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RELATING TO

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PALAR ANICUT SYSTEM.

Note by Colonel J. O. Hasted, R.E., on the Revised Estimate for the Palar Anicut System, No. 105 I.

The Palar anicut was originally designed to give an improved supply to old channels which fed a series of old native tanks. The project which provided for construction of the anicut with under-sluices and head-sluices, and improvements of channels and tanks, was submitted to the Government of India in September 1853, and received the sanction of the Court of Directors in November 1854. The amount of this estimate was Rs. 8,66,144.

The work was commenced in the beginning of 1855, and the anicut was reported completed in September 1857, the total expenditure up to April 1858 being Rs. 5,15,977. The anicut was then only 5 feet high.

The works were connected very slowly, in consequence apparently of funds being limited, and were yet incomplete in 1864, when an estimate, amounting to Rs. 7,700, was sanctioned for raising the anicut 2 feet; additional works, fitting the scouring sluices with shutters and improving the apron, were then sanctioned, and subsequently improvements to the channels. The total expenditure on the project up to the end of March 1864 was Rs. 7,48,987. The system as it then stood possessed many defects, and in 1868 a special officer was deputed to take levels with a view to improving it. The investigations were, however, not completed until, in 1877, an officer was available who worked out the improvements of the channels on the north side, which were undertaken as famine works. Meanwhile, in October 1874, the anicut breached, nearly half its length in the middle of the river being carried away. The repairs were completed in 1875-76 at a cost of Rs. 1,35,349, the breached portion of the anicut being rebuilt clear of the foundations of the old work up stream. The estimates for the nothern channels, sanctioned as famine-relief works, amounted to Rs. 2,82,000, and the expenditure incurred during the famine was Rs. 3,66,157, which the normal value of work done was estimated at Rs. 1,63,588, leaving Rs. 2,01,712 as excess due to famine.

Subsequently, revised estimates for the northern channels were prepared, which amounting to Rs. 3,58,430, including establishment and tools and plant charges, were submitted for the sanction of the Government of India, with Proceedings of Madras Government, No. 93 I., dated 8th February 1881, but were returned for revision and explanation. In paragraph 23 of a later Resolution of the Government of India, No. 56—A.I., dated 15th March 1882, it was ordered that complete revised estimates, which should include the improvements proposed for the southern channels, should be submitted.

2. Complete revised estimates have now been prepared by Mr. Vincent, Executive Engineer, in communication with this office, and are submitted with forecast statements, which have been countersigned by the Director of Revenue Settlement and Agriculture.

3. The expenditure on the system up to the end of 1882-83 is as follows:—

	Rs.
Works	12,29,002
Establishment	3,33,127
Tools and plant	29,875
TOTAL	15,92,004

The irrigation, which commenced in 1853-54 with an area of 9,055 acres first crop and 722 acres second crop, extended till in 1882-83 there was an area of 66,751 acres first crop and 20,652 acres second crop irrigated. The steady increase of irrigation, as well as the marked effect of famine years not only in decreasing the revenue at the time but also in checking the extension of irrigation for the next two years, is shown in Mr. Wilson's accounts submitted to the Government of India with Proceedings of Madras Government, No. 616 I., dated 7th August 1882. The net revenue derived from the system to end of 1882-83 (including enhanced land revenue) was Rs. 5,51,755, or 36·5 per cent. on the amount of direct charges, but the

charges for interest at the same date amounted to Rs. 13,71,171, leaving a balance of interest unpaid of Rs. 7,89,416.

4. The system is classed under "Irrigation and Navigation Works for which Capital and Revenue Accounts are kept, but not classed as Productive."

5. The anicut is 2,634 feet in length between wing-walls and 7 feet high, with a vertical fall having 22 under-sluices on the north side and 10 on the south side; 3 head-sluices, *viz.*, the Kávéripák and Mahendravadi on the north bank, and one, the Dusi, on the south bank.

The channels on the north are the Mahendravadi channel supplying the tank of that name, the main channel branching into the Kávéripák supply channel at 3 miles from head, and the Govindavadi channel supplying the tank of that name at 21 miles from anicut. From the Govindavadi channel at 16½ miles the Kambankal channel takes off, and, after a course of 26½ miles, terminates in the Sríperambudur tank. On the south side there are 3 channels,—(1) the Sakkiramallur channel (now called Dusi channel) supplied by the under-sluices, (2) the Tennampattu channel, and (3) the Kalavai channel. When water is available it is passed through the last tank supplied by the Sakkiramallur channel into the Rajahkal channel, which is taken off the river at some distance below the anicut to supply the Dusi-Mamandur tank.

6. The chief reason that the project has not realised the anticipations originally formed is that the supply in the river was over-estimated, but there were considerable defects in the channels as originally laid out. These are—

(1) Excessive or irregular falls on bed slopes.

(2) Disproportion between dimensions of channels and areas of irrigation.

(3) Absence of effective regulation.

And they have been amended in the estimates now submitted, so that the fullest advantage may be taken of the supply in the river; but this supply is so variable that there is great difficulty in estimating the revenue to be expected in future.

7. The water registers (statement A appended to Executive Engineer's report) show that in the fifteen years for which water returns are given there are four during which no water passed over the anicut and one year during which no water was registered at all, and that, on the average, there are 273·73 days yearly on which no water is registered. The northern channels receive a full supply when there is 5½ feet on the anicut under-sluices sill, and the southern channels not till there is 7 feet on this side.

8. The method that has been adopted in estimating the area to be irrigated by improving the works, any considerable extension of them being considered out of the question, is as follows. The full supply has been calculated from the number of days which, on the average, it is shown to be available for each channel, and to it is added one-fourth the average quantity that would pass through the head-sluices when the water was below full supply and not less than 1 foot on the sills of the sluices; this has been taken to determine the area that can be cultivated, allowing 7,000 cubic yards to be stored for each acre. Then, as all the tanks receive in addition to the river supply a supply from local drainage, the area cultivable under each tank commanded has been ascertained, an allowance made of 40 acres to be irrigated under each square mile of catchment, and the balance provided for from the river. This limits, of course, the number of the tanks to be supplied, and consequently it is proposed now to include only 201 in the system, instead of 270 as formerly. The additional supply available, that is, when the river is above full supply and when 1 foot or less is passing through the sluices, is calculated to be sufficient to irrigate for second crop half the area of the first crop irrigation, or 84,000 acres, and as the latest return shows that the system has irrigated 66,751 acres first crop and 20,652 acres second crop, it is not unreasonable to suppose that with improved regulation this extent may be irrigated.

9. As in years when the river has a large flood discharge a much larger area could be irrigated than that provided for, the tanks selected for terminal tanks of the system are of considerable size and are provided with weirs, over which the available water can be passed on to tanks lower down, of which there are a considerable number. No credit is taken for this additional supply, as it will only be available occasionally, but it will be of great advantage to the country, and will, no doubt, be utilised.

10. Details of the work to be done have been given in the Executive Engineer's report. The northern channel estimates remain very nearly as when submitted before. These estimates provided for widening the main channel and heads of principal channels for drop weirs to reduce the bed fall, and improvements to head-sluices, &c., and for minor sluices and tank weirs. The amount under "Works" was, in the estimates submitted to the Government of India, Rs. 3,11,723, and is now Rs. 3,29,455, including Rs. 15,688 for unforeseen expenses, of which Rs. 2,02,024 has already been expended.

The only alteration to be made in the anicut itself is restoring the under-sluices which have hitherto been used to supply the Sakkiramallur channel to their proper use, a new head for the channel being opened in the main channel. The cost of this work is Rs. 1,963.

The southern channel estimates are now submitted for the first time. They provide for constructing head-sluices to each of the main branches, so as to have the water entirely under control, for improving the channels, reducing the fall to what the soil will stand, disposing of cross drainage, constructing sluices to branch channels, and improving tank weirs. The amount for "Works" is Rs. 99,179.

The works are unimportant in character, but it is believed that they will remedy the defects above noticed, prevent waste of water, and improve the irrigation generally.

11. The total of the complete estimates as now submitted is as follows:—

Direct Charges.

	Rs.
Works	14,62,650
Establishment	3,97,861
Tools and plant	34,404
TOTAL	18,94,915

Indirect Charges.

Capitalisation of land revenue abated	17,147
Leave and pension allowances	81,831
TOTAL	98,978
GRAND TOTAL	19,93,893

Of which the actual outlay to end of 1882-83, on sanctioned estimates, has been—

Direct Charges.

	Rs.
Works	12,29,002
Establishment	333,127
Tools and plant	29,875
TOTAL	15,92,004

Indirect Charges.

Capitalisation of land revenue	16,217
Leave and pension allowances	72,744
TOTAL	88.961
GRAND TOTAL	16,80.965

12. The area expected to be irrigated at the end of four years is 68,700 acres first crop and 34,000 acres second crop, producing a gross revenue of Rs. 1,40,970; and deducting maintenance charges a net revenue of Rs. 93,720, which is 4·9 per cent. on direct charges, or 4·7 per cent. on direct and indirect charges. The balance of interest remaining unpaid will, as shown by the Director of Revenue Settlement and Agriculture, be paid in 45 years from date.

13. The remarks made by the Superintending Engineer regarding designs of minor works and those made in this office on the plan, will receive attention when the works are put in hand.

Note by Mr. C. Vincent, Executive Engineer, D. Project Division, on the Revised Estimates for the Palar Anicut System, dated 27th October 1883.

Estimates called for.

In paragraph 23 of the Resolution on the Preliminary Issue of the Irrigation Budget Estimate for 1882-83, printed in Proceedings of the Madras Government, No. 287 I. of 27th March 1882, the Government of India ordered that a complete revised estimate for the Palar Anicut System should be submitted in the place of the completion estimate for the northern section of the system which had been previously forwarded, but which had been returned for

further information. The revised estimates prepared in accordance with the above orders are now forwarded for approval.

Palar river.

2. It may be well to preface this Note with a brief account of the Palar Anicut System.

The river Palar rises on the Mysore plateau and runs into the sea near Sadras after a course of about 220 miles. There is extensive irrigation from it throughout the district of North Arcot by means of river channels, which are chiefly provided with masonry heads. The anicut supplying the system has been built at about the 152nd mile, and is situated about 4 miles below the famous town and fort of Arcot. The drainage basin of the river up to this point is about 3,974 square miles, the maximum flood discharge about 25,000 cubic feet per second, and the maximum depth of flow passing over the anicut 6·75 feet.

The anicut.

3. The anicut itself is 2,634 feet in length between wing-walls. The body-wall, the crest of which is 489·5 feet above M.S.L., is 7 feet high with a vertical fall, and is built on a double row of circular wells. There are three aprons; the first, of cut-stone in mortar, 10 feet wide; the second, of rubble stone in mortar, 36 feet wide; the third, of dry rubble stone, 30 feet wide. There are under-sluices on either flank. Those on the north side (the river runs from east to west) consist of 22 vents of 5′ × 5′ each. Those on the south side consist of 10 vents of the same dimensions. The anicut was breached for a length of 1,015 feet by the floods of October 1874, the damage being at once repaired. The original construction had been commenced about the year 1855.

The channels.

4. Prior to the construction of the anicut, there was a large supply-channel to the Kávéripák tank, but in connection with the anicut a masonry head was built to this, the channel itself being largely extended, and new channels with masonry heads being excavated on both sides of the river. There are now four sets of head-sluices arranged as follows:—

Northern side .	Main or Kávérpák head-sluice, 18 vents of 5′ × 5′ each. Mahendravadi head-sluice, 9 vents of 5′ × 5′ each.
Southern side .	Main or Dusi head-sluice, 15 vents of 5′ × 5′ each. Sakkiramallur head-sluice, 2 vents of 5′ × 5′ each.

The last-mentioned head-sluice is at present situated in the line of the anicut, being formed, in fact, by the adaptation of two of the original under or sand sluices. This arrangement, which is very objectionable, will now be dispensed with, the Sakkiramallur channel being supplied from a new head in the Main or Dusi channel, and the sand sluices restored to their legitimate functions. There will then be only one head on the southern side. The following table shows the distribution of the main channels:—

Section.	Head-sluices.	Main Channels.
Northern . . .	Main or Kávéripák	Kávéripák Tank. Govindavadi. Kambankal.
	Mahendravadi	Mohendravadi.
Southern . . .	* Sakkiramallur	Sakkiramallur.
	Main or Dusi	Dusi or Tennampattu. Kalavai.

* Now to be dispensed with, as above stated.

The nomenclature of the Dusi head-sluice and channel is erroneous. It naturally implies that the channel feeds the large Dusi tank (*vide* sketch map). But this tank is supplied principally by means of an independent river channel with its head 14 miles below the anicut, and it only receives the *tail-water* of the Sakkiramallur and Dusi channels. The head-sluice will therefore be called throughout the remainder of this note "the southern head-sluice," and the channel "the Tennampattu channel," the latter being the name of the first tank into which it runs.

Tank irrigation.

5. There is little or no direct irrigation from the main or branch channels. In almost every case the water is led into tanks in which it is stored. Some of these tanks are of very large size, especially the Kávéripák tank on the northern and the Dusi Mamandur tank on the

southern side, which irrigate directly 5,873 and 3,046 acres respectively. In the system as now revised, 127 tanks irrigating 38,269* acres have been included in the northern section, and 74 tanks irrigating 14,754† acres in the southern section. Only a portion of these areas require, however, river-water (*vide* paragraph 13).

* Average per tank 301 acres.
† „ „ 198 „

Proposals to complete works.

6. During the famine years 1876—78 the question of improving the channels of the northern section of the system was raised. When these channels were first excavated, the bed fall given to each was excessive, the natural slope of the ground having been adopted almost throughout. The result was that a very large amount of silt was carried into the channels, and a heavy expenditure to remove this had to be periodically incurred. The channels were also blocked in many places with a thick growth of prickly-pear. Mr. Rundall, Executive Engineer, was accordingly deputed to prepare the necessary estimates for the reformation of the channels, and these, which were at once provisionally sanctioned, were executed by means of famine labour.

The following table shows the main heads of the original estimate, the subsequent additions to it, the expenditure actually incurred, that written off against famine, and the balance remaining to be spent:—

Channels.	Amount of Estimates.			Total Expenditure incurred from Famine Funds.	Expenditure recorded against the Estimates.			Balance of Estimates.
	Mr. Rundall's Estimates.	Subsequent increase to the Estimate	Total.		Normal Value of work done during Famine.	Subsequent Expenditure.	Total.	
1	2	3	4	5	6	7	8	9
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Kávéripák main channel .	1,91,300	37,702	2,29,002	3,66,157	1,63,588	27,471	1,91,059	37,943
Govindavadi do. . .								
Kávéripák tank supply channel	9,000	187	9,187	...	...	9,187	9,187	...
Govindavadi do. . . .	12,000	...	12,000	...	...	361	361	11,639
Kambankal do. . . .	56,100	1,440	57,540	...	...	1,440	1,440	56,100
Mahindravadi do. . . .	7,630	—152	7,478	...	...	1,428	1,428	6,050
Total .	2,76,030	39,177	3,15,207	3,66,157	1,63,588	39,887	2,03,475	1,11,732

A few of the masonry works have been completed since the famine, but all capital expenditure on the system was stopped by the Government of India, in letter No. 267 I.‡ of 9th July 1881. As above stated, a complete revised estimate for the whole system, to include past as well as proposed expenditure, was subsequently called for. To meet this demand the whole of the figures relating to the northern section have been reconsidered and recast; the improvement of the southern section has been estimated for, and, finally, the question of the water-supply available has been carefully worked out, and the system strictly confined to the limits, which it is believed can be adequately supplied through the *existing* head-sluices and main channels. I italicise "existing," because neither the water-supply available nor the returns hitherto derived from the irrigation warrant any such expenditure as would be involved by the enlargement of the head works.

‡ Proceedings, Madras Government, No. 447 I. of 19th July 1881.

Financial statements in the authorised forms, showing the probable return due to the expenditure now proposed, have also been prepared.

It will be convenient to consider each of the above points separately and at some detail.

Water-supply.

7. Firstly, as regards the water-supply.

It is unfortunately true that it would scarcely be possible to have a worse river than the Pálár for the supply to a large irrigation system. A synopsis of the water registers which have been maintained since 1864 is given in Statement A, and from this it will be seen that during a period of 15 years the average number of days on which absolutely no water passed down the river was 273·73. In 1867 no water at all passed, and the average would be much worse but for the year 1874, during which water passed on 204 days.

The northern head-sluices receive a full supply when there is more than 5½ feet of water on the sill of the anicut under-sluices,§ and Statement A shows that this depth of water occurs on the average on 22·67 days in each year. The

§ The sills on the northern head-sluices and the anicut under-sluices are on the same level.

southern head-sluice only receives a full supply when there is more than 7 feet of water on the sill of the under-sluices,* which occurs on the average on only 14·07 days in the year.

* The sill of the southern head-sluice is 2 feet above that of the under-sluices.

8. The next point to be considered is the carrying capacity of the existing main channels, any further enlargement of which is, for the reasons above given, not contemplated. Mr. Rundall, in his completion estimates for the northern section, which comprised the enlargement of the main channel, calculated that a depth of 4 feet and a fall of 3 feet per mile would give a discharge of 4,000 cubic feet per second in a channel 215 feet wide. On calculating the discharges afresh, and in making use of Bazin's discharge co-efficients, it has been found, however, that the discharge in the northern main channel will not amount to more than 3143·5 cubic feet per second. In the southern main channel, which is 113·5 feet wide, with a fall of 6 feet per mile, the discharge with a 4 feet depth of flow will be 2302·9 cubic feet per second. The details regarding these discharges, as well as those for intermediate depths of flow, are given in Appendix B.

Carrying capacity of main channels.

Combining these results with the calculations regarding the water-supply available noticed in the previous paragraph, it is found that, in an average year, the northern main channel carries 6,158,110,000 cubic feet during the period of full supply, and that the southern main channel similarly carries 2,799,630,000 cubic feet. These are assumed as the volumes which determine the area capable of being irrigated, all supplies less than full being taken as only replenishing the intermediate tanks, and not as increasing the volume reaching the tail ends of the channels.

9. To determine the area that can be irrigated, the ayacut area of each tank in the system has been taken from the revenue returns, a calculation made of the catchment basin of each, and a corresponding deduction carried out to determine the area remaining to be supplied with river-water. These details are shown in Statements E-1 and E-2 for the northern and southern sections of the system respectively. It has been assumed that each square mile of catchment suffices for the irrigation of 40 acres, the rainfall averaging 35 inches per annum. For the balance of the irrigation 189,000 cubic feet (7,000 cubic yards) of river-water have been assumed as necessary for each acre. This is equivalent on the northern side to 0·0965 cubic feet per acre per second during the average period of full supply; and on the southern side to 0·1555 cubic feet per acre per second. Taking now the volume available at full supply, as stated in the last paragraph, it is found that 32,582 acres can be supplied with river-water on the northern side and 14,813 acres on the southern side.

Area that can be irrigated.

10. In the case of the former, the selection of tanks to be in future included in the system has been made so that the area under them requiring river-water shall strictly correspond with the amount of such water calculated to be available. The selected tanks are shown in the sketch map of the section. It will be seen from Statement E-1 † that the total area entered as requiring river water is 32,698 acres, or only 116 acres in excess of the area capable of being supplied. The fact of the last tank in the series being a very large one accounts for this small discrepancy. It can be partly, but not wholly, supplied.

In Northern section.

† Excluding Mahendravadi channel.

11. In the case of the southern section, however, circumstances are somewhat different. It has been said above that water is available for 11,813 acres, but of these only 14,309 acres have been entered in Statement E-2 of the tanks forming the section. The following reasons account for what at first sight appears an omission to fully utilise the water-supply.

In Southern section.

It will be evident from what has been already said that the system is one which is now, and must always be, very far from a brilliant financial success, and it has therefore been considered that the works undertaken to complete it must be strictly confined to such as are absolutely necessary to secure a proper supply to and régime for the channels, combined with such other improvements as can be executed at small cost. Now it is unfortunately true that the southern channels were very badly aligned and carelessly excavated in the first instance. The head of the Sakkiramallur channel was put in a very inconvenient and wrong place, and no attempt was made to regulate the bed-slope of the main channels by means of masonry falls. These improvements are therefore essential, but at the same time the cost thereby incurred amounts to, if indeed it does not exceed, the expenditure on the section that can be termed legitimate. Unless, then, it could be clearly shown that the further expenditure required to

secure a free passage to tanks of the excess supply of water available would be directly met by an increased irrigation, or by a saving of remission under those tanks, it does not appear legitimate to incur this charge. But these conditions do not obtain. After very careful examination it appears certain that no extension of the area immediately under the channels as now laid down could be secured except at a cost which the corresponding increase to revenue would not justify.

It has been urged that by thus limiting the area under the channels of the southern section, hardship will be inflicted on many cultivators whose lands lying under tanks now to be excluded from the system have been assessed as "irrigated by river-water." But it is a mistake to suppose that any such hardship will result. As much* water will enter the head of the main channel under the present proposals as previously, and it will be better carried as the régime of the main channels will be improved. The water will thus reach just as far, or further than, it ever has previously. Whether the tanks in question have been rightly classed hitherto as "river-fed" may be matter for question. Personally, I should say that the classification had been wrong, being certain that their supplies of river-water must have been very few and far between. But however this may be, their exclusion from present calculations is a matter purely of accounts interest, and does not affect, otherwise than to benefit, their position as regards "river-fed" tanks.

* As a matter of fact probably, rather more, for the conversion of the present Sakkiramallur head into under-sluices will keep the southern head-sluice much more free from silt than heretofore.

12. It will be noticed that throughout the foregoing remarks all mention of the Mahendravadi head-sluice and channel on the northern side has been omitted. But this channel is of very minor importance, only supplying 956 acres, which require river-water, much of which area has also an alternate supply from the Kávéripák tank. No detailed notice of the circumstances of this channel appear therefore to be called for.

Mahendravadi head-sluice.

13. The following table shows the area proposed to be irrigated by each of the principal channels according to the average existing area of cultivation under the various tanks:—

Area to be irrigated by each channel.

Section.	Channels.	Total Area irrigated.	Area of catchment basin.	Area rain-fed, at 40 acres per square Mile.	Area requiring river-water.
		Acres.	Sq. miles.	Acres.	Acres.
Northern Section	Kadaperi branch channel	920	3·00	120	800
	Kávéripák tank supply channel	5,873	15·00	600	5,273
	Do. surplus channels	10,081	43·41	1,737	8,344
	Govindavadi channel	7,953	20·75	830	7,123
	Kambarkal do.	12,396	30·95	1,238	11,158
	Mahendravadi do.	1,046	2·25	90	956
	Total	38,269	115·36	4,615	33,654
Southern Section	Sakkiramallur channel	2,574	17·5	700	1,874
	Rajakal do.	3,135	12·50	500	2,635
	Tennampattu do.	5,908	39·62	1,585	4,323
	Kalavai do.	3,137	16·50	660	2,477
		14,754	86·12	3,445	11,309
	Total for both Sections	53,023	201·48	8,060	44,963

The above total of 53,023 acres will, it is contemplated, be ultimately increased to 68,700 acres (*vide* paragraph 37) in consequence of the improved supply reaching land now commanded but not fed.

14. Some details will now be given of the works it is proposed to undertake. It will be convenient to divide the description according to the main heads of the revised estimates.

Works to be undertaken.

15. No alteration is proposed to the anicut further than is implied by the abolition of the present Sakkiramallur head-sluice on the southern side. This is now formed, as has been already said, by means of two vents, each 5′ × 5′, of which the functions are properly those of under-sluices. The conversion of these two vents to other than their proper uses has resulted in a great silting up of the head of the Tennampattu channel, and also on more occasions than one, in the breaching of the bank of the Sakkiramallur channel, owing to the admission of water to the latter being now under imperfect control. It is therefore proposed to restore the

Head works.

present head-sluice vents to their proper functions, supplying the Sakkiramallur channel from a new cut in the left bank of the southern main channel. The cost of this alteration, so far as the head works are concerned, will be only Rs. 1,963, the cost of the new cut coming under the head of main canals and branches.

Northern section, main canals and branches.

16. Turning now to the northern section, it appears necessary to refer in some detail to Mr. Rundall's estimates, to which allusion has already been made in paragraph 4, as the whole of the expenditure incurred under them has yet to receive sanction, and because the works remaining to be executed are, almost wholly, those which Mr. Rundall proposed, but which have not yet been carried out. In the comparative statement attached to the revised estimates, the entries under "Works proposed" consist, in the case of completed works, of the actual cost of execution, where this is more than the estimated cost; in other cases, the estimated cost is entered. It will be convenient, therefore, to treat of these works as a whole, *i.e.*, without specifying those entirely or partially completed, or those not commenced, leaving these details to be gathered, if desired, from the comparative statement.

Main channel.

17. The estimates include a provision of Rs. 5,126 for removing the old shutter-gear from the head-sluices of the main channel and replacing it by screw-gearing of the latest and most approved type.

Provision is also made for the widening of the main channel, with side-slopes of 4 to 1, from about 160 feet to 215 feet, and for the reduction of the bed-fall from 7 feet to 3 feet per mile. This reduction is obtained by means of two falls, 7 feet and 6 feet high respectively. The above section, with a maximum depth of flow of 4 feet, will give a velocity of discharge of 3·4 feet per second. The main channel is 3 miles 7 chains long up to the point at which it divides into the Kávéripák and Govindavadi channels. There is only one small off-take from the main channel up to this point, *viz.*, the Kadaperi channel, which supplies tanks irrigating 920 acres. The heads to the two channels into which the main channel bifurcates are protected by means of head or division sluices, for which new screw-shutter gearing is provided in the present estimates. The Kávéripák channel head has 10 vents, each $6' \times 4'$, and the Govindavadi channel head 13 vents, each $6' \times 4\frac{1}{2}'$.

Kávéripák tank supply channel.

18. Little work to the Kávéripák tank supply channel has been estimated for, beyond widening the upper portion of it, the old channel being, in most places, capable of carrying the whole discharge required. The hydraulic details are given in Statement D, from which it will be seen that the average bottom width is 86 feet, depth of flow 5 feet, the side-slopes 2 to 1, and the bed-fall 2·6 feet per mile. This gives a velocity of 3·65 feet per second and a carrying capacity of 1,753 cubic feet per second. The channel is required to irrigate 13,617 acres, for which the average supply required, according to the method of calculation adopted in paragraph 8, is only 1,314 cubic feet per second, so that the channel will actually carry 439 cubic feet per second more than the theoretically required supply. It is obvious, however, that some such margin is necessary, in order that any high temporary freshes may be rapidly passed into the tanks and stored.

Kávéripák tank.

19. The tank supply channel is $2\frac{3}{8}$ miles long to the point at which it enters the Kávéripák tank. This tank is one of the largest and finest in the Madras Presidency. Its bund or bank is nearly $4\frac{1}{4}$ miles long, with its top 6 feet above M.W.L., 8 feet above full tank level, and 44 feet above the level of the sill of the lowest sluice. There is thus a maximum height of water against the bank of 36 feet. The bank is protected by means of a massive stone revetment. This reservoir was formed before the country came under British rule, and it possesses more than ordinary historical interest, for it was in and around the supply channel to it that Clive, in February 1752, fought a memorable but little known-of battle—a battle that Colonel Malleson, in his recent "Life of Lord Clive," declares to have been the turning-point of British supremacy in Southern India, and "in very deed one of the decisive battles of the world."

There are ten sluices for the supply of the irrigation immediately below the tank, and the surplus arrangements consist of two weirs and two surplus sluices. The most southern of the two weirs is 310 feet long, and is provided with 37 sluice-vents, each 5 feet wide, with pivot-shutters. The second weir is 278 feet long, and has 34 vents, 4 feet wide, similarly fitted. The sills of all these vents are 4 feet below full tank level.

Kávéripák tank surplus.

20. One channel carries off the water passing from these two weirs, and this becomes known eventually as the Kortalayar river, which, after receiving affluents, forms the source of supply to the Red Hills and Cholavaram reservoirs, serving the city of Madras. Thirty-five tanks, included in the northern section of the Pálár system, are supplied by this surplus channel. They irrigate in all 6,669 acres, of which 1,300 acres are rain-fed and 5,369 acres require river-water. The supply is fairly well maintained and provided for; but as it is not proposed to spend any money on the improvement of this surplus channel or its off-takes, it is not necessary to give here any further details regarding either, as all necessary particulars can be obtained from Statement E and the sketch map of the section.

Kávéripák first surplus sluices.

21. Neither is it necessary to say anything regarding the first surplus sluice, a work of very small importance, and responsible only for the irrigation of 650 acres, of which 508 acres require river-water.

Kávéripák second surplus sluices.

22. Of the second surplus sluices, some more particulars are required, as under present arrangements, 2,762 acres will be supplied through these, of which 2,467 acres require river-water. It will be seen, on referring to the sketch map, that the tanks thus supplied lie on the extreme north of the section, and, until lately, it was supposed that they derived the whole of their river-water through the Mahendravadi channel, the existence of the surplus sluices being ignored.

Now, however, it has been determined to make the Govindachari tank the terminal of those fed by the Mahendravadi channel, and to supply all the remaining tanks on this side of the system through these surplus sluices. The necessary volume of water will be thus obtained more easily and surely, and the heavy cost of widening the upper portion of the Mahendravadi channel, which would otherwise be necessary, will be avoided. The surplus sluices in question consist of 9 vents, each $5' \times 4\frac{1}{2}'$, with their sills half a foot below those of the weir-sluices above mentioned. No expenditure of importance is proposed to be incurred on this portion of the section.

Govindavadi channel.

23. To return now to the Govindavadi channel, which is the second branch of the main channel alluded to in paragraph 17. This channel is $17\frac{1}{4}$ miles long to where it enters the Govindavadi tank. Up to 13 miles 1 chain, where the Kambankal channel takes off, it has also to carry the supply of this channel. The whole area to be fed by it up to the point of bifurcation is therefore 20,349 acres, of which 18,281 acres require river-water. For this area the volume calculated in the manner previously indicated should be 1,764 cubic feet per second, but with a full supply passing through the head-sluice and also down the Kávéripák channel only 1,753 cubic feet would be available. To allow, however, any exceptional fresh to pass rapidly down it, the channel, as altered, has been designed to carry 1,847 cubic feet per second up to the point of bifurcation. To obtain this, allowance is made for the widening of the channel to a bottom width of about 106 feet with a $4\frac{1}{2}$ feet maximum depth of flow. The estimated cost of the earthwork is Rs. 71,347. An expenditure of Rs. 23,325 is also rendered necessary for the removal of the prickly-pear with which the channel was found much overgrown. The previous bed-fall was excessive, amounting to an average of 10 feet or 11 feet per mile. This has been reduced, by means of 14 drop weirs, with body-walls from $4\frac{1}{2}$ to 7 feet high, to an average of 2·84 feet per mile. The total estimated expenditure on falls and weirs is Rs. 56,485. Other works estimated for include the conversion into a road-dam of a bridge of three arches, each of 15 feet span, which would require an addition of at least five similar arches to suit the increased dimensions of the channel. Also, for widening another bridge, now consisting of one arch of 30 feet and two of 15 feet span, by the addition of three arches of 20 feet span. Also, for the improvement of the off-takes to the minor channels leading to the several tanks, and for the removal of the present small masonry falls.

The regulator, at the point where the Kambankal branches off from the Govindavadi channel, consists now of a weir 61 feet long across the head of the former, and of a sluice of 3 vents, each 6 feet broad, to continue the supply into the latter. As this is the first point at which water can be surplused, it has been considered advisable to increase the Govindavadi channel sluices to 6 vents, each $5' \times 4'$ closed by screw-gearing shutters, at an estimated cost of Rs. 1,800. A weir 15 feet long with its crest at the same level as that across the Kambankal will also be provided, so as to regulate the ordinary distribution of water between the two channels. The distribution might, of course, be effected through the proposed sluices; but as

the proportionate distribution would then be depended on the judgment of the man in charge, a weir seems to be required. The sluices will only be used when it is considered advisable to reduce the supply to the Kambankal.

24. At a distance of 2¾ miles below these division works, some further works of the same description are found consisting of a weir 92 feet long across an escape channel, with its crest 3 feet above the bed of the Govindavadi channel. It is proposed to remove the present body-wall of this weir, and to fit it with screw-gearing shutters; 10 vents, each 10½ feet long and 3 feet high, being allowed for, with the sill of the vents at bed level. The estimated cost is Rs. 3,450. Across the head of the tank channel a drop-weir will also be placed at a cost of Rs. 900. The channel from this point to where it enters the Govindavadi tank is 1½ miles long and requires a little clearing, and also the removal of prickly-pear. The Govindavadi tank irrigates 976 acres, of which 936 acres require river-water.

Kambankal.

25. The passage of an improved supply down the channel, known as the Kambankal, forms the principal object of the present proposals, so far as the northern section is concerned. The tanks lying above this channel have always received a more or less good supply, but complaints from the Chingleput district, in which most of the irrigation under the Kambankal lies, have always been rife, as to the short supply of water received by the tanks there situated, and held to form part of the Palar system. No doubt these complaints have been well-founded, and it is hoped that, by the arrangements just detailed for the purpose of bringing a larger supply to the head of the Kambankal, an improved state of affairs may now be inaugurated. But the uncertain supply of water furnished by the Palar will, it is feared, prevent complete satisfaction from being given. Moreover, the Kambankal channel does not lend itself, nor can it at any reasonable cost be adapted, to a by-any-means perfect system of irrigation. Its present fall and section are very unequal. In the first 12½ miles the natural fall of about 6·5 feet per mile is considerably broken by numerous drops. In the next 7 miles there is scarcely any fall at all. The longitudinal section shows clearly how extremely irregular the channel is at present; in fact, it seems to have been excavated without any regard to levels. The line has, however, been judiciously chosen, as for the first 18 miles it runs along a ridge, receiving little or no drainage, and irrigating on both sides. But one of the chief reasons why no water has ever yet reached the tail of the channel is to be found in the fact that all the existing sluices had been made of uniform size, 6′ × 4′, whether they supply a channel leading to a tank irrigating 90 acres, or whether one leading to a tank irrigating 1,300 acres, and the consequent waste of water has been enormous.

The principal works proposed to be undertaken consist of—

(*a*) Lengthening the weir at the head of the channel from 61 feet to 81 feet, and raising its body-wall 1½ feet, at an estimated cost of Rs. 1,190.

(*b*) Deepening the channel where necessary, especially through a ridge in the 22nd mile, at an estimated cost of Rs. 39,020.

(*c*) Four new drop-weirs between the 12th and 20th mile, at a cost of Rs. 7,900.

(*d*) The alteration of the existing falls and heads to channels.

The terminal tank of this channel and of the northern section of Palar system is the Sriperambudur, which irrigates 1,256 acres, of which 1,056 require river-water.

Mahendravadi channel.

26. The Mahendravadi channel, which is the last main channel on the northern side requiring notice, has, as was stated in paragraph 12, a separate head from the Palar, consisting of 9 vents, each 5′ × 5′. It was at one time supposed that the supply to the Kortalayar river, and consequently that to the Madras city reservoirs, could be materially improved by means of this channel, but this hope has now been abandoned owing to the deficient water-supply in the Palar. The functions of the channel are therefore confined to irrigation, and, as has been said in paragraph 22, the whole of the tanks below that of Govindachari, previously taken as lying under it, can now be better supplied from the Kávéripák tank. The irrigated area under the channel consists therefore of only 1,046 acres, of which 956 acres require river-water. A supply of 92·25 cubic feet per second is sufficient for this area, and only three of the nine vents of the head-sluice require to be fitted with new screw-gearing. The cost of this is entered as Rs. 959. The channel itself is very irregular in bed-fall and section, but there is no object in devoting a large sum to its reformation, and an expenditure of Rs. 5,460 on earthwork, and the revision of the designs of a few of the existing masonry works, will provide everything that is absolutely required.

Northern section: Distributaries and cross drainage works.

27. It is not proposed to undertake any works of importance under the heads Distributaries and Cross Drainage Works. As regards the former, only small improvements to the heads of some of the tank channels are allowed for, leaving the channels themselves and the tank bunds to be dealt with out of the grant for revenue maintenance and repairs as occasion may arise. Most of the drainage of the country irrigated by the system is intercepted by means of the tanks, and the small quantity that enters the channels will, it is assumed, pass down them without requiring to be specially dealt with.

Southern section: Main canals and branches.

28. Turning now to the southern section, it may be said, firstly, that an allowance of Rs. 2,760 is entered in the estimate for the improvement of the shutter-gearing of the head-sluices by which the whole of this section will now be supplied. This work has been carried out in anticipation of sanction.

29. It is proposed to construct the new head to the Sakkiramallur channel, to which reference has already been made in paragraph 15, at a point 3·8 chains below the southern head-sluice. New heads to the Tennampattu and Kalavai channels, in the place of the imperfect ones now existing, are also proposed at a point 9·5 chains below the head-sluice. These will all be fitted with screw-gearing shutters, the total estimated outlay being as follows:—

	Rs.
Sakkiramallur channel	5,457
Tennampattu do.	5,046
Kalavai do.	3,823

A thorough control over the water-distribution will thus be secured. The following table shows the number and dimensions of the vents in each division sluice:—

Channel.	Number of Vents.	Dimensions.
1. Sakkiramallur	5	6′ × 4′
2. Tennampattu	6	6′ × 4′
3. Kalavai	4	6′ × 4′

Sakkiramallur channel: (*a*) Channel from anicut.

30. The new cut for the Sakkiramallur channel, starting from the sluice mentioned in the last paragraph, joins the old channel at a distance of 20 chains from the new head. Crossing over a new siphon-sluice to carry the water of a small existing irrigation channel, the Sakkiramallur channel falls into the tank of that name, about $1\frac{1}{20}$ miles below the same point. Up to this the channel is to be 40 feet broad with a depth of flow of 4 feet, a bed-fall of 3 feet per mile, and a velocity of 3·14 feet per second. The Sakkiramallur tank irrigates 281 acres, of which 191 acres require river-water. The channel passes out of the tank by a surplus weir 45 feet long, in which are 8 vents, each 4′ × 4′. From this weir the channel is to be of the following dimensions:—

Bottom width	30 feet.	
Depth	3 „	
Fall	4·58 „	
Velocity	3·82 „	per second.

No very regular course is followed by the existing channel below the Sakkiramallur tank. It passes through a series of minor tanks, and finally loses itself in some flat low-lying ground below the Esyanur tank. This defect it is now proposed to remedy by means of a new cut starting from the head of the channel leading to the Anatangal tank, 4½ miles below the head of the main channel. This cut will be about 2½ miles long, and will run into the remains of the original channel, whence a series of drops will carry the water into the Natteri tank. This tank irrigates 400 acres. One surplus from it supplies the Bramadesam tank, irrigating 191 acres, and another carries the balance of the water into a natural drainage channel leading to the Vengalattur tank, irrigating 453 acres, which is the terminal tank of this channel. The surplus from the Vengalattur tank goes into the Rajakal (*vide* next paragraph), and thence into the Dusi-Mamandur tank.

The total area irrigated by the channel is 2,574 acres, of which 1,874 acres require river-water. The required water-supply, on the assumption stated in paragraph 8, is 291 cubic feet per second. The carrying capacity of the channel at its head has, however, been made equal to 580 cubic feet per second, or an excess of 289 cubic feet per second. The necessity for provision for the rapid passage of flood-water accounts for this large excess.

Sakkiramallur channel: (b) Rajakal.

31. It is convenient to consider the Rajakal in the light of an adjunct to the Sakkiramallur channel, for it occasionally receives a considerable supply from the surplus to the Vengalattur tank, though it mainly depends on a separate river-head consisting of 6 vents of 5′ × 4′ each.

The channel from the river will have its bed-fall reduced from 6·1 to 3 feet per mile by means of two masonry falls, but no other improvements of importance are proposed. The channel falls into the Dusi-Mamandur tank after a course of about $8\frac{3}{10}$ miles. This tank is the second largest in the Palar anicut system, being exceeded only by the Kávéripák tank. It irrigates 3,046 acres, of which 2,576 require river-water. It is of old native formation, the bank being formed between two hills. There are two low-level and two high-level sluices, also two surplus weirs provided with self-acting shutters. The surplus falls back into the Palar near its junction with the Cheyár.

Tennampattu channel.

32. The next channel to be described is that previously known as the Dusi, but which it is now proposed to call the Tennampattu channel. This irrigates 5,908 acres, of which 4,323 require river-water, involving a carrying capacity of 672 cubic feet per second. The channel as proposed will carry 716 cubic feet per second, or a margin of 44 cubic feet. At its commencement this channel runs with a very small fall through a stiff gravelly and rocky soil, but its fall rapidly increases until at a point 5 miles below the head its reaches 14 feet per mile. Some drops are proposed which will reduce the maximum fall to 10 feet per mile, giving a velocity of 4·37 feet per second, which it is considered can be carried without erosion. In the 9th mile the channel falls into the Tennampattu tank, irrigating 262 acres. Out of this it now flows without any control, but a weir with vents is proposed to regulate the supply to the channel below the tank. No works are proposed below the weir, the channel being in sufficiently good order to pass down any river-water that may reach so far into the various tanks which are fed by it either directly or by means of branch channels. The main channel eventually terminates in the Tirúpanamur tank, the surplus of which goes into the Kil Nelli tank, and thence serves to augment the supply of the Dusi-Mamandur tank.

Kalavai channel.

33. The Kalavai channel requires but brief notice. It irrigates 3,177 acres, of which 2,477 require river-water. The corresponding carrying capacity is 385 cubic feet per second, and it is proposed to pass 402 cubic feet per second, or an excess of 17 cubic feet, down the channel.

Paragraph 29.

The new joint head to be formed for this and the Tennampattu channel has been already described. The bed of the Kalavai channel is extremely irregular, and three drops are proposed to bring its fall within reasonable limits. In the 5th mile below its head the channel enters the Kalavai tank irrigating 932 acres. This tank has three surplus weirs, each forming the head of a branch channel supplying the remaining tanks fed by the Kalavai main channel.

Southern section: Distributaries and cross drainage works.

34. The remarks made in paragraph 27 as regards the distributaries in the northern section apply also to the southern section. The most important disbributary on the southern side is the so-called Tennampattu high-level channel, which takes off at $6\frac{1}{2}$ miles from the head of the main channel. It supplies 18 tanks, irrigating 2,473 acres, of which 1,713 acres require river-water. Some alterations and improvements to the existing head are proposed at an estimated cost of Rs. 8,733; also deepening the channel where necessary.

The only new cross-drainage works proposed are for the Sakkiramallur channel, a considerable portion of which is formed simply by a retaining bank on ground with a side-long slope. The drainage along this portion is led into the channel by means of passages made of rough stone, the bank of the channel opposite these being reveted. There are two such passages estimated to cost in the aggregate Rs. 1,651.

Financial aspect of project.

35. This concludes all that need be said in description of the revised estimates so far as works are concerned. It remains to consider their financial aspect.

Classified abstract estimate.

36. The classified abstract estimate shows that the total expenditure up to date, which cannot be properly distributed by heads and sub-heads, amounts to Rs. 13,19,498, divided as follows:—

	Rs.
Works	10,26,978
Establishment	2,68,675
Tools and plant	23,845

The proposed new expenditure for which sanction is now awaited amounts to Rs. 5,63,250, divided thus:—

	Rs.
Works	4,35,556
Establishment	1,18,162
Tools and plant	9,532

Of this amount, Rs. 2,72,506 thus divided—

	Rs.
Works	2,02,025
Establishment	64,452
Tools and plant	6,030

has been spent in anticipation of sanction, leaving Rs. 2,90,744 remaining to be spent, divided as follows:—

	Rs.
Works	2,33,532
Establishment	53,710
Tools and plant	3,502

A margin for unforeseen works, amounting to 5 per cent. on the unsanctioned works expenditure, or to Rs. 20,647, has been provided for.

The total gross expenditure thus amounts to Rs. 18,82,748, divided into—

	Rs.
Works	14,62,534
Establishment	3,86,839
Total and plant	33,477

Forecast statements.

37. Forecast statements in the most recent forms prescribed by the Government of India have been drawn up and are appended. The revenue figures in these have been filled in by Mr. Wilson, Director of Revenue Settlement and Agriculture, and in charge of the irrigation accounts. These forecasts show that it is proposed to spend one lakh a year on works in each of the years 1884-85 and 1885-86, and the balance of Rs. 33,521 in 1886-87.

The ultimate area of irrigation under the tanks to which the system is now confined amounts to 68,700 acres. It is calculated that with the improvements proposed half this area will be double-cropped, bringing the total irrigated area up to 102,700 acres, as against 87,403 acres, the actual area irrigated in 1882-83. The increase amounts to 15,297 acres. The estimated gross revenue due to the 102,700 acres amounts to Rs. 1,40,970, the manner in which this is calculated being shown in paragraph 5 of Mr. Wilson's letter No. 67 of 19th October 1883. The estimated maintenance charges, calculated at 8 annas per acre, *minus* the old maintenance charges, amount to Rs. 47,250, leaving Rs. 93,720 as the net revenue due to the works, excluding interest. Simple interest at 4 per cent. on the estimated gross expenditure of Rs. 18,82,748 amounts to Rs. 75,310, leaving therefore a yearly balance of Rs. 18,410 in favour of the system. There being at present a deficit on it, amounting to Rs. 7,89,416, the estimated annual surplus will suffice to pay this deficit off, and so to clear the system, in forty-five years.

Statements to accompany Note.

38. This Note is accompanied by complete financial and hydraulic statements, by sketch maps of the system, by index longitudinal sections, by detailed plans of the masonry works remaining to be executed, and by detailed and abstract estimates for all works.

PALAR ANICUT SYSTEM.

Classified Abstract Estimate.

Names of Channels.	(1) Head Works.		(2) Main Canals and Branches.									(3) Distributaries.				Total Works.	Establishment.	Tools and Plant.	Grand Total.
	C. Works.	Total.	B. Land.	D. Regulators.	E. Falls and Weirs.	F Other Cross Drainage Works	G. Bridges.	H. Escapes.	L. Earthwork.	O. Miscellaneous.	Total.	B. Land.	C. Works.	L. Earthwork.	Total.				
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Old outlay on Head Works and Northern and Southern Sections, not classified	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	10,26,078	2,68,675	23,845	13,10,498
Head Works	1,963	1,963	...	...	...	...	...	...	...	...	...	..	...	...	...	1,963	451	29	2,443
Northern Section. Main Channel	...	...	1,000	5,126	15,222	...	...	...	36,328	4,200	61,876	...	...	...	...	61,876			
Northern Section. Kavéripak Tank Supply Channel	...	...	...	2,544	153	...	...	...	4,020	1,570	9,187	...	...	...	...	9,187			
Northern Section. Gobindavadi Channel	...	...	2,725	4,720	57,385	...	5,916	3,450	72,897	27,825	1,74,718	50	4,008	350	4,408	1,79,126			
Northern Section. Kambankal do.	...	...	...	1,190	11,305	...	1,900	...	39,020	...	53,415	...	2,535	150	2,685	56,100			
Northern Section. Mahendravadi do.	...	...	...	959	469	...	...	240	5,460	350	7,478	...	...	...	...	7,478			
Total	...	...	3,725	14,539	84,534	...	7,816	3,690	1,58,425	33,945	3,06,674	50	6,543	500	7,093	3,13,767			
Add 5 per cent. for unforeseen works	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15,688			
Total for Northern Section	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3,29,475	93,759	7,941	4,31,175
Expenditure already incurred	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2,02,024	64,452	6,030	2,72,506
Southern Section. Sakkiramallur Channel	...	...	400	5,644	14,758	2,047	...	324	28,974	...	52,147	...	1,274	350	1,624	53,771			
Southern Section. Tennampattu do.	...	...	...	6,046	7,125	...	...	636	15,450	...	28,257	...	3,655	5,078	8,733	36,990			
Southern Section. Kalavai do.	...	...	...	3,823	2,523	...	...	...	...	...	6,346	...	...	...	...	6,346			
Southern Section. Rajakal do.	...	...	...	...	1,652	...	...	...	420	...	2,072	...	...	..	...	2,072			
Total	...	...	400	14,513	26,058	2,047	...	980	44,844	...	88,822	...	4,929	5,428	10,357	99,179			
Add 5 per cent. for unforeseen works	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4,959	23,932	1,562	1,29,652
Total for Southern Section	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	1,04,138	1,18,162	9,533	5,63,250
Total proposed new expenditure	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	4,35,556	3,86,837	33,377	18,82,748
Total	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14,62,534			
* Expenditure incurred in investigating the project and charged to 34, Protective Works, Irrigation.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	116	11,024	1,027	12,467
GRAND TOTAL	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	14,62,450	3,97,861	34,404	18,94,915

* Added in the office of the Chief Engineer for Irrigation.

MADRAS;
The 27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

STATEMENT A.

PALAR ANICUT SYSTEM.

Synopsis of the Water Registers at the Anicut from 1864 to 1880.

Years.	Number of days in each year on which water stood at the heights shown above the level of the sills of the Anicut under-sluices.																Maximum Flood.			Number of days on which no water passed.
	More than 8' 0".	7' 6" to 8' 0"	7' 0" to 7' 6"	6' 6" to 7' 0"	6' 0" to 6' 6"	5' 6" to 6' 0"	5' 0" to 5' 6"	4' 6" to 5' 0"	4' 0" to 4' 6"	3' 6" to 4' 0"	3' 0" to 3' 6"	2' 6" to 3' 0"	2' 0" to 2' 6"	1' 6" to 2' 0"	1' 0" to 1' 6"	0' 6" to 1' 0"	0' 0" to 0' 6"	Date.	Height.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
																			Ft. In.	
1864	...	3	1	...	...	2	...	1	...	3	1	6	6	4	8	4	6	.....	...	321
1865	1	...	2	3	1	...	1	4	1	2	4	4	7	2	2	...	2	5th December	9 6	329
1866	6	...	5	7	...	3	1	7	2	3	1	6	11	10	6	18	9	26th October	11 0	276
1867	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	.....	...	365
1868	...	...	...	2	1	...	3	2	1	4	1	5	2	2	5	3	8	.....	...	327
1869	...	...	...	...	...	...	2	...	3	2	6	11	10	14	10	12	6	.....	...	289
1870	5	1	1	1	1	2	2	...	2	1	4	9	8	16	16	7	1	21st October	9 6	288
1871	8	4	4	5	2	1	2	...	2	5	7	5	9	7	20	11	3	10th November	10 6	270
1872	9	4	3	9	2	7	4	9	5	10	10	12	14	20	12	12	...	3rd May	13 6	224
1873	12	5	3	8	4	4	2	13	4	4	3	15	5	22	13	5	1	15th October	10 6	242
1874 Entries only up to 31st October, when the anicut breached	24	14	4	11	2	0	5	6	4	9	11	13	5	14	8	3	1	25th October	13 9	161
1875	Anicut under repair.																			
1876																				
1877	15	9	5	3	3	5	4	2	8	10	5	6	15	7	...	2	...	4th November	10 2	263
1878	31	11	13	4	5	4	2	4	7	13	23	5	11	7	2	2	...	31st August 6th September 22nd October	9 6	221
1879	...	...	...	1	...	3	2	9	17	30	36	27	...	...	3	2	...	.....	...	235
1880	4	2	2	6	2	6	...	4	9	13	23	...	...	...	...	--	...	22nd November	10 0	295
Total	115	53	43	60	23	46	30	61	65	109	135	124	103	125	105	81	37	.....	...	...
Average for 15 years	7·67	3·35	2·87	4·0	1·53	3·07	2·0	4·07	4·33	7·27	9·0	8·27	6·87	8·33	7·0	5·4	2·47	.....	...	273.
Total for Northern Section, *vide* Statement B	22·67						6·07		7·97	12·63		8·27	6·87	8·33						
Total for Southern Section, *vide* Statement C	14·07			4·76	2·3	3·54	4·07		4·33	7·27										

CHEPÂK,
27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

STATEMENT B.

PALAR ANICUT SYSTEM.

CALCULATIONS FOR DISCHARGES.

BAZIN'S CO-EFFICIENTS.

NORTH MAIN CHANNEL.

Bottom width 215 feet. Side slopes 4 to 1. Fall 3 feet per mile = $\frac{1}{1760}$.

Item No.	Particulars.	Depth of Flow in Channel.						
		1′	1′5	2′0	2′5	3′0	3′5	4′0
1	Wetted perimeter (feet)	223·2	227·36	231·4	235·6	239·8	243·8	248·
2	Area (square feet)	219·	331·5	446·	562·5	681·	8 1·5	924·
3	Hydraulic mean depth	0·98	1·46	1·92	2·38	2·82	3·28	3·72
4	Co-efficient of discharge	48·	55·	61·	66·	68·5	72·	74·
5	Velocity of flow (feet per second)	1·1327	1·5841	2·0148	2·427	2·742	3·1082	3·4021
6	Discharge (c. feet per second)	248·05	525·13	898·58	1365·8	1867·3	2491·2	3141·5

SOUTH MAIN CHANNEL.

Bottom width 113·5 feet. Side slopes 1½ to 1. Fall 6 feet per mile = $\frac{1}{880}$.

Item No.	Particulars.	Depth of Flow in Channel.						
		1′	1′5	2′0	2′5	3′0	3′5	4′0
1	Wetted perimeter (feet)	117·1	119·26	120·7	122·5	124·3	126·12	127·9
2	Area (square feet)	115·	173·6	233·	293·	354·	416·6	478·
3	Hydraulic mean depth	0·98	1·45	1·93	2·39	2 88	3·29	3·73
4	Co-efficient of discharge	48·	56·	61·	66·	69·	72·	74·
5	Velocity of flow (feet per second)	1·6018	2 2325	2·8567	3·4395	3·9022	4·4024	4·8178
6	Discharge (c. feet per second)	184·21	387·57	665·62	1007·8	1381·4	1829·6	2302 9

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27th October 1883.

C. VINCENT,

Executive Engineer, D. Project Division.

STATEMENT C—1.

PALAR ANICUT SYSTEM.

NORTHERN MAIN CHANNEL.

Statement showing the average annual supply of water that may be expected.

18 vents, each 5′ × 5′, sills 7′ below crest of anicut.

Full supply in channel with 4′ depth of flow.

Depth of water above sill of head-sluice.	Corresponding area of discharge.	Depth of flow in channel.	Head of water available.	Average theoretical discharge through head-sluice.	Average carrying capacity of channel.	Average number of days of given depth of water from Statement A.	Total corresponding discharge (columns 6 and 7).	Discharge assumed to be available yearly.
1	2	3	4	5	6	7	8	9
	Sq. ft.	Ft.		C. ft. per sec. Not less than	C. ft. per sec.		C. ft.	C. ft.
More than 5·5′	450	4	1·5	3,538	3,144	22·67	6,158,110,000	6,158,110,000
From 5′·5 to 4′·5	From 450· to 405·	From 4′ to 3′·5	From 1′·5 to 1·	3,069	2,818	6·07	1,477,890,000	1,559,304,500
„ 4′·5 to 3′·75	„ 405· to 337·5	„ 3′·5 to 3′	„ 1 to 0·75	2,238	2,179	7·97	1,500,470,000	
„ 3′·75 to 3′	„ 337·5 to 292·5	„ 3′ to 2′·5	„ 0·75 to 0·5	1,602	1,616	12·63	*1,748,150,000	
„ 3′ to 2′·5	„ 292·5 to 225·	„ 2′·5 to 2′	„ 0·5	1,179	1,133	8·27	809,560,000	
„ 2′·5 to 2′	„ 225· to 180·	„ 2′ to 1′·5	„ 0·5	919	712	6·87	422,620,000	
„ 2′ to 1′·5	„ 180· to 135·	„ 1′·5 to 1′	„ 0·5	715	387	8·33	278,528,000	
						TOTAL	12,395,328,000	7,717,414,500

* Average theoretical discharge (column 5) taken.
Allowance of water for cultivation = 189,000 cubic feet (7,000 cubic yards) per acre.
The total average yearly supply with full channel as given above is therefore sufficient for the cultivation of 32,582 acres.

CHEPÂK,

27th October 1883.

C. VINCENT,

Executive Engineer, D. Project Division.

STATEMENT C-2.

PALAR ANICUT SYSTEM.

SOUTHERN MAIN CHANNEL.

Statement showing the average annual supply of water that may be expected.

15 vents, each 5′ × 5′ sills 5′ below crest of anicut.
Full supply in channel with 4′ depth of flow.

Depth of water above sill of head-sluice.	Corresponding area of discharge.	Depth of flow in channel.	Head of water available.	Average theoretical discharge through head-sluice.	Average carrying capacity of channel.	Average number of days of given depth of water from Statement A.	Total corresponding discharge (columns 6 and 7).	Discharge assumed to be available yearly.
1	2	3	4	5	6	7	8	9
	Sq. ft.	Ft.	Ft.	C. ft. per sec. Not less than	C. ft. per sec.		Ft.	C. ft.
More than 5′	375	4	1	2,408	2,303	14·07	2,799,630,000	2,799,630,000
From 5′ to 4′·25	From 375 to 318·75	From 4 to 3·5	From 1 to 0·75	2,090	2,017	4·76	829,519,000	
„ 4′·25 to 3′·75	„ 318·75 to 281·25	„ 3·5 to 3	„ 0·75	1,668	1,606	2·3	319,144,000	
„ 3′·75 to 3′	„ 281·25 to 225	„ 3 to 2·5	„ 0·75 to 0·5	1,292	1,195	3·54	365,498,000	546,322,750
„ 3′ to 2′·5	„ 225 to 187·5	„ 2·5 to 2	„ 0·5	936	837	4·07	294,329 000	
„ 2′·5 to 2′	„ 187·5 to 150	„ 1·5 to 1	„ 0·5	766	527	4·33	197,157,000	
„ 2′ to 1′·5	„ 150 to 112·5		„ 0·5	596	286	7·27	179,614,000	
						TOTAL	4,984,921,000	3,345,952,750

Allowance of water for cultivation = 189,000 cubic feet (7,000 cubic yards) per acre.
The total average supply with full channel as given above is therefore sufficient for the cultivation of 14,813 acres.

CHEPÂK,
27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

STATEMENT D-1.

PALAR ANICUT SYSTEM.

Hydraulic Details of Main Branch Channels of Northern Section.

Item number.	Channel.	Area under channel.	Discharge required to give 189,000 cubic feet per acre in 22·67 days.	Proposed carrying capacity of channel.	Excess carrying capacity.	Maximum depth of flow.	Bottom width. Present.	Bottom width. Proposed.	Side slopes.	Fall. Present. Feet per mile.	Fall. Proposed. Feet per mile.	Fall. Proposed. Ratio to unity.	Wetted perimeter.	Area when full.	Hydraulic mean depth.	Co-efficient.	Velocity.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
		Acres.	C. ft. per sec.	C. ft. per sec.	C. ft. per sec.	Ft.	Ft.	Ft.					Ft.	Sq. ft.			Ft. per sec.	
	Discharge in Main Channel, 3,144 cubic feet per second.																	
1	Kadaperi	800	77															
2	Kávéripák tank	13,617	1,314	1,753	439	5	86	86	2 to 1	2·6	2·6	2,021 to 1	108·36	480	4·43	78	3·6519	
3	Govindavadi	(a) 18,281	1,764*	1,847	83	4½	106	106	2 to 1	2·84	2·84	1,859 to 1	126·12	517·5	4·1	76	3·5691	* Only 1,753 cubic feet per second available, *vide* Statement E.
	TOTAL	32,698	3,155	3,600	522													
4	Kambankal	11,158	1,077	1,258	181	5	...	61	2 to 1	...	2·68	1,970 to 1	...	355	4·28	77	3·5425	
5	Mahendravadi	956	92	The present channel is very much wider than is necessary, and its hydraulic details are therefore of unimportance.														

(a) Includes Kambankal.

CHEPÂK,
27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

STATEMENT D-2.

PALAR ANICUT SYSTEM.

Hydraulic Details of Main Branch Channels of Southern Section.

Item number.	Channel.	Area under channel.	Discharge required to give 189,000 cubic feet per acre in 14·07 days.	Proposed carrying capacity of channel.	Excesse carrying capacity.	Maximum depth of flow.	Bottom width. Present.	Bottom width. Proposed.	Side slopes.	Fall. Present. Feet per mile.	Fall. Proposed. Feet per mile.	Fall. Proposed. Ratio to unity.	Wetted perimeter.	Area when full.	Hydraulic mean depth.	Co-efficient.	Velocity.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
		Acres.	C. ft. per sec.	C. ft. per sec.	C. ft. per sec.	Ft.	Ft.	Ft.					Ft.	Sq. ft.			Ft. per sec.	
1	Sakkiramallur—																	
	(*a*) Channel from anicut	1,874	291	580	289	4	28	40	2 to 1	8·18	3·0	1,760 to 1	57·89	192	3·32	72·42	3·14	The proposed fall entered in column 12 only applies to that portion of each channel immediately below the head.
	(*b*) Rajakal . . .	2,635	409	444	35	4	35	30	1½ to 1	16·1	3·0	1,760 to 1	44·42	144	3·24	71·94	3·10	
2	Tennampattu . . .	4,323	672	716	44	4	49	55	1½ to 1	2·9	2·45	2155·1 to 1	69·42	246	3·51	73·92	2·96	
3	Kalavai . . .	2,477	385	388	3	4	30	26	1½ to 1	1·68	3·0	1,760 to 1	40·42	164	3·16	71·42	3·03	
	TOTAL .	11,309	1,757	2,128	371													

Discharge in Main Channel 2,303 cubic feet per second.

CHEPÁK,
27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

STATEMENT E-1.

PALAR ANICUT SYSTEM.

NORTHERN SECTION.

Areas to be irrigated by Branch Channels and corresponding Water-supply.

Number of channel (vide sketch map).	Name of Branch Channel.	Name of Tank.	Area to be irrigated.	Catchment area of tank.	Corresponding area irrigated.	Leaving area to be irrigated by river-water.	Total area under branch channel requiring river-water.	Corresponding water-supply at 0·0965 c. feet per acre per second.	Balance of water.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
			Acres.	Acres.	Acres.	Acres.	Acres.	C. ft. per secd.	C. ft. per secd.	
		1. Kadaperi Channel.							3,144	
...	Kadaperi . . .	Kadaperi . . .	276	0·5	20	256				
		Semathangy . . .	311	0·5	20	291				
		Jadayeri . . .	333	2·0	80	253				
		TOTAL .	920	3·0	120	800	800	77	3,067	
		2. Kávéripák Tank Supply Channel.							*1,314	
		Kávéripák . .	5,873	15·0	600	5,273	5,273	509		
		3. Kávéripák Main Surplus.								
1	Alapákam . .	Alapákam . . .	71	0·75	30	41				
		Sattuvanattam . .	80	0·5	20	60				
		Pudupattu . . .	91	0·5	20	71				
							172	17	788	
2	Iralacheri Kondam	Iralacheri Kondam .	35	0·5	20	15				
							15	2	786	
3	Ottrampattu Kondam.	Ottrampattu Kodam	71	0·5	20	51				
							51	5	781	
4	Darmaindi . .	Darmaindi . . .	162	1·0	40	122				
		Nangamangalam .	168	1·0	40	128				
							250	24	757	
5	Peruvalayam . .	Peruvalayam . .	324	1·0	40	284				
		Siruvalayam . .	451	1·5	60	391				
							675	65	692	
6	Kalapalampattu .	Torayoor . . .	101	1·0	40	61				
		Kalapalampattu .								
		Alagarantangal . .	95	0·62	25	70				
							131	13	679	
7	Reddivalam . .	Reddivalam . .	114	0·5	20	94				
							94	9	670	
8	Vettankulam .	Vettankulam . .	138	0·75	30	108				
		Punnai . . .	283	0·75	30	253				
		Veperi . . .	117	1·0	40	77				
		Kondenkerai . .	105	0·5	20	85				
							523	50	620	
9	Nedampalli Kondam	Nedampalli Kondam .	344	0·5	20	324				
							324	31	589	
10	Asanallikuppam .	Asanallikuppam .	610	2·0	80	530				
		Kolattúr . . .	267	1·0	40	227				
		Nelvoy . . .	303	1·5	60	243				
		Pólúr, large . .	445	1·5	60	385				
		,, Putteri . .	99	0·75	30	69				
		,, Chitteri . .	139	0·5	20	119				
							1,573	152	437	
11	Nemali . . .	Nemali . . .	165	0·12	5	160	160	15	422	
12	Sayanaveram . .	Sayanaveram, large and small.	754	3·0	120	634				
		Alapákam . . .	32	0·25	10	22				
		Santham a n g a l a m, large.	89	1·25	50	39				
		Do. small								
		Ganapatipuram . .	264	1·0	50	214				
		Murungai . . .	235	1·0	80	155				
							1,064	103	319	
13	Paramaswaramangalam.	Paramaswaraman g a lam.	165	1·0	40	125				
		Attupal[illegible], large .	118	1·0	40	78				
		Punnai[illegible] . .	149	1·5	60	89				
							292	28	291	
14	Illapetandalam .	Illapetandalam .	85	1·0	40	45	45	4	287	
		TOTAL .	6,669	32·5	1,300	5,369	5,369	518	...	

* Allowance for Kávéripák channel.

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STATEMENT E-1—*contd.*

Areas to be irrigated by Branch Channels and corresponding Water-supply—contd.

Number of channel (vide sketch map).	Name of Branch Channel.	Name of Tank.	Area to be irrigated.	Catchment area of tank.	Corresponding area irrigated.	Leaving area to be irrigated by river-water.	Total area under branch channel requiring river-water.	Corresponding water-supply at 0·0965 c. feet per acre per second.	Balance of water.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
			Acres.	Acres.	Acres.	Acres.	Acres.	C. ft. pe secd.	C. ft. per secd.	
		4. Káveripák first surplus sluices.								
1	Gangadaravellore .	Gangadaravellore .	91	0·75	30	61	61	6	281	
2	Kilviranam, small .	Kilviranam, small .	44	0·5	20	24				
		Sirukolam . .	87	0·25	10	77	101	10	271	
3	Direct . . .	Ponniyar . .	122	0·50	20	102				
		Pudur . .	194	1·25	50	144				
		Vedantangal . .	112	0·28	12	100	346	33	238	
		TOTAL .	650	3·53	142	508	508	49		
		5. Káveripák second surplus sluice.								
	Govindachari .	Govindachari . .	412	1·0	40	372	372	36	202	
	Kilviranam . .	Kilviranam . .	99	0·5	20	79	79	7	195	
	Maliamedu . .	Maliamedu . .	66	0·125	5	61	61	6	189	
	Main . . .	Mahendravadi . .	320	1·0	40	280	280	27	162	
	Balakistnapuram .	Balakistnapuram .	56	0·125	5	51				
		Kattupakam .	42	0·125	5	37				
		Meleri . .	53	0·25	10	43				
		Velithangipuram .	136	0·5	20	116				
		Arasankuppam .	90	0·5	20	70	317	31	131	
	Kilneedi, small .	Kilneedi, small .	178	0·5	20	158	158	15	116	
7	Mahendravadi south surplus.	Paraperi . .	200	0.5	20	180				
		Kilneedi, large .	595	1·0	40	555				
		Narientangal .	59	0·25	10	49				
		Voolianelloro .	456	1·0	40	416	1,200	116	...	
		TOTAL .	2,762	7·38	295	2,467	2,467	238		
		6. Govindavadi Channel.							*1,753	* Allowance for Govindavadi channel.
1	Avalur . . .	Avalur . .	355	1·5	60	295				
		Sangarambadi .	155	2·0	80	75				
		Damel . .	2,254	2·0	80	2,174				
		Perumbulipakam .	140	0·5	20	120				
		Kolattur . .	575	2·0	80	495				
		Karividu . .	295	0·5	20	275	3,434	331	1,422	
2	Peyanallur . .	Peyanallur . .	193	0·25	10	183				
		Panapakam . .	388	0·5	20	368				
		Mambakam . .	140	1·0	40	100	651	63	1,359	
3	Thandalam . .	Thandalam . .	370	2·0	80	290				
		Narasapetai . .	135	0·75	30	105				
		Melvembakam . .	74	0·5	20	53				
		Kilvembakam . .	173	0·5	20	153	602	58	1,301	
4	Tayapakam . .	Tayapakam . .	102	0·5	20	82				
		Muthuvakam . .	219	0·75	30	189	271	26	1,275	
5	Melbungaram .	Melbungaram . .	57	0·5	20	37	37	4	1,271	
6	Govindavadi tank .	Govindavadi . .	976	1·0	40	936				
		Ooveri . .	229	0·25	10	219				
		Maniachi . .	75	0·5	20	55				
		Putteri . .	85	0·25	10	75				
		Pullalur . .	624	0·5	20	604				
		Pondavakam . .	108	0·5	20	88				
		Kottavakam . .	197	1·5	60	137				
		Konakambakam .	34	0·5	20	14	2,128	205	1,066	
		TOTAL .	7,953	20·75	830	7,123	7,123	687		

STATEMENT E-1—*contd.*

Areas to be irrigated by Branch Channels and corresponding Water-supply—contd.

Number of channel (vide sketch map).	Name of Branch Channel.	Name of Tank.	Area to be irrigated.	Catchment area of tank.	Corresponding area irrigated.	Leaving area to be irrigated by river-water.	Total area under branch channel requiring river-water.	Corresponding water-supply at 0·0965 c. feet per acre per second.	Balance of water.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
			Acres.	Acres.	Acres.	Acres.	Acres.	C. ft. per secd.	C. ft. per secd.	
		7. Kambankal Channel.							*1,066	* Allowance for Kambankal channel.
1	Vaithiyur .	Vaithiyur . . .	94	0·75	30	64	64	6	1,060	
2	Pudupakam . .	Pudupakam . .	929	2·00	80	849				
		Tiroomalpuram . .	380	0·5	20	360	1,209	117	943	
3	Kuram . . .	Kuram . . .	974	1·25	50	924				
		Ariyamperambakam .	346	1·0	40	306	1,230	119	824	
4	Periakaramboo .	Periakaramboo . .	238	0·25	10	228	228	22	802	
5	Sembrambakam .	Sembrambakam . .	305	1·5	60	245	245	24	778	
6	Vishakandikuppum	Vishakandikuppam .	124	0·5	20	104				
		Injambakam . .	398	0·3	12	386	490	47	731	
7	Velur . . .	Velur . . .	740	0·5	20	720				
		Parandur, large .	212	0·75	30	182	902	87	644	
8	Siruvakam . .	Siruvakam . .	370	0·75	30	340				
		Siruvallur . .	363	0·5	20	343	683	66	578	
9	Podavur . .	Podavur . . .	302	0·75	30	272	272	26	552	
10	Nagapedu . .	Nagapedu . .	138	0·25	10	128	128	12	540	
11	Nelvoy . . .	Nelvoy . . .	244	1·0	40	204	204	20	520	
12	Tikanaveram .	Tikanaveram . .	398	0·3	12	386	386	37	483	
13	Thandalam . .	Thandalam . .	746	0·3	12	734				
		Melmaduramangalam .	192	1·25	50	142	876	85	398	
14	Singlepaudi . .	Singlepaudi . .	141	0·25	10	131	131	13	385	
15	Mahadevamangalam	Mahadevamangalam .	270	0·75	30	240	240	23	362	
16	Maduramangalam .	Maduramangalam, large . .	458	0·75	30	428	428	41	321	
17	Kanakarambakam .	Kanakarambakam .	231	0·5	20	211	211	20	301	
18	Kannantangal .	Kannantangal, large .	271	0·3	12	259				
		Do. small .	40	0·5	20	20	279	27	274	
19	Maduramangalam .	Maduramangalam, small . . .	118	0·5	20	98	98	9	265	
20	Pudupattu . .	Pudupattu, large .	118	0·5	20	98				
		Ettikuttimedu . .	55	0·5	20	35	133	13	252	
21	Maduramangalam .	Maduramangalam .	47	0·75	30	17	17	2	250	
22	Kondur . . .	Kondur . . .	326	1·0	40	286				
		Kiranellore . .	396	0·75	30	366	652	63	187	
23	Podavur . .	Podavur shrotriem .	176	0·75	30	146	146	14	173	
24	Nandimedu . .	Nandimedu . .	88	0·5	20	68	68	7	166	
25	Tirumangalam .	Tirumangalam . .	178	0·25	10	168	168	16	150	
26	Pillapakam . .	Pillapakam . .	734	3·0	120	614	614	59	91	
27	Sriperambudur .	Sriperambudur . .	1,256	5·0	200	1,056	1,056	102	−11	11 c. ft. per second short.
		TOTAL .	12,396	30·95	1,238	16,151	11,158	1,077	...	

STATEMENT E-1—*concld.*

Areas to be irrigated by Branch Channels and corresponding Water-supply—concld.

Number of channel (*vide* sketch map).	Name of Branch Channel.	Name of Tank.	Area to be irrigated.	Catchment area of tank.	Corresponding area irrigated.	Leaving area to be irrigated.	Total area under branch channel requiring river-water.	Corresponding water-supply at 0·0965 c. ft. per acre per second.	Balance of water.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
			Acres.	Acres.	Acres.	Acres.	Acres.	C. ft. per secd.	C. ft. per secd.	
		8. Mahendravadi Channel.								
	Main . . .	Pundi, large . .	532	1·0	40	492	492	...	...	
	Pundi Samudram .	Pundi Samudram .	24	0·125	5	19				
		Do. Putteri . .	132	0·25	10	122	141	...	...	
1	Merideri . .	Merideri . . .	59	0·125	5	54	54	...	...	
2	Bagavali, large .	Bagavali, large and small . . .	52	0·25	10	42	42	...	...	
3	Valluvambakam .	Valluvambakam .	168	0·25	10	158	158	...	...	
4	Vangoorthangal .	Vangoorthangal .	75	0·25	10	69	69	...	...	
		Total .	1,046	2·25	90	956	956	...	...	

ABSTRACT.

Section.	Name of Channel.	Area irrigated.	Catchment area of Channel.	Corresponding area irrigated.	Leaving area to be irrigated.	Corresponding water-supply.
		Acres.	Acres.	Acres.	Acres.	C. ft. per second.
Northern Section .	Kadaperi	920	3·0	120	800	77
	Kávéripák tank supply .	5,873	15·0	600	5,273	1,314
	Do. main surplus .	6,669	32·5	1,300	5,369	
	Do. first do. .	650	3·53	142	508	
	Do. second do. .	2,762	7·38	295	2,467	
	Govindavadi . . .	7,953	20·75	830	7,123	1,764
	Kambankal . . .	12,396	30 95	1,238	11,158	
	Mahendravadi . . .	1,046	2·25	90	956	...
	Grand Total .	38,269	115·36	4,615	33,654	...

Chepâk,
27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

STATEMENT E-2.

PALAR ANICUT SYSTEM.

Southern Section.

Areas to be irrigated by Branch Channels and corresponding Water-supply.

Number of channel (*vide* sketch map).	Name of Branch Channel.	Name of Tank.	Area to be irrigated.	Catchment area of tank.	Corresponding area irrigated.	Leaving area to be irrigated by river-water.	Total area under branch channel requiring river-water.	Corresponding water-supply at 0·1555 c. ft. per acre per second.	Balance of water.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
			Acres.	Acres.	Acres.	Acres.	Acres.	C. ft. per secd.	C. ft. per secd.	
		1. Sakkiramallur Channel.								
	Main channel .	Sakkiramallur . .	281	2·25	90	191	191	30	...	
1	Anatangal . .	Anatangal . . .	141	1·25	50	91				
		Arimbakkam . .	225	1·0	40	185				
		Sattuvantangal . .	56	0·5	20	36				
		Munjuriputtu . .	78	0·75	30	48				
		Kurumuditangal .	35	0·25	10	25	385	60	...	
2	Chitrapakkam .	Chitrapakkam . .	103	1·75	70	33				
		Esayanur . . .	305	1·0	40	265	298	46	...	
3	Puntandalam .	Puntandalam . .	69	1·0	40	29				
		Pulivalam . . .	144	0·5	20	124				
		Sonaipattu . . .	93	0·5	20	73	226	35	...	
4	Natteri . . .	Natteri . . .	400	1·25	50	350				
		Brammadesam .	191	1·5	60	131	481	75	...	
	Vengalattur . .	Vengalattur . .	296	4·0	160	136				
		Umayapuram . .	157		...	157	293	45	...	
		Total .	2,574	17·5	700	...	1,874	291	...	
		2. Rajahkal Channel.								
1	Namandi . .	Namandi . . .	89	0·75	30	59	59	9		
	Rajahkal . .	Dusi-Mamandur .	3,046	11·75	470	2,576	2,576	400		
		Total .	3,135	12·50	500	...	2,635	409	...	
		3. Tennampattu Channel.								
1	Paneri . . .	Paneri . . .	51	0·25	10	41				
		Kirambadi . .	123	0·75	30	93	134	21	...	
2	Kadapantangal .	Kadapantangal .	39	0·5	20	19				
		Do. Chitteri .	27	0·25	10	17				
		Macantangal . .	25	0·25	10	15				
		Mullavadi . .	201	1·0	40	161				
		Do. Chitteri .	28	0·25	10	18				
		Mecheri, large .	188	1·75	70	118	348	54	...	
3	Arimbakkam .	Arimbakkam Chitteri.	104	0·75	30	74				
		Sirivanjiputtu . .	148	0·75	30	118				
		Iramavaram . .	156	0·75	30	126				
		Oteri . . .	200	1·0	40	160	478	74	...	
4	Mecheri channel .	Mecheri small tank .	188	1·75	70	118	118	18	...	
		Randan large tank .	106	0·75	30	[illegible]				
		Do. small tank .	65	0·50	20	45	21	19	...	
4a	Nayantangal . .	Nayantangal . .	[illegible]	0·50	20	91				
		Tandapantangal .	49	0·5	20	29				
		Vadamanapakkam .	114	1·5	60	57				
		Perangathur . .	414	2·5	100	314				
		Kodayambakkam .	71	1·5	60	11				
		Mantangal . .	85	0·5	20	45				
		Somangali . .	239	0·5	20	183				
		Kunnathur . .	198	1·5	60	138				
		Kahanam . .	213	1·5	60	153				
		Sittatur . . .	224	1·75	70	153	17	182	...	

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4 A

STATEMENT E-2—*contd.*

Areas to be irrigated by Branch Channels and corresponding Water-supply—contd.

Number of channel (vide sketch map).	Name of Branch Channel.	Name of Tank.	Area to be irrigated.	Catchment area of tank.	Corresponding area irrigated.	Leaving area to be irrigated by river-water.	Total area under branch channel requiring river-water.	Corresponding water-supply at 0·1555 c. ft. per acre per second.	Balance of water.	Remarks.
1	2	3	4	5	6	7	8	9	10	11
		3. Tennampattu Channel—contd.	Acres.	Acres.	Acres.	Acres.	Acres.	C. ft. per secd.	C. ft. per secd.	
4b	Melbuderi . .	Melbuderi . .	59	0·75	30	29				
		Pullavakkam, large .	116	0·75	30	86				
		Do. small .	45	0·5	20	25				
		Aratirivellur .	106	0·75	30	76				
		Moranam . .	124	1·0	40	84				
							300	47	...	
	Main . . .	Tennampattu . .	262	2·0	80	182				
							182	28	...	
5	Meleri . . .	Meleri . . .	134	0·5	20	114				
							114	18	...	
6	Kuttanur . .	Kuttanur . . .	299	1·5	60	239				
							239	37	...	
7	Alivaditangal large tank.	Alivaditangal . .	440	2·0	80	360				
							360	56	...	
8	Alivadi Chitteri .	Alivadi Chitteri . .	129	0·5	20	109				
							109	17	...	
9	Vembakkam . .	Vembakkam . .	156	1·25	50	106				
							106	17	...	
	Main . . .	Tirapanamur . .	287	1·5	60	227				
		Seleri . .	28	0·25	10	18				
		Pakantangal . .	34	0·375	15	19				
		Voorooleri . .	94	0·5	20	47				
		Karandi . . .	107	0·75	30	77				
		Kilnelli . . .	175	1·25	50	125				
							540	84	...	
		TOTAL .	5,908	39·625	1,585	...	4,323	672		
		4. Kalavai Channel.								
1	Kukundi . .	Kukundi . . .	106	0·75	30	76				
							76	12	...	
2	Velur . . .	Velur . . .	451	2·0	80	371				
							371	58	...	
3	Karikantangal	Karikantangal . .	95	0·25	10	85				
							85	13	...	
	Main channel .	Kalavai . . .	932	4·50	180	752				
							752	117	...	
	Kalvai first surplus	Nallur . . .	75	1·0	40	35				
							35	5	...	
	Do. second do.	Kalavaiputtur . .	185	1·0	40	145				
		Vembi . . .	112	0·75	30	82				
		Kodali . . .	120	0·75	30	90				
		Pali	171	0·75	30	141				
		Melapulam . .	59	0·75	30	29				
		Pennagur . . .	249	0·75	30	219				
		Donimedu . . .	98	0·75	30	68				
							774	120	...	
	Do. third do.	Vellambi . . .	282	0·75	30	252				
		Pullaitangal . .	87	0·75	30	57				
		Attiyanam, large and small.	115	1·0	40	75				
							384	60	...	
		TOTAL .	3,137	16·50	660	...	2,477	385		

ABSTRACT.

Section.	Name of Channel.	Area irrigated.	Catchment area of channel.	Corresponding area irrigated.	Leaving area to be irrigated by river-water.	Corresponding water-supply.
		Acres.	Acres.	Acres.	Acres.	C. ft. per second.
Southern Section. .	Sakkiramllur channel . .	2,574	17·5	700	1,874	291
	Rajahkal do. . .	3,135	12·50	500	2,635	409
	Tennampattu do. . .	5,908	39·625	1,585	4,323	672
	Kalavai do. . .	3,137	16·50	660	2,477	385
	GRAND TOTAL .	14,754	86·125	3,445	11,309	1,757

CHEPÂK;
27th October 1883.

C. VINCENT,
Executive Engineer, D. Project Division.

H.—EXPENDITURE ON PUBLIC WORKS NOT CLASSED AS PRODUCTIVE.

46.—IRRIGATION AND NAVIGATION.

Imperial.

Works for which Capital and Revenue Accounts are kept.

PALAR ANICUT SYSTEM.

No. I.—Summary of the Actual and Estimated Direct Charges to Capital.

Year.	Works.	Establishment.	Tools and Plant.	TOTAL.
1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
Actual outlay to end of 1882-83 . .	12,29,002	3,33,127	29,875	15,92,004
Probable outlay during 1883-84 . .	...	...	...	...
,, ,, 1884-85 . .	1,00,127	34,024	2,527	*1,36,678
,, ,, 1885-86 . .	1,00,000	23,000	1,500	1,24,500
,, ,, 1886-87 . .	33,521	7,710	502	41,733
TOTAL .	14,62,650	3,97,861	34,404	18,94,915

* Includes Rs. 12,167 provided to admit of the recoupment to F.—Famine Relief and Insurance, 34.—Protective Works—Irrigation, of the outlay incurred therefrom during 1881-82 and 1882-83 for investigating the project.

J. O. HASTED, *Colonel, R.E.,*
Chief Engineer for Irrigation.

No. II.—Summary of the Actual and Estimated Indirect Charges to Capital.

Year.	Capitalisation of Land Revenue abated.	Loss by Exchange on Payments in England.	Charges on Leave and Pension Allowances.	TOTAL.
1	2	3	4	5
	Rs.	Rs.	Rs.	Rs.
Actual outlay to end of 1882-83 . .	16,217	...	72,744	88,961
Probable charges during 1883-84 . .	...	...	...	...
,, ,, 1884-85 . .	*930	...	4,801	5,731
,, ,, 1885-86 . .	...	...	3,258	3,258
,, ,, 1886-87 . .	...	...	1,028	1,028
TOTAL .	17,147	...	81,831	98,978

* This amount has been calculated at twenty-five times the annual assessment on land to be taken up for the works, the annual assessment being, in the absence of information, taken at one-twentieth of the unspent balance of the estimate for land compensation.

J. O. HASTED, *Colonel, R.E.,*
Chief Engineer for Irrigation.

No. III.—Estimate of Growth of Irrigation and Revenue Receipts and Charges.

Year.	Irrigated Area at end of Year.		Net Receipts and Charges.					
			Gross Revenue due to Work.			Charges, both Direct and Indirect.	Net Revenue due to Work.	
	1st Crop.	2nd Crop.	Direct Receipts.	Enhanced Land Revenue or Indirect Receipts.	Total.		Including enhanced Land Revenue.	Excluding enhanced Land Revenue.
1	2	3	4	5	6	7	8	9
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Actuals to end of 1882-83	66,751	20,682	2,030	13,21,321	13,23,351	7,41,596	5,81,755	...
Estimated during 1883-84	67,200	22,800	250	1,13,960	1,14,210	41,000	73,210	...
„ 1884-85	67,700	26,300	300	1,23,710	1,24,010	43,000	71,010	...
„ 1885-86	68,200	29,800	350	1,31,850	1,32,200	45,000	87,200	...
„ 1886-87	68,700	34,000	400	1,40,570	1,40,970	47,250	93,720	...
Total	...	...	3,330	18,31,411	18,34,741	9,17,846	9,16,895	...

J. O. HASTED, *Colonel, R.E.,*
Chief Engineer for Irrigation.

W. WILSON,
Director of Revenue Settlement and Agriculture.

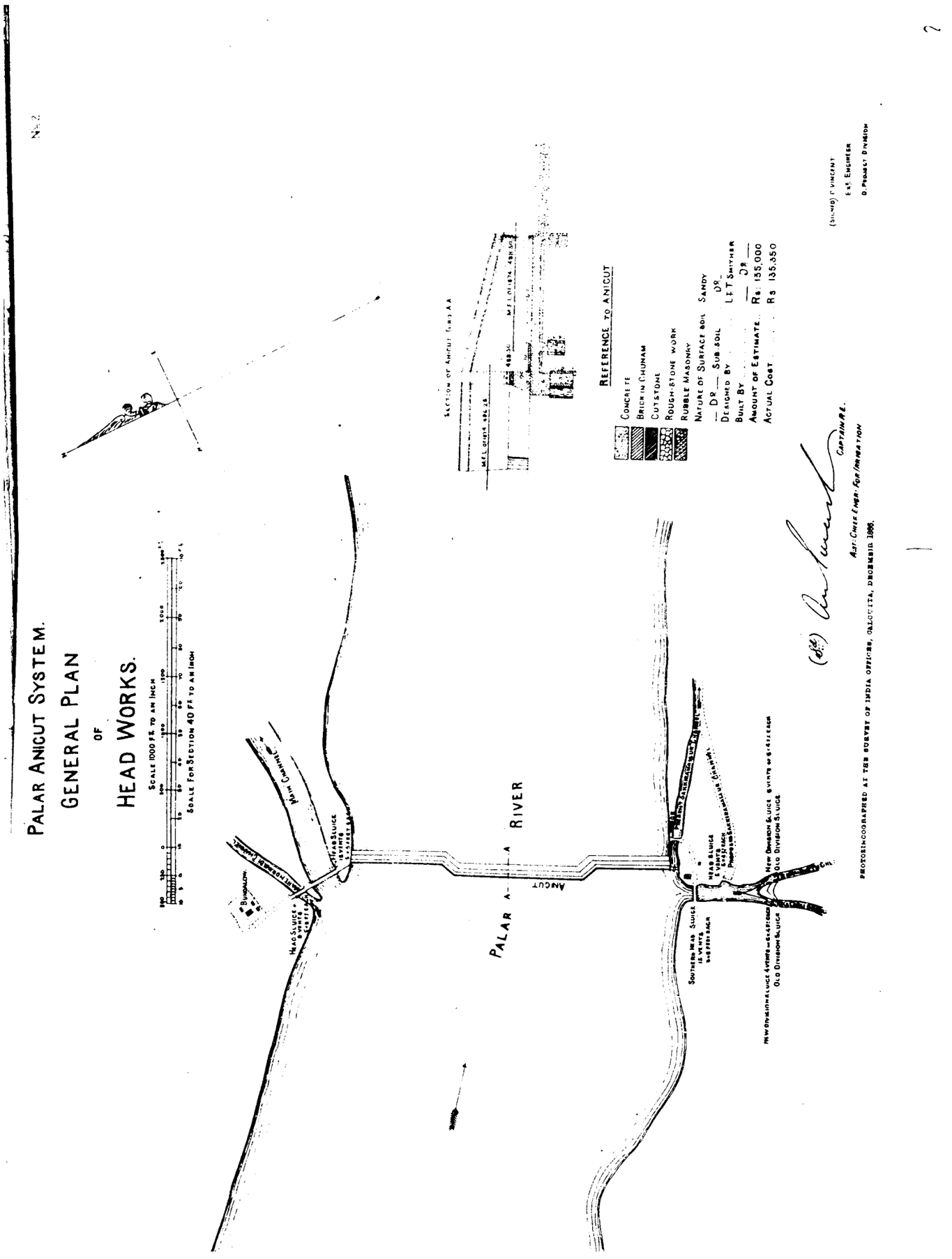
MADRAS,
12th October 1883.

N.B.—The only alteration made since Mr. Wilson countersigned is the separation of the extent irrigated with first and second crops.

No. IV.—Estimate of Net Financial Results to date of Completion of the Work.

Year.	Direct Capital Outlay during the Year.	Direct Capital Outlay to end of Year.	Simple Interest at 4 per cent. on Capital Outlay to end of previous year, *plus* half Outlay during Year.	Net Revenue, including enhanced Land Revenue: Column 7 of Table III.	Simple Interest *less* Net Revenue.	Net Revenue *less* Simple Interest.
1	2	3	4	5	6	7
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Actuals to end of 1882-83	..	15,92,034	13,71,171	5,81,755	7,89,416	...
Estimated during 1883-84	...	15,92,004	63,680	73,210	...	9,
„ 1884-85	1,26,678	17,28,682	66,413	81,010	...	14,5d
„ 1885-86	1,24,500	18,53,182	71,637	87,200	...	15,59
„ 1886-87	41,783	18,94,915	74,962	93,720	...	18,56
„ 1887-88	...	18,94,915	75,797	93,720	...	17,92
„ 1888-89	...	18,94,915	75,797	93,720	...	17,92
„ 1889-90	...	18,94,915	75,797	93,720	...	17,92
„ 1890-91	...	18,94,915	75,797	93,720	...	17,92
„ 1891-92	...	18,94,915	75,797	93,720	...	17,923
„ 1892-93	...	18,94,915	75,797	93,720	...	17,923
„ 1893-94	...	18,94,915	75,797	93,720	...	17,923
„ 1894-95	...	18,94,915	75,797	93,720	...	17,923
„ 1895-96	...	18,94,915	75,797	93,720	...	17,923
„ 1896-97	...	18,94,915	75,797	93,720	...	17,923
Total	...	18,94,915	24,05,833	18,54,095	7,89,416	2,37,678

J. O. HASTED, *Colonel, R.E.,*
Chief Engineer for Irrigation.



PLAN Nº3

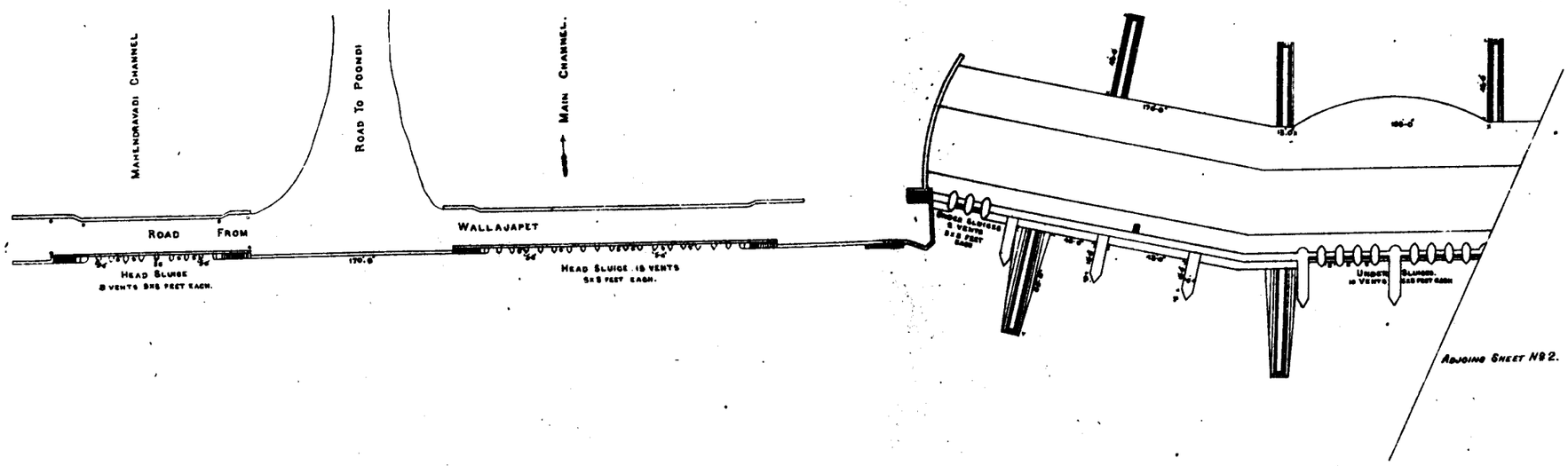
SHEET Nº1

PALAR ANICUT SYSTEM

PALAR ANICUT

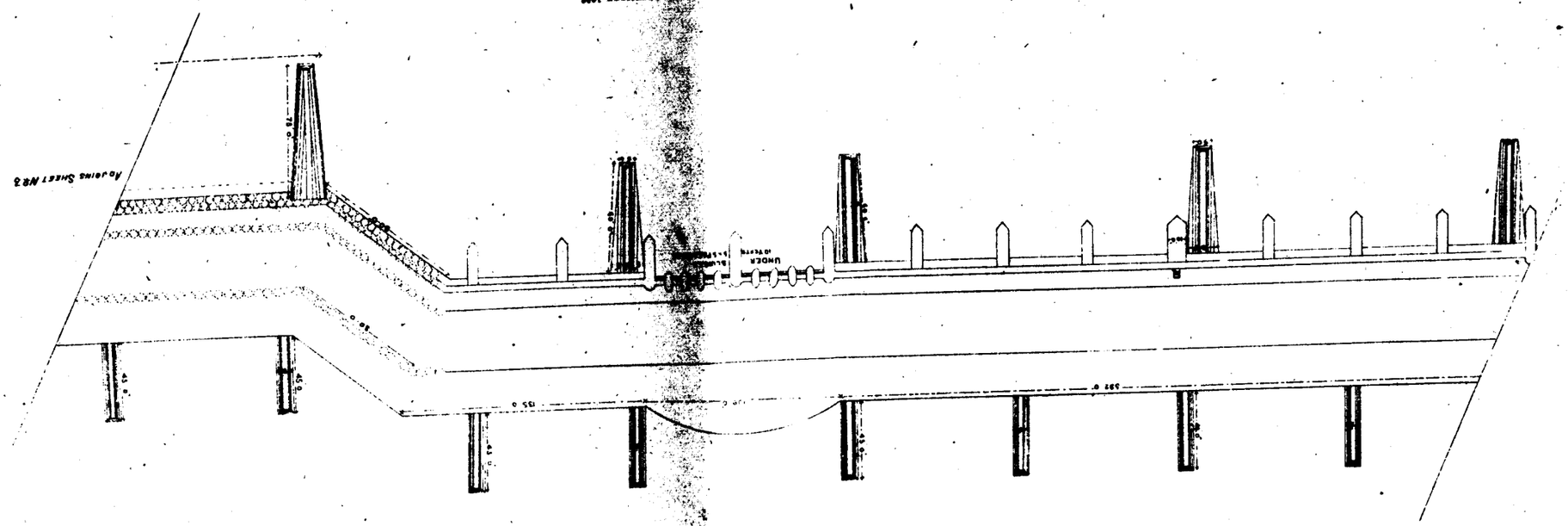
SCALE 80 FEET TO AN INCH

IN 4 SHEETS



PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, DECEMBER 1886.

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1886.



Sheet N°2.

PLAN N°3

PLAN NR 3
SHEET NR 3

CROSS SECTION OF PALAR ANICUT

REFERENCE

- CONCRETE
- CUT STONE
- ROUGH STONE WORK
- RUBBLE MASONRY
- BRICK IN CHUNAM

NATURE OF SURFACE SOIL
DR SUB-SOIL
DESIGNED BY LT. T. SMITHER
BUILT BY DR
AMOUNT OF ESTIMATE 135.000 Rs
ACTUAL COST .....135.350 Rs

AREA OF DRAINAGE BASIN 5974 SQ: MILES
M.F. DISCHARGE = ABOUT 25,000 C.FT. PER SEC.
MAXIMUM DEPTH OF FLOW PASSING OVER THE ANICUT } = 6·75 FEET.
LENGTH OF ANICUT BETWEEN WING WALLS } = 2654 FEET.
CREST OF BODY WALL ABOVE M.S.L. 499·8 FEET.

SCALE 20 FEET TO AN INCH
FOR SECTION

SCALE 800 FEET FOR PLAN

M.F.L. OF 1874 · 488·25

M.F.L. OF 1874 · 488·25

SECTION OF ANICUT THRO: A A.

ADJOINS SHEET NR 4

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, DECEMBER 1886.

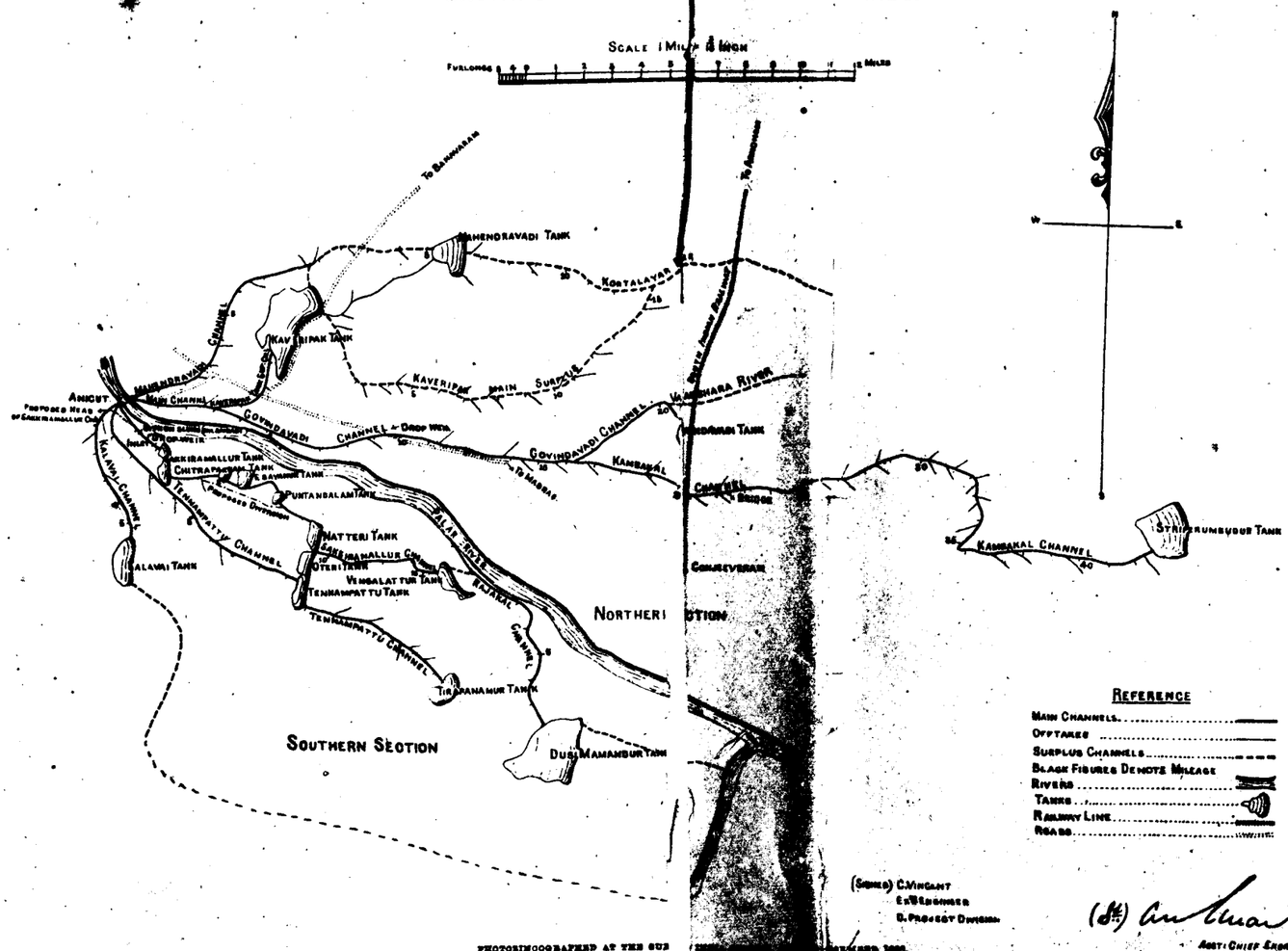
PALAR ANICUT SYSTEM

INDEX MAP

SHOWING MAIN CHANNELS AND OFFTAKES.

NORTHERN AND SOUTHERN SECTIONS

№ 1



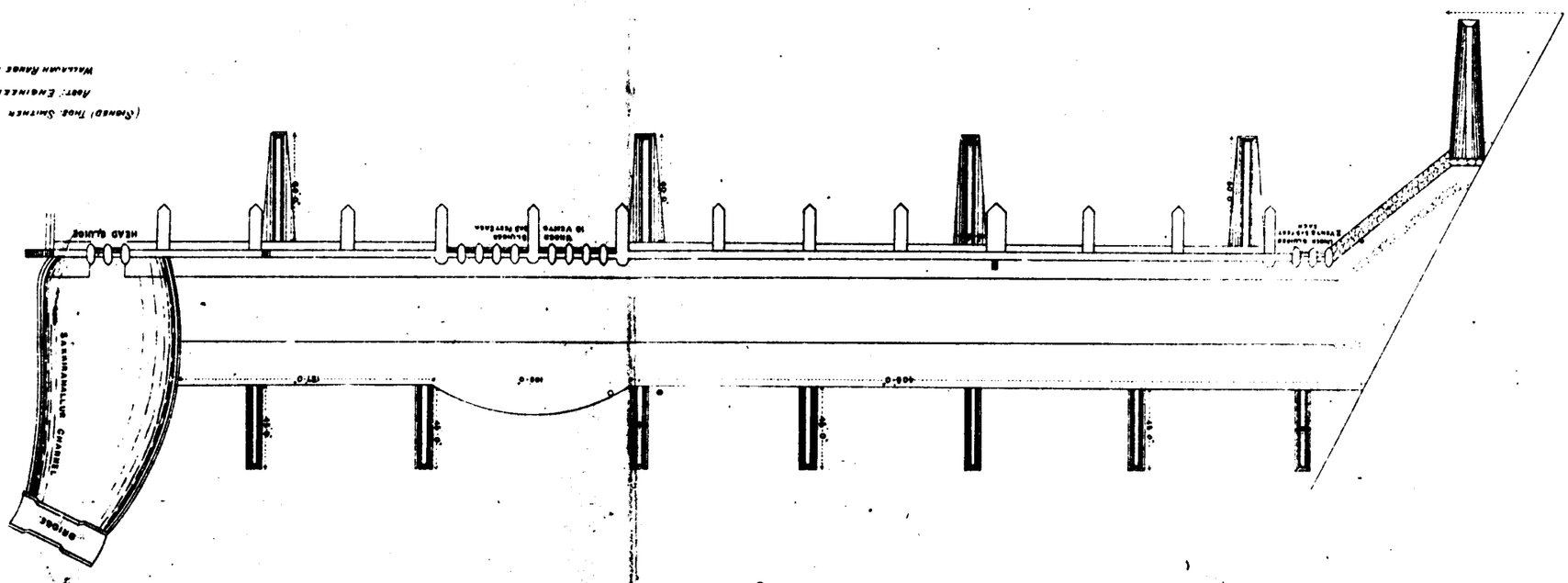
REFERENCE

Main Channels
Offtakes
Surplus Channels
Black Figures Denote Mileage
Rivers
Tanks
Railway Line
Roads

(Signed) C. Vincent
Executive Engineer
Q. Project Division

(Sd.) [illegible] Captain R.E.
Asst. Chief Engr. for Irrigation

PHOTOSINCOGRAPHED AT THE SUR[illegible] DECEMBER 1888.



PROPOSED RAILWAY AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1886.

(Sd) [illegible]
Capt.R.E
Asst: Chief Engr. for Irrigation

PALAR ANICUT SYSTEM

NORTHERN SECTION

N14

MAIN CHANNEL

KAVERIPAK TANK SUPPLY CHANNEL

GOVINDAVADI CHANNEL

LONGITUDINAL SECTIONS OF MAIN CHANNELS

HORIZONTAL SCALE 1 INCH TO A MILE

VERTICAL SCALE 400 FEET

(SIGNED) C. VINCENT
EX-S-ENGINEER
D. PROJECT DIVISION

(SIGNED) CAPTAIN R.E.
ASST. CHIEF ENGINEER FOR IRRIGATION.

PHOTOSINCOGRAPHED AT THE SURVEY OF INDIA OFFICES CALCUTTA DECEMBER 1886.

PALAR ANICUT SYSTEM

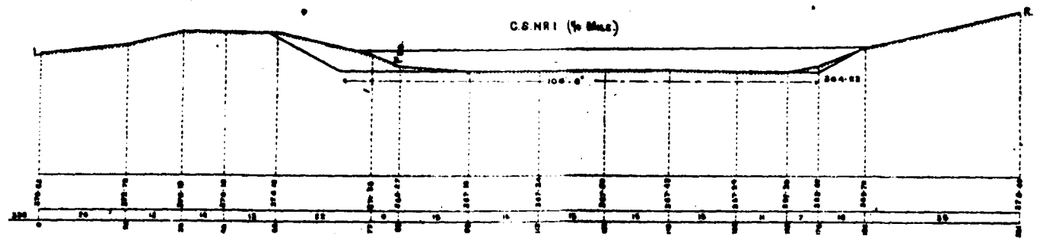
NORTHE[illegible]TION

Nº 5

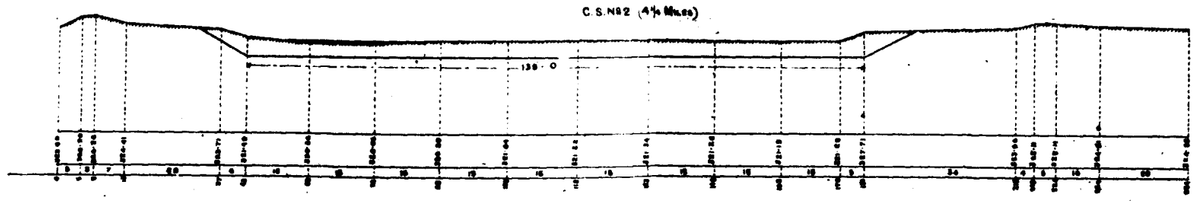
CROSS SECTIONS
OF
GOVINDAVADI CHANNEL

SCALE [illegible]

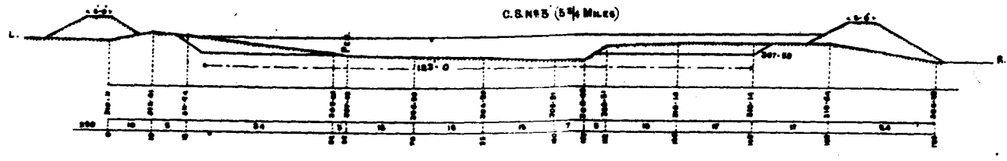
C.S.NR1 (¼ MILE)



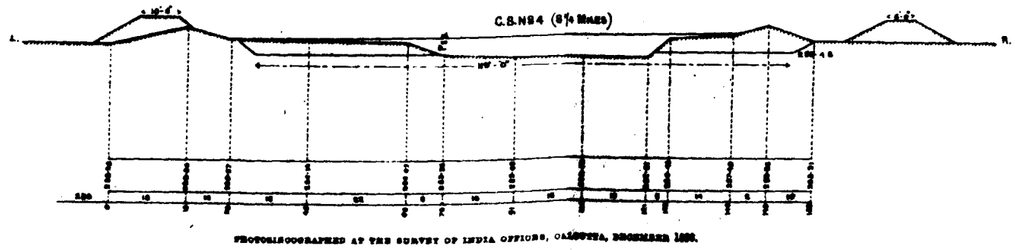
C.S.NR2 (4¼ MILES)



C.S.NR5 (5⅝ MILES)



C.S.NR4 (6¼ MILES)



(SIGNED) C. WRIGHT
EXECUTIVE ENGINEER
D. PROJECT DIVISION

CAPTAIN R.E.
ASST: CHIEF ENGR: FOR IRRIGATION

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1880.

ENNORE ANICUT SYSTEM

LONGITUDINAL SECTION OF KAMBAKAL CHANNEL

NORTHERN SECTION

No 6

HORIZONTAL SCALE 1 INCH TO 2 MILES

VERTICAL SCALE 40ft

C.S. No 2

C.S. No 3.

C.S. No 4

FALL PER MILE 2·00

FALL PER MILE 0·50

FALL PER MILE 0·30

LEVELS OF PROPOSED B.S.D

LEVELS OF FIELDS OR BED OF EXISTING CHANNELS ABOVE OR BELOW SILL LEVEL

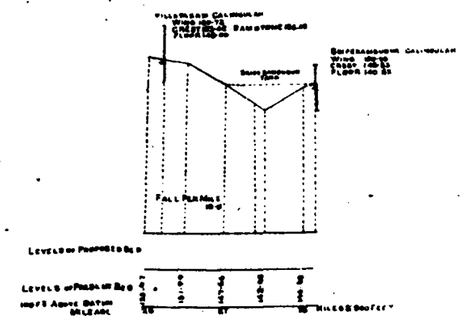


PHOTO-LITHO DRAWN AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1896.

(SIGNED) C. VINCENT
Lt-Col. ENGINEER
& PROJECT DIVISION

(SD) [illegible]
CAPTAIN R.E
ASST. CHIEF ENGR. FOR INVESTIGATION

PALAR ANICUT SYSTEM

NORTHERN SECTION

№7.

CROSS SECTIONS OF KAMBAKAL CHANNEL.

SCALE 400

C.S.№1 (1/8 MILE)

C.S.№2 (11/4 MILE)

C.S.№3 (1 5/8 MILE)

C.S.№4 (2 3/8 MILE)

(SIGNED) J.O. HASTED LIEUT. COL: R.E.
OFFG. CHIEF ENGINEER
FOR IRRIGATION.

(SGD.) Captain R.E.
ASST: CHIEF ENGINEER FOR IRRIGATION

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, DECEMBER 1888.

PLAR ANICUT SYSTEM

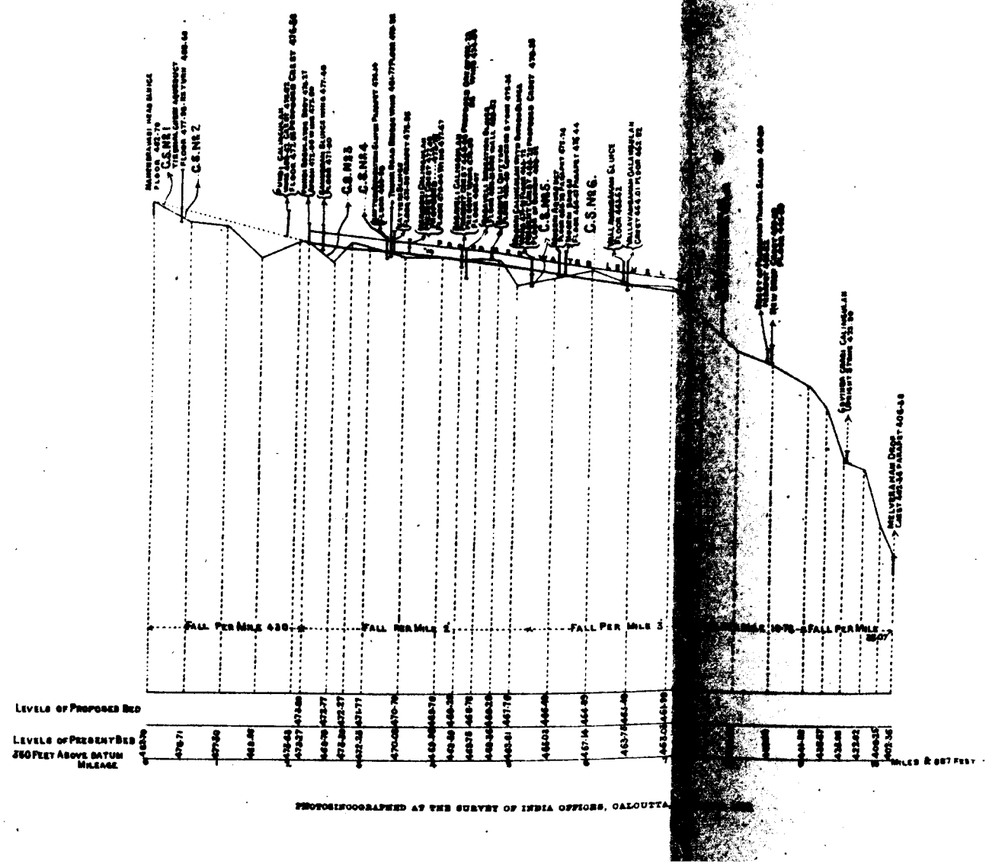
LONGITUDINAL SEC[illegible]
OF
MAHENDRAVADI CH[illegible]NEL

NORTHERN SECTION

NO.8.

HORIZONTAL SCALE 1 INCH TO A MILE

VERTICAL SCALE 400



PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA

(SIGNED) C.V.VINCENT
EXE. ENGINEER
D. PROJECT DIVISION

(Wd.) [illegible]
CAPTAIN R.E.
ASST-CHIEF ENGINEER FOR IRRIGATION

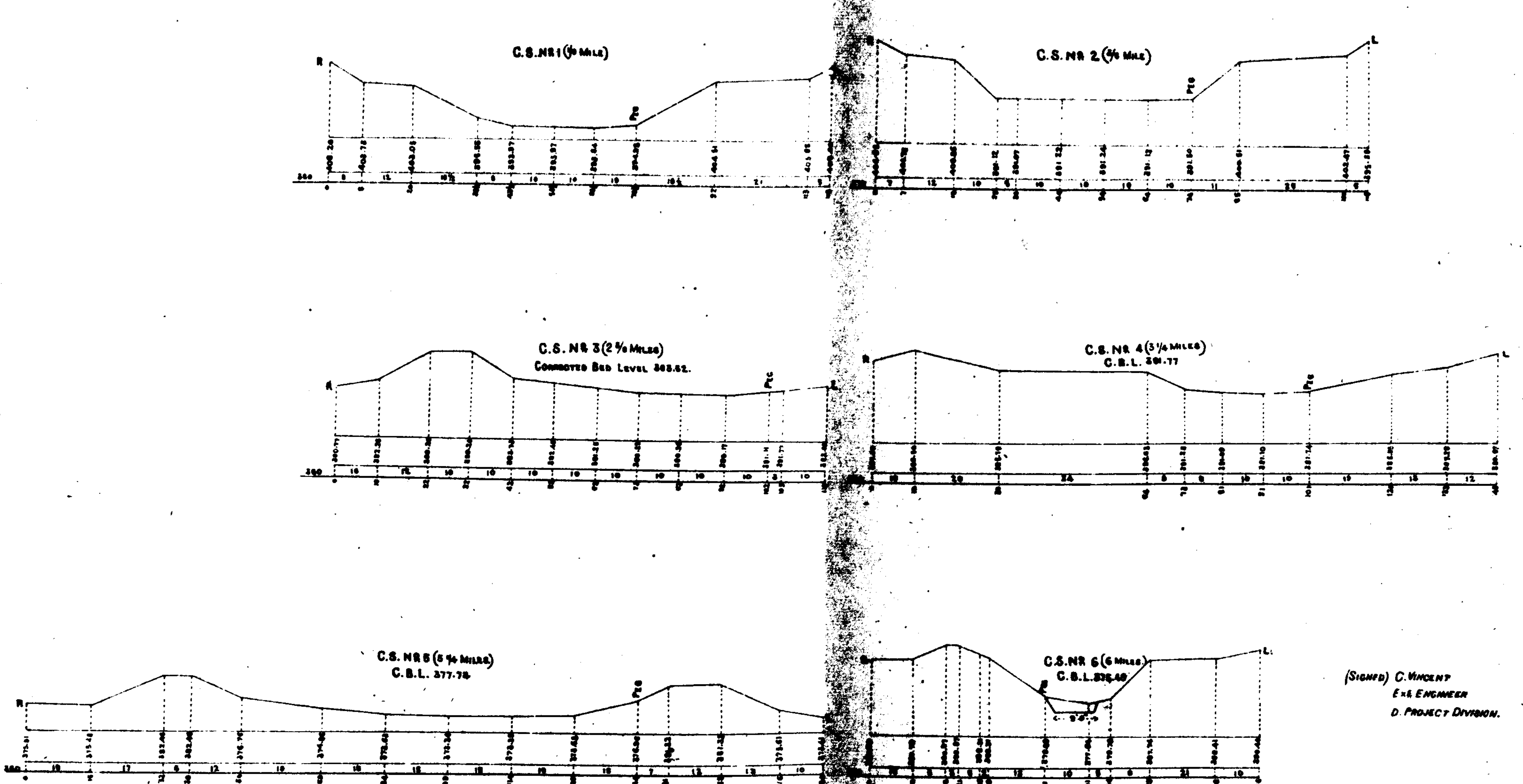
PALAR ANICUT SYSTEM

NORTHERN SECTION

No. 9

CROSS SECTIONS
OF
MAHENDRAVADI CHANNEL

SCALE $\frac{1}{400}$



(SIGNED) C. VINCENT
EX. ENGINEER
D. PROJECT DIVISION.

(Sd.) [signature] CAPTAIN R.E.
ASST. CHIEF ENGR. FOR IRRIGATION

PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1886.

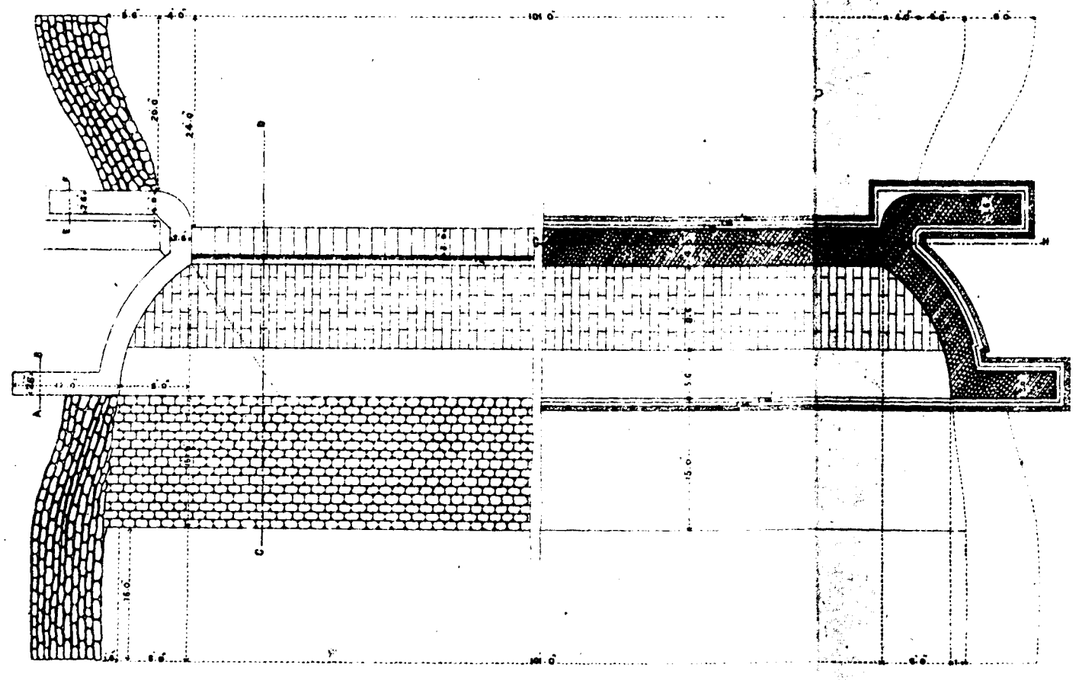
PALAR ANICUT SYSTEM

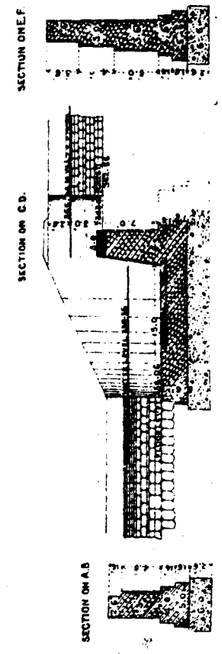
GOVINDAVADI CHANNEL
DROP WEIR
AT
9 MILES 40 CHAINS.

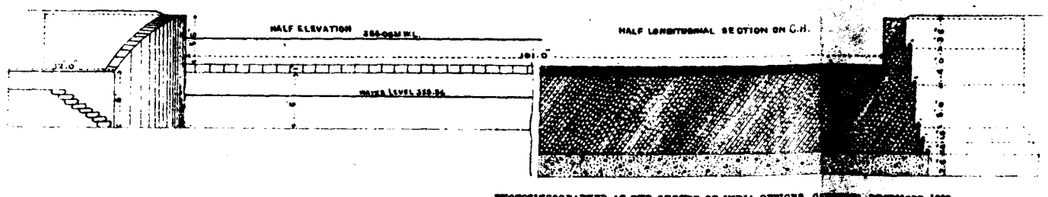
NORTHERN SECTION

NR10

SCALE 1/60







REFERENCE

CONCRETE
RUBBLE MASONRY
CUT STONE WORK
ROUGH STONE WORK

NATURE OF SOIL ..... ALLUVIAL
— DR. — SUB-SOIL ..... SI
DISCHARGE 1939 C.F.S. PER SECOND
AMOUNT OF ESTIMATE RUPEES 5000

(SIGNED) C. VINCENT
EXECUTIVE ENGR.
D. PROJECT DIVISION.

(Sd.) [illegible]
ASST. CHIEF ENGINEER FOR IRRIGATION

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICES, [illegible], DECEMBER 1939.

PALAR ANICUT SYSTEM

NORTHERN SECTION

KAMBAKAL CHANNEL BRIDGE

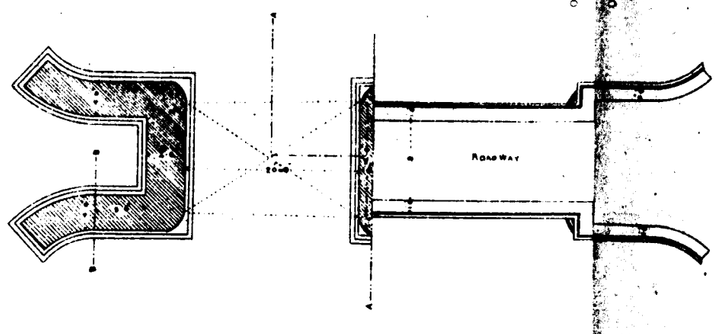
AT

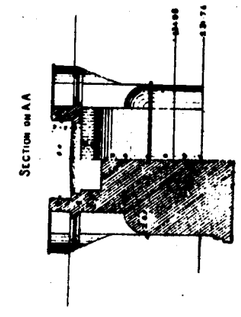
22 MILES. 44 CHAINS.

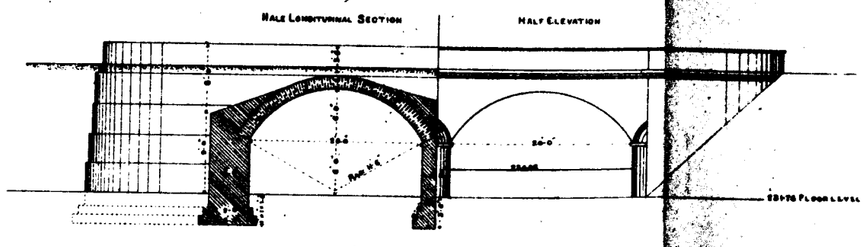
Reference

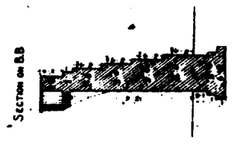
- Brick in Chunam
- Brick in Chunam (Arch work)
- Nature of Soil.-Sub-soil. Gravel
- Discharge 325 C.F.F per Second.
- Amount of Estimate Rupees 1900.

Scale 1/50









Signed C. Vincent
Ex-Executive
P. Project Division

Captain R.E.
Asst. Chief Engr. for Irrigation

Photolithographed at the Survey of India Offices, Calcutta, December 1900.

PALAR ANICUT SYSTEM

HEAD SLUICE
TO
SOUTHERN CHANNEL

Scale 10 Ft to an Inch

Scale 1 Foot to an Inch for Shutter

Scale 1 Foot to an Inch for Details of Shutter

SOUTHERN SECTION
No 12

Reference

Plan of Holding Down Bolt Plate

Section

Enlarged Section of Holding Down Gear Plate

Cross Section of Holding Down Plate

Plan of Gear Plate

Section

Plan of Angle Iron Bearing

Wooden Spanner

Enlarged Plan of Shutter

N.B. Thickness of Shutter 3

Rear Elevation

Front Elevation and Section on A.A.

Cross Section on C.C

Cross Section on E.E.

(Signed) John Pennycuick Captain R.E.
District Engineer
North Arcot

Captain R.E.
Asst Chief Engineer for Irrigation

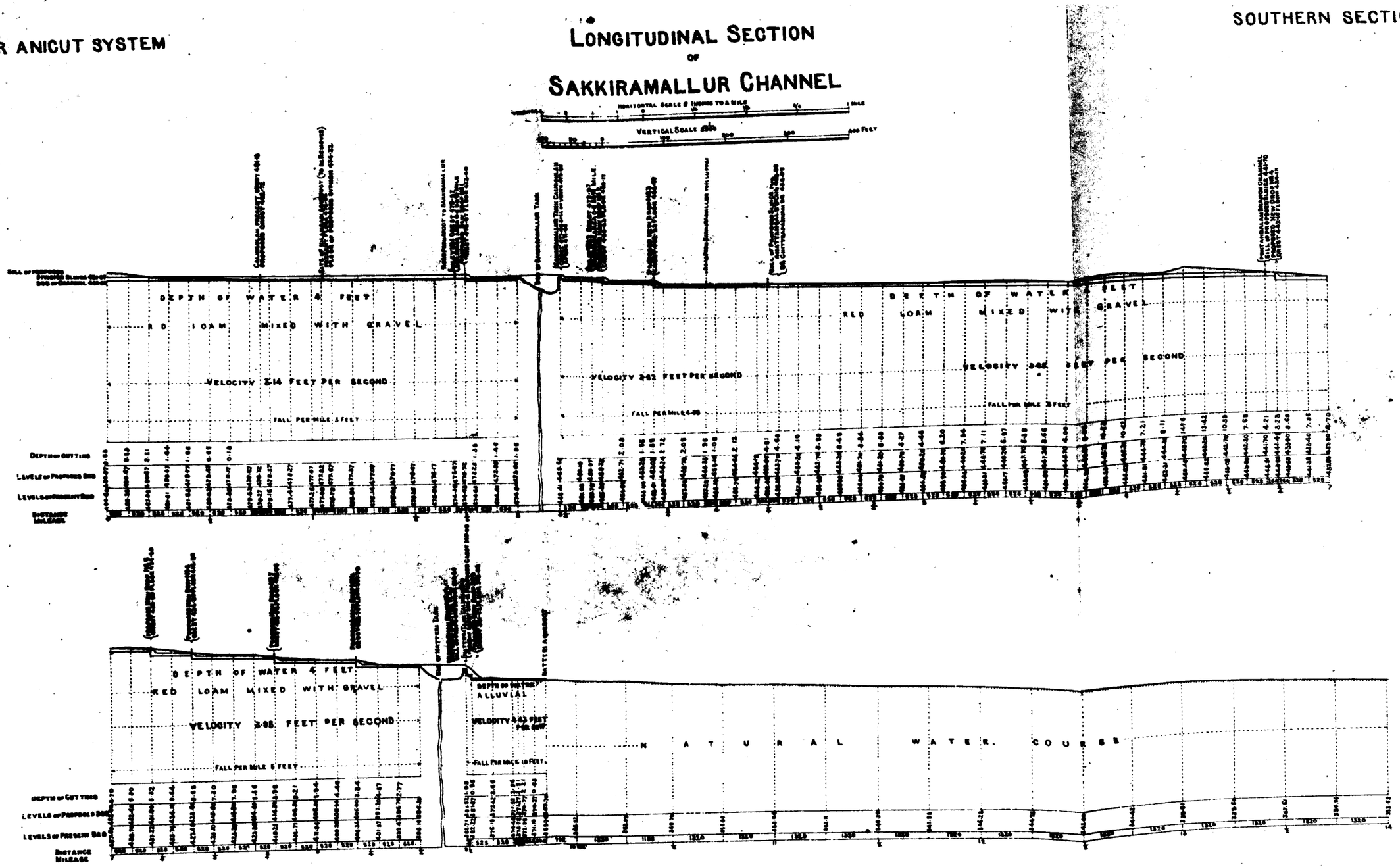
Photolithographed at the Survey of India Offices, Calcutta, December 1886

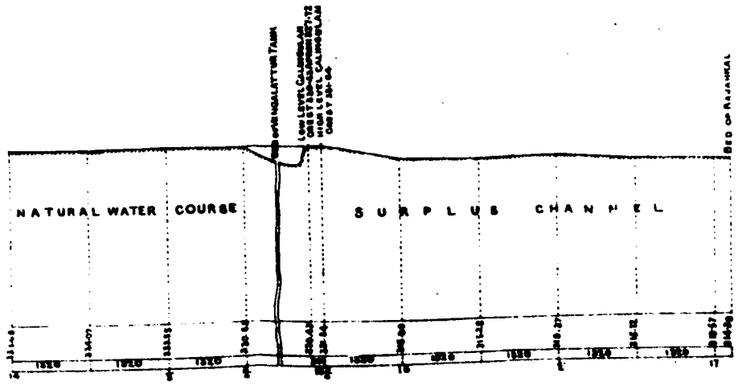
PALAR ANICUT SYSTEM

LONGITUDINAL SECTION OF SAKKIRAMALLUR CHANNEL

SOUTHERN SECTION

Nº13.





PROPOSED SURVEYED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1869.

(SIGNED) C. VINCENT
EXECUTIVE ENGINEER
IN PALAR DIVISION

(Sd.) [illegible] CAPTAIN R.E.
ASSTT. CHIEF ENGINEER IN CHARGE OF IRRIGATION

PALAR ANICUT SYSTEM

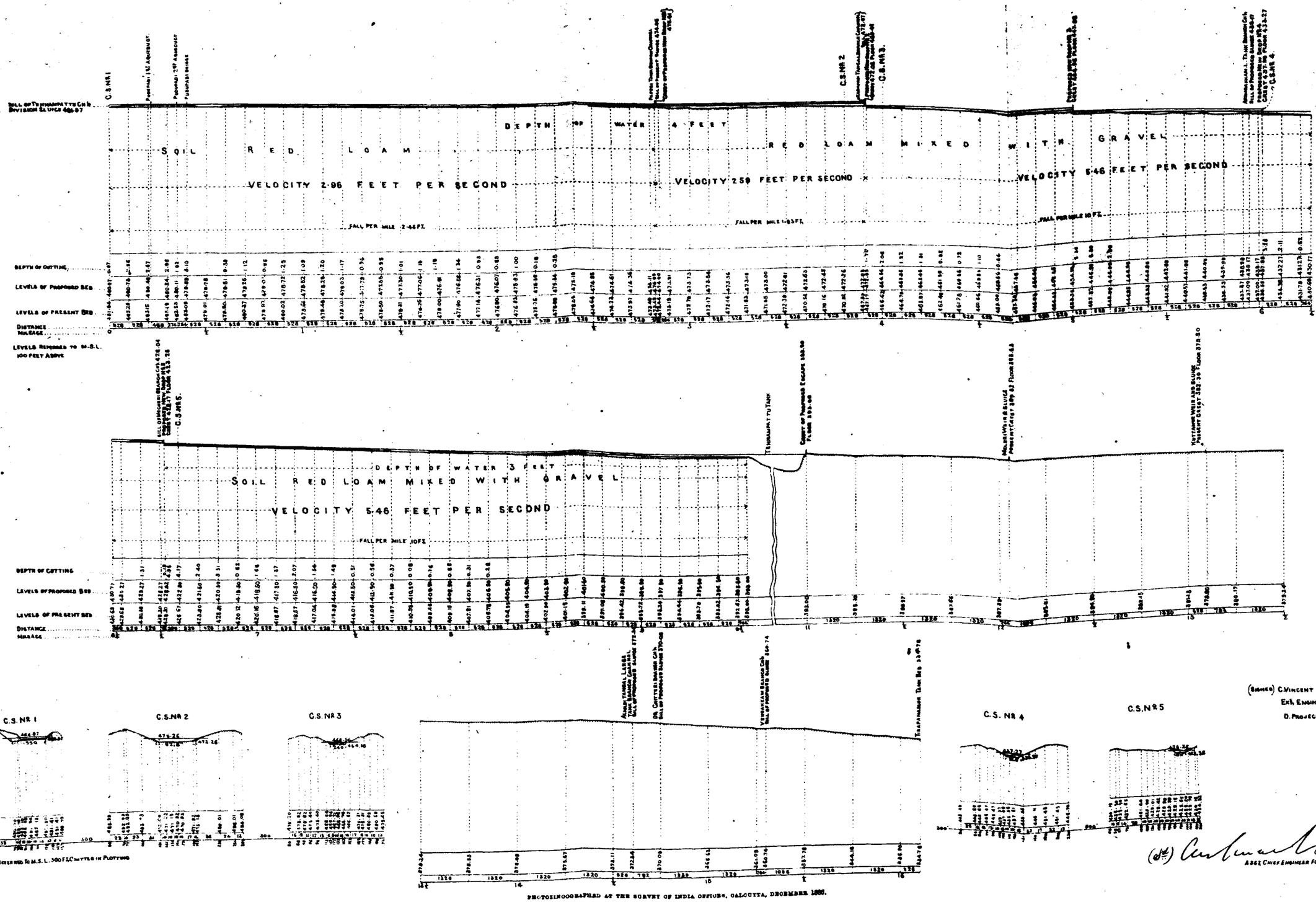
LONGITUDINAL AND CROSS SECTIONS OF TENNAMPATTU CHANNEL

SOUTHERN SECTION

No. 14.

HORIZONTAL SCALE 2 INCHES TO A MILE

VERTICAL AND CROSS SECTIONS SCALE 6000



(SIGNED) C. VINCENT
EXE. ENGINEER
D. PROJECT DIVISION

(SD.) CAPTAIN R.E.
ABEL CHIEF ENGINEER FOR IRRIGATION

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1886.

PALAR ANICUT SYSTEM

SOUTHERN SECTION

NR 15

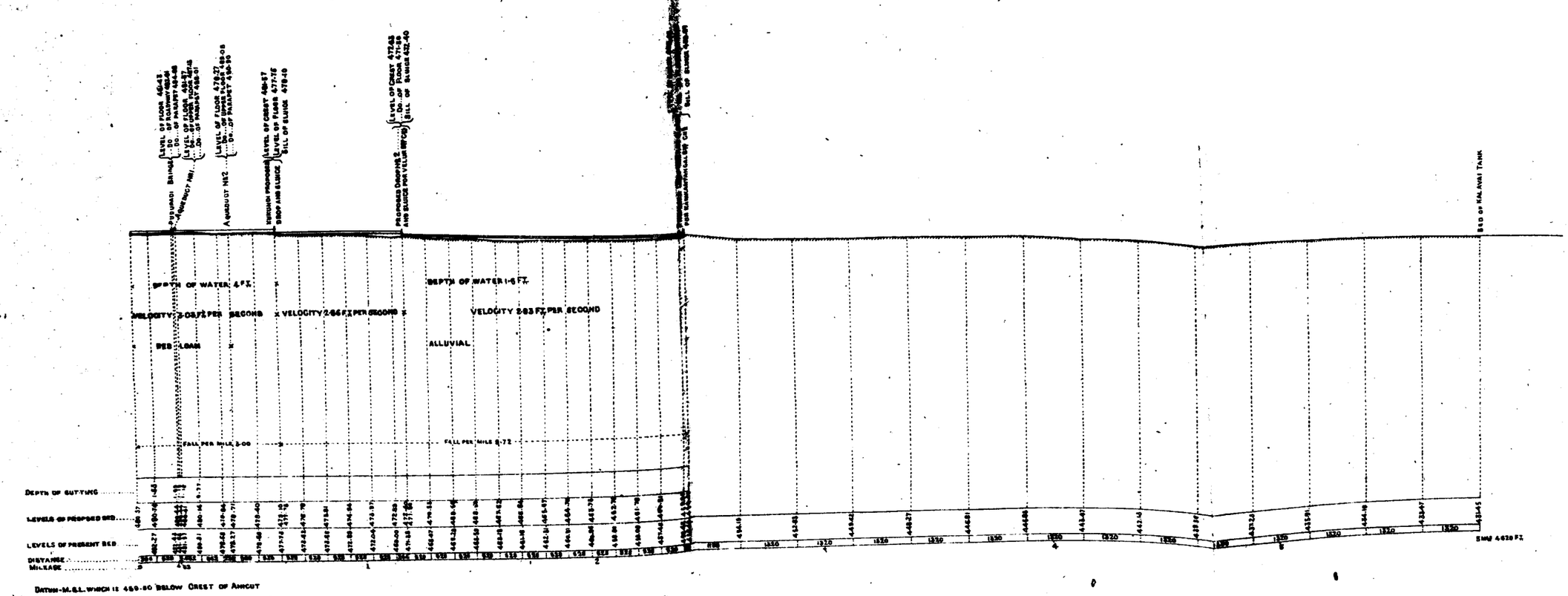
LONGITUDINAL SECTION OF KALAVAI CHANNEL

HORIZONTAL SCALE 2 INCHES TO A MILE

FURLONGS 8 7 6 5 4 3 2 1 0 1 MILE

VERTICAL SCALE 1/250

10 5 0 10 20 30 FT.



DATUM-M.S.L. WHICH IS 459.80 BELOW CREST OF ANICUT

(SIGNED) C. VINCENT
EXE ENGR
D. PROJECT DIVISION

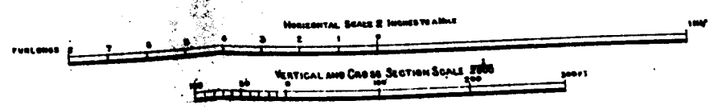
(Sd) Cockburn
CAPTAIN R. E.
ASST. CHIEF ENGINEER FOR IRRIGATION

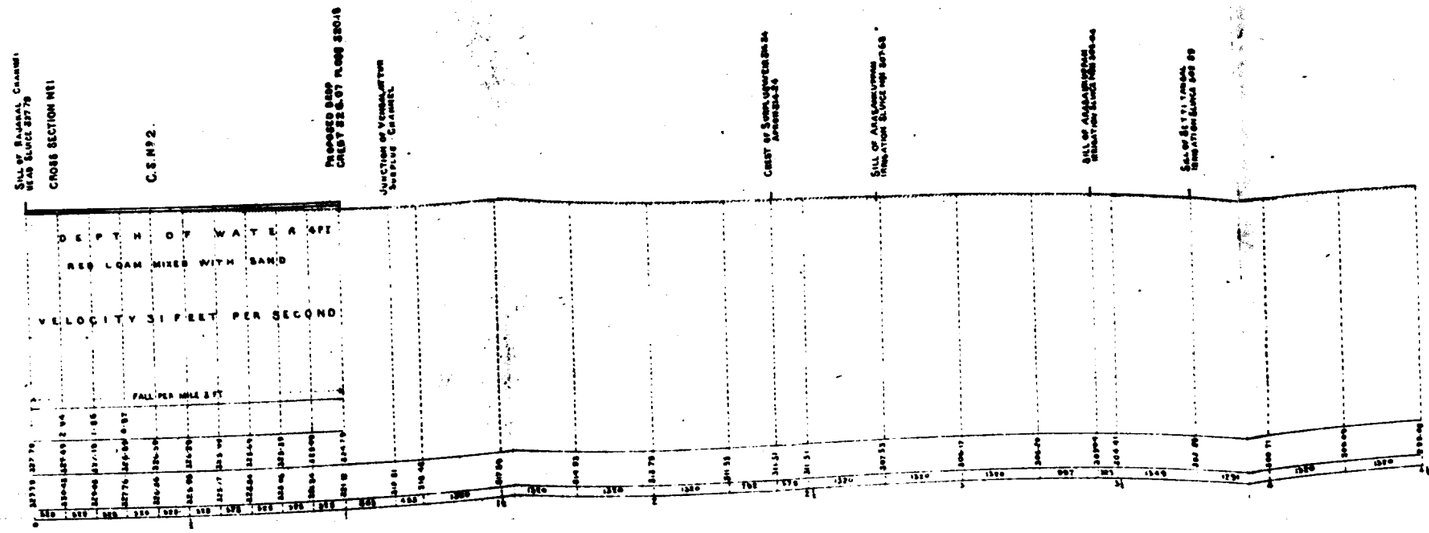
PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICES, CALCUTTA, DECEMBER 1901.

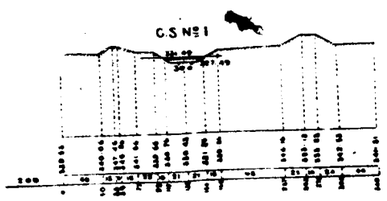
PALAR ANICUT SYSTEM

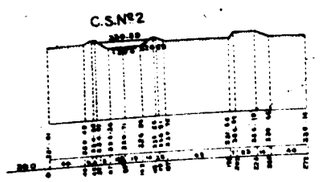
SOUTHERN SECTION Nº 16.

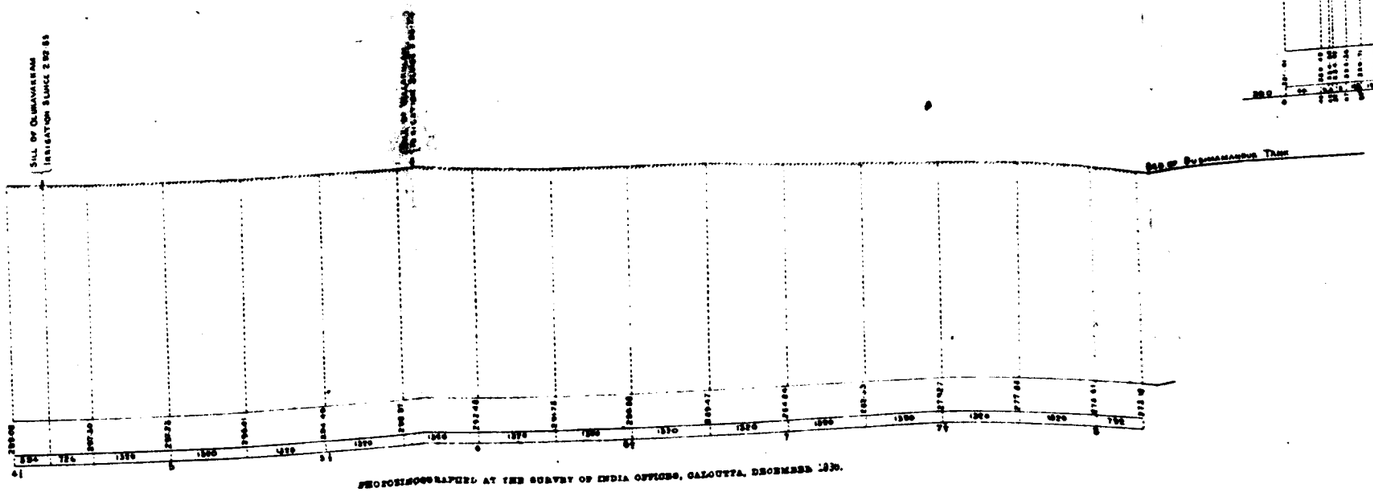
LONGITUDINAL AND CROSS SECTIONS OF RAJAKAL CHANNEL











N.B. LEVELS REFERRED TO M.S.L.

(SIGNED) C. VINCENT
EXE. ENGR
D. PROJECT DIVISION

PHOTOLITHOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1930.

(1931) SEPTEMBER
ASST CHIEF ENGINEER FOR IRRIGATION

PALAR ANICUT SYSTEM

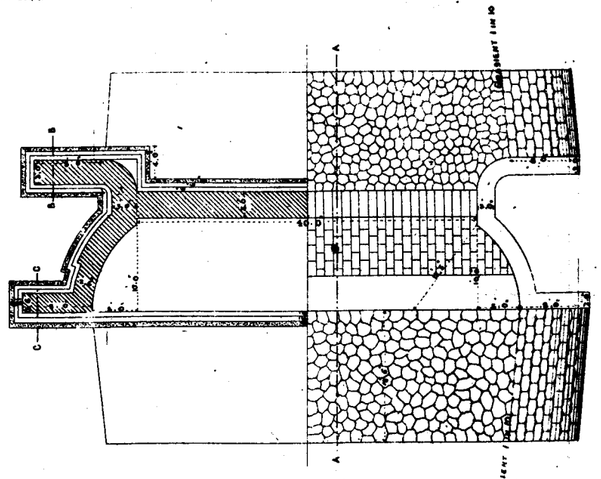
SAKKIRAMALLUR CHANNEL
DROP WEIR
AT
1 MILE 60 CHAINS

SCALE 200 Feet

REFERENCE

- CONCRETE
- BRICK IN CHUNAM
- RUBBLE MASONRY
- ROUGH-STONE WORK
- CUT-STONE

BED OF CHANNEL	+475·12
CREST	+476·97
FLOOR	+473·40
WATER LEVEL IN FRONT	+478·72
—— DR —— IN REAR	+477·40
DISCHARGE	580 C^FT PER SECOND C = 625
NATURE OF SOIL SUB-SOIL	RED LOAM MIXED WITH GRAVEL
ESTIMATE	Rs 1524
DESIGNED BY	C. VINCENT ESQ^R

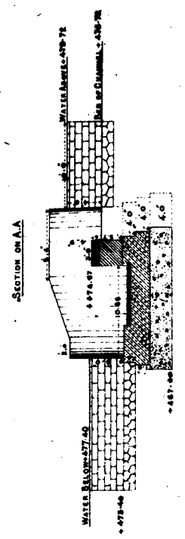


SECTION AND ELEVATION

TO DISCHARGE 580 CF^S PER SECOND WITH A DEPTH OF 2·6
W.L. +478·72

SOUTHERN SECTION

№ 17



(SIGNED) C. VINCENT.
EXECUTIVE ENGINEER
D. PROJECT DIVISION.

CAPTAIN R.E
ASST. CHIEF ENGR. FORTIFICATION

PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1886.

FALAR ANICUT SYSTEM

SAKKIRAMALLUR CHANNEL INLET AT 1 MILE 3696 FEET.

SCALE 1/30

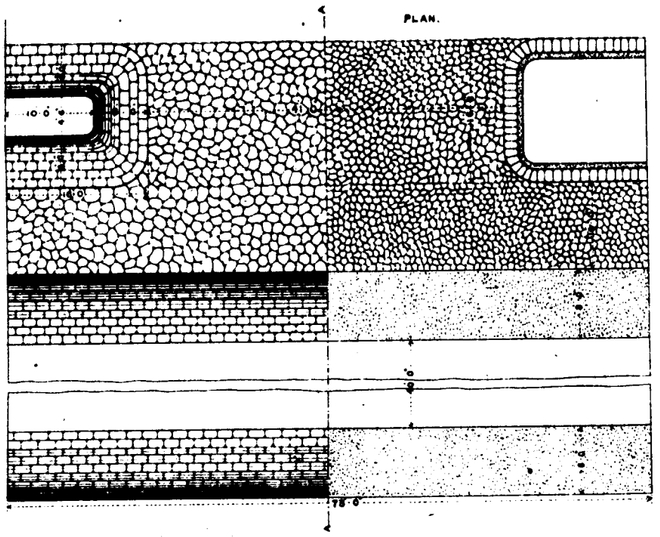
10 5 0 10 20 30 40 50 FEET

REFERENCE

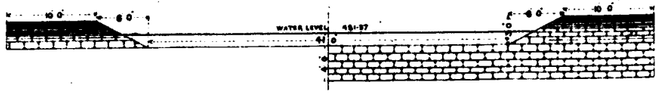
Rough Stone Pevement and Apron
Gravel Backing

Drainage Area ..... 0·8 Sq. Miles C=400
Discharge 256 C.ft. per second C. 625
Depth of Water ..... 1·5 Feet
Floor of Inlet ..... 478·87
Nature of Soil & Sub soil.... Red Loam Mixed with Gravel
Estimate ..... Rupees 912.
Designed By..... C. Vincent Esq.

PLAN.



FRONT AND REAR ELEVATION

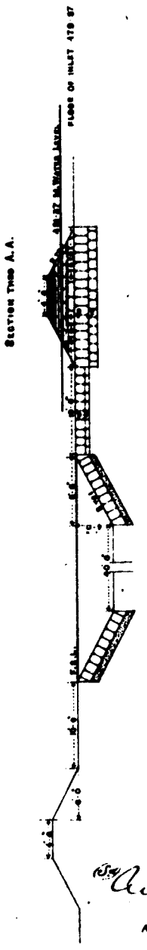


PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFICE, CALCUTTA, DECEMBER 1886.

SOUTHERN SECTION

No 16

SECTION THRO A.A.



(Signed) C. Vincent.
Ex. Engineer
D. Project Division

Captain R. E.
Asst. Chief Engineer for Irrigation.

Captain R. E.
for Irrigation

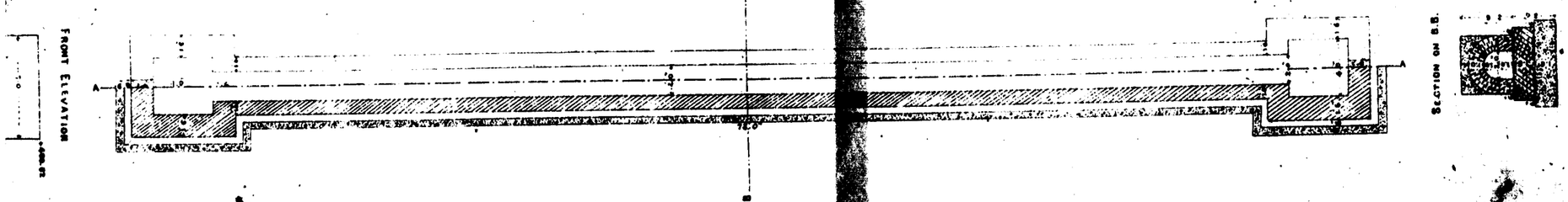
PALAR ANICUT SYSTEM

SOUTHERN SECTION

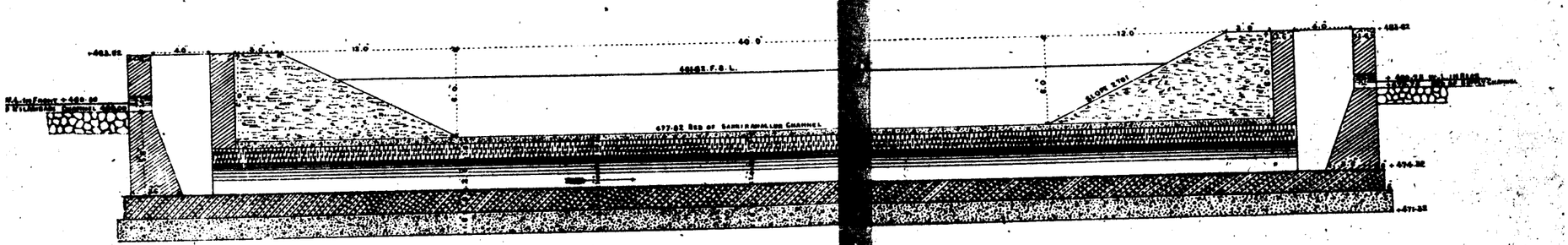
No. 19

PLAN
OF
KILAMBADI SYPHON & LUICE

SCALE 100



LONGITUDINAL SECTION on A.



REFERENCE

- CONCRETE
- BRICK IN CHUNAM
- (ARCH WORK) BRICK IN CHUNAM
- RUBBLE MASONRY
- ROUGH-STONE WORK

AREA OF LAND IRRIGABLE ..... 40 ACRES
DISCHARGE ..... 0.60 C.F.S. PER SECOND
NATURE OF SOIL COMMANDED ..... RED LOAM MIXED WITH GRAVEL
AMOUNT OF ESTIMATE ..... RUPEES 396
DESIGNED BY ..... G. VINCENT Sc.

PHOTOZINCOGRAPHED AT THE SURVEY OF INDIA OFFI[CE], CALCUTTA, DECEMBER 1886.

(SIGNED) G. VINCENT
EXS. ENGINEER
D. PROJECT DIVISION.

(SIGNED) [illegible]
CAPTAIN R.E.
ASSL. CHIEF ENGINEER FOR IRRIGATION

Order by the Government of Madras, No. 561-I., dated 13th June 1884.

The complete revised estimates for the Palar anicut project, as follows :—

Direct Charges.

	Rs.
Works	14,62,650
Establishment	3,97,861
Tools and plant	34,404
TOTAL	18,94,915

Indirect Charges.

Capitalisation of land revenue	17,147
Leave and pension allowances	81,831
TOTAL	98,978

will be forwarded for the sanction of the Government of India.

2. The variable nature of the water-supply renders any considerable increase of irrigation improbable, but the improvement of the channels will result in a fair return on the expenditure, though the balance of interest charges unpaid, the consequence of defective original designs and accidents, will for many years absorb the greater part of the revenues.

Despatch from the Government of India, to Her Majesty's Secretary of State for India, No. 57-P.W., dated 27th October 1884.

We have the honour to submit, for the approval and sanction of Her Majesty's Government, a revised estimate for the Palar Anicut System in the Madras Presidency, amounting to Rs. 19,93,893, of which Rs. 18,94,915 represent the direct, and Rs. 98,978 the indirect, charges.

2. The previous history of the project is briefly described in paragraph 1 of the Note by Colonel J. O. Hasted, R.E., Chief Engineer for Irrigation, Madras, which explains how the scope of the work has been enlarged, from time to time, since 1854. The estimate originally sanctioned by the Court of Directors proved quite insufficient for the complete scheme, so that revised and supplementary estimates became necessary, and finally in 1882 we called on the Madras Government to submit a complete revised estimate covering the cost of all necessary improvements. The present estimates have, therefore, been prepared to provide for works intended for the full utilisation and regulation of the available supply of water. For details of the proposed improvements and those which have already been carried out, we beg to refer Your Lordship to the Executive Engineer's report which accompanies this despatch.

3. Out of the estimated direct outlay of Rs. 18,94,915, Rs. 15,92,004 have been expended up to the close of 1882-83, leaving a balance of Rs. 3,02,911 for future expenditure. The work is therefore very nearly completed.

* Estimated capital outlay :—

	Rs.
Direct	18,94,915
Indirect	98,978
TOTAL	19,93,893
Add—Simple interest less net revenue up to the tenth year after the completion of the work	5,51,738
TOTAL SUM AT CHARGE	25,45,631

4. On the completion of the entire project, in 1886-87, the area of irrigation is expected to reach 68,700 acres of first and 34,000 acres of second crop. The net revenue expected to be obtained from the irrigation of this area will amount to Rs. 93,720, being a return of 3·68 per cent. on Rs. 25,45,631,* the total sum which will be at charge in the tenth year after the completion of the project.

5. The estimate of the growth of irrigation and revenue receipts and charges has been countersigned by Mr. Wilson, Director of Revenue Settlement and Agriculture; and we have not considered it necessary to call for a separate report on the subject, as the present case is one in which the anticipated results do not differ very markedly from those actually attained.

6. The scheme will not prove sufficiently remunerative to allow of its being classed as a Productive Public Work, and it is shown in our accounts as an Imperial Ordinary Work. We therefore request Your Lordship's sanction to the estimate now submitted as a charge against the ordinary revenues of the country.

Documents accompanying.

1. Endorsement by the Madras Government, No. 562-I., dated 13th June 1884, and enclosures.
2. Two maps and four plans.

Despatch from Her Majestry's Secretary of State for India, No. 79-P.W., dated 11th December 1884.

I have received and considered in Council Your Excellency's Public Works letter No. 57, dated 27th October 1884, submitting for my sanction a revised estimate for improving and completing the Palar Anicut System in the Madras Presidency.

2. It appears from your letter and the documents accompanying it that this project, which was commenced in 1855, has been enlarged in scope from time to time till 1882, when your Government called on the Government of Madras for a complete revised estimate covering the cost of all necessary improvements. This final estimate, which you now transmit, provides for a total expenditure on the work of Rs. 19,93,893, of which Rs. 15,92,004 have already been expended, leaving, therefore, a balance of Rs. 4,01,889 to be provided, Rs. 3,02,911 of this sum being direct, and Rs. 98,978 indirect, outlay.

3. The direct returns obtained hitherto from the operations of this work have not been satisfactory, but this is accounted for by the fact mentioned in the enclosures to your letter, that the river Palar, which supplies the system, is absolutely without water for three-fourths of the year, and also by the defects in the headworks and distributing channels. In spite of these drawbacks, however, the area irrigated has increased from a total of 9,777 acres in 1855 to a total of 87,403 acres in 1882-83, and it is estimated that by the improvements to be now effected, a total irrigated area of 102,700 acres will be reached in 1887-88, these figures representing first and second crops combined. The benefits conferred by the work must, therefore, have been, and will probably continue to be, considerable, and the comparatively small further expenditure estimated to be required to remedy existing defects and improve and regularize the water-supply should also bring about, eventually, better results still.

4. Although the accounts of this work show that there still remains an accumulated charge of about eight lakhs of rupees on account of the excess of interest on capital above net revenue in past years, I observe that the present net return is rather more than 4 per cent on the direct capital outlay. This result is satisfactory, and I sanction the revised estimate of cost for the Palar Anicut System, amounting to Rs. 19,93,893, of which Rs. 18,94,915 represents direct, and Rs. 98,978 indirect, charges, the work being classed as an Imperial Ordinary Work, and the funds provided from your ordinary revenues by such advances as having regard to other works which are in progress, your Government may be able to spare.

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