needed to dispose of subsoil leakage, it was decided (G.O., No. 406 I., 24th June 1880,) that, at any rate in the first instance, these drains should be constructed and their effect ascertained before any final decision against or for a puddle wall was come to.

The work is in progress, and the regular estimate for it was sanctioned in G.O., No. 498 I., dated 6th August 1881.

20. In preparing this revised estimate it has been considered desirable to show distinctly:—

1*st.*—The total amount to be divided between Imperial (Irrigation) and Provincial.

2*nd.*—The amount chargeable to Provincial only.

With regard to the division of the former, it was estimated in the papers printed in Proceedings of Madras Government, No. 2,650, of the 2nd October 1876, that the Provincial share would be 46 per cent. and the Imperial share 54 per cent. of the total, the shares being based on the quantity of water required to be reserved for Municipal purposes, and on that therefore left for irrigation. There was for a time a doubt as to whether the quantity required for Madras might not have to be increased, in connection with the drainage arrangements of the city, but by G.O., No. 598-A I., of the 10th October 1879, it was settled that no more water would need to be reserved. It is believed therefore that no closer approximation than that already given can be made to the shares appertaining to Provincial and Imperial respectively. The amount to be divided is that for the part of the project common to both services. That part which belongs exclusively to the supply of Madras and which therefore belongs entirely to Provincial, and that part* which provides for distributaries and which belongs exclusively to Irrigation, have not been included in the amount to be divided.

* Items 37, 51, 52, 53, 60, 61 to 64 and 65 of Comparative Statement.

21. Two of the entries under Direct Charges appertaining to Provincial solely may require brief explanation.

Land Compensation. Item 71 of Comparative Statement.—The cost of the land taken up for the Municipal delivery channel from the Red Hills Tank and for the subsidiary works has been finally settled, and it was at first determined that the Municipality should refund to Provincial Rs. 29,422, the value of the land in excess of

the 56·2 acres required for the original design at the average rate for the 156·98 acres actually taken up. The Municipality for their own convenience adopted a line quite different from that originally determined on, but they nevertheless objected to the enforcement of this claim. Though there is no doubt that the claim was equitable the Government have (Proceedings of Madras Government, No. 492 I., of 5th August 1881,) determined not to enforce it, in consequence of the impecunious state of the Municipality. The whole of the land compensation for the delivery channel, amounting to Rs. 42,270, forms therefore a charge against Provincial.

Pumping and dismantling Pumps. *Item 74 of Comparative Statement.*—The water in the Red Hills Tank in 1876 having fallen to an unusually low level pumping had to be resorted to in order to keep up the supply to the City of Madras, and the cost was ordered, in Financial G.O., No. 82, dated 18th January 1879, to be debited to Public Works, Provincial.

G.O., No. 623 W., dated 1st March 1879.
" " 1,415, dated 7th June 1876, Financial.
" " 620, dated 4th April 1876 "

22. It has been shown that the Capital expenditure debitable to Imperial (Irrigation) will amount to for—

	Rs.
Direct Charges	8,32,944
Indirect "	1,49,161
Total...	9,82,105

In Appendix C will be found a statement showing the maintenance charges from 1870-71, when the project first came into operation, up to 1879-80. The average outlay for this period of ten years excluding 1871-72 and 1873-74 which were abnormal years has been Rs. 8,969 yearly, from which deducting Rs. 1,704, the assumed cost* of maintenance of the old tanks, the increased cost of upkeep to be distributed becomes Rs. 7,265, and of this 54 per cent. or Rs. 3,923 is chargeable to Irrigation. The increase of revenue being, up to 1879-80, Rs. 5,365 per annum on the average, as shown in paragraph 10 above, this increase was sufficient to cover the maintenance expenses.

* Proceedings of Madras Government, No. 2,650, 2nd October 1876.

	Rs.
Works, calculated at 10 per cent. on average old revenue	1,311
Establishment, &c., at 30 per cent. on works...	393
	1,704

23. But there is no probability of the returns from the project covering the interest on the outlay.

The gross income necessary to make the project properly remunerative would be—

	Rs.
4½ per cent. on Rs. 8,32,944	37,482
Maintenance charges 3,923 }	
Collection do. 1,781 }	5,704
Total ...	43,186

	Acs.
Total irrigable area, *vide* paragraph 1 of Note in Proceedings of Madras Government, No, 2,650, 2nd October 1876	9,852
Deduct average old irrigated area, *vide* paragraph 9 of this Note	3,829
	* 6,023

and the water-supply is not likely to suffice for more than 6,023* acres of additional irrigation. The estimated ultimate direct revenue (water-tax) amounts to only Rs. 24,741, and this would leave a yearly deficit of Rs. 18,445. The actual return from the works, after paying maintenance and collection charges would on this estimate be Rs. 19,037, which is equivalent to 2·28 per cent. on the Direct Charges or to 1·9 per cent. on Direct and Indirect Charges.

24. The estimate of growth of irrigation and of Revenue Receipts and Charges has been drawn up with reference to the Proceedings of the Board of Revenue, No. 9,678, dated 5th November 1881, (*Vide* Appendix D). This estimate is in

Form 3, modified to suit the circumstances of the present case, of Circular No. 17 of 1880 from the Government of India. The enhanced land revenue, or Indirect Receipts, has not been included for the reason assigned by the Board of Revenue in paragraph 2 of their Proceedings.

25. This Note is followed by Appendices showing :—

Appendix A. Comparative Statement.
B. Particulars of Land taken up for Project.
C. Abstract of annual Maintenance Charges.
D. Estimate of growth of Irrigation.
E. List of Component Works.
F. Sketch Map of System.

OFFICE OF THE CHIEF ENGINEER FOR IRRIGATION, CHEPAUK,
17th November 1881.

(Signed) JOHN MULLINS, Colonel, R.E.,
Chief Engineer for Irrigation.

To the Joint Secretary to Government, Public Works Department, Irrigation Branch.

APPENDIX A.

CHINGLEPUT DISTRICT.

COMPARATIVE STATEMENT of the Madras Water-supply and Irrigation Extension Project.

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 696 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	I. ANICUT AND HEAD WORKS.	RS.	RS.	RS.	RS.	RS.	RS.	
1	Anicut on the Kortalayár at Thamarapak.	60,180	60,382	..	60,382	202	..	The excess in this case is small and is due to increases in rates.
2	Do. extension..	..	23,437	..	23,437	23,437	..	A breach in rear of the left wing occurred in November 1872 and the height reached by the flood showed that the original length of the anicut was inadequate. It was therefore lengthened by 150 feet on an estimate of Rs. 25,300 sanctioned in G.O., No. 2,132, dated 26th August 1873.
3	Embanking the Kortalayár.	4,800	3,038	..	3,038	..	1,762	.....
4	Planting trees on waste land on the south bank of the Kortalayár at Thamarapak anicut.	..	648	..	648	648	..	*Vide* letters from the Superintending Engineer, Chingleput, Nos. 779 and 1,446, dated 21st February and 5th April 1878, respectively. Carried out in 1876-77. No provision in the revised estimate sanctioned by the Government of India in 1871.
5	Connecting right wing of anicut with left bank of Cholaveram tank supply channel by a flood bank.	..	1,338	.	1,338	1,338	..	To prevent floods from the river entering the supply channel an estimate, amounting to Rs. 2,135, was sanctioned in G.O., No. 368 I., dated 3rd October 1877.
6	Office and store shed on line of works.	2,670	4,638		38	1,968	..	The excess is attributed to the loss in 1870 of a large quantity of materials (bricks) in stock (*vide* Superintending Engineer's letter No. 2,155, dated 17th April 1879).
7	Inspection house at Red Hills tank.	..	1,977	..	1,977	1,977	..	Required for the accommodation of inspecting and executive officers, not provided for in the revised estimate sanctioned by the Government of India in 1871; but an estimate, amounting to Rs. 1,910, was sanctioned by local Government in G.O., No. 1,641, dated 6th July 1872.
8	Planting trees and constructing well in the compound of the inspection house at Red Hills tank.	..	381	..	381	381	..	*Vide* explanation against Item 4.
	Total, Anicut and Head Works.	67,650	95,839	..	95,839	29,951	1,762	

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 696 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	II. CHOLAVERAM TANK. SUPPLY CHANNEL.	RS.	RS.	RS.	RS.	RS.	RS.	
9	Head sluice ..	32,563	33,113	..	33,113	550	..	The excess is due to the increased cost of wood-work for shutters.
10	Kattankal surplus weir.	7,145	4,293	..	4,293	..	2,852	Saving owing to the modification of the design (*vide* G.O., No. 824, dated 20th March 1871).
11	Kattankal surplus weir extension.	..	..	19,000	19,000	19,000	..	Entry of this item in the revised estimate approved in G.O., No. 2,785, dated 17th October 1876.
12	Bridge							
13	Do.							
14	Do.							
15	Do.							
16	Do.							
17	Inlet							
18	Do.							
19	Do.	51,539	53,739	..	53,739	2,200	..	Excess attributed to the extra cost of wood-work. The individual estimates cannot now be separated, as they are lumped together in the estimate of 1871. The original estimate was Rs. 53,502.
20	Do.							
21	Do.							
22	Do.							
23	Do.							
24	Do.							
25	Do.							
26	Do.							
27	Raising No. 2 bridge	..	..	560	560	560	..	Required in connection with the calculated maximum water-level in the channel due to upland drainage.
28	Boosikal surplus weir.	6,531	6,651	..	6,651	120	..	Excess due to excavation of a small channel from the weir which was not provided for in the estimate of 1871.
29	Do. extension ..	..	..	17,400	17,400	17,400	..	Entry of this item in the revised estimate approved in G.O., No. 2,785, dated 17th October 1876.
30	Alachari aqueduct..	6,286	6,286	..	6,286	..	..	.....
31	Channel from Kortalayár to Cholaveram, including Boosikal diversion channel.	89,813	89,813	..	89,813	.	..	.....
32	Bank across Kattankal.	765	765	..	765		..	.....
33	Boosikal upper and lower bund.	8,871	8,871	..	8,871	..	..	
34	Widening channel down to 5¾ miles.	32,000	..	..	..	..	32,000	Original estimate cancelled as unnecessary, the channel having been sufficiently enlarged by natural scour (*vide* G.O., No. 1,548, dated 2nd June 1876).
35	Maintenance during construction.	5,179	5,179	..	5,179	..	..	.....
	Total ..	2,40,692	2,08,710	36,960	2,45,670	39,830	34,852	.....
	III. CHOLAVERAM TANK. MASONRY WORKS.							
36	Calingulah ..	19,989	16,685	..	16,685	..	3,304	Saving effected by reduction of the level of calingulah crest as per orders of the Chief Engineer for Irrigation issued in memorandum No. 88, dated 4th June 1872.
37	Irrigation sluice ..	9,171	9,174	..	9,174	3	..	Chargeable to Imperial. This item was included in the comparative statement of 1871.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	CHOLAVERAM TANK—*cont.*	RS.	RS.	RS.	RS.	RS.	RS.	
	EARTHWORK.							
38	Tank bank ..	2,10,918	2,11,676	..	2.11,676	758	..	The excess in this case is owing to the settlement of the earthwork which had to be raised.
39	Reconstructing a portion of the bund.	..	29,832	..	29,832	29,832	..	This work was found to be necessary to meet the slipping of the bund. An estimate, amounting to Rs. 30,675, was sanctioned by the local Government.—*Vide* G.O., No. 271, dated 4th February 1874.
	Total ..	2,40,078	2,67,367	..	2,67,367	30,593	3,304	
	IV.							
	RED HILLS TANK.							
	SUPPLY CHANNEL.							
	MASONRY WORKS.							
40	Head sluice ..	31,177	31,468	.	31,468	291	..	The excess in this case is attributed to an increase in rates.
41	Bridge	6,782						
42	Under tunnel ..	1,793	9,701	"	9,701	202	..	Do. do.
43	Inlet	924						
	EARTHWORK.							
44	Channel	91,713	91,713	.	91,713	..	..	.....
	Total ..	1,32,389	1,32,882	.	1,32,882	493	..	.....
	V.							
	RED HILLS TANK.							
	MASONRY WORKS.							
45	Surplus weir at north end.	10,245	5,878	.	5,878	..	4,367	The saving was on account of the surplus channel from the weir not being any higher than weir level, further deepening being considered unnecessary.
								.....
46	Masonry dam with a small irrigation sluice attached.	38,429	37,072	..	37,072	..	1,357	
47	Inserting ten vents in the surplus weir including ring bund.	..	16,823	3,200	20,023	20,023	..	Required to allow of the regulation of the water-level in the tank. An estimate, amounting to Rs. 17,100, was sanctioned by the local Government.—*Vide* G.O., No. 2,322, dated 11th August 1875. The excess is due to the ring bund having cost Rs. 3,800 instead of Rs. 600 as allowed in the estimate. The waves necessitated a much stronger bund than was at first intended to be thrown up.
48	Constructing a new apron in rear of the ten-vent sluice.	..	..	2,499	2,499	2,499	..	As the condition of the rear apron of the ten-vent sluice was very bad, owing to a portion of the laterite on which it was built having been scoured out, it was decided to construct a new apron, the arrangement for the work having been approved of by the Chief Engineer for Irrigation in April 1881.
49	New screw gearing for the ten-vent sluice shutters.	..	..	2,760	2,760	2,760	..	*Vide* paragraph 18 of note.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	RED HILLS TANK—*cont.*	RS.	RS.	RS.	RS.	RS.	RS.	
	MASONRY WORKS—*cont.*							
50	Constructing a parapet wall from the Polal to ten-vent sluice.	..	2,385	..	2,385	2,385	..	To prevent the waves caused by high winds washing over the bund when the tank is full, it was considered desirable to raise the original low parapet wall of laterite stone at the top of the revetment 2 feet, making it 3 feet high and 1½ feet thick, for a distance of 5,646 feet in length. The amount of the estimate for the work was sanctioned in G.O. No. 307 I., dated 10th May 1881, to be included in the present estimate
51	Irrigtn. sluice, north.	30,171	30,215	..	30,215	44	..	Chargeable to Imperial.
52	Do. do., south.							Do. do. Required to allow of water being passed into the Vilankadupakam channel.
53	Extension of north sluice.	..	..	4,200	4,200	4,200	..	
	EARTHWORK.							.....
54	Red Hills tank bank.	1,43,799	1,43,744	..	1,43,744	..	55	.....
55	Soorapedoo bank ..	26,110	25,040	..	25,040	..	1,070	
56	Puddle to toe of main bank.	16,500	14,800	..	14,800	..	1,700	Originally sanctioned as an emergent estimate on somewhat rough data.
57	Planting trees along the toe of the bund of the Red Hills tank.	..	113	..	113	113	..	*Vide* explanation against item No. 4.
58	Drains under rear part and in rear of bund.	..	6,795	3,085	9,880	9,880	..	Sanctioned in G.O., No. 406 I., dated 24th June 1880. The bund being insecure from leakage which has occasioned several slips, an approximate estimate was sanctioned for immediate execution, and in G.O., No. 498 I., dated 6th August 1881, the amount of the regular estimate for the work was directed to be included in the present estimate.
	Total ..	2,65,254	2,82,865	15,744	2,98,609	41,904	8,549	
	VI.							
	DISTRIBUTARIES, &c.							.....
59	Drainage channel at Cholaveram tank bund.	..	560	..	560		..	
60	Channel from north sluice of Cholaveram tank to Villivoil tank.	..	44	..	44		..	Chargeable to Imperial.
	Below Cholaveram Tank.							* A lump sum amount was entered for distributaries in the original estimate.
61	Marembedu channel.		38	8,000		*2,201	..	
	Below Red Hills Tank.							
62	Vilankadupakam channel.	25,000	..	3,550	20,821		..	Chargeable to Imperial.
63	Madaveram channel.		395	7,600			..	
64	Channel leading to Soorapedoo Irrigation sluice.		1,238	..			..	
65	Soorapedoo sluice ..	..	5,776	..	5,776		..	Do. Estimate of Rs. 5,463 sanctioned against the lump sum of Rs. 25,000 for distributaries in G.O., No. 807, of 17th Mar. 1871.
	Total ..	25,000	8,051	19,150	27,201	2,201	..	

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 66, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	ut required to complete each	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4		6	7	8	9
	VII.	RS.	RS.		RS.	RS.	RS.	
66	Land other than for Madras Municipality.	1,75,917	1,30,218	14	1,45,079	..	30,838	This decrease is only nominal, the rest of the compensation, viz., for the Madras Municipal channel being shown separately under charges appertaining to Provincial.
	Total ..	1,75,917	1,30,218	14,	1,45,079	..	30,838	
	VIII. MISCELLANEOUS.							
67	Constructing new tank in Alamady village.	..	9,066	..	9,066	9,066	..	This tank was constructed to replace the one submerged by the Cholaveram tank; no provision in the revised estimate sanctioned by the Government of India in 1871. An estimate, amounting to Rs. 9,260, was sanctioned by the local Government. —*Vide* G.O., No. 422, dated 7th February 1877.
68	Contingencies and superintendence.	47,746	47,405	341	47,746	..	..	.....
69	Removing calingulah at lower end of surplus channel of Red Hills tank near Shadiyankupam lock.	..	369	..	369	369	..	The calingulah was a hindrance to the free flow of drainage. Sanctioned in G.O., No. 873, dated 2nd April 1875.
70	Providing a Stoney's equilibrium valve.	..	..	1,415	1,415	1,415	..	This valve was obtained from England under Government sanction and placed in 1875 in a convenient situation at the Red Hills tank for the purpose of carrying out a preliminary trial. The result of this trial is recorded in G.O., No. 846 I., dated 23rd October 1878. As the sluice valve cannot at present be utilized at any of the deep tanks in other districts of the Presidency, the Committee appointed to investigate and report on the superfluous stock of the Public Works Department recommended in their report printed in Proceedings, Madras Government, No. 914 W., dated 4th April 1881, that the valve be charged to the work to which it was issued and on which it stands.
	Total ..	47,746	56,840	1,756	58,596	10,850	..	
	IX. ITEMS CHARGEABLE TO PROVINCIAL.							
71	Land for Municipal Delivery channel.	..	30,501	11,769	42,270	42,270	..	Covered in part by the saving of Rs. 30,838 shown against item 66 above.
72	Contribution to do. being part of original estimate.	30,832	30,832	..	30,832	..	..	.....
73	Gauge weir below municipal sluice.	..	257	..	257	257	..	Required for the purpose of gauging the supply of water to Madras.—*Vide* G.O., No. 2,503, dated 13th October 1873.
74	Pumping and dismantling pumps.	..	23,214	..	23,214	23,214	..	Expenditure incurred when the Red Hills tank was low during the famine to supply the city of Madras.—*Vide* G.O., No. 623 W., dated 1st March 1879.
	Total ..	30,832	84,804	11,769	96,573	65,741	..	

APPENDIX B.

STATEMENT showing the Area, Compensation, Annual Assessment and Capitalized abatement of Land-revenue of the Land acquired for the Madras Water-supply and Irrigation Extension Project.

—	LAND PAID FOR UP TO END OF 1879-80.		LAND REMAINING TO BE PAID FOR.		TOTAL.		Annual Assessment.	Capitalized abatement of Land-revenue.	Remarks.
	Area.	Compensation.	Area.	Compensation.	Area.	Compensation.			
	ACS. CTS.	RS. A. P.	ACS. CTS.	RS. A. P.	ACS. CTS.	RS. A. P.	RS. A. P.	RS. A. P.	
1. For all works other than the distribution and deliivery channels.	4,330 95	1,30,218 2 9	294 49	4,713 10 8	4,625 44	1,34,931 13 5	7,846 13 3	1,96,170 11 3	*Vide* letters from Collector of Chingleput, No. 2,399, dated 20th June, and No. 3,056, dated 6th Aug. 1881.
2. For thedistribution channels.	..	..	136 66	10,147 7 3	136 66	10,147 7 3	176 0 7	4,400 14 7	
3. For the delivery channel in the Chingleput district.	125 36	12,438 13 8	8 34	2,104 0 4	133 70	14,542 14 0	405 14 0	10,146 14 0	
Do. Madras district.	19 02	24,623 15 4	4 26	3,103 1 6	23 28	27,727 0 10	104 1 2	2,601 13 2	Do.—*Vide* letters from Collector of Madras, No. 893, dated 15th Nov. 1879, and No. 378, dated 7th April 1881.
Total ..	4,475 33	1,67,280 15 9	443 75	20,068 3 9	4,919 08	1,87,349 3 6	8,532 13 0	2,13,320 5 0	

APPENDIX C.

ABSTRACT STATEMENT of Annual Maintenance charges of the Madras Water Supply and Iirrgation Extension Project.

Years.	Outlay on Repairs.	ESTABLISHMENT.			Tools and Plant.	Grand Total.
		Share of Public Works.	Water Regulation.	Total.		
	RS.	RS.	RS.	RS.	RS.	RS.
1870-71	7,954	1,988	...	1,988	199	10,141
1871-72	21,153	5,288	477	5,765	529	27,447
1872-73	6,463	1,616	636	2,252	162	8,877
1873-74	39,542	9,886	853	10,739	989	51,270
1874-75	8,537	2,134	1,192	3,326	213	12,076
1875-76	5,381	1,345	1,062	2,407	134	7,922
1876-77	11,411	2,853	1,139	3,992	285	15,688
1877-78	2,412	603	1,080	1,683	60	4,155
1878-79	2,936	734	1,074	1,808	73	4,817
1879-80	5,537	1,384	1,018	2,402	138	8,077
Total ...	1,11,326	27,831	8,531	36,362	2,782	1,50,470

MADRAS,
February 1881.

(Signed) D. H. TRAIL, Major, R.E.,
Offg. Examiner of Public Works Accounts

APPENDIX D.

Proceedings of the Board of Revenue, dated 5th November 1881, Miscellaneous No. 9,678.

Read letters from the Chief Engineer for Irrigation, dated 4th October 1881, No. 176 M, and 17th October 1881, No. 189 M.

THE areas entered in the revised statement and the revenue shown for years up to 1879-80 are correct, but the Board think that the revenue for years subsequent to 1879-80 should be calculated, not with reference to the average rates of the district, but the average rate at which the revenue was actually raised on the lands in 1878-79 or 1879-80 after the introduction of the Settlement. Taking the rates* of 1879-80 and applying them to the increased areas subsequent to 1879-80, the figures stand as shown in the margin,† which may be adopted.

		Rs.	A.	P.	
* First crop	... ...	2	6	8	per acre.
Second crop	... ...	2	0	11	do.

Years.	Revenue. Rs.
† 1880-81	13,405
1881-82	14,667
1882-83	15,925
1883-84	17,184
1884-85	18,443
1885-86	19,704
1886-87	20,960
1887-88	22,222
1888-89	23,480
1889-90	24,741

2. The Board have no information in regard to the land assessment of waste lands brought under irrigation subsequent to the work.

(True Extract.)

(Signed) E. GIBSON,
Acting Secretary.

(FORM 3.—GOVERNMENT OF INDIA CIRCULAR No. XVII OF 1880.)

ESTIMATE of Growth of Irrigation and Revenue Receipts and Charges, Madras Water-supply and Irrigation Extension Project.

Year.	Irrigated Area at end of Year.		Revenue Receipts and Charges.										
			Revenue due to Works.					Charges against Revenue Account.			Net Earnings due to Works.		
			Direct Receipts.			Enhanced Land Revenue or Indirect Receipts.	Total.						
	First Crop.	Second Crop.	Public Works Department.	Revenue Department.	Total.			Maintenance Charges in Public Works Department.	Collection Charges in Revenue Department.	Total.	Including enhanced Land Revenue.	Excluding enhanced Land Revenue.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1870-71 ..	179	..	..	1,506	1,506	..	..						
1871-72 ..	793	..	..	— 64	— 64	..	..	4,556	108	4,664	..	— 3,158	
1872-73 ..	1,724	..	..	1,816	1,816	..	..	13,901	..	13,901	..	—13,965	
1873-74 ..	1,291	1,029	..	1,652	1,652	..	..	3,873	131	4,004	..	— 2,188	
1874-75 ..	1,913	1,403	..	3,585	3,585	..	..	26,766	119	26,885	..	—25,233	
1875-76 ..	1,918	1,578	..	4,935	4,935	..	..	5,601	258	5,859	..	— 2,274	
1876-77 ..	1,033	1,004	..	— 7,185	— 7,185	..	..	3,358	355	3,713	..	1,222	
1877-78 ..	2,313	547	..	4,857	4,857	..	..	7,551	..	7,551	..	—14,736	
1878-79 ..	1,989	2,214	..	10,333	10,333	..	..	1,324	350	1,674	..	3,183	
1879-80 ..	2,648	2,769	..	12,149	12,149	..	..	1,681	744	2,425	..	7,908	
								3,441	875	4,316	..	7,833	Actuals.

NOTE 1.—The old cultivation averaging 3,829 acres and yielding a water-tax of Rs. 8,576 has been omitted from this table.
2.—The figures in column 5 for the years subsequent to 1879-80 have been taken from Proceedings, Board of Revenue, No. 9678, dated 5th November 1881.
3.—Statement D-I shows how the figures in column 9 have been obtained.
4.—The collection charges in the Revenue Department have been calculated at 7·2 per cent. on revenue column 6.

Estimate of Growth of Irrigation and Revenu Receipts and Charges, &c.—*cont.*

Year.	Irrigated Area at end of Year.		Revenue Receipts and Charges.										
			Revenue due to Works.					Charges against Revenue Account.			Net Earnings due to Works.		
			Direct Receipts.			Enhanced Land Revenue or Indirect Receipts.	Total.						
	First Crop.	Second Crop.	Public Works Department.	Revenue Department.	Total.			Maintenance Charges in Public Works Department.	Collection Charges in Revenue Department.	Total.	Including enhanced Land Revenue.	Excluding enhanced Land Revenue.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1880-81 ..	2,985	2,984	..	13,405	13,405	..	..	3,923	965	4,888	..	8,517	
1881-82 ..	3,323	3,200	..	14,667	14,667	..	..	3,923	1,056	4,979	..	9,688	
1882-83 ..	3,660	3,416	..	15,925	15,925	..	..	3,923	1,147	5,070	..	10,855	
1883-84 ..	3,998	3,631	..	17,184	17,184	..	..	3,923	1,237	5,160	..	12,024	
1884-85 ..	4,335	3,847	..	18,443	18,443	..	..	3,923	1,328	5,251	..	13,192	
1885-86 ..	4,673	4,063	..	19,704	19,704	..	..	3,923	1,419	5,342	..	14,362	
1886-87 ..	5,010	4,278	..	20,960	20,960	..	..	3,923	1,509	5,432	..	15,528	
1887-88 ..	5,348	4,494	..	22,222	22,222	..	..	3,923	1,600	5,523	..	16,699	
1888-89 ..	5,685	4,710	..	23,480	23,480	..	..	3,923	1,691	5,614	..	17,866	
1889-90 ..	6,023	4,926	..	24,741	24,741	..	..	3,923	1,781	5,704	..	19,037	

NOTE 1.—The old cultivation averaging 3,829 acres and yielding a water-tax of Rs. 8,576 has been omitted from this table.
2.—The figures in column 5 for the years subsequent to 1879-80 have been taken from Proceedings, Board of Revenue, No. 9678, dated 5th November 1881.
3.—Statement D-I shows how the figures in column 9 have been obtained.
4.—The collection charges in the Revenue Department have been calculated at 7·2 per cent. on revenue, column 5.

STATEMENT D-I.

STATEMENT showing the way in which the entries in Column 9 of Estimate Form 3 have been obtained.

Years.	Balance of Maintenance Charges after deducting Rs. 1,704 for old Irrigation.	Portion of Balance chargeable to		Remarks.
		Imperial at 54 per cent.	Provincial at 46 per cent.	
1	2	3	4	5
	Rs.	Rs.	Rs.	
1870-71	8,437	4,556	3,881	
1871-72	25,743	13,901	1,842	
1872-73	7,173	3,873	3,300	
1873-74	49,566	26,766	2,800	
1874-75	10,372	5,601	4,771	
1875-76	6,218	3,358	2,860	
1876-77	13,984	7,551	6,433	
1877-78	2,451	1,324	1,127	
1878-79	3,113	1,681	1,432	
1879-80	6,373	3,441	2,932	
1880-81	7,265	3,923	3,342	* The average actual expenditure of eight years, exclusive of the expenditure incurred in 1871-72 and 1873-74, has been assumed to be the amount of maintenance charges in the Public Works Department. The figures in column 3 of this statement have been entered in column 9 of the Estimate Form 3.
1881-82	7,265	3,923	3,342	
1882-83	7,265	3,923	3,342	
1883-84	7,265	3,923	3,342	
1884-85	7,265	3,923	3,342	
1885-86	7,265	3,923	3,342	
1886-87	7,265	3,923	3,342	
1887-88	7,265	3,923	3,342	
1888-89	7,265	3,923	3,342	
1889-90	7,265	*3,923	3,342	

CHEPAUK,
9th November 1881.

(Signed) JOHN MULLINS, Colonel, R.E.,
Chief Engineer for Irrigation.

APPENDIX E.

List of Component Works, Madras Water-Supply and Irrigation Extension Project.

No.	Items.	Mileage. Miles.	Mileage. Chain of 66 feet.	Remarks.	Level above M.S.L.
1	2	3		4	5
1	Thamarapak anicut	...	...	...	Crest 69·86
	Do. under sluice	...	...	...	Sill 63·86
2	Inspection bungalow	...	...	...	
	Supply channel, Cholaveram tank ...	...	...	...	
	Head sluice, do. ...	...	...	...	Sill 63·86
	Inlet	0	20	...	75·12
	Bridge	0	55	...	62·84
	Kattankal surplus weir	1	60	...	Crest 65·86
	Do. do.	...	...	...	Sill 62·86
	Inlet	1	66	...	67·86
	Do.	2	8	...	67·24
	Do.	2	39	...	65·98
	Do.	2	63	...	64·12
	Do.	2	69	...	63·40
	Bridge	3	3	...	58·30
	Inlet	3	26	...	62·81
	Do.	3	44	...	63·05
	Do.	3	68	...	63·79
	Do.	4	11	...	65·23
	Old Boosikal diversion	4	53	...	Crest 59·69
	Boosikal surplus weir	4	64	...	Sill 56·69
	Do. do.	...	...	...	56·92
	Ramapuram bridge across Boosikal floor.	4	73	...	54·39
	Bridge	4	79	...	53·00
	Do.	5	55	...	52·10
	Aqueduct, Alacheri	6	12	...	
		8	14	Channel ends.	
3	Cholaveram tank	...	...	Begins north end of bund.	...
	Do. north weir	0	9	...	Crest 63·62
	Do. weir	0	43	...	Crest 61·68
	Do. weir sluice	0	43·84	...	Sill 52·68
	North sluice	1	0	...	Sill 41·83
	South sluice	2	3·63	...	
		2	22	Tank ends.	
	Inspection bungalow	2	45	...	
4	Supply channel to Red Hills tank ...	...	...	...	
	Head sluice do. ...	2	5	Mileage of Cholaveram tank.	Sill 45·33
	Inlet	1	25	...	48·20
	Girder bridge	2	29	...	
		2	50	Channel ends.	
5	Red Hills tank	...	...	Begins at left wing of weir (Mr. Fraser's).	
	Surplus weir, Red Hills tank ...	0	11	...	Crest 46·31
	Weir sluice (irrigation)	0	15	...	31·42
	Ten-vent surplus sluice (in weir) ...	0	21·06	...	Sill 31·31
	North sluice	0	32·34	...	Sill 20·66
	Polal sluice	1	27·07	...	Sill 21·10
	Inspection bungalow	2	30	...	
	Soorapedoo sluice	3	3·25	...	Sill 27·31
	Municipal do.	3	15	...	Sill 31·31
		3	27	Tank ends.	

No. 17. ORDER THEREON, 9th December 1881, No. 849 I.

THE report submitted by the Chief Engineer for Irrigation on the revised estimate for the Madras Water-supply and Irrigation Extension project fully explains the several differences between the present sanction for this project and the amount of the revised estimate. The latter amounts to Rs. 18,54,463.

2. Of the above sum the component items are—

(1.) Direct charges—

	Rs.
Works	13,42,950
Establishment	2,19,255
Tools and Plant	8,201
	15,70,406
Deduct receipts	1,167
	15,69,239

(2.) Indirect charges—

Capitalized abatement of Land Revenue	2,13,320
Interest during construction	71,904
Total ...	18,54,463

This total does not differ very materially from that given in Proceedings of Madras Government, No. 2650 of the 2nd October 1876, which was Rs. 18,06,720.

Of this total the amount chargeable to Imperial (Irrigation) is Rs. 9,82,105.
Provincial on account of the water-supply of the city of Madras „ 8,72,358.
The distribution of the charge has been made as follows:—

1*st.*—All items belonging exclusively to either service have been charged thereto.

2*nd.*—The shares of charges for items appertaining to both services have been fixed at 54 per cent. for Imperial and 46 per cent. for Provincial.

G.O., No. 2,650, dated 2nd October 1876.

3. The net excess over the present sanction under *Works* is Rs. 1,16,225, and this is more than covered by the aggregate Rs. 1,88,158 of the items not before provided for but found requisite as explained in detail in the report. There has been hitherto no sanction for establishment and this item amounts to Rs. 2,19,255 altogether; the charges to cover which additional sanction is required are—

	Rs.
Direct charges	3,43,681
Indirect do.	2,85,224
Total ...	6,28,905

4. With regard to the Imperial share of the project so far as can be at present judged the annual charges for interest on outlay, maintenance, and collection of revenue will amount to about ... Rs. 43,186*
and the revenue (water-tax) to ... „ 24,741

	Rs.
* Interest	37,482
Maintenance	3,923
Collection	1,781
	43,186

Annual deficit ... „ 18,445

It is possible that the results may be ultimately more favorable, but it is tolerably clear that the probability of the revenue fully covering the interest charges is very remote.

5. Provincial will however be still less favorably circumstanced, viz. :—

	RS.
Interest on	
At 4½ per cent.	7,36,295*
Share of maintenance charges	33,133
	3,342
Total ...	36,475

* Direct charges.

against which the receipts from the Municipality are not likely to exceed Rs. 12,000, so that the Government contribution to the water-supply of Madras will be but little under Rs. 24,500 a year, and at the present time it is considerably more.

6. It is observed from Statement D.I. that the Provincial share of maintenance charges up to the end of 1879-80 amounted to Rs. 61,378, and the Examiner of Public Works Accounts will see that this and the share for subsequent years are duly adjusted.

7. Ordered that the revised estimate be forwarded for the sanction of the Government of India with a copy of these Proceedings.

(True Extract.)

(Signed) JOHN MULLINS, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Superintending Engineer, Fifth Circle.
" Chief Engineer for Irrigation.
" Examiner of Public Works Accounts
" Revenue Department.
" Financial do.

Exd. S. T. Austin.
Spare Copies

IRRIGATION.
ACCOUNT.

Govt. of {1881} Madras.

PUBLIC WORKS.

To

THE SUPERINTENDING ENGINEER,
FIFTH CIRCLE,
&c., &c., &c.

Dated December, 9th.

Recd. *Encl.*

G.O., 9th December 1881, No. 849 I.

DECEMBER.

Nos. 16-17.

Madras Water-supply and Irrigation Extension System.—Passing orders on the revised estimate for the — .

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

9th December 1881, No. 850 I.

Irrigation.
Account.

Read the following paper :—

No. 16. No. 150 I.

Note by the Chief Engineer for Irrigation.

IN the subjoined note is recorded the total expenditure on the Madras Water Supply and Irrigation Extension System to the end of 1880-81, and a comparison is drawn between the revised estimate and that sanctioned by the Government of India in their letter No. 695 I., dated 10th November 1871, the cause of excess on individual items or of additional expenditure being duly explained.

Statement of Total Outlay on the Madras Water Supply and Irrigation Extension Project to the end of 1880-81.

Particulars of Charges.	To end of 1874-75 as per G.O., No. 341, dated 8th Feb. 1876.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.	Total to end of 1880-81.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Works	11,73,436	6,119	(a)15,541	(a)2,630	(b)24,410	9,141	11,533	12,42,710
Establishment ..	1,83,977	1,676	3,885	633	6,102	2,285	2,295	2,00,853
Tools and Plant ..	4,779	62	389	63	610	229	229	6,361
Suspense	(c)	..	..	..	..	..	..	..
Total ..	13,62,192	7,857	19,815	2,226	31,122	11,655	14,057	14,49,924
Receipts on Capital Account	1,167	..	..	..	..	..	..	1,167
Net Total ..	13,61,025	7,857	19,815	2,226	31,122	11,655	14,057	14,48,757
Capitalization of abatement of Land Revenu	1,95,647	(d)	(d)	(d)	(d)	(d)	(d)	1,95,647
Interest	71,904	..	..	..	..	..	..	71,904
Grand Total ..	16,28,576	7,857	19,815	2,226	31,122	11,655	14,057	(e) 17,16,308

(a) The charges up to 1875-76 stand debited to Capital, but from 1876-77 to Irrigation and Navigation Works for which Capital and Revenue Accounts are not kept. The Establishment and Tools and Plant charges were not calculated from 1876-77, no administrative accounts being kept up for this project. The amounts now shown are specially calculated for the purpose of this statement.

(b) Of this amount Rs. 23,214 are debited to Provincial grant and the remainder, Rs. 1,196, to Irrigation and Navigation Works for which Capital and Revenue Accounts are not kept.

(c) Suspense balances have been removed, *vide* Office Note dated 20th November 1879.

(d) The abatement of land revenue during these years is not known, and the charges for "Leave and Pension Allowances" have been omitted as they are not intended for works for which Capital and Revenue Accounts are not kept, *vide* G.O., No. 1,949, dated 2nd August 1876.

(e) Rs. 3,00,000 have been paid on account of this project from Provincial Funds to Loan Funds (Capital Productive Public Works).

2. The principal causes of excess expenditure on this project are as follow :—

1*st*.—The extension or modification of several of the component works.

2*nd*.—The omission of essential items from the former estimate.

3. Under the head of Direct Charges the excess under Works is shown to be Rs. 1,96,697. Of this amount the items not provided for in the estimate last sanctioned aggregate Rs. 188,158,* so that the actual increase on items previously sanctioned is Rs. 8,539.

* Exclusive of the erroneous Establishment debit of Rs. 24,866.

	RS.
On the other hand the decreases shown amount to Rs. 79,305, making the net excess on *works* to be ...	1,17,392
Add for Establishment	2,19,255
Add for Tools and Plant	8,201
	3,44,848
Deduct receipts on Capital Account	1,167
Total amount of Direct Charges requiring sanction ...	3,43,681
To which add total amount of Indirect Charges ...	2,85,224
Grand total of Direct and Indirect Charges requiring sanction in excess of the estimate sanctioned in letter No. 695 I., dated 10th November 1871	6,28,905

4. The total amount of the revised estimate including both charges is therefore Rs. 18,54,463,† of which the Provincial share, for the supply of the City of Madras, is Rs. 8,72,358, leaving a balance of Rs. 9,82,105, to be met from Imperial Funds.

† *Vide* Abstract B.

5. Under the head of Compensation the land taken up for the project is 4,919·08 acres, valued at Rs. 1,87,349-3-6, and may be particularised as follows :—

Chingleput District.

		ACRES.	RS.	A.	P.
Collector's letter No. 2,399, dated 20th June 1881.	For all works other than the Delivery channel ...	4,762·10	1,45,079	4	8
	For the open Delivery channel	133·70	14,542	14	0
	Madras District.				
Collector's letter No. 893, dated 15th November 1879.	For the open Delivery channel	20·82	17,891	6	0
	For Municipal works below the end of the open Delivery channel	2·46	9,835	10	10
	Total Municipal ...	156·98	42,269	14	10
	Grand Total ...	4,919·08	1,87,349	3	6

6. The amount paid by Government for land taken up for Municipal purposes is as under :—

	ACRES.	RS.		
Chingleput District	125·36	12,438	13	8
Madras District	19·02	24,623	15	4
Total paid for	144·38	37,062	13	0
Do. not paid for	12·60	5,207	1	10
Total Municipal ...	156·98	42,269	14	10

7. The amount paid for land taken up for the project for other than Municipal purposes is as follows :—

		ACRES.	RS.	A.	P.
Land paid for		4,330·95	1,30,218	2	9
Do. not paid for		431·15	14,861	1	11
	Total ...	4,762·10	1,45,079	4	8
Total land paid for in both cases ...		4,475·33	1,67,280	15	9*
Total land not paid for in both cases.		443·75	20,068	3	9
	Grand Total ...	4,919·08	1,87,349	3	6

* Of this sum only Rs. 1,60,719 have been booked by the Examiner up to end of 1880-81.

8. It was anticipated many years ago that there would be a considerable increase in the estimated amount of land compensation, and in G.O., No. 2,783, dated 10th September 1867, it was stated that the compensation for land would amount to Rs. 2,06,000, which is a fair approximation to the actual demand.

9. The following statement shows the area irrigated and the revenue derived under the project both before and after the construction of the work. Correct figures are only available up to the end of 1879-80 (Fasli 1289).

Proceedings of the Board of Revenue, Mis. No. 11,356, dated 2nd December 1879.
Do. do. No. 3,606, dated 5th April 1881.

	Fasli.	Area Irrigated. First Crop.	Area Irrigated. Second Crop.	Revenue exclusive of Remissions. Land.	Revenue exclusive of Remissions. Water.	Revenue exclusive of Remissions. Total.	Remarks.
		ACS.	ACS.	RS.	RS.	RS.	
Years prior to the construction of the work.	1265 ...	2,283	Not known.	2,588	4,968	7,556	
	1266 ...	3,441		4,038	7,711	11,749	
	1267 ...	3,534		4,179	8,361	12,540	
	1268 ...	3,763		4,499	8,825	13,324	
	1269 ...	4,131		4,853	9,539	14,392	
	1270 ...	3,811		4,632	8,964	13,596	
	1271 ...	4,101		4,863	8,968	13,831	
	1272 ...	4,255		5,082	9,265	14,347	
	1273 ...	4,423		5,326	9,652	14,978	
	1274 ..	4,379		5,263	9,861	15,124	
	1275 ...	4,626		5,617	10,171	15,788	
	1276 ...	3,997		4,888	9,431	14,319	
	1277 ..	3,383		3,919	7,552	11,371	
	1278 ...	3,027		3,306	6,181	9,487	
	1279 ...	4,283		5,099	9,198	14,297	
	Total ...	57,437	...	68,052	1,28,647	1,96,699	
	Average ...	3,829	...	4,537	8,576	13,113	
Years subsequent to the construction of the work.	1280 ...	4,008	...	4,947	10,082	15,029	
	1281 ...	4,622	...	5,922	8,512	14,434	
	1282 ...	5,553	...	7,355	10,392	17,747	
	1283 ...	5,120	1,029	6,768	10,228	16,996	
	1284 ...	5,742	1,403	7,279	12,161	19,440	
	1285 ...	5,747	1,578	7,308	13,511	20,819	
	1286 ...	4,862	1,004	6,011	1,391	7,402	Famine year.
	1287 ...	6,142	547	6,493	13,433	19,926	
	1288 ...	5,818	2,214	6,249	18,909	25,158	
	1289 ...	6,477	2,769	7,105	20,725	27,830	
	Total ...	54,091	10,544	65,437	1,19,344	1,84,781	
	Average ..	5,409	1,054	6,543	11,934	18,478	

10. The extended works may be considered to have come into operation in Fasli 1280 (1870-71), and the following table shows the increase of area and revenue for each year from that date inclusive—

Periods.	Area Irrigated.			Revenue exclusive of Remissions.			Difference.	
	First Crop.	Second Crop.	Total.	Land.	Water.	Total	Area.	Revenue.
Average for the fifteen years 1855-56 to 1869-70.	ACRES. 3,829	ACRES. ..	ACRES. 3,829	RS. 4,537	RS. 8,576	RS. 13,113	ACRES. ..	RS. ..
Fasli 1280 (1870-71) ..	4,008	..	4,008	4,947	10,082	15,029	179	1,916
,, 1281 (1871-72) ..	4,622	..	4,622	5,922	8,512	14,434	793	1,321
,, 1282 (1872-73) ..	5,553	..	5,553	7,355	10,392	17,747	1,724	4,634
,, 1283 (1873-74) ..	5,120	1,029	6,149	6,768	10,228	16,996	2,320	3,883
,, 1284 (1874-75) ..	5,742	1,403	7,145	7,279	12,161	19,440	3,316	6,327
,, 1285 (1875-76) ..	5,747	1,578	7,325	7,308	13,511	20,819	3,496	7,706
,, 1286 (1876-77) ..	4,862	1,004	5,866	6,011	1,391	7,402	2,037	— 5,711
,, 1287 (1877-78) ..	6,142	547	6,689	6,493	13,433	19,926	860	6,813
,, 1288 (1878-79) ..	5,818	2,214	8,032	6,249	18,909	25,158	4,203	12,045
,, 1289 (1879-80) ..	6,477	2,769	9,246	7,105	20,725	27,830	5,417	14,717
Total ..	..	..	64,635	..	..	1,84,781	24,345	53,651
Average ..	..	..	6,463	..	..	18,478	2,434	5,365

11. The cause of the great falling off in revenue in 1876-77 is owing to Government, in April 1876, having adopted measures in consequence of the continued drought to diminish the offtake. The Collector was directed to limit cultivation and to prevent further use of water for irrigation purposes.

G.O., Revenue Department, No. 844, dated 8th April 1876.

G.O., Public Works Department, No. 165, dated 25th April 1876.

In March 1877 Government directed the immediate closure of all the irrigation sluices.

G.O., Public Works Department, No. 703, dated 1st March 1877.

12. The possibility of restrictive orders of the above-mentioned nature having to be issued has necessarily exercised a prejudicial effect on the area irrigated and the revenue obtained.

13. The Comparative Statement, Appendix A, shows the difference between the last sanctioned estimate (recorded in Proceedings of Madras Government, No. 2,171, 23rd August 1871, and permission to carry out which was communicated with G.O., No. 65, dated 10th January 1872,) and the present revised estimate, the cause of excess being briefly explained in each case. An abstract of this statement is subjoined.

ABSTRACT A.

Particulars.	Amounts in the Estimate sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in Proceedings of Madras Government No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or Totals of Columns 3 and 4.	Increase.	Decrease.
1	2	3	4	5	6	9
IMPERIAL AND PROVINCIAL.						
I.—Anicut and Head Works ..	RS. 67,650	RS. 95,839	RS. ..	RS. 95,839	RS. 29,951	RS. 1,762
II.—Cholaveram Tank supply channel ..	2,40,692	2,08,710	36,960	2,45,670	39,830	34,852
III.—Cholaveram Tank	2,40,078	2,67,367	..	2,67,367	30,593	3,304
IV.—Red Hills Tank supply channel ..	1,32,389	1,32,882	..	1,32,882	493	..
V.—Red Hills Tank	2,65,254	2,82,865	15,744	2,98,609	41,904	8,549
VI.—Distribution, &c., below the two tanks	25,000	8,051	19,150	27,201	2,201	..
VII.—Land other than for Madras Municipality	*1,75,917	1,30,218	14,861	1,45,079	..	30,838
VIII.—Miscellaneous	47,746	56,840	1,756	58,596	10,850	..
	11,94,726	11,82,772	88,471	†12,71,243	1,55,822	79,305

* This was for all the land. † Includes Rs. 70,230 chargeable wholly to Imperial.—*Vide* paragraph 20.

ABSTRACT A—*cont.*

Particulars.	Amounts in the Estimate sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in Proceedings of Madras Government No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or Totals of Columns 3 and 4.	Increase.	Decrease.
1	2	3	4	5	6	7
PROVINCIAL.						
IX.—Items chargeable to Provincial, on *Works*	RS. 30,832	RS. 84,804	RS. 11,769	RS. 96,573	RS. 65,741	RS. ..
	12,25,558	2,67,576	1,00,240	13,67,816	2,21,563	79,305
Deduct amount charged to Works, which properly belonged to Establishment	..	24,866	..	24,866	24,866	..
	12,25,558	2,42,710	1,00,240	13,42,950	1,96,697	79,305
Establishment	..	2,00,853	18,402	2,19,255	2,19,255	..
Tools and Plant	..	6,361	1,840	8,201	8,201	..
	12,25,558	4,49,924	1,20,482	15,70,406	4,24,153	79,305
Deduct Receipts on Capital Account.	..	1,167	..	1,167	1,167	..
Total, Direct Charges ..	12,25,558	4,48,757	1,20,482	15,69,239	4,22,986	..
Capitalization of abatment of Land Revenue	..	1,95,647	17,673	2,13,320	2,13,320	..
Interest	..	71,904	..	71,904	71,904	..
Total, Indirect Charges ..	..	2,67,551	17,673	2,85,224	2,85,224	..
Grand Total ..	12,25,558	7,16,308	1,38,155	18,54,463	7,08,210	79,305
Deduct amount of estimate sanctioned by the Government of India in letter No. 695 I., dated 10th November 1871, embodied in Proceedings of Madras Government, No. 65, dated 10th January 1872.	..	..	..	12,25,558	79,305	..
Net amount requiring sanction ..	..	..	..	6,28,905	6,28,905	..

ABSTRACT B

Particulars.	Direct Charges.				Indirect Charges.			Grand Total.
	Works.	Establishment.	Tools and Plant.	Total.	Capitalized abatement of Land Revenue.	Interest.	Total.	
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
I.—Imperial	70,230	17,557	1,755	89,542	4,401	..	4,401	93,943
II.—Imperial and Provincial	11,74,980	1,95,830	5,860	13,76,670	1,96,171	71,904	2,68,075	16,44,745
III.—Provincial	96,573	5,868	586	1,03,027	12,748	..	12,748	1,15,775
	13,41,783	2,19,255	8,201	15,69,239	2,13,320	71,904	2,85,224	18,54,463
						Total, Revised Estimate ..		18,54,463

			Imperial.	Provincial.
			RS.	RS.
I.—Items chargeable wholly to Imperial.	Direct charges ..		89,542	..
	Indirect do. ..		4,401	..
II.—Items chargeable to Imperial and Provincial by the shares 54 and 46 respectively.	Direct charges.	RS. 13,76,670	7,43,402	6,33,268
	Indirect do.	2,68,075	1,44,760	1,23,315
III.—Items chargeable wholly to Provincial.	Direct charges ..		..	1,03,07
	Indirect do. ..		..	12,73
			9,82,105	8,72,358
	Total Revised Estimate ..		18,54,463	

	RS.
Amount chargeable to Provincial ..	8,72,358
Amount already met from do.—	
By transfer in 1876-77 .. 50,000	
Do. in 1878-79 .. 50,000	*
Do. in 1879-80 .. 1,00,000	
Do. in 1880-81 .. 1,00,000	
From the Reserve, G.O., No. 623 W., 1st March 1879 23,214	
	3,23,214
Balance due to Imperial	5,49,144

* Refund to P. P. W.

14. In paragraph 3 above it was shown that the revised estimate includes works not previously provided for, which are estimated to, or have cost Rs. 1,88,158.

The principal items are:—

		Rs.
(1).	Lengthening Thamarapak anicut	23,437
(2).	Cholaverm Tank channel. Increasing capacity of Kattankal surplus weir	19,000
	Do. Increasing capacity of Boosikal surplus weir	17,400
(3).	Reconstructing a portion of the bund of Cholaveram tank ...	29,832
(4).	Surplus sluices, Red Hills Tank	20,023
(5).	Drainage of rear part of bund, &c., of do.	9,880

and the following remarks, in addition to the brief explanations given in the comparative statement, are submitted regarding these. All these items have been specially approved by Government.

15. ITEM 2 OF COMPARATIVE STATEMENT.—*Extension of the Thamarapak Anicut.*—The insufficient length, 474 feet, of the anicut as originally constructed was made evident by the fresh of November 1872 in the Kortalayár. The river having risen to 13 feet above the crest and to several feet above the level of the country on the north side, a large breach was made through the bank behind the north wing, though but little damage was sustained by the anicut. The work was inspected by the Inspector-General of Irrigation and he concurred in the necessity for lengthening the anicut by 150 feet, so as to carry it across the breach to the new line of the river bank. A still higher fresh occurred in 1874 and showed that the additional length of weir had not been provided without sufficient reason.

G.O., No. 2,132, dated 26th August 1873.

16. ITEMS 11 and 29 OF COMPARTIVE STATEMENT.—*Alteration of the Kattankal and Boosikal Surplus Weirs.*—The requirements for cross drainages were in the first instance very inadequately provided for. The areas of the drainage basins were not properly ascertained, while up to 1872 the maximum flood level in the Kortalayár was not even approximately known, the clculations made when the project was originally drawn up being very far from correct. The result has been that the Cholaveram Tank supply channel has suffered on several occasions very extensive damage. The circumstances unfortunately do not admit of completely satisfactory arrangements at a reasonable cost. Should the river be in extreme fresh when the local rainfall approaches a maximum, the discharge of the drainages will not be capable of being disposed of without exceeding the intended maximum water level in the channel, and on the rare occasions when these unfavorable circumstances may be expected to occur, the left bank of the channel will probably breach at places which will be left exceptionally low so as to fix the site of the breaches.

G.O., No. 2,785, dated 17th October 1876.

17. ITEM 39 OF COMPARATIVE STATEMENT.—*Reconstructing a portion of the bund of the Cholaveram Tank.*—The bund of this tank before its enlargement was a small one, and the new earthwork was placed partly inside and partly outside the old bund. This led to slips in the rear slope, and it was found necessary to secure stability by turning over the rear part near the suth end and thus reforming the bank on the inside of the old bund. The bund has given no trouble since this was done. The length dealt with was 1,100 feet.

G.O., No. 271, dated 4th February 1874.

18. ITEM 47 OF COMPARATIV STATEMENT.—*Surplus Sluices of ten vents. Red Hills Tank.*—These sluices which have been built in the southern part of the surplus weir of the tank were deemed necessary as a safeguard, owing to the unsatisfactory condition of the bund of this large reservoir. The surplus weir is of ample capacity to discharge all the water to be dispose of, but it does not come into action until the water rises above full tank level. On several occasions there have been extensive slips in the bund, which were occasioned by subsoil leakage, as also by water getting into the bund itself above ground level, and considerable anxiety was expressed lest the breaching of the tank should inundate Madras. It was considered therefore to be desirable to

G.O., No. 2,322, dated 11th August 1875.

provide means for rapidly lowering the water level should the bund be in danger of giving way, as also to allow of the discharge of surplus without necessitating the rise of the water level in the reservoir to as great a height above full tank level as would be necessary were all such surplus to be passed over the weir. Although Madras would not be inundated were the tank to breach, such an accident would be a very serious matter, whether the damage to property, the cost of repairs, or the loss of water, with the consequent cessation of irrigation and of the water-supply to the city, be considered. The construction of the sluices was therefore sanctioned by Government, but so far, owing to bad work, and badly set up gear for working the shutters, they have been of little use. The defects are being remedied.

The excess on the ring-bund in connection with these sluices is explained in the Comparative Statement Item No. 47.

19. ITEM 58 OF COMPARATIVE STATEMENT.—*Drainage of rear part of bund of the Red Hills Tank.*—The slips which have from time to time occurred, and the state of the bund at the slips, indicated that, unless the leakage which had caused these could be prevented from saturating the base of the rear part of the bund, and the leakage conveyed away, accidents would continue to occur. Borings which were made showed that much of the old bund, as well as of the additions made thereto, was formed of bad soil, and as the bund rests for a large part of its length on porous laterite there is not only leakage through the bund but also through the subsoil to be provided against. After consideration, the conclusion was arrived at that a suitable puddle wall could not be inserted in the bund without lowering the water level in the tank to a greater extent, and keeping it down for a much longer period than could be allowed without great inconvenience to the City of Madras. As, in any case, drains would be needed to dispose of subsoil leakage, it was decided (G.O., No. 406 I., 24th June 1880,) that, at any rate in the first instance, these drains should be constructed and their effect ascertained before any final decision against or for a puddle wall was come to.

The work is in progress, and the regular estimate for it was sanctioned in G.O., No. 498 I., dated 6th August 1881.

20. In preparing this revised estimate it has been considered desirable to show distinctly:—

1*st.*—The total amount to be divided between Imperial (Irrigation) and Provincial.

2*nd.*—The amount chargeable to Provincial only.

With regard to the division of the former, it was estimated in the papers printed in Proceedings of Madras Government, No. 2,650, of the 2nd October 1876, that the Provincial share would be 46 per cent. and the Imperial share 54 per cent. of the total, the shares being based on the quantity of water required to be reserved for Municipal purposes, and on that therefore left for irrigation. There was for a time a doubt as to whether the quantity required for Madras might not have to be increased, in connection with the drainage arrangements of the city, but by G.O., No. 598-A I., of the 10th October 1879, it was settled that no more water would need to be reserved. It is believed therefore that no closer approximation than that already given can be made to the shares appertaining to Provincial and Imperial respectively. The amount to be divided is that for the part of the project common to both services. That part which belongs exclusively to the supply of Madras and which therefore belongs entirely to Provincial, and that part* which provides for distributaries and which belongs exclusively to Irrigation, have not been included in the amount to be divided.

* Items 37, 51, 52, 53, 60, 61 to 64 and 65 of Comparative Statement.

21. Two of the entries under Direct Charge appertaining to Provincial solely may require brief explanation.

Land Compensation. Item 71 *of Comparative Statement.*—The cost of the land taken up for the Municipal delivery channel from the Red Hills Tank and for the subsidiary works has been finally settled, and it was at first determined that the Municipality should refund to Provincial Rs. 29,422, the value of the land in excess of

the 56·2 acres required for the original design at the average rate for the 156·98 acres actually taken up. The Municipality for their own convenience adopted a line quite different from that originally determined on, but they nevertheless objected to the enforcement of this claim. Though there is no doubt that the claim was equitable the Government have (Proceedings of Madras Government, No. 492 I., of 5th August 1881,) determined not to enforce it, in consequence of the impecunious state of the Municipality. The whole of the land compensation for the delivery channel, amounting to Rs. 42,270, forms therefore a charge against Provincial.

Pumping and dismantling Pumps. *Item* 74 *of Comparative Statement.*—The water in the Red Hills Tank in 1876 having fallen to an unusually low level pumping had to be resorted to in order to keep up the supply to the City of Madras, and the cost was ordered, in Financial G.O., No. 82, dated 18th January 1879, to be debited to Public Works, Provincial.

G.O., No. 623 W., dated 1st March 1876.
" " 1,415, dated 7th June 1876, Financial.
" " 620, dated 4th April 1876 "

22. It has been shown that the Capital expenditure debitable to Imperial (Irrigation) will amount to for—

	Rs.
Direct Charges	8,32,944
Indirect "	1,49,161
Total ..	9,82,105

In Appendix C will be found a statement showing the maintenance charges from 1870-71, when the project first came into operation, up to 1879-80. The average outlay for this period of ten years excluding 1871-72 and 1873-74 which were abnormal years has been Rs. 8,969 yearly, from which deducting Rs. 1,704, the assumed cost* of maintenance of the old tanks, the increased cost of upkeep to be distributed becomes Rs. 7,265, and of this 54 per cent. or Rs. 3,923 is chargeable to Irrigation. The increase of revenue being, up to 1879-80, Rs. 5,365 per annum on the average, as shown in paragraph 10 above, this increase was sufficient to cover the maintenance expenses.

* Proceedings of Madras Government No. 2,650, 2nd October 1876.

	No.	Rs.
Works, calculated at 10 per cent. on average old revenue		1,311
Establishment, &c., at 30 per cent. on works...		393
		1,704

23. But there is no probability of the returns from the project covering the interest on the outlay.

The gross income necessary to make the project properly remunerative would be—

	Rs.
4½ per cent. on Rs. 8,32,944	37,482
Maintenance charges 3,923 } Collection do. 1,781 }	5,704
Total ...	43,186

	Acs.
Total irrigable area, *vide* paragraph 1 of Note in Proceedings of Madras Government, No. 2,650, 2nd October 1876	9,852
Deduct average old irrigated area, *vide* paragraph 9 of this Note	3,829
	6,023

and the water-supply is not likely to suffice for more than 6,023* acres of additional irrigation. The estimated ultimate direct revenue (water-tax) amounts to only Rs. 24,741, and this would leave a yearly deficit of Rs. 18,445. The actual return from the works, after paying maintenance and collection charges would on this estimate be Rs. 19,037, which is equivalent to 2·28 per cent. on the Direct Charges or to 1·9 per cent. on Direct and Indirect Charges.

24. The estimate of growth of irrigation and of Revenue Receipts and Charges has been drawn up with reference to the Proceedings of the Board of Revenue, No. 9,678, dated 5th November 1881, (*Vide* Appendix D). This estimate is in

Form 3, modified to suit the circumstances of the present case, of Circular No. 17 of 1880 from the Government of India. The enhanced land revenue, or Indirect Receipts, has not been included for the reason assigned by the Board of Revenue in paragraph 2 of their Proceedings.

25. This Note is followed by Appendices showing :—

Appendix A. Comparative Statement.
B. Particulars of Land taken up for Project.
C. Abstract of annual Maintenance Charges.
D. Estimate of growth of Irrigation.
E. List of Component Works.
F. Sketch Map of System.

OFFICE OF THE CHIEF ENGINEER FOR IRRIGATION, CHEPAUK, 17th November 1881.

(Signed) JOHN MULLINS, Colonel, R.E., Chief Engineer for Irrigation.

To the Joint Secretary to Government, Public Works Department, Irrigation Branch.

APPENDIX A.

CHINGLEPUT DISTRICT.

COMPARATIVE STATEMENT of the Madras Water-supply and Irrigation Extension Project.

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	I. ANICUT AND HEAD WORKS.	RS.	RS.	RS.	RS.	RS.	RS.	
1	Anicut on the Kortalayár at Thamarapak.	60,180	60,382	..	60,382	202	..	The excess in this case is small and is due to increases in rates.
2	Do. extension..	..	23,437	..	23,437	23,437	..	A breach in rear of the left wing occurred in November 1872 and the height reached by the flood showed that the original length of the anicut was inadequate. It was therefore lengthened by 150 feet on an estimate of Rs. 25,300 sanctioned in G.O., No. 2,132, dated 26th August 1873.
3	Embanking the Kortalayár.	4,800	3,038	..	3,038	..	1,762	.....
4	Planting trees on waste land on the south bank of the Kortalayár at Thamarapak anicut.	..	..	..	648	648	..	*Vide* letters from the Superintending Engineer, Chinglepat, Nos. 779 and 1,446, dated 21st February and 5th April 1878, respectively. Carried out in 876-77. No provision in the revised estimate sanctioned by the Government of India in 1871.
5	Connecting right wing of anicut with left bank of Cholaveram tank supply channel by a flood bank.	..	1,338	..	1,338	1,338	..	To prevent flood river entering the channel an estimate, amounting to Rs. 1,135, was sanctioned in G.O., No. 368 I., dated 4th October 1877.
6	Office and store shed on line of works.	2,670	4,638	..	4,638	1,968	..	The excess is attributed to the loss in 1870 of a large quantity of materials (bricks) in stock (*vide* Superintending Engineer's letter No. 2,155, dated 17th April 1879).
7	Inspection house at Red Hills tank.	..	1,977	..	1,977	1,977	..	Required for the accommodation of inspecting and executive officers, not provided for in the revised estimate sanctioned by the Government of India in 1871; but an estimate, amounting to Rs. 1,910, was sanctioned by local Government in G.O., No. 1,641, dated 6th July 1872.
8	Planting trees and constructing well in the compound of the inspection house at Red Hills tank.	..	381	..	381	381	..	*Vide* explanation against Item 4.
	Total, Anicut and Head Works.	67,650	95,839	..	95,839	29,951	1,762	

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	II. CHOLAVERAM TANK. SUPPLY CHANNEL.	RS.	RS.	RS.	RS.	RS.	RS.	
9	Head sluice ..	32,563	33,113	..	33,113	550	..	The excess is due to the increased cost of wood-work for shutters.
10	Kattankal surplus weir.	7,145	4,293	..	4,293	..	2,852	Saving owing to the modification of the design (*vide* G.O., No. 824, dated 20th March 1871).
11	Kattankal surplus weir extension.	..	..	19,000	19,000	19,000	..	Entry of this item in the revised estimate approved in G.O., No. 2,785, dated 17th October 1876.
12	Bridge							
13	Do.							
14	Do.							
15	Do.							
16	Do.							
17	Inlet							
18	Do.							
19	Do.	51,539	53,739	..	53,739	2,200	..	Excess attributed to the extra cost of wood-work. The individual estimates cannot now be separated, as they are lumped together in the estimate of 1871. The original estimate was Rs. 53,502.
20	Do.							
21	Do.							
22	Do.							
23	Do							
24	Do.							
25	Do.							
26	Do.							
27	Raising No. 2 bridge	..	..	560	560	560	..	Required in connection with the calculated maximum water-level in the channel due to upland drainage.
28	Boosikal surplus weir.	6,531	6,651	..	6,651	20	..	Excess due to excavation of a small channel from the weir which was not provided for in the estimate of 1871.
29	Do. extension ..	..	..	17,400	17,400	17,400	..	Entry of this item in the revised estimate approved in G.O., No. 2,785, dated 17th October 1876.
30	Aleshari aqueduct..	6,286	6,286	..	6,286	.	..	.....
31	[illegible] from Kortalayár to Cholaveram, including [illegible] diversion channel.	89,813	89,813	..	89,813	.	..	.....
32	Bank across Kattankal.	765	765	..	765	..	..	.....
33	Boosikal upper and lower bund.	8,871	8,871	..	8,871	.	..	
34	Widening channel down to 5¾ miles.	32,000	..	..	..	.	32,000	Original estimate cancelled as unnecessary, the channel having been sufficiently enlarged by natural scour (*vide* G.O., No. 1,548, dated 2nd June 1875).
35	Maintenance during construction.	5,179	5,179	..	5,179	..	..	.....
	Total ..	2,40,692	2,08,710	36,960	2,45,670	39,530	34,852	.....
	III. CHOLAVERAM TANK. MASONRY WORKS.							
36	Calingulah ..	19,989	16,685	..	16,685	..	3,304	Saving effected by reduction of the level of calingulah crest as per orders of the Chief Engineer for Irrigation issued in memorandum No. 88, dated 4th June 1872.
37	Irrigation sluice ..	9,171	9,174	..	9,174	3	..	Chargeable to Imperial. This item was included in the comparative statement of 1871.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	CHOLAVERAM TANK—*cont.*	RS.	RS.	RS.	RS.	RS.	RS.	
	EARTHWORK.							
38	Tank bank ..	2,10,918	2,11,676	..	2,11,676	758	..	The excess in this case is owing to the settlement of the earthwork which had to be raised.
39	Reconstructing a portion of the bund.	..	29,832	..	29,832	29,832	..	This work was found to be necessary to meet the slipping of the bund. An estimate, amounting to Rs. 30,675, was sanctioned by the local Government.—*Vide* G.O., No. 271, dated 4th February 1874.
	Total ..	2,40,078	2,67,367	..	2,67,367	30,593	3,304	
	IV.							
	RED HILLS TANK.							
	SUPPLY CHANNEL.							
	MASONRY WORKS.							
40	Head sluice ..	31,177	31,468	..	31,468	291	..	The excess in this case is attributed to an increase in rates.
41	Bridge	6,782	9,701	..	9,701	202	..	Do. do.
42	Under tunnel ..	1,793						
43	Inlet	924						
	EARTHWORK.							
44	Channel	91,713	91,713	..	91,713	..	..	.....
	Total ..	1,32,389	1,32,882	..	1,32,882	493	..	.....
	V.							
	RED HILLS TANK.							
	MASONRY WORKS.							
45	Surplus weir at north end.	10,245	5,878	..	5,878	..	4,367	The saving was on account of the surplus channel from the weir not being any higher than weir level, further deepening being considered unnecessary.
46	Masonry dam with a small irrigation sluice attached.	38,429	37,072	..	37,072	..	1,357	.....
47	Inserting ten vents in the surplus weir including ring bund.	..	16,823	3,200	20,023	20,023	..	Required to allow of the regulation of the water-level in the tank. An estimate, amounting to Rs. 17,100, was sanctioned by the local Government.—*Vide* G.O., No. 2,322, dated 11th August 1875. The excess is due to the ring bund having cost Rs. 3,800 instead of Rs. 600 as allowed in the estimate. The waves necessitated a much stronger bund than was at first intended to be thrown up.
48	Constructing a new apron in rear of the ten-vent sluice.	..	..	2,499	2,499	2,499	..	As the condition of the rear apron of the ten-vent sluice was very bad, owing to a portion of the laterite on which it was built having been scoured out, it was decided to construct a new apron, the arrangement for the work having been approved of by the Chief Engineer for Irrigation in April 1881.
49	New screw gearing for the ten-vent sluice shutters.	..	..	2,760	2,760	2,760	..	*Vide* paragraph 18 of note.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
2	3	4	5	6	7	8	9
RED HILLS TANK—*cont.*	RS.	RS.	RS.	RS.	RS.	RS.	
MASONRY WORKS—*cont.*							
Constructing a parapet wall from the Polal to ten-vent sluice.	..	2,385	..	2,385	2,385	..	To prevent the waves caused by high winds washing over the bund when the tank is full, it was considered desirable to raise the original low parapet wall of laterite stone at the top of the revetment 2 feet, making it 3 feet high and 1½ feet thick, for a distance of 5,546 feet in length. The amount of the estimate for the work was sanctioned in G.O. No. 307 I., dated 10th May 1881, to be included in the present estimate
Irrigtn. sluice, north.	30,171	30,215	..	30,215	44	..	Chargeable to Imperial.
Do. do., south.							
Extension of north sluice.	..	..	4,200	4,200	4,200	..	Do. do. Required to allow of water being passed into the Vilankadupakam channel.
EARTHWORK.							
Red Hills tank bank.	1,43,799	1,43,744	..	1,43,744	..	55	.....
Soorapedoo bank ..	26,110	25,040	..	25,040	..	1,070	.....
Puddle to toe of main bank.	16,500	14,800	..	14,800	..	1,700	Originally sanctioned as an emergent estimate on somewhat rough data.
Planting trees along the toe of the bund of the Red Hills tank.	..	113	..	113	113	..	*Vide* explanation against item No. 4.
Drains under rear part and in rear of bund.	..	6,795	3,085	9,880	9,880	..	Sanctioned in G.O., No. 406 I., dated 24th June 1880. The bund being insecure from leakage which has occasioned several slips, an approximate estimate was sanctioned for immediate execution, and in G.O., No. 498 I., dated 6th August 1881, the amount of the regular estimate for the work was directed to be included in the present estimate.
Total ..	2,65,254	2,82,865	15,744	2,98,609	41,934	8,549	
VI.							
DISTRIBUTARIES, &c.							
Drainage channel at Cholaveram tank bund.	..	560	..	560		..	.....
Channel from north sluice of Cholaveram tank to Villivoil tank.	..	44	..	44		..	Chargeable to Imperial.
Below Cholaveram Tank.							* A lump sum amount was entered for distributaries in the original estimate.
Marembedu channel.		38	8,000		*2,201	..	
Below Red Hills Tank.							
Vilankadupakam channel.	25,000	..	3,550	20,821		..	Chargeable to Imperial.
Madaveram channel.		395	7,600			..	
Channel leading to Soorapedoo Irrigation sluice.		1,238	..			..	
Soorapedoo sluice ..	..	5,776	..	5,776		..	Do. Estimate of Rs. 5,463 sanctioned against the lump sum of Rs. 25,000 for distributaries in G.O., No. 807, of 17th Mar. 1871.
Total ..	25,000	8,051	19,150	27,201	2,201	..	

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	VII.	RS.	RS.	RS.	RS.	RS.	RS.	
66	Land other than for Madras Municipality.	1,75,917	1,30,218	14,861	1,45,079	..	30,838	This decrease is only nominal, the rest of the compensation, viz., for the Madras Municipal channel being shown separately under charges appertaining to Provincial.
	Total ..	1,75,917	1,30,218	14,861	1,45,079	..	30,838	
	VIII.							
	MISCELLANEOUS.							
67	Constructing new tank in Alamady village.	..	9,066	..	9,066	9,066	..	This tank was constructed to replace the one submerged by the Cholavernm tank; no provision in the revised estimate sanctioned by the Government of India in 1871. An estimate, amounting to Rs. 9,260, was sanctioned by the local Government. —*Vide* G.O., No. 422, dated 7th February 1877.
68	Contingencies and superintendence.	47,746	47,405	341	47,746	..	..	.....
69	Removing calingulah at lower end of surplus channel of Red Hills tank near Shadiyankupam lock.	..	369	..	369	369	..	The calingulah was a hindrance to the free flow of drainage. Sanctioned in G.O., No. 873, dated 2nd April 1875.
70	Providing a Stoney's equilibrium valve.	..	..	1,415	1,415	1,415	..	This valve was obtained from England under Government sanction and placed in 1875 in a convenient situation at the Red Hills tank for the purpose of carrying out a preliminary trial. The result of this trial is recorded in G.O., No. 846 I., dated 23rd October 1878. As the sluice valve cannot at present be utilized at any of the deep tanks in other districts of the Presidency, the Committee appointed to investigate and report on the superfluous stock of the Public Works Department recommended in their report printed in Proceedings, Madras Government, No. 914 W., dated 4th April 1881, that the valve be charged to the work to which it was issued and on which it stands.
	Total ..	47,746	56,840	1,756	58,596	10,850	..	
	IX.							
	ITEMS CHARGEABLE TO PROVINCIAL.							
71	Land for Municipal Delivery channel.	..	30,501	11,769	42,270	42,270	..	Covered in part by the saving of Rs. 30,838 shown against item 66 above.
72	Contribution to do. being part of original estimate.	30,832	30,832	..	30,832	..	..	.....
73	Gauge weir below municipal sluice.	..	257	..	257	257	..	Required for the purpose of gauging the supply of water to Madras.—*Vide* G.O., No. 2,503, dated 13th October 1873.
74	Pumping and dismantling pumps.	..	23,214	..	23,214	23,214	..	Expenditure incurred when the Red Hills tank was low during the famine to supply the city of Madras.—*Vide* G.O., No. 623 W., dated 1st March 1879.
	Total ..	30,832	84,804	11,769	96,573	65,741	..	

APPENDIX B.

STATEMENT showing the Area, Compensation, Annual Assessment and Capitalized abatement of Land-revenue of the Land acquired for the Madras Water-supply and Irrigation Extension Project.

	LAND PAID FOR UP TO END OF 1879-80.		LAND REMAINING TO BE PAID FOR.		TOTAL.		Annual Assessment.	Capitalized abatement of Land-revenue.	Remarks.
	Area.	Compensation.	Area.	Compensation.	Area.	Compensation.			
	ACS. CTS.	RS. A. P.	ACS. CTS.	RS. A. P.	ACS. CTS.	RS. A. P.	RS. A. P.	RS. A. P.	
1. For all works other than the distribution and delivery channels.	4,330 95	1,30,218 2 9	294 49	4,713 10 8	4,625 44	1,34,931 13 5	7,846 13 3	1,96,170 11 3	*Vide* letters from Collector of Chingleput, No. 2,399, dated 20th June, and No. 3,056, dated 6th Aug. 1881.
2. For the distribution channels.	..	..	136 66	10,147 7 3	136 66	10,147 7 3	176 0 7	4,400 14 7	
3. For the delivery channel in the Chingleput district.	125 36	12,438 13 8	8 34	2,104 0 4	133 70	14,542 14 0	405 14 0	10,146 14 0	
Do. Madras district.	19 02	24,623 15 4	4 26	3,103 1 6	23 28	27,727 0 10	104 1 2	2,601 13 2	Do.—*Vide* letters from Collector of Madras, No. 893, dated 15th Nov. 1879, and No. 378, dated 7th April 1881.
Total ..	4,475 33	1,67,280 15 9	443 75	20,068 3 9	4,919 08	1,87,349 3 6	8,532 13 0	2,13,320 5 0	

APPENDIX C.

ABSTRACT STATEMENT of Annual Maintenance charges of the Madras Water Supply and Irrgation Extension Project.

Years.	Outlay on Repairs.	ESTABLISHMENT.			Tools and Plant.	Grand Total.
		Share of Public Wrks.	Water Regulation.	Total.		
	RS.	RS.	RS.	RS.	RS.	RS.
1870-71	7,954	1,38	...	1,988	199	10,141
1871-72	21,153	5,38	477	5,765	529	27,447
1872-73	6,463	1,66	636	2,252	162	8,877
1873-74	39,542	9,86	853	10,739	989	51,270
1874-75	8,537	2,14	1,192	3,326	213	12,076
1875-76	5,381	1,35	1,062	2,407	134	7,922
1876-77	11,411	2,83	1,139	3,992	285	15,688
1877-78	2,412	66	1,080	1,683	60	4,155
1878-79	2,936	73	1,074	1,808	73	4,817
1879-80	5,537	1,34	1,018	2,402	138	8,077
Total ...	1,11,326	27,83	8,531	36,362	2,782	1,50,470

MADRAS,
February 1881.

(Signed) D. H. TRAIL, Major, R.E.,
Offg. Examiner of Public Works Accounts

APPENDIX D.

Proceedings of the Board of Revenue, dated 5th November 1881, Miscellaneous No. 9,678.

Read letters from the Chief Engineer for Irrigation, dated 4th October 1881, No. 176 M, and 17th October 1881, No. 189 M.

THE areas entered in the revised statement and the revenue shown for years up to 1879-80 are correct, but the Board think that the revenue for years subsequent to 1879-80 should be calculated, not with reference to the average rates of the district, but the average rate at which the revenue was actually raised on the lands in 1878-79 or 1879-80 after the introduction of the Settlement. Taking the rates* of 1879-80 and applying them to the increased areas subsequent to 1879-80, the figures stand as shown in the margin,† which may be adopted.

	Rs.	A.	P.	
* First crop	2	6	8	pr acre.
Second crop	2	0	11	do.

Years.	Revenue. Rs.
† 1880-81	13,405
1881-82	14,667
1882-83	15,925
1883-84	17,184
1884-85	18,443
1885-86	19,704
1886-87	20,960
1887-88	22,222
1888-89	23,480
1889-90	24,741

2. The Board have no information in regard to the land assessment of waste lands brought under irrigation subsequent to the work.

True Extract.)

(Signed) E. GIBSON,
Acting Secretary.

(FORM 3.—GOVERNMENT OF INDIA CIRCULAR No. XVII OF 1880.)

ESTIMATE of Growth of Irrigation and Revenue Receipts and Charges, Madras Water-supply and Irrigation Extension Project.

Year.	Irrigated Area at end of Year.		REVENUE RECEIPTS AND CHARGES.										
			Revenue due to Works.					Charges against Revenue Account.			Net Earnings due to Works.		
			Direct Receipts.			Enhanced Land Revenue or Indirect Receipts.	Total.						
	First Crop.	Second Crop.	Public Works Department.	Revenue Department.	Total.			Maintenance Charges in Public Works Department.	Collection Charges in Revenue Department.	Total.	Including enhanced Land Revenue.	Excluding enhanced Land Revenue.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1870-71 ..	179	..	..	1,56	1,506	..	..	4,556	108	4,664	..	— 3,158	Actuals.
1871-72 ..	793	..	..	— 4	— 64	..	..	13,901	..	13,901	..	—13,965	
1873-74 ..	1,724	..	..	1,88	1,816	..	..	3,873	131	4,004	..	— 2,188	
1874-75 ..	1,291	1,029	..	1,62	1,652	..	..	26,766	119	26,885	..	—25,233	
1875-76 ..	1,913	1,403	..	3,55	3,585	..	..	5,601	258	5,859	..	— 2,274	
1876-77 ..	1,918	1,578	..	4,95	4,935	..	..	3,358	355	3,713	..	1,222	
1877-78 ..	1,033	1,004	..	— 7,15	— 7,185	..	..	7,551	..	7,551	..	—14,736	
1878-79 ..	2,313	547	..	4,87	4,857	..	..	1,324	350	1,674	..	3,183	
1879-80 ..	1,989	2,214	..	10,33	10,333	..	..	1,681	744	2,425	..	7,908	
	2,648	2,769	..	12,19	12,149	..	..	3,441	875	4,316	..	7,833	

NOTE 1.—The old cultivation averaging 3,29 acres and yielding a water-tax of Rs. 8,576 has been omitted from this table.
2.—The figures in column 5 for the yars subsequent to 1879-80 have been taken from Proceedings, Board of Revenue, No. 9678, dated 5th November 1881.
3.—Statement D-I shows how the figres in column 9 have been obtained.
4.—The collection charges in the Revenue Department have been calculated at 7·2 per cent. on revenue column 6.

Estimate of Growth of Irrigation and Revenue Receipts and Charges, &c.—*cont.*

Year.	Irrigated Area at end of Year.		REVENUE RECEIPTS AND CHARGES.										
			Revenue due to Works.					Charges against Revenue Account.			Net Earnings due to Works.		
			Direct Receipts.			Enhanced Land Revenue or Indirect Receipts.	Total.						
	First Crop.	Second Crop.	Public Works Department.	Revenue Department.	Total.			Maintenance Charges in Public Works Department.	Collection Charges in Revenue Department.	Total.	Including enhanced Land Revenue.	Excluding enhanced Land Revenue.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1880-81 ..	2,985	2,984	Rs. ..	Rs. 13,405	Rs. 13,405	Rs. ..	..	Rs. 3,923	Rs. 965	Rs. 4,888	Rs. ..	Rs. 8,517	
1881-82 ..	3,323	3,200	..	14,667	14,667	..	..	3,923	1,056	4,979	..	9,688	
1883-84 ..	3,660	3,416	..	15,925	15,925	..	..	3,923	1,147	5,070	..	10,855	
1884-85 ..	3,998	3,631	..	17,184	17,184	..	..	3,923	1,237	5,160	..	12,024	
1885-86 ..	4,335	3,847	..	18,443	18,443	..	..	3,923	1,328	5,251	..	13,192	
1886-87 ..	4,673	4,063	..	19,704	19,704	..	..	3,923	1,419	5,342	..	14,362	
1887-88 ..	5,010	4,278	..	20,960	20,960	..	..	3,923	1,509	5,432	..	15,528	
1888-89 ..	5,348	4,494	..	22,222	22,222	..	..	3,923	1,600	5,523	..	16,699	
1889-90 ..	5,685	4,710	..	23,480	23,480	..	..	3,923	1,691	5,614	..	17,866	
	6,023	4,926	..	24,741	24,741	..	..	3,923	1,781	5,704	..	19,037	

NOTE 1.—The old cultivation averaging 3,829 acres and yielding a water-tax of Rs. 8,576 has been omitted from this table.
2.—The figures in column 5 for the years subsequent to 1879-80 have been taken from Proceedings, Board of Revenue, No. 9678, dated 5th November 1881.
3.—Statement D-I shows how the figures in column 9 have been obtained.
4.—The collection charges in the Revenue Department have been calculated at 7·2 per cent. on revenue, column 5.

STATEMENT D.I.

STATEMENT showing the way in which the entries in Column 9 of Estimate Form 3 have been obtained.

Years.	Balance of Maintenance Charges after deducting Rs. 1,704 for old Irrigation.	Portion of Balance Chargeable to		Remarks.
		Imperial at 54 per cent.	Provincial at 46 per cent.	
1	2	3	4	5
	Rs.	Rs.	Rs.	
1870-71	8,437	4,556	3,881	
1871-72	25,743	13,901	11,842	
1873-74	7,173	3,873	3,300	
1874-75	49,566	26,766	22,800	
1875-76	10,372	5,601	4,771	
1876-77	6,218	3,358	2,860	
1877-78	13,984	7,551	6,433	
1878-79	2,451	1,324	1,127	
1879-80	3,113	1,681	1,432	
	6,373	3,441	2,932	
1880-81	7,265	3,923	3,342	* The average actual expenditure of eight years, exclusive of the expenditure incurred in 1871-72 and 1873-74, has been assumed to be the amount of maintenance charges in the Public Works Department.
1881-82	7,265	3,923	3,342	
1882-83	7,265	3,923	3,342	
1883-84	7,265	3,923	3,342	
1884-85	7,265	3,923	3,342	
1885-86	7,265	3,923	3,342	
1886-87	7,265	3,923	3,342	
1887-88	7,265	3,923	3,342	
1888-89	7,265	3,923	3,342	
1889-90	7,265	*3,923	3,342	

The figures in column 3 of this statement have been entered in column 9 of the Estimate Form 3.

CHEPAUK,
h November 1881.

(Signed) JOHN MULLINS, Colonel, R.E.,
Chief Engineer for Irrigation.

APPENDIX E.

LIST of Component Works, Madras Water-Supply and Irrigation Extension Project.

No.	Items.	Mileage. Miles.	Mileage. Chain of 66 feet.	Remarks.	Level above M.S.L.	
1	2	3		4	5	
1	Thamarapak anicut	...	...	...	Crest	69·86
	Do. under sluice	...	...	...	Sill	63·86
2	Inspection bungalow	...	...	...		
	Supply channel, Cholaveram tank ...	...	...	...		
	Head sluice, do. ...	...	...	...		
	Inlet	0	20	...	Sill	63·86
	Bridge	0	55	...		75·12
	Kattankal surplus weir	1	60	...		62·84
	Do. do.	...	...	...	Crest	65·86
	Inlet	1	66	...	Sill	62·86
	Do.	2	8	...		67·86
	Do.	2	39	...		67·24
	Do.	2	63	...		65·98
	Do.	2	69	...		64·12
	Bridge	3	3	...		63·40
	Inlet	3	26	...		58·30
	Do.	3	44	...		62·81
	Do.	3	68	...		63·05
	Old Boosikal diversion	4	11	...		63·79
	Boosikal surplus weir	4	53	...		65·23
	Do. do.	4	64	...	Crest	59·69
	Ramapuram bridge across Boosikal floor.	4	73	...	Sill	56·69
	Bridge	4	79	...		56·92
	Do.	5	55	...		54·39
	Aqueduct, Alacheri	6	12	...		53·00
3	Cholaveram tank	8	14	Channel ends.		52·10
				Begins north end of bund.	...	
	Do. north weir	0	9	...	...	
	Do. weir	0	43	...	Crest	63·62
	Do. weir sluice	0	43·84	...	Crest	61·68
	North sluice	1	0	...	Sill	52·68
	South sluice	2	3·63	...	Sill	41·83
	Inspection bungalow	2	22	Tank ends.	...	
4	Supply channel to Red Hills tank ...	2	45	...	...	
	Head sluice do.	2	5	...	...	
	Inlet	1	25	Mileage of Cholaveram tank.	Sill	45·33
	Girder bridge	2	29	...		48·20
5	Red Hills tank	2	50	...	...	
				Channel ends.	...	
				Begins at left wing of weir (Mr. Fraser's).	...	
	Surplus weir, Red Hills tank ...	0	11	...	Crest	46·31
	Weir sluice (irrigation)	0	15	...		31·42
	Ten-vent surplus sluice (in weir) ...	0	21·06	...	Sill	31·31
	North sluice	0	32·34	...	Sill	20·66
	Polal sluice	1	27·07	...	Sill	21·10
	Inspection bungalow	2	30	...	...	
	Soorapedoo sluice	3	3·25	...	Sill	27·31
	Municipal do.	3	15	...	Sill	31·31
		3	27	Tank ends.	...	

No. 17. ORDER THEREON, 9th December 1881, No. 849 I.

THE report submitted by the Chief Engineer for Irrigation on the revised estimate for the Madras Water-supply and Irrigation Extension project fully explains the several differences between the present sanction for this project and the amount of the revised estimate. The latter amounts to Rs. 18,54,463.

2. Of the above sum the component items are—

(1.) Direct charges—

	Rs.
Works	13,42,950
Establishment	2,19,255
Tools and Plant	8,201
	15,70,406
Deduct receipts	1,167
	15,69,239

(2.) Indirect charges—

Capitalized abatement of Land Revenue	2,13,320
Interest during construction	71,904
Total ...	18,54,463

This total does not differ very materially from the given in Proceedings of Madras Government, No. 2650 of the 2nd October 1876, which was Rs. 18,06,720.

Of this total the amount chargeable to Imperil (Irrigation) is Rs. 9,82,105.

Provincial on account of the water-supply of the city of Madras ,, 8,72,358.

The distribution of the charge has been made as follows:—

1*st.*—All items belonging exclusively to ither service have been charged thereto.

2*nd.*—The shares of charges for items appertaining to both services have been fixed a 54 per cent. for Imperial and 46 per cen for Provincial.

G.O., No. 2,650, dated 2nd October 1876.

3. The net excess over the present sanctio under *Works* is Rs. 1,16,225, and this is more than covered by the aggregate Rs 1,88,158 of the items not before provided for but found requisite as explained in deil in the report. There has been hitherto no sanction for establishment and thisitem amounts to Rs. 2,19,255 altogether; the charges to cover which additional sction is required are—

	Rs.
Direct charges	3,43,681
Indirect do.	2,85,224
Total ...	6,28,905

4. With regard to the Imperial share of the roject so far as can be at present judged the annual charges for interest on outla, maintenance, and collection of revenue w amount to about ... Rs. 43,186*

	Rs.
* Interest	37,482
Maintenance	3,923
Collection	1,781
	43,186

and the rev ue (water-tax) to ... ,, 24,741

Annual deficit ... ,, 18,445

It is poss e that the results may be ultimately m favorable, but it is tolerably clear that the probability of the revenue fully co ring the interest charges is very remote.

5. Provincial will however be still less favorably circumstanced, viz. :—

	Rs.
Interest on At 4½ per cent.	7,36,295*
Share of maintenance charges	33,133
	3,342
Total ...	36,475

* Direct charges.

against which the receipts from the Municipality are not likely to exceed Rs. 12,000, so that the Government contribution to the water-supply of Madras will be but little under Rs. 24,500 a year, and at the present time it is considerably more.

6. It is observed from Statement D.I. that the Provincial share of maintenance charges up to the end of 1879-80 amounted to Rs. 61,378, and the Examiner of Public Works Accounts will see that this and the share for subsequent years are duly adjusted.

7. Ordered that the revised estimate be forwarded for the sanction of the Government of India with a copy of these Proceedings.

(True Extract.)

(Signed) JOHN MULLINS, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Superintending Engineer, Fifth Circle.
" Chief Engineer for Irrigation.
" Examiner of Public Works Accounts.
" Revenue Department.
" Financial do.

No. 18. (DOCKET No. 85 I., dated 9th December 1881.)

Forwarded accordingly.

(Signed) JOHN MULLINS, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

Exd. S. T. Austin.
Spare Copies

IRRIGATION.
ACCOUNT.

Govt. of 1881 Madras.

PUBLIC WORKS.

To

THE SECY. TO THE GOVT.
OF INDIA

Dated December, 9th.

Issued.

Recd. *Enc'*

9th December 1881, *No.* 850 *A.*

DECEMBER.

Nos. 16—18.

FORWARDING for sanction revised estimate for the Madras Water-supply and Irrigation Extension System.

MADRAS WATER SUPPLY AND IRRIGATION EXTENSION SYSTEM.

No. 150 I.

Note by the Chief Engineer for Irrigation.

IN the subjoined note is recorded the total expenditure on the Madras Water Supply and Irrigation Extension System to the end of 1880-81, and a comparison is drawn between the revised estimate and that sanctioned by the Government of India in their letter No. 695 I., dated 10th November 1871, the cause of excess on individual items or of additional expenditure being duly explained.

Statement of Total Outlay on the Madras Water Supply and Irrigation Extension Project to the end of 1880-81.

Particulars of Charges.	To end of 1874-75 as per G.O., No. 341, dated 8th Feb. 1876.	1875-76.	1876-77.	1877-78.	1878-79.	1879-80.	1880-81.	Total to end of 1880-81.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Works ..	11,73,436	6,119	(a)15,541	(a)2,530	(b)24,410	9,141	11,533	12,42,710
Establishment ..	1,83,977	1,676	3,885	633	6,102	2,285	2,295	2,00,853
Tools and Plant ..	4,779	62	389	63	610	229	229	6,361
Suspense	(c)	..	..	..	..	..	..	..
Total ..	13,62,192	7,857	19,815	3,226	31,122	11,655	14,057	14,49,924
Receipts on Capital Account	1,167	..	..	..	..	..	..	1,167
Net Total ..	13,61,025	7,857	19,815	3,226	31,122	11,655	14,057	14,48,757
Capitalization of abatement of Land Revenue.	1,95,647	(d)	(d)	(d)	(d)	(d)	(d)	1,95,647
Interest	71,904	..	..	..	..	..	..	71,904
Grand Total ..	16,28,576	7,857	19,815	3,226	31,122	11,655	14,057	(e) 17,16,308

(a) The charges up to 1875-76 stand debited to Capital, but from 1876-77 to Ordinary Agricultural for which Capital and Revenue Accounts are not kept. The Establishment and Tools and Plant charges were not calculated from 1876-77, no administrative accounts being kept up for this project. The amounts now shown are specially calculated for the purpose of this statement.

(b) Of this amount Rs. 23,214 are debited to Provincial grant and the remainder, Rs. 1,196, to Ordinary Agricultural for which Capital and Revenue Accounts are not kept.

(c) Suspense balances have been removed, *vide* Office Note dated 20th November 1879.

(d) The abatement of land revenue during these years is not known, and the charges for "Leave and Pension Allowances" have been omitted as they are not intended for works for which Capital and Revenue Accounts are not kept, *vide* G.O., No. 1,949, dated 2nd August 1876.

(e) Rs. 3,00,000 have been paid on account of this project from Provincial Funds to Loan Funds (Capital Productive Public Works).

Irrigation and Navigation Works

Irrigation and Navigation Works

2. The principal causes of excess expenditure on this project are as follow:—

1*st*.—The extension or modification of several of the component works.

2*nd*.—The omission of essential items from the former estimate.

3. Under the head of Direct Charges the excess under Works is shown to be Rs. 1,96,697. Of this amount the items not provided for in the estimate last sanctioned aggregate Rs. 188,158,* so that the actual increase on items previously sanctioned is Rs. 8,539.

* Exclusive of the erroneous Establishment debit of Rs. 24,866.

	RS.
On the other hand the decreases shown amount to Rs. 79,305, making the net excess on *works* to be ...	1,17,392
Add for Establishment	2,19,255
Add for Tools and Plant	8,201
	3,44,848
Deduct receipts on Capital Account	1,167
Total amount of Direct Charges requiring sanction ...	3,43,681
To which add total amount of Indirect Charges ...	2,85,224
Grand total of Direct and Indirect Charges requiring sanction in excess of the estimate sanctioned in letter No. 695 I., dated 10th November 1871	6,28,905

4. The total amount of the revised estimate including both charges is therefore Rs. 18,54,463,† of which the Provincial share, for the supply of the City of Madras, is Rs. 8,72,358, leaving a balance of Rs. 9,82,105, to be met from Imperial Funds.

† *Vide* Abstract B.

5. Under the head of Compensation the land taken up for the project is 4,919·08 acres, valued at Rs. 1,87,349-3-6, and may be particularised as follows :—

Chingleput District.

		ACRES.	RS.	A.	P.
Collector's letter No. 2,399, dated 20th June 1881.	For all works other than the Delivery channel ...	4,762·10	1,45,079	4	8
	For the open Delivery channel	133·70	14,542	14	0

Madras District.

Collector's letter No. 893, dated 15th November 1879.	For the open Delivery channel	20·82	17,891	6	0
	For Municipal works below the end of the open Delivery channel	2·46	9,835	10	10
	Total Municipal ...	156·98	42,269	14	10
	Grand Total ...	4,919·08	1,87,349	3	6

6. The amount paid by Government for land taken up for Municipal purposes is as under :—

	ACRES.	RS.		
Chingleput District	125·36	12,438	13	8
Madras District	19·02	24,623	15	4
Total paid for	144·38	37,062	13	0
Do. not paid for	12·60	5,207	1	10
Total Municipal ...	156·98	42,269	14	10

7. The amount paid for land taken up for the project for other than Municipal purposes is as follows :—

	ACRES.	RS.	A.	P.
Land paid for	4,330·95	1,30,218	2	9
Do. not paid for	431·15	14,861	1	11
Total ...	4,762·10	1,45,079	4	8
Total land paid for in both cases ...	4,475·33	1,67,280	15	9*
Total land not paid for in both cases.	443·75	20,068	3	9
Grand Total ...	4,919·08	1,87,349	3	6

* Of this sum only Rs. 1,60,719 have been booked by the Examiner up to end of 1880-81.

8. It was anticipated many years ago that there would be a considerable increase in the estimated amount of land compensation, and in G.O., No. 2,783, dated 10th September 1867, it was stated that the compensation for land would amount to Rs. 2,06,000, which is a fair approximation to the actual demand.

9. The following statement shows the area irrigated and the revenue derived under the project both before and after the construction of the work. Correct figures are only available up to the end of 1879-80 (Fasli 1289).

Proceedings of the Board of Revenue, Mis. No. 11,356, dated 2nd December 1879.
Do. do. No. 3,606, dated 5th April 1881.

	Fasli.	Area Irrigated. First Crop.	Area Irrigated. Second Crop.	Revenue exclusive of Remissions. Land.	Revenue exclusive of Remissions. Water.	Revenue exclusive of Remissions. Total.	Remarks.
		ACS.	ACS.	RS.	RS.	RS.	
Years prior to the construction of the work.	1265 ...	2,283	Not known.	2,588	4,968	7,556	
	1266 ...	3,441		4,038	7,711	11,749	
	1267 .	3,534		4,179	8,361	12,540	
	1268 ...	3,763		4,499	8,825	13,324	
	1269 ...	4,131		4,853	9,539	14,392	
	1270 ...	3,811		4,632	8,964	13,596	
	1271 ...	4,101		4,863	8,968	13,831	
	1272 ...	4,255		5,082	9,265	14,347	
	1273 ...	4,423		5,326	9,652	14,978	
	1274 ..	4,379		5,263	9,861	15,124	
	1275 ...	4,626		5,617	10,171	15,788	
	1276 ...	3,997		4,888	9,431	14,319	
	1277 ..	3,383		3,919	7,552	11,371	
	1278 ...	3,027		3,306	6,181	9,487	
	1279 ...	4,283		5,099	9,198	14,297	
	Total ...	57,437	...	68,052	1,28,647	1,96,699	
	Average ...	3,829	...	4,537	8,576	13,113	
Years subsequent to the construction of the work.	1280 ...	4,008	...	4,947	10,082	15,029	
	1281 ...	4,622	...	5,922	8,512	14,434	
	1282 ...	5,553	...	7,355	10,392	17,747	
	1283 ...	5,120	1,029	6,768	10,228	16,996	
	1284 ...	5,742	1,403	7,279	12,161	19,440	
	1285 ...	5,747	1,578	7,308	13,511	20,819	
	1286 ...	4,862	1,004	6,011	1,391	7,402	Famine year.
	1287 ...	6,142	547	6,493	13,433	19,926	
	1288 ...	5,818	2,214	6,249	18,909	25,158	
	1289 ...	6,477	2,769	7,105	20,725	27,830	
	Total ...	54,091	10,544	65,437	1,19,344	1,84,781	
	Average ..	5,409	1,054	6,543	11,934	18,478	

10. The extended works may be considered to have come into operation in Fasli 1280 (1870-71), and the following table shows the increase of area and revenue for each year from that date inclusive—

Periods.	Area Irrigated.			Revenue exclusive of Remissions.			Difference.	
	First Crop.	Second Crop.	Total.	Land.	Water.	Total	Area.	Revenue.
Average for the fifteen years 1855-56 to 1869-70.	ACRES. 3,829	ACRES. ..	ACRES. 3,829	RS. 4,537	RS. 8,576	RS. 13,113	ACRES. ..	RS. ..
Fasli 1280 (1870-71) ..	4,008	..	4,008	4,947	10,082	15,029	179	1,916
,, 1281 (1871-72) ..	4,622	..	4,622	5,922	8,512	14,434	793	1,321
,, 1282 (1872-73) ..	5,553	..	5,553	7,355	10,392	17,747	1,724	4,634
,, 1283 (1873-74) ..	5,120	1,029	6,149	6,768	10,228	16,996	2,320	3,883
,, 1284 (1874-75) ..	5,742	1,403	7,145	7,279	12,161	19,440	3,316	6,327
,, 1285 (1875-76) ..	5,747	1,578	7,325	7,308	13,511	20,819	3,496	7,706
,, 1286 (1876-77) ..	4,862	1,004	5,866	6,011	1,391	7,402	2,037	— 5,711
,, 1287 (1877-78) ..	6,142	547	6,689	6,493	13,433	19,926	860	6,813
,, 1288 (1878-79) ..	5,818	2,214	8,032	6,249	18,909	25,158	4,203	12,045
,, 1289 (1879-80) ..	6,477	2,769	9,246	7,105	20,725	27,830	5,417	14,717
Total ..	..	..	64,635	..	..	1,84,781	24,345	53,651
Average ..	..	..	6,463	..	..	18,478	2,434	5,365

11. The cause of the great falling off in revenue in 1876-77 is owing to Government, in April 1876, having adopted measures in consequence of the continued drought to diminish the offtake. The Collector was directed to limit cultivation and to prevent further use of water for irrigation purposes.

G.O., Revenue Department, No. 844, dated 8th April 1876.

G.O., Public Works Department, No. 165, dated 25th April 1876.

In March 1877 Government directed the immediate closure of all the irrigation sluices.

G.O., Public Works Department, No. 703, dated 1st March 1877.

12. The possibility of restrictive orders of the above-mentioned nature having to be issued has necessarily exercised a prejudicial effect on the area irrigated and the revenue obtained.

13. The Comparative Statement, Appendix A, shows the difference between the last sanctioned estimate (recorded in Proceedings of Madras Government, No. 2,171, 23rd August 1871, and permission to carry out which was communicated with G.O., No. 65, dated 10th January 1872,) and the present revised estimate, the cause of excess being briefly explained in each case. An abstract of this statement is subjoined.

Abstract A.

Particulars.	Amounts in the Estimate sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in Proceedings of Madras Government No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or Totalsof Columns 3 and 4.	Increase.	Decrease.
1	2	3	4	5	6	9
Imperial and Provincial.						
I.—Anicut and Head Works ..	RS. 57,650	RS. 95,839	RS. ..	RS. 95,839	RS. 29,951	RS. 1,762
II.—Cholaveram Tank supply channel .	2,40,692	2,08,710	36,960	2,45,670	39,830	34,852
III.—Cholaveram Tank	2,40,078	2,67,367	..	2,67,367	30,593	3,304
IV.—Red Hills Tank supply channel ..	1,32,389	1,32,882	..	1,32,882	493	..
V.—Red Hills Tank	2,65,254	2,82,865	15,744	2,98,609	41,904	8,549
VI.—Distribution, &c., below the two tanks	25,000	8,051	19,150	27,201	2,201	..
VII.—Land other than for Madras Municipality	*1,75,917	1,30,218	14,861	1,45,079	..	30,838
VIII.—Miscellaneous	47,746	56,840	1,756	58,596	10,850	..
	11,94,726	11,82,772	88,471	†12,71,243	1,55,822	79,305

* This was for all the land. † Includes Rs. 70,230 chargeable wholly to Imperial.—*Vide* paragraph 20.

Abstract A—*cont.*

Particulars.	Amounts in the Estimate sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in Proceedings of Madras Government No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or Totals of Columns 3 and 4.	Increase.	Decrease.
1	2	3	4	5	6	7
Provincial.						
IX.—Items chargeable to Provincial, on *Works*	RS. 30,832	RS. 84,804	RS. 11,769	RS. 96,573	RS. 65,741	RS. ..
Deduct amount charged to Works, which properly belonged to Establishment	12,25,558 ..	12,67,576 24,866	1,00,240 ..	13,67,816 24,866	2,21,563 24,866	79,305 ..
Establishment	12,25,558	12,42,710	1,00,240	13,42,950	1,96,697	79,305
Tools and Plant	.. ..	2,00,853 6,361	18,402 1,840	2,19,255 8,201	2,19,255 8,201	.. ..
Deduct Receipts on Capital Account.	12,25,558 ..	14,49,924 1,167	1,20,482 ..	15,70,406 1,167	4,24,153 1,167	79,305 ..
Total, Direct Charges ..	12,25,558	14,48,757	1,20,482	15,69,239	4,22,986	..
Capitalization of abatment of Land Revenue	..	1,95,647	17,673	2,13,320	2,13,320	..
Interest	..	71,904	..	71,904	71,904	..
Total, Indirect Charges ..	..	2,67,551	17,673	2,85,224	2,85,224	..
Grand Total ..	12,25,558	17,16,308	1,38,155	18,54,463	7,08,210	79,305
Deduct amount of estimate sanctioned by the Government of India in letter No. 695 I., dated 10th November 1871, embodied in Proceedings of Madras Government No. 65, dated 10th January 1872.	..	..	..	12,25,558	79,305	..
Net amount requiring sanction ..	..	..	..	6,28,905	6,28,905	..

Abstract B.

Particulars.	Direct Charges.				Indirect Charges.			Grand Total.
	Works.	Establishment.	Tools and Plant.	Total.	Capitalized abatement of Land Revenue.	Interest.	Total.	
I.—Imperial	RS. 70,230	RS. 17,557	RS. 1,755	RS. 89,542	RS. 4,401	RS. ..	RS. 4,401	RS. 93,943
II.—Imperial and Provincial	11,74,980	1,95,830	5,860	13,76,670	1,96,171	71,904	2,68,075	16,44,745
III.—Provincial	96,573	5,868	586	1,03,027	12,748	..	12,748	1,15,775
	13,41,783	2,19,255	8,201	15,69,239	2,13,320	71,904	2,85,224	18,54,463

Total, Revised Estimate .. 18,54,463

			Imperial.	Provincial.		
I.—Items chargeable wholly to Imperial.	Direct charges ..		RS. 89,542	RS. ..		RS.
	Indirect do. ..		4,401	..	Amount chargeable to Provincial ..	8,72,358
II.—Items chargeable to Imperial and Provincial by the shares 54 and 46 respectively.	Direct charges.	RS. 13,76,670	7,43,402	6,33,268	Amount already met from do.—	
	Indirect do.	2,68,075	1,44,760	1,23,315	By transfer in 1876-77.. 50,000	
					Do. in 1878-79.. 50,000	
					Do. in 1879-80.. 1,00,000	
					Do. in 1880-81.. 1,00,000	
III.—Items chargeable wholly to Provincial.	Direct charges ..		..	1,03,027	From the Reserve, G.O., No. 623 W., 1st March 1879 23,214	
	Indirect do. ..		..	12,748		3,23,214
			9,82,105	8,72,358	Balance due to Imperial	5,49,144
	Total Revised Estimate ..		18,54,463			

* Refund to P.P.W

14. In paragraph 3 above it was shown that the revised estimate includes works not previously provided for, which are estimated to, or have cost Rs. 1,88,158.

The principal items are :—

		Rs.
(1).	Lengthening Thamarapak anicut	23,437
(2).	Cholaverm Tank channel. Increasing capacity of Kattankal surplus weir	19,000
	Do. Increasing capacity of Boosikal surplus weir	17,400
(3).	Reconstructing a portion of the bund of Cholaveram tank ...	29,832
(4).	Surplus sluices, Red Hills Tank	20,023
(5).	Drainage of rear part of bund, &c., of do.	9,880

and the following remarks, in addition to the brief explanations given in the comparative statement, are submitted regarding these. All these items have been specially approved by Government.

15. Item 2 of Comparative Statement.—*Extension of the Thamarapak Anicut.*—The insufficient length, 474 feet, of the anicut as originally constructed was made evident by the fresh of November 1872 in the Kortalayár. The river having risen to 13 feet above the crest and to several feet above the level of the country on the north side, a large breach was made through the bank behind the north wing, though but little damage was sustained by the anicut. The work was inspected by the Inspector-General of Irrigation and he concurred in the necessity for lengthening the anicut by 150 feet, so as to carry it across the breach to the new line of the river bank. A still higher fresh occurred in 1874 and showed that the additional length of weir had not been provided without sufficient reason.

G.O., No. 2,132, dated 25th August 1873.

16. Items 11 and 29 of Comparative Statement.—*Alteration of the Kattankal and Boosikal Surplus Weirs.*—The requirements for cross drainages were in the first instance very inadequately provided for. The areas of the drainage basins were not properly ascertained, while up to 1872 the maximum flood level in the Kortalayár was not even approximately known, the calculations made when the project was originally drawn up being very far from correct. The result has been that the Cholaveram Tank supply channel has suffered on several occasions very extensive damage. The circumstances unfortunately do not admit of completely satisfactory arrangements at a reasonable cost. Should the river be in extreme fresh when the local rainfall approaches a maximum, the discharge of the drainages will not be capable of being disposed of without exceeding the intended maximum water level in the channel, and on the rare occasions when these unfavorable circumstances may be expected to occur, the left bank of the channel will probably breach at places which will be left exceptionally low so as to fix the site of the breaches.

G.O., No. 2,785, dated 17th October 1876.

17. Item 39 of Comparative Statement.—*Reconstructing a portion of the bund of the Cholaveram Tank.*—The bund of this tank before its enlargement was a small one, and the new earthwork was placed partly inside and partly outside the old bund. This led to slips in the rear slope, and it was found necessary to secure stability by turning over the rear part near the south end and thus reforming the bank on the inside of the old bund. The bund has given no trouble since this was done. The length dealt with was 1,100 feet.

G.O., No. 271, dated 4th February 1874.

18. Item 47 of Comparative Statement.—*Surplus Sluices of ten vents. Red Hills Tank.*—These sluices which have been built in the southern part of the surplus weir of the tank were deemed necessary as a safeguard, owing to the unsatisfactory condition of the bund of this large reservoir. The surplus weir is of ample capacity to discharge all the water to be disposed of, but it does not come into action until the water rises above full tank level. On several occasions there have been extensive slips in the bund, which were occasioned by subsoil leakage, as also by water getting into the bund itself above ground level, and considerable anxiety was expressed lest the breaching of the tank should inundate Madras. It was considered therefore to be desirable to

G.O., No. 2,322, dated 11th August 1875.

provide means for rapidly lowering the water level should the bund be in danger of giving way, as also to allow of the discharge of surplus without necessitating the rise of the water level in the reservoir to as great a height above full tank level as would be necessary were all such surplus to be passed over the weir. Although Madras would not be inundated were the tank to breach, such an accident would be a very serious matter, whether the damage to property, the cost of repairs, or the loss of water, with the consequent cessation of irrigation and of the water-supply to the city, be considered. The construction of the sluices was therefore sanctioned by Government, but so far, owing to bad work, and badly set up gear for working the shutters, they have been of little use. The defects are being remedied.

The excess on the ring-bund in connection with these sluices is explained in the Comparative Statement Item No. 47.

19. Item 58 of Comparative Statement.—*Drainage of rear part of bund of the Red Hills Tank.*—The slips which have from time to time occurred, and the state of the bund at the slips, indicated that, unless the leakage which had caused these could be prevented from saturating the base of the rear part of the bund, and the leakage conveyed away, accidents would continue to occur. Borings which were made showed that much of the old bund, as well as of the additions made thereto, was formed of bad soil, and as the bund rests for a large part of its length on porous laterite there is not only leakage through the bund, but also through the subsoil to be provided against. After consideration, the conclusion was arrived at that a suitable puddle wall could not be inserted in the bund without lowering the water level in the tank to a greater extent, and keeping it down for a much longer period than could be allowed without great inconvenience to the City of Madras. As, in any case, drains would be needed to dispose of subsoil leakage, it was decided (G.O., No. 406 I., 24th June 1880,) that, at any rate in the first instance, these drains should be constructed and their effect ascertained before any final decision against or for a puddle wall was come to.

The work is in progress, and the regular estimate for it was sanctioned in G.O., No. 498 I., dated 6th August 1881.

20. In preparing this revised estimate it has been considered desirable to show distinctly :—

1*st.*—The total amount to be divided between Imperial (Irrigation) and Provincial.

2*nd.*—The amount chargeable to Provincial only.

With regard to the division of the former, it was estimated in the papers printed in Proceedings of Madras Government, No. 2,650, of the 2nd October 1876, that the Provincial share would be 46 per cent. and the Imperial share 54 per cent. of the total; the shares being based on the quantity of water required to be reserved for Municipal purposes, and on that therefore left for irrigation. There was for a time a doubt as to whether the quantity required for Madras might not have to be increased, in connection with the drainage arrangements of the city, but by G.O., No. 598-A I., of the 10th October 1879, it was settled that no more water would need to be reserved. It is believed therefore that no closer approximation than that already given can be made to the shares appertaining to Provincial and Imperial respectively. The amount to be divided is that for the part of the project common to both services. That part which belongs exclusively to the supply of Madras and which therefore belongs entirely to Provincial, and that part* which provides for distributaries and which belongs exclusively to Irrigation, have not been included in the amount to be divided.

* Items 37, 51, 52, 53, 60, 61 to 64 and 65 of Comparative Statement.

21. Two of the entries under Direct Charges appertaining to Provincial solely may require brief explanation.

Land Compensation. Item 71 *of Comparative Statement.*—The cost of the land taken up for the Municipal delivery channel from the Red Hills Tank and for the subsidiary works has been finally settled, and it was at first determined that the Municipality should refund to Provincial Rs. 29,422, the value of 56·2 acres required

the land in excep[illegible] the

for the original design at the average rate for the 156·98 acres actually taken up. The Municipality for their own convenience adopted a line quite different to that originally determined on, but they nevertheless objected to the enforcement of this claim. Though there is no doubt that it might have been made legally binding on them, the Government have (Proceedings of Madras Government, No. 492 I., of 5th August 1881,) determined not to enforce it, in consequence of the impecunious state of the Municipality. The whole of the land compensation for the delivery channel, amounting to Rs. 42,270, forms therefore a charge against Provincial.

Pumping and dismantling Pumps. Item 74 of Comparative Statement.—The water in the Red Hills Tank in 1876 having fallen to an unusually low level pumping had to be resorted to in order to keep up the supply to the City of Madras, and the cost was ordered, in Financial G.O.,

G.O., No. 623 W., dated 1st March 1879.
" " 1,415, dated 7th June 1876, Financial.
" " 620, dated 4th April 1876 "

No. 82, dated 18th January 1879, to be debited to Public Works, Provincial.

22. It has been shown that the Capital expenditure debitable to Imperial (Irrigation) will amount to for—

	Rs.
Direct Charges	8,32,944
Indirect "	1,49,161
Total ..	9,82,105

In Appendix C will be found a statement showing the maintenance charges from 1870-71, when the project first came into operation, up to 1879-80. The average outlay for this period of ten years excluding 1871-72 and 1873-74 which were abnormal years has been Rs. 8,969 yearly, from which deducting Rs. 1,704, the assumed cost* of maintenance of the old tanks, the increased cost of upkeep to be distributed becomes Rs. 7,265, and of this 54 per cent. or Rs. 3,923 is chargeable to Irrigation. The increase of revenue being, up to 1879-80, Rs. 5,365 per annum on the average, as shown in paragraph 10 above, this increase was sufficient to cover the maintenance expenses.

	Rs.
Works, calculated at 10 per cent. on average old revenue	1,311
Establishment, &c., at 30 per cent. on works...	393
	1,704

* Proceedings of Madras Government, No. 2,650, 2nd October 1876.

23. But there is no probability of the returns from the project covering the interest on the outlay.

The gross income necessary to make the project properly remunerative would be—

	Rs.
4½ per cent. on Rs. 8,32,944	37,482
Maintenance charges 3,923 }	5,704
Collection do. 1,781 }	
Total ...	43,186

	Acs.
Total irrigable area, *vide* paragraph 1 of Note in Proceedings of Madras Government, No. 2,650, 2nd October 1876	9,852
Deduct average old irrigated area, *vide* paragraph 9 of this Note	3,829
	* 6,023

and the water-supply is not likely to suffice for more than 6,023* acres of additional irrigation. The estimated ultimate direct revenue (water-tax) amounts to only Rs. 18,445, and this would leave a yearly deficit of Rs. 25,158. The actual return from the works, after paying maintenance and collection charges would on this estimate be Rs. 19,037, which is equivalent to 2·28 per cent. on the Direct Charges or to 1·9 per cent. on Direct and Indirect Charges.

24. The estimate of growth of irrigation and of Revenue Receipts and Charges has been drawn up with reference to the Proceedings of the Board of Revenue, No. 9,678, dated 5th November 1881, (*Vide* Appendix D). This estimate is in

Form 3, modified to suit the circumstances of the present case, of Circular No. 17 of 1880 from the Government of India. The enhanced land revenue, or Indirect Receipts, has not been included for the reason assigned by the Board of Revenue in paragraph 2 of their Proceedings.

25. This Note is followed by Appendices showing :—

Appendix A. Comparative Statement.
B. Particulars of Land taken up for Project.
C. Abstract of annual Maintenance Charges.
D. Estimate of growth of Irrigation.
E. List of Component Works.
F. Sketch Map of System.

OFFICE OF THE CHIEF ENGINEER FOR IRRIGATION, CHEPAUK,
17th November 1881.

Colonel, R.E.,
Chief Engineer for Irrigation.

To the Joint Secretary to Government, Public Works Department, Irrigation Branch.

APPENDIX A.

Chingleput District.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project.

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	I. Anicut and Head Works.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1	Anicut on the Kortalayár at Thamarapak.	60,180	60,382	..	60,382	202	..	The excess in this case is small and is due to increases in rates.
2	Do. extension..	..	23,437	..	23,437	23,437	..	A breach in rear of the left wing occurred in November 1872 and the height reached by the flood showed that the original length of the anicut was inadequate. It was therefore lengthened by 150 feet on an estimate of Rs. 25,300 sanctioned in G.O., No. 2,132, dated 26th August 1873.
3	Embanking the Kortalayár.	4,800	3,038	..	3,038	..	1,762	.....
4	Planting trees on waste land on the south bank of the Kortalayár at Thamarapak anicut.	..	648	..	648	648	..	*Vide* letters from the Superintending Engineer, Chingleput, Nos. 779 and 1,446, dated 21st February and 5th April 1878, respectively. Carried out in 1876-77. No provision in the revised estimate sanctioned by the Government of India in 1871.
5	Connecting right wing of anicut with left bank of Cholaveram tank supply channel by a flood bank.	..	1,338	..	1,338	1,338	..	To prevent floods from the river entering the supply channel an estimate, amounting to Rs. 2,135, was sanctioned in G.O., No. 368 I., dated 3rd October 1877.
6	Office and store shed on line of works.	2,670	4,638	..	4,638	1,968	..	The excess is attributed to the loss in 1870 of a large quantity of materials (bricks) in stock (*vide* Superintending Engineer's letter No. 2,155, dated 17th April 1879).
7	Inspection house at Red Hills tank.	..	1,977	..	1,977	1,977	..	Required for the accommodation of inspecting and executive officers, not provided for in the revised estimate sanctioned by the Government of India in 1871; but an estimate, amounting to Rs. 1,910, was sanctioned by local Government in G.O., No. 1,641, dated 6th July 1872.
8	Planting trees and constructing well in the compound of the inspection house at Red Hills tank.	..	381	..	381	381	..	*Vide* explanation against Item 4.
	Total, Anicut and Head Works.	67,650	95,839	..	95,839	29,951	1,762	

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	II. Cholaveram Tank. Supply Channel.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
9	Head sluice ..	32,563	33,113	..	33,113	550	..	The excess is due to the increased cost of wood-work for shutters.
10	Kattankal surplus weir.	7,145	4,293	..	4,293	..	2,852	Saving owing to the modification of the design (*vide* G.O., No. 824, dated 20th March 1871).
11	Kattankal surplus weir extension.	..	..	19,000	19,000	19,000	..	Entry of this item in the revised estimate approved in G.O., No. 2,785, dated 17th October 1876.
12	Bridge							
13	Do.							
14	Do.							
15	Do.							
16	Do.							
17	Inlet							
18	Do.							
19	Do.							
20	Do.	51,539	53,739	..	53,739	2,200	..	Excess attributed to the extra cost of wood-work. The individual estimates cannot now be separated, as they are lumped together in the estimate of 1871. The original estimate was Rs. 53,502.
21	Do.							
22	Do.							
23	Do.							
24	Do.							
25	Do.							
26	Do.							
27	Raising No. 2 bridge	..	..	560	560	560	..	Required in connection with the calculated maximum water-level in the channel due to upland drainage.
28	Boosikal surplus weir.	6,531	6,651	..	6,651	120	..	Excess due to excavation of a small channel from the weir which was not provided for in the estimate of 1871.
29	Do. extension ..	..	..	17,400	17,400	17,400	..	Entry of this item in the revised estimate approved in G.O., No. 2,785, dated 17th October 1876.
30	Alachari aqueduct..	6,286	6,286	..	6,286	..	..	.....
31	Channel from Kortalayár to Cholaveram, including Boosikal diversion channel.	89,813	89,813	..	89,813	..	..	.....
32	Bank across Kattankal.	765	765	..	765	..	..	.....
33	Boosikal upper and lower bund.	8,871	8,871	..	8,871	..	..	
34	Widening channel down to 5⅝ miles.	32,000	..	..	..	..	32,000	Original estimate cancelled as unnecessary, the channel having been sufficiently enlarged by natural scour (*vide* G.O., No. 1,548, dated 2nd June 1875).
35	Maintenance during construction.	5,179	5,179	..	5,179	..	..	.....
	Total ..	2,40,692	2,08,710	36,960	2,45,670	39,830	34,852	.....
	III. Cholaveram Tank. Masonry Works.							
36	Calingulah ..	19,989	16,685	..	16,685	..	3,304	Saving effected by reduction of the level of calingulah crest, as per orders of the Chief Engineer for Irrigation issued in memorandum No. 88, dated 4th June 1872.
37	Irrigation sluice ..	9,171	9,174	..	9,174	3	..	Chargeable to Imperial. This item was included in the comparative statement of 1871.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	CHOLAVERAM TANK—*cont.*	RS.	RS.	RS.	RS.	RS.	RS.	
	EARTHWORK.							
38	Tank bank ..	2,10,918	2,11,676	..	2,11,676	758	..	The excess in this case is owing to the settlement of the earthwork which had to be raised.
39	Reconstructing a portion of the bund.	..	29,832	..	29,832	29,832	..	This work was found to be necessary to meet the slipping of the bund. An estimate, amounting to Rs. 30,675, was sanctioned by the local Government.—*Vide* G.O., No. 271, dated 4th February 1874.
	Total ..	2,40,078	2,67,367	..	2,67,367	30,593	3,304	
	IV.							
	RED HILLS TANK.							
	SUPPLY CHANNEL.							
	MASONRY WORKS.							
40	Head sluice ..	31,177	31,468	..	31,468	291	..	The excess in this case is attributed to an increase in rates.
41	Bridge	6,782						
42	Under tunnel ..	1,793	9,701	..	9,701	202	..	Do. do.
43	Inlet	924						
	EARTHWORK.							
44	Channel	91,713	91,713	..	91,713	..	..	.....
	Total ..	1,32,389	1,32,882	..	1,32,882	493	..	.....
	V.							
	RED HILLS TANK.							
	MASONRY WORKS.							
45	Surplus weir at north end.	10,245	5,878	..	5,878	..	4,367	The saving was on account of the surplus channel from the weir not being any higher than weir level, further deepening being considered unnecessary.
46	Masonry dam with a small irrigation sluice attached.	38,429	37,072	..	37,072	..	1,357	.....
47	Inserting ten vents in the surplus weir including ring bund.	..	16,823	3,200	20,023	20,023	..	Required to allow of the regulation of the water-level in the tank. An estimate, amounting to Rs. 17,100, was sanctioned by the local Government.—*Vide* G.O., No. 2,322, dated 11th August 1875. The excess is due to the ring bund having cost Rs. 3,800 instead of Rs. 600 as allowed in the estimate. The waves necessitated a much stronger bund than was at first intended to be thrown up.
48	Constructing a new apron in rear of the ten-vent sluice.	..	..	2,499	2,499	2,499	..	As the condition of the rear apron of the ten-vent sluice was very bad, owing to a portion of the laterite on which it was built having been scoured out, it was decided to construct a new apron, the arrangement for the work having been approved of by the Chief Engineer for Irrigation in April 1881.
49	New screw gearing for the ten-vent sluice shutters.	..	..	2,760	2,760	2,760	..	*Vide* paragraph 18 of note.

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1	2	3	4	5	6	7	8	9
	RED HILLS TANK—*cont.*	RS.	RS.	RS.	RS.	RS.	RS.	
	MASONRY WORKS—*cont.*							
50	Constructing a parapet wall from the Polal to ten-vent sluice.	..	2,385	..	2,385	2,385	..	To prevent the waves caused by high winds washing over the bund when the tank is full, it was considered desirable to raise the original low parapet wall of laterite stone at the top of the revetment 2 feet, making it 3 feet high and 1½ feet thick, for a distance of 5,546 feet in length. The amount of the estimate for the work was sanctioned in G.O. No. 307 I., dated 10th May 1881, to be included in the present estimate.
51	Irrigation sluice, north.							
52	Do. do., south.	30,171	30,215	..	30,215	44	..	Chargeable to Imperial.
53	Extension of north sluice.	..	..	4,200	4,200	4,200	..	Do. do. Required to allow of water being passed into the Vilankadupakam channel.
	EARTHWORK.							
54	Red Hills tank bank.	1,43,799	1,43,744	..	1,43,744	..	55	.....
55	Soorapedoo bank ..	26,110	25,040	..	25,040	..	1,070	.....
56	Puddle to toe of main bank.	16,500	14,800	..	14,800	..	1,700	Originally sanctioned as an emergent estimate on somewhat rough data.
57	Planting trees along the toe of the bund of the Red Hills tank.	..	113	..	113	113	..	*Vide* explanation against item No. 4.
58	Drains under rear part and in rear of bund.	..	6,795	3,085	9,880	9,880	..	Sanctioned in G.O., No. 406 I., dated 24th June 1880. The bund being insecure from leakage which has occasioned several slips, an approximate estimate was sanctioned for immediate execution, and in G.O., No. 498 I., dated 6th August 1881, the amount of the regular estimate for the work was directed to be included in the present estimate.
	Total ..	2,65,254	2,82,865	15,744	2,98,609	41,904	8,549	
	VI.							
	DISTRIBUTARIES, &c.							
59	Drainage channel at Cholaveram tank bund.	..	560	..	560		..	.....
60	Channel from north sluice of Cholaveram tank to Villivoil tank.	..	44	..	44		..	Chargeable to Imperial.
	Below Cholaveram Tank.							
61	Marembedu channel.							* A lump sum amount was entered for distributaries in the original estimate.
	Below Red Hills Tank.		38	8,000		*2,201	..	
62	Vilankadupakam channel.	25,000	..	3,550			..	Chargeable to Imperial.
63	Madaveram channel.		395	7,600	20,321		..	
64	Channel leading to Soorapedoo Irrigation sluice.		1,238	..			..	
65	Soorapedoo sluice ..	..	5,776	..	5,776		..	Do. Estimate of Rs. 5,463 sanctioned against the lump sum of Rs. 25,000 for distributaries in G.O., No. 807, of 17th Mar. 1871.
	Total ..	25,000	8,051	19,150	27,201	2,201	..	

Comparative Statement of the Madras Water-supply and Irrigation Extension Project—*cont.*

Number of Item.	Name of Work.	Amounts in the Estimate of 1871 sanctioned by the Government of India in letter No. 695 I., dated 10th Nov. 1871, embodied in G.O., No. 65, dated 10th Jan. 1872.	Amount spent up to end of 1880-81.	Amount required to complete each work.	Total Revised Estimate or total of Columns 4 and 5.	Increase.	Decrease.	Remarks.
1.	2	3	4	5	6	7	8	9
	VII.	RS.	RS.	RS.	RS.	RS.	RS.	
66	Land other than for Madras Municipality.	1,75,917	1,30,218	14,861	1,45,079	..	30,838	This decrease is only nominal, the rest of the compensation, viz., for the Madras Municipal channel being shown separately under charges appertaining to Provincial.
	Total ..	1,75,917	1,30,218	14,861	1,45,079	..	30,838	
	VIII.							
	MISCELLANEOUS.							
67	Constructing new tank in Alamady village.	..	9,066	..	9,066	9,066	..	This tank was constructed to replace the one submerged by the Cholaveram tank; no provision in the revised estimate sanctioned by the Government of India in 1871. An estimate, amounting to Rs. 9,260, was sanctioned by the local Government. —*Vide* G.O., No. 422, dated 7th February 1877.
68	Contingencies and superintendence.	47,746	47,405	341	47,746	..	..	.....
69	Removing calingulah at lower end of surplus channel of Red Hills tank near Shadiyankupam lock.	..	369	..	369	369	..	The calingulah was a hindrance to the free flow of drainage sanctioned in G.O., No. 873, dated 2nd April 1875.
70	Providing a Stoney's equilibrium valve.	..	..	1,415	1,415	1,415	..	This valve was obtained from England under Government sanction and placed in 1875 in a convenient situation at the Red Hills tank for the purpose of carrying out a preliminary trial. The result of this trial is recorded in G.O., No. 846 I., dated 23rd October 1878. As the sluice valve cannot at present be utilized at any of the deep tanks in other districts of the Presidency, the Committee appointed to investigate and report on the superfluous stock of the Public Works Department recommended in their report printed in Proceedings, Madras Government, No. 914 W., dated 4th April 1881, that the valve be charged to the work to which it was issued and on which it stands.
	Total ..	47,746	56,840	1,756	58,596	10,850	..	
	IX.							
	ITEMS CHARGEABLE TO PROVINCIAL.							
71	Land for Municipal Delivery channel.	..	30,501	11,769	42,270	42,270	..	Covered in part by the saving of Rs. 30,838 shown against item 66 above.
72	Contribution to do. being part of original estimate.	30,832	30,832	..	30,832	..	..	.....
73	Gauge weir below municipal sluice.	..	257	..	257	257	..	Required for the purpose of gauging the supply of water to Madras.—*Vide* G.O., No. 2,503, dated 13th October 1873.
74	Pumping and dismantling pumps.	..	23,214	..	23,214	23,214	..	Expenditure incurred when the Red Hills tank was low during the famine to supply the city of Madras.—*Vide* G.O., No. 623 W., dated 1st March 1879.
	Total ..	30,832	84,804	11,769	96,573	65,741	..	

APPENDIX B.

STATEMENT showing the Area, Compensation, Annual Assessment and Capitalized abatement of Land-revenue of the Land acquired for the Madras Water-supply and Irrigation Extension Project.

—	LAND PAID FOR UP TO END OF 1879-80.		LAND REMAINING TO BE PAID FOR.		TOTAL.		Annual Assessment.	Capitalized abatement of Land-revenue.	Remarks.
	Area.	Compensation.	Area.	Compensation.	Area.	Compensation.			
	ACS. CTS.	RS. A. P.	ACS. CTS.	RS. A. P.	ACS. CTS.	RS. A. P.	RS. A. P.	RS. A. P.	
1. For all works other than the distribution and delivery channels.	4,330 95	1,30,218 2 9	294 49	4,713 10 8	4,625 44	1,34,931 13 5	7,846 13 3	1,96,170 11 3	*Vide* letters from Collector of Chingleput, No. 2,399, dated 20th June, and No. 3,056, dated 6th Aug. 1881.
2. For the distribution channels.	..	..	136 66	10,147 7 3	136 66	10,147 7 3	176 0 7	4,400 14 7	
3. For the delivery channel in the Chingleput district.	125 36	12,438 13 8	8 34	2,104 0 4	133 70	14,542 14 0	405 14 0	10,146 14 0	
Do. Madras district.	19 02	24,623 15 4	4 26	3,103 1 6	23 28	27,727 0 10	104 1 2	2,601 13 2	Do.—*Vide* letters from Collector of Madras, No. 893, dated 15th Nov. 1879, and No. 378, dated 7th April 1881.
Total ..	4,475 33	1,67,280 15 9	443 75	20,068 3 9	4,919 08	1,87,349 3 6	8,532 13 0	2,13,320 5 0	

APPENDIX C.

ABSTRACT STATEMENT of Annual Maintenance charges of the Madras Water Supply and Irrigation Extension Project.

Years.	Outlay on Repairs.	ESTABLISHMENT.			Tools and Plant.	Grand Total.
		Share of Public Works.	Water Regulation.	Total.		
	RS.	RS.	RS.	RS.	RS.	RS.
1870-71	7,954	1,988	...	1,988	199	10,141
1871-72	21,153	5,288	477	5,765	529	27,447
1872-73	6,463	1,616	636	2,252	162	8,877
1873-74	39,542	9,886	853	10,739	989	51,270
1874-75	8,537	2,134	1,192	3,326	213	12,076
1875-76	5,381	1,345	1,062	2,407	134	7,922
1876-77	11,411	2,853	1,139	3,992	285	15,688
1877-78	2,412	603	1,080	1,683	60	4,155
1878-79	2,936	734	1,074	1,808	73	4,817
1879-80	5,537	1,384	1,018	2,402	138	8,077
Total ...	1,11,326	27,831	8,531	36,362	2,782	1,50,470

MADRAS,
February 1881.

(Signed) D. H. TRAIL, Major, R.E.,
Offg. Examiner of Public Works Accounts.

APPENDIX D.

Proceedings of the Board of Revenue, dated 5th November 1881, Miscellaneous No. 9,678.

Read letters from the Chief Engineer for Irrigation, dated 4th October 1881, No. 176 M, and 17th October 1881, No. 189 M.

THE areas entered in the revised statement and the revenue shown for years up to 1879-80 are correct, but the Board think that the revenue for years subsequent to 1879-80 should be calculated, not with reference to the average rates of the district, but the average rate at which the revenue was actually raised on the lands in 1878-79 or 1879-80 after the introduction of the Settlement. Taking the rates* of 1879-80 and applying them to the increased areas subsequent to 1879-80, the figures stand as shown in the margin,† which may be adopted.

	Rs.	A.	P.	
* First crop	2	6	8	per acre.
Second crop	2	0	11	do.

Years.	Revenue. Rs.
† 1880-81	13,405
1881-82	14,667
1882-83	15,925
1883-84	17,184
1884-85	18,443
1885-86	19,704
1886-87	20,960
1887-88	22,222
1888-89	23,480
1889-90	24,741

2. The Board have no information in regard to the land assessment of waste lands brought under irrigation subsequent to the work.

(True Extract.)

(Signed) E. GIBSON,
Acting Secretary.

(FORM 3.—GOVERNMENT OF INDIA CIRCULAR No. XVII OF 1880.)

ESTIMATE of Growth of Irrigation and Revenue Receipts and Charges, Madras Water-supply and Irrigation Extension Project.

Year.	Irrigated Area at end of Year.		Revenue Receipts and Charges.										
			Revenue due to Works.					Charges against Revenue Account.			Net Earnings due to Works.		
			Direct Receipts.			Enhanced Land Revenue or Indirect Receipts.	Total.						
	First Crop.	Second Crop.	Public Works Department.	Revenue Department.	Total.			Maintenance Charges in Public Works Department.	Collection Charges in Revenue Department.	Total.	Including enhanced Land Revenue.	Excluding enhanced Land Revenue.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1870-71 ..	179	..	Rs. ..	Rs. 1,506	Rs. 1,506	Rs. ..	Rs. ..	Rs. 4,556	Rs. 108	Rs. 4,664	Rs. ..	Rs. — 3,158	Actuals.
1871-72 ..	793	..	..	— 64	— 64	..	..	13,901	..	13,901	..	— 13,965	
1872-73 ..	1,724	..	..	1,816	1,816	..	..	3,873	131	4,004	..	— 2,188	
1873-74 ..	1,291	1,029	..	1,652	1,652	..	..	26,766	119	26,885	..	— 25,233	
1874-75 ..	1,913	1,403	..	3,585	3,585	..	..	5,601	258	5,859	..	— 2,274	
1875-76 ..	1,918	1,578	..	4,935	4,935	..	..	3,358	355	3,713	..	1,222	
1876-77 ..	1,033	1,004	..	— 7,185	— 7,185	..	..	7,551	..	7,551	..	— 14,736	
1877-78 ..	2,313	547	..	4,857	4,857	..	..	1,324	350	1,674	..	3,183	
1878-79 ..	1,989	2,214	..	10,333	10,333	..	..	1,681	744	2,425	..	7,908	
1879-80 ..	2,648	2,769	..	12,149	12,149	..	..	3,441	875	4,316	..	7,833	

NOTE 1.—The old cultivation averaging 3,829 acres and yielding a water-tax of Rs. 8,576 has been omitted from this table.
2.—The figures in column 5 for the years subsequent to 1879-80 have been taken from Proceedings, Board of Revenue, No. 9678, dated 5th November 1881.
3.—Statement D-I shows how the figures in column 9 have been obtained.
4.—The collection charges in the Revenue Department have been calculated at 7·2 per cent. on revenue column 5.

Estimate of Growth of Irrigation and Revenue Receipts and Charges, &c.—*cont.*

Year.	Irrigated Area at end of Year.		Revenue Receipts and Charges.										
			Revenue due to Works.					Charges against Revenue Account.			Net Earnings due to Works.		
			Direct Receipts.			Enhanced Land Revenue or Indirect Receipts.	Total.						
	First Crop.	Second Crop.	Public Works Department.	Revenue Department.	Total.			Maintenance Charges in Public Works Department.	Collection Charges in Revenue Department.	Total.	Including enhanced Land Revenue.	Excluding enhanced Land Revenue.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1880-81			Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
1881-82 ..	2,985	2,984	..	13,405	13,405	..	..	3,923	965	4,888	..	8,517	
1882-83 ..	3,323	3,200	..	14,667	14,667	..	..	3,923	1,056	4,979	..	9,688	
1883-84 ..	3,660*	3,416	..	15,925	15,925	..	..	3,923	1,147	5,070	..	10,855	
1884-85 ..	3,998	3,631	..	17,184	17,184	..	..	3,923	1,237	5,160	..	12,024	
1885-86 ..	4,335	3,847	..	18,443	18,443	..	..	3,923	1,328	5,251	..	13,192	
1886-87 ..	4,673	4,063	..	19,704	19,704	..	..	3,923	1,419	5,342	..	14,362	
1887-88 ..	5,010	4,278	..	20,960	20,960	..	..	3,923	1,509	5,432	..	15,528	
1888-89 ..	5,348	4,494	..	22,222	22,222	..	..	3,923	1,600	5,523	..	16,699	
1889-90 ..	5,685	4,710	..	23,480	23,480	..	..	3,923	1,691	5,614	..	17,866	
	6,023	4,926	..	24,741	24,741	..	..	3,923	1,781	5,704	..	19,037	

NOTE 1.—The old cultivation averaging 3,829 acres and yielding a water-tax of Rs. 8,576 has been omitted from this table.
2.—The figures in column 5 for the years subsequent to 1879-80 have been taken from Proceedings, Board of Revenue, No. 9678, dated 5th November 1881.
3.—Statement D-I shows how the figures in column 9 have been obtained.
4.—The collection charges in the Revenue Department have been calculated at 7·2 per cent. on revenue, column 5.

STATEMENT D-I.

STATEMENT showing the way in which the entries in Column 9 of Estimate Form 3 have been obtained.

Years.	Balance of Maintenance Charges after deducting Rs. 1,704 for old Irrigation.	Portion of Balance Chargeable to		Remarks.
		Imperial at 54 per cent.	Provincial at 46 per cent.	
1	2	3	4	5
1870-71	Rs. 8,437	Rs. 4,556	Rs. 3,881	
1871-72	25,743	13,901	11,842	
1872-73	7,173	3,873	3,300	
1873-74	49,566	26,768	22,800	
1875-76	10,372	5,601	4,771	
1876-77	6,218	3,358	2,860	
1877-78	13,984	7,551	6,433	
1878-79	2,451	1,324	1,127	
1879-80	3,113	1,681	1,432	
	6,373	3,441	2,932	
1880-81				
1881-82	7,265	3,923	3,342	
1882-83	7,265	3,923	3,342	
1883-84	7,265	3,923	3,342	
1884-85	7,265	3,923	3,342	
1885-86	7,265	3,923	3,342	
1886-87	7,265	3,923	3,342	
1887-88	7,265	3,923	3,342	
1888-89	7,265	3,923	3,342	
1889-90	7,265	*3,923	3,342	

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* The average actual expenditure of eight years, exclusive of the expenditure incurred in 1871-72 and 1873-74, has been assumed to be the amount of maintenance charges in the Public Works Department.
The figures in column 3 of this statement have been entered in column 9 of the Estimate Form 3.

CHEPAUK,
9th November 1881.

(Signed) JOHN MULLINS, Colonel, R.E.,
Chief Engineer for Irrigation.

(1)
Fd Order No 620 of 4-4-76.
G.O. 1204 of 3.5.75
" 21 & 5.1.76
" 341 of 8.2.76
" 2650 of 2.10.76
" 475 of 10.11.77
" 793 of 9.10.78
" 794 of 9.10.78
" 271 of 22.1.79
" 532 of 18.8.80
" 598 B of 10.10.79
" 311 of 17.5.80
" 719 of 2.11.80
" 730 of 6.11.80
" 775 of 29.11.80
" 745 of 20.11.80
" 819 of 23.12.80
" 23 of 6.1.81
" 492 of 5.8.81

(2)
" 65 of 10.1.72
" 240 of 25.1.72
" 66 of 10.1.72
" 2172 of 22.5.71
" 271 of 22.8.71

(3)
" 165 of 25.4.76
" 66 of 11.5.76
" 703 of 1.2.77
" 93 of 9.6.77
" 94 of 20.6.77
" 2524 of 10.7.78
" 3053 of 15.8.78
" 3719 of 21.9.78
" 3762 of 25.9.78
" 4994 of 20.12.80

P. W. C. No 7028

APPENDIX E.

List of Component Works, Madras Water-Supply and Irrigation Extension Project.

No.	Items.	Mileage. Miles.	Mileage. Chain of 66 feet.	Remarks.	Level above M.S.L.	
1	2	3		4	5	
1	Thamarapak anicut	...	...	...	Crest	69·86
	Do. under sluice	...	...	...	Sill	63·86
2	Inspection bungalow	...	...	...		
	Supply channel, Cholaveram tank ...	...	...	...		
	Head sluice, do. ...	...	...	...	Sill	63·86
	Inlet	0	20	...		75·12
	Bridge	0	55	...		62·84
	Kattankal surplus weir	1	60	...	Crest	65·86
	Do. do.	...	...	...	Sill	62·86
	Inlet	1	66	...		67·86
	Do.	2	8	...		67·24
	Do.	2	39	...		65·98
	Do.	2	63	...		64·12
	Do.	2	69	...		63·40
	Bridge	3	3	...		58·30
	Inlet	3	26	...		62·81
	Do.	3	44	...		63 05
	Do.	3	68	...		63·79
	Do.	4	11	...		65·23
	Old Boosikal diversion	4	53	...		
	Boosikal surplus weir	4	64	...	Crest	59·69
	Do. do.	...	...	...	Sill	56·69
	Ramapuram bridge across Boosikal floor.	4	73	...		56·92
	Bridge	4	79	...		54·39
	Do.	5	55	...		53·00
	Aqueduct, Alacheri	6	12	...		52·10
		8	14	Channel ends.	...	
3	Cholaveram tank	...	...	Begins north end of bund.	...	
	Do. north weir	0	9	...	Crest	63·62
	Do. weir	0	43	...	Crest	61·68
	Do. weir sluice	0	43·84	...	Sill	52·68
	North sluice	1	0	...	Sill	41 83
	South sluice	2	3·63	...	...	
		2	22	Tank ends.	...	
	Inspection bungalow	2	45	...	...	
4	Supply channel to Red Hills tank ...	...	...	...	...	
	Head sluice do. ...	2	5	Mileage of Cholaveram tank.	Sill	45·33
	Inlet	1	25	...		48·20
	Girder bridge	2	29	...	...	
		2	50	Channel ends.	...	
5	Red Hills tank	...	...	Begins at left wing of weir (Mr. Fraser's).	...	
	Surplus weir, Red Hills tank ...	0	11	...	Crest	46·31
	Weir sluice (irrigation)	0	15	...		31·42
	Ten-vent surplus sluice (in weir) ...	0	21·06	...	Sill	31·31
	North sluice	0	32·34	...	Sill	20·66
	Polal sluice	1	27·07	...	Sill	21·10
	Inspection bungalow	2	30	...	...	
	Soorapedoo sluice	3	3·25	...	Sill	27·31
	Municipal do.	3	15	...	Sill	31·31
		3	27	Tank ends.	...	

Rec'd. to Hon'ble M. 6-12. R. 9-12.
A 30-11 R. 2-12

From Acct V 62

No. 22. No. 8491 Public Works Department.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Under date the 9th December 1881

Read the following :—

Report by the Chief Engineer for Irrigation } H. E. No. 150. I. dy 17th Nov. 1881

The Report submitted by the Chief Engineer for Irrigation on the revised estimate for the Madras Water supply and Irrigation extension project fully explains the several differences between the present sanction for this project and the amount of the revised estimate. The latter amounts to Rupees 18,57,463.

2. Of the above sum the component items are

(over)

(1)

111 Direct Charges

Works	13,42,950	
Establishment	2,19,255	
Tools and Plant	8,201	
	15,70,406	
Deduct receipts	1,167	
	15,69,239	

121 Indirect Charges

Capitalized abate=ment of land revenue	2,13,320
Interest during con=struction	71,904
Total Rs	18,54,463

This total does not differ very materially from that given in P. W. G. No. 2650 of the 2nd October 1876 which was Rupees 18,06,720.

Of this total, the amount chargeable to Imperial (Irrigation) is Rs. 9,82,105

Provincial on ac=count of the Water sup=ply of the City of Madras ——— 8,72,358

The remarks were made with reference to the refund on acct of the Chembrumbakkum Tank. The refund on acct of the M. W. S & D. E. Project was ordered to continue during 80/81 & 81/82, (vide P. W. G. 748 of 20th/80 para 3 of Resolution & para 3 of letter in P. W. G. 819 of 23/80).

5/12.

G. O. No. 2650 dated 2nd Oct. 1876

The distribution of the charge has been made as follows.

1st All items belonging exclusively to either service have been charged thereto

2nd the shares of charges for items appertaining to both services have been fixed at 54 per cent for Imperial, and 46 per cent for Provincial

3. The net excess over the present sanction under Works is Rs. 1,16,225 and this is more than covered by the aggregate Rs. 1,88,158 of the items not before provided for but found requi=site as explained in detail in the Report. There has been hitherto no sanction for establishment and this

this item amounts to Rs. 2,19,255 altogether the charges to cover which additional sanction is required are

Direct Charges Rs. 3,43,681
Indirect — do — 2,85,224
Total Rs. 6,28,905

4. With regard to the Imperial share of the project so far as can be at present judged the annual charges for interest on outlay, maintenance and collection of revenue will amount to about ..... Rs. 43,186 and the revenue (water tax) to 24,741
Annual deficit Rs. 18,445

It is possible that the results may be ultimately more favourable, but it is tolerably clear that the probability of the

× Interest 37,482
Maintenance 3,923
Collection 1,781
Rs. 43,186

6

the revenue fully covering the interest charges is very remote.

5. Provincial will however be still less favourably circumstanced viz:

Interest on Rs. 7,36,295 × at 4½ per cent Rs. 33,133
Share of maintenance charges 3,342
Total Rs. 36,475

against which the receipts from the Municipality are not likely to exceed Rs. 12,000, so that the Government contribution to the water supply of Madras will be but little under Rs. 24,500 a year, and at the present time it is considerably more.

6. Ordered that the

× Direct Charges

5. Note on Abstract from Statement D.I that the Provincial share of maintenance charges up to the end of 1879-80 amounted to Rs 61,378 + the Examiner of P.W.A. will see that this + the charges for subsequent years is duly adjusted.

the revised estimate be forwarded for the sanction of the Government of India with a copy of these Proceedings.

29/11

(A. E. No. 850 Ja/9 dtd 29/11/81)
forwarded accordingly.

Despd to Calcutta
with Tracing

21-12-81

S. E. 5th Circle ✓
Ch. Engr for Irrn. W ✓
Supdt. W ✓
Rev. dept ✓
Fin. dept ✓
Dated
21/12/81

7.C
a.654 J 15.7 fa.

Chilton-W.H. 6.12 1.7.12

C. 20.11. R.2.12

6-11-08

Ex. 12-22 BIII

11/7/29 BIII

B dee

6-6-34 BIII

7028.

Govt. of [1881] Madras.

PUBLIC WORKS.

To

Dated 10-12

Issued

Recd. Encl.

G. O., Pub. Dept., 1881, No. 849 J.
850 J.

Nos. 5 & 18

Madras Water Supply & Irrigation Extension System.

Passing orders on the revised estimate for the ——.

Forwd. for sanction revised estimate for the Madras Water Supply & Irrigation Extension System.

Subd. in Receipt Regr.